Pearls of Wisdom from a Macintosh Guru



Macintosh Revelations

CUSTOMIZING
UPGRADING
TROUBLESHOOTING
USING SYSTEM 7.5



BMUG's Macintosh Revelations
CD ROM Included

KEN MAKI

Macintosh Revelations

KEN MAKI



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This book is dedicated to my friend and brother, John.
The older I get, the more I appreciate you.

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Introduction

I remember when I was in college and there were no personal computers. I wrote everything on a typewriter. My outlines and notes were scribbled by hand and my hand writing was, and still is, so bad that I had a hard time reading those scraps of paper. I hated writing papers. I hated my typewriter—but somehow I survived and even graduated.

At that time, the idea of writing a book was unthinkable. If a ten-page paper could cause so much pain, a book was out of the question. When personal computers finally became an everyday tool for people, I didn't even think about writing a book because I didn't have a computer. But, by the time I had had my first Macintosh for a couple of years, I started thinking about the possibility. I held that thought for a few more years, and now I've written four books. I know that, without my Macintosh, I'd never have written the first book, let alone four—and I'm not unique. Even though my books are about the tools, I use to write, without the tools I wouldn't have written the books. The technology is powerful but, without skills and ideas, any computer—even the Mac—is just an expensive decoration. We all need to exploit these tools and, to exploit the tools, we must know how to use them. That's what this book is about.

Macintosh Revelations is not your usual computer book. Most Macintosh books try to tell you everything there is to know about the Macintosh, its software, and everything it connects to. You find copious amounts of information that you then have to decipher, and, usually, only a small amount of the information in the book applies to you or your computing needs. In *Macintosh Revelations*, you won't find instructions for using every major program written for the Mac, or charts of Macintosh models with their technical specifications. These mundane details about the Mac are helpful but they miss a very important point. They don't teach you *how* to use your Mac, they only *tell* you about it.

This book is designed to teach you how your Mac works and how to use *any* Macintosh program. It begins with the assumption that you don't know anything

about computers or the Macintosh, and ends by providing you with the principles you need to correct problems you might encounter.

There is no magic involved in learning to use a Mac; it is work. But if you take the time to learn what is in *Macintosh Revelations*, you may never need to buy another Macintosh book. You'll have the knowledge you need to figure out how new software works, and you'll have what you need get the most from your Mac.

Whom This Book Is For

This book is for anyone, both the beginner and experienced user, who is perplexed about their Macintosh. If you're tired of using just one or two programs and want to do more with your Mac, *Macintosh Revelations* will help you. If you're new to computing and to Macintoshes, you are holding a book that will explain and teach you what you need to know. If you want to learn about your Mac from a more conceptual point of view, *Macintosh Revelations* can help. For the more advanced Mac user, the most valuable aspect of this book is the accompanying CD-ROM disc. This in itself is worth more than the cost of the book; you can read about the CD-ROM in Appendix A.

How To Use This Book

How you'll use *Macintosh Revelations* is up to you, of course, and your experience with computers or the Mac will ultimately determine what you do with the book. *Macintosh Revelations* will progressively move you from one level of knowledge to another to give you a solid understanding about all aspects of your Mac. This is not a technical reference—you won't find your Macintosh model in here. This is a book that begins by assuming you know nothing and it ends by showing you how to perform tasks for which most people hire consultants. It could put me out of a job.

Here is a brief summary for each chapter of *Macintosh Revelations*:

Part I Introducing the Macintosh

In this part of *Macintosh Revelations*, you learn what a computer is, how to set it up, and how to use it.

Chapter 1 Your Macintosh Computer—This chapter is about computers in general. You will learn about the parts of a computer, what they are, and how they function. It is a technical description of your Macintosh in nontechnical terms.

Chapter 2 Macintosh Beginnings—Here you'll learn how to set up and turn on your Mac. This chapter will familiarize you with the actual computer.

Chapter 3 Using Your Macintosh—In this chapter you'll learn the basics for using your Mac. The first time someone turns on a Mac, they are confronted

with an amazing number of issues. This chapter will explain what you need to know to start using a Mac.

Chapter 4 Using Programs—All Macintosh programs use the same principles. This chapter uses a program that comes with every Macintosh to teach you those principles and lays the groundwork for using any Macintosh program.

Chapter 5 Keeping Track of Your Data—Computers are used to create and store information. If you don't know where the information is, it is not much use. This chapter will teach you how to store your information so that you can easily find it when you need it.

Part II The Macintosh System

In this part of *Macintosh Revelations*, you'll find out all about what makes your Macintosh work. Every computer has a system; this is your guide to the Macintosh's system.

Chapter 6 Installing Your System and Software—If you know how to install your Mac's System software, you'll know how to install most programs you encounter. Knowing how to install the System is also the first thing you'll need to know if you ever have trouble with your Mac; it is like knowing how to change a tire on a car.

Chapter 7 Getting the Most from Your System—This chapter is an in-depth exploraton of what makes your Mac work the way it does. By exploring the System, you'll learn a lot about your Mac in general.

Chapter 8 System Enhancements (AppleScript, PowerTalk, and QuickDraw GX)—This chapter will explain some of the new and more complex aspects of the Macintosh System. You will be introduced to Apple's new technologies and, at the same time, you'll learn more about your Mac's capabilities.

Chapter 9 Customizing Your System—Now you can begin to truly make your Mac your own. With the information in this chapter and the contents of the CD-ROM, you have the ability to customize every aspect of how your Mac works.

Part III Macintosh Hardware and Hard Drives

Once you've learned about how the Mac's software works, you might want to know more about the hardware. This part will provide you with more technical information about the Mac itself. By understanding what is in these chapters, you'll become a salesperson's nightmare.

Chapter 10 Macintosh Disk Drives—This chapter has everything you ever wanted to know about disk drives and more. You will learn what disk drives are and why they are important to you.

Chapter 11 Essential File, Disk, and Data Information—Your disk drives hold all of your information. This chapter talks about your information and provides tips about how to keep it safe.

Part IV Communications and Networking

Connecting your Macintosh to other computers and the outside world is something that you will eventually want to do. This part of *Macintosh Revelations* will provide you with the basic information you need to accomplish this task.

Chapter 12 Reaching the Outside World—This chapter is about using your Macintosh with a modem. It will tell you how to set up your software so that you can communicate with other computers or information services.

Chapter 13 Networking for the Beginner—In the office, you might need to connect your Macintosh to other Macs to exchange information. This chapter explains how to do this.

Part V Troubleshooting

Troubleshooting is the process of determining what is wrong with your Macintosh. Yes, Macs do have problems form time to time. In this part of the book, you'll find the information you need to fix almost any Macintosh problem. Read this part before you need it.

Chapter 14 Avoiding Problems—This chapter talks about maintenance and how to avoid trouble, which means Macintosh problems. If you follow the guidelines in this chapter, you may never need the other four chapters in this part of the book.

Chapter 15 Common Macintosh Problems—It's fright night. If you want to know what can go wrong with your Mac, read this chapter. If something does go wrong with your Mac, read this chapter. Knowing the problem is the first step toward fixing it.

Chapter 16 Macintosh Hardware Problems—This chapter will help you decide if you have a sofware problem or a problem with the physical Macintosh. It will also help you determine what type of problem you have.

Chapter 17 System and Application Troubleshooting—When your Mac is misbehaving, you'll have to straighten it out. This chapter provides detailed steps for restoring your Macintosh to its proper operating conditions.

Chapter 18 Disk Crashes and Data Recovery—When things go wrong, you may have to know how to retrieve your information. This is the chapter you will need if you ever must recover your data when it seems hopeless. Don't despair, all is not lost.

Appendix A *BMUG's Macintosh Revelations CD-ROM*—This contains a brief description of the files and programs on the BMUG *Revelations* disk. This is really a remarkable collection of programs, utilities, and other types of files. This CD-ROM is a wonderful resource.

Appendix B *Shortcuts*—In Appendix B you'll find a list of Macintosh shortcuts which will help you use your Macintosh more efficiently, if you choose to use them. After you've read the first part of *Macintosh Revelations*, review these shortcuts and experiment with them.

The BMUG Macintosh Revelations *CD-ROM*

This is a special CD-ROM prepared by the BMUG for inclusion with *Macintosh Revelations*. The CD-ROM contains over 600 megabytes of programs, pictures, and utilities. The CD-ROM provides you with the opportunity of customizing and learning about your Mac without spending any extra money. Enjoy.

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CHAPTER 1

How Your Macintosh Computer Works

Introduction

When you buy a Macintosh computer, you've purchased the most innovative and easy to use computer available. Every new Mac comes from the box ready to work for you—with a little bit of practice, you'll soon be creating letters, reports, and graphics; playing games; and doing almost everything else you want a Mac to do.

Did I say a *little* practice? The Macintosh is a powerful computer, but you have to learn how to work with it. At first, there may be many kinds of little icons, menus, and other things on the screen that don't make sense. Sometimes, your Mac makes clicking and buzzing noises even when you're not using it—and you don't have a clue about what is happening.

If you've ever wondered exactly how your Macintosh works (in a general sense), then this chapter is for you. If you are an experienced Mac user, you may be tempted to skip this chapter because you'll think it's too elementary; but you might want to reconsider. I suggest you read this chapter unless you can answer the following questions.

- What is a computer?
- What are the two main tasks that a computer performs?
- What is binary code or representation?
- What are the two meanings of CPU?
- What is the difference between RAM, ROM, and disk space? And what is the difference between a bit, byte, kilobyte, and megabyte?

Do you know the meaning for all of the acronyms and terms used above?

If you're new to the Mac or don't know the answer to even one of the above questions, you should read this chapter. You may be thinking: "Why do I have to know all those arcane technical terms? They belong in computer mumbo jumbo land, not

in my head. If I wanted to know them, I would have a degree in computer science or electrical engineering." I know where you're coming from, but believe me, sooner or later you'll need to know this stuff. By learning it now, you'll be well on the road to using your Mac to its fullest potential.

Not knowing your Mac is like not knowing your car's capabilities. If you didn't know that you can drive your car thousands of miles, you would not use it to make a cross-country trip. But to make that trip, you also need to know about maintaining your car, getting the fuel it needs, reading a road map, and the rules of the road.

To take your Mac on a similar trip, you need to know the basics of how your Mac works. You won't get all of this from this first chapter, but it's the beginning of the journey. In this chapter, you will learn about computers in general and how they work. The intention is to make you comfortable with your Mac. If you know what the Mac is doing and how, then you will be in control.

What Exactly Is a Computer?

Although you may not read books about your car, you probably know quite a bit about your car, cars in general, the automobile industry, and the infrastructure that supports your car. To learn some of the same type of information about your Macintosh, the first place to start is not with the Macintosh but with computers in general.

All cars on the road today have many similarities: steering wheels, gas pedals, brakes, engine's, and so on. Likewise, all computers today share many similarities. The rest of this section will discuss topics that apply to all computers. If you already know how a computer works, you may want to skip this section. If you're not sure, read on.

Whatever you may think of your Macintosh, there is nothing mystical or supernatural about it (or any computer). The only thing that makes a Mac special is what it can do for you. Regardless of what you do with your Mac, remember that it is only a tool.

Computers are used to perform complex tasks that would take hours, months, days, or years if the same tasks were to be done by hand. But a computer can do only what it has been told to do and nothing else. Your car can't take off by itself to buy a Slurpie for you at 7-11, and your Mac can't do anything without you. So, let's look at this tool and see how it really works.

Hardware vs. Software

To understand your Macintosh, you have to know a little bit about its separate parts and how they work. Your Mac is a combination of physical components and the instructions that tell the physical components what to do. The physical part of the computer is called *hardware* and the instructions are its *software*.

Hardware The physical components of your computer, including the monitor, keyboard, mouse, disk drives, and memory.

Software Word processors, spreadsheets, games, System 7, and other sets of instructions that tell the computer's hardware what to do.

Everything a computer does is the direct result of its software (and you) telling it what to do. Software is written to work with specific hardware. Software written for the Macintosh will require Macintosh or Macintosh-compatible hardware, while software written for some other type of computer will probably not run on your Mac.

What makes software so difficult to understand is that you'll never see it. All you see are its results—what it makes the computer do. This is why people think computers are more than tools. But software is like music on an LP, CD, or cassette tape. You never see the actual music, but you hear it when it is played on the appropriate device. Just as your CD player does not play music without a CD, your computer will not perform without software.

Understanding how your Mac uses software and hardware is the next step in the process of understanding your computer. Before you continue, however, familiarize yourself with Figure 1.1. The various parts of the Mac will be mentioned as you learn what your computer really does.

How a Macintosh Works

Since the basic function of your Macintosh or any computer is to process data understanding how your Macintosh processes data is one of the most important fundamentals of computing you can know. Knowing what your Mac is generally doing can help you later on when you're working on your Mac and start thinking that there must be an easier way to do something. All computers process data using the same principles. This section will look at the data a computer processes, and will explore how the computer processes that data.

Bits, Bytes, and More

These above two facts are important because they are the foundation for all computing measurements. Every computer has a specific capacity for storing and processing



Running Non-Macintosh Software on Your Mac

This may sound confusing, but you should know that the Macintosh does have the ability to run software made for other computers. This is done by making the Macintosh act like a different computer, which is an advanced Macintosh topic, explained in Chapter 11.

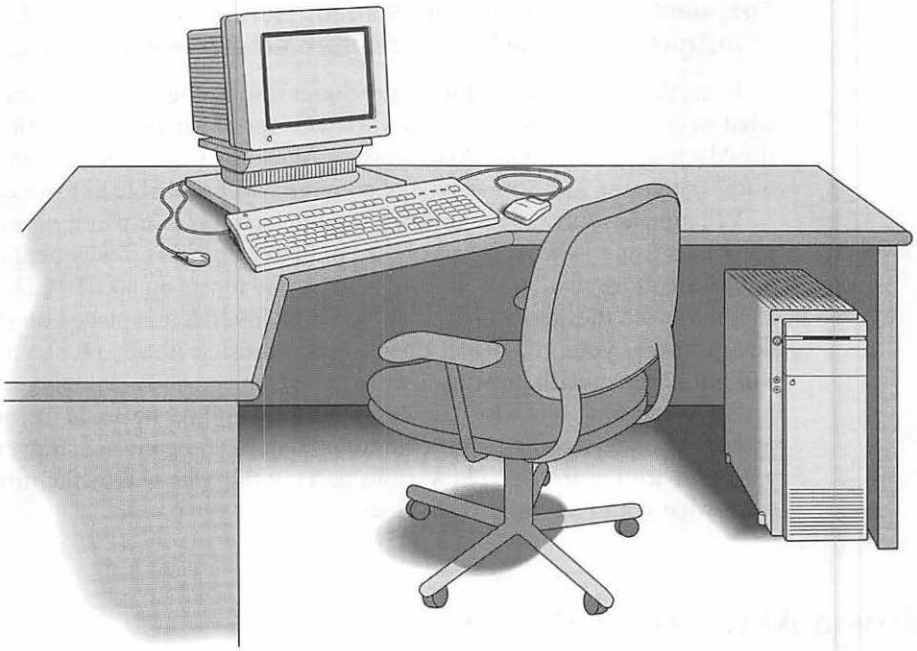


Figure 1.1 *A basic Macintosh system.*

Notes

Some Really Technical Stuff

When a computer processes data, it is really performing one of the following actions: adding, subtracting, or comparing numbers. Everything your computer does is the result of these processes, regardless of how complicated the task. This is a difficult concept to grasp, but your computer adds and compares data so quickly that it can use the results to manipulate any information put into it.

The best way to understand how your computer adds and compares is to look at a simple example that demonstrates the basic concept of multiplying numbers. When the command to multiply 10 by 12 is put into the computer, the computer stores the numbers 10, 0, and 0. The numbers are stored in registers, which are special temporary storage sections. One is set to 10 and will not change, and the other two are set to 0 (see Figure 1.2).

The computer then puts 12 into register B and 1 into register C. The registers now read 10, 1, and 12. The computer then compares the registers with 10 and 1 to

continued

Notes

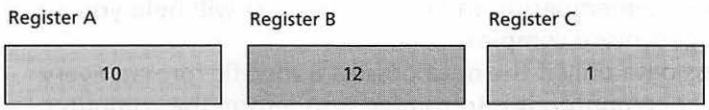


Figure 1.2 *The registers.*

see if they are the same. Since they are not the same, it adds 12 and 1 to the two variable registers, performing the compare function again. This process is repeated until register C equals 10. Once this register equals 10, register B will equal 120. The computer has just multiplied 10 by 12. Figure 1.3 illustrates this process.

Every function of a computer is based on this principle. This is not to say that computers can't perform complex functions; it is just the process a computer uses

continued

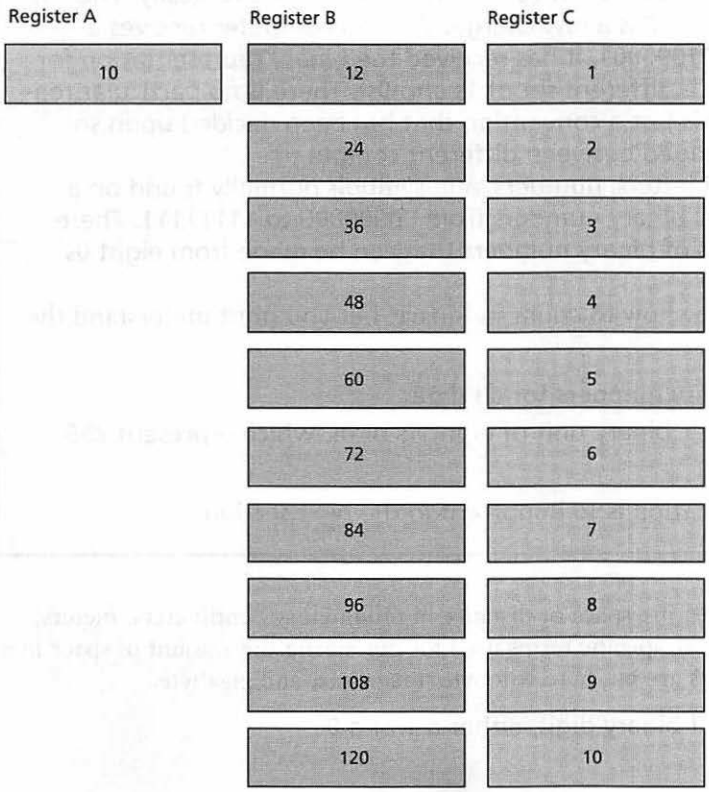
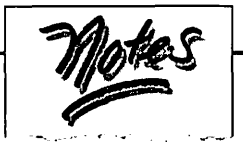


Figure 1.3 *The add and compare process.*



reduced to a simple explanation. Remembering this computing fact will help you later when the overall process gets more complex.

Your computer can process data only if the data possess a specific format. Every time information is put into your computer, it is translated into a form the computer can use. This process of translation occurs with all information or data put into a computer and, although you'll never see this translation process, it happens. If there is some type of data that cannot be translated, the computer cannot process the data.

The computer turns all information into a series of 1s and 0s, *regardless of how it appears to you*. These 1s and 0s are a code that can be used to represent numbers and all of the letters of the alphabet. This method of representation is called binary code.

Binary A numbering system with a base of two. All binary numbers are represented using two digits: 0 and 1.

Computers use binary code because it can be transmitted electronically. The 1 is a high charge of electricity, and a 0 is a low charge. When a computer receives a series of 1s and 0s that equal 01000001, it has received the binary representation for the letter *A* (not an *a*, which is a different set of 1s and 0s). There is no particular reason why 01000001 equals *A*; it is just a convention that has been decided upon so that information can be exchanged between different computers.

The computer equates all letters, numbers, and symbols normally found on a typewriter (plus a few more) as binary numbers from 00000000 to 11111111. There are 256 different combinations of binary numbers that can be made from eight 0s and 1s.

It is not important to know how to count in binary, but you must understand the following:

- ❖ The computer uses binary numbers for all data.
- ❖ All computers use a basic binary unit of eight 1s or 0s, which represent 256 different combinations.

You'll see why this information is so important in the next section.

data. Just as we can measure space or distance in millimeters, centimeters, meters, and kilometers, there are specific terms used for measuring the amount of space in a computer. These terms are bit, byte, kilobyte, megabyte, and gigabyte.

Bit Abbreviation of binary digit, either a 1 or a 0

Byte 8 bits

Kilobyte 1024 Bytes

Megabyte 1024 Kilobytes

Gigabyte 1024 Megabytes

The smallest possible data unit is a *bit* and it equals one 1 or 0 (a single binary element). The next unit is a *byte*, which is eight 1s or 0s. The byte is the smallest binary unit because a byte can represent a letter, number, or symbol. The next unit is a kilobyte, which is 1024 bytes. Since a kilobyte is 1024 bytes, it stands to reason that a megabyte would be 1024 kilobytes. When dealing with computing measurements, the next larger unit is always 1024 of the preceding unit. Following this rule, a gigabyte is 1024 megabytes.

Hardware

Figure 1.4 shows basic computer hardware so that you can easily identify the different parts. The parts of the computer shown in Figure 1.4 will be explained in the following sections.

The internal parts of your computer that will be discussed in this section are:

- Logic board
- Processors
- Power supply
- Memory

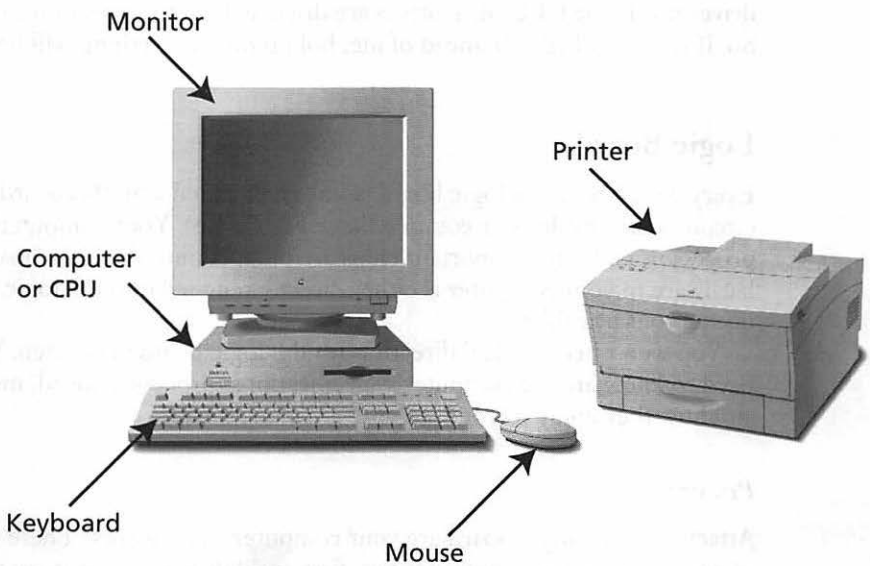


Figure 1.4 *A typical computer.*

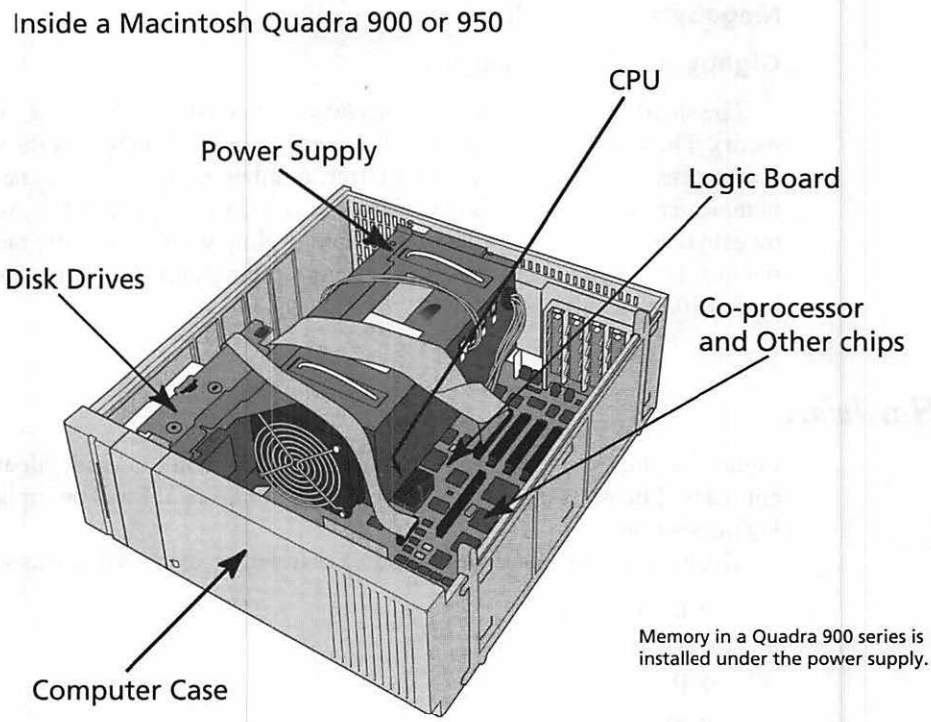


Figure 1.5 *The guts of a typical computer.*

Figure 1.5 shows the inside of a computer. Although computers now have disk drives inside the CPU, disk drives are discussed later in a section called "Storage." So, if you are a little bit ahead of me, hold tight—everything will be covered.

Logic Board

Every computer has a logic board (sometimes called a motherboard), which is a large circuit board inside your computer (see Figure 1.6). Your computer's memory, processor, and other important chips are plugged into the logic board. In fact, all the hardware in your computer is either directly plugged into the logic board or is connected to it by cables.

You won't need to deal directly with the logic board very often. What you really need to know are the computer's specifications (processor speed, memory size, etc.) and how they apply to you.

Processors

Attached to the logic board are your computer's processors. There can be a number of processors in your computer but, first, we'll discuss the primary processor called the Central Processing Unit (CPU). The CPU is the *engine* of your computer. It

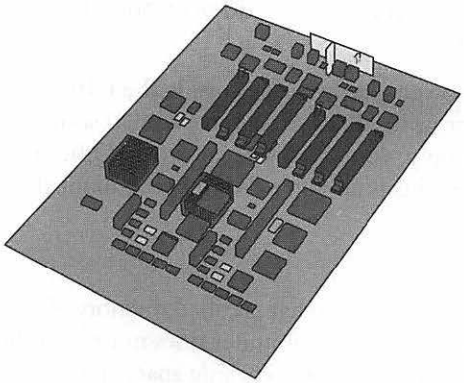


Figure 1.6 *A logic board.*

takes data, combines it with instructions from you and your software, and produces the results you want. The CPU organizes all the flow of information inside your computer—the faster your CPU, the faster your Macintosh will run. A CPU's speed is rated in Megahertz (Mhz)—the bigger the Mhz rating, the faster the CPU.

Megahertz Millions of cycles per second. Used to rate the speed of many computer components. The higher the megahertz, the faster the component.

What makes a CPU powerful is the number of transistors it contains. The original CPU in the first Mac had about 68,000 transistors, while the newest Macs produced today have CPUs with 2.8 million transistors. At the moment, the number of transistors double from one generation of processor to the next, which happens about once every two years. However, doubling the number of transistors results in computing power that is about four times as powerful as the previous generation.

Although a processor doesn't do much more than add and compare numbers, as CPUs get more complicated, this basic function is enhanced so that computers can perform complex processing operations, allowing the CPU to process data more efficiently and quickly. To really explain how the CPU works would require an advanced degree in electronic engineering, and even then it would be pretty tough. So, just remember that a CPU works by juggling lots of numbers really fast.

There are also several types of co-processors that are like turbo chargers for an engine. Co-processors help the CPU run faster by doing some of its work. Your Macintosh might have a math co-processor (FPU), paged memory management unit (PMMU), and a digital signal processor (DSP). Co-processors are used to assist the CPU in performing certain functions.

Power Supply

Your Mac must convert the power it receives from the wall into power it can use. This task is done by the Mac's power supply.

Power Supply A step-down transformer that reduces the voltage for the computer.

The power supply resides inside the CPU case and can be compared to your car's alternator or (in older cars) generator. If something goes wrong with your Mac's power supply, your Mac will not work. Other than being a component of the overall computer, this is all you need to know about the power supply.

Memory

Every computer has what is called memory. Computer memory, however, is not like human memory; the computer does not remember anything. Memory should be thought of as storage or working space, not the ability to remember and recall information.

Memory A computer chip that holds programs and data either temporarily as Random Access Memory (RAM), or permanently as Read Only Memory (ROM). Many people confuse memory with hard disk space. Memory indicates how much software and data your computer can manipulate at one time while it's running. Hard disk space indicates how much software your computer can store permanently.

The two types of memory in your computer are Random Access Memory and Read Only Memory, called RAM and ROM. Although similar, each type of memory has a different function. The best way to describe how memory works is to compare it to post office boxes, which are arranged in rows and can each contain mail. Computer memory has a similar arrangement, only each slot, which can be compared to an individual post office box, holds an electronic charge. Each slot is one bit of computer data, and the CPU can check each one to see if the bit is on or off.

The more memory you have in your computer, the more slots you have to store bits. The average Macintosh today comes with 8 Megabytes (8M) of RAM and up to 4M of ROM, which means that the computer will have 67,108,864 bits of RAM. If you figure that it takes 8192 bits to equal one page of printed material, we're talking about 8192 pages. This is a lot of space.

When your computer is working, it loads its system software and any programs you're using into RAM. The programs in turn load your data into RAM so that they can manipulate the data. And it is up to the CPU to keep track of where in memory all of this data (system software, programs, and the data manipulated by the programs) is located and to access it properly. It is a complex process.

One important thing to remember about RAM is that its contents are temporary. When the power to your Macintosh is turned off, anything in RAM is lost forever. RAM needs the power supplied by your computer to operate. Also, any of the data at any place in RAM can be quickly changed.

ROM is structured just like RAM, except the data held in ROM is permanent and does not change. The data in ROM is used by your computer to operate and is actually part of the system software. It is possible to put all of the system software into ROM but, if that were done, it would be impossible to use new system software

when it was created without changing the Mac's ROMs. For this reason, the ROMs only contain some of the Macintosh's system software.

All of the data in memory can be accessed very quickly. However, memory is not the only means your computer has of storing data. And memory should not be considered as true storage. It is the space your Mac uses to do its work. In this sense it is very much like the top of your desk. When you're working at your desk, you take the things you'll be using—pens, paper, books, and so on—and place them on your desk. Your tools are the same as the software and data your Mac loads into RAM. As you continue to work, more things get put on your desk. Eventually your desk gets so full that you can't continue to work without putting some of the material away in drawers, cupboards, and file cabinets.

The same thing happens with your computer. As RAM fills up, it becomes necessary to put away some of what is in RAM but not being used. This data will be kept on a more permanent storage medium, and the computer will retrieve it from storage when it's needed. This entire process is called *memory management.*

The quantity of RAM you can put into your computer will depend on the model of Macintosh you have. The primary points you need to know about memory are:

- Memory is a form of storage space.
- RAM is the space your computer uses to do its work.
- The contents of RAM disappear when your computer is turned off, and new data is put into RAM when it is turned on.
- ROM is permanent storage space for some of your Mac's system software.

Other particulars about memory will be discussed as the need arises throughout the rest of the book.

Peripherals

Any device that is connected to your computer is called a peripheral device. Peripheral devices are anything and everything except the cables used to connect the devices to the CPU. Usually, a peripheral device name describes its function.

Peripheral Device Any hardware device that is connected to your Macintosh other than the CPU.

The remainder of this section will talk about some of the peripheral devices you'll find attached to computers. The first types of peripheral devices that will be discussed are storage devices, after which input and output devices will be examined.

Storage

The best way to understand computer data storage is to look at a little bit of computer history. Hopefully, the history lesson will have the added value of giving some perspective to this entire discussion on computers. The really technical information about disk drives can be found in Part III, "Macintosh Hardware and Hard Drives."

Regardless of how fast your CPU can process data, there first has to be a way to quickly put the data into the computer. To truly make it useful, you need a way to store the data for reuse later. In the early days of computing, paper ticker tape and punch cards were used to put data into computers, and the output was almost always to a printer.

It didn't take long to realize that those punch cards and reams of printer paper were inadequate. So, first, tape drives were developed and used for both input and data storage. However, using tapes became inefficient as computers became faster. Tape drives could not access data fast enough. To meet the new needs for speed, the hardware engineers developed very large disk drives.

The first disk drives were the size of four metal desks, two with their ends placed together and the other two stacked on top. The disk was a very large drum that rotated at about 200 revolutions per minute (RPMs) and looked like the disks from very early phonographs. They stored data on magnetic material and the total capacity was about 20 megabytes.

In the 1960s, it was possible to reduce the size of the disk drive to a small filing cabinet. IBM developed the first drive of this type; it had a 30-megabyte fixed disk and a 30-megabyte removable disk. The fixed disk was used as the working drive, while the removable disk was for data backup. They called it a 30–30 and it became known as a Winchester, after the rifle, and became the designation for any drive that used the same technology as the fixed disk in the IBM drive.

However, having a large hard drive solved only half the problem. A convenient means for inputting data was still needed. Punch cards just didn't make it. The late 1970s produced a floppy disk drive that used a disk made of heavy mylar with a ferrous oxide coating similar to that used on recording tape. It was eight inches in diameter and held about 80K. The disk was flexible, looked like a large LP record, and was called a floppy disk.

The technology used in floppy disks and drives has advanced to the point where all Macintoshes use a 3.5-inch floppy drive. Over the years, the capacity of the 3.5-inch floppy has gone from 400 kilobytes to 1.44 megabytes. While floppy drive technology has progressed a long way, it has not stopped. The next generation of floppies will hold over 2 megabytes of data.

Hard drive technology also continued to evolve. The same era that gave birth to the floppy also witnessed the miniaturization of the hard drive. By the early 1980s, hard drives became small enough for use with the new personal computers. A 20-megabyte drive was 5.5 inches cubed, and considered to be large enough to meet any computing need. However, the optimism of the beginning age of personal computing rapidly gave way to the realities of the technology: Access to data creates more data and there may never be a storage medium large enough.

Even today, depending on the type of work you do, your hard drive will probably soon be too small. Moreover, a drive that holds a gigabyte of data—which, by the way, is the same size as the first 20-megabyte drives—will soon be too small. And speaking of small, the new, smallest drives are the size of a pack of cigarettes and hold 500+ megabytes.

For the time being, you need to know that your Mac has both a floppy and a hard disk drive. The floppy disk is the primary means for inputting programs and

exchanging data with other Macs. Your hard drive is for storing your data permanently so that it can be quickly accessed by your Mac. You will learn a lot more about your hard drive in Chapter 5.

Input and Output

Any piece of hardware that is used to put data into your computer is called an *input device*, while any piece of hardware that displays, prints, or otherwise moves data out of your computer is called an *output device*. And there are some hardware devices, called *input/output devices*, which are used for both inputting and outputting data. Everything connected to your computer, except the CPU and cables, is either an input or output device.

Figure 1.7 shows a complete computer system, including a printer. Each device is labeled according to its function.

The following is a list of the hardware you're likely to have with your Mac, each item described according to its function.

Device	Function	Description
Keyboard	Input	The keyboard is used to put typed information into your computer.
Mouse	Input	The mouse is used to give commands to your Mac.

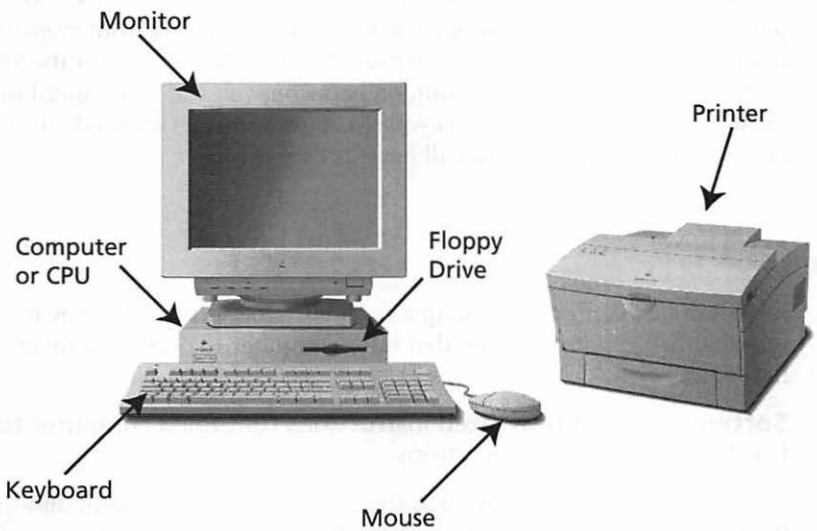


Figure 1.7 *A complete computer system.*

Device	Function	Description
Monitor	Output	On the monitor you will see the results of what you have told your computer to do.
Printer	Output	The printer delivers the results of your computer's work as printed information.
CD-ROM Drive	Input	CD disks hold data that is read into your computer through the drive.
Modem	Input/Output	A modem is used to connect your Mac to a telephone line that the modem uses to send data from your computer to another one, while also receiving data from the other computer and placing it into yours.
Hard and Floppy Disk Drives	Input/Output	The various types of disk drives used to store data onto disks or read it from the disks that contain the data.

Although there are a few other devices that can be used with a computer, the above list covers the most important and frequently used input and output devices. Normally, they are referred to by their names; the terms input and output are used to describe their basic function.

Driver Software that allows a computer to access a peripheral device.

One very important thing to remember is that any device attached to your computer requires software before your Mac can receive data from or send data to the device. Usually, this software is part of the computer's system software and you won't have to worry about it. But, on occasion, you will be required to install this software. Any software that lets your Mac use some device is called a *driver*, and every input or output device will have its own driver.

Software

As mentioned earlier, everything a computer does is controlled by its software, which is a set of written instructions that tell a computer to perform a function or series of functions.

Software A set of written instructions that tell a computer to perform a function or a series of functions.

You might think of software as the gasoline, oil, transmission fluid, and hydraulic fluid used in your car. Each type of fluid serves a different function, and each is essential to your car's operation.

Each type of computer has its own software: Macintosh software will not run on a different type of computer, and software made for another type of computer will not

run on a Macintosh. Next, there are several categories of software and, within each category, there are several different types. Although we will not discuss all of the different types of software in this section, you'll be exposed to most of them in this book. The categories of software you need to know about right now are:

- System software
- Application software
- Utility software

Something you should keep in mind when you think about software is that it is written by people. Computers do not tell themselves what to do; people tell computers what to do. So no matter how complex and sophisticated the software may seem, it is still the result of human efforts.

System Software

Of all the software you possess, your system software is the most important. System software makes your computer work—like the oil in your car's engine.

System Software that controls the general operations of the computer. The Mac's system software is called the System.

The system software for any computer controls all of the computer's basic functions and interacts with your application software. System software works in conjunction with the Mac's ROMs at the time you start your Mac. The ROMs contain the instructions that tell your Mac to start. After the Mac starts, it will go through a process called *loading the System*, during which time the software needed to operate all of the Macintosh's hardware is loaded into memory.

Once the System is loaded into memory, your Mac is a fully functioning computer, ready to run your application software. Figure 1.8 provides a graphic example of how the Mac loads the System and application software.

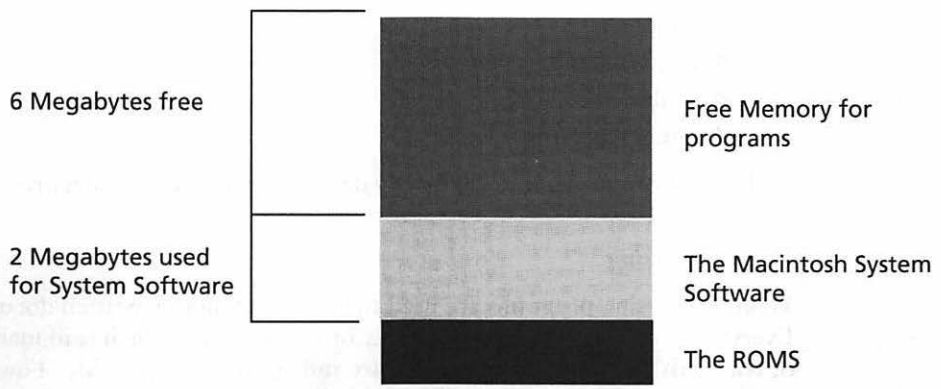


Figure 1.8 *How the System loads into memory.*

In Figure 1.8, you will see a chart that represents the Mac's memory. The ROMs are at the bottom of the chart with the System sitting on top of the ROM. The System is in RAM. After or on top of the System, you will see the space in RAM where your applications fit into memory. When your application is loaded into RAM, you can start doing work on your Mac.

Part of the Mac's System is the software that provides you with the Mac's interface. The interface is what allows you to interact with the Macintosh and serves the same function as the controls and instrument panel of your car, which determine how you interact with your car in the same way that your system software determines how you interact with your computer.

Interface The means by which you interact with a computer. Merriam Webster's dictionary defines interface as "the place at which independent and often unrelated systems meet and act on or communicate with each other."

Understanding your Mac's System and interface is critical to your success with the Macintosh. As such, you will find that the System will be a primary topic throughout this book. For the time being, however, what you really need to know is that your Mac system software allows the Mac to function, and it is also needed to enable you to use any other program.

Application Software

The following list of major tasks represents most application software or programs you'll use. It is possible that you'll use software from several of the categories to do a project.

Program A program is software used to accomplish a task or tasks.

- ❖ Word processing
- ❖ Database
- ❖ Spreadsheets
- ❖ Communications
- ❖ Graphics
- ❖ Page layout
- ❖ Multimedia
- ❖ Other categories

The rest of this section will briefly describe each of these categories.

Word processing

Word processing programs are used to create and modify written documents. Everything you do with a word processor has one goal, which is to make the creation of your written communications as easy and attractive as possible. Toward this end, most word processors will check your spelling and grammar as well as provide tools

for arranging or formatting the words you type. All of the text for this book was written on a Macintosh using a word processing program.

Database

A database program allows you to keep collections of related data and easily organize and arrange the data for reports. A database program can be used for many things, such as keeping track of all your video cassettes, sales records, or employee information with a database program. Some database programs also let you make your own applications to meet special needs.

Databases are very powerful tools because you can arrange your information in so many different ways. You can view and manipulate selected samplings of data according to any specified criteria, which makes it easy to select all of your customers from specific states or according to their purchasing histories. If you're using the computer at home, you can catalogue receipts and auto records, or maintain a family mailing list.

Communications

Communications programs allow one computer to talk to another. Data is sent from one computer to another via a communications program. While writing this book, all of the chapters were sent from Portland, Oregon, to New York City using communications software.

Spreadsheets

Spreadsheet programs are used for any information that can be kept in rows and columns. If you have ever used columnar paper, you have used the noncomputer equivalent of a spreadsheet. Spreadsheet programs do a lot more than let you store information in rows and columns (see Figure 1.9): You can add numbers across the rows and columns, make charts, and do reports with spreadsheets.

Graphics

Graphics programs are any software applications that let you create, manipulate, or view a picture of some type. These packages range from simple to very complex. Fifteen years ago, almost every ad you saw was done by hand by a graphic artist. Now they're done almost exclusively by computer. Even many of the graphics you'll see on the evening news were done with a computer. All of the figures in this book were either created or modified using a graphics package.

Page Layout

Page layout programs are made specifically for combining what was done with a graphics and word processing program to make a single page, catalogue, or book. In this way, all of the document's parts (the text, notes, figures, etc.) can be easily and effectively combined to make a book. The pages for this book were created using a page layout package.

File Edit Formula Format Data Options Macro Window

Normal

A1 Description

cashflow

	A	B	C	D	E	F	G
1	Description	4/94	5/95	6/95	7/94	8/95	9/95
2	INFLOWS						
3	Beginning Cash	$240.00					
4	Rent Income	$0.00	$0.00	$650.00	$650.00	$650.00	$650.0
5	Salary Income	$1,000.00	$1,950.00	$1,950.00	$1,950.00	$1,950.00	$1,950.0
6	Writing	$0.00	$280.00	$140.00	$140.00	$140.00	$140.0
7	Other Income	$4,200.00	$0.00	$0.00	$4,500.00	$4,500.00	$4,500.0
8	Extra Estimated Bus Income		$1,716.00			$1,000.00	
9	TOTAL INFLOWS	$5,440.00	$3,946.00	$2,740.00	$7,240.00	$8,240.00	$7,240.0
10	OUTFLOWS						
11	Essential Household						
12	Car Payments (RC)	$200.00	$100.00	$100.00	$100.00	$100.00	$100.0
13	Auto Insurance	$0.00	$100.00	$100.00	$100.00	$100.00	$100.0
14	Mortgage Payment	$0.00	$1,239.55	$1,239.55	$1,239.55	$1,239.55	$1,239.5
15	Rent	$0.00	$300.00	$300.00	$300.00	$300.00	$300.0
16	The Loan 1	$293.00	$293.00	$293.00	$293.00	$293.00	$293.0
17	VISA	$75.00	$75.00	$75.00	$75.00	$75.00	$75.0
18	Cable	$45.00	$45.00	$45.00	$45.00	$45.00	$45.0
19	Jeweler	$110.00	$110.00	$110.00	$35.00	$0.00	$0.0
20	Student Loan	$110.00	$50.00	$50.00	$50.00	$50.00	$50.0
21	*Tot. Essential Household*	*$833.00*	*$2,312.55*	*$2,312.55*	*$2,237.55*	*$2,202.55*	*$2,202.5*
22	Household Taxes						
23	1992	$350.00	$300.00	$0.00	$0.00	$0.00	$0.0
24	1993	$0.00	$0.00	$200.00	$800.00	$800.00	$800.0
25	State	$0.00	$0.00	$0.00	$0.00	$0.00	$0.0
26	Estimated Tax	$0.00	$0.00	$0.00	$350.00	$550.00	$550.0
27	*Tot. Household Taxes*	*$350.00*	*$300.00*	*$200.00*	*$1,150.00*	*$1,350.00*	*$1,350.0*
28	Variable Household						
29	Food	$100.00	$150.00	$150.00	$150.00	$150.00	$150.0

Ready NUM

Figure 1.9 *An example spreadsheet.*

Multimedia

Multimedia programs are used to combine words, graphics, pictures, and sound for presentation on a computer or television monitor. Multimedia programs are used largely by businesses and the television and movie industry for creating presentations, advertising, and special effects. Many of the special effects seen in recent major motion pictures were done using computers. A lot of animation is being done with multimedia software.

Other Categories

You will note that not all programs fit into the above categories. There are programs for entertainment, accounting, personnel time management, and almost any type of specialized business need. The term for this type of software is *vertical market* software, which is made for a single and specific business or business need. Software written specifically to do work orders and track inventory for an auto repair shop is an example of vertical market software; there are vertical market programs for almost all industries.

Utility Software

Your computer will require regular maintenance, inspections, and repairs. Often these tasks are done with software tools called utility programs. Listing the different types of utility software would be like listing all of the tools you could find in a garage. So, rather than list or categorize utility software, the various programs you'll need are discussed throughout the book where appropriate.

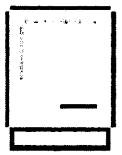
Summary

This chapter was intended as preparatory background information for using your Mac. You may have read it and decided that the information is so basic that it is not necessary. But, reviewing it may help you avoid some of the pitfalls that computer users everywhere have encountered.

The most important things to remember are:

1. A computer is stupid.
2. The computer cannot hurt you.
3. A computer only does what it has been told to do.
4. Unless you use a hammer on the computer, you cannot hurt it.
5. All computers are based on the same principles.

The next most important parts of the chapter are the sections about computer binary counting and data processing. If these concepts are unclear, reread these sections. If you do not understand either of these concepts, you will often find yourself confused as you work with your Mac.



CHAPTER 2

Macintosh Beginnings

Introduction

This chapter assumes that your experience with computers is minimal (none) and that you've just received your Mac. Even if this is not true and you really do have some experience with a Mac, you may want to read this chapter because it contains information which will make it easier for you to operate your Mac and you may learn something you didn't know.

There are specific steps that you must go through when setting up a Macintosh—these steps will be outlined throughout the rest of this chapter. There are many ways to do the same tasks, and if you have experience with the Mac or computers in general, you might find the steps presented here to be different from what you usually do. That's OK—what's important in this section is that you know everything you need to do to properly set up a Mac.

This chapter also has information that will help you fix many problems you have with your Mac. You may think that it's premature to talk about problems, but you'll find that most problems are easy to fix (and that you can actually avoid most problems) if you develop good Mac habits from the beginning.

Now, onward! Let's assume that you have a brand new Macintosh and you want to set it up and start using it.

Setting Up a Macintosh

It's a grand day when you bring home your first Macintosh. Some of us get excited even if it isn't our first Mac. The usual scenario is to take the Mac from its box, set it up, plug it in, and turn it on. However, since this is your first Mac, you need to slow down and take your time while doing these steps. There is nothing confusing about what you're going to do, but there are some things you'll want to remember.

Where Will You Put It?

Before taking your Mac from the box, you need to have some place to put it., which you'll probably have thought about this before buying it. But in case your eagerness got the best of you, now is the time to consider the following.

You'll want enough space to work comfortably. Just because your Mac will fit in a corner, it does not follow that you should necessarily put it there. You need to think about how much you're going to use the Mac, and how many things you'll want close at hand (such as books and papers) while you work on your Mac .

You'll need a three-prong (grounded) power outlet close to your Mac, but don't plug your Mac directly into the wall. Buy a surge protector and plug it into the wall, then plug your Mac into the surge protector. This is cheap protection against lightning, electrical spikes, short circuits, and other hazards that can turn your lovely Mac into a pile of smoking plastic.

Finally, you'll need at least a table and chair. If you can afford to do so, you might even consider getting a Macintosh computer work station. If you do buy a computer



Leaving Your Mac On

Many people shudder at the idea of not turning off their computer, but there are good reasons for leaving it on 24 hours a day. The electrical components on the Mac's logic board and power supply expand as they get warm and contract as they get cold. The more times you turn your computer on and off, the more times the chips expand and contract, eventually wearing them out. Also, your hard drive is designed to be left on all the time (unless you are using a Macintosh Portable or PowerBook). Starting and stopping the hard drive every time you turn your Mac on and off is very hard on it.

Make sure you are using a very good power surge protector. The surge protector should shut off if there is a brown out (if your power drops below a predetermined voltage, all of the lights in a room or your house usually will dim when a brown out occurs)and not come back on until you switch the power back on. This happens because a power surge usually follows a brown out which can really harm your Mac.

There are many companies that make good surge protectors. Look for one that comes with a guaranty to replace your computer equipment if it's damaged by a power surge. One company that has this type of guaranty is PanaMax. DataShield also makes an excellent surge protector but does not have a guaranty. Do not use an inexpensive power strip or surge protector; they are not up to the task of protecting thousands of dollars worth of Macintosh.

work station, make sure it will work with your Mac. Many workstations are made for IBM type computers and do not work well with some Macs. Also, before you buy a work station, read the section "Safety Considerations" later on in this chapter.

Unpacking Your Mac

Once you know where you're putting the Mac, all that's left is unpacking it. When you unpack your Mac, open each box by carefully cutting any tape on the flaps; you do not want to cut or mar the finish on your components. Take your time and when you're done, check to make sure you didn't leave something in the box. Also, don't throw the box away for awhile, just in case your Mac was damaged in shipping and needs to be returned. When you unpack your Mac, try to be organized and place like items together. Keep your manuals, disks, receipts, and packing slips together in some organized fashion so that you'll know where everything is when you need it. There are a lot of papers, manuals, and disks that you'll want to keep track of.

Every Macintosh and peripheral has a packing list that details what you should have in the box. Find this list and check off every item against what is in the box. If anything is missing, you will want to call either the store where you purchased the equipment or the manufacturer.

Before you start to set up your Macintosh, unpack all of the boxes, with the exception of any software you might have purchased. By having everything out of the box and organized, it will be easier to see how your Mac fits together.

A First Look at Your Mac

Now that you have made a mess of your space with boxes, hardware, manuals, and other sundry stuff, it is time to identify everything (if you haven't done so already). Figure 2.1 shows what most people get with the first Mac they buy.



Add Ons

There are some items mentioned here that have not really been discussed, such as diskettes, microphones, and other items. Although these items are important, they require more than just a definition as an explanation. Over the course of these next three chapters, you'll find information about all of this and it will all be explained. Just be patient.



A Macintosh Quadra 840AV system.

Figure 2.1 *A complete Macintosh system.*

What Every Mac Should Have

When we were discussing computers in general (Chapter 1), we said that you would need a CPU, Monitor, and keyboard to have a functioning system. The same is true of your Mac. You should have the following components:

- Macintosh CPU, power cord, and mouse
- Monitor, power cord, and cable
- Keyboard and cable

If you do not have any of the above items, you cannot set up your Mac. If you purchased a printer, you should also have:

- The printer, power cord, and printer cable

Basically, you should make sure any peripheral you purchase comes with the proper cable to connect it to your Mac and a power cord or adapter. Once you've confirmed that you have everything you need, you're ready to set everything up.

Because every Mac has the ability to record sound, it also comes with a microphone. The microphone is not required to make your Mac run but you should find one in the box.

Putting Your Mac Together

By now, you might be thinking that you'll never get your Mac up and running. Hang in there, you're almost done. The next step is to put your Macintosh together but, before going through the actual setup, you should take a few minutes to become more familiar with your Mac. If you know where what gets plugged in where before you start putting your Mac together, you'll find the setup process to be a lot easier.

The Macintosh's Ports

Whenever a peripheral device is connected to your Mac, it is plugged into a port. The first thing to look for, therefore, are the ports on the back of your Macintosh.

Port A port is a socket on the Mac, which you plug other things into (such as a mouse) so that they can communicate with your Mac.

Your Macintosh has several ports that are usually located at the back of the Macintosh. Figure 2.2 shows all of the standard ports that you'll find on the back of the Macintosh. On some Macs, you'll find some of these ports duplicated, while others will have a single port that serves double duty.

Every Mac will have at least one of the ports described below. Each Macintosh port has a symbol associated with it, and the symbol is usually stamped on the CPU case above the port. The symbols are displayed next to each definition below. The number of ports will vary, depending on the model of Macintosh, but you can figure on at least one of each of the following (the only exception to this rule are all of the Macintosh Duo computers).

The following are ports found on most Macintoshes:

***ADB (Apple Desktop Bus)** This is the connection used for keyboards, pointing devices (the mouse), and sometimes other devices, such as modems.

***SCSI or Small Computer System Interface (pronounced *SKUH-zee*)** A standard interface that enables the Macintosh to connect a peripheral device; usually, a hard disk drive.

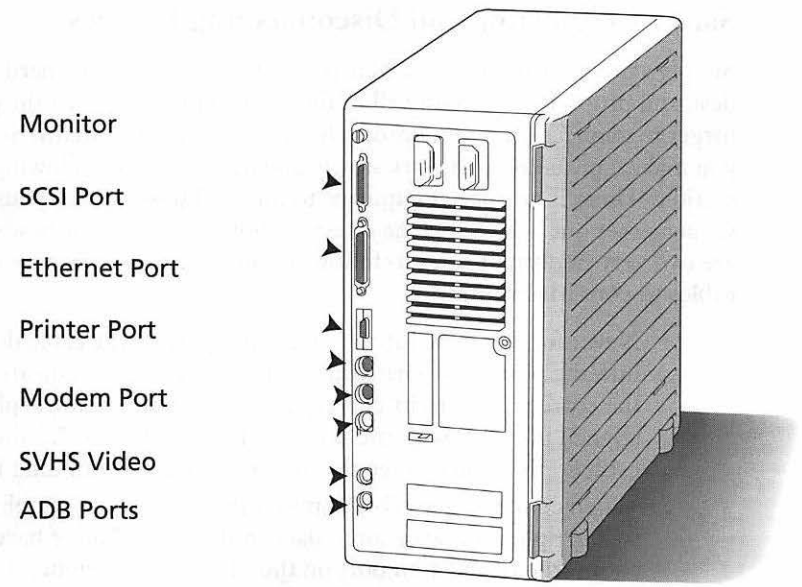


Figure 2.2 *The Macintosh's ports.*

***Serial** A connector on the back of the Macintosh that enables the user to connect serial devices using a serial interface (also called a serial interface).

***Printer/Apple Talk** A serial port used for connecting the Macintosh to a network or a printer or both.

Ethernet An interface for connecting the Macintosh to other computers for the purpose of exchanging data (networking). Some printers can be connected to a Mac via the Ethernet port.

***Sound In** A connection for putting sound into a Mac from an external sound source, such as an external microphone.

***Sound Out** A connector for attaching external speakers to a Mac. This port can also be used to send sound from the Macintosh to other devices that use sound input (such as a tape recorder).

Monitor The connector used to attach a monitor to a Macintosh.

Serial/Printer This port is found only on some Macintoshes, primarily PowerBooks, and is an AppleTalk or a serial port.

The ports marked with an asterisk (*) are the standard for all Macintoshes, except for the Macintosh Duo. If your Mac does not have one of the ports listed above, it will be missing the Ethernet port or the monitor port if it has a built in monitor.

Safely Connecting and Disconnecting Devices

Simply stated, setting up your Mac is a matter of placing the hardware on a table or desk and properly connecting all of the cords. However, even the pros sometimes forget to connect something properly when setting up systems. So, don't worry if you make a mistake—just work slowly and methodically, following the steps in this section. There is no special sequence to follow. However, for your first time, use the sequence set out below; it is the safest for both you and your new equipment. There are two very important rules to follow whenever you are connecting peripheral cables to your Macintosh:

1. Never force a cable into a connection port. If the cable does not easily fit into the port, stop what you are doing. Make sure you are trying to connect the correct cable to its corresponding port and that the pins in the cable are aligned properly with the holes in the port. Figure 2.2 shows a port and cable so that you can see the pins and the corresponding holes in the port.
2. When connecting a cable between the CPU and a peripheral or between two peripherals, leave some slack in the cable. Never have a taut cable that strains the connection port on the Mac or the peripheral. Doing so can damage the Mac, the peripheral, or both.

To set up your Macintosh:

1. Place the Macintosh CPU on the desk or table. It is possible to place some CPUs on the floor. If you place your Mac on the floor, next to or under your desk, be sure your cables can reach the CPU without being strained.
2. Attach the monitor, keyboard, and printer cables to the back of the CPU
3. Position the Macintosh on the table so that you have room for the keyboard and mouse.
4. Attach the keyboard.
5. Attach the mouse to the keyboard. Some Macs have two ADB ports; in that case, is does not matter which port you use for the keyboard. You can also attach the keyboard in one port and the mouse in the other. Each ADB port will support up to five peripherals.
6. Place the Monitor on top of the CPU or on your table (desk) top. If you are placing the monitor on the table top, make sure the cable will reach from the CPU to the monitor.
7. Connect the cable to the monitor.
8. Attach the power cord to the monitor. Some monitor cords are designed to plug into the CPU if the CPU has a connector like the one shown in Figure 2.3. Also, some monitors are designed with a plug similar to the one shown in Figure 2.3; so, you can plug the CPU's power cord into the monitor instead of plugging the monitor's power cord into the CPU.

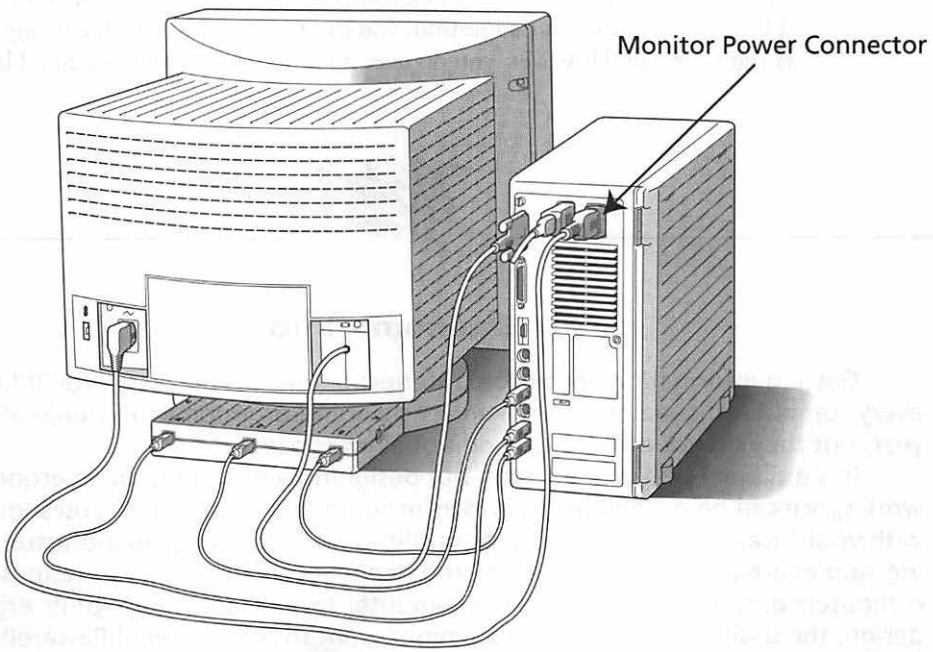


Figure 2.3 *A monitor power connector on a CPU.*

9. Connect the monitor's power cable to the CPU if your CPU has the correct power connector. Otherwise, connect the monitor's power cable to your surge protector.
10. Attach the power cord to your printer.
11. Attach the power cord to your CPU.
12. Plug your surge protector into the wall; if it has an on/off switch, turn it off.
13. Plug the power cords from the CPU, printer, and monitor (if you're not plugging the monitor into the CPU) into the surge protector.
14. Turn on the surge protector.
15. Turn on the monitor's power switch. The power switch for each type of monitor is in a different location; examine your monitor to find the power switch and refer to its manual if necessary.
16. Turn on the power to the printer.

You're now ready to start your Macintosh. Before you do so, read the next section about "Safety Considerations" and the section titled "Turning On Your Mac for the First Time."

Other Safety Considerations

The table or desk you use for the Mac should be ergonomically correct. Figure 2.4 shows a person sitting in front of a computer in an ergonomically correct position. This consideration is a suggestion; you can work with your Mac in any position that is right for you. However, you do need to know about injuries caused by repeatedly



Ergonomic Info

Getting information about computer ergonomics is not easy. You'll find that every computer magazine will run an article about ergonomics a couple of times a year, but they do not offer much additional information.

It is a subject that is important, but designing and setting up an ergonomic work space can be expensive. To find information on ergonomics, you should check with your local college, university, or public library. Computer manufacturers (including Apple) are increasingly aware of and implementing ergonomic designs for their computers but, if you do not use the computer to take advantage of its ergonomic design, the design will not help. You might want to read Dr. Emil Pascarelli's book, *Repetitive Strain Injury*, published by John Wiley & Sons.

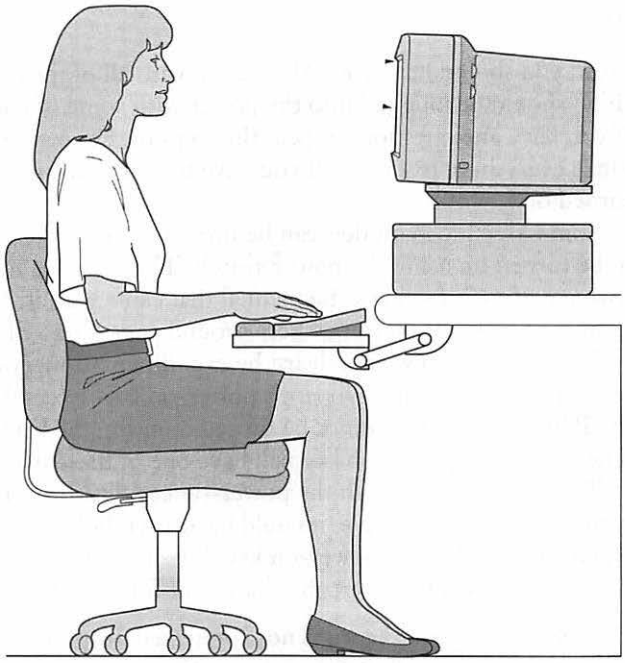


Figure 2.4 *An ergonomic workstation.*

performing the same movements. These are called repetitive stress injuries and computer usage has been associated with these types of injuries.

To prevent these types of injuries, you should set up your Mac as shown in Figure 2.4.

You should be aware of the height of the keyboard and mouse in relation to your arms and hands. Your hands and forearms should be parallel to the ground while working at the keyboard. If you are seated too high or low, you will begin to experience discomfort after working for only a short period of time. Figure 2.4 should be used for reference only; if you want more information about computer ergonomics, you should contact your local university or an ergonomics consultant.

Firing Up Your Mac for the First Time

It is now time to start your Macintosh, and this section is very important. You're going to learn some terms that are specific to the Macintosh and its operation, and anyone who uses a Mac without learning these terms will find themselves at a serious disadvantage: They will not be able to talk to anyone technically about their Mac or what it is doing—making it difficult to get help over the phone or to understand their manuals. I cannot stress enough how important it is to learn some of these basic terms.

So, let's go start your Macintosh.

Turning On Your Mac

Now, you should have your Mac set up with all of the cables connected, and everything should be plugged into the power with some of your devices already turned on. If you have any questions, repeat the steps in the section, "Putting It All Together." Once everything is set up, all you have to determine is how your particular Mac is turned on.

Some Macintosh models can be turned on from the keyboard, while others have to be turned on using the power switch. The best way to determine which type of Mac you have is to check the manual that came with it. You should find the instructions for turning it on somewhere around page 4 or 5 of your Macintosh manual.

However, if you wish to learn by experimentation, you can start by trying to turn on your Mac with the keyboard's power-on key. Every Macintosh keyboard, except the PowerBooks that cannot be turned on using the keyboard, have a power-on key. The keyboard's power-on key will have one of these two symbols (P or I) on it as well.

To start your Mac with the power-on key, just press the key. Depending on the type of keyboard you have, it could have a symbol like I or _ next to or on the power-on key. If pressing the power-on key does not turn on your Mac, it could be because your Mac does not support this feature or for any of the following reasons:

- ❖ The keyboard cord is not connected properly.
- ❖ The power cord is not plugged in.
- ❖ The surge protector is turned off.

If you know for certain that the Mac should turn on with the power-on key, then you need to check the items in the list above. Otherwise, you need to find your Mac's power switch. Wherever the power switch happens to be—it could be on the front or the back of the CPU—it will have an I symbol next to or stamped on the switch. If you have any doubts, you should look in your Macintosh manual; it will tell you the exact location of your power switch.

Once you've found the power switch, just press it. As long as everything is connected properly, your Mac will start. When your Mac starts, you'll hear it make a computer sound, it will start to whir, and the monitor will turn on. On the front panel of some Macintoshes, you might see a light come on as well.

As Your Mac Starts

As your Macintosh starts up, you'll see several things happen on the screen. This sequence of events is called the *boot* process.

Boot Another way to say *start up.* Starting up is often accomplished by first loading a small program that then reads a larger program into memory. The program is said to pull itself up by its own bootstraps—hence, the term *bootstrapping* or *booting.*

A complete and technical description of what the Mac does as it starts up can be found in Chapter 17. For now, all you need to know is that the Mac starts itself

through a complicated process of checking its hardware and then loading the System into memory. Most of what takes place does so behind the scene, but there are some visual indicators that will tell you that your Mac is starting up.

As your Mac starts, you'll see an image in the middle of the monitor. This image and many others that you'll see are called *icons*. The icon you'll see as your Mac starts looks like:  .

Icon An image that graphically represents an object, a concept, or a message. Icons on the outside of the computer can be used to show you where to plug in cables, such as the disk drive icon on the back panel that marks the disk drive connector. Icons on the screen represent disks, documents, application programs, or other things.

The smiling Mac icon tells you that the Mac is starting up. The next image you'll see is a rectangle.

While the "Welcome to Macintosh" is displayed on your screen, you may see more icons flash across the bottom of your screen, starting in the lower left-hand corner. These icons represent software that is being loaded into your Mac's memory as it starts. Because all Macs come from the factory ready to run, you should have no problems starting your Mac.

If Things Go Wrong

It is possible for things to go wrong so that your Mac will not start properly straight from the box. If this happens to you, read this entire section before deciding what to do.

Although it does not happen often, you might have problems immediately. If you do, you will have to decide whether to fix the problem yourself or take the Mac back to the store where you purchased it. If you are unfamiliar with computers and the Mac, you should probably box it up and take it back to the store where it was purchased. If this is not possible, you will have to try to figure out what is wrong and fix it. You could be in for quite a challenge at this point.

To attempt to get your Mac up and running:

1. Check all of your cable connections.
2. Make sure the Mac is plugged in and that the outlet you're using has power. If you're unsure about the power outlet, plug a lamp into it and see if the outlet has power. Don't forget about those outlets that you have that are turned on by a wall switch.
3. Turn on the Mac again. If it starts, you're home free.
4. If it still doesn't start, you should call the store you purchased the Mac from to see if they can help.
5. If the store cannot help, call Apple's Technical Support at (800) SOS-APPL (767-2775). Apple Technical Support is open from 9:00 A.M. to 9:00 P.M. (Eastern Standard Time). The people who handle the calls are very good, but you might have to wait awhile to speak to a technician.

When a Mac does not start, it will often try to tell you why. The following list might be helpful in determining what is wrong. This is not a troubleshooting guide, but a quick list of what might be wrong together with some suggestions.

- If your Mac displays an icon that looks like  , call the store where you purchased the Mac. Tell them that you have a *Sad Mac icon* and make arrangements to take the computer back to them. Usually, this means that there is something wrong with the computer itself.
- If your Mac is displaying the question mark icon (?), it means that your Mac cannot find a disk to start up from. You will probably have to install the System software onto your hard drive before you can use the Mac. Instructions for doing this can be found in Chapter 6.
- Should you see an icon of a disk with an X through the disk _ it means that the disk you are using to start up does not have the necessary software. (Usually, you will see this icon only when you are trying to start from a floppy disk that cannot start the Mac.) If you see this icon when first starting your Mac and you are not trying to start from a floppy disk, you should call the store where you purchased the Mac and make arrangements to take it back and let them fix the problem.

If you do not want to call Apple or if you want to try to fix the problem yourself, you can proceed to the last part of this book, "Troubleshooting," and work your way through those chapters. However, at this moment, unless you're an experienced Mac user, you should find someone to help you. Check out the options already listed and look at the manual that came with your Mac; also, check your cables again.

You probably won't encounter these circumstances, but, every once in awhile, people have problems with a Mac straight out of the box; I just wanted to give you some idea of what to do if this happens.

Navigating the Macintosh Screen

Once the Mac starts, you will find yourself looking at a screen that has all kinds of icons, words, and strange boxes. If you are new to the Mac and computers, there is no reason why any of what you see should make sense. The remainder of this chapter is about using your Macintosh, with the assumption that you've never used a Mac and that you've just taken it from the box and set it up.

At the beginning of each exercise, your Mac should be displaying something similar to the accompanying figures in this book—if it isn't, you should not do the exercise but read further. At some point, you will find the information you need to make your Mac show an image like the one in the corresponding example.

Even if you go through the rest of the chapter and get to the point where you're told how to shut down your Macintosh, shutting down and restarting your Mac will get you to a point that is close to the beginning point for the examples. You will then be able to make what your Mac is displaying look similar to the figures in this book.

Your Mouse

When using your Mac, 90 percent of what you do will be done with either the keyboard or the mouse. The keyboard will be used for entering text-based information into your Mac, while the mouse is the device that you will use for performing many different types of operations. Of these two devices, the mouse will be the more perplexing. It is a unique device and, on most Macs, it looks like the one shown in Figure 2.5.

The mouse is used to move the *pointer* (which looks like ↖) across the monitor's screen. It is an mechanical device that houses a ball that is rolled across a surface. As the ball in the mouse turns, it moves the pointer on the screen. You can move the mouse in any direction and, as you do so, the pointer on the screen will move in the same direction as the mouse. When you hold and move your mouse, the cord that connects the mouse to the computer should be facing away from you.

Pointer A small shape on the screen (↖) that follows the movement of the mouse or shows where your next action will take place. The pointer can be an arrow, an I-beam, a crosshair, or a wristwatch.

If you have a Macintosh PowerBook, you will not have a mouse. Instead, you'll have a trackball or a trackpad such as the ones shown in Figure 2.6. The trackball is

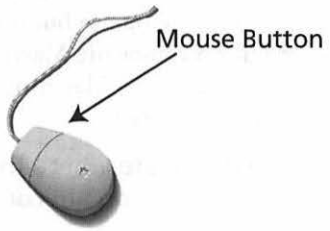


Figure 2.5 *The Mouse.*

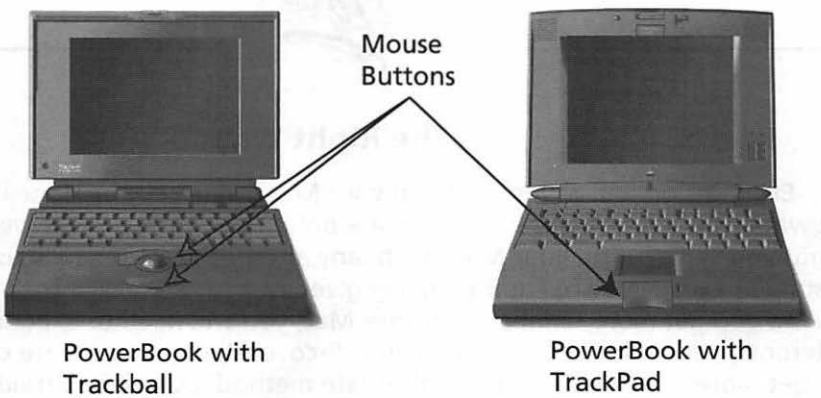


Figure 2.6 *A PowerBook trackball and a PowerBook trackpad.*

an inverted mouse; rather than rolling the mouse across a surface, you'll be rolling the ball. As you move the ball, the pointer on the screen will also move.

The trackpad is a new device that does not use a ball, but the results of using it are the same as using a mouse. The trackpad is a flat pad that is pressure sensitive so that, as you move your finger across the pad, the pointer on the screen moves in the same direction as your finger.

Regardless of what type of mouse your Mac has, using it might take some practice, because it does more than just move the pointer around the screen. On each mouse, there is a button that, when depressed, activates the pointer telling it to *select* whatever is under the pointer at the time. Everything you do with the mouse will be a combination of moving the pointer and pressing the button. In all, there are two basic actions you can perform with the mouse: clicking and dragging.

Click (v.) To position the pointer on something, and then press and quickly release the mouse button. (n.) The act of clicking.

Drag To position the pointer on something, press and hold the mouse button, move the mouse, and release the mouse button. When you release the mouse button, you either confirm a selection or move an object to a new location.

Clicking is the act of placing the pointer over an icon and pressing and releasing the mouse button. Dragging is done by depressing the mouse button and then moving the pointer while the mouse button is held down. In either case, the act of pressing the mouse button causes the Macintosh to *select* something. The process of selecting something tells the Macintosh that you want to use or manipulate the object that you have selected.

Select (v.) To designate where the next action will take place. To select using a mouse, you click on an icon or drag across screen information. In



The Right Way

Every action you will perform on your Mac can usually be done in several different ways. There is no *right* way; there are only ways that work. As we look at the things you can do with your Macintosh, any alternatives will be discussed in addition to standard ways for accomplishing any given task.

As you get more familiar with your Mac, you will need to experiment with the different ways of doing things. You may discover that you are more comfortable and can get more work done using an alternate method. Do not be afraid to experiment; you will not hurt your Macintosh.

some applications, you can select items in menus by typing a letter or number at a prompt, by using a combination keypress, or by using arrow keys.

Using the mouse gets more complicated. Although all mouse actions are based on clicking and dragging, you can modify the meaning of your actions by the number of clicks you perform, or by holding down a key on the keyboard while clicking the mouse to modify the meaning of a click or drag operation.

In the next chapter, we will discuss the most common mouse actions you can perform. At this time, all you are going to do is move the pointer around the screen and get used to how the mouse works. In the next section, you'll use the mouse to select different objects to get a feel for how they work.

The Finder

The Finder is your portal to the Macintosh. It is the place where you begin a journey that can take you around the world. It is the place from which you can create a world of your own, which is what you'll be doing as you use your Macintosh. The Finder is the program that you see when you start your Macintosh, and it is from here that you will start your programs and perform many of your computer housekeeping functions.

Figure 2.7 shows the Macintosh's Finder, also known as the *desktop*. The terms desktop and Finder are often used interchangeably so that whenever someone talks

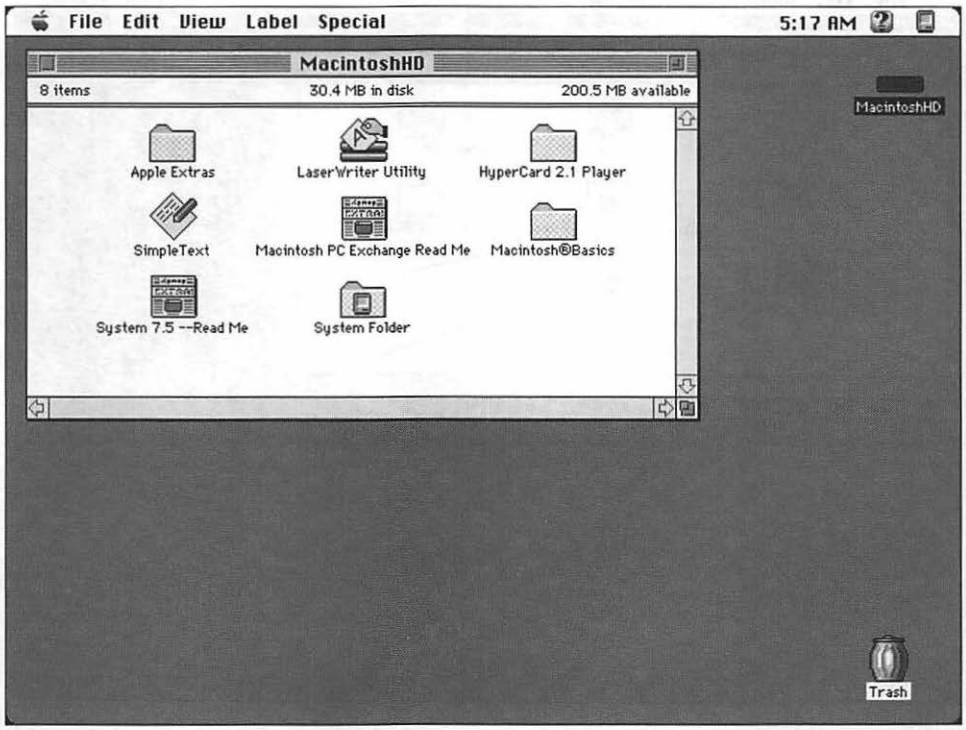


Figure 2.7 *The Macintosh Finder.*

about the desktop, they are talking about the Finder. The Finder is a program that is part of the Mac's system software and it is your entry point into the entire Macintosh system.

Finder The application that maintains the Macintosh desktop and starts up other programs at the request of the user. You use the Finder to manage documents and applications, and to get information to and from disks. You see the desktop upon starting up your computer.

From the Finder, you have access to all of your documents and programs, and you will do a lot of your housekeeping from the Finder. However, I'm getting ahead of myself. Before we can really talk about what you can do, you need to know what everything is. Figure 2.8 is the same picture as 2.7, only there are names assigned to each of the elements you see in the Finder.

Everything you seen in the Finder has a function or purpose; in a sense, there is no wasted space. The primary function of the Finder is to create an association between what you see and what you might find in the real world. Those items are supposed to function just like their real world counterparts.

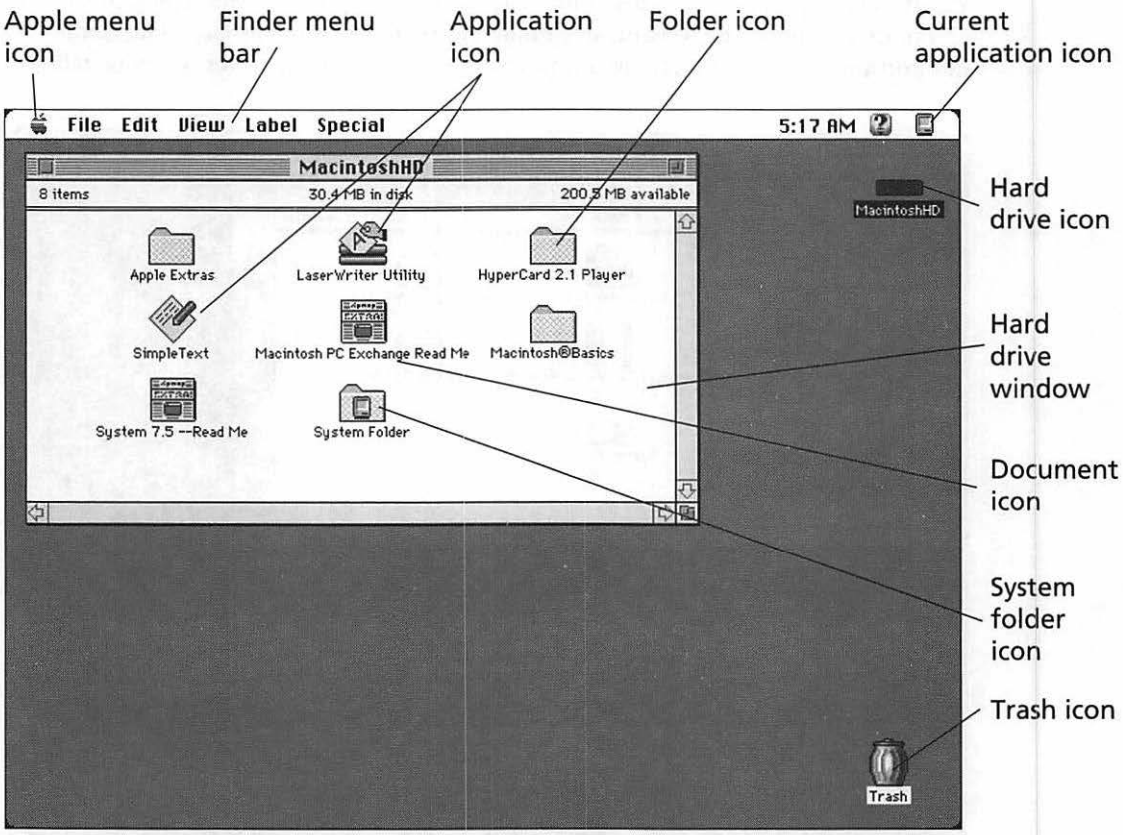


Figure 2.8 *The Finder.*

This association between what you see and the real world is called a *metaphor*. Metaphors are very important to the Macintosh; every icon inside the Macintosh is designed to look like something you might find in the real world to facilitate easy identification. An example of this is the Trash can, which is the icon in the lower-right hand corner of your screen (also shown in Figure 2.8). It is usually referred to as the *Trash*.

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

The Trash is the Mac's counterpart to the trash can that (probably) sits next to your desk. The actual mechanics for trashing something will be found in Chapter 5.

The Desktop and Icons

If you will refer back to Figure 2.8, you will see the area of the Finder that is called the desktop. Even though the terms desktop and Finder are often used interchangeably, the desktop is really the area indicated in Figure 2.8. The metaphor for the desktop is your real-world desk. Just like your home or office desk, the Macintosh desktop can become quite messy. Figure 2.9 is an example of a desktop that is somewhat cluttered.

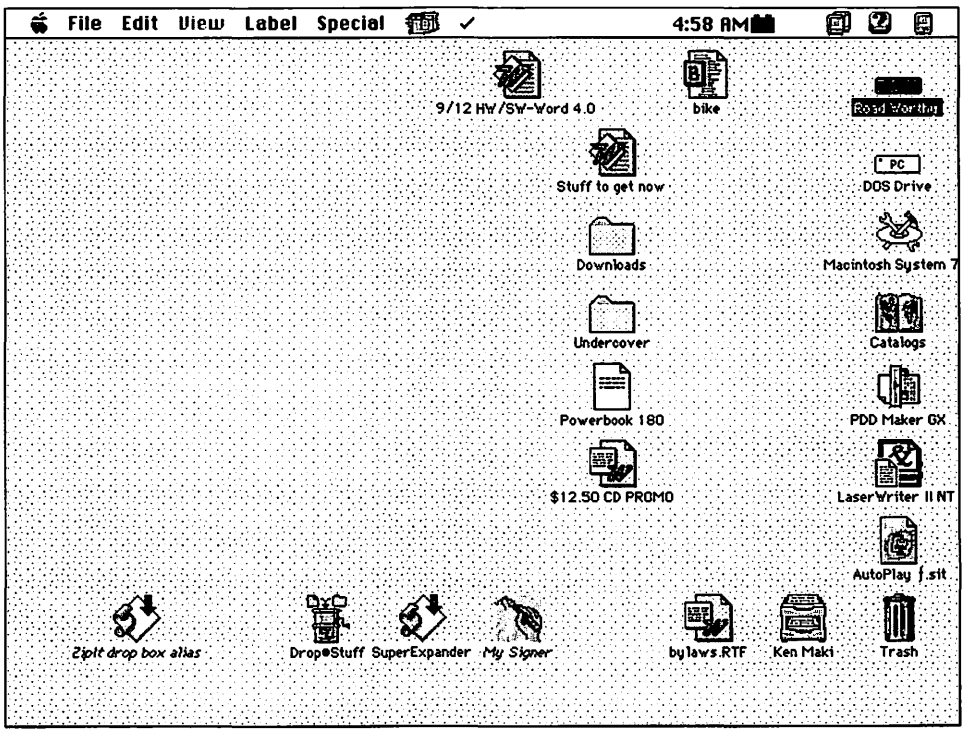


Figure 2.9 *A cluttered and customized desktop.*

You'll also see that Figure 2.9 looks a lot more complicated and in many ways different from Figure 2.8. The Finder shown in Figure 2.9 has been highly customized and is an example of what can be done and where you are going in this Macintosh journey. In a sense, it is a glimpse into your future, because you will learn how to modify and customize your Mac's Finder in Chapter 9. However, for the time being, let's look at a noncustomized desktop and Finder.

Desktop Your working environment on the Macintosh—the menu bar and the gray area on the screen. You can have a number of documents on the desktop at the same time. At the Finder level, the desktop displays the Trash and the icons (and windows) of disks that have been accessed.

Any icon you see on the desktop is going to be a tool, document, or container. Tools are programs, documents are data files created by programs; and the containers are where the tools and documents are stored. The icons you see represent *real* items and, by manipulating icons, you are actually performing some action on the object in your Macintosh's memory or on the hard drive that is represented by the icon. It is important that you understand this before you really start using your Mac.

I said earlier that you cannot hurt the Mac by using it. However, you can lose data or information if you are not careful. Losing data is what most people fear when it comes to computers, which is why you need to really understand how your Mac works. By understanding what is happening from the beginning, you're less apt to lose data; and if you develop good work habits now, you'll never lose any data.

You must *really* understand that anything represented by an icon seen on the desktop is real; it is like the paper, pencil, or other object on your physical desk. Just because it appears on the screen of your Macintosh does not mean that it really does not exist; it does.

What may give an icon a sense nonreality comes form the concept of an icon being a metaphor for the real world—and the fact that much of what we see on television screens is not real. As human beings, we tend to assume that, unless something has physical attributes, it is not real. This is the tendency you must guard against. The objects you see on your Mac's screen do take up space and have form, and they obey laws of physics just like the items on our desk—only they do so completely within your Macintosh.

Menus and Windows

Across the top of your Macintosh's screen you'll see a white bar with the words *File*, *Edit*, *View*, *Label*, and *Special*; and on the right-hand side of the screen, you'll see the time, a question mark icon, and an icon that looks like a Macintosh (see Figure 2.10). This white area is called a menu bar, and almost every program you'll use will have one.

Menu bar The horizontal strip at the top of the screen, which contains menu titles.

A menu is a basic computing concept and not unique to the Macintosh. What is unique to the Macintosh is that Apple established standards for how programmers

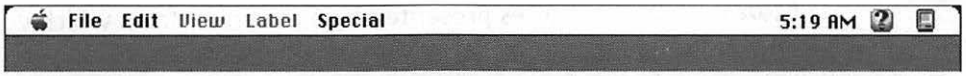


Figure 2.10 *The Finder's menu bar.*

(the people who write computer programs) use menus. By understanding these standards, you will have the basic knowledge you need to begin using any Macintosh program. It is not possible in this introductory section, however, to outline the entire standard.

Instead, you need to be aware of and start noticing that there is a method to the madness. Some menus will be the same regardless of what program you're using, and all programs will share similar or common attributes. In a way, this will be like learning a language. All languages have a basic set of rules that apply in almost all circumstances. Then, all of a sudden, a word comes along that does not follow the same rules as the other words. The wayward word is an exception to the rule.

You will encounter the same principle at work in your Macintosh and in how the rules Apple established for its operation apply. Most of the time, your Mac will operate according to Apple's standards but, out of the blue, some program will offer an exception to the rule. These exceptions do not happen often, but you do need to know about them and every effort will be made to point them out as they occur.

The basic way menus work is always the same. Each word in the menu bar is the name of a menu. Menus are accessed by:

1. Placing the very tip of the pointer on the word or icon in the menu bar.
2. Pressing the mouse button.

These steps will cause a menu to drop down. When you access the menu, you are offered a list of choices. The choices are commands that you can tell the Macintosh to perform. Figure 2.11 shows the contents of the File menu.

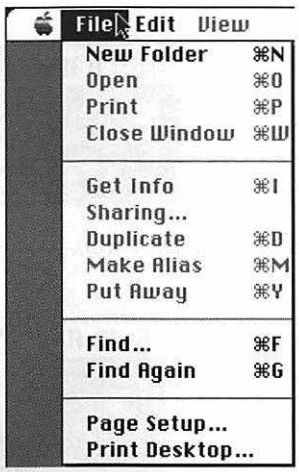


Figure 2.11 *The Finder's File menu.*

Menu A list of choices presented by a program, from which you can select an action.

Menu item A choice in a menu; usually, a command to the current application. Also called an item.

The File menu is one of the attributes shared by all programs. Every program with a menu bar will have at least a File and Edit menu. The File menu is used to access and print your data, while the Edit menu is used for manipulating your document while you are working on it. You will learn more about menus as we go on. At the moment, let's get used to how the Mac works by learning how to use the mouse. The following steps will take you through a simple procedure that will require you to use your mouse to select an icon and a menu to get some information from your Macintosh.

These steps are intended to illustrate how you use your mouse and to demonstrate how a menu functions:

1. Position the pointer over the icon in the upper right-hand corner of the desktop that has the name MacintoshHD (see Figure 2.12). This is the Macintosh's hard drive icon.
2. Click the mouse button. This action selects the hard drive icon. You will either see the icon and its name change from (A), being a light colored or white icon with text that was black on white, into an icon that is black or colored with text that is white on black. Or (B), the icon and text were already black or colored with white text on a black background. You want the icon to look like Figure 2.13.
3. Move the pointer so it is over the word *File* in the menu bar (Figure 2.14).
4. Press and hold the mouse button. This action activates the File menu, causing it to drop down as shown in Figure 2.15.
5. With the mouse button depressed, move the pointer so that it is over the words *Get Info.* Moving the mouse with the button depressed is called drag-

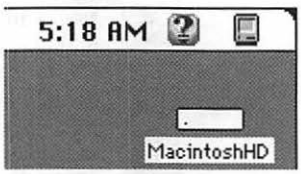


Figure 2.12 *The hard drive icon.*

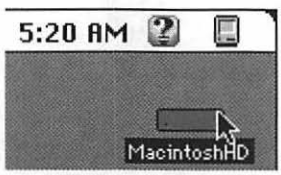


Figure 2.13 *The selected hard drive icon.*

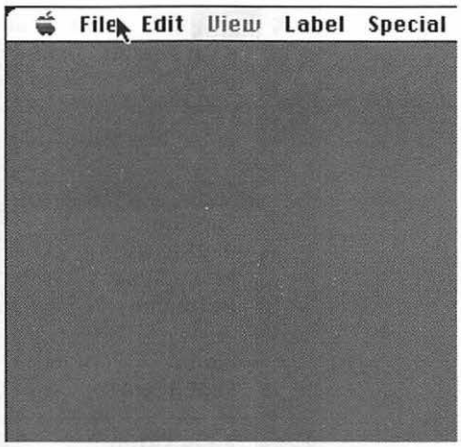


Figure 2.14 *The pointer on the File menu.*

ging. When the Get Info menu item is selected, the words *Get Info* will be white with a black band appearing across the menu, as shown in Figure 2.16.

6. Release the mouse button. This will cause the menu item to flash as the menu disappears. Immediately, as the menu disappears, you will see what is called a window appear in almost the same location as the File menu. Your screen should look like Figure 2.17.

By completing the above steps, you've just selected your hard drive and opened its Get Info window using the Get Info menu command. If I had been talking to you, I simply would have asked you to open the Get Info window for your hard drive. The entire procedure required six steps but it is normally considered a single action. Not only that, but the same action can be done in three steps.

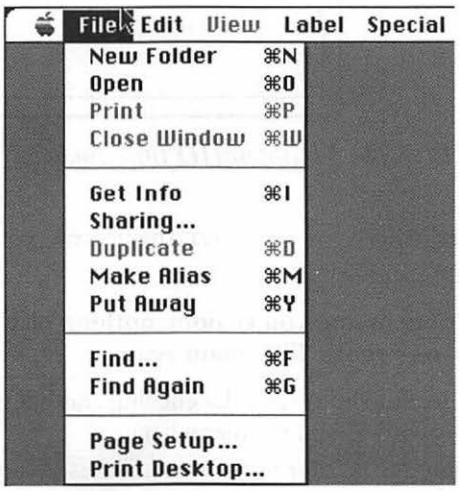


Figure 2.15 *The File menu.*



Figure 2.16 *The selected Get Info menu item.*

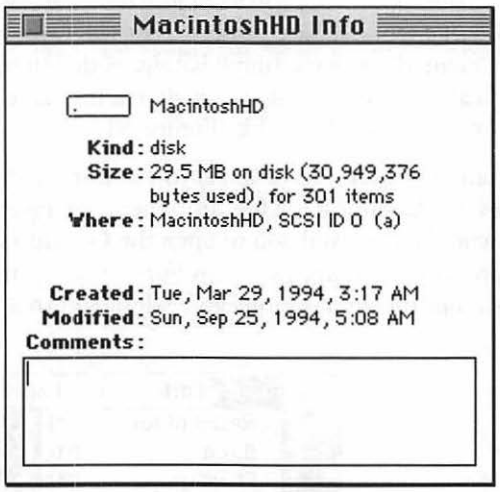


Figure 2.17 *The MacintoshHD Info window.*

However, before you can repeat the process, you'll have to close the drive's Get Info window.

To do this (assuming you've done nothing else since opening the Get Info window), you use the File menu again:

1. Select the File menu (by clicking and holding down the mouse button on the word File in the menu bar).
2. Drag the pointer to the word Closes Window.

This will cause the Get Info window to disappear.

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

To open the Get Info window in three steps:

1. Position the pointer over the icon in the upper right-hand corner of the desktop that has the name MacintoshHD.
2. Click the mouse button to select the hard drive.
3. Hold down the command key (⌘) and press the **I** key at the same time.

The result should be the same as the six steps above. Now you can close the Get Info window using a similar technique which will take only one step instead of three.

1. Hold down the command key (⌘) and press the **W** key at the same time.

The steps where you either open or close an item using the command key (⌘) are called command key equivalents and represent another way to access your menus. In Figure 2.15, you will see in the Finder's file menu, next to some of the menu items, the ⌘ symbol plus a letter. Each of these is a keyboard equivalent that allows you to perform the menu command associated with the command key instead of accessing the menu item with your mouse. This is an example of performing the same steps using different techniques.

Windows

The introduction to menus also introduced an interface element that has not been discussed yet: the window. A window is a standard computer device for providing information, and it is also the primary element of most programs.



Mousing Around

Using the mouse is not easy for everyone. It is quitet likely that you will sometimes run out of space as you move your mouse, bumping into the side of the computer or sliding off the edge of the table. When this happens, you should lift the mouse from the table surface and move it in the opposite direction that you want the pointer to move. When you set the mouse down, you can continue moving it in the direction that you want the pointer to move. You'll have to practice this movement, but it won't be long before it becomes automatic.

Window The area that displays information on a desktop; you view a document through a window. You can open or close a window, move it around on the desktop, and sometimes change its size, scroll through it, and edit its contents.

You've seen one example of how a window works. However, the window in Figure 2.17 is only an information window. You can look at the information it gives you and open, close, or move the window, but you cannot change anything else in the window. Other windows are entry points into your Macintosh where you will view and do your work.

However, windows are complex; you need to be fresh and ready to learn a bunch of new terms as well as the things you can do with a window. Perform the steps in the next section and then go on to the next chapter.

Shutting Down the Mac

When you are finished using your Mac, you will probably want to turn it off. The problem is that the Mac is not like other tools that you use where, when you are finished, you just pull the plug. When it is shut off, the Mac has to go through a series of steps to ensure that it shuts off properly. Although it can be shut off by depressing the power switch (on some models), doing so too many times will result in problems and has the potential for losing your data.

There are two ways to shut down your Mac; both of them are similar and accomplish the same thing. The first method is to use the Shut Down command from the Special Menu in the Finder.

To do this:

1. Place the pointer over the Special menu in the menu bar and then click and hold the mouse button down. You will see a menu like the one in Figure 2.18.
2. Drag the pointer to the Shut Down menu item (see Figure 2.19).
3. One of two things will happen: either your Macintosh will turn off or you will see a dialog box (a message) that says it is safe to turn off your

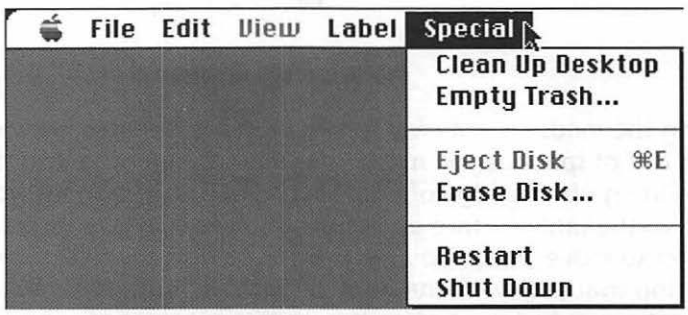


Figure 2.18 *The Special menu.*

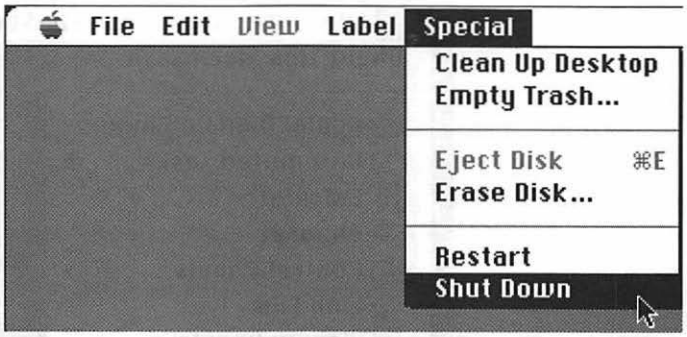


Figure 2.19 *Selecting the Shut Down menu item.*

Macintosh (Included with the message will be a button that says restart. Dialog boxes and buttons will be covered in Chapter 3.)

4. If you see the Shut Down dialog box, turn off your Macintosh.

The alternative method for shutting off your Macintosh is almost the same as the above steps, only the command is found in a different spot. This alternative command will not be present on all Macintoshes, so do not worry if yours does not have this particular command. This alternative will be found only on Macintoshes that are new or on Macs that have had their system software upgraded (a topic covered in Chapter 6).

The steps for using the alternative shut down are:

1. Place the pointer over the Apple (🍎) in the upper left-hand corner of your screen. Click and hold the mouse button down. You will see a menu that looks like the one in Figure 2.20. This menu is called the Apple menu.
2. Drag the pointer to the Shut Down menu item (see Figure 2.21).
3. Follow steps 3 and 4 from above.

Your Macintosh is now shut down and it is probably time to take a break. When you come back, follow the instructions listed in the beginning of this chapter to start your Mac.

Summary

If you are new to the Mac and computers, you may be feeling a little overwhelmed by now. Learning to use your new tool is not an easy task but, if you stick with it, you will reap the rewards of Macintosh proficiency. So far, you have learned:

- How to set up your Macintosh
- How to start up your Macintosh
- About your mouse and using it
- What the Finder is (there is a lot more to learn about the Finder)

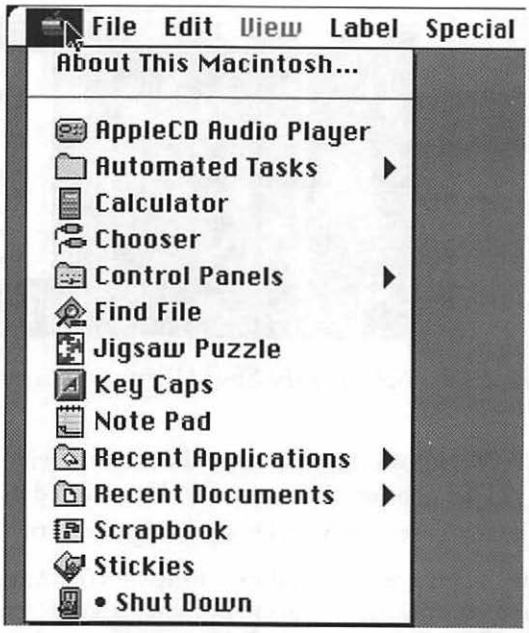


Figure 2.20 *Selecting the Apple menu.*

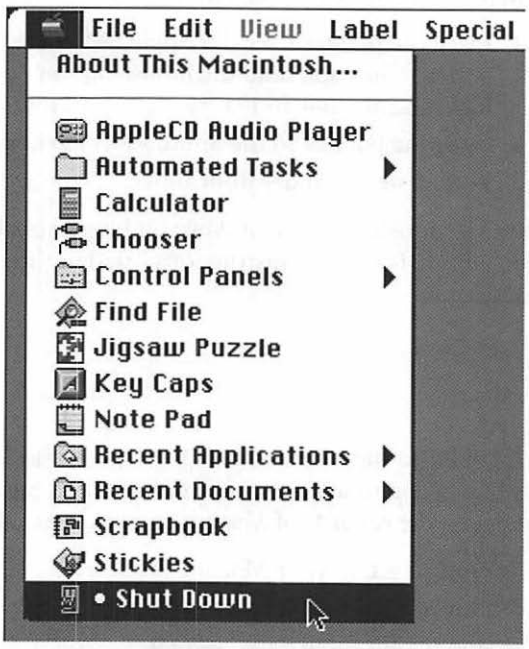


Figure 2.21 *Selecting the Shut Down menu item in the Apple menu.*

- About the desktop, icons, and menus
- A little about windows
- How to shut down your Mac

This is quite a bit if you're just starting out. If you're not comfortable with any of the topics covered so far, you should take the time to reread the appropriate sections of this chapter. On the other hand, if you've some experience with computers or the Mac, you may have learned something from this chapter that you didn't already know.

The next chapter will cover how to run a program and what to do with it. My methods for teaching these things are a bit unorthodox, but I have faith that you'll be learning what you need to know.



CHAPTER 3

Using Your Macintosh

Introduction

In the last chapter, we looked at setting up, starting, and the beginning steps for using your Mac. The topics that have been covered are:

- How to start up your Macintosh
- About your mouse and using it
- The Finder and metaphors
- The desktop, icons, and menus
- A little about windows
- How to shut down your Mac

In this chapter we're going to continue exploring the Finder and windows, but the major emphasis will be on how to use most Macintosh programs. You will learn how to start a program, the different types of programs you'll find in the Macintosh world, and introductory steps for using any Macintosh program.

By the time you finish this chapter, you should have the basic knowledge you need to use your Mac. However, Chapter 5, "Keeping Track of Your Data," is one of the most important chapters in the book. Until you've finished Chapter 5, you will not have all of the knowledge you need to fully use your Mac.

The adventure continues...

More about the Finder

As you learned in the last chapter, the Finder is the program you will use to access and manage all of the data you put into your Mac. In this chapter, we're going to explore two primary elements of the Finder: windows and menus, which are the pri-

mary elements in all Macintosh programs. The time you spend on this section of the book will give you 65 to 75 percent of what you need to use any Macintosh program.

The Anatomy of a Window

Windows are your portals into the Macintosh. Almost all of the information you'll receive from your Mac and any work you do will usually be done inside a window. The window you saw when we explored menus was an information window (Figure 3.1) that gave you information about your hard drive.

Window The area that displays information on a desktop; you view a document through a window. You can open or close a window, move it around on the desktop, and sometimes change its size, scroll through it, and edit its contents.

The Get Info window has two elements that are common to all standard windows. One is the Close box and the other is the title bar; both of these are indicated in Figure 3.1. There is also a comments field in this window where, if you were to type using your keyboard, you could place some note or reference about the hard drive (or the item for which you were getting information).

We're going to play with a few windows to illustrate how they work and to give you some practice. Before you start this exercise, your Finder should look like Figure 3.2. If it does not, close all of your open windows using the Close Window command from the File menu (these steps are in the section on menus given earlier). If the Close Window command is grayed out, move the pointer into the window that is

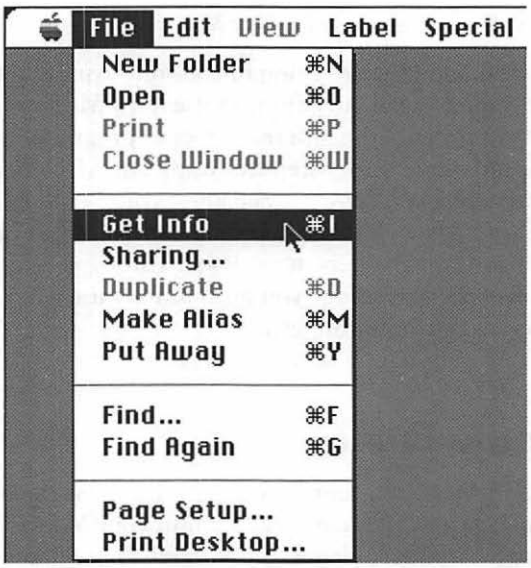


Figure 3.1 *The Get Info window.*

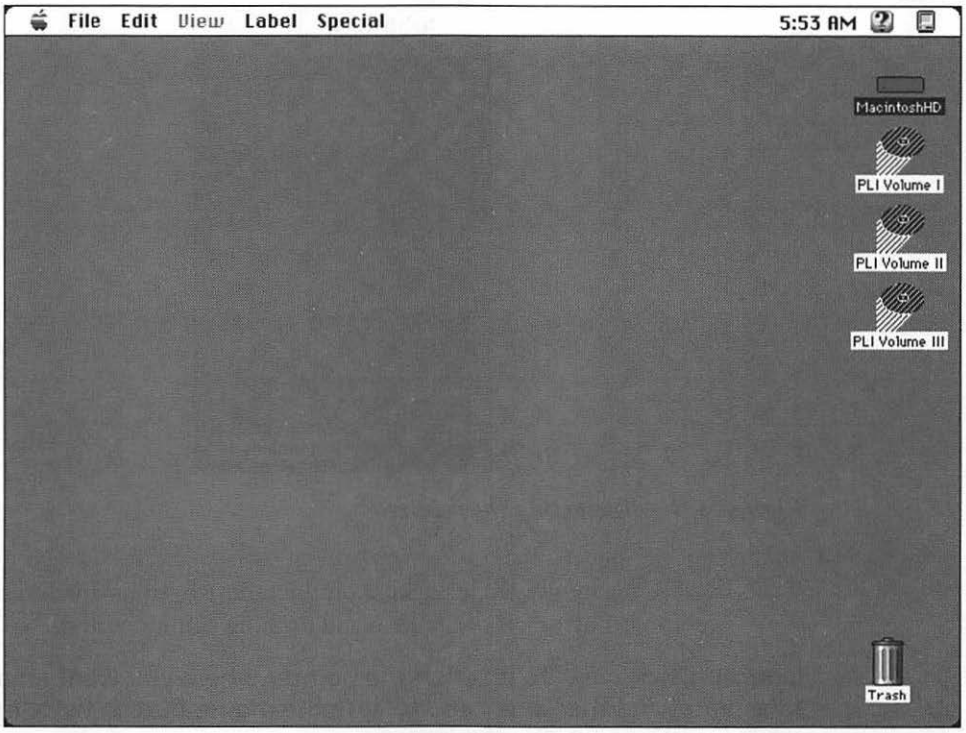


Figure 3.2 *The Finder with everything closed.*

open and click the mouse button (remember, clicking means depressing and releasing the mouse button once); this process activates the window. Now, you should be able to use the ⌘+W keyboard option (or the Close Window menu command) to close the open window. Do this for any open windows.

Now, if your screen looks like figure 3.2, you're ready to begin. In this first set of steps, you're going to open your hard disk, identify and describe the window's elements, and take a quick look at what is on your hard disk. Everything you've learned up to this point will be used and added to in this example. If you have difficulty with any of these steps, repeat this exercise until you can do it comfortably.

To view what's on your hard disk:

1. Move the pointer so that its tip is over your hard drive, as shown in Figure 3.3.
2. Open the hard drive. This can be done by double clicking the mouse, which is the process of clicking the mouse button twice. Double clicking the mouse on an icon is the same as using the Open command from the File menu or using the ⌘+O keyboard option.

   As soon as you've clicked once, click again; remember, when the word click is used by itself it means pushing the mouse button down and then immediately releasing the button. Be sure you do not move the pointer when you double click. Many people experience frustration at this point, because they

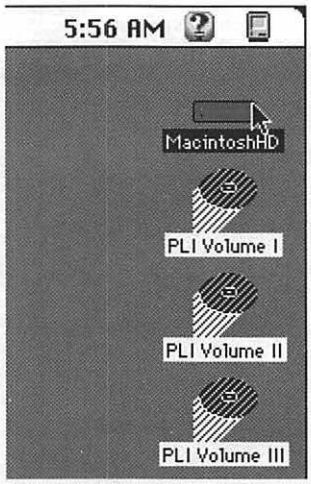


Figure 3.3 *Positioning the pointer.*

move the mouse while clicking on the mouse button, which results in the pointer moving off of the icon and nothing being selected.

Double-Click (v.) 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.

3. You will see a window open on the desktop; it should look like Figure 3.4. This window displays the contents of your hard drive and is different from the Get Info window we looked at earlier. It has more components and is displaying something different. Each of the window's parts are marked in Figure 3.4 and defined in the list below.

Figure 3.4 shows the hard drive window and the names of the window's elements or controls. Some of these are informational only, while others are used to manipulate the window itself. With your mouse (by clicking or dragging), you can move, change the size, view different areas of the window, or close the window.

Title bar The horizontal bar at the top of a window that shows the name of the window's contents. You can move the window by dragging the title bar.

Zoom box A small box with a smaller box enclosed in it found on the right side of the title bar of some windows. Clicking the zoom box expands the window to its maximum size; clicking it again returns the window to its original size.

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

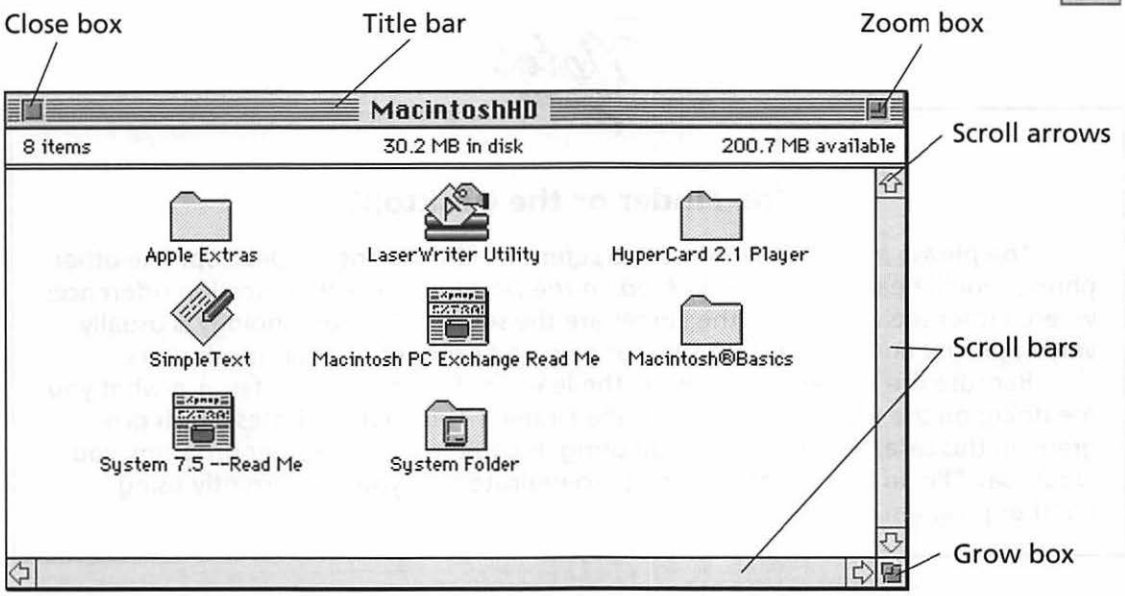


Figure 3.4 *The hard disk window.*

Scroll arrow An arrow at either end of a scroll bar. Clicking a scroll arrow moves a document or directory one line. Pressing a scroll arrow moves a document continuously.

Grow region A window region, usually within the content region, where dragging changes the size of an active window.

Go-away region A region in a window frame. Clicking inside this region of the active window makes the window close or disappear.

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

Scroll (1) To move a document or directory in its window so that a different part of it is visible; (2) to move all the text on the screen upward or downward and, in some cases, sideways.

Inside the window in Figure 3.4, you will see icons that represent the contents of a hard drive. When you look at your own Mac, you will be seeing the contents of your hard drive. You will access, open, or otherwise manipulate what is on your hard drive with your mouse. The only times you'll use your keyboard while *in the Finder* will be to type names or to issue keyboard equivalent commands.

However, before working inside of the window, we are going to learn how to manipulate the window itself. Actually, we're going to learn how to manipulate two windows that are open in the Finder. The following exercises will step you through each of the basic operations that you can perform on a window.



The Finder or the Desktop?

The phrase *in the Finder* is used to reference the Macintosh Desktop. The other phrases you'll hear are *on the Desktop, in the Desktop,* and other location references where either the Desktop or the Finder are the subject. This terminology is usually very imprecise and can be confusing for new and experienced Macintosh users.

Because the Finder is a program, the least confusing way to reference what you are doing on the Mac is to say "I'm in the Finder." This communicates which program, in this case, the Finder, you are using. If you are using another program, you would say "I'm in [the program name]" to indicate that you are currently using another program.

Working with the Window

The window in Figure 3.4 is representative of a normal Macintosh window. It is has all of the elements of the windows you'll use when working with other applications, so the principles you'll learn here, in most cases, will apply to your other Macintosh programs.

As you work through these exercises, keep in mind that what you're learning here will apply to the other programs that you'll use on your Macintosh. If you start by learning the principles rather than the individual steps, your Macintosh experience will be much easier. However, because you're learning principles, you will encounter programs that do not always follow the rules and you will have to think about what you're doing until these steps become automatic.

With the Mac, you need to become aware of a variety indicators. This process is called feedback. If your Mac is not waiting for you to do something, it will provide you with indicators so that you know what it is doing and it's status. Some of the things it will tell you are:

- Which window is active
- What item(s) are selected
- When it is busy and unavailable
- If it is waiting for you to do something

As you work through the exercises, keep the concept of feedback in mind and look for similarities from one example to the next. Then, when you start working with programs, look for similarities between programs and how they work. After awhile, you'll learn that, up to a point, all Macintosh programs have the same features and capabilities.

All of the documents you create using programs on your Macintosh will appear in a window. In this sense, the window is your document. But some programs, like the

Finder, do not produce documents. Instead, the Finder's window tells you what is inside your Mac and how your data is organized. Understanding this will make it possible for you to use a wide variety of Macintosh programs, even those you've never used before. Now, on to the exercises.

Inside the Window

In this section you're going to do a series of exercises. These exercises have several goals in mind:

- To get you familiar with using the Finder
- Demonstrate how window controls operate
- Provide a practice space for using your mouse
- Demonstrate the features of any standard window

Each of the exercises are based on the definitions given in the section, "The Anatomy of a Window," or operations that can be performed from the Finder. The window objects that were defined are also the controls you will want to know how to use. The lessons in this section are:

- Selecting, hiding, and moving a window
- Hiding the window
- Using the zoom box
- Using the grow region
- Scrolling the window contents
- Using multiple windows
- Viewing the contents of a window

Figure 3.5 is the same window we opened earlier, only it is shown as it would appear on your Desktop. Your Desktop should look similar to Figure 3.5. The steps for getting to this point are in the section, "The Anatomy of a Window."

While you perform the following exercises, if you have trouble with one of them or one of the steps in an exercise, take your time and practice. Being able to perform the steps listed below is essential to using your Mac. If you find yourself getting frustrated, take a break.

Selecting and Moving a Window

First, you're going to move the window around. You can position a window anywhere on your Desktop.

To practice selecting and moving a window:

1. Select the window. You can have only one window selected at a time; when a window is selected, it will have six horizontal lines that fill the title bar on either side of the window's name.

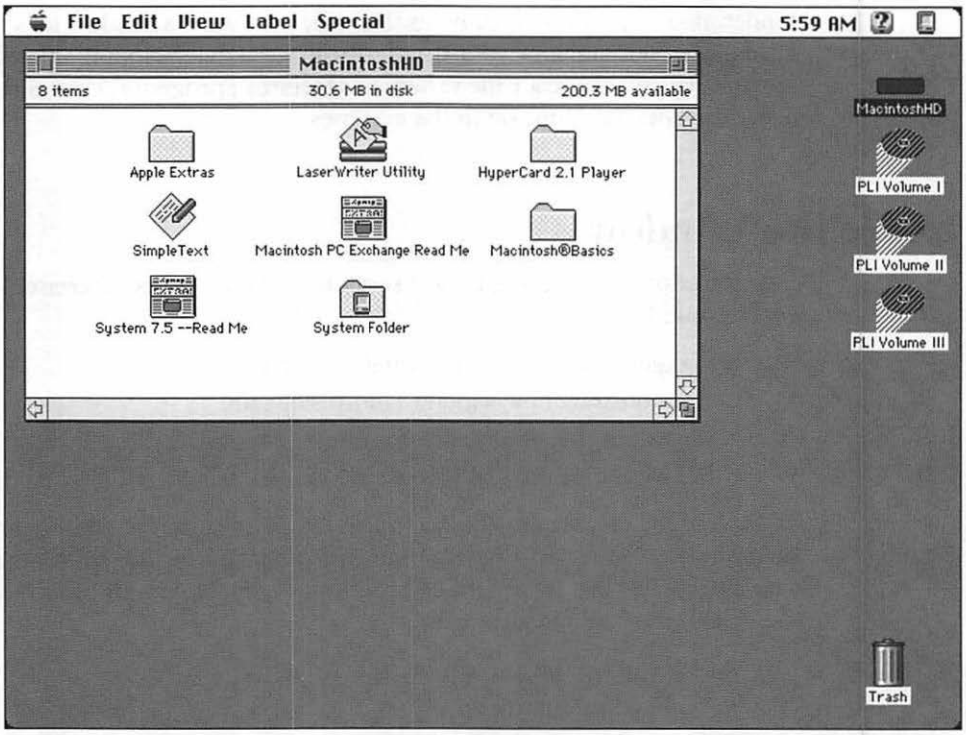


Figure 3.5 *The Desktop with an open window.*



The System Version

Although it is a little early to talk about what version of the Macintosh System your Mac is running, but it is a question that will consistently come up. How your Mac behaves will depend on the System version. The examples in this book are based on the Macintosh System version 7.5, which is the latest version of the system.

To determine which version of the System you're running, follow these steps while in the Finder:

1. Select the Apple menu.
   The Apple menu is on the far right and is an icon that looks like an Apple. (See figure 3.5)
2. Select the menu item, About This Macintosh...
3. A window like the one in Figure 3.6 will appear.

Notes

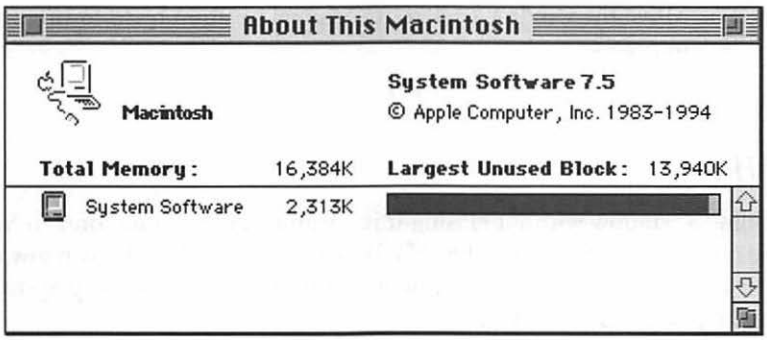


Figure 3.6 *The About This Macintosh window.*

4. After checking the system version, close the window by clicking in the Go-away box.

2. Click the desktop outside of the window. When you do this, the window is no longer selected and the bars in the title bar disappear (Figure 3.7)
3. Click on the window to select it again; notice that the bars reappear in the title bar.
4. You move a window by dragging it by the title bar. Remember, dragging is the action of placing the pointer on the object (in this case the title bar) and

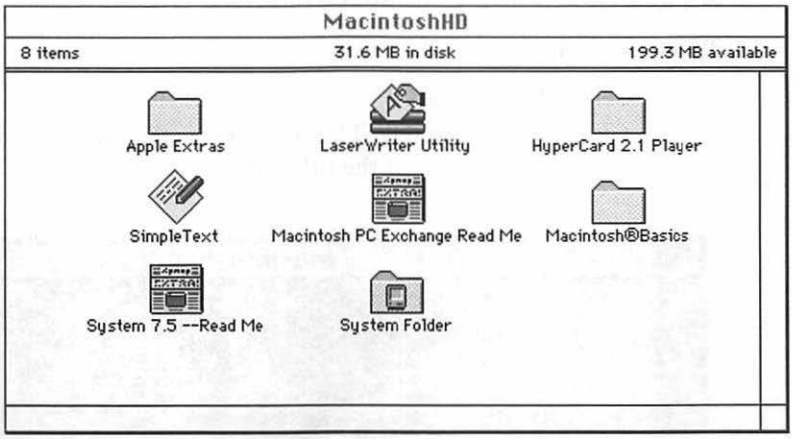


Figure 3.7 *The window when it is not selected.*

depressing the mouse button and then moving the mouse. As the pointer moves, the window will also, and you can then move the window to a new location. Drag the window from one side of your screen to the other. In Figure 3.9 you will see that the window has been moved from the right side of the screen to the left.

5. Move the window back to its original position by following the above steps in reverse.

Hiding the Window

Hiding a window without closing it is a feature that is found only in System 7.5 (see the note, "What System Is This?"). If, when you try this, the window does not function as described in these steps, then you are probably not using System 7.5 and you should just go to the next lesson.

To hide a window:

1. Double click on the title bar; the window will disappear, leaving only the title bar, as shown in Figure 3.8.
2. Double click on the window's title bar again and the window reappears.

This feature is useful when you are using multiple windows and want to leave a window open, but do not need it immediately. A window can be selected even though it is hidden, but you will have to check the title bar to determine the windows status. Hiding or displaying a window automatically selects the window.

Using the Zoom Box

The Zoom Box is used to expand a window so that it completely reveals the contents of a window or fills the Macintosh screen.

To zoom a window:

1. Select the window.
2. Click in the zoom box. The zoom box is the small square within a square on the right-hand side of the title bar.



Figure 3.8 *The window with only a title bar showing.*

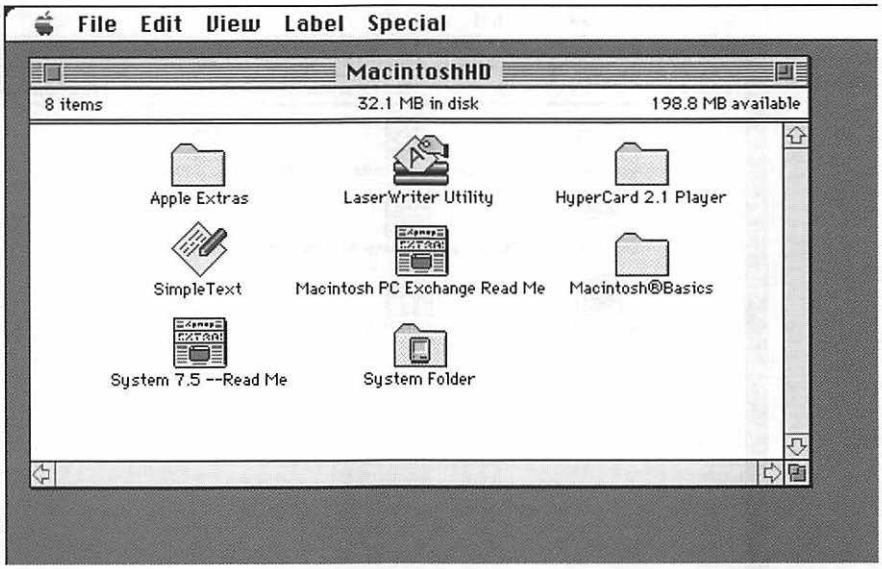


Figure 3.9 *An expanded window.*

3. The window will expand to display everything in the window or fill the Mac's entire screen. (See Figure 3.9.)
4. Click in the zoom box again, which will return the window to its original position and size—or to its *default* position.

Default A value, action, or setting that a computer system assumes, unless the user gives an explicit instruction to the contrary.

Defaults are settings that are automatically assumed by the computer. In this example, the original position of the window is considered to be a default but it is a default that you have set. Some defaults are set by the Macintosh and are unchangeable.

Using the Grow Region

The Grow region is often called the *grow box*. It is the window control that you use to set the default size or visible area of a window. The grow box is located in the lower right-hand corner of the window. You will use this function to change the size of a window, and when you are working with multiple windows.

To change the size of the window:

1. Select the window.
2. To increase the visible area of a window, drag the grow box down and to the right. To decrease the visible area of a window, drag the grow box up and to the left. Figure 3.10 shows the window we've been working with, after it has been enlarged.

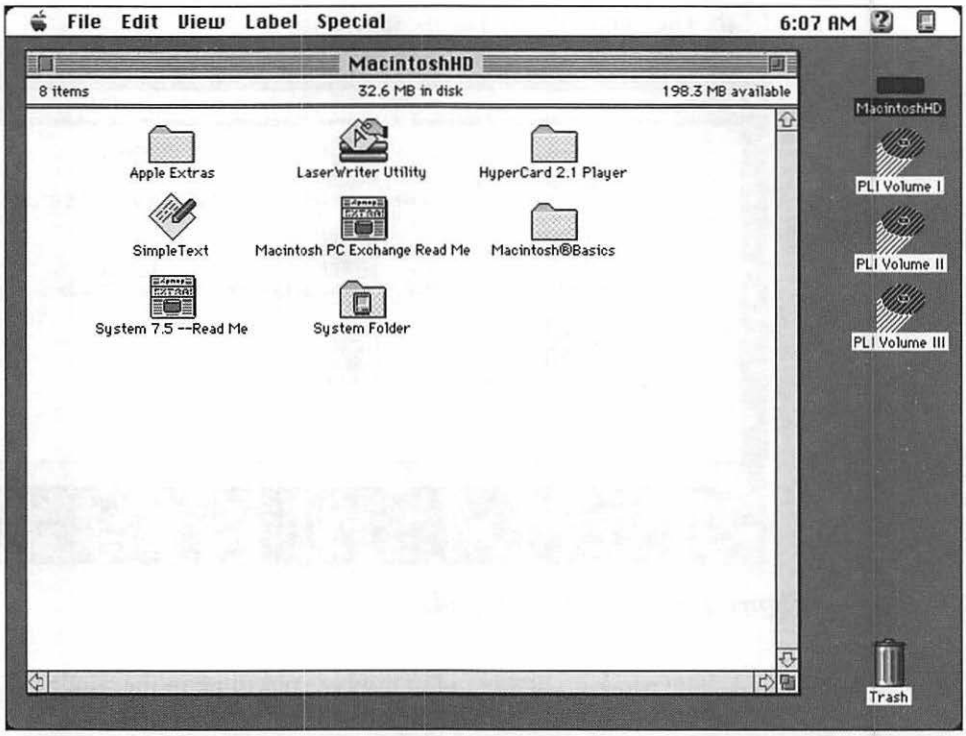


Figure 3.10 *An expanded window.*

3. Once you've changed a windows size, click on the zoom box.
4. Click on the zoom box again. Notice that the window returns to the new size and position that you've set. This is the new default setting for your window, which includes the window's position and size on the screen.

Some windows, when you are using a program, will not have a grow box. The grow box is an optional feature that a programmer can choose not to include. Usually, your program windows will have all of the same features found in Finder windows, but not always. If you have a program that does not have all of the window elements we're discussing, do not be alarmed; it is just a quirk of the program you're using.

Viewing the Contents of a Window

There are several different ways to view the items in a window while in the Finder. The method you'll eventually select will depend purely on personal preference, but you need to be aware of and know how to adjust your viewing method.

You can select the view of a window based on the file attributes of the items in the window. A file attribute is a property associated with a file. A file is the generic name for referring to the items you see inside a window while in the finder. Files are discussed in detail in Chapter 5.

File Any named, ordered collection of information stored on a disk. Application programs and operating systems on disks are examples of files. You make a file when you create text or graphics, give the material a name, and save it to disk; in this sense, *file* is synonymous with *document.*

When you are in the Finder, you can use one of seven attributes for viewing the contents of a window or your files. These attributes are found in the view menu, and they are:

- By Small Icon—Displays all files using a small icon.
- By Icon—Displays all files using a large icon.
- By Name—Displays your files alphabetically in a list.
- By Size—Displays your files starting with the largest file down to the smallest file, and then alphabetically.
- By Kind—Displays your files according to each file's kind. Every file is either a folder, application, system file, or a document created by an application. (You will learn about the different kinds of files in Chapter 5.)
- By Label—Displays your files according to a label that you have assigned to the files.
- By Date—Displays your files according to the date each file was last modified or created.

The default view is by Icon. The *by Icon* or *Small Icon* views allow you to arrange your files in any order and to place them in any position, while the other five views are called list views and arrange your data first by the attribute selected and then alphabetically.

In all of the figures up to this point, the view has been set to *by Icon* view mode. Figure 3.11 shows what a window looks like when its view is set to *by Name.*

To change a window's view:

1. Select the window.

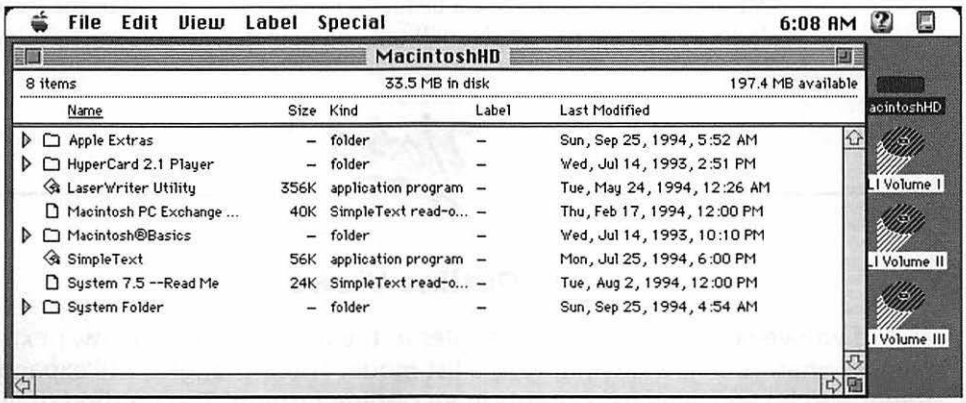


Figure 3.11 *A window viewed by name.*

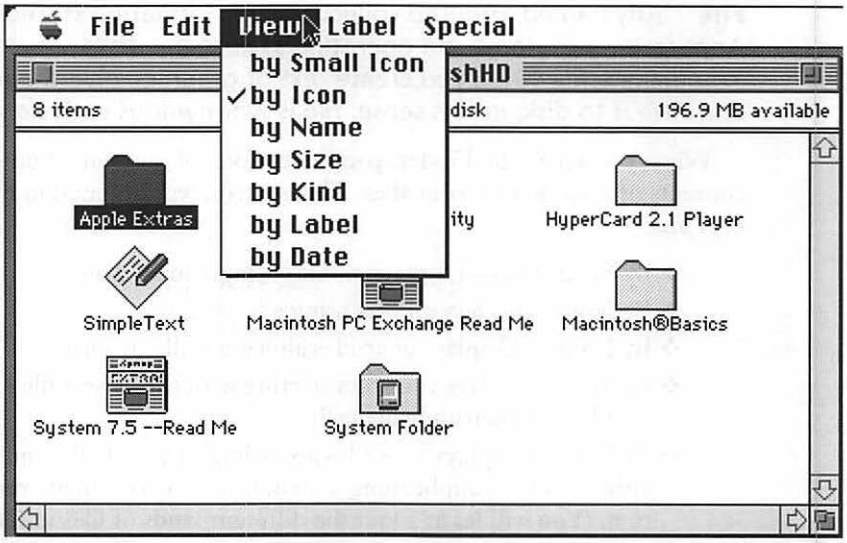


Figure 3.12 *The View menu.*

2. Select the View menu. Notice that one of the view options will have a check mark next to a view selection (see Figure 3.12). The check mark indicates the view mode that is currently selected. Notice that *by Icon* is the selected view mode.
3. Drag down to the view selection you wish to use and release the mouse button.
4. The window will change and display its contents according to the view mode you have selected.

Figure 3.13 shows the same window after the *by Name* view mode has been selected. In the window, you should notice that it now has a header line that indicates how the information in the window is viewed. In Figure 3.13, the word *Name* in the header is underlined.

A Finder window will have a header whenever it is viewed in the list modes. The underlined word in the header will tell you how the information in the window is



Outline Views

If you've noticed, there are triangles in the margin of a window, next to folder names, when you view a window in a list mode. These triangles will expand the folder and let you view its contents in an outline fashion. This method of viewing information will be discussed in Chapter 5.

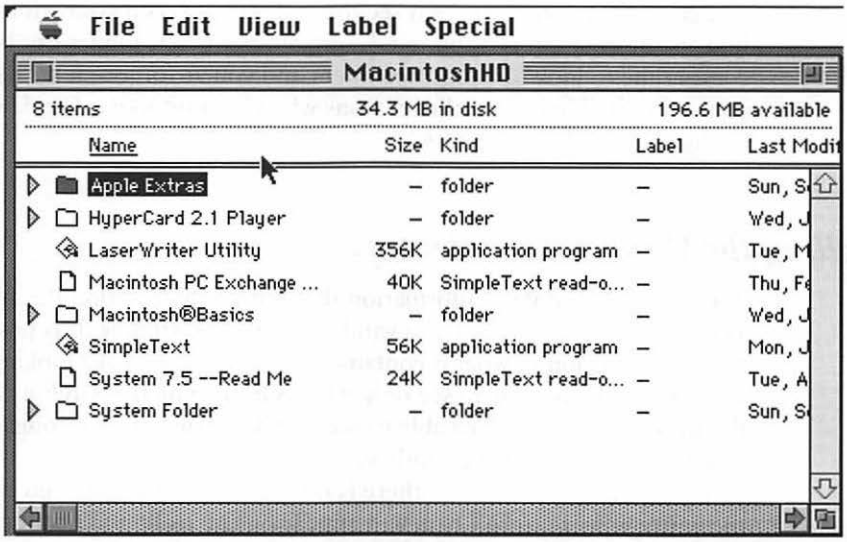


Figure 3.13 *The window viewed by name.*

sorted, and you can quickly change sorting order of the information without using the View menu. To change how your information is viewed while in the list view mode, just click on the header name.

To demonstrate this, click on the word *Size* in your windows header, then click on the word *Name*. The information in the window will be sorted by size and then by name. Figure 3.14 shows the same window we've been using, with the information sorted by size.

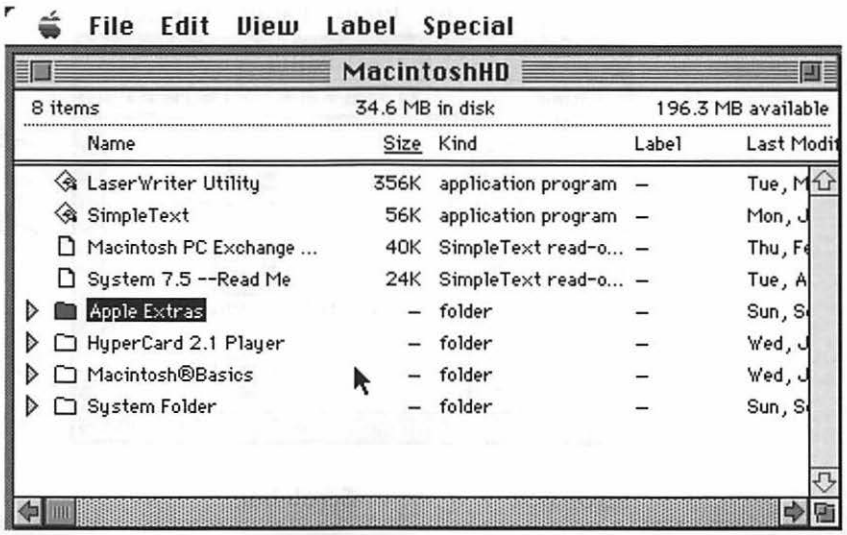


Figure 3.14 *The window viewed by size.*

Before going on to the next section, experiment with your window by changing how its information is displayed. Using different view modes can be useful when it comes time to look for some document and you've forgotten it's name or where you've put it. There are other reasons why you want to use list views, but those will be discussed in later chapters.

Scrolling the Window's Contents

A Window can contain information that is not visible within the area of the window as it is displayed. This is why a window is called a window. It is possible for you to see only a portion of what is contained in the window—like looking through a real window and being able to see only what is framed by the window. If you could move the window, you would be able to see another view but you would still be constrained by the size of the window.

When this is the case and there is more in a window than you can see due to the window's size, scroll bars will appear on the right and bottom of the window. Figure 3.15 shows a window that contains information that is not visible. Notice the scroll bars.

The process of moving the contents of a window to see what is not visible is called scrolling, hence the name scroll bars. Think of the window and scroll bars as an ancient Roman scroll, where, as you read the scroll, you have to roll it on one end and unroll it at the other.

Scroll (1) To move a document or directory in its window so that a different part of it is visible; (2) to move all the text on the screen upward or downward and, in some cases, sideways.

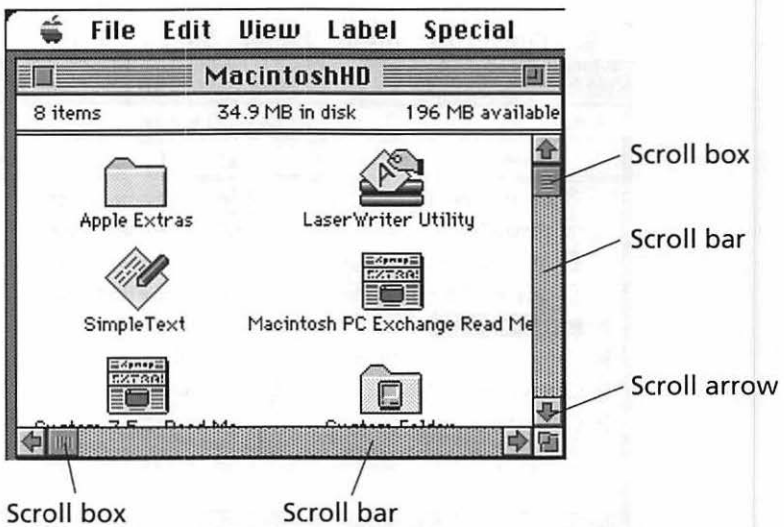


Figure 3.15 *A window with scroll bars.*

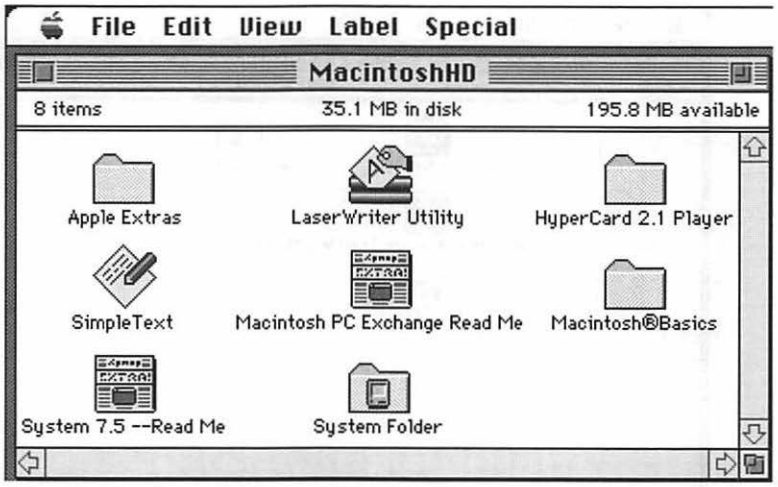


Figure 3.16 *A window with an inactive scroll bar.*

Active scroll bars indicate that the window contains something you cannot see. An *active* scroll bar is one that is gray and has a scroll box and arrows. The term *active* means that a control can be used; all of the window controls we're discussing are active if you can use them.

If the scroll bar is inactive, as in the window in Figure 3.16, it means that you're viewing the window's entire contents.

To see what is hidden in the window, you have to move the window's contents by manipulating the window controls, as indicated in Figure 3.15. Scroll controls are a consistent element for all Macintosh application windows and there is a set of rules that govern how these controls work. To demonstrate how the scroll bars work, we'll do an exercise that will use much of what you've learned in this chapter.

The following steps will demonstrate how scroll bars work:

1. Select your window.
2. Click in the window's zoom box so that the window expands to fill your screen. If the window does not fill the entire screen, use the window's grow box and expand the screen manually so that it fills or almost fills your entire screen.
3. From the File menu, select *New Folder.*
4. Select the new *untitled folder* that is created and drag it to the lower left-hand corner of the window. Be careful that you don't drag the folder outside of the window (see Figure 3.17).
5. Reduce the window's size by using the grow box. You should reduce the window so that you cannot see the folder you just created. Figure 3.18 shows how your window should look; compare Figure 3.18 with 3.17.

Notice that your window has scroll bars across the bottom and on the right-hand side of the window. Now, you can experiment with the scroll controls. In Figure 3.15,

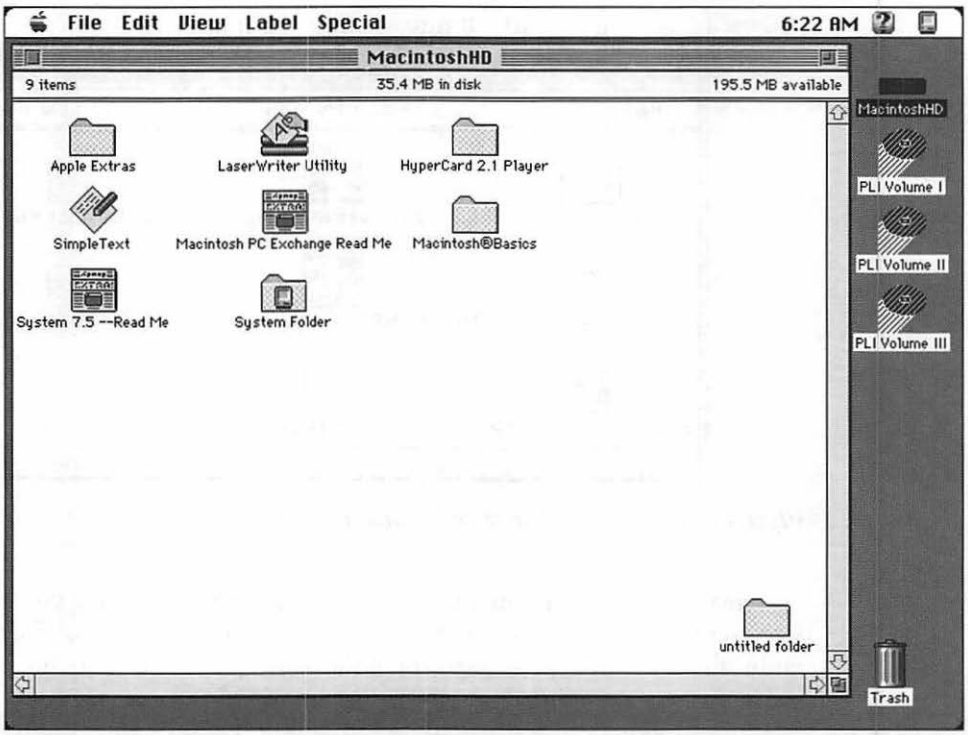


Figure 3.17 *The expanded window with an untitled folder.*

all of the scroll controls are marked. The following list explains the use and function of each control:

- Scroll box—The scroll box serves two functions: First, it is an indicator that shows what portion of the window you're viewing. The indicator function is relative to the size of the window, and the scroll box shows the window's

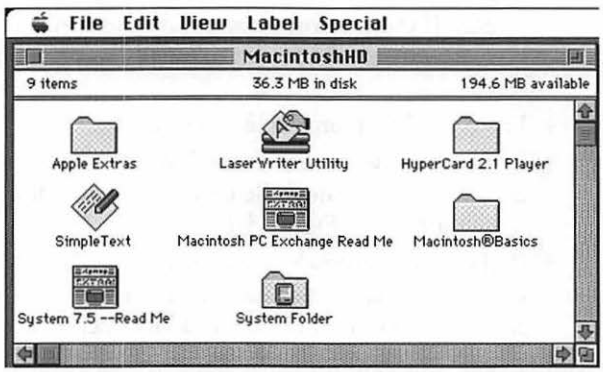


Figure 3.18 *The reduced window.*

position relative to the top and bottom or the left and right of the window's contents.

Second, it is a manual control for moving the window's contents. By dragging the scroll box, you move the window's contents up and down or to the right and left, depending on which scroll box you're manipulating. In Figure 3.19, notice that the scroll boxes are to the far right and bottom of the window, and that the untitled folder is visible.

- Scroll arrows—The scroll arrows are manual controls that, when clicked, move the window's contents one line in the direction indicated by the arrow. If you are using the vertical scroll arrows, the window's contents will be moved one row up or down, depending on the arrow you use. The horizontal scroll arrows move the window's contents one column to the left or right.

  When you are in the Finder, a column or row is defined by the icons on the screen. A column is equivalent to the width of an icon, and a row equals an icon's height. For other applications, a row or column can be a line of text, numbers, or part of a picture.

Row A horizontal arrangement of character cells or graphics pixels on the screen.

Column A vertical arrangement of graphic points or character cells on the display screen.

Rows and columns are defined by the primary screen element of the program you're using (the Finder uses icons) or the amount of space that an icon uses. A word processor uses letters and numbers (alphanumeric characters), so a row would be a row of letters like a line on a page, while a column will usually be defined by an arbitrary amount of space, such as a half inch. Each program will utilize the scroll arrows in its own fashion, and you'll have to experiment; but the basic rules described here will usually apply.

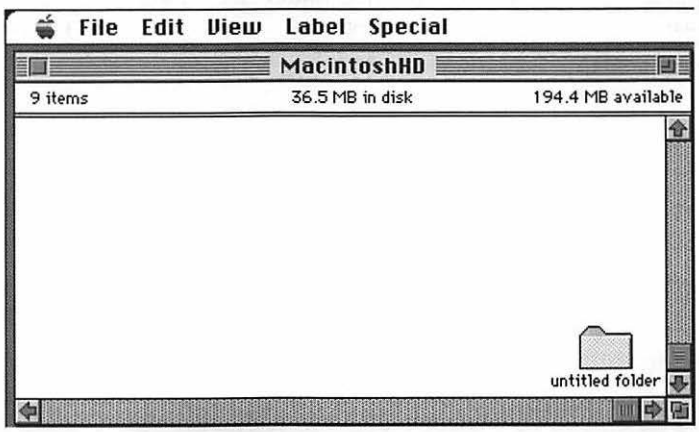


Figure 3.19 The scroll boxes at the right and bottom.

- Scroll bars—The scroll bars are the gray areas between the scroll arrows. In addition to being indicators to show that the window contains additional information, they are also controls. When you click in a scroll bar you will be clicking between a scroll arrow and the scroll box. Clicking scrolls the window one screen height or width in the direction of the scroll arrow. Placing the pointer in the scroll bar and holding the mouse button down causes the window to scroll rapidly, because the Mac interprets the continually depressed mouse button as rapid and continuous clicks.

Using Multiple Windows

One of the features of the Macintosh is that you can have multiple windows open simultaneously. In addition to multiple windows, you can also run several programs simultaneously. However, you can have only one window active at a time.

To start with, we are going to open multiple windows while in the Finder. When you first get your Mac, you might have a couple of folder icons in your hard drive's window. However, if you don't, you should have at least two at this point: the untitled folder you created earlier and the System Folder.

To open the untitled folder:

1. Scroll to the untitled folder.
2. Double click on the untitled folder.

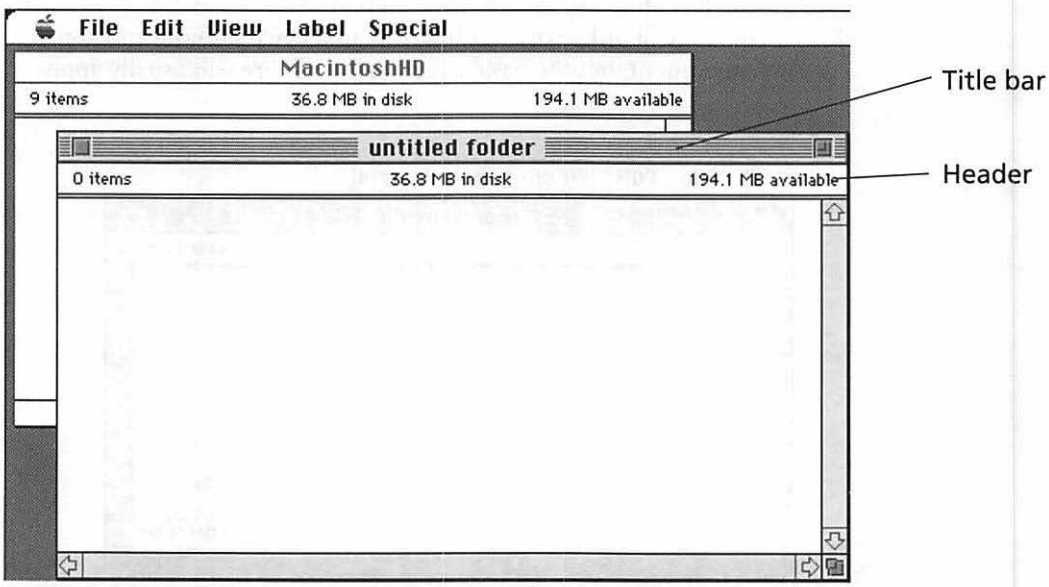


Figure 3.20 *The untitled folder in front of the hard drive's window.*

When you open this folder. it will appear as a window in front of your hard drive's window. Your screen should look something like Figure 3.20.

The things you should notice about this window are its header and the title bar. The header will tell you how many items are in the folder (in this case, it should say 0), how much disk space is used, and how much is available. The title bar will say *untitled folder* and it will be the active window, signified by the lines in the title bar. The hard drive window will be open but its title bar will be clean, without the horizontal lines indicating that it is inactive.

It is possible that the untitled window will fill up a large portion of your screen, so you should:

1. Shrink the size of the window with the grow box.
2. Move the window, dragging it by the title bar, so you can see the hard drive window behind the untitled folder window.

Once you can see the hard drive window, you can switch back and forth between the windows. This is done by positioning the pointer in the window you want to activate and then clicking. When you click in a window that is not active, the window is brought to the front and activated.

Get used to using multiple windows; it can be confusing to have a half dozen windows open at the same time. Some programs have a window menu that will let you quickly move from one open window to another, but the Finder does not have this ability.

Toward this end you might want to create a few more untitled folders. Each new untitled folder you create will be named *untitled folder*, with a sequence number, such as 2, 3, or 4, for each successive window you open. Thus, the second new folder you create will be named *untitled folder 2*.

Make a few folders and practice opening, closing, moving, and switching between them. If you spend half an hour now developing this skill, using your Mac will be easier later on.



Clicking Too Much

One of the most common mistakes made by a new Macintosh user has to do with clicking the mouse. You will have to be conscious of when you perform a single click verses a double click, because you might run programs that you didn't want to run or open windows, you did not want to open.

A Few Comments about Using Windows

The art of utilizing your windows involves using all of the controls listed in this section. On the surface, each of the manipulations you can perform is fairly basic. However, by practicing and using these controls together, you will soon be jumping from window to window, making your Mac do what you want.

More about Menus

In this section, you're going to look at the Finder's menus and learn how to use menus in general. While windows are used to view and work on your documents, menus are where you'll find the program's controls. You've used some of the Finder's menu functions in the last two chapters, but you haven't really learned about menus.

Menus are one of the ways you tell a program what you want it and, by extension, your Mac to do. To make using programs easier, Apple established some guidelines for programmers; the result is that program menus are similar for all Macintosh programs.

Menu Elements

All Macintosh programs have the same menu structure, which consists of a menu bar, menu titles, and menu items. Figure 3.21 shows the Finder's menu bar, a menu title, and the menu items from the File menu.

Menu title A word, phrase, or icon 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.

Menu item A choice in a menu; usually, a command to the current application.

In Figure 3.21, you will see that some of the menu items are black and others are gray. The black menu items can be used or are active, while the gray ones are inactive. A menu item is inactive because is requires a special condition to be active—usually, the selection of a specific object. When using the Finder, you usually need an icon or window selected. Once an icon is selected, other menu items become active, as shown in Figure 3.22

Compare the items in Figure 3.22 with Figure 3.21 and you'll see the menu items that are now active, because there is a folder selected in the open window. In general, this principle operates in all Macintosh programs, not just the Finder. Some specific condition must exist for some of the menu items to be active; those that are active all the time will always affect your document.

As you worked through the exercises in the last section, you used several different menu commands, so you already know how to access and use menus. What you have to learn is what the different menus and menu items do. However, rather than pre-

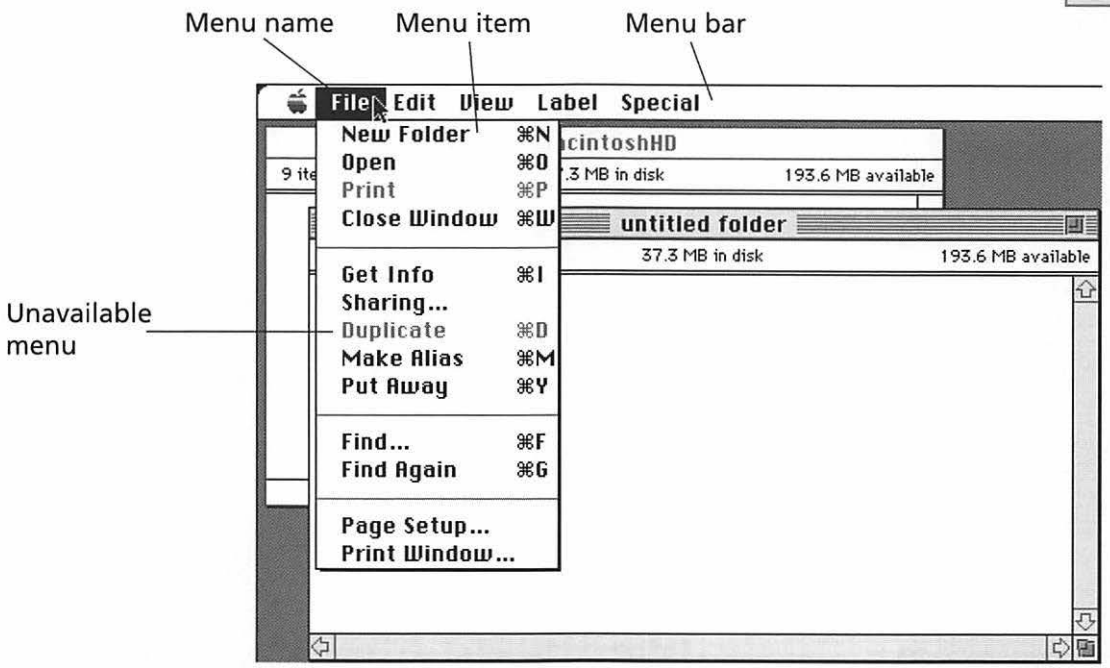


Figure 3.21 *The Finder's File menu.*

sent a list of all the menu items and provide a definition, you'll learn what the menu items do as you work through the first part of this book. By the end of Chapter 5, you'll have a good grasp of how the Finder works, including the menu items and their functions. Also in Appendix B, you'll find a list of shortcuts that apply to the Finder and some of the rules that govern how the Mac operates.

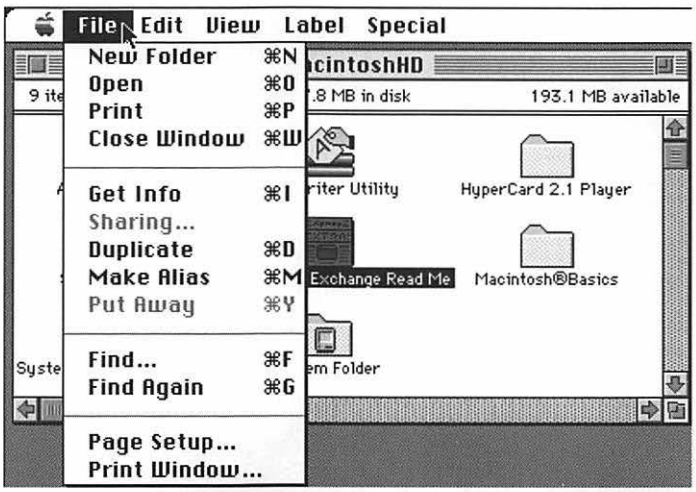
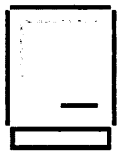


Figure 3.22 *Active menu items in the Finder's File menu.*



CHAPTER 4

Using Macintosh Software

The whole purpose in having a Macintosh is to run your favorite software. Whatever software you're going to use will have specific characteristics—some characteristics are common to all Macintosh software and others will be unique to a particular piece of software (or program).

In Chapter 3, windows and menus were discussed. In this chapter, we're going to look at using a program that comes with every new Macintosh. This look is an in-depth exploration of the SimpleText program. In addition to learning this program, you will learn about the features that SimpleText has, which are common to all Macintosh programs.

Macintosh software is designed so that once you learn the basics of one program, you can immediately use other programs, because they all share some features. You won't be an instant expert with every new program you pick up, but the amount of time you need to become proficient will be greatly reduced.

As you progress through this book, the language becomes more technical and it is assumed that you know the information that has been presented in previous chapters. In this chapter, you will not find instructions for scrolling through windows or for selecting menu items. Instead, you will be told to scroll the window or to select a specific menu. If you find that you're having trouble with these operations, you should review Chapters 2 and 3 about using your Macintosh before proceeding. Each successive chapter will make similar assumptions.

What's a Program?

The only program we've really looked at so far is the Finder, which is not a good example, because it is always running and you do not have to start it. In a sense, the Finder is a program that lets you use all of your other Macintosh applications, which makes it similar to the Macintosh's master program.

Program (n.) (1) A set of instructions describing actions for a computer to perform to accomplish some task, conforming to the rules and conventions of a particular programming language; (2) a file containing coded instructions to the computer.

Any other program you use on your Mac must be started, run, or booted. These terms are all ways of saying the same thing. Somehow, you have to access to the program. Once the program is running, you can use it to create or modify your documents.

Document Whatever you create with an application program—information you enter, modify, view, or save.

Most programs you use will display the documents in a window and you'll access the program's features through its menus, which is why they were discussed in the last chapter. So, before you continue, if you are not familiar with either menus or windows, you should review Chapter 3.

Otherwise, continue on and we'll look at the basics for using programs. Keep in mind that, although we're using a specific program as an example, every Macintosh program will behave in a manner similar to the one in our examples.

Starting a Program

Before you can use a program, it has to be started or run. Depending on the type of program you're using, it can be started in one of two ways. You can either manipulate the program's icon or the icon of a document created by the program.

Run To start a program. When you run a program, you are telling your computer to load the program from your hard disk into memory so that you can use it.

Figure 4.1 shows the Macintosh with an open window. In the window, you will see an icon named SimpleText, which is a text processor, a program used to type documents, such as memos and letters. (The section called "Types of Macintosh Software," toward the end of this chapter, describes the basic categories of Macintosh software.) SimpleText is not a sophisticated program; hence, the name.

If you are using an older Mac, the program you'll be using is called TeachText, SimpleText's predecessor. Figure 4.1 assumes that you just opened and started your Mac and shows what you would see if your Mac were new. If you are somewhat familiar with your Mac or have been experimenting with it, your screen will probably not look like Figure 4.1.

If your screen does not look like Figure 4.1 or if you cannot find the SimpleText program (from here on, read TeachText if you don't have SimpleText), you will have to search for it. If you need help finding SimpleText, you should jump ahead to Chapter 5 and read the section titled "When Your File Is Not Where It Should Be."

To open SimpleText directly:

1. Double Click on the application's icon.

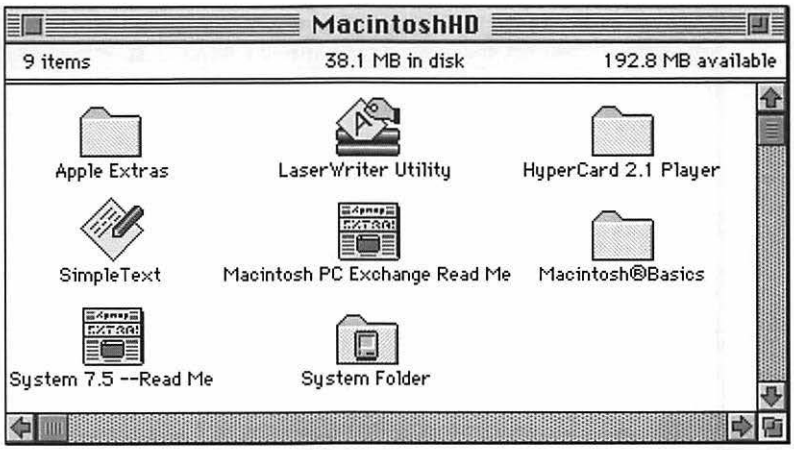


Figure 4.1 *The SimpleText Icon.*

2. Select the application by clicking on it and select the Open command from the Finder's File menu.
3. Select the application by clicking on its icon and use the keyboard equivalent (⌘+**O**) for the Open command from the Finder's File menu.

Performing any one of the above actions will cause SimpleText to start. When it starts, you'll see a rectangle zoom out from the program icon and your pointer icon will turn into a watch icon.

Whenever you see your pointer turn into a watch icon or some other animated icon, it means that your Macintosh is busy performing some task. You cannot regain control until your Mac has finished whatever task it is doing. You will see examples of other animated cursors throughout the book. Once SimpleText has started, your screen will look like Figure 4.2.

Using a Program

Now that you've a program up and running, what do you do with it? Well, for starters, just type a few words on your keyboard. As you press each letter, it will appear in SimpleText's window. Now, type a paragraph; do not press the return key as you type. Your typed words will be handled differently from a typewriter; if you've used a computer before, you probably know what I'm talking about. This feature of most text and word processors is called a word wrap, where the program automatically starts a new line of text when the end of the previous line has been reached.

By now, your screen should look something like Figure 4.3. The text you've entered will be different.

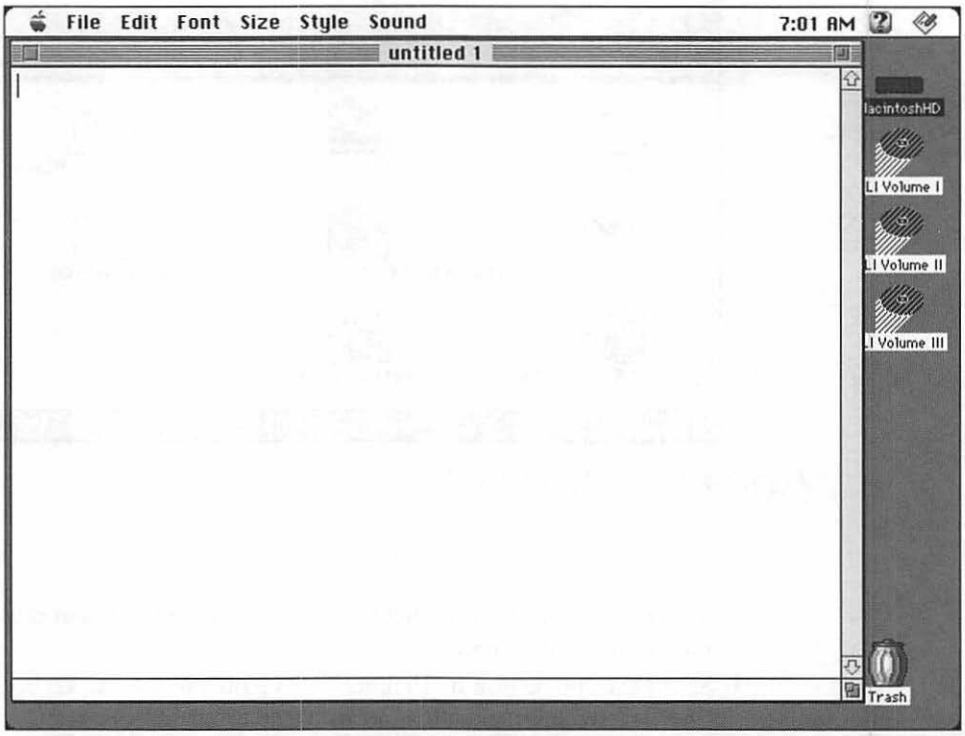


Figure 4.2 *SimpleText, up and running.*

Now, there are some specific things you should notice about how your Mac behaves. Each of the items listed below applies to all Macintosh programs, not just SimpleText.

- As you move the pointer across the screen, it will change into an I-beam (I) as it enters SimpleText's window.
- When you type, you will see a blinking indicator called the insertion point (|), which indicates where the letters and numbers will appear when you type.
- To change the position of the insertion point, you have to place the I-beam where you want the new letters to appear, and click the mouse button.
- As soon as you move the pointer outside of the window, it becomes the standard Macintosh pointer.
- Whenever the pointer is an I-beam, it has become a text manipulation tool
- It is possible to select letters, words, paragraphs, and entire documents so that you can manipulate the text.
- Any selected text can be copied or cut (removed) and subsequently pasted into the same document or another document.

Insertion point The place in a document where something will be added, which is represented by a blinking vertical bar. You select the insertion point by clicking where you want to make the change in the document.

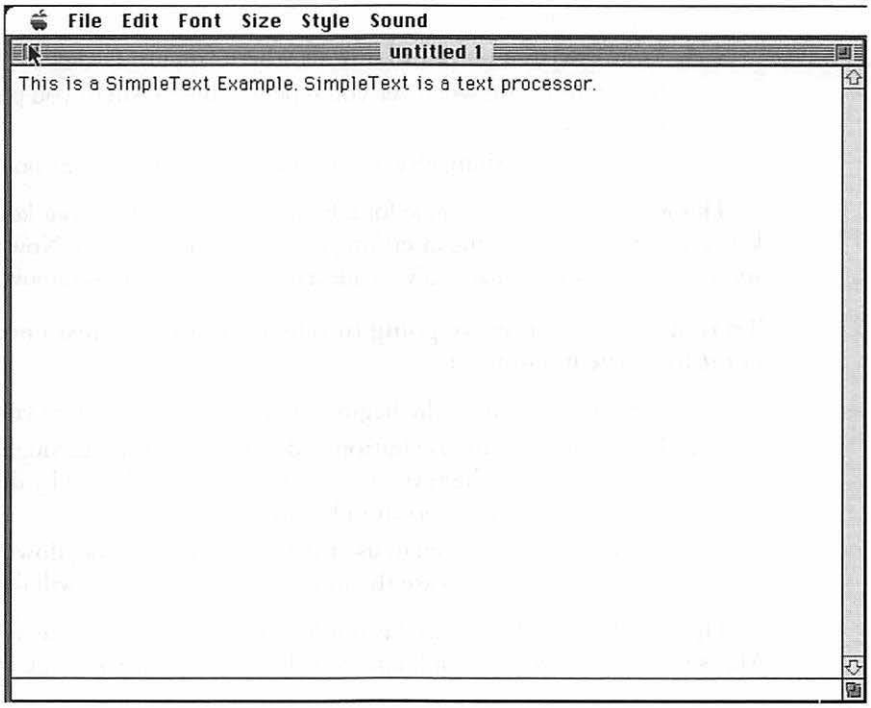


Figure 4.3 *SimpleText with some writing.*

I-beam A type of pointer shaped like the capital letter "I" and used in entering and editing text.

When you consider what can be done with just a simple text processor, you begin to see some of the advantages and complexity involved in any Macintosh program. For the remainder of this section, we're going to look at these features.

Manipulating Text

At the moment, SimpleText should look something like Figure 4.4 in the last section. In this section, we'll go through the steps you need to learn to manipulate what you've already typed. Each of the capabilities listed in the last section will be covered.

What you'll learn in this section is critical to successfully using your Mac. Every one of these functions is standard for every Macintosh program you'll use, including the Finder. Of course, there are always some exceptions to the rules and any programs you might find that do no react as described are aberrant.

To insert some text into your document:

1. Locate your insertion point (|).
2. Move your I-beam (I) to someplace where there is text, other than where your insertion point is located.

3. Click the mouse.
4. Your insertion point will now be where you just clicked.
5. Start typing and whatever you type will begin where you placed the insertion point.
6. Do not do anything else; the next example starts at this point.

This is the standard technique for editing text. If you press your keyboard's delete key, the text to the left of the insertion point would be removed. Now that you've added some text, let's assume that you've made a mistake and want to remove the new text.

To remove the text, we're going to select the text you just entered and then cut it from the document:

1. Place the I-beam at the beginning or the end of the text you just entered.
2. Hold down the mouse button and drag the I-beam through the text you want to select. The text will indicate that it is selected by displaying the text in reverse video, as shown in Figure 4.4.
3. Once the text is selected, use the Edit menu and drag down to the Cut menu item. When you release the mouse, the selected text will disappear.

The text that just disappeared is not lost; it has been moved to a section of the Mac's memory called the Clipboard, which is a temporary storage area for items that

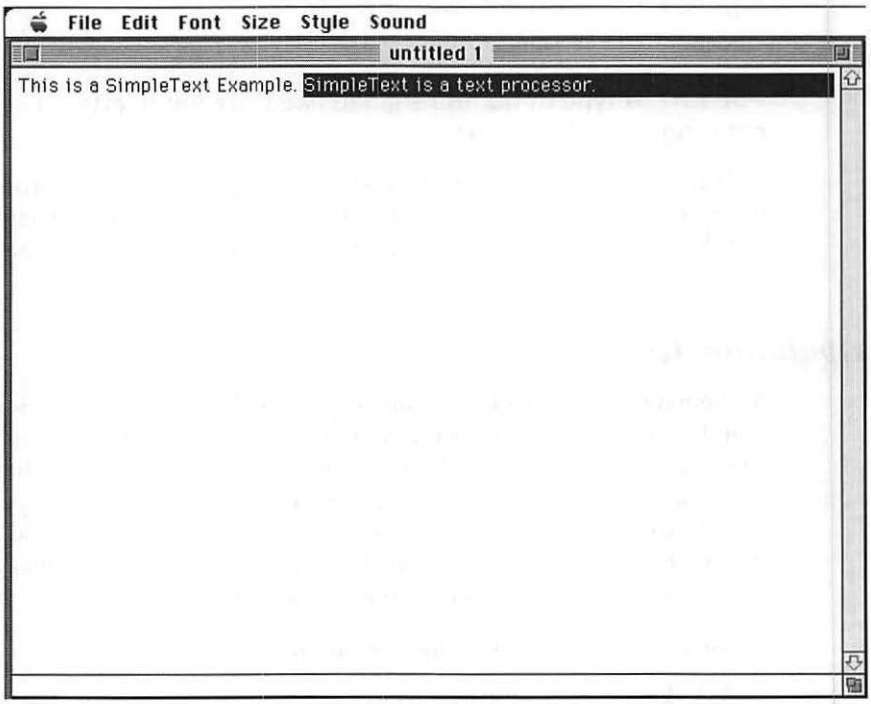


Figure 4.4 *Selected text.*

are either copied or cut. The Clipboard will hold only the last item you copied or cut. You cannot store multiple items in the Clipboard.

Clipboard The holding place for what you last cut or copied; a buffer area in memory. Information on the Clipboard can be inserted (pasted) into documents.

To paste the text that you just cut back into your document:

1. Place the insertion point at some new location in your document.
2. Go to the Edit menu and select the Paste menu item.

The text you just cut will be placed where you put the insertion point. If you wanted to, you could place the text again, because it is still in the Clipboard and will remain there until you replace the text by using the cut or copy command.

The Copy menu item works just like the Cut menu item, except that the text you select is not removed from the document. You should try the above steps, only, this time, do a copy instead of a cut.

Now that you've selected text manually by dragging and using the menus to cut, copy, and paste, we'll talk about the shortcuts for performing these actions. First, we'll look at the different ways you can select text. The following list describes the different text selection methods:

- Double Clicking—Double clicking on a word will select the entire word.
- Shift Clicking—Holding down the Shift key on the keyboard while clicking the mouse will select all of the text between the insertion point and the I-beam.
- Shift Double Clicking—Holding down the Shift key on the keyboard while double clicking the mouse will select all of the text between the insertion point and the entire word under the I-beam.
- Select All—This is a menu item that will select everything within your document. Select all can also be performed by using the ⌘+A keyboard command equivalent.

The above are the different methods that will work in SimpleText. There are more selection methods you can employ in other programs, which are presented in the section "Additional Selection Methods and Other Commands."

The alternative methods for performing a cut, copy, or paste involve keyboard commands and function keys if you are using a keyboard that has them. Function keys are the F1, F2, F3, and other similarly labeled keys across the top of your keyboard, or on the numeric key pad if you're using an adjustable keyboard.

The following describes the various ways to perform a cut, copy, and paste.

- Cut—The command key option to cut selected text is ⌘+X. A cut can also be executed by using the F2 function key.
- Copy—The command key option to cut selected text is ⌘+C. A cut can also be executed by using the F3 function key.
- Paste—The command key option to cut selected text is ⌘+V. A cut can also be executed by using the F4 function key.

Once again, these commands will work in any Macintosh program and are not just features of the SimpleText program. These steps are your foundation for working with the Macintosh. You should repeat the steps in this section, using each of the different techniques for selecting and manipulating text. As you use your Mac, you will find that one of these techniques works better for you than the others and it will become your preferred method for performing these operations.

Changing Fonts in SimpleText

So far, the only menu we've used in SimpleText is the Edit menu. There are also the File, Font, Size, Style, and Sound menus. The File menu will be discussed in the next section,"Saving Your Work." In this section, we're going to look at the Font, Size, Style, and Sound menus.

Most Macintosh programs will let you manipulate how your text appears on the screen. TeachText does not have these features, but you should read this section, anyway. Every word processing and almost all other Macintosh programs you encounter will have these features.

When you use other programs, the features we're about to discuss will not always appear in separate menus. Sometimes, they will be combined in a single menu or divided unequally in a couple of menus. Later in this chapter, we're going to discuss how to experiment with other programs in the section called "How to Experiment with Software."

For the moment, however, we're going to concentrate on SimpleText and change the text font, size, and style. After you learn the basics, which is a very quick process, you should spend some time experimenting with these features until you're comfortable with their implementation.

The first things to look at are the Fonts. You may choose what type of font (sometimes called typeface) you use in your documents.

Font A complete set of characters in one design, size, and style. In traditional typography usage, a *font* may be restricted to a particular size and style, or may comprise multiple sizes, and styles of a typeface design.

Before changing, let's see which font you're using:

1. To select the Font menu, just hold the mouse button down. The active font, Geneva, will have a check mark next to it (see Figure 4.5).
2. Drag down and select a font, say, Times, and release the mouse button.
3. Now, start typing. All of the new text you enter will be in the Times font.

You've just changed the font for all new text from Geneva to Times. However, this applies only to the new text you type starting at the insertion point. If you use the I-beam and change the insertion point's location (outside of the new text typed in Times), the font will revert to Geneva. Likewise if you move the insertion point to where you've used Times, the selected font changes to Times.

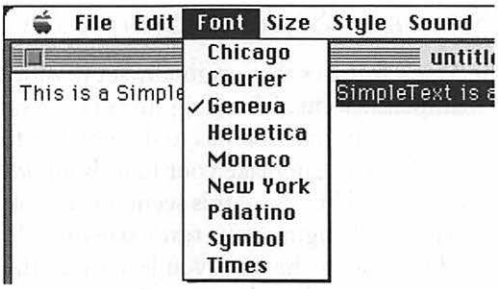


Figure 4.5 *SimpleText's Font menu.*

Try moving the insertion point to various sections of your document and then checking the Font menu. Also, try adding a few more font types using the steps above and selecting different fonts. After you have four or five fonts, perform the check again. You need to be comfortable with how you can use multiple fonts within a single document and how the font can change from one space or character to the next.

The following steps will help you understand how this works:

1. Place your insertion point where there is a change in fonts, as shown in Figure 4.6.
2. Check the Menu font to see which font is selected
3. Use the cursor keys on the keyboard and move the insertion point by pressing the → key.
4. Check the Font menu to see which font is selected.
5. Continue steps 3 and 4 until the font changes.

Notice how the font changes. In one space, it will be one font; and in the next, it will be another. It is possible to hit the space key twice and between the two spaces, have a font that is different from the font on either side of the spaces. This makes it possible to use special fonts, such as Symbol.

If you are unsure about how to select different fonts, practice the above steps until you are comfortable changing fonts and have explored some of the fonts that are available.

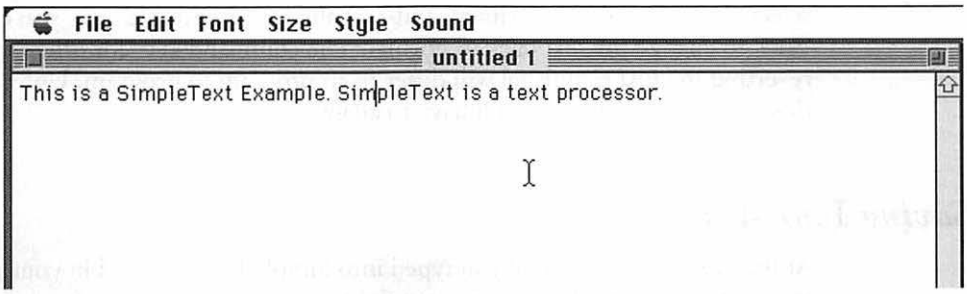


Figure 4.6 *The insertion point where the font changes.*

Changing Font Sizes and Styles in SimpleText

One of the Mac's features that originally set it aside from other computers was its ability to manipulate fonts. Changing fonts is just one aspect one of that ability. The other part of font manipulation has to do with the font's size and characteristics.

With your Mac, you can make your fonts **bold**, *italic*, or underlined, as well as changing their sizes. The rest of this section will look at changing font sizes and styles.

The first step to changing your text's size or style is to select the text you want to manipulate. The same techniques you learned in the first part of this section for selecting text will be used to change their style and size.

To change your text's size:

1. Select the text you want to change.
2. Select the Size menu; you'll notice that 12 is the default size. Now, drag down to size 18 and release the mouse button.
3. The size of the selected text will have increased.

Experiment changing the size of your text in different areas so that you get used to how this feature works. Fonts are measured according to points, where one point is 1/72nd of an inch.

Changing the style of your text is much like changing it's size.

To change your text's style:

1. Select the text you want to change.
2. Select the Style menu. You will note that the checkmark is next to Plain.
3. Select the Bold menu item.

The selected text will change into a style that is called bold. When you repeat the above steps selecting different styles, you'll discover something that's different from other menu selections. You can select multiple styles simultaneously.

If you select bold and underlined, your text will look like **this**. As you experiment more, you'll discover that you can make all kinds of interesting combinations. And when you're tired of changing your styles, you can change them back to normal by selecting the Style menu item, *Normal*.

In the menus, you should have also noticed that there are command key equivalents. Usually **⌘+B**, **⌘+U**, and **⌘+I** will work in any program for changing your selected text to bold, underlined, and/or italic text. In SimpleText, you can also use **⌘+T** to change the text back to normal. The command keys for other styles and for reverting the text to normal will differ from program to program. Unfortunately, this is an inconvenience you'll have to adapt to.

Saving Your Work

At the moment, everything you typed into SimpleText is stored in your Mac's RAM. If you were to turn off the computer right now (don't do it), all of your typing would

be lost. What you need to do now is move the typing you've done from the Mac's memory onto its hard drive so that you can recall what you've typed. This process is called *saving* the file.

Save To store information by transferring it from main memory to a disk. Work not saved disappears when you switch off the computer or when the power is interrupted.

The actual process of saving files is easy. What is complicated about this process, however, is placing the files where you can easily find them again. As such the topic of file location will be discussed in Chapter 5. Therefore, in this section, we'll demonstrate only how to save a file.

To save your SimpleText document to Mac's Desktop:

1. Select the File menu.
2. Select the Save As... menu option.
3. A window called a Save As dialog box will appear, which looks like Figure 4.7.
4. Click on the Desktop button.
5. Click in the File Name field where it says *Untitled 1.*
6. Type a name, such as *Test Document.*
7. Click on the OK button.

These actions will save your document with the name *Test Document* to your Desktop. The file is written to the Mac's hard drive and saved exactly as it appears on the screen.

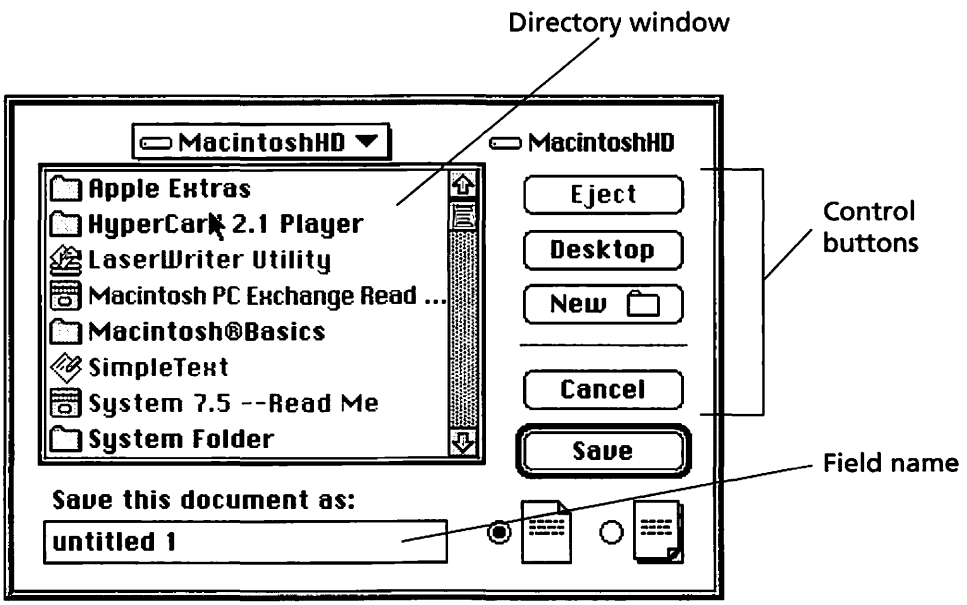


Figure 4.7 The Save As dialog box.



Elipsis in a Menu

Something you should notice about the Save As... menu item is the elipsis, which means that your Mac will require more information before the command is executed. You will be presented with a dialog box that will request this information.

In SimpleText, the first time you save a document you can select either the Save or Save As menu item and you will be presented with the Save As dialog box. Other programs will have a grayed-out Save command and you will have only the Save As menu item for a choice. If both the Save and Save As menu items are available, you can perform your initial Save As by using the ⌘+S command key option.

Dialog Box (1) A box that contains a message requesting more information. Sometimes, the message warns you that you're asking your computer to do something it can't do, or that you're about to destroy some of your information. In these cases, the message is often accompanied by a beep; (2) a box that a Macintosh application displays to request information or to report that it is waiting for a process to complete.



Dialog Boxes

The Save As dialog box is a standard Macintosh convention found in every Macintosh program and used to create data documents. Actually, dialog boxes are Macintosh conventions of which you'll see many. Dialog boxes are presented whenever your Mac needs extra information or is telling you something important about itself.

Whenever a dialog box is presented, you will have to address the issue at hand; namely, whatever is being asked of you by the dialog box. In our example in this section, you have to provide a name for your file and click on the OK button. If you decide not to save your document, you can click on the Cancel button and the dialog box will disappear and your document will not be saved.

Most dialog boxes will have, at a minimum, an OK and a Cancel button. Some, however, will have only an OK button. When a dialog box only has an OK button, you have no choice but to acknowledge the message and click on the OK button. Any other action you try to perform, short of shutting off the Mac, will not work.

Button A pushbutton-like image in dialog boxes, on which you click to designate, confirm, or cancel an action. (Compare to *mouse button.*)

To make some changes in your document:

1. Before you make any changes, select the File menu. Notice that the Save command is now gray. This means that it cannot be selected, because there are no changes in your document to save.
2. Make some changes in your document.
3. Select the File menu. Notice that the Save menu item is now selectable. The program—in this case, SimpleText—makes the Save menu item available as soon as you make any changes in the document. The change can be as subtle as adding a single space.
4. Select the Save menu item.

When you make changes to a document that has been saved, the changes are transferred to the saved document only when you execute a save command. Like the original document, before it was saved, changes made to a document are not saved until you tell the Mac to do so. Saving your document adds the changes you've made to the original document file. You can always tell which document you're working on by checking your window's title, which will usually be the file's name. In our example, the window name will be Test Document.

The easiest way to make sure your work is saved while working is to periodically use the ⌘+S command key option. Saving your changes is something you should do on a regular basis. All too often, people do not regularly save their changes and sometimes lose their hard work.

Other File Menu Functions

In all Macintosh programs, functions for manipulating files and for printing will be found in the File menu. At a minimum, you'll have the following options from the File menu. Each menu command is listed, with its command key equivalent and a brief description. If there is no command key listed for a menu item, it does not have one.



Save Your Work

Periodically save the changes you've made to your document. This way, if your Mac malfunctions (something that will occasionally happen), your work will still be saved.

New	⌘+N	This command will create a new document blank document.
Open	⌘+O	Open an existing document. This command is discussed in Chapter 5.
Close	⌘+W	Closes an open document.
Save	⌘+S	Saves changes in a document.
Save As...		Saves a document with a new name.
Print Setup...		Used to configure your printer.
Print	⌘+P	Prints your documents.
Quit	⌘+Q	Closes the program.

You will always be asked to save your changes before the document closes or you quit the program. The Quit command will be discussed more later on in the section, "Quitting and Restarting Your Program."

The Print Setup... and Print menu items tell your printer how you want your document printed and to print your documents. Printing your documents is not a complicated process but, with the System 7.5, printing is more complicated and requires more discussion than you'll find here. A more detailed discussion about printing will be found in Chapter 8. Check that your printer is connected to your Macintosh and turned on.

To print your document:

1. Select Page Setup... from the File menu.
2. You will be presented with a Page Setup dialog box similar to the one in Figure 4.8.
3. Using the controls in the dialog box select how you want your document printed.
4. Click on the OK button.

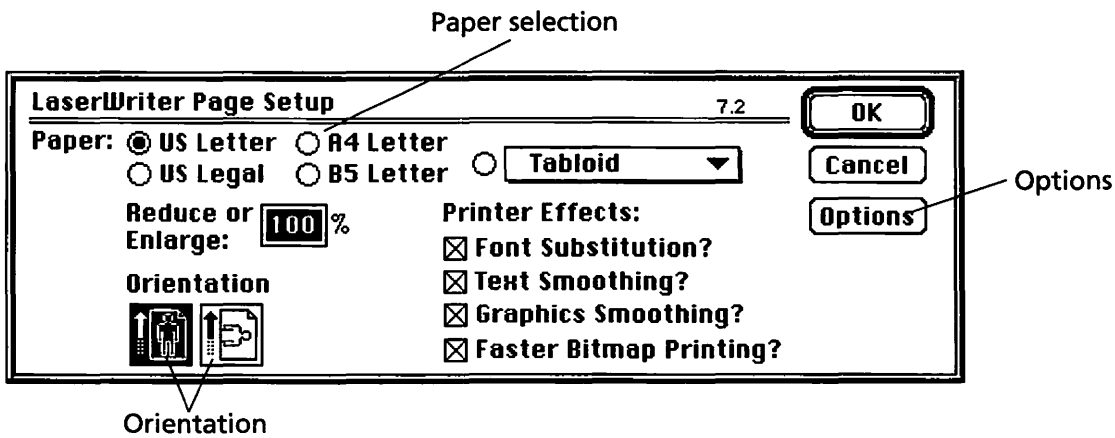


Figure 4.8 The Print Setup dialog box.

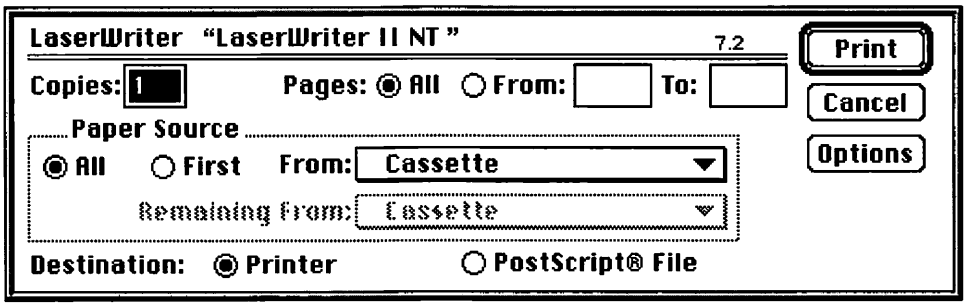


Figure 4.9 The Print dialog box.

5. Select the Print menu item or use the command key.
6. You will be presented with a Print dialog box similar to the one in Figure 4.9.

In both the Print Setup and the Print dialog boxes, you will have options you can select. The options you'll have depend on the printer you're using. The example we're using is for a LaserWriter, but you could be using a different type of printer and have different options. Because there are so many possibilities, you may have to refer to your printer manual for a full explanation of your options.

The following are the Page Setup dialog box options:

- Paper—With this option, you tell the Mac what type of paper you have in your printer.
- Reduce or Enlarge—You can choose to reduce or enlarge the size of the printed output. Usually, you'll use 100 percent, which means that you're printing at the normal size.
- Orientation—The little icons tell it all. You can tell the printer to print your document in a normal position (portrait) or sideways (landscape). Regardless of how your paper goes into the printer, your printer can print the document in either orientation.
- Printer Effects—Printer effects are options that are determined by your printer's capabilities. For the LaserWriter, the options tell the printer how to handle fonts and graphic images.
- Options—The options button presents you with settings that are specific to your printer and its capabilities.

The following are the Print dialog box options:

- Copies—This tells your printer how many copies to print.
- Pages—Lets you select which pages to print. If you want to print page 5, you would enter 5 to 5 for your print range.
- Paper Source—If your printer has more than one source for paper, you can tell it which source to use. Usually, you'll have the option between the normal paper tray and a manual feed, which is when you insert the paper into the printer rather than using its normal paper source.

- Destination—For LaserWriters you can print to the printer or to a PostScript file.

These instructions and explanations are the bare minimum you'll need to print. Printing is a subject that will be developed in various places in the book and is complex enough to require a series of explanations that will be presented throughout the book. Before you'll really be proficient at printing, you need to understand your printer. It would help you to be familiar with your printer's manual as well.

Using Multiple Windows and Program Switching

Most Macintosh programs, SimpleText included, can open several documents at the same time. Add to the multiple documents the fact that you can also have several programs running, each with multiple documents open at the same time, and you're operating a fairly complicated system.

Knowing how to manage your programs and documents is essential to mastering your Mac. This section will discuss the fundamentals of using multiple documents and how to switch between multiple programs. First, we'll look at using multiple documents within an application.

Using Multiple Documents

The principles for using multiple documents within an application are very similar to using multiple windows in the Finder. If you haven't read Chapter 3, you should review the section called "The Anatomy of a Window." You'll find 90 percent of the information you need for using multiple documents in that section.

Using multiple documents in any Mac program is like using multiple windows in the Macintosh Finder. Some programs make using multiple documents easier by providing a Window menu that will list your open documents; others will require you to move the document windows around. A quick look at SimpleText will help in this matter. Perform these steps using SimpleText (TeachText does not have the ability to open multiple documents).

To open multiple documents:

1. Open a New Window using the ⌘+N or New menu item from the File menu.
2. Now, you have two windows open, but the new document completely covers your other document.
3. Resize the new document using the grow box.
4. Once the document window is resized, you can click on your original window, which is behind.
5. Select some text from your original window and copy it.
6. Resize the current window so that you can see the window behind it.
7. Click on the window that is behind and bring it forward.
8. Zoom the front document window and paste in the copied text.



Another Text Editor

As you know, a CD-ROM is included with this book. If you have a CD-ROM drive, you can use all of the programs on the CD-ROM disk (at the moment, you may not know how to access these programs, so this note maybe premature). There is a program on the CD-ROM disk called SaintEdit that you can use instead of SimpleText or TeachText.

If you're using TeachText instead of SimpleText, you will have discovered that TeachText is very limited when compared to SimpleText. To get more out of this chapter, you should repeat the exercises in this chapter with SaintEdit.

You will find instructions for copying programs (moving a program or data file from one disk to another) in Chapter 5. Once you've learned to do this, repeat these exercises using SaintEdit. It can be found on the CD-ROM in the Utilities folder. There are differences between SaintEdit and SimpleText; namely, the ability to use styles—but you will learn more using SaintEdit than you will using TeachText.

Now, you have two document windows, each with text. If you want to switch quickly between the two windows, you will have to configure both windows using the grow box. The secret here is to configure the two windows so that they can both be seen, regardless of which window is in front. Figure 4.10 shows one configuration



Layering or Tiling Elements

Bringing a window forward is the terminology used for selecting a window that may be behind another. The same terminology is used in programs that have objects, which are elements that can be layered within the same window. The programs that use objects are programs that use graphics or graphics programs.

When you encounter a program with elements, you should keep in mind that the elements will often behave like document windows or windows in the Finder. These can be layered, one object can hide another, or they can overlap.

This is an example of principles that work in many different circumstances. Think of the things you learn about operating your Mac in terms of principles rather than isolated steps that apply in only one situation. This is one of the keys to becoming a Macintosh master.

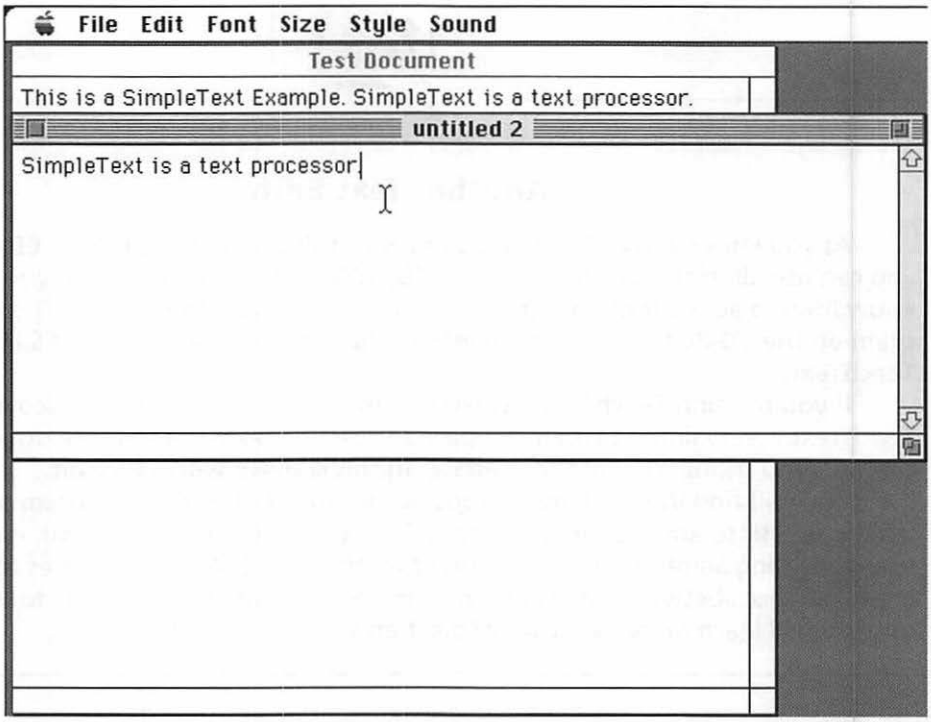


Figure 4.10 *Window configuration for using multiple documents.*

that will work. Now, with your windows configured, you can bring forward the window you want to use.

To quickly switch between the document windows:

1. Zoom the window to full size by clicking in the zoom box.
2. When you want to use the window that is in back, click in the zoom box again. The window will return to its original position.
3. Now you can select the other window.
4. Zoom it to work in it.
5. When you want to use the other window, repeat steps 2 through 3.

This technique will work in any application where the document window has a zoom box. Practice using multiple windows now. Learning to use your Mac is a lot like learning any new skill: You have to practice and be patient. Practicing now will pay off later when you have to work on multiple documents while under a deadline.

Using Multiple Programs

Using Multiple programs is a lot like using multiple documents, only it is easier to switch between programs. To show you how to use multiple programs, we're not

going to run another application; instead, you're going to switch between SimpleText and the Finder.

If you haven't noticed, there is a little icon in the upper right-hand corner of your screen. If you're in SimpleText the icon is a smaller representation of the SimpleText icon you double clicked on to start SimpleText. This icon will change depending on the program you're currently using, so it is an indicator that tells you what program you're running. But the icon is also the Application menu (see Figure 4.11).

When you click on the Application menu, you will see the following menu items.

- Hide SimpleText
- Hide Others
- Show All
- A list of all active applications

Each Application menu item will be described so that you can learn how it works. Each description will explain what happens when the menu item is selected. Read all of the descriptions before experimenting so that you'll know how to navigate between your applications.

The Hide [application name] menu item The Hide [application name] menu item will hide the application you're using. Selecting Hide SimpleText will cause SimpleText to be suspended, hiding its windows and menu bar. The program will still be running but it will not be visible. If you have more programs running than just SimpleText when you select the Hide menu item, you will switch to the last program you were using before you switched into SimpleText. If you are returned to the Finder, it means that the Finder was the last program you used, probably to start SimpleText or the application you're using.

The Hide Others menu item The Hide Others menu item will hide all of the applications you're running, except the one you're using. This will cause the open windows and menus for all of your other programs to be hidden. Using this command will also gray out both the Hide and Hide Others menu items, which are unavailable if you're running two programs and one is hidden.

The Show All menu item The Show All menu item is used to make all of your hidden applications reappear.



Figure 4.11 *Using the Application menu while running SimpleText.*

The list of active applications Any program that is running will be included in the applications list. The active application will have a check mark next to it. If a program is hidden, its icon will be gray. You can switch from one program to another by selecting the program's name from the applications list.

The reason for hiding applications you're not using is twofold. One reason is to speed up your Mac; it doesn't have to do quite as much work while a program is hidden. The other reason is that your Mac's screen will be less cluttered with extra windows in the background.

You can also selectively hide programs by switching to the program and then hiding it. This can be advantageous when you're using several programs and need to switch between only two of them, because there is another way to switch between two programs that is quite convenient.

When you have two active applications, you can switch between them by clicking a document window of either program. With our current example, it is easy to demonstrate this capability by switching between SimpleText and the Finder.

To switch between active applications:

1. SimpleText should be the active application and your screen should look like Figure 4.12.
2. Click outside of the SimpleText document window on the right-hand side.
3. This will switch you to the Finder. Now, your screen should look something like Figure 4.13. Notice that the SimpleText window is visible and that its title bar indicates it is inactive.
4. Now, click in the SimpleText document window that is in the background.
5. The SimpleText document is now the active window.
6. Repeat steps 2 and 3 while holding down the option key on your keyboard.

If you repeated the exercise while holding down the option key, you will have noticed that SimpleText was hidden when you switched to the Finder. Whenever you switch applications while holding down the option key, the application you're switching form will be hidden, even when using the Application menu.

As with all of the other operation techniques in this chapter, you should experiment with program switching. It is another of the basic skills you will use when you really start using your Mac.



Figure 4.12 *SimpleText as the active application.*

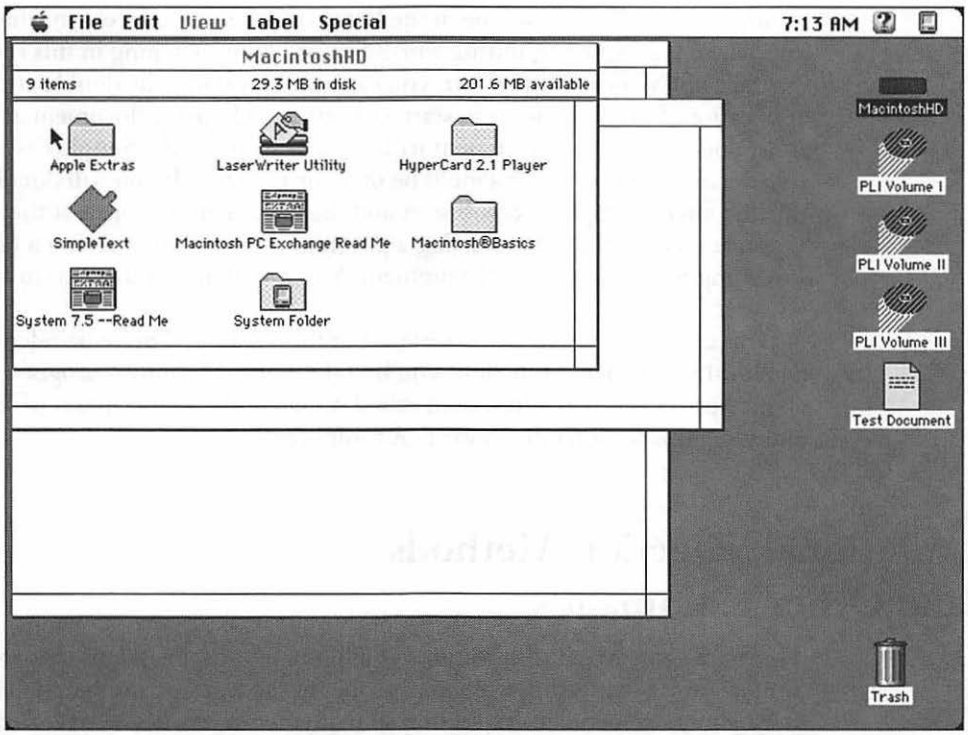


Figure 4.13 *After switching to the Finder.*

Quitting and Restarting Your Program

Now, it is time to quit SimpleText, which is a simple procedure of selecting the Quit menu item from the File menu or using the ⌘+**Q** command key option. Either action will cause SimpleText to quit and return you to the Finder. If you are running



Checking the Clipboard

While you're switching back and forth between the Finder and SimpleText, you should check the contents of the Macintosh's Clipboard. To check the Clipboard's contents, you must be in the Finder, where you will find a Show Clipboard menu item in the Edit menu.

Select the Show Clipboard menu item. A window will appear showing you what is in the Clipboard. You will also see the file type. (File types are discussed in Chapter 5.)

multiple programs, you will be in the last program that you were in when you quit your current program. Quitting works like program switching in this respect.

Once you've quit SimpleText, you can always restart it by double clicking on the application. But, if you want to start a program and open a document at the same time, double click on a document icon. Earlier, you saved a SimpleText document called *Test Document* and it should be on your Desktop. If you will double click on the document, SimpleText will start and the document will open at the same time.

Since this technique for starting a program also involves opening a file, this is all I'm going to say about it at the moment. You'll find more information about files in Chapter 5.

This concludes the instructional part of this chapter. The remainder will talk about other command functions you'll find in most Macintosh programs, a section about Apple's on-line help system called AppleGuide, a description of software types, and some tips for learning more about software.

Additional Selection Methods and Other Commands

There are some Macintosh features you'll find in most programs that are missing in SimpleText. This section will look at some of the features and functions you should know about. Remember this section so that you can practice what is listed here when you start using other programs.

The Undo Function

The Macintosh has a feature called *Undo*. This feature will let you reverse whatever you've done since your last mouse click or the last time you pressed the enter key on your keyboard. The Undo command can be used to remove an edit you've made to a document, reverse an accidental cut, or remove something you just pasted into that document.

In a note earlier in this chapter, I mentioned a program on the CD-ROM called SaintEdit, which is a good program to use for the following steps. However, this means that you will have to come back to this chapter after you've installed SaintEdit.

To perform the Undo function:

1. Open your program and type something into the document window.
2. Select the Edit menu and drag down to the Undo menu item.
3. An alternative to using the menu command is to use the keyboard equivalent (⌘+Z).

   Once you've executed this command, the text you just entered will disappear. If you want the text to return, repeat the Undo command. Undo is a toggle command, meaning that each time you perform the command it will

switch back and forth between the last two commands, one of which is the Undo command itself. So, Undo is really an undo and a redo command.

4. Move the pointer and click the mouse somewhere within your document.
5. Now, execute the Undo command as described in steps 1 or 2 above.

You'll notice that the Undo command does not do anything, because there is now nothing to undo. When you get the opportunity, practice this command. It is very useful and you'll want it in your repertoire of skills.

Selection Techniques You'll Want to Know

Once again, the items in this section are techniques that do not work in SimpleText but are, nevertheless, standard Macintosh functions that work in almost every program. Like the Undo section above, these techniques do work in SaintEdit and, once you've installed it, you should try these functions.

There are no steps listed here because each of these techniques is a single command. Type a couple of paragraphs and try them out.

- **Triple Clicking**—Selects an entire paragraph
- **Command (⌘) Click**—Selects an entire sentence (this does not work in SaintEdit; try it in other programs).
- **Using the Shift key**—When you use the shift key in combination with another command, the Shift key becomes a modifier. There are several ways it can be used. One is to double click on a word and then hold the Shift key down as you click on subsequent words. Each time you click on another word, it too becomes selected.

Another way to use the Shift key in conjunction with the cursor keys. When you hold the Shift key down and press the cursor keys, you will select text as you move the insertion point. This selection technique can also be used to unselect text if you dragged through too much text.

These techniques are Macintosh standards and are supposed to be included in every program. Sometimes they get left out, so experiment with your programs to see if these techniques work. In Appendix B you will find a list of the standard Macintosh command keys and keyboard shortcuts, such as those listed in this section.

Using AppleGuide

AppleGuide is a new feature of System 7.5. It is an online help system and Apple's new method for providing you with help, and is like having a program's manual available at all times. AppleGuide has not been mentioned until now because it is easier to use if you are familiar with windows, menus, and some basic Macintosh skills.

At the time of this writing, AppleGuide works only in the Finder and a few other programs. But, in the future, most commercial programs you purchase will use AppleGuide, which is accessible from the Help menu, the icon with the ? next to the Application menu.

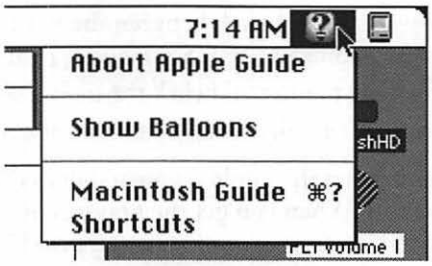


Figure 4.14 *The Help menu.*

If the program you're using supports AppleGuide, it will have menu items following the Show Balloons menu item. Figure 4.14 shows the Help menu while in the Finder.

Notice that Macintosh Guide, Shortcuts, and PowerTalk are menu items that you can choose. The other menu options, About Balloon Help... and Show Balloons, are another help system that is also available (see the note for more information about Balloon Help).

In this section, we'll look at the Macintosh Guide. Once you're familiar with it, you can go on and explore the other AppleGuides at your leisure. The most unique feature of AppleGuide is that it will walk you through the required steps for most Macintosh operations while providing a detailed description.

In the following, we'll look at just one example available in the Macintosh Guide:

1. From the Finder, select the Macintosh Guide menu item from the Help menu.



Balloon Help

Balloon Help is a help system that causes balloons with explanations to appear as you move the pointer to different areas of the screen. The balloons are like those used in comic strips and they provide only a brief description of the object.

You turn on Balloon Help by using the Show Balloons menu item; when the balloons are turned on, the menu item says Hide Balloons. This is an example of a toggling menu; some menus, when selected, change to indicate that something can be turned off or on.

Balloon Help is useful when you are unfamiliar with the elements in a program, because they will identify different window parts and offer a brief description. But, balloons will soon get in the way and be more of an annoyance than a help. As such, they are mentioned here so that you can use Balloon Help if you wish.

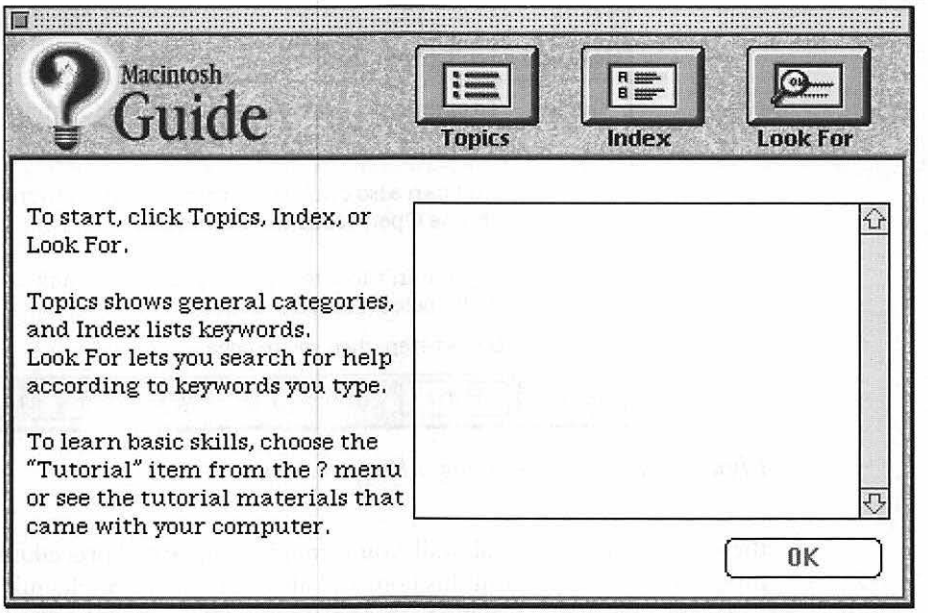


Figure 4.15 *The Macintosh Guide window.*

2. When the Macintosh Guide window opens, click on the Topics button (Figure 4.15).

   You'll notice that this window looks different from the ones we've used up to this point. Also, if you click outside of the window, it does not disappear. AppleGuide takes control of your Mac and, even though you can switch programs and access your windows, will remain present and in front of anything else you try to do—because it is a help system and not a normal application.
3. When the topics appear, click on Working with Programs.
4. A list of additional topics will appear on the right-hand side. Click on Open a Program.
5. Click on the OK button.
6. A window like the one in Figure 4.16 will appear with instructions on how to start a program.
7. After reading the information in the window, click on the Huh? button.
8. Another window titled *Definitions Tips for Finding Files* will open to give you additional help (see Figure 4.17).
9. Continue to play with various options from the Definitions Tips for Finding Files window.
10. When you are through, click on the Close box to quit AppleGuide

By using the controls shown in Figure 4.17, you can spend a lot of time exploring AppleGuide. What makes AppleGuide unique is its ability to open programs, mark

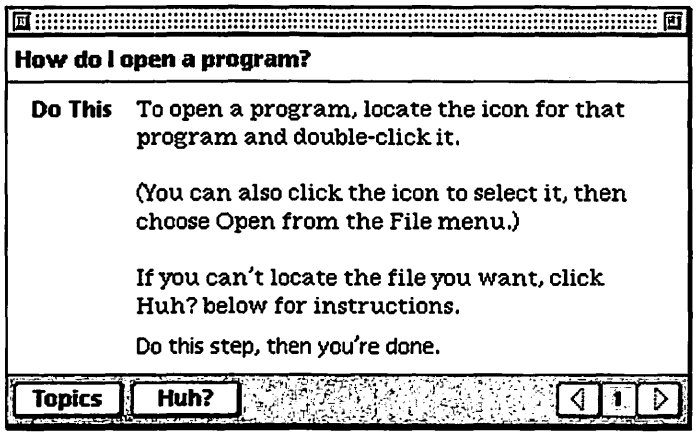


Figure 4.16 The Starting a Program window.

the screen, and, in general, walk you through complicated procedures. Many of the things you'll read about in this book can also be found in AppleGuide.

Spend a few hours playing with AppleGuide as you read this book, because it offers a unique way to safely explore your Macintosh's system. Just remember that the Macintosh operates according to a set of rules and that, many times, when you're being told or shown, steps you are actually being shown principles that can be applied to other computing situations.

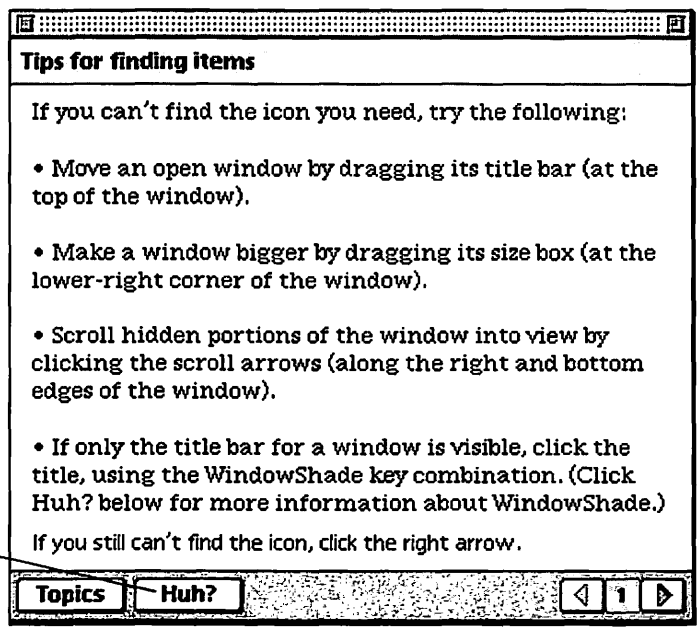


Figure 4.17 The Definitions Tips for Finding Files window.

How to Experiment with Software

Throughout this chapter, you've been told to experiment. However, your playing must be orderly and somewhat planned. When you get new software and it has been installed, take some time to get used to the program and its features. The following is a list of suggestions that will help you become a software expert:

Review the manual—Become familiar with any terms that are particular to the software and the manual's layout. Look at the index; it is easier to find topics you need help with by looking in the index rather than the table of contents.

Start the program—When you start the program, look at the screen for a few minutes before you do anything. Look at the menu names, the window layout, and any elements you're unfamiliar with.

Turn on Balloon Help—With Balloon Help, you can identify any screen elements you're unfamiliar with. Just move the pointer to those screen elements you don't know. When you're done, don't forget to turn off Balloon Help.

Check for an AppleGuide—See if the program has an AppleGuide. If it does, explore the topics and index so that you will know what type of help is available.

Other Help—If the program does not use AppleGuide, see if there is another on-line help system. Check the manual to see how it is accessed.

Explore the menus—Look at each of the menus and their menu items. Knowing what menu options you have will help you understand the program and what it can do. Also, if you see a specific menu item referenced in the manual, you'll know where to find it. After you've looked at the menu items, try the ones that are unfamiliar.

Go through the tutorial—The more complicated programs often have a tutorial, which is usually designed to show you the basic features of the program and introduce you to its more advanced features.

Experiment with modifier keys—Many programs build in special functions that are accessed by holding down the option, command, or control keys while accessing menus, tools, or dialog boxes. Spend some time trying the different modifier key options with these items. When you do this type of experimenting, do not be disappointed if you don't find special options. In the chapters on System software, you will see the results of some of this type of experimentation.

How the Mac's Graphical Interface Is Designed

Throughout this chapter, you've read about how the menus, windows, and other aspects of the Mac are consistent from one program to the next. It is this consistency

that makes experimentation possible and profitable. But the consistency built into Macintosh programs did not happen by accident.

When Apple created the Macintosh, it was very concerned with how you would interact with your computer and established a set of guidelines called the *Human Interface Guidelines.* These guidelines were established so that programmers would create programs that conformed to specific standards of operability in all areas—from how the programs ran to what they asked you, including how to store your data. In principle, Apple wants every program to conform to specific visual and operational standards, so that by learning how to use one program, you will already know the basics for using other programs, which in turn, keeps your learning curve to a minimum, making you more productive.

The major areas covered by the *Guidelines** are:

- Metaphors from the real world—Whenever possible you should be able to relate what you see and do on your Macintosh to a similar event in the *real world.*
- Direct Manipulation—Whenever you perform an action with your Mac, you should see some indication that you have done something. This is a reality check; if you throw a file into the trash, the trash can should bulge to verify that a file has been thrown away.
- See-and-point (not remember-and-type)—Apple does not want you to remember anything you do not need to. Thus, you have menus, buttons, a mouse, and icons. To use the Mac, you have is figure out how to use your mouse.
- Consistency—By maintaining a specific function for menus, such as the File and Edit menus, the way the mouse operates, and, whenever possible, all of the dialog boxes and messages, you will not have to learn a new vocabulary or set of commands for each program you use.
- WYSIWYG (what you see is what you get)—Whenever you are working on a document, whether it is a picture, database report, or letter, what you should see should be exactly what you will get as a finished product.
- User control—You are in the driver's seat. Your Macintosh should never do anything without your expressed approval (although this is not reality, it is a great ideal).
- Feedback and dialog—Your Mac should always tell you what it is doing, dutiful servant that it is.
- Forgiveness—Apple wants you to be notified of every action that is not reversible, and to be able to undo anything if you should change your mind.
- Perceived stability—Your computing environment should be stable and not change.
- Aesthetic integrity—Apple does not like ugly icons. The visual interface should not be distracting and you should have control over your workspace (the Finder and Desktop).

* Inside Macintosh, Volume VI, 1991, ©Apple Computer, Inc. Addison-Wesley Publishing Company, Inc.

This list represents the basis for everything your computer does. In a sense, the *Guidelines* are the key to the map that you need when using your Mac. By keeping these principles in mind, you can become a Macintosh master.

Summary

In this chapter, you have the basics for learning how to use your software. Even though the example used throughout the chapter was a simple program, it demonstrated many of the features you'll need for using other programs. Teaching you how to use SimpleText was actually a secondary goal; the primary goal was to demonstrate the features you'll find in most Mac programs and to provide you with the basic knowledge you need to use any Mac program.

The next chapter will complete your basic Mac education. Once you've read Chapter 5, you will have been exposed to all of the basic skills and knowledge you need to start using your Mac. The rest of the book after Chapter 5 will build on the knowledge of these first five chapters and take you down the road of Macintosh self-sufficiency.



CHAPTER 5

Keeping Track of Your Data

Keeping your data safe, secure, and easily accessible takes some practice. Every time you turn on your Mac, you're faced with the task of file management. Where are you going to put documents and graphics you've created? And once you've put them somewhere, how do you find them again? Do you need to keep your data secure or share it? And how do you keep your data safe?

The processes of managing your data files is called *file management*, which is what this chapter is about. All too often, people buy their Macs and start using them, doing an admirable job of teaching themselves the basics and becoming productive, only to find that they do not really know where on their hard drives their data is located . They can often find their data, but they have no idea how it ended up where it did or how to put it where they want it to be.

Part of the reason for their ignorance is justified. There are certain files on your hard disk that must remain in place, or your Macintosh won't run properly. Moving the wrong file from its proper location can result in your Mac failing to start or a program not running properly. So, if you do not know how to recognize the different types of files found on your Mac, it is not only reasonable but prudent that you don't move anything. However, it is not efficient use of your Mac.

So, in this chapter, you're going to learn how to recognize different types of files, where they are stored, and how to move and copy your files. Other topics covered are finding files, keeping your data safe, and lots of details about how your Mac handles data. Read through this entire chapter before trying any of the examples. The examples are designed to safeguard your data but, if you make a mistake, it is possible to lose some of your data or even render your Mac inoperable.

More about the Finder

In Chapters 2 and 3, you were introduced to the Finder and some of its functions. Now it is time to learn more about the Finder. All of the functions related to file

management, with the exception of saving files within an application, are done from the Finder.

To effectively use the Finder, you need to learn several things. The following is a list of the topics covered in this section:

- Icon recognition
- Creating and naming folders
- Understanding how files and folders are stored.

What Are Those Icons?

By now, you know that Icons are graphic representations used by the Mac to identify various objects. These objects can be files, programs, devices, or even tools employed by applications. In addition to being a "metaphor from the real world," icons are also supposed to represent functionality. Specific Icons exemplify a particular capability, function, or purpose.

The main reason for knowing what different icons denote is so that you can identify an icon's function. In Figure 5.1, you will see a series of icons that are used in the Finder to represent files, drives, and devices.

The icons in the this section will all be discussed in this chapter. The different types of icons in Figure 5.1 are:

- **An application file** Any icon that has a diamond, such as the SimpleText icon, is supposed to represent a program that you can double click on to start. Conversely, all applications are supposed to use some form of a diamond for their icons. However, not all programs conform to this standard; usually, an application icon will be distinctive and different from the other types of icons.
- **An application data file** All icons like the *document* icon in Figure 5.1 are supposed to represent a user-created data file. The icon is supposed to be designed around a piece of paper with a folded corner. Some programs do not conform to this standard, which means that you may have to learn what the document icons for some programs look like. Also, some programs create different icons for different types of data.
- **Disk icon** Disk icons represent disk drives. When a disk icon is opened ,it will display the files and folders on the disk. There are different types of disks and their icons usually denote their type. Figure 5.1 shows some of the different types of disk icons you'll encounter. Hard disk icons will vary in their appearance; notice the two different icons in Figure 5.1 for the hard drives.
- **Folder icons** The icon labeled Folder is meant to represent a manila file folder, just like the ones in your filing cabinet. The difference between a real-world folder and a Macintosh folder is that you can put folders within folders on the Macintosh, while in the physical universe, folders usually do not fit inside each other.

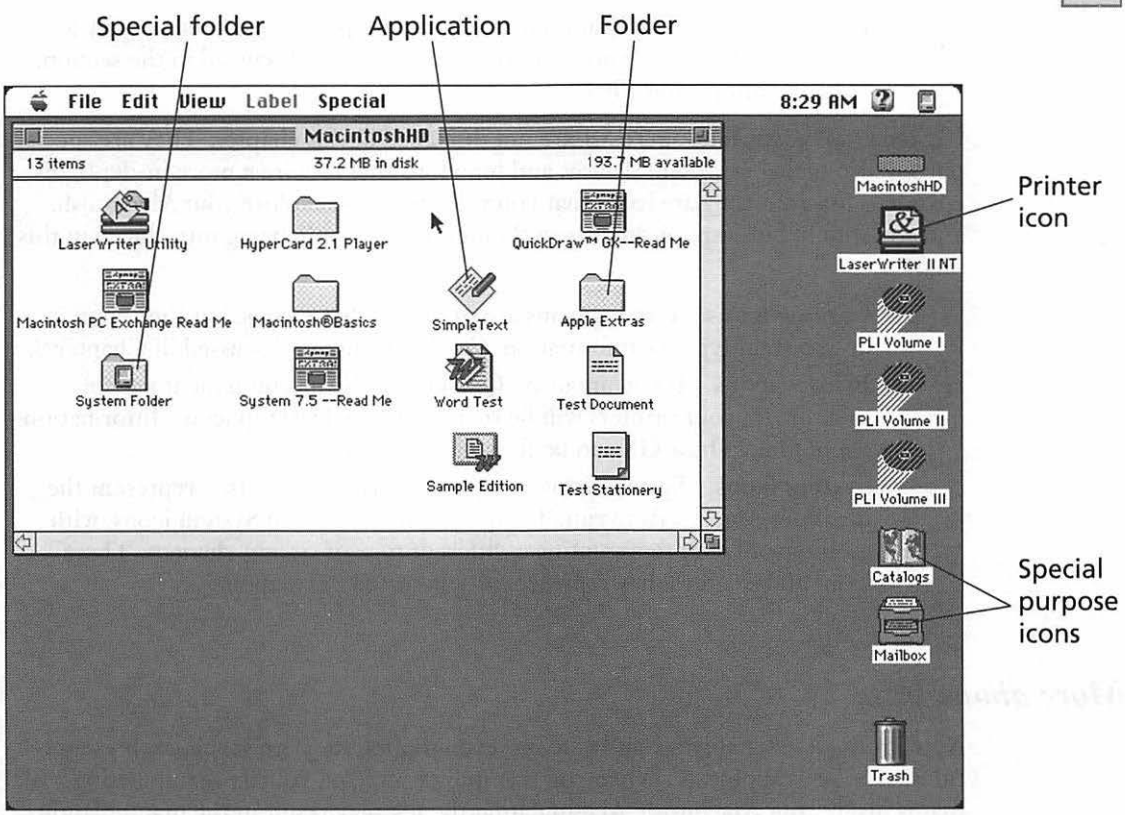


Figure 5.1 *The Macintosh Desktop.*

- **Special-purpose folder icons** In addition to the generic folder icon, there are special-purpose folder icons. Although these should be used only to specify that the folder has a special purpose, like the Control Panels Folder that goes in the System Folder does, you will see some software manufacturers creating folders that appear to be special purpose folders just so that they can distinguish their product from the others (a subliminal form of advertising).
- **The Trash icon** The Trash icon is another special-purpose icon. The Trash icon is meant to symbolize a real-world trash can and its function is similar. With the Trash icon, you will dispose of your unwanted files.
- **Stationery icons** Stationery icons represent templates. A template is a user-created document, which is a form that you will used again and again. Rather than re-create your form each time you need it, you double click on the stationery icon, which will open a document that you can then customize and save as a new data document.

Template A predefined set of contents (numbers, text, and formulas) for a spreadsheet, designed for some specific purpose or task—for example, a budget template.

- **Edition icons** The Edition icon is a special-purpose icon created by a function called *Publish and Subscribe*, which will be discussed in the section, "Manipulating Your Files."

Some of the icons in Figure 5.1 are not discussed in this chapter. They are special purpose icons that represent devices and functions that require a more in-depth discussion. However, they are icons that you will see as you explore your Macintosh, and you should be aware of them even though they are only being introduced in this section.

- **Catalog icons** Catalog icons are similar to drive icons, but they contain only certain types of information. Catalog icons are discussed in Chapter 8.
- **Printer icons** If you are using QuickDraw GX, a component part of System 7.5, your printers will be represented as Desktop icons. Information about QuickDraw GX can be found in Chapter 8.
- **System icons** System icons are special-purpose icons that represent the files your Mac needs to run. There is a whole series of System icons, with each type of icon representing a different type of system element. These icons and the files they represent are discussed in Chapter 7.

More about Icons

As mentioned in Chapters 2 and 3, icons, even though they are graphic representations, are also real objects. When you manipulate an icon, you are manipulating a file that is inside your Macintosh. Manipulating the file may result in the manipulation of some peripheral device connected to your Mac, but, operation of any part of your Mac is caused by one of the files in your Mac.

In a sense, this is an over simplification of what happens when you use your Mac. But, for the moment, it is an adequate explanation, 98 percent of all the icons you see represent files, whether they are program, system, or data files. The other 2 percent of the icons you'll encounter represent devices, such as disk drives and printers, and offer a means to manipulate them. It is important to remember this, because, if you have experience with a computer that uses Microsoft Windows (we in the Mac world like to think of them as that other type of computer), icons always represent files.

Although the Mac is easy to use, you should exercise some caution when using it. Just moving the right file to the wrong location can result in your Mac not working.

Getting Organized

This section is the final installment of information you need to use your Mac. You know how to start and use a program , save a file, view the contents of a folder, and are generally familiar with your Mac's Desktop. Now, you're going to learn how to organize your Mac so that you know where your data is stored and how to find it.

Some of the examples in this section will probably display hard drives that are more complex and contain more information than you have on your system. Once more, the principles demonstrated are what's important. How you organize your Mac will be entirely up to you.

Keeping your hard drive organized can be a constant battle; if you don't do it consistently, the mess can quickly crowd you off your disk.

Using Your Folders

In Chapter 3 you learned how to create folders. But using folders was only marginally covered. However, you'll use everything you learned about using windows as you work with your folders. In this section, we'll look at what folders are and how they work. The topics that will be covered are:

- ❖ More about your folders
- ❖ Nesting folders
- ❖ Naming folders

Folders are used to store your Mac's computer files. They are also used to group and categorize those same files. Some of the organization is done automatically by the Mac, or rather the programs that install software onto your Mac. For the moment, we're primarily concerned with the organization of the files you create.

Folder A holder of documents, applications, and even other folders on the desktop. Folders act as subdirectories, allowing you to organize information in any way you want.

To see how your Mac uses a folder we're going to look inside your System folder. During this exercise, all we're going to do is look, which means you're going to open, look, and close the System folder:

1. Make sure your hard drive is open.
2. Select the System folder it is labeled *System Folder.*
3. Open the System folder. You should see something that lookslike Figure 5.2.
4. Now, look at the files using the various view menu items in the View menu.
5. Resize the window when necessary so that you can see the files.
6. After you're through looking, close the System Folder window.

This exercise was meant to show you only how a folder is used to hold files. One of the things you should have noticed were the folders that were in the System Folder. The System Folder contains all of the files that run your Mac. However, you'll have to wait until Chapter 7 for an explanation of these files.

A folder is sometimes called a directory, because the folder's counterpart on other computers is called a directory.

Directory A list of the contents of a disk or a specific folder. Some directories contain subdirectories. A directory is sometimes called a *catalog.*

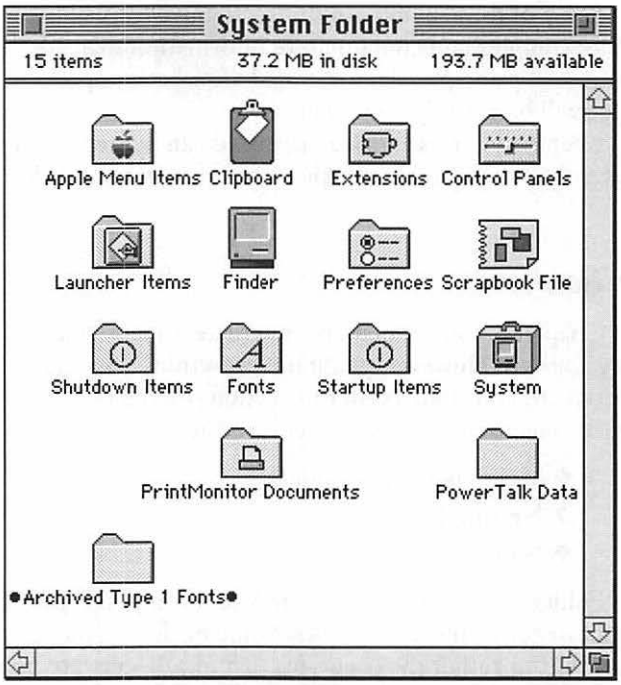


Figure 5.2 *The open System folder.*

Thus, the System Folder is also called the System Directory. This terminology is not common when talking about the Mac, but it does get used some times.

Nesting Your Folders

The folders contained in the System Folder in Figure 5.2 are called nested folders or subdirectories. It was mentioned earlier that your Mac's folders are like their real-world counterparts, file folders. The process of placing folders inside of folders is called *nesting* and is the result of the Mac's hierarchical file system. The hierarchical file system can be described in several ways. Think of the system as a tree: The hard drive is the trunk, each folder ia a branch, and each nested folder is another branch coming off of the main branch. Figure 5.3 shows this concept.

To demonstrate how this works on your Mac, let's work through an exercise, in which we're going to make folders and name them. Naming folders is easy, and you'll be using some of the principles discussed in Chapter 4. "Using Programs".

If you've been working your way through this book starting with Chapter 1, you will have created at least one folder in Chapter 3 when learning how to work with windows.

Now, let's use the folder you created and play with it:

1. Find the folder called *untitled folder*.

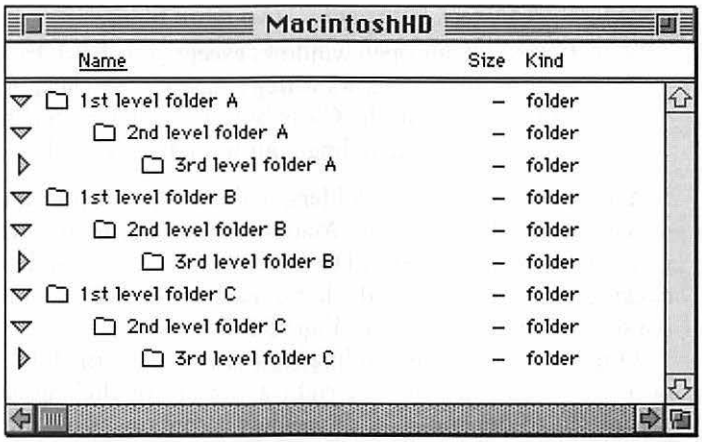
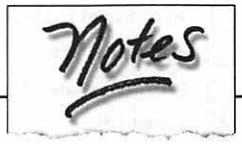


Figure 5.3 *An untitled folder's name selected for editing.*

2. Move your pointer over the folder's name and click once. A box should appear around the folder's name, as shown in Figure 5.3.
3. Type in a new name.
4. Deselect the folder to set the name. Press the enter or return key or click in the window, but not on the new name.
5. Open your renamed folder.
6. Create a new folder inside the window that opens.
7. When the folder is created, just start typing to rename it. When you create a new folder, you don't have to select the folder's name to rename it.



Renaming Files

The steps for naming a folder also apply to renaming data files. In step 3, if you move the pointer over the folder's name, you'll see the pointer turn into an I-beam. Clicking the mouse while the pointer is over the folder's name will place an insertion, just as if you were editing text. All of the text editing techniques discussed in Chapter 4 apply to the Finder when editing filenames, including using the cut, copy, and paste functions.

When editing file or folder names, there are some limitations: The name cannot exceed 32 characters, nor can it contain a colon (:) or a carriage return (the invisible character that your Mac creates when you use the return key); otherwise, you can use any name you want.

8. Repeat steps 5 through 7, two more times.
9. Close all your open windows except your hard drive. If you want to close all of your open windows with a single mouse click, hold down the option key when clicking in the Close box. This clicking technique will close every open window, including your hard drive's window.

You've just created four folders, with each one inside of the other. The easiest way to see how this looks on your Mac is to view your hard drive using one of the list views: View by Name, Size, Date, or Kind. Then, expand each of your folders by clicking on the triangle to the left of each folder. When you've done this, you should see something that looks like Figure 5.4.

Other ways to use the outline view are to select the folder and hold down the option key while pressing the right-arrow key or clicking on the triangle. This will expand the folder and all of the folders it contains. To close all of the folders when in an outline view, hold down the option key and press the left-arrow key or click on

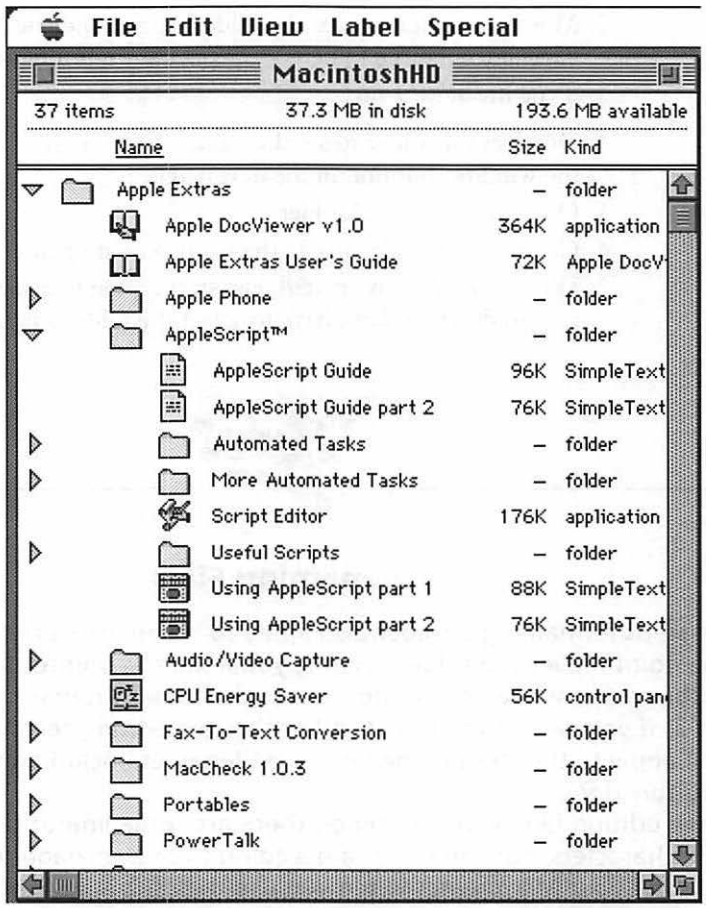


Figure 5.4 *The expanded folders.*

the triangle. You can also open a folder by holding the option key and pressing the down-arrow.

Figure 5.4 uses an outline type of view to show you your folders and how each folder contains others. The number of folders you can nest is, in theory, unlimited, but you will reach a practical limit before you reach the limit of folders the Mac can actually nest. In most cases, you'll find that nesting folders deeper than two or three becomes awkward—but this is a personal opinion; you may want to build a labyrinth.

Take the time now to understand how nested folders work. Remember, each folder can contain data files as well as folders, and the number of items you can place in a folder can be unlimited (in theory)—but there is a practical limit. If you put several hundred files and folders into a single folder, you'll find that it can take the Mac a long time to open that folder.

Setting Up a System for Your Folders

How you organize your data is a personal matter. If you have some secret code you want to use and can remember what it all means, then knock yourself out. However, most people will want to use folder names that reflect their work habits and make finding their data easy. The following is a suggestion to demonstrate how you can organize your data.

One method that works well is to set up your hard drive with a limited number of folders named by category. Using this method, you would have your System folder and Applications, Utilities, and Data folders. You can have more if necessary, but the more folders you have on the top level of your drive, the harder it will be to find one of those hundreds of files.

After you have your basic categories set up, you can subdivide the folders by putting folders inside each other. (You should put items in your System folder only when you know that they belong there.) After you install programs on your Mac, try dividing your applications folder according to category by dividing it into Word Processing, Spreadsheets, Databases, Graphics, and so on. If you do not have multiple programs of a specific type, you can just put the application, such as Microsoft Excel, into the Applications folder without worrying about nesting it inside a spreadsheet folder. The idea is to group like programs with like programs if necessary.

In Figure 5.5, you will see three folders set up in the fashion described. The most important folder to work on is your Data (or Documents) folder. Inside of it, you may want to set up your subsidiary folders according to clients, projects, or a similar type of categorization that will work for you. One possible way to set up the structure could be by Customers, with a folder named for each customer and subdivided by letters, invoices, orders, and so on.

Hopefully, this structure seems self-evident. What makes it work is that you will easily be able to find your data if you are conscientious in using this system. All too often, people create a folder on the fly without thinking about where to put it, stick a couple of files in the folder, and then repeat the process. This can result in hundreds of folders with just a few files in each, leaving you with no idea of where the document you want is located.

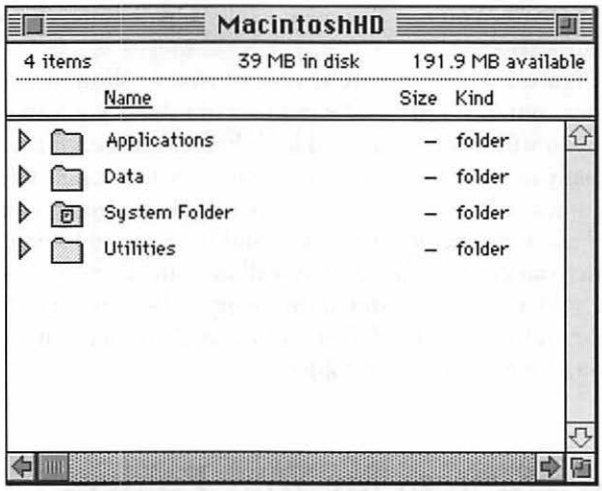


Figure 5.5 *An example for setting up your folder hierarchy.*

The other advantage to a system like this is that it will prevent sensory overload. The average person can remember seven (plus or minus two) groups of information at a single time. So, if you have 20 folders visible, you will spend more time looking for the one you want than if you have a system that groups your data into easily digestible chunks. If you can keep your hierarchy for your data folders so that you are never looking at more than seven folders at a time (and you do not stack your folders so deep that you forget what subcategory you are in), you will always be able to find a document.

Before you set up your folders, read the section, "Saving Your Work and Opening Files." There is a feature of System 7.5 that is discussed in that section that could affect how you set up your folders. If you are not using System 7.5, use whatever organizational method you wish.

How Bad Can It Get?

You may think that organizing your data is no big deal because you don't have any at the moment, but you need to remember that you're planning for the future. This section will give you an idea of how bad it can get. The amount of data that you create and acquire can be phenomenal.

Six or seven years ago, a 20-megabyte hard disk was considered huge. Today, huge is an 8G (1 gigabyte equals 1024 Megabytes) drive. In the days of old, a complete the system software for a Macintosh would fit on an 800K floppy disk. Today, it comes on over a dozen 1.44 Megabyte floppies. As the Macintosh's system software and programs become more complex and powerful, they also take up more disk space and everything becomes more complex.

In Figure 5.6, you will see, on a single Macintosh, four drives with over 10,000 individual files, accounting for 900 Megabytes of disk space. Granted, some of these

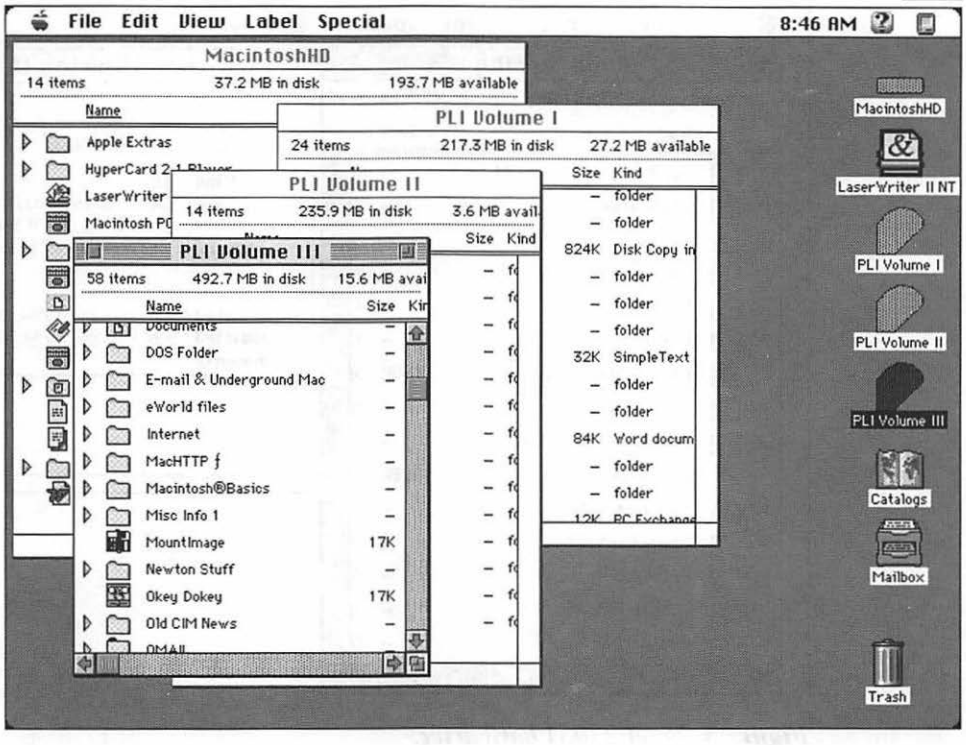


Figure 5.6 *Drives and files.*

files are programs, supplementary files, and System Files required for the operation of the Mac. Some of them are essential and others are not.

As you can see, there is an awful lot of data on the machine in Figure 5.6, and you may be saying that you'll never have anything close to what's shown. It is easy to underestimate how much data you'll collect, and you'll be surprised at how much you will collect within a short period of time. Even a 230M hard drive can collect a lot of data; the one shown in Figure 5.7 has almost 5000 files.



Hard Drive Details

If you are wondering about how your Mac stores data on a drive, that is a subject that will be covered in Chapter 10. Knowing the mechanics of how your Mac stores data is something you should know, but it's not necessary for you to know it now.

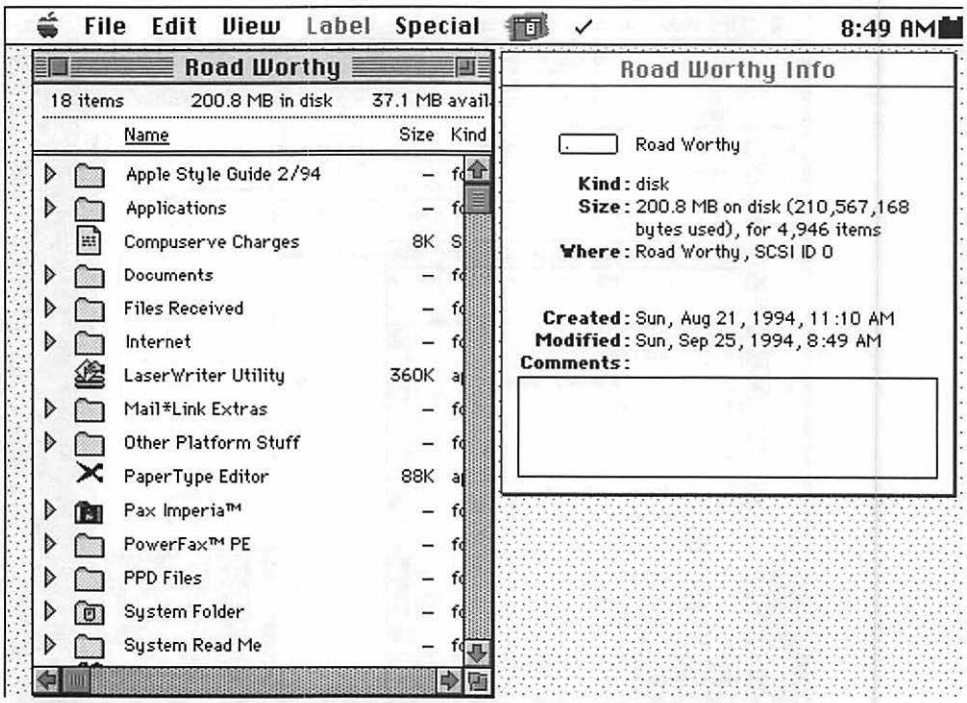


Figure 5.7 A 230M hard drive.

So, if you had to find just one file out of the 5000 and didn't have some method for ordering your data, you could spend days looking for your file. There are ways of finding your files that won't take days. But, if you forgot the name of the file, you could be in trouble, because most searching methods require that you know something about the file such as its name. If you need to find a lost file, you can find help in the coming section titled "When Your File Is Not Where It Should Be."

Manipulating Your Files

This section is intended to serve two purposes: One is to teach you how to copy and move data, and the other is to provide you with operational information that will make using your Mac easier. Some of the suggestions go beyond the basics and are geared for when you start using your Mac for serious work.

If you've been using your Mac for a while, you could have data scattered all over your drive. If this is the case, you may want to rearrange it. And even if you don't want to rearrange your data, you may still need to know how to move and copy your files. If you're rearranging your data, you'll find this is the tedious part of the process, because you will have to go through all of your other folders one at a time and move your data to its new folders. However, there are ways to make this process easier.

First, you do not have to move your files one at a time. You can move or copy them in groups, thereby speeding up the process. If you want a specific file, it is easy to look for it if you remember all or part of its name.

For the beginner, the section "Moving Groups of Files" is good information for the future, but now you're more interested in basic file manipulations such as copying and moving. The next section, "Moving, Copying, and Deleting Files," will look at those basics first. The remaining sections will cover those techniques and functions that can make accessing your files easier.

Moving, Copying, and Deleting Files

Now that you know about the Mac's hierarchical file structure and have some idea of where you're going to store your data, it's time look at shuffling it around. This section will look at the mechanics for performing each of these operations.

If you've been following the exercises, you've probably started setting up a system for your files and folders. And on your Desktop, you have one lonely file called *Test Document*. What we're going to do is move this document around and then remove it from your hard drive. Once again, the steps you'll find here are more than just procedures for moving, copying, or deleting files. These procedures, especially how files are moved, are similar to functions you'll find in other programs.

Copying and Moving Files on the Same Disk

There are three different ways to copy files. One is to make a duplicate of a file, the second is to copy the file while it is being placed in a new location, and the third is to copy the file onto another disk. All of these methods make an exact copy of the file.

In Figure 5.8, you'll see the file *Test Document* on the Desktop.

To copy this document:

1. Select the document.
2. Select the Duplicate menu item from the File menu. You can also use the ⌘+D command key.
3. A new file will appear on your Desktop called *Test Document copy*.

You've just created an exact copy of the *Test Document* file. If you double click on the copy, your Mac will start SimpleText and open the file. Its contents will be the same as the original, with the only difference being the document's name.

The second way for making a file's copy involves the same techniques you'd use when moving the file. So, first, we're going to move a file, which is nothing more than selecting the file's icon and dragging it to its new location. The new location can be a folder or an open window.

To move the file "Test Document" into a folder on your hard drive:

1. Open your hard drive.

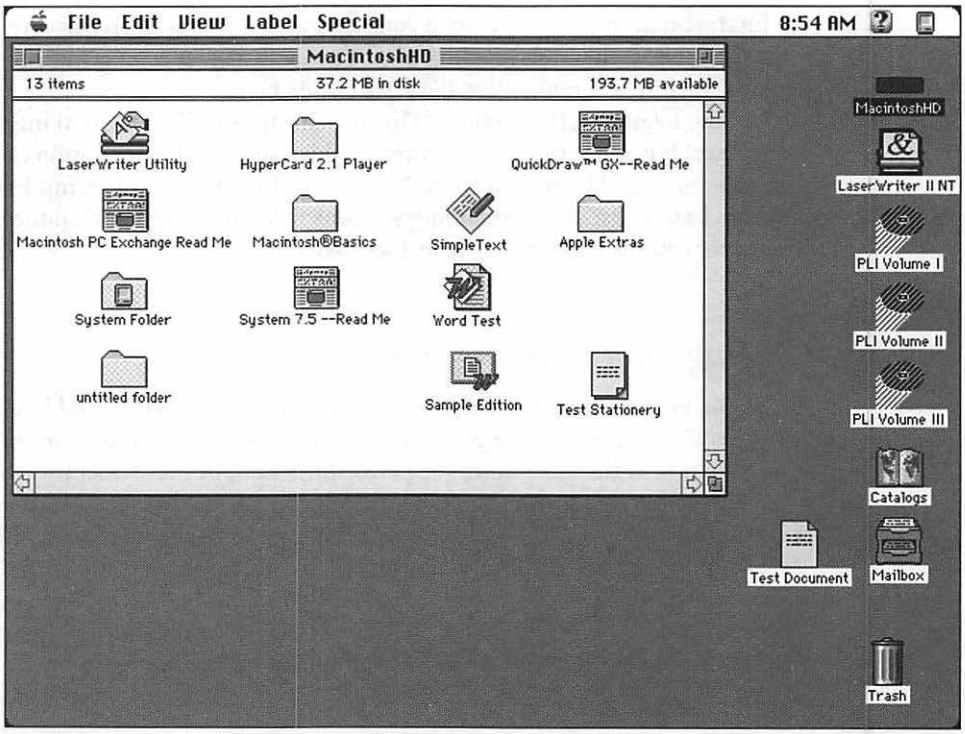


Figure 5.8 *The Desktop with the* Test Document.

2. Create a new folder (this folder will be temporary)
3. Select either the *Test Document* or its copy.
4. Drag the file to the folder you just created. Remember, dragging means clicking and holding the mouse button down while selecting the file and then moving the file's icon to its destination. When you reach your destination, the folder will be highlighted.
5. When the folder highlights, stop moving the mouse and release the button. Your file should disappear.
6. Open the folder you just dragged the file onto. Inside, you should see your file. It will be the only object in the folder, because you just created the folder and it was empty until you moved the file into it.
7. If you had difficulty moving the file, you should move it back, close the folder, and try it again.
8. Repeat these steps as many times as needed.

Once you're comfortable with moving the file, you're ready to perform the next operation. If you're having trouble moving the file, you'll have trouble with this next exercise.

Notes

Dragging Objects

The concept of dragging files, for the newcomer, can seem a cruel. Clicking on and then dragging an object can be frustrating: Your finger slips off the mouse, you run out of mouse-pad space, or you let up on the mouse and the icon is sitting on top of the destination, not quite making it into the folder. These are common problems. The first and last require practice, while running out of mouse-pad space is cured in a different way.

Actually, when you run out of mouse-pad space, you also need to practice. But, what you have to practice is picking up the mouse while holding down the mouse button, and, while it is in the air, moving the mouse to the edge of the mouse pad. If you're moving the file to the left, you'll want to place the mouse on the right-hand side of the mouse pad, and vice versa if you're moving the file in the other direction. Once you put the mouse back on the pad, resume moving the file to its destination. It is almost easier to write this description than it is to do the maneuver. If you're having this trouble, you'll just have to practice and practice and then practice some more. However, I've yet to meet someone who cannot learn how to use a mouse.

To make a copy of the file without moving the original:

1. Hold down the option key on the keyboard.
2. Select the file *Test Document*.
3. Drag the file to the new folder created in the last exercise.
4. When you release the mouse, you will see a dialog box like the one in Figure 5.9.
5. Open the folder.

Inside, you'll have two files: the one you moved in the last exercise and the copy you just made. You'll notice that the file you copied has the same name as the origi-

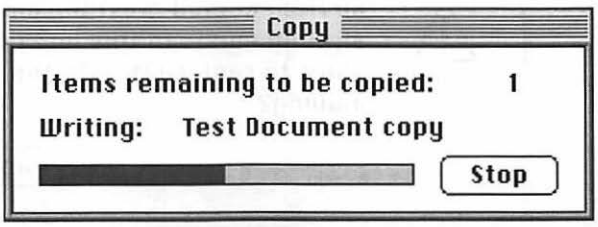


Figure 5.9 *The copy dialog box.*



Default Button

The OK button in a dialog box, like the one in Figure 5.10, is called the *default* button. Any button that has a dark button can be activated by pressing the return or enter key in addition to clicking on the button. Cancel, unless it is the default button, can be activated by pressing the escape (Esc) key. There will be times when a program does not support the escape key for cancel, and sometimes the Cancel button is the default button. Always look at dialog boxes when they are presented. It is all too easy to cause something you did not want to happen with the push of a key, such as erasing a few files.

nal and does not have the word *copy* appended to its name. Also, the original file is still on the Desktop.

Now, you need to know what happens when you try to copy or move a file into a location where a file with the same name already exists.

The following steps will demonstrate what happens:

1. Close the folder.
2. Repeat above steps 1 through 3.
3. When you release the mouse, you'll see a dialog box like the one in Figure 5.10.
4. Click on the OK button.
5. Open the folder.

When you open the folder, there will be two only files in it, because you replaced the file when you did the last copy. One of the rules regarding file storage is that you cannot have two files with the same name in the same location. So, when you copied

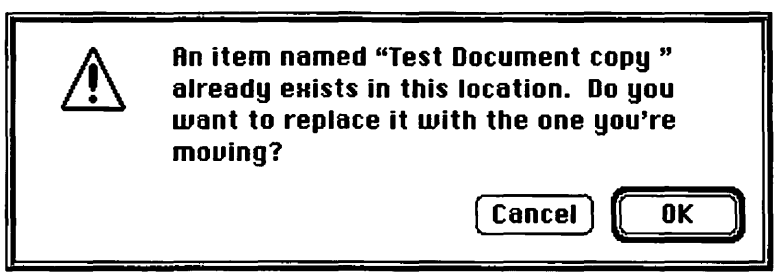


Figure 5.10 The existing file dialog box.

a second copy of the *Test Document* file into the folder, the file you replaced the existing copy with the a new copy of *Test Document*.

It is important to understand this concept because, if the file in the folder was different from the second one, the first file would have been lost when you made the copy. The Mac will always warn you when you are about to replace a file with another that has the same name, but it is easy to ignore or dismiss the warning, realizing only after it is too late that the file is gone.

Copying Files to Another Disk

One of the most common reasons for making a file copy is to put the file onto another disk for safe keeping. Just like a paper document, your computer documents may be valuable and fragile. If you trust the hard drive in your Macintosh as the sole repository of your data files, you'll be disappointed.

At some point in time, you will have trouble with your hard drive and there is potential for all of the data on it to be lost. It is recommended that you always copy your data to another disk and keep the disk in a safe place. The entire procedure of copying your data to another disk for safe keeping is called *backing up* your data. If the data is safely stored somewhere in addition to your Mac, you will always have your data—even if your Mac should be stolen.

Chapter 11 talks about keeping your data secure. Data security is a topic that you should take very seriously, so be sure to take a look at Chapter 11.

The process of copying files from one disk to another is easy, because it is like moving files from one place to another on your hard disk. The difference is that when moving a file from one disk to another, you will be making a copy and your original files will remain in place. To copy files onto another disk, you need to have a second hard disk drive or a floppy disk. Ideally for this exercise, you should use a floppy disk.

The following steps demonstrate the process of copying files:

1. Insert your floppy disk into the floppy disk drive.
2. If you see a message like the one in Figure 5.11, see the sidebar, "Formatting Floppy Disks."
3. The disk will appear on your Desktop under your hard drive's icon.
4. Double click on the floppy-disk icon.
5. A window will open with disk's name in the title bar.
6. Select the *Test Document* file on the hard drive and drag it into the open window.
7. You will see a dialog box like the one in Figure 5.12.
8. The *Test Document* file will appear in the window.

Moving the file into the window is the same as the moving it onto the disk's icon. If you repeat the above steps, dragging the file to the floppy disk's icon instead of the open window, the results would be the same.

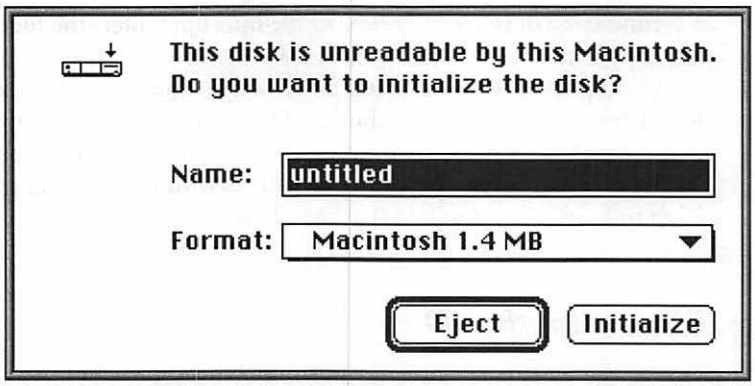


Figure 5.11 *This disk needs to be initialized.*

To copy the folder you created in the last exercise onto the other disk drive:

1. Close the floppy disk window.
2. Open your hard drive if it is closed.
3. Select the folder you created in the previous exercises.
4. Drag it onto the floppy icon.
5. You'll see the Copy dialog box, and it will tell you how many files are being copied.
6. After the files are copied, open the floppy disk, there you'll see your copied folder. If you open this folder and compare it to the original on the hard drive, you'll see that both folders are identical. You have just copied your data from one disk to another.

Copying data from one disk to the other is always done in the same manner. You can copy to an open window, a closed disk, or folder icon. In this sense, copying data is just like the above exercise for moving data, where the file was moved to a folder. Some of the rules you need to keep in mind when copying and moving data are:

- Dragging a folder moves or copies the entire contents of the folder, including all subfolders.
- Dragging a disk icon onto another disk or folder icon copies the entire contents of the disk being dragged.

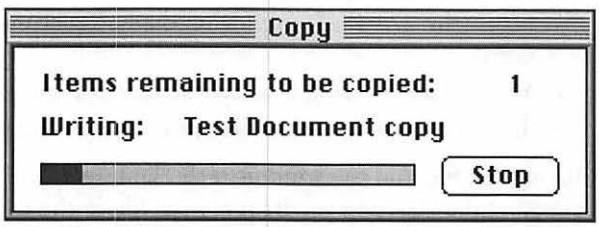


Figure 5.12 *The Copy dialog box.*

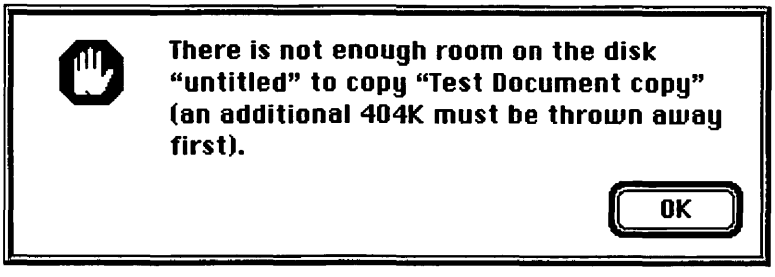
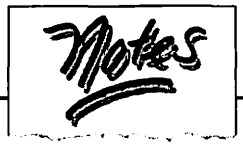


Figure 5.13 Insufficient disk space.

- If a drive has insufficient space to contain the files being copied, the Mac will display a dialog box like the one in Figure 5.13 and will not complete the operation.
- You will always be warned if you are about to overwrite (copy or move a file to a location that contains a file with the same name).
- A file with the same name as a folder cannot replace a folder and, vice versa, a folder with the same name as a file cannot replace the file.

Like everything else associated with computers and the Mac, some people will find copying easy, while others will encounter difficulties. If you find these techniques hard, make more folders and practice moving and copying them.

Format To divide a disk into tracks and sectors where information can be stored. Blank disks must be formatted before you can save information on them for the first time; synonymous with *initialize.*



Formatting Floppy Disks

Before any disk can be used on a Macintosh it has to be formatted. When your Mac can't read a disk, it will ask you if you want to initialize the disk. As long as you know that the disk is a new and blank disk, you should format it, telling the Mac OK when you receive a dialog box like the one shows in Figure 5.11.

However, if you know there is data on the disk you should *not* initialize it. Initializing a floppy disk will destroy any information it contains and the data is irretrievably lost. A hard disk that is initialized as a result of the dialog box in Figure 5.11 can be retrieved, but it is difficult and not a recommended practice.

The term *initialize* is often used synonymously with *format*, but they have different meanings technically. You will find more information about formatting and initializing disks in Chapter 10.

Initialized disk A disk that has been organized into tracks and sectors by the computer and is therefore ready to store information.

Deleting Files

If you've been doing the exercises in this chapter, you should have four copies of the *Test Document*. There is one on your Desktop, one in the folder on your hard drive, another on the floppy disk, and the fourth in the folder on the floppy. It is now time to get rid of these files; the process of getting rid of files is technically called deleting the files. In Macintosh parlance, the files are *trashed*.

The process is called *trashing* because the files are dragged to the trash can icon in the lower right-hand corner of your Desktop, called simply the Trash. The Trash icon is the metaphorical equivalent to the trash can next to your desk. When you move something into the Trash, the Trash icon expands to show that it contains files that have not yet been deleted, as shown in Figure 5.14.

Moving files into the trash is the same as taking a piece of paper off your desk and throwing it into your trash can. The papers remain in the trash until you take out the trash to the garbage can. Likewise, your files remain in the Trash until you empty the Trash, which is done by selecting the Empty Trash... menu item from the Finder's Special menu. When you select the Empty Trash... menu item you are presented with a dialog box like the one in Figure 5.15.

Once you click on the OK button or press the return key, the Mac will delete all of the files in the Trash and they will be gone. GONE.



Figure 5.14 *The expanded Trash icon.*

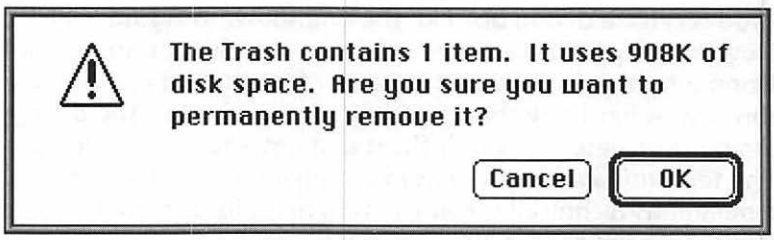


Figure 5.15 *The Trash warning.*

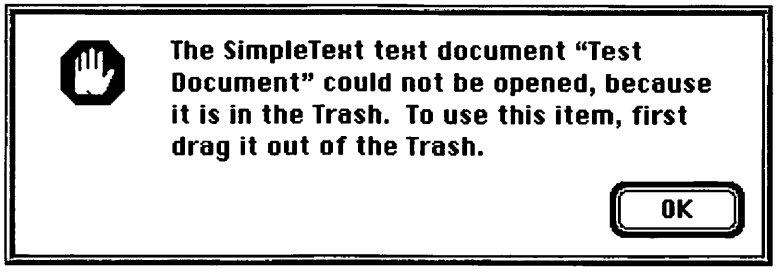


Figure 5.16 The dialog box received when trying to open a file that is in the Trash.

Because the files are not deleted until you select the Empty Trash... menu item, you can, as it were, dig through the Trash if you accidentally throw away a file. To dig through the Trash, all you have to do is open the Trash and you will see in a window all of the files and folders you've put there. Like all other Finder windows, you can select how to view the files. However, you cannot open a file that is in the Trash.

If you want to check a file that is in the Trash before you chuck it out, you must move the file from the Trash and then open the file. If you try to open a file that is in the Trash, you'll receive a dialog box like the one in Figure 5.16.

Other actions you can perform on trashed items are:

- Get Info
- Put Away

The Put Away command has not been discussed yet. It returns to their original locations files placed in the Trash or moved to the Desktop, which is wherever the file was located prior to being moved to the Trash or the Desktop. The Put Away menu item is found in the File menu and can be invoked with the ⌘+Y option key command.

To see how the Put Away function works:

1. Move the *Test Document* File on the Desktop to the Trash.
2. Open the Trash.
3. Select the *Test Document.*
4. Select the Put Away menu item or use the ⌘+Y option key command.
5. The *Test Document* file will automatically be moved from the Trash back to the Desktop.

Once you've emptied the trash, your files are gone. It is possible to retrieve a file that has been deleted, but it can be a lot of work. If you ever trash a file that you really need, you should turn off your Mac and read Chapter 18.

There is one more feature about the Trash that you should know. If you wish, you can turn off the warning when you select the Empty Trash... menu item by selecting the Trash and performing a Get Info... (⌘+I) command. The Trash's Get Info window looks like Figure 5.17.



Unmounting a Disk

When you formatted a floppy disk as described in the last section, "Copying Files to Another Disk," the disk, after being initialized, was *mounted* on the Desktop. Whenever you insert a disk into your Mac, it is mounted when it appears on the Desktop. When you are done with the disk, it must be unmounted.

Unmounting a disk is done in one of two ways: You can drag the disk's icon to the Trash, or you can use the Put Away menu item (or ⌘+Y) from the File menu. Both methods remove the disk's icon from the Desktop and eject the disk.

If you've been poking about, as you should, and discovered the Eject menu item in the Special menu, you might wonder about its purpose. The Eject menu item is used to eject a disk without unmounting it. When a disk is ejected with the Eject (⌘+E) command, the Mac treats the disk as if it were still available. This command is useful for copying floppy disks or using two floppies at once. You'll find more information about how the Mac handles disks in Chapter 10.

Call Out the Check Box

In the Trash's Get Info window, there is a check box labeled *Warn before emptying*. When the check box is marked, your Mac will warn you before it empties the Trash. When the box is unchecked, the Empty Trash... menu item becomes *Empty Trash*, without the ellipsis. The ellipsis after a menu item means that you will have to provide more information or supply a confirmation before the command is executed.

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.

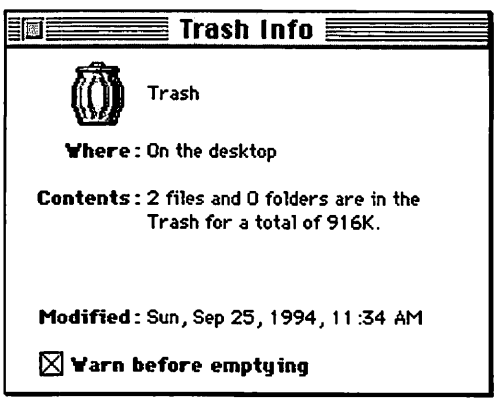


Figure 5.17 The Trash's Get Info window.

You now know almost everything there is to know about the Trash. Did you ever dream that the Trash could be so interesting?

Moving Groups of Files

There will be times when you want to clean up your drive. You might want to move application folders to organize your programs or move data files to reorganize everything. Whatever your motives, you will be moving many files. This section is written with the assumption that you are organizing your hard drive as described in the "Getting Organized" section.

When you are ready to move your data and applications to new folders, you need to be methodical so that you don't miss any data and it all gets put in the proper place. One way to accomplish this is to move your data through the hierarchy one step at a time.

If you have several application folders on your drive that are not buried in other folders, open each application folder to make sure you do not have data inside of it. (It is easy to absentmindedly store a letter inside the same folder that contains your word processor.) The process might go something like this:

- Open your hard drive and view its contents by name. This will let you work with each folder in some type of order.
- Make sure your main folders are visible and accessible. You may want to put them on the Desktop under your drive icons.
- Select your first folder and open it. If it contains folders and files, start with the files. Make a rough division of the files according to the main categories you have set up. Select the files for a specific category by clicking on the first one you want, and then select the rest by holding down the Shift key as you click on each additional file.
- Once you have all of the files selected for the category, put the mouse over one of the selected files and drag it to the proper folder. All of the selected files will follow. If you want to copy the files to the new folder rather than just move them, hold down the option key before you click on the file you are going to drag.
- Next, open the folder you just moved everything to and continue the process of subdividing your files. If you want to process a couple of folders at a time, that's fine; just don't put so many individual files into a folder that you will not be able to easily move them to the next subcategory.
- As you clean all of the data files from an application's folder, be sure to leave any files the application requires inside the application's folder. You can then simply move the application's folder to your new *Applications* folder. If you have any question about what files are required by your application, check the manual. There is no reason to keep anything you do not need, unless you have disk space to spare (if you do, count your blessings).
- Repeat this process for each folder until all of them have been emptied or moved. If you empty a folder, throw it into the Trash so that it will not be in

Notes

The Marquee

Another way to select groups of files is to use a Macintosh feature called a *marquee*. The marquee is a standard Macintosh selection tool that is invoked by dragging the pointer so that a rectangle is drawn around a group of objects. Figure 5.18 shows how the marquee appears when used to select a group of files.

You select all of these files by starting in one corner and dragging the pointer to the opposite corner. The marquee appears and selects all of the objects enclosed in the rectangle created by dragging the pointer. The rectangle is the marquee because it can appear to be a series of moving dots on the screen, like the lights on a movie theater marquee.

your way. Trashing the folders and any files you no longer need as you go is a good way to measure your progress. *Do not empty the Trash until you are sure all of your data is safe in its new home, and then double check the Trash to make sure you are not throwing away a file you need.*

As you go through the above process, look for files you no longer need or programs you are not likely to use. A good test is, if you don't know what an application

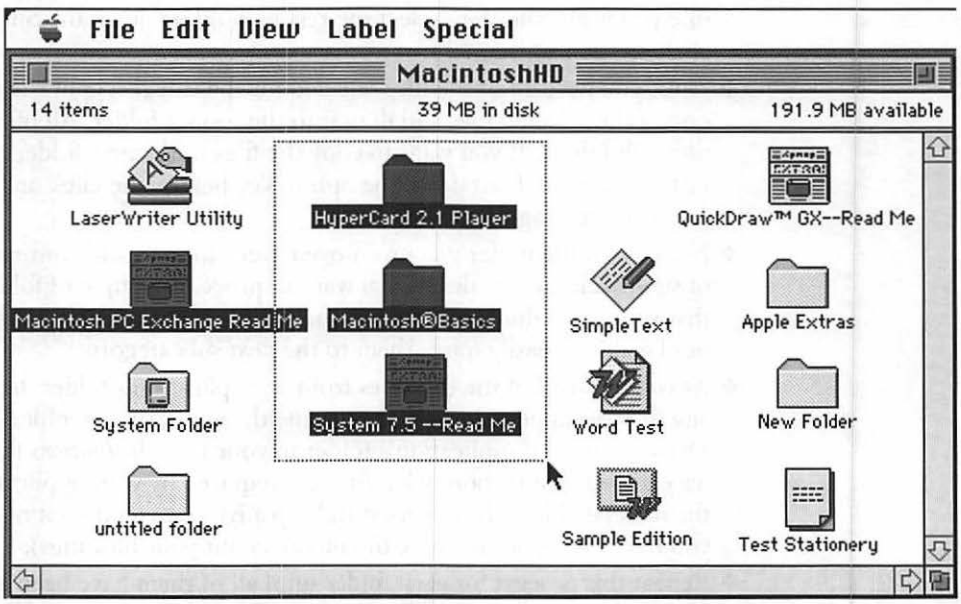


Figure 5.18 *The selection marquee.*

does, you probably don't need it. But, before you toss it into the trash, copy it onto a floppy disk. Also, you can run the program before throwing it away to make sure it is not something you want to keep. *If you are using System 6.0.X, do not run any applications during this process unless you are sure you do not want the contents of your Trash running an application will empty the Trash.*

Other types of files you can trash are *Read Me* files. They usually come on program disks and are only pertinent to the installation process, or have information that you read when the program was installed and haven't looked at since. If you are not going to use them, trash them (the *Read Me* file is still on your program's Master Disk).

When Your File Is Not Where It Should Be

If you lose a file during the reorganization of your drive or at any other time, you can search for it using the Find menu item from the File menu, or by using the ⌘+F command key option. When you use the Find command, you will get a window that looks like Figure 5.19.

If you know the name or even just part of the file you want, type it into the *Find:* field and press the *Find* button. Your Mac will scan the drive that appears in the pop-up menu for any files that have names that contain whatever you put into the *Find:* field.

You can search specific disks or all mounted disks by using the pop-up menu, which will list each mounted disk and provide the option to search all disks.

Field The place where you type information within a dialog box.

When an item is found that matches the search criteria, the folder or drive that contains the found file opens and the file is displayed in a window, as shown in Figure 5.20.

If you want to narrow the search criteria, you can use the *More Choices* button. When you select this option, you will get a window that looks like Figure 5.21.

By using the extra choices and entering additional criteria, you can narrow your search considerably. Your choices consist of whether to use the name and/or some

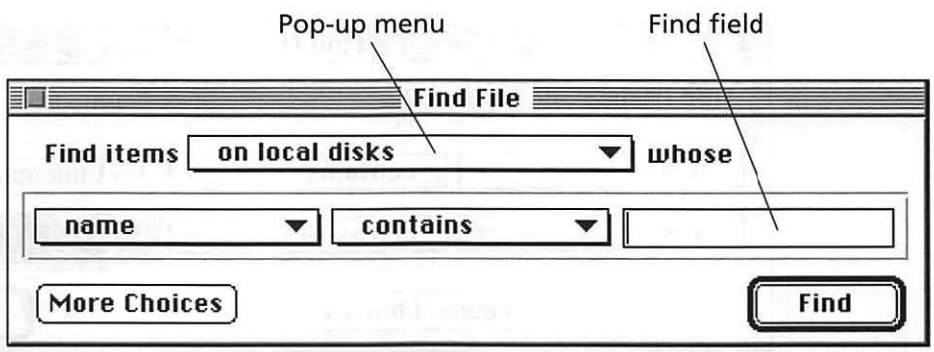


Figure 5.19 *The Find window.*

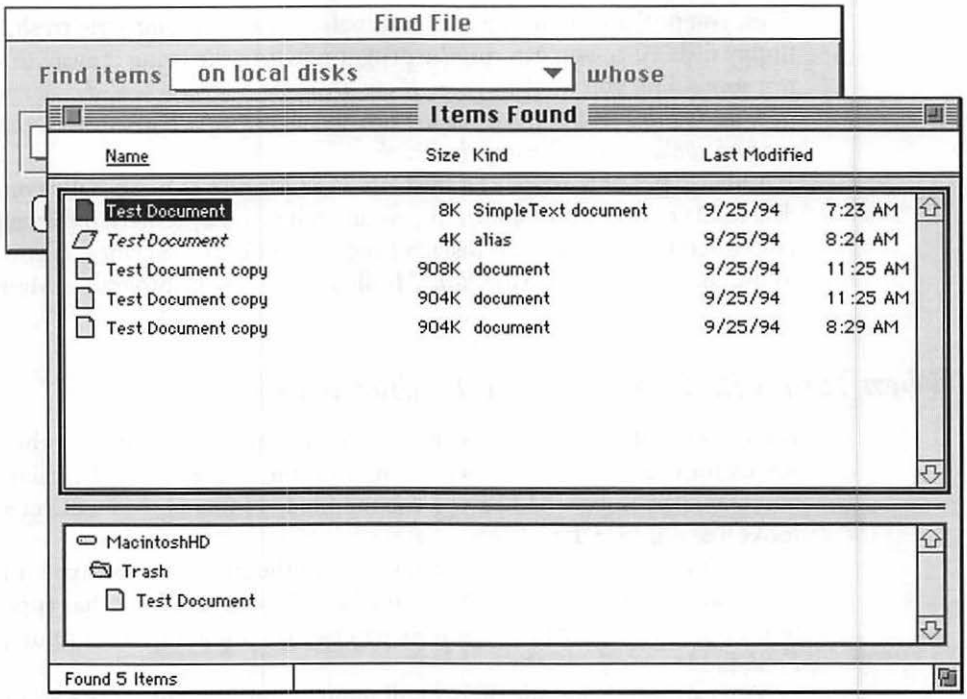


Figure 5.20 *The found window.*

other file attribute, and whether it should match your criteria. The different combinations of choices are quite extensive and listed below:

- **Attribute criteria** You can search for your file using its name, any normal file attributes, or specific comments placed in the file's comment box from within its Info window. Figure 5.22 shows all of the possible search criteria you can select. Some of the items listed may not make any sense right now because they are topics that have not been discussed yet. Advanced information about Macintosh files can be found in Chapter 11.

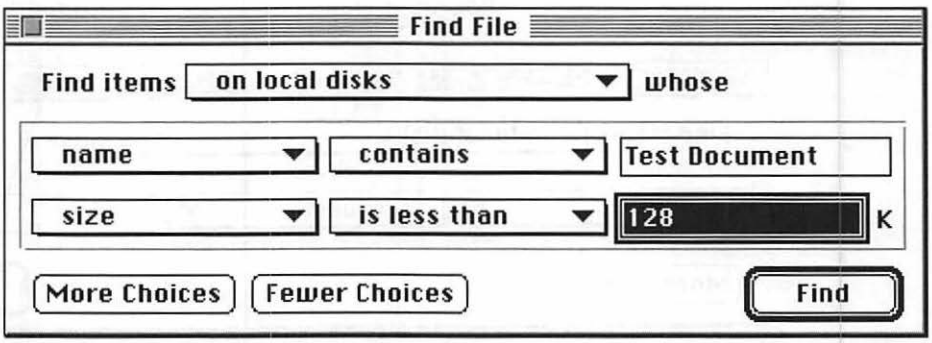


Figure 5.21 *The Find window with search options.*

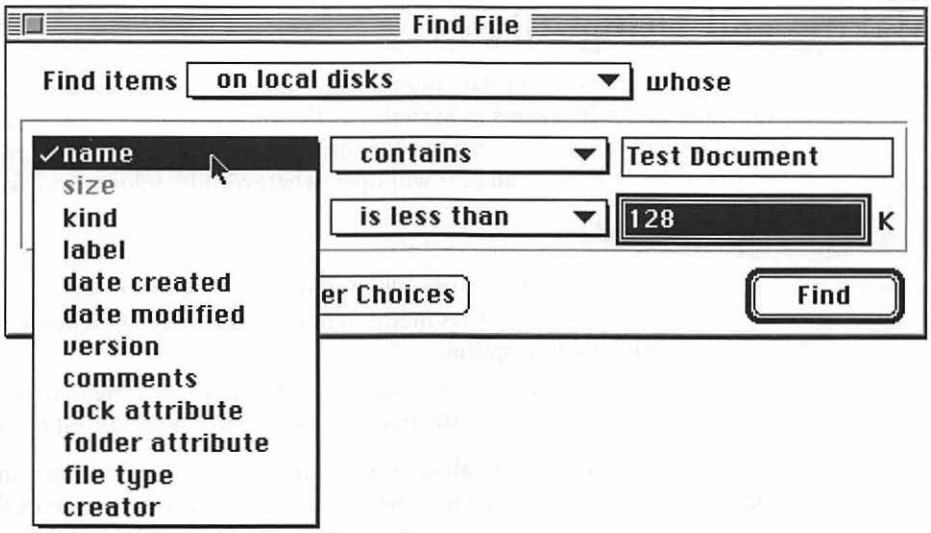


Figure 5.22 *The Find window with attribute options.*

- **Condition options** Finally, you can specify search conditions, which are based on matching specific conditions with the attributes you choose for your search. Figure 5.23 show the list of conditions applicable if you were conducting a search using the name of a file.

There are different condition options available for each of the different attributes you might want to use. Spend a couple of minutes looking at the different options; you might find some of them useful.

Versions of the Macintosh system, prior to 7.5, have Find functions that are different from those just described. If you are using an earlier version of the System, you should experiment with the Find program or menu item on your Mac to see how it differs.

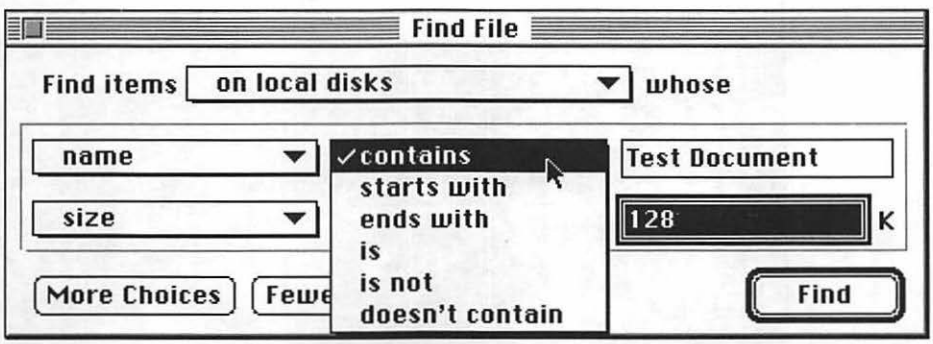


Figure 5.23 *The Find window with condition options.*

Making and Using Aliases

Now that you have your data organized, it is time to make accessing it easier. One of the most useful functions in System 7 is the ability to make aliases. An *alias* is a small data file that stores the location of an original file, application, folder, or disk. When you double click on an alias, it will open whatever file, folder, or disk it represents.

To create an alias:

1. Select the item (a disk, folder, data file, or application).
2. Select the Make Alias menu item from the Special menu or use the ⌘+M command key option.
3. You will see what looks like an exact duplicate of the item, except its title will be in *italics* and the name of the file will be followed by the word *alias*.

Once you have made an alias, you can move to any location on your hard drive. In Figure 5.24, you will see a whole row of aliases across the bottom of the Desktop. One of the things you might notice is that none of them have the name *alias* following the name. You can change the name of your aliases to anything that might suit your fancy; doing so does not impair their function.

When you make an alias of an item and then move the original, double clicking on the alias will find and open the original file. Should you delete an item for which

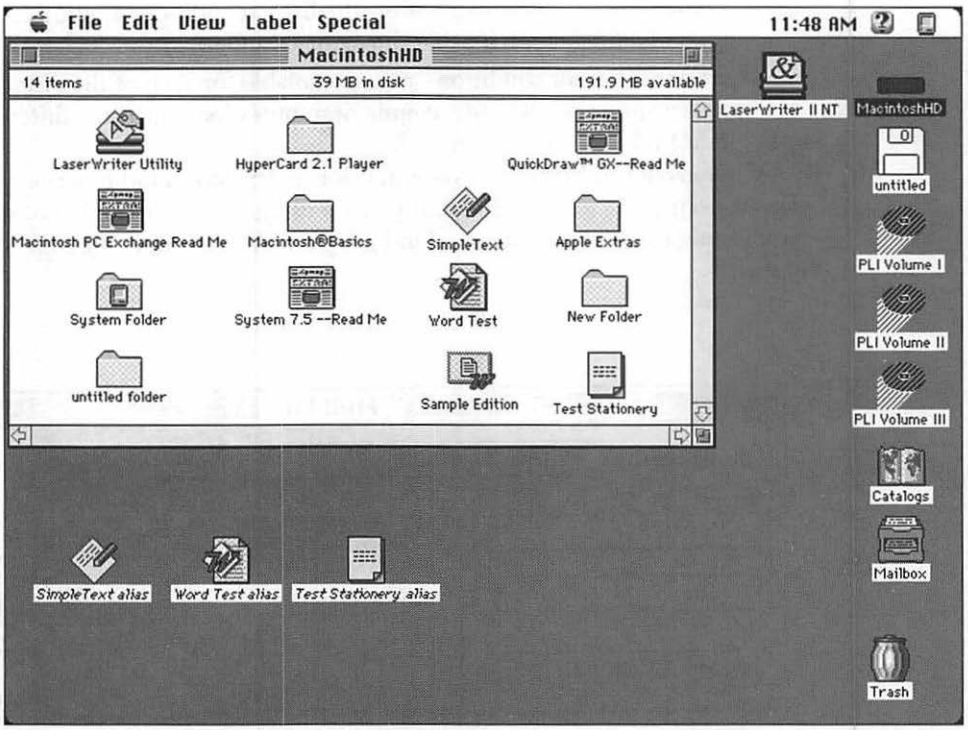


Figure 5.24 *Aliases on the Desktop.*

you have made an alias, the alias will remain even though the original item no longer exists. This means your hard drive can become very cluttered with aliases which are no longer functional, so don't create confusion by forgetting to remove an alias you no longer need.

If you need to find out where the original of an alias resides, you can perform a Get Info... (⌘+I) on the alias and it will tell you where the original item is supposed to be. In Figure 5.25, you can see that the original is located using the following nomenclature:

Road Warrior :Utilities :Logger Folder :Logger Beta 1.7

This means of identifying the location of an item is called the *path* for the item, and designates the hierarchy of the file. In this case, the path describes the program, Logger Beta 1.7, as being on the hard drive, Road Warrior, which contains a folder called Utilities, inside of which is the Logger Folder that houses the Logger Beta 1.7 program. Figure 5.26 shows how the path translates to the actual hard disk location.

Pathname The complete name of a document beginning with the name of the disk (also called the *volume name*), the name of the subdirectory it's in (if it's in one), and the name of the document. The pathname begins with a slash, and the parts of the pathname are separated by slashes. It's called a pathname because it describes the route to the document. (Compare to *filename*. See also *full pathname, partial pathname*.)

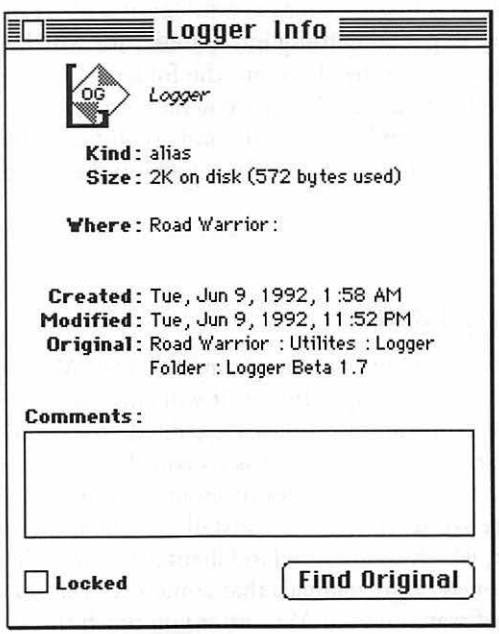


Figure 5.25 *Get Info on an alias.*

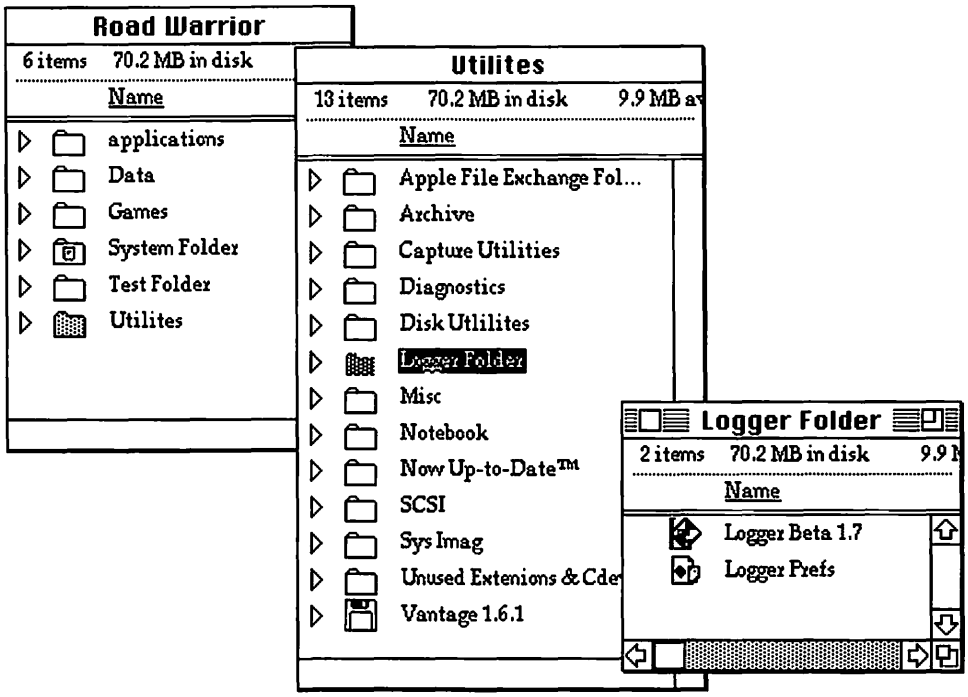


Figure 5.26 The alias path shown via windows.

When you make an alias of a folder, it will act just like the regular folder. When you want to put something into a folder for which you have created an alias, just drag the item you want to place into the folder on top of the alias. Your Mac will move or copy the file to the folder as if you had dragged it in the original.

Aliases are handy little items and you'll find references to them throughout the book. Explaining all of the things you can do with an alias would be premature at this point.

Installing Programs

The process of putting a program onto your Macintosh is called *installing* the program. When you buy software, it will come with a manual that will tell you how to install the software. In some cases, all you have to do to install the software is copy the program from a floppy disk to your hard drive. If the software cannot be copied, it will come with an installer program that installs the software for you.

There are several types of installers. The most commonly used installer is Apple's installer, which is described in Chapter 6. The other installers you'll encounter will be explained in the manuals that come with the software. So, if you are waiting to install software on your Mac, after you finish this chapter, you should read Chapter 6. If you want to play with some of the programs on the Berkeley Macintosh Users

Group CD-ROM included with this book, read Appendix A for information about the CD-ROM disk and installing the programs on the disk.

Saving Your Work and Opening Files from within Programs

Now that you have your data organized, all you have to do is keep it that way. If you have no problems saving or finding your documents, you can skip this section. However, there are lots of people who have used their Macs for years and never really gotten the hang of navigating their way to the folder they want while using a program, to save their data. Likewise, they have the same problem when trying to open a data file from within a program. In this section, we're going to look at both opening and saving files from within an application.

Saving Your Data

You need to know where you are storing your documents when you perform a Save As... from the File menu of any application. Even experienced Mac users sometimes forget to check where they are storing their data and, as a result, save a file in the wrong folder. It takes just a bit of care and attention to store your documents in their proper location.

To properly save your data, you have to understand how your hard disk is organized and how folders can be placed within folders. If, after you read this section, you are still confused regarding these topics, reread the section titled "Getting Organized" in this chapter.

Remember that your drive's organization is based on a hierarchy, and the entire structure of your drive and the series of nested folders is like a tree as described earlier. If you go down the trunk of the tree (the top level of your drive), you can then climb back up the tree via the branch that contains the folder in which you want to store your document.

In Figure 5.27, you will see the standard Save As... dialogue box for the SimpleText application.

The first thing to note is where you currently are in your drive's hierarchy. You will notice at the top of the dialogue box that there is an icon of an open folder titled Utilities, with a downward-pointing arrow. The arrow means that you are in a nested folder, and the entire structure (the folder icon and name) is a drop-down menu. Figure 5.27 shows the entire hierarchy for where you currently are when you click on the pop-up menu.

By dragging through the menu, you can select any folder between the one you are in and your hard drive, you can select the hard drive, or you can go to the Desktop to select a different disk drive. When you select the hard drive, you will have access to any of the folders there, and can then begin to navigate through a different chain of folders. Figure 5.28 shows the top level of the drive. Notice the drive icon and drive name in the drop-down menu.

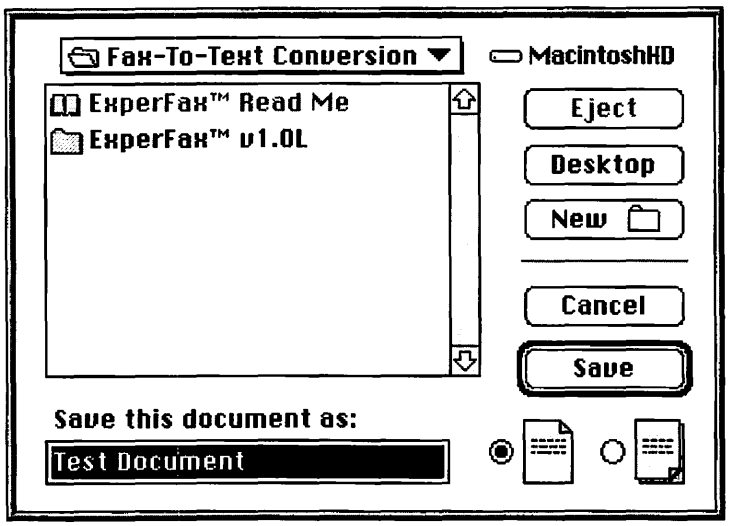


Figure 5.27 *The Save As... dialog box.*

Notice the black border around the window that contains the list of folders. The extra dark border means the file selection window is selected. If you wish, you can navigate to a folder by typing the first letter of its name. Your Mac will automatically select the first folder that starts with the letter you type. When a folder is selected, the Save button in Figure 5.28 will turn into an Open button, as shown in Figure 5.29.

Once the folder is highlighted and there is an Open button, pressing the return or enter key will open the folder. To change the Open button to a Save button, press

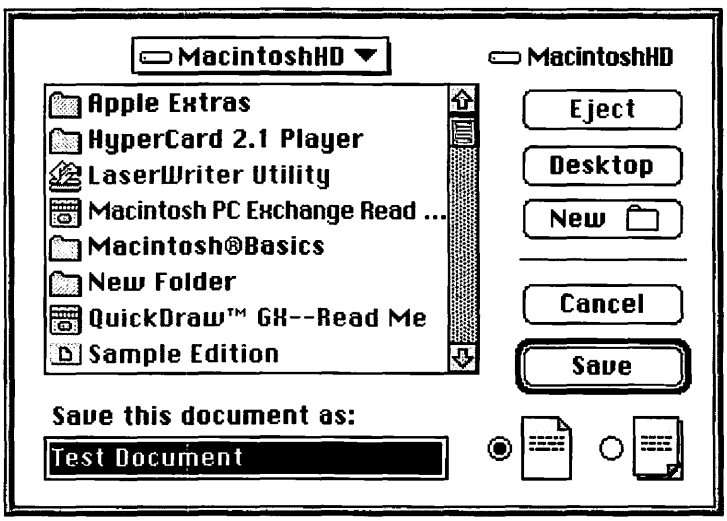


Figure 5.28 *The top level of the drive.*

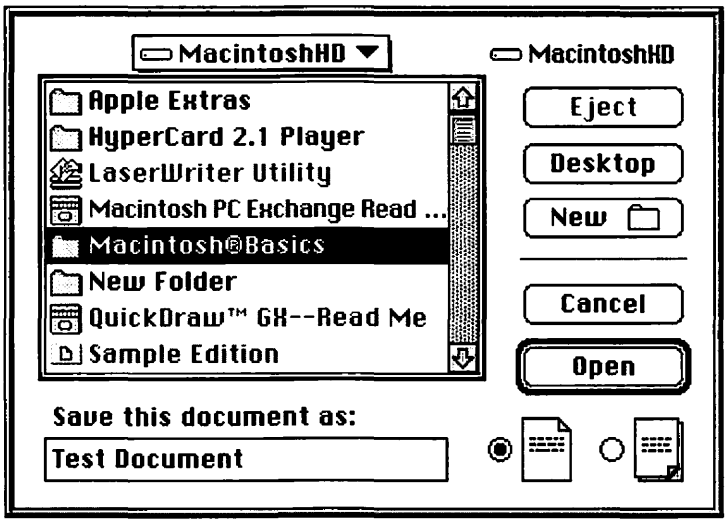


Figure 5.29 *The Open button.*

the Tab key or place the pointer in the filename field and click. If you type in your file's name and press enter, your file will be saved in the folder or on the disk whose title appears in the pop-up menu.

If you want to create a new folder to store your document, just press the button with the word *New* and the folder icon. You will be presented with a dialogue box like the one in Figure 5.30. The new folder you create will be placed in the same location your file would be if you were saving a file; the new folder will be for your document's new location.

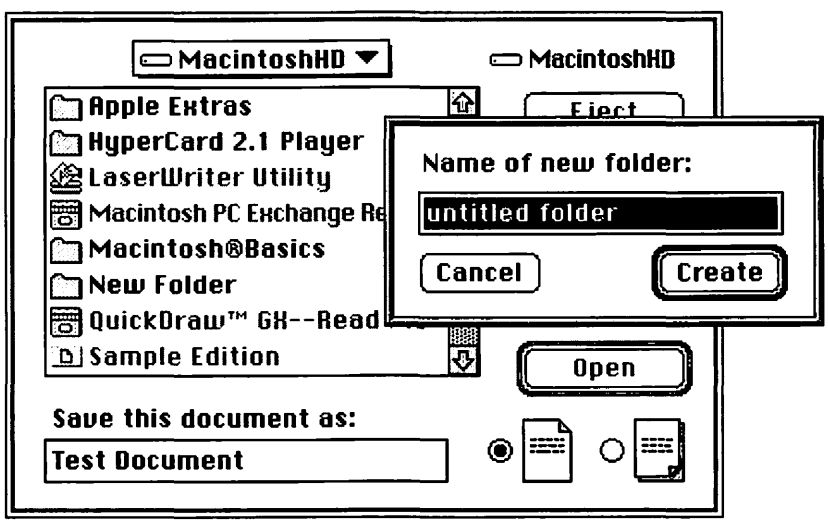


Figure 5.30 *Creating a folder from a Save As... dialog box.*

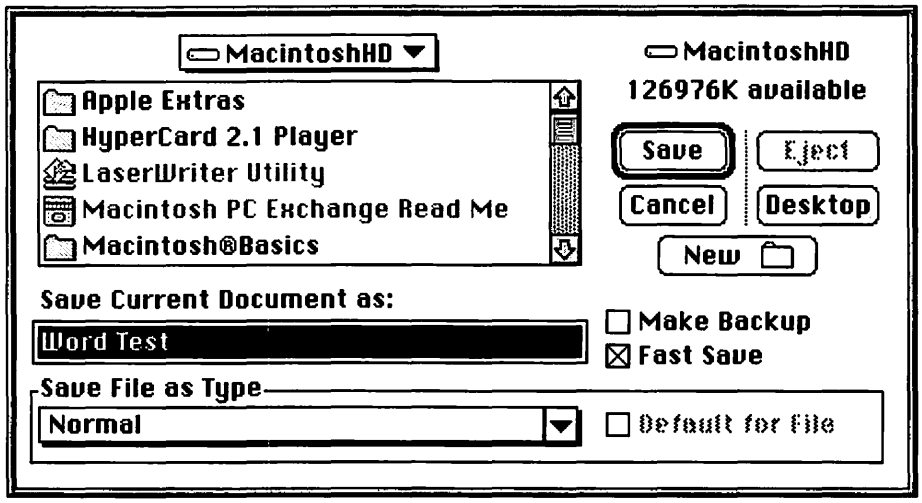


Figure 5.31 *Save As... dialog box in Microsoft Word.*

The dialog box used in these examples is the standard Macintosh Save As... dialog box. However, the Save As... dialog box is dynamic and can be altered by the program you're using. Figure 5.31 shows the Save As... dialog box created by Microsoft Word.

All of the functions described above are the same; the main difference is that there is an extra drop-down menu for selecting different file formats. Don't be surprised when you find variations on a theme when saving documents with different programs.

When you start any application, it will automatically save the documents you make in the same folder as the application, or in the folder of the document you used to start the application (by double clicking on a document icon). If you want to save the document elsewhere, you will have to navigate your way to it.

Another way of keeping yourself organized is to use an alias of a folder or even a disk drive. By keeping a few select aliases on your Desktop, you will be able to access the folders they represent from any Save As... dialog box (discussed in the next section, "Opening Files from within Applications"). Simply click on the Desktop button from the dialog box and you will have access to all of your drives, any folder, and aliases on your Desktop.

Opening Files from within Applications

People who have problems saving files in the correct location will have the same problem when opening files from within an application; They won't know where to find their documents. The procedure for opening files from within an application are basically the same as those for saving your files. The dialog boxes are similar and will vary only slightly, depending on the application. The major difference is that there are no fields into which you type anything.

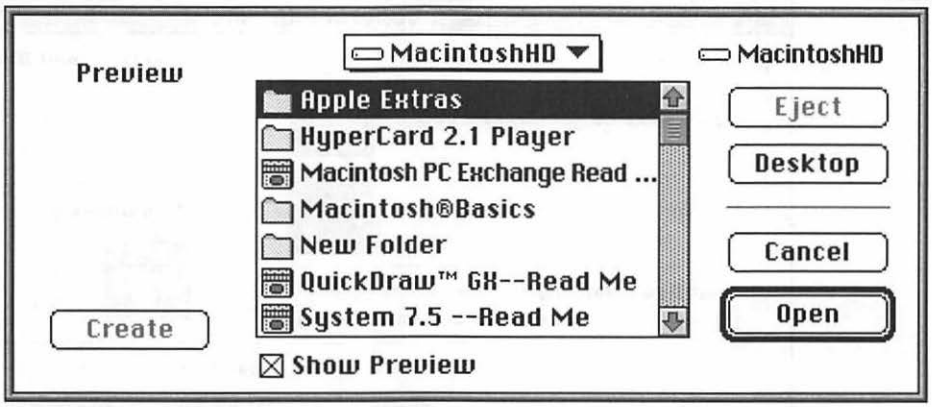


Figure 5.32 *The Open dialog box.*

To open a document from within an application, select the Open menu item from the File menu or use the ⌘+O command key. You will be presented with an Open dialog box similar to the one in Figure 5.32.

Like the Save As dialog box, your location will be where you last saved or opened a file. If you've organized your data and know where to find your document, you would get the location in the same manner as described in an earlier section, "Saving Your Data." All you have to know is where you've saved your data.

This is the reason why you should be organized. If you do not make a conscious decision to save your data in a specific location, you'll forever be looking for that report or letter you wrote last week. Of course, you can always use the Find File program to locate those wayward files, but you'll be wasting a lot of time. A much better solution is to organize your hard drive so that you know where your data is stored.

Using the Documents Folder

One of the features of System 7.5 is an automatic default location for your documents. You can select for the default the folder where the program you're using is located, or a special folder called *Documents*. You select either of these locations from a special configuration program, a Control Panel, called *General Controls*.

Mentioning this feature here is a bit premature, because it involves some features and terms that haven't been introduced to yet. But, because we're talking about data organization, you needed to know about it. You will find more information about Control Panels in Chapter 7.

To access the General Controls Control Panel, you need to select the Control Panels menu item in the Apple menu. From the Control Panels menu item, you will be presented with a list of items; drag your way to the General Controls menu item. This action will present you with a window, as shown in Figure 5.33.

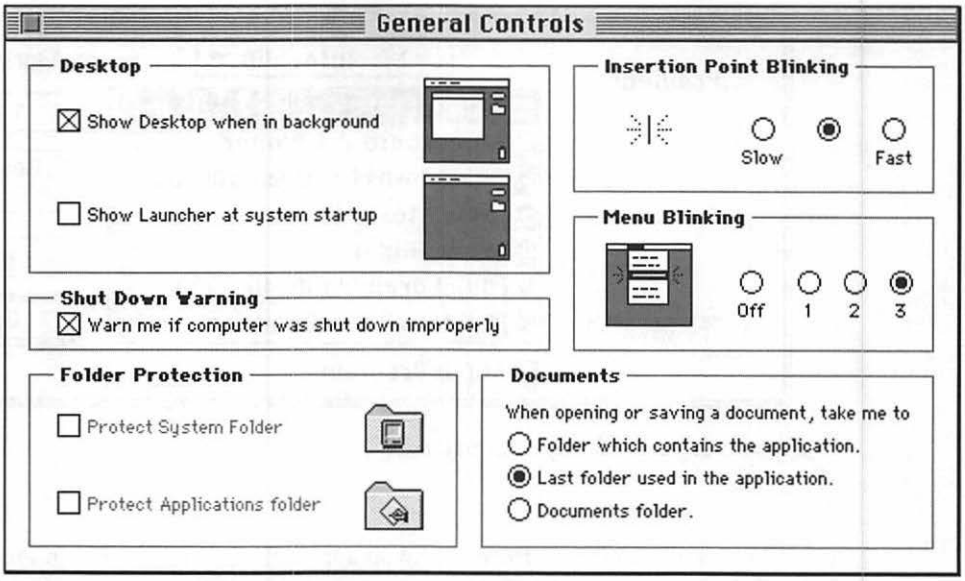


Figure 5.33 *The General Controls Control Panel.*

In the lower right-hand corner, you'll see a section called *Documents*. In this section, you'll see three radio buttons. Your choices are:

- Folder that contains the application
- Last folder used in the application
- Documents folder

Radio button A series of buttons for selecting an option where only one of the listed options can be chosen.

These choices control the default location for saving or opening files from within an application. The default setting is the *last folder used in the application*. This setting is the one used in the sections "Saving Your Data" and "Opening Files from within Applications." However, you can select the default location selection method you want to use. If you select *Documents folder*, your Mac will create a folder called *Documents* and place it on your Desktop. Then, every time you save or use the application's Open menu item, your location will default to the *Documents* folder. The *folder that contains the application* choice will default you to the application's folder every time you save or use the application's Open menu item.

Summary

Phew! If you're not tired just from reading about all of this, I'd be surprised. There is a lot of information in this chapter, but you now have all of the essential information you need to use your Mac.

You know about all of the icons, how to use your folders and organize your data, and how to save your data from within an application. You've various techniques for using your Mac and are now on the road to Macintosh mastery.

Granted, there is a lot more to learn, but now you have all of the basic information you need—not only to use your Mac, but to understand most of the other chapters. From here, you can read the chapters as they appear in the book or you can jump around, selecting those chapters that interest you the most.

If, during your explorations, you encounter a topic or term that you don't understand, flip to the index to locate where the topic or term is first mentioned. Remember, learning the language associated with the Mac and computers will do more than anything else to make you an expert.



CHAPTER 6

Installing Your System and Software

Several System versions ago, Apple introduced the *Installer*. Its purpose is to automate and simplify what might otherwise be a complex and tedious process of installing your Macintosh's System software. It is not possible to properly install your System without the Installer, so it will be a primary topic of this section. Chapter 7 will cover what the System actually does and how to use it.

This chapter will show you how to deal with the Installer, show you the different types of installations you can perform, and explain how you should upgrade or install System 7.5. What you learn about the Installer in this chapter is not limited to installing the System. About 60 percent or more of all software that you'll install on your Mac will use Apple's Installer. All of the features covered in this chapter apply to the Apple Installer, whether you're installing System software, applications, or utilities. So, even though the primary focus of this chapter is installing System software, remember the principles involved so that you a can use them when installing other software.

The following topics are covered in this chapter.

- The Apple Installer
- Using software updates
- Other types of installers

Do not be fooled by this short list of topics. The Apple Installer section contains a lot of technical information. In addition to learning about the Installer, you'll learn more about the System and your Macintosh. What you'll learn are primarily technical details that might seem boring at first, but when the time comes for you to use this information, you'll at least have an idea of where it is located.

And you will need it at some point in time. You will either use it when performing maintenance or possibly late at night when working on a report that is due in the morning. That's when things usually go wrong. And if they do, this chapter could be the most important one in the book, next to the troubleshooting chapters.

The Apple Installer

When you first received your Mac, it probably came with the System already installed. But, as you use your Mac or as new versions of the System are released, the latest being System 7.5, you will have to install or reinstall your System and you'll use a new system called the *Installer*.

The Installer is a small program located on the Install Me First, Installer, or Disk 1 of your software disk set. Very few programs come on a single disk anymore; most require at least two, and some, many more. The Macintosh's System software comes on seven high-density disks, not counting PowerTalk or QuickDraw GX.

The installation process is no longer quick and simple. Although Apple has done everything possible to keep the process simple, its simplicity is actually an illusion. If you've read the manuals that came with your Mac or your System 7.5 upgrade, you might wonder what the fuss is all about, because the instructions that come with Apple's manuals are very straightforward. But, Apple has a nasty habit of not telling you everything, thinking that you don't need to know what your computer is doing or why things are done the way they are.

If you want to know what is happening and why, this section will tell you as it looks at:

- The very first step
- What the Installer does
- Preparing for an upgrade or installation
- Upgrading from System 6.0.X
- The installation
- After you upgrade
- Using the Installer to remove software

There is an order to the madness. You'll learn what the Installer does and the process of performing an installation before you actually install any software. Before you install or reinstall your System, you should read this whole section so that you will know what to expect and what to do if something goes wrong.

If you started to install your System only to get a message that said something was wrong, you could spend the next hour trying to figure out the problem. By knowing what might happen before you start, as well as the precautions to take before you install your System, you will save yourself time and possible heartache.

The Very First Step

The very first step you should perform is to make a backup copy of your System disks, especially if you're using floppy disks. Your System disks are the most important disks you posses; without the data that is on those disks, your Macintosh cannot operate.

Since learning about the installer is also the first step in disaster preparedness, before you can be truly prepared, you have to have the tools you need to make your

Mac work. Too often, the set of System disks is taken for granted, misplaced, or even lost. It is not hard to get new ones if you have to, but if it is after 5:00 P.M. and you need a set of disks that you don't have, you're out of luck. *Make a backup of all your System and Application disks.*

If your System disks come on a CD-ROM, you should still put them on floppy disks. It is possible to damage CDs, or, if you have a non-Apple CD-ROM drive, you cannot use the floppy disk that came with System 7.5 to start your Mac. The System 7.5 CD will let you make a set of floppies using the Disk Copy program inside the CD Backup folder.

To backup your System disks:

1. Lock and insert the floppy disk to be copied into your Mac.
2. Eject the floppy disk using the Eject Disk menu item from the File menu, the ⌘+E command key, or ⌘+Shift 3 command key. The disk will eject but it will still be mounted. Figure 6.1 shows a disk that is ejected but still mounted.
3. Insert a blank floppy disk into your Mac.
4. If the disk is unformatted, your Mac will ask if you want to format the disk; otherwise, it will appear on your Desktop.
5. Drag the disk icon of your System disk onto the icon of the floppy disk (this is similar to dragging a disk icon to the Trash).
6. You will see a dialog box like the one shown in Figure 6.2, asking if you want to *completely replace contents of* the blank floppy with the contents of the System disk. Click on the OK button. Make sure you are not performing this process in reverse, copying the contents of the backup disk onto your System disk.
7. Your backup disk will be ejected and you will be asked to insert the System disk. The Mac will read the System disk, eject it, and ask you to insert the backup disk.

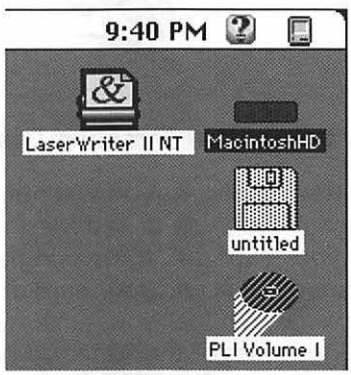


Figure 6.1 *An ejected floppy that is still mounted.*

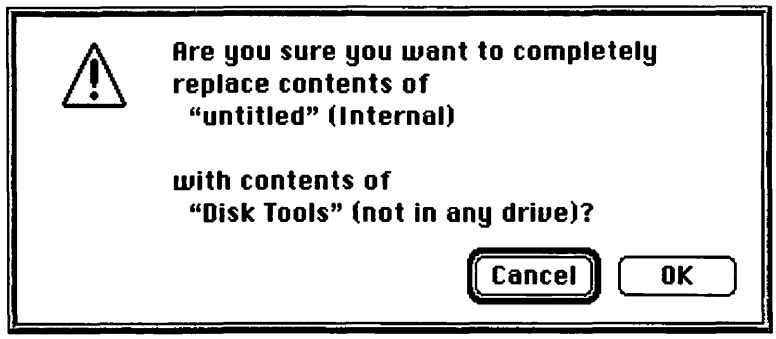


Figure 6.2 *The copy disk dialog box.*

8. Step 7 may be repeated several times. After the copy is made, the backup disk will be in your Mac and the System disk will have been ejected. Click on the name of the System disk and select Copy (⌘+C) from the Edit menu. This copies the name of the System disk.
9. Select the backup disk's name and paste the name of the System disk using the Paste menu item from the Edit menu (⌘+V), replacing the backup disk's name.
10. Repeat steps 1 through 9 for each disk, and don't forget to make a copy of your Disk Tools disk.

If you're using the Disk Copy program on the System 7.5 CD, making backups is easier. The instructions for running Disk Copy are on the CD in the Back-Up CD folder in a file called *Using Disk Copy*. Follow the instructions and make your backups.

Once you've made your backups, you're ready to continue. Whatever you do, make backups of your System and application disks. Disks can be damaged, and if you can't install your System, you can't use your Mac. Likewise, if you can't install a



If You Didn't Receive System Disks with Your Mac

If you have a Macintosh Performa, you will not have a set of System disks. This is also true for some of the newer, low-priced Macs. However, there are a program, instructions, and files on your hard disk for making a backup of your System.

You should check your manual and your hard drive for instructions. The instructions can vary, depending on which Mac you purchased. Performas use a hard-disk backup program for making copies of the System, while other Macs could use disk copy. Whichever program your Mac has, you need to make copies of your System disks.

program because you have damaged disks, you'll be unable to work. This precaution cannot be emphasized enough.

What the Installer Does

With System 6.0.X, the Installer became an essential component for upgrading or installing your System. The Installer consists of the Installer application and an Installer script. The Installer is a very flexible application that depends on the Installer script to perform its magic. Even though it is the script that controls the Installer, when we're talking about the installation process, we'll refer to the Installer instead of the Installer script.

What the Installer does is quite complicated, especially when you are performing an Easy install. It will check your Macintosh hardware to determine what model of Mac you are using. It will determine what type of disk drive you are installing the System onto, and check the boot blocks of the drive for any necessary modifications. In addition to this, it checks your operating environment to determine what System software has previously been installed.

Boot block (1) An area on a formatted disk that signals the computer that the disk contains an application to be started up; (2) the first block of a file system, or the first two logical blocks of a volume. The boot block contains the system's start-up instructions.

One of the reasons the Installer is so important is that the Installer script contains more than just instructions for installing the System. It also contains resources, bits of programming code, that can be essential for Macintosh. Figure 6.3 shows the resources in the Installer script on the Install disk 1 for System 7.5, as seen in a program called ResEdit (which will be discussed in Chapter 9.



Technical Terms

Because of what the Installer does, there will be some technical terms thrown about somewhat freely in this chapter. Each of these terms will be defined and you'll be referred to other chapters where you'll find more information regarding each term. The first of these terms is *boot block.*

Boot blocks are an area on every disk, where information is stored that will tell your Macintosh where to find the System file and other vital information about the disk drive. If there is a problem with a drive's boot blocks, your Macintosh will not operate properly. More information about boot blocks can be found in Chapters 11 and 12.

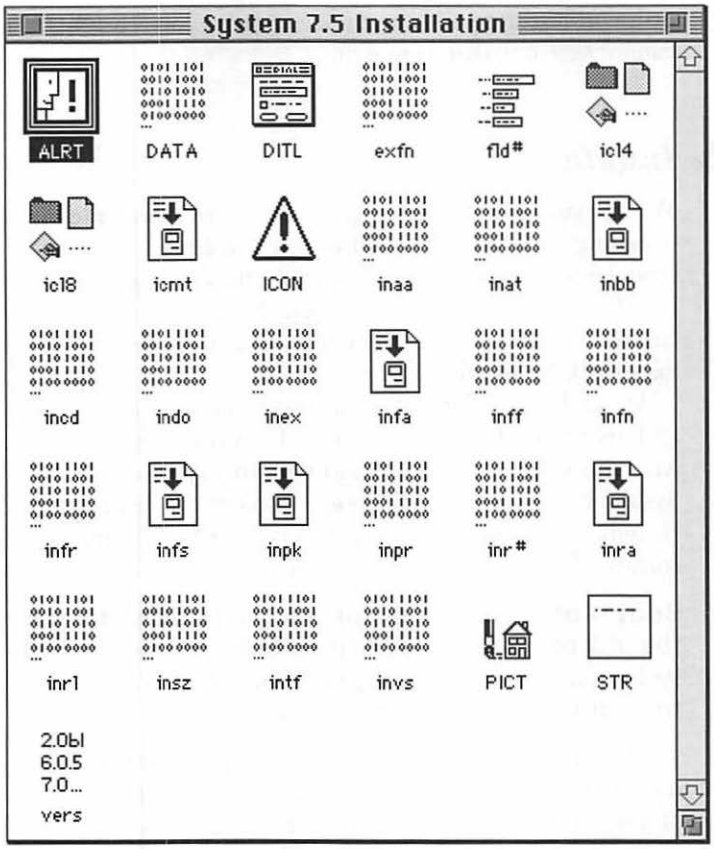


Figure 6.3 *Installer resources as seen in ResEdit.*

If you were to just drag-copy the System file found on Install Disk 1 onto the drive where you wanted to upgrade or install your system, you would not get the resources contained in the Installer script, and your new System would be unstable and prone to crashes. Even though the System on the Install disk 1 will boot any Macintosh, it is not safe to use the System without the Installer.

Another reason for using the Installer is that the ROMs found on two different Macs, even if they are the same model, are not always identical. The Mac made in July may incorporate bug fixes or improvements that ROMs in Macs made in March do not contain. The programmers responsible for the ROMs and the operating system know this information and take it into consideration when writing Installer scripts. The Installer can determine what ROMs your Mac has and make the necessary modifications to the System to compensate for differences in the ROMs when it installs your System. This means the difference between smooth, trouble-free operation and irritating random system errors.

System error (1) A crash that is accompanied by an alert box that has either a number code or phrase that identifies the source of the problem; (2) a generic term used for a *crash* or *hang.*

There are several steps you should take to make sure your installation is successful. Some of them are good maintenance steps that you should periodically perform even when you're not installing or reinstalling your System. Also, reinstalling your System is something that you should occasionally do, even when everything is working properly. Reinstalling the System can prevent and detect problems before they become disasters.

Preparing for an Upgrade or Installation

Unless you are installing the System onto a hard drive that has just been formatted, there are several steps you need to take before installing or reinstalling your System. This section assumes that you have been using System 7.0 or later. If you're using System 6.0.X and upgrading to 7.X, you need to perform all of the steps in this section and the ones that follow the section, "Upgrading from System 6.0.X."

If you're installing your System onto a freshly formatted hard drive, you need to make sure your hard-drive driver is compatible with System 7.5; this is discussed in the coming section, "Updating Your Hard Disk Driver." All of the essential information for updating a hard-drive driver is included in that section. From there, you can skip to the section "Performing an Easy Install" or "Customizing Your Installation."

For the rest of you, who are upgrading a System or reinstalling your System, you need to read each of the following sections. Skipping any one of them could lead to an unsuccessful installation.

Back Up Your Hard Drive

Before you ever do anything radical with your Macintosh, you should back up your hard drive. Although installing the System may not seem like a radical procedure, it is. The first step you should perform before upgrading or reinstalling your System is to back up all of your data.

Backup A copy of a disk or of a file on a disk. It's a good idea to make backups of all your important disks and to use the copies for everyday work, keeping the originals in a safe place. (Compare to *archive*.)

You'll find information about backing up your hard drive in Chapter 11. Basically, to back up your hard drive, you'll need another hard drive, some type of storage backup mechanism, such as a tape drive, or a mess of floppy disks and a backup program. Unfortunately, Apple does not supply a backup program as part of your System software.

If you do not back up your entire hard drive, you need to at least back up any of your data files that you can't live without. If you would kill yourself because a particular file got destroyed while installing the System, copy it onto a floppy disk. If it won't fit onto a floppy disk, read Chapter 11 and don't install the System until the file is backed up.

Fixing Your Hard-Disk Directory

Every hard drive has a file that you can't see called the *volume directory*. This file tells your Mac where all of the files on the hard drive are located. If something is wrong with the volume directory, or the hard disk's directory your Mac will not function properly.

Volume directory The main directory file of a volume. It contains the names and locations of other files on the volume, any of which may themselves be directory files (called subdirectories). The name of the volume directory is the name of the volume. The pathname of every file on the volume starts with the volume directory name. (See also *directory file, subdirectory.*)

The Mac has a very complex hard-disk structure and it can easily be damaged. Also, there have been a number of System software bugs that have resulted in directory problems. Apple has spent a lot of time finding and correcting these bugs and none are super-critical, but reinstalling your System is the perfect time to make sure your hard drive is OK. So, perform this maintenance step even if you think it is redundant. If you try to install the System and there is a problem with your hard drive, the installation will fail. It takes less time to check your hard drive and fix any problems than to start to install your System only to find out that you have problems. Play it safe to begin with.

To check your hard drive's directory, you need to run Disk First Aid, which is found on your Disk Tools disk or in the Disk Tools folder on the 7.5 CD. Disk First Aid will fix any directory damage caused by bugs in earlier System versions and check for other disk-drive problems.

Running Disk First Aid is a simple task and takes just a few minutes. However, you cannot fix your startup disk or the disk that contains Disk First Aid with Disk First Aid. So, you will have to boot your Macintosh from a drive other than the one you're fixing or from the Disk Tools disk.

Follow these steps:

1. Boot your Mac with the Disk Tools disk.
2. Start the Disk First Aid program. When it starts, you'll see a window like that shown in Figure 6.4.
3. Select the drive you want to check by clicking on it.
4. Click on the Verify button. Verify checks the disk and tells you if it needs to be repaired.
5. If the disk needs to be repaired, click on the Repair button. After a disk has been repaired, you will see a message that says the repair was successful.
6. Repeat steps 3 through 5 for any additional disks you wish to check.
7. Quit Disk First Aid.

If you were unable to repair a disk, it needs to be reformatted before you continue. Trying to install a System onto a damaged disk will only cause more problems, and a hard disk with a problem is a disaster waiting to happen. Chapter 10 will tell you how to format your hard drive. Once you're sure your hard disk is OK, you can go on to the next step, which is upgrading your hard disk's driver.

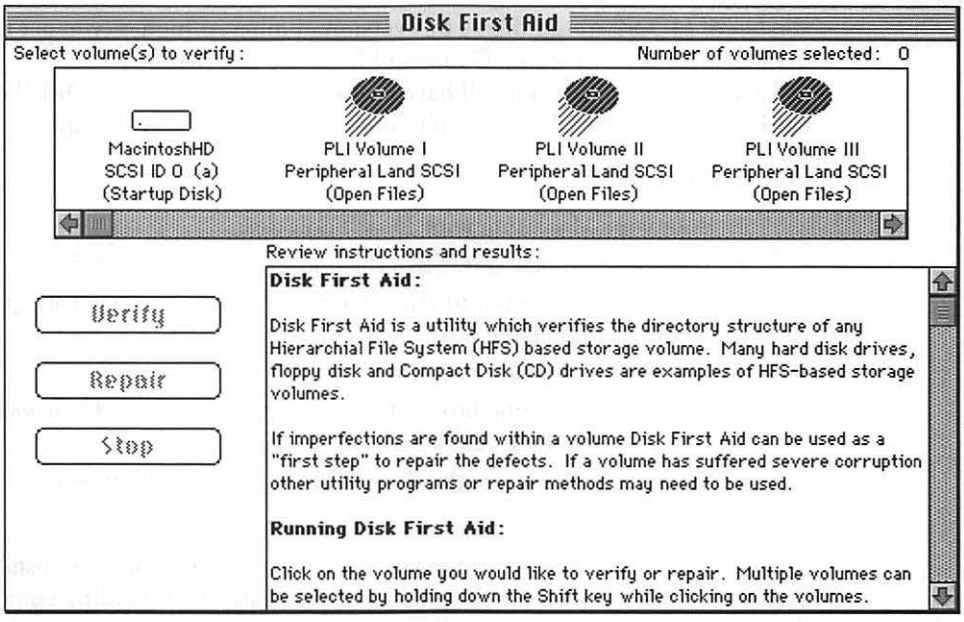


Figure 6.4 *The Disk First Aid window.*

Update Your Hard-Disk Driver

The Mac has software called the SCSI Manager built into its ROM. The SCSI Manager tells the Mac how to communicate with SCSI peripherals, primary hard drives. System 7.5 has a new SCSI Manager, version 4.3. Although the SCSI Manager is normally in a Mac's ROM, only the newest Mac's have SCSI Manger 4.3 built into their ROM.

SCSI Manager The part of the Macintosh Operating System that controls the exchange of information between a Macintosh and peripheral devices connected through the Small Computer Standard Interface (SCSI).

The SCSI Manager, when working with hard disks, uses what is called a *hard-disk driver*, which is stored on the hard drive and loaded into the Mac's memory as it boots. This means that the hard disk driver and the SCSI Manager have to be compatible; if they are not, you will have problems with your hard disk.

So, the next step is to make sure your hard-disk driver is SCSI Manager 4.3-compatible. If you're using an Apple hard drive, you'll have no problems, because you can update your hard disk's driver from the System 7.5 Disk Tools disk. However, if you are not using an Apple hard drive you will have to check with the drive's manufacturer to make sure your drive is SCSI Manager 4.3-compatible. If you have to update your hard disk's driver and it is not an Apple drive, you will have to follow the manufacturer's instructions when you get your updated driver. You can find more information about hard-disk drivers in Chapter 12.

To upgrade an Apple disk-drive driver, you will use the Apple HD SC Setup program. The one that comes with System 7.5 is version 7.3.2. You should use only a

version of HD SC Setup that is this version number or higher (you get the version number with the Get Info... Command from the File menu).

Like Disk First Aid, you will have to boot your Mac from the Disk Tools disk or a hard drive other than the one you're updating to use HD SC Setup.

Follow these steps:

1. Boot your Mac using your Disk Tools disk.
2. You will see a dialog box like the one shown in Figure 6.5.
3. Use the Drive button to select your hard drive. Its name will appear in the bottom of the dialog box.
4. Click on the Update button.
5. You will get a dialog box that says *the new driver will not be available until you restart* your Mac. Click on the OK button.
6. Perform steps 3 through 5 for any drive you want to update.
7. Quit HD SC Setup.

This completes the second step you need to perform before you install your System. Do not forget to do this; it's an essential step to upgrading your System.

Are Your Applications Compatible?

After you have checked and/or upgraded your drive, you should run Apple's Safe Install utility (a similar utility called the Compatibility Checker is used with earlier versions of System 7.X). This is a program that comes with your System 7.5 upgrade.

The Safe Install utility will check all of the applications on your hard disk(s) to see if they are compatible with System 7.5. It is not foolproof but it will give you an idea of what might not work after you have upgraded the System.

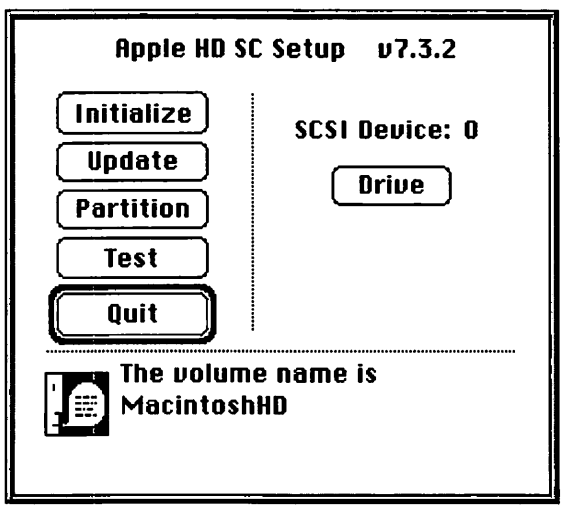


Figure 6.5 *The HD SC Setup dialog box.*

It will also remove any incompatible or questionable extensions and control panels from your System folder and place them in a folder called *May Not Work with System 7.5* so that they will not cause conflicts. It will also provide you with a list of all of your installed programs and the manufacturer's phone number, but it does not tell you that a program is incompatible with System 7.5. When you run the Safe Install utility, you need to realize that it is primarily giving you recommendations. If you have any questions at all about any product you are using, call the publisher or manufacturer. Figure 6.6 shows you the results of using the Safe Install utility.

Additional hardware considerations you need to think about are accelerators, third-party video displays, some scanners, and any piece of hardware you have had installed in your Mac. If it was done before 1989, chances are very good that it is not System 7-compatible. If it was done before May 1991, it may or may not be compatible; you'll have to check it out. All hardware that was System 7.0 or 7.1-compatible will be System 7.5-compatible, unless it is a very strange peripheral.

If you do not run the Safe Install utility and install System 7.5 anyway, you may end up having to remove System 7.5 and reverting to your old System. If you have two hard drives, upgrade only one of them to System 7.5. Leave the other with your current System. This way, if you do run into problems, you can boot from the other drive and not have to suffer the pain and agony of deinstalling, then reinstalling System software.

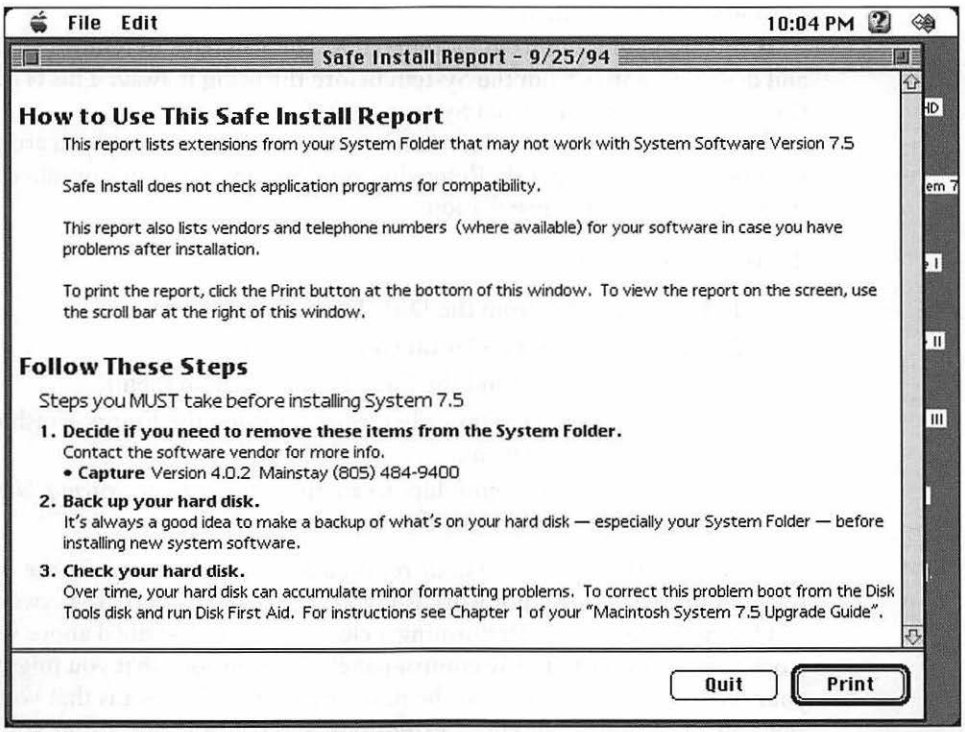


Figure 6.6 *The Safe Install utility.*



Installer Notes

The installer has a couple of undocumented features. If you hold down the option key when you double click on the Installer, you will bypass the introduction window and jump straight to the Custom Install windows. This also closes the Finder folder or disk window that contains the Installer.

Doing a Clean Install

If you are upgrading from an older version of System 7.X, you should perform a clean install rather than an upgrade. To perform a clean install, throw away your System file. This is a deviation from Apple's recommended upgrade procedures. However, this is also the only way to guarantee that you are getting a clean System install. If you install over your old System, it is possible for the old System to be missing needed resources that the Installer does not install. This is especially true if you are reinstalling System 7, since you are probably doing so because you are having some type of problem.

If you are upgrading from System 6.0.X, you will have to remove all of your fonts and desk accessories from the System before throwing it away. This is discussed in the section, "Upgrading from System 6.0.X."

The only time you should not trash your old System file is if you are performing the upgrade over a network. Removing your System file in this instance would make it impossible to do the installation.

To trash the System:

1. Boot your Mac from the Disk Tools disk.
2. Open the System folder on your hard drive.
3. Select the System and the Finder (shift-click on them).
4. Drag them to the Trash, then empty it using the Empty Trash command from the Special menu.
5. Rename your System folder to anything other than *System folder* and put it into another folder for safe-keeping.

Now, you are ready to install or reinstall System 7. Once again, the only time trashing the System will not work is if you are doing an over-the-network install.

One note of warning: Performing a clean install as described above will result in a stock System 7.5 install. Any control panels or extensions that you might have had in your old System folders will not be in the new one. This means that you will have to reinstall all of your preferences, extensions, and control panels after you've reinstalled your System.

An alternative to steps 4 and 5 above is to leave your System folder where it is and then do your installation. This will result in the new System being installed in the same System folder as your old System. This installation technique is fine, as long as you don't have any trouble caused by extensions or control panels.

If, after you install the System, you have problems, you'll want to repeat the steps in this section, including steps 4 and 5. Then, install your System again. Instructions for restoring your extensions and control panels are in the section called "After You Upgrade."

Upgrading from System 6.0.X and 7.0 or 7.0.1

Although it is possible to install System 7.X over your existing System 6.0.X, you should take the extra time necessary to do a clean install of your new System. It requires a little more work, but is worth it in the end.

One of the nice things about System 7 is that everything is neatly tucked away in folders within the System folder, rather than loose in the System folder, as in the 6.0.X versions. If you just upgrade over your existing System 6.0.X, a lot of what is kicking around loose in your System Folder will remain that way and probably never make its way to its new home.

Before you run pell-mell into trouble, you should check everything discussed above before you install, or upgrade to, System 7.X. Make sure your hard-disk driver is System 7.X-compatible, or update it using Apple's HD SC Setup. Check your hard drive's directory with Disk First Aid and, for your sake, back up your data.

In System 6.0.X, all display fonts and desk accessories are installed directly into the System file. When they are stored outside of the System, they are saved in files called suitcases, which have an icon like that shown in Figure 6.7.

In Systems 7.1 and 7.5, display fonts are also in suitcases, but they are not installed into the System file (they go in the Fonts folder). This means that when upgrading

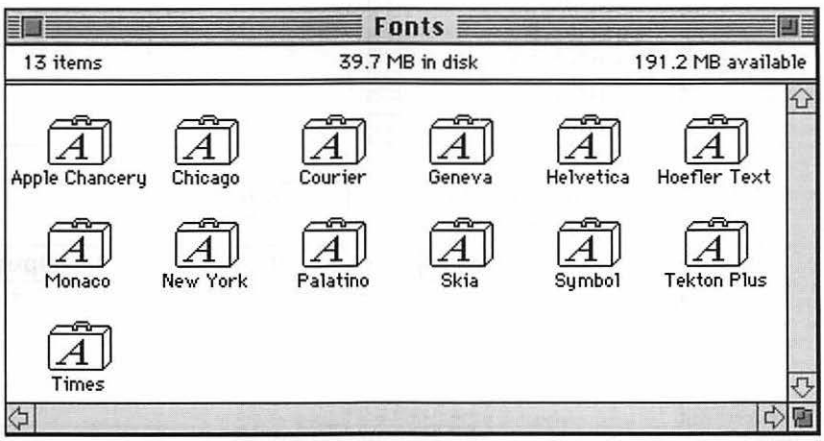


Figure 6.7 *Font suitcases.*

from System 6.0.X, you have to move your fonts and desk accessories from the System and put them into suitcases if you're going to do a clean install.

So, before you toss your System file into the trash (You are going to do a clean install, right?), you need to remove any desk accessories and fonts that you want to keep. This is an optional process; you would be better off reinstalling all of your fonts and desk accessories (DAs) rather than saving them and moving them to your new System. But, one of the wonderful things about computers is: You're the boss. So, read the rest of this section and then decide whether you want to save your fonts and desk accessories or just reinstall them later.

When using System 6.0.X, you need Apple's Font/DA Mover to get your fonts and DAs. If you can't find your old copy of this utility, you will have to get a copy from your Apple dealer. You should be version 3.8 or higher; 4.1 is the version that is System 7.0-compatible. When you run the Font/DA Mover utility, the version number is displayed in the upper right-hand corner of the Mac's screen (see Figure 6.8).

When you run Font/DA Mover, it will automatically open the System file that is running your Mac. So, you should be booted from your hard drive that has System 6.0.X; you will see all of the fonts from your System on the left-hand side. (To open Font/DA Mover so that it automatically opens your installed DAs instead, hold down the option key as you launch it.) Select the fonts you want to save by shift-clicking on them, and click on the Open button on the right-hand side of the window.

The steps you should follow are:

1. Start the Font/DA Mover.

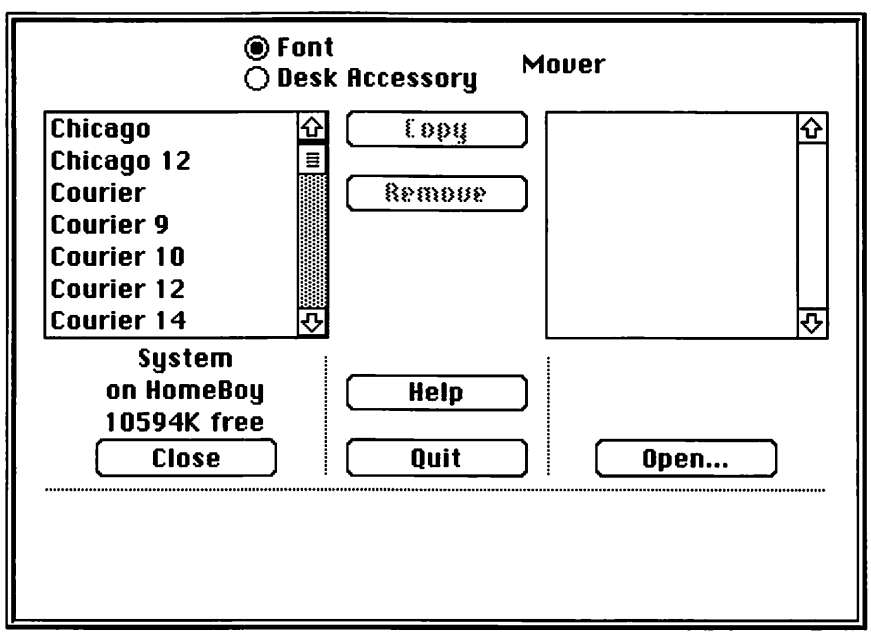


Figure 6.8 Font/DA Mover's version number.

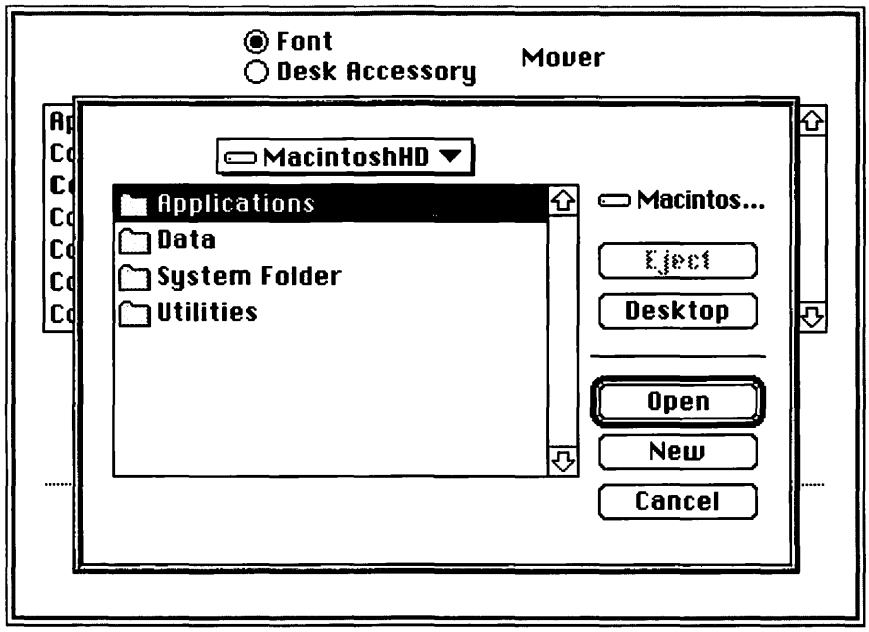


Figure 6.9 *Dialogue box for creating or opening a suitcase.*

2. Create a new suitcase for the fonts you want to save by clicking on the New button on the right-hand side of the Font/DA Mover dialog box (see Figure 6.9).
3. Give the suitcase a name and save it.
4. Select the Fonts you want to save. Don't save any of the standard Apple fonts listed below (shift-click to select multiple fonts, option-click to save multiple fonts that are not in contiguous order).
5. Click on the Copy button with the arrows pointing to the right (Figure 6.10). Font/DA Mover will copy the fonts into the suitcase, and they will be saved for later use.
6. The procedure for saving your DAs is the same as steps 1 through 4 above, except that you select the DA button in the Font/DA Mover window instead of the Font button.

You do not need to save the Fonts or DAs that are included with Apple's System software. The desk accessories that you don't need to save are:

- Alarm Clock
- Battery
- Calculator
- Chooser
- Key Caps
- Note Pad

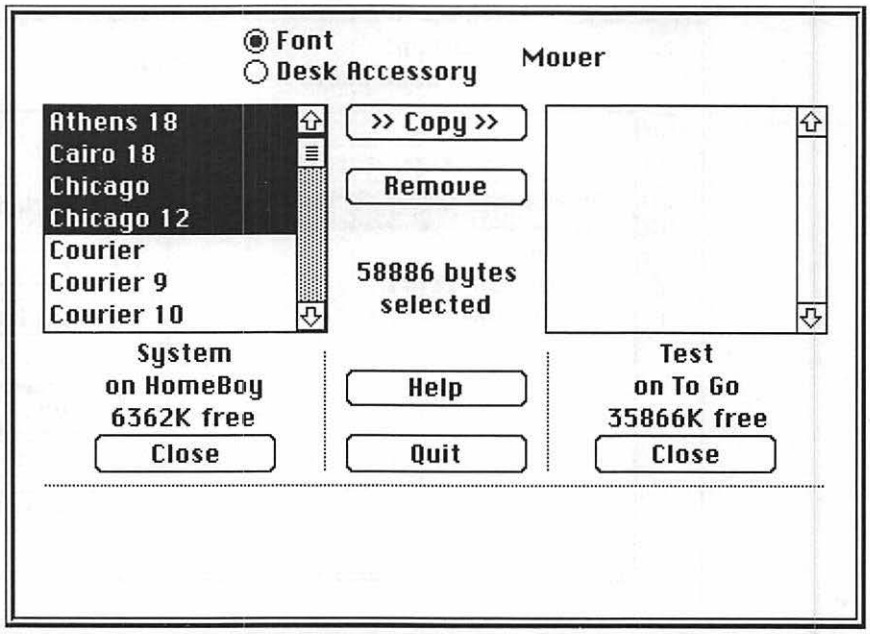


Figure 6.10 *The Copy button in the Font/DA Mover application.*

- Puzzle
- Scrapbook

The fonts that you don't need to save are:

- Apple Chancery
- Chicago
- Courier
- Geneva
- Helvetica
- Hoefler Text
- Monaco
- New York
- Palatino
- Skia
- Symbol
- Tekton Plus
- Times

If you are reinstalling System 7.0 or 7.0.1, the process of rescuing your fonts is much easier. All you have to do is open your System file by double clicking on it and move all of the fonts to a folder. Figure 6.11 shows an open System 7 file, with the Helvetica 9 font both in the System and in a folder called *Items to Keep*. Basically, all

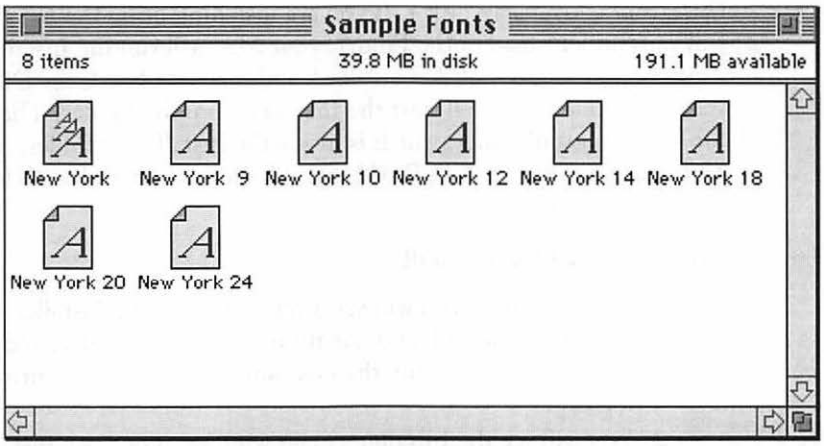


Figure 6.11 *Fonts without suitcases.*

you have to do is either move or copy the fonts you want to keep, just as you would files while in the Finder.

You should also make a copy of all of the DAs you want to keep. Just open the Apple Menu Items folder in your System folder and either move or copy them to another folder.

The Installation

Now that you know what the prerequisites to installing your System are, you should start planning your installation. As you can see, installing the System is a little more complicated that just running the Installer. You should finish reading this section, then make a plan.

Think about everything you'll have to do and guess at how much time it will take. After you have made your time estimate, double it. It often takes more time than you'd expect. If you're not sure that you'll have enough time, you might want to wait until you do. Although it is supposed to be fairly simple, if things don't go right, you could be in for a long session and/or you could lose data.

Performing an Easy Install

An Easy Install is just that—an installation where you don't make any decisions other than to install the System software. The Installer script is programmed to determine what you need and install it. In many cases, an Easy Install will be fine, but there are occasions where you will want to have more control over what is or is not installed. If you want more control over how your System is configured, you should *not* use the Easy Install option.

The installation process is started in one of two ways: You either boot your Mac with the Disk Tools disk and install the System from your CD-ROM disk, or you

boot from your Install disk 1. If you are installing using the Install disk 1, your Mac will start and, instead of the Finder, your Mac will run the Installer.

If you're using the Disk Tools disk and the CD-ROM, the Disk Tools disk will start your Mac and you'll start the Installer from the Finder. The Installer is inside the System Install folder, which is inside the Installation folder, which is on the Macintosh System 7.5 CD-ROM disk. Open the System Install folder and double click on the Installer.

To perform an Easy Install:

1. The first thing you will see after launching the Installer is the Welcome window. It provides information about the Installer, and an OK button (see Figure 6.12). Clicking the OK button or pressing return dismisses this dialog box.
2. You will see the Installer's main window. The Easy Install option is automatically selected, as shown in Figure 6.13.
3. In the bottom left corner of the Installer's window, you will see a Destination Disk section. If the disk selected is not the one you want to install the System onto, click on the Switch Disk button until the correct disk appears.

   As you switch disks, the Installer will check each disk to determine what needs to be installed. The Easy Install option does not tell you what is being installed, only that *all of the recommended System Software* for your Macintosh will be installed (Figure 6.14), or that the *installation will include all of the*



Figure 6.12 Welcome to the Installer.

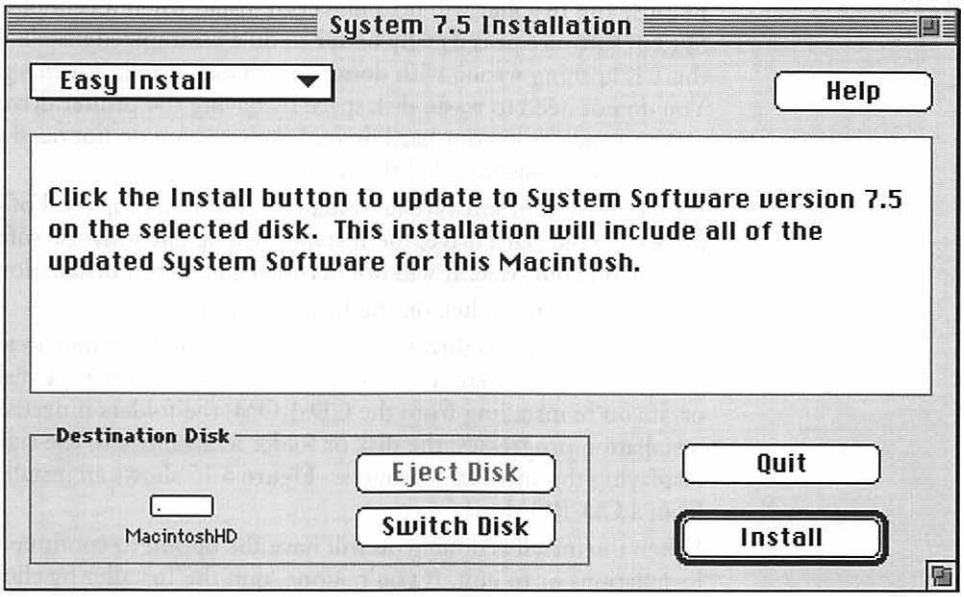


Figure 6.13 *The Installer's main window.*

updated System Software for your Macintosh if you're upgrading or reinstalling the System, rather than performing a complete (clean) installation.

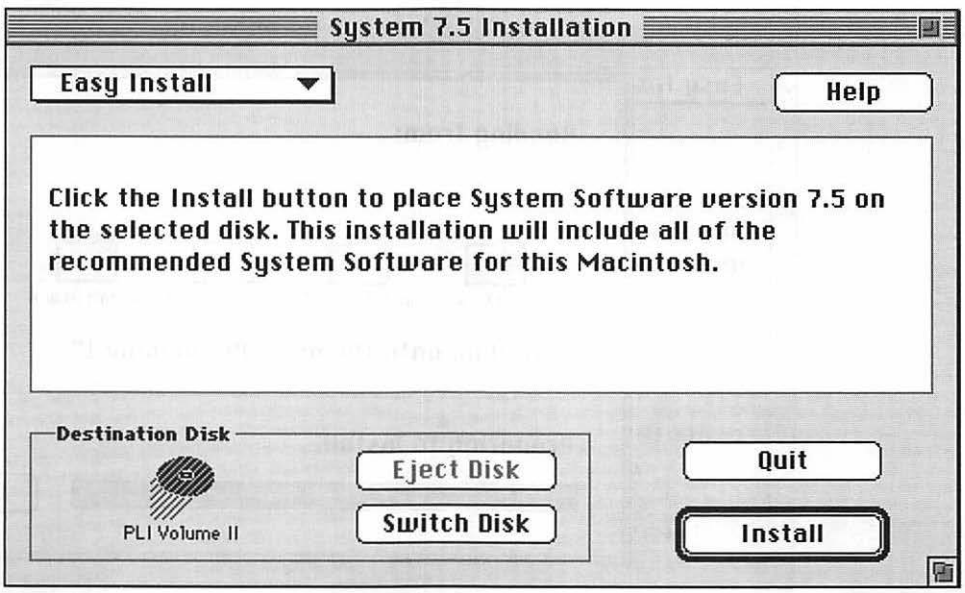


Figure 6.14 *After changing disk drives.*

Because the Installer will do a universal install when it cannot find existing System software, it is usually better to do a customized install. Although there is nothing wrong with doing a universal install, it seems gratuitous. You do not need to waste disk space by having the printer driver Apple makes installed on your hard drive. Likewise, you do not need control panels and extensions installed that you will never use.

If there is System software (a System folder on the top level of your hard drive) on your hard drive, the Installer will update only the software that is already on your Mac. It will not perform a universal installation.

4. The final step is to click on the Install button.

   The installer will go through a series of steps to determine exactly what it is going to install. Then, it will display a window showing the disks you'll need or, if you're installing from the CD-ROM, the folders it needs. As the installation progresses, the disk or folder icons move to the right, graphically displaying the Installer's progress. Figure 6.15 shows an install in progress from a CD-ROM.

5. When the install is done, you will have the option to continue with more installations or to quit. If you're done, quit the Installer by clicking on the Quit button. If you click on the Continue button, you can install the System onto another disk repeating the steps above.

If you installed from floppy disks, the installer will quit and you'll be given the option to Shut Down or Restart your Mac. When you Quit after installing from a CD-ROM, you'll have to restart using the Restart item from the Finder's Special menu. When your Mac restarts, you'll be running your new System.

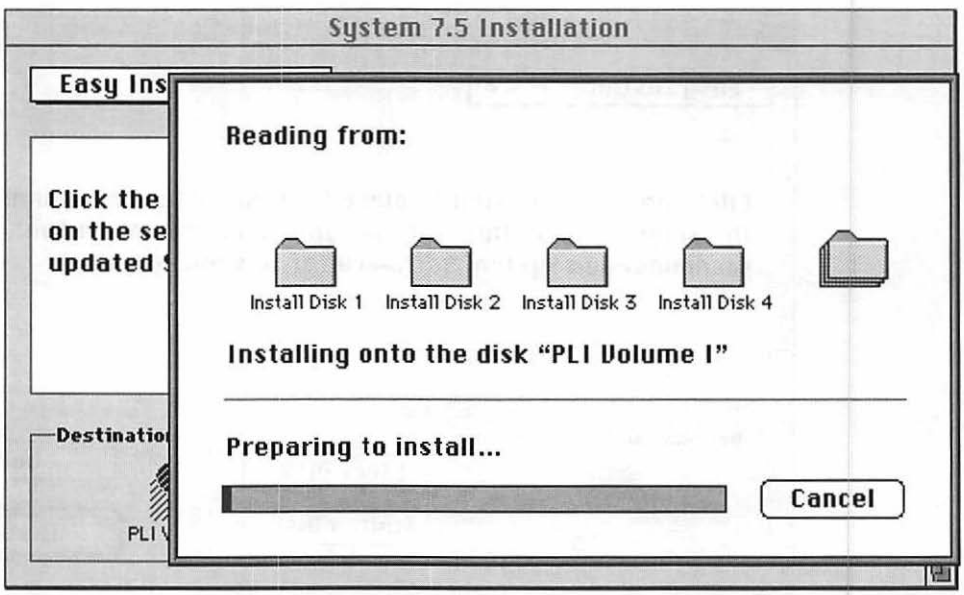


Figure 6.15 *An install in progress.*

Customizing Your Installation

The basic instructions for using Apple's Installer are in the above section, "Performing an Easy Install." The instructions for using the Installer that have already been discussed will not be repeated here. So, if you skipped the "Performing an Easy Install," section you'll have to glance through it to familiarize yourself with those steps. This section will discuss only the Installer in relation to a customized installation.

Ideally, you should perform a customized install because it lets you install only the System elements you need or want. In Figure 6.16, you will see a pop-up menu with a Customize item. When you select the Customize item, you are presented with a new window that has all of the possible choices for installing your System.

From the Custom Install window, you can select as many or as few options as you choose. The Custom Install window (Figure 6.17) lists each of the System's software features that you can select.

Your choices are to install your System software for any of the following:

- System Software
- Printing
- Networking Software
- Utility Software
- Multimedia Software
- Compatibility Software
- Fonts

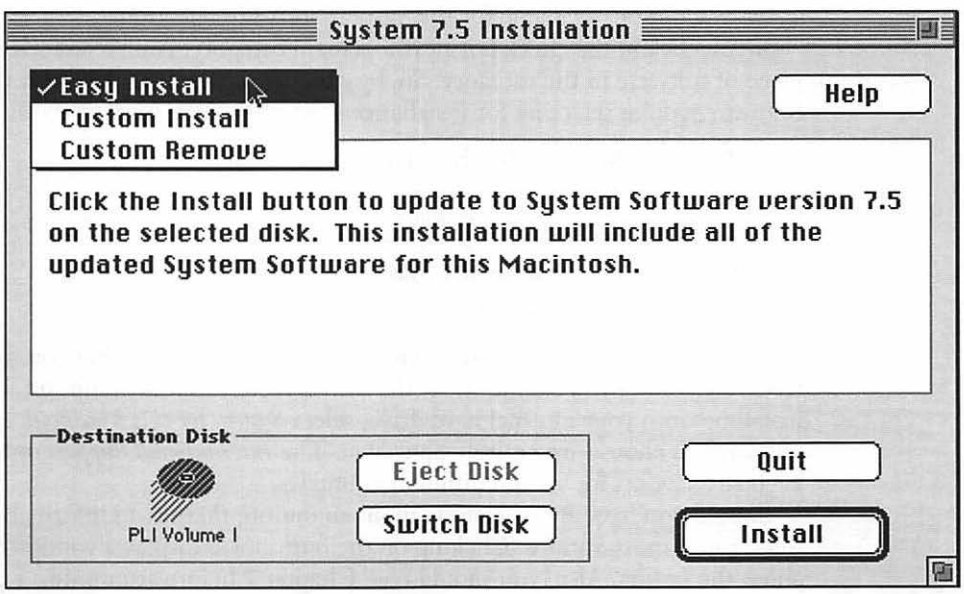


Figure 6.16 *The Installer's pop-up menu.*

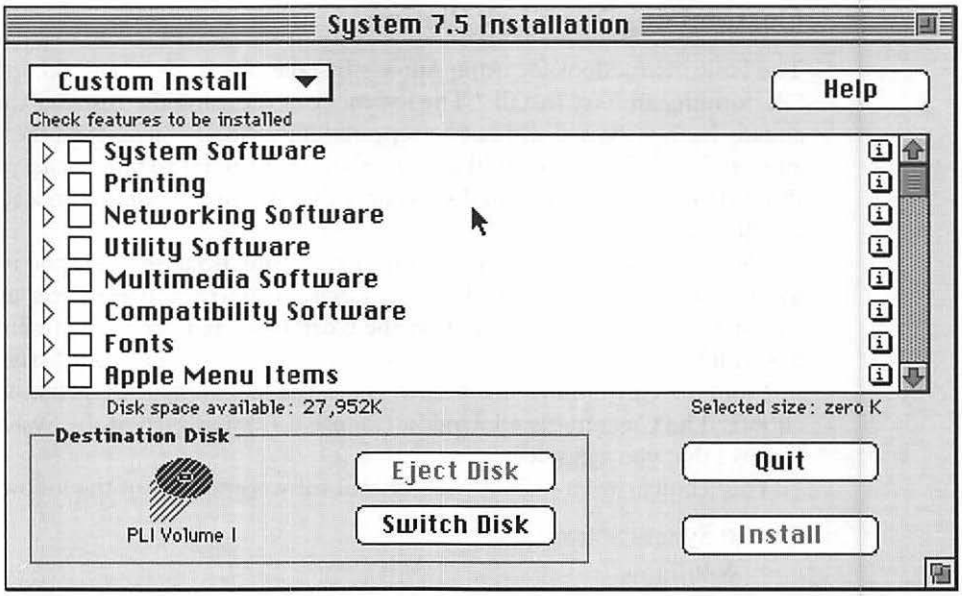


Figure 6.17 *The Custom Install window.*

- Apple Menu Items
- Control Panels

Next to each of these selections, you'll see an arrow. By clicking on the arrow, the category selection expands to give you a list of items that you can install. Figure 6.18 shows the options available for the System Software selection.

If you click in the check box next to a main category, you've just selected every piece of software in the category. So, by clicking in the check box next to System Software, you're selecting for installation:

- System Software for this Mac
- System Software for any Mac
- Minimal System for this Mac
- Minimal System for any Mac
- International Support

If you're installing the System onto an external hard drive that you will use on different machines, you should select the *System for any Macintosh* option. If you're installing onto your internal hard drive, select *System for this Macintosh only*. Which options you choose are entirely up to you. The *International Support* option installs keyboard layouts for several different countries.

Should you have any questions about an option, there is an information button to the right of most options. Clicking on the button will display a window that tells you about the option. Also, you should read Chapter 7 before attempting a custom instal-

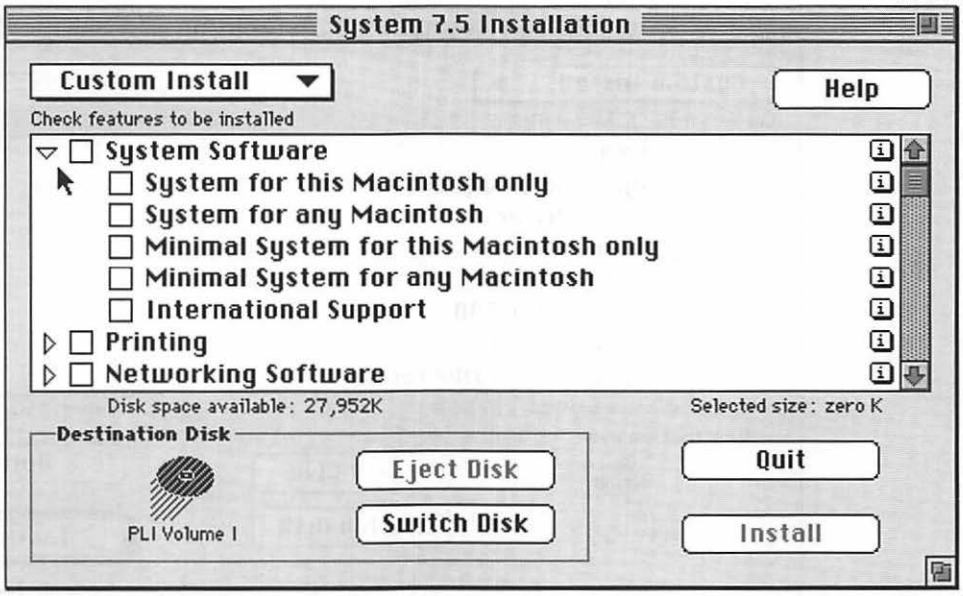


Figure 6.18 *The System Software options.*

lation. You'll find all of the control panels and most of the other options, some of which are extensions, briefly explained.

Once you've gone through the list and selected the options you want, you perform the installation using steps 3, 4, and 5, as described in the "Performing an Easy Install" section above.

Besides customizing your System to meet your needs, there is one more reason for performing a custom install, which is how you add capabilities that you did not install originally. Let's say you just got a LaserWriter 300 (lucky you). In order for it work with your Mac, you need to install the printer's driver. The easiest way to do this is via a custom install, where you select just the LaserWriter 300, as shown in Figure 6.19.

After selecting your LaserWriter driver, perform steps 3, 4, and 5, as described in the "Performing an Easy Install" section above. When you're done, you'll have the software you need for your new printer.

At any time during the Custom Install selection process, you can revert to the Easy Install by selecting the Easy Install pop-up menu item. You can also quit the process without installing anything by pressing Quit.

Things That Can Happen During an Install

There are things that can happen during an installation that you really should know about. There are a variety of messages that you can get while installing your System. Some of the messages are alerting you to conditions that must be fulfilled before and

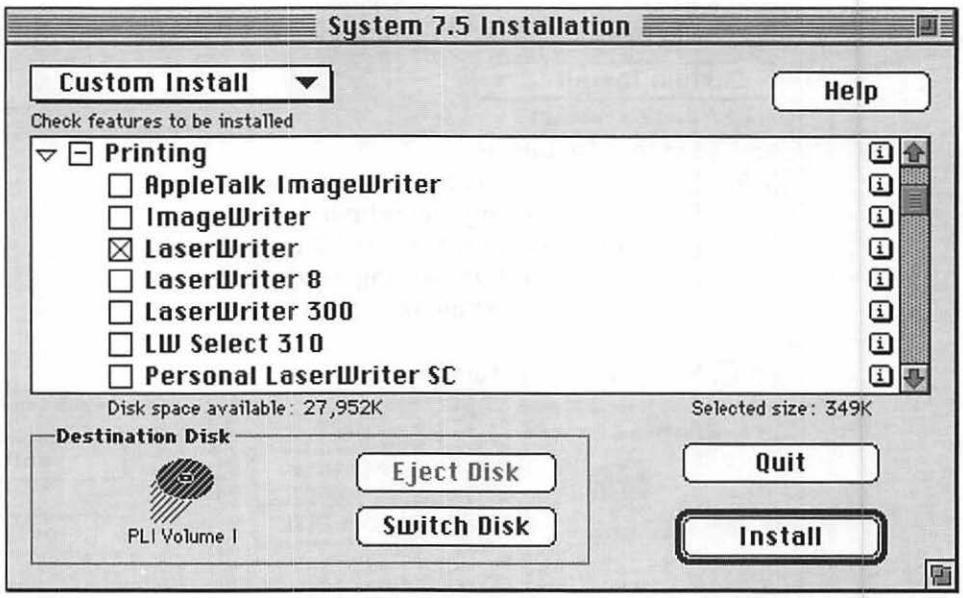


Figure 6.19 *Selecting a single element for installation.*

during your installation. It is also possible to be partway through an installation and suddenly receive a message telling you that the installation cannot be completed.

In this section, we'll look at some of the messages you can receive from the Installer and discuss what they mean. When installing System software you need to stay alert even though it is an intrinsically boring task. If you have a problem or respond incorrectly to an inquiry, you may have to start over.

Should you cancel the installation at this point—up to where the disks or folders are all displayed—you will not alter anything in your System. Figure 6.20 shows the dialogue box that you get when you cancel at this point.

After the install starts, you will see a window like the one shown in Figure 6.21. This is the progress window for a network install. If you are using floppies instead, the folder icons are replaced with disk icons.



Interrupting an Install

If you are installing a version of the System earlier than 7.5, interrupting the installation can result in an incomplete System install and a damaged System which will not work properly. As you install the System using earlier versions of the Installer, System resources and files will be removed as the install progresses (see Figure 6.22).

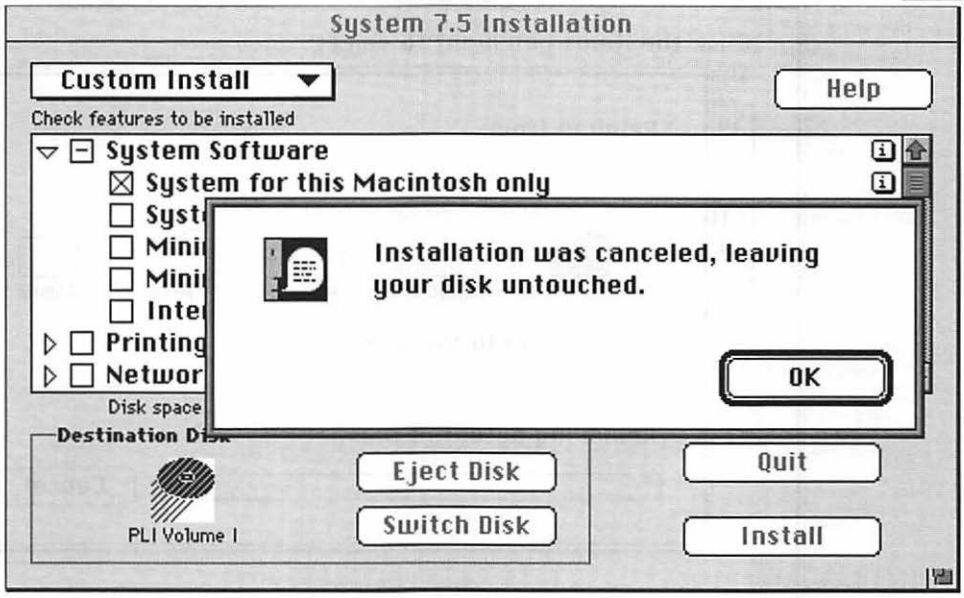


Figure 6.20 *After having canceled, nothing is changed.*

Now, the Installer is actually making changes to your System, such as removing outdated files, as seen in Figure 6.22. If you cancel at some point after this, you will have interrupted the installation process. Canceling a System 7.5 installation will result in your disk being untouched and all changes being reversed.

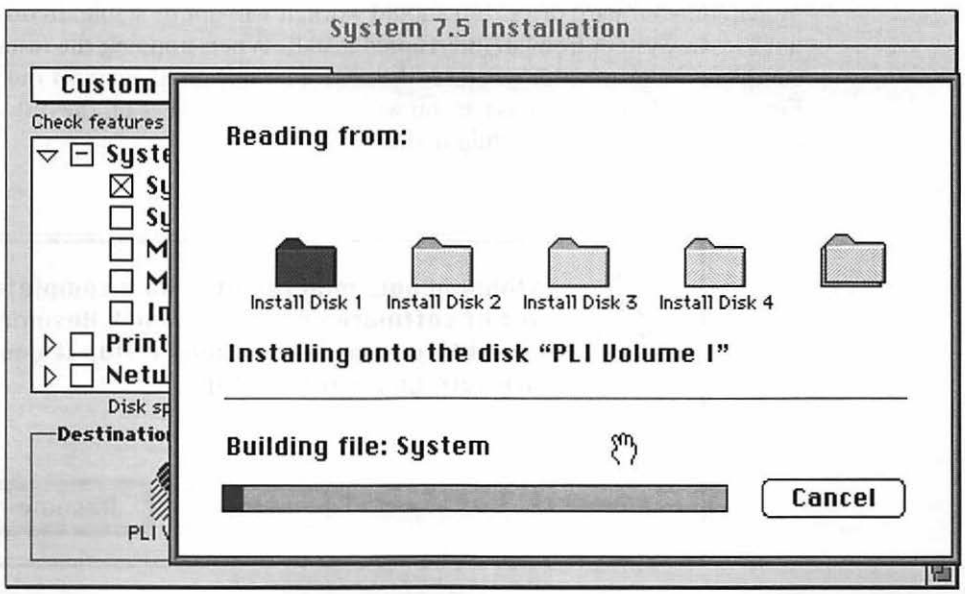


Figure 6.21 *The progress window during an install.*

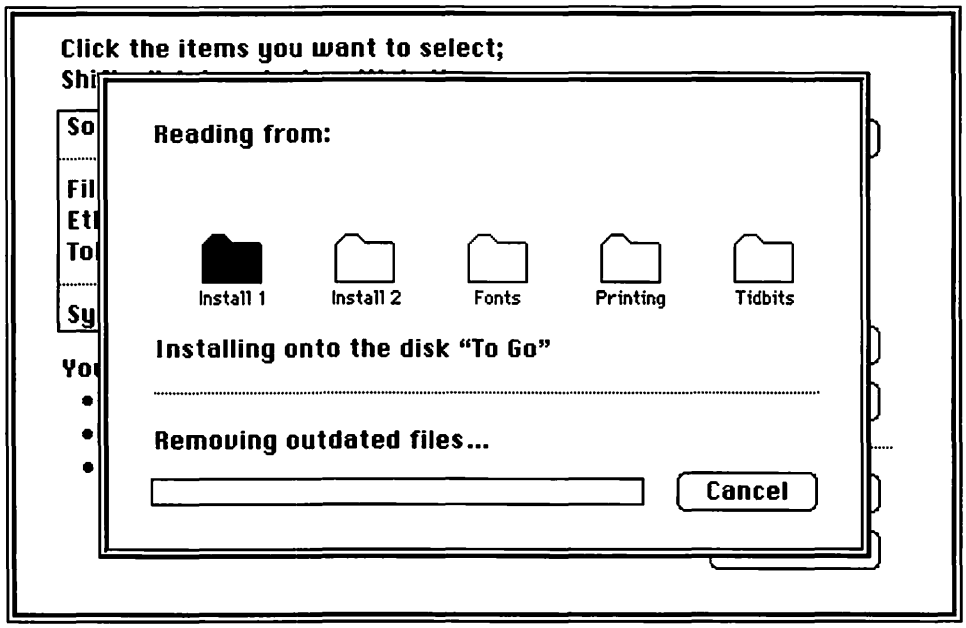


Figure 6.22 *Window showing the removal of outdated files.*

After the installer has started removing these files, if you click on the Cancel button, you will be presented with a dialog box like the one shown in Figure 6.23. Now, you have to decide if you want to continue. If you continue, everything will proceed as if you had done nothing. However, if you stop, you will not be able to use the System on your hard drive. If it should work, it will not be stable. In other words, do not use the System from an interrupted install. When stopping the install, it will complete the process for whatever disk or folder it is on, then abort the process. Figure 6.24 shows the message you will get while it finishes up the disk it is working on (the folder or disk is highlighted).



Figure 6.23 *Your choice to Stop or Resume.*

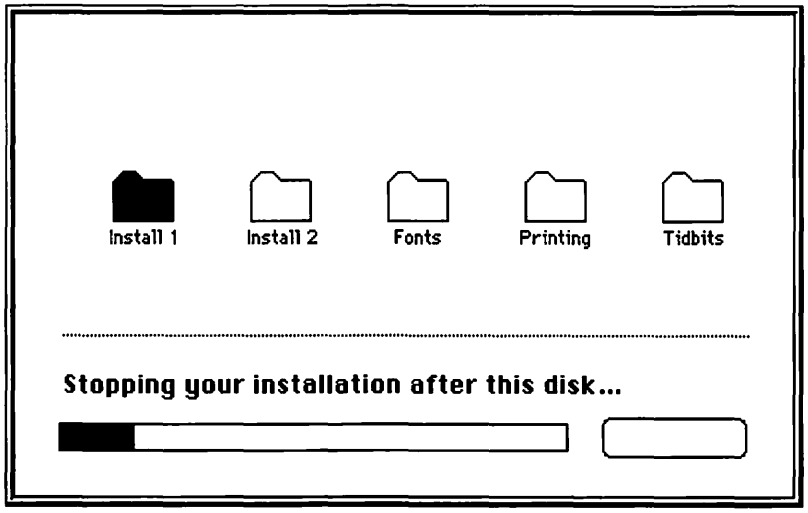


Figure 6.24 *Stopping after this disk.*

You will get a warning message after you have stopped the install process. Remember, the disk is no longer reliable as a startup disk.

When performing an Easy Install, the only other messages you will receive are a request to unlock a file that is locked or a report of a disk error. If you get the disk-error message, you will have to quit the installation, repair your hard drive, and then reinstall. The locked-file message will occur immediately and you'll have to either quit the installation or suspend, unlock the disk, and then continue.

If, while doing a Custom Install, you are upgrading or reinstalling your System software over an existing System folder, you could receive a dialog box like the one shown in Figure 6.25. This dialog box appears when the creation date of an item being replaced is newer than its replacement.

Upgrading an existing System folder causes the Installer to remove drivers, extensions, control panels, and other resources from the System file and System folder prior to installing new ones. Before the installer removes these items, it checks their dates and compares the dates of items being removed with their replacements.

You are given the choice of replacing or keeping an item or canceling the installation. If you are reinstalling your System, you are probably having problems, so you might as well replace all of the items the Installer asks you about. Canceling the installation will abort the installation, leaving your hard drive untouched and with no installation taking place, while keeping the newer item will leave the file in question on your hard drive instead of replacing it.

The one message you can get that you should be very concerned about is the disk-error message. You will get a disk-error message if the Installer has a hard time reading or writing to your disk or if it detects problems with the disk's structure.

This message means one of two things: either you didn't check your disk with Disk First Aid, or there is a problem with your disk that Disk First Aid could not

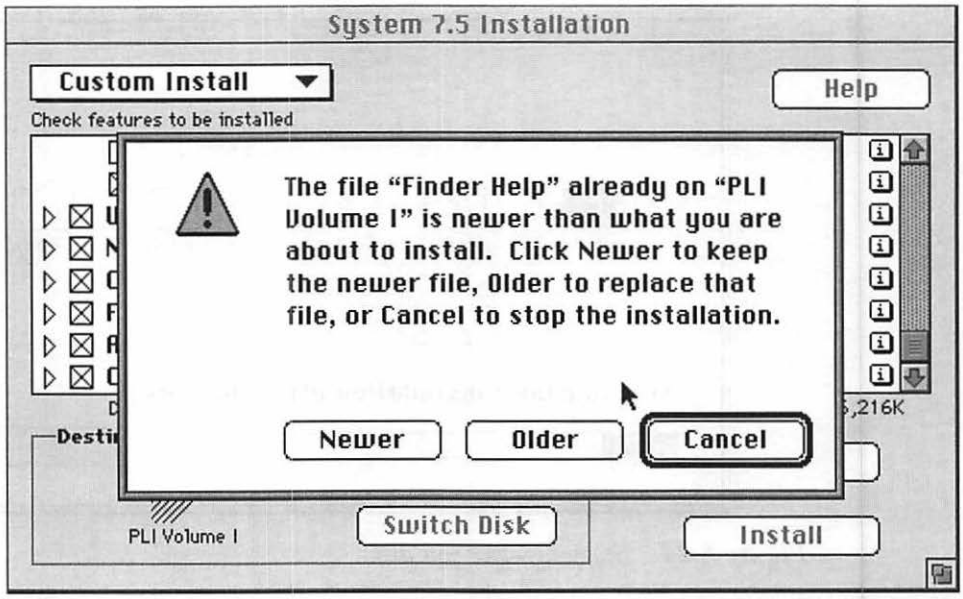


Figure 6.25 *A Newer, Older, or Cancel dialog box.*

detect and/or fix. This is a serious message and you need to be very careful about what you do.

First, you'll have to acknowledge the message and quit the Installer. But, before you do, check to see which disk or folder the Installer is using. After you've quit, you should run Disk First Aid. If Disk First Aid detects no problems, try installing the System again. But, if the second install attempt is unsuccessful, you have only a couple of options:

- Your System Disks (the ones your using for the install) are damaged and need to be replaced.
- Your hard drive is seriously sick.

Whatever you do, don't boot from the hard drive until you've determined what is wrong. Your System could be seriously damaged due to an incomplete install. And, if your drive is damaged, booting from it could make matters worse.

To determine what is wrong:

1. Replace the System disk (or folder) that the Installer was using when you received the error message.
2. Try to install the System again.
3. If the install fails, you probably have a hard-drive problem and should read Chapter 10 and Chapter 18.

Chances are, you will have to back up your data (if you haven't already done so) and reformat your hard drive, but it is possible that a disk repair program, such as Norton Disk Doctor published by Symantec, can solve your problems. However, do

read about disk drives and hard-disk troubleshooting before going on. What you learn there will have a definite bearing on what you do.

If you find yourself at this point and you still can't install your System you should consider your data to be in imminent peril. If you haven't made a backup, make one now, even if you spend the entire night swapping floppy disks because you have to boot from your System Tools disk.

If you don't back up your data, at least turn off your Mac until you can read the necessary chapters or get help from a professional. If you do have a backup, the worst that can happen is that you have to reformat your hard drive and restore your data from the backup.

The above basically covers most of the contingencies that can occur while installing your new System. Remember, it is always better to error on the side of caution. If you are ever in doubt about what is happening during an installation, quit, read some more, contact a local users group for help, or call a professional consultant. Without a System, your Mac will not work and your data is useless.

Installing Over a Network

When you have several Macs to upgrade, it is easiest to do a network install. The advantages to installing from a file server are speed and convenience. Specifically, multiple sets of disks don't have to be copied and tedious disk-swapping is eliminated. Also, depending upon the network to which the target machine is connected, installation may be much faster.

This section provides instructions for installing your System software over a network. This procedure will work with any software that uses the Apple Installer, as long as you're using version 3.2 or later. If you need instructions for using your network or setting it up, you should read Chapter 13.

One of the nice things about the Installer that comes with System 7.X is that it is able to work off of a hard drive, a CD-ROM disk, or an AppleShare volume. This



Software License

If you do a network install, you are required by law to have a license agreement that allows you to install your software onto several machines. All software is copyrighted and protected by law for use with a specific number of computers. When you buy software at the computer store, you are usually purchasing software for use on a single computer. To install the software on more than one computer can be a violation of the license and, if you're caught using it on more than one machine, you could be prosecuted.

means that you can copy each of the disks to your hard drive, name the folders the same as the floppy disk, put them all in a folder, and install the System 7 software from the drive.

The folder can also be mounted as a shared device using File Sharing or from an AppleShare file server. You can then perform your installation by double clicking on the Installer. The Installer will work just as if you booted from the Installer disk 1, except that your Mac has to be running independently of the Installer—from its own hard disk, a floppy, or the System on the drive on which the Installer is installed. You cannot install the System onto the same disk that contains the installer.

The following instructions will walk you through the steps to create an *over the network* installation setup for System 7.X. Before you begin to create this setup, be aware that you could need up to 25M of free disk space.

- The first step is to create a folder to contain the set of Installer files. You can name the folder anything you want, but it makes sense to choose a name that reflects the nature of the upgrade. These instructions will refer to it as the *upgrade folder.*
- Next, all of the disks that the Installer may need must be copied into the upgrade folder. The Installer will look for folders with the same names as the disks. The easiest method of ensuring that the folders are named correctly is to drag the icon of each disk directly into the upgrade folder. Even the disk Disk Tools should be copied. All of the disks in the System 7.X software kit are needed.
- Once the disks are successfully copied, the Installer and the script file must be moved from the folder Install 1, Install Disk 1, or Install Me First to the upgrade folder. Figure 6.26 shows how your folder should look.

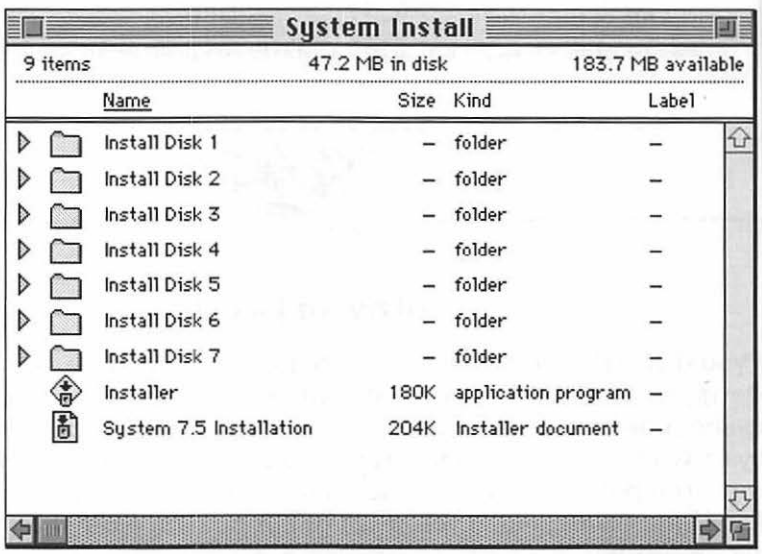


Figure 6.26 *The network upgrade folder.*

- Set the privileges for the folders using the Sharing Info command under the File menu of the Finder. Regardless of who should be allowed to use the upgrade, you only need allow *only read* access. The Installer doesn't need to modify itself, and you probably don't want someone obliterating your painstaking work. Be sure that these privileges are applied to all subfolders. Figure 6.27 shows the Sharing Info window for the upgrade folder in this example.

Once you have everything set up, you can instruct your users to perform their own upgrades with the Easy Install option. If you want them to use another option, you should very carefully instruct them or do it yourself.

Doing a Minimum Install

If you want to run System 7.X from a floppy disk, you need to perform a Minimum Install. The System is just too large to fit on even a high-density floppy disk unless it is stripped down to its bare essentials. Floppy disks with a minimum System are good only for starting a Mac and doing maintenance. You should never try to run applications while using a minimum System. The chances that you'll crash are excellent under those circumstances.

The real problem with doing a minimum install is if you only have one floppy drive and you are installing the System from a floppy onto another floppy. It is possible to do this, but you could develop *disk-swapper's* elbow. Now, if you have never had this charming experience, go ahead and install from one floppy to another. By missing a really serious disk-swaping session, you have not been properly initiated into the Macintosh fraternity. It will take you 30 minutes to an hour.

If you want to avoid this toil and misery, you need to set up a network install using your hard disk, or get a second floppy drive. The other option you have is to

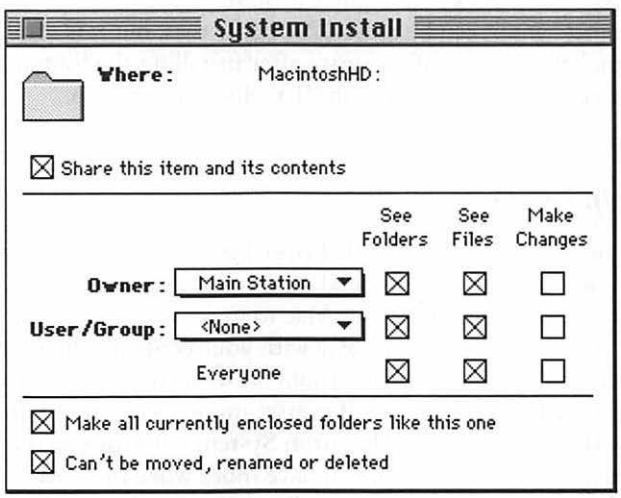


Figure 6.27 *Setting the network preferences for the shared update folder.*

copy your Disk Tools disk to your hard drive, and then copy the System folder from your drive to the floppy disk. After you've made this copy, do not forget to trash the copy of the Disk Tools disk that is on your hard drive.

If you've got System 7.X on a CD-ROM disk, you're in luck; making a minimum install floppy is no problem because you can run the Installer from the CD and install onto the floppy. The installation process is the same as doing a Custom Install, except you select only one of two installations options.

You select the System Software and one of the following:

- Minimal System for this Macintosh only
- Minimal System for any Macintosh only

If you select any other options, the System will be too big to fit on a floppy disk. Otherwise, you perform the steps we've already discussed.

Ready to Go

Now, it's time to get down to business. First of all, check to see that you have your:

- System 7.5 System disks.
- The System 7.5 Disk Tools disk, or a System 7.5-compatible formatter for your hard drive.
- If you are upgrading, the Safe Install utility.
- A backup of your hard drive. (If something should go wrong, you do not want to have to read the five chapters of Part V, "Troubleshooting," to fix it.)
- Your favorite nonalcoholic beverage.
- Enough time to complete the task.

Now you are ready to begin. Installing the System is not a fun task, but a necessary one. It is like changing the oil in your car: The task takes time, it is an inconvenience, and it can be messy. Not only that, but it is sometimes just the beginning. If you have to reinstall software after installing the System, you're in for a few hours of work. Sometimes having the TV close by can help.

After You Upgrade

Now that you have installed your System, there are a few more tasks you may need to perform. If you upgraded over an existing version 7.X System or System folder, you're done. Just test your Mac to make sure everything works the way it should.

Run a few programs, play with your control panels, and spend a few minutes doing what you normally would do with your Mac—write a letter, create a report, or play with your database. If everything works, you're home free.

If you've just upgraded from System 6.0.X or you did a clean install (not over an existing System folder), you have more work to do. It is time to put everything back where it belongs—another tedious process. As you restore your extensions, control

panels, and preference files, you need to frequently test your System to make sure everything is working properly.

The rest of this sections explains how to restore parts of your System that were not installed by Apple's installer. Once all of your software tools and toys have been restored and everything works, you'll be done.

Now all you have to do is reinstall your fonts, desk accessories, and extensions. All of these should have been preserved if you did not throw away your old System folder and kept the ones you removed from your System before you trashed it.

Reinstalling System Elements

This section will tell you how to reinstall your fonts, desk accessories, extensions, control panels, and preference files from your old System folder. Ideally, you should reinstall any of your commercial utilities, including fonts, from their original disks. There are some utilities that have to be restored from their master disks. However, you may not know which files can be manually installed and which ones have to be reinstalled from their original disks. Not knowing which files are compatible makes the process described in this section a bit touchy.

Utilities that have to be reinstalled from their original disks are utilities that patch the System. Utilities that patch the System add or change some of the programming code in the System file to perform their job. There are very few utilities that patch the System, because Apple kind of frowns on software that plays with its System; but these utilities do exist.

Patch (v.) To replace one or more bytes in memory or in a file with other values.

So, if part of a utilities software patches the System during installation, when you reinstall the part of the utility that is an extension or control panel, it won't work. It could even cause your Mac to crash. For this reason, you need to frequently test the your Mac when you manually install your extensions and control panels.

If you manually reinstall your extensions and control panels, you need to restore everything in the following manner presented shortly. These instructions are brief; each of these procedures will be covered in more detail in Chapters 9 and 10, but this should be enough to get you up and running. Although this is a fairly simple process, you want to be careful not to replace any devices that were installed by the Installer. Be forewarned: The simplicity can be deceiving.

If you have upgraded from System 6.0.X, all of your extensions and control panels are loose in your old System folder and your fonts and desk accessories are wherever you saved the suitcase you made at the beginning of this adventure. System 7.X now has a folder for each of these different files. Review Chapter 7 if you're feeling unsure about where things belong. Having folders for everything is great for keeping order within the System folder, but should any of these devices not be System 7-aware or -compatible, they will not work properly when they are installed in their new homes.

The following steps should be repeated for each type of System element you're restoring. In the steps, the word *element* means extensions, control panels, preference, or font, depending on the type of System file you're moving.

To move your extensions after upgrading from System 6.0.X:

1. Open your old System folder.
2. Open your new System folder.
3. View the contents of the old System folder By Type.
4. View the contents of your new System folder By Name.
5. Open the *element* folder in your new System folder.
6. View the *element* folder by Name.
7. Arrange your Desktop so that you can see both your old System folder and the *element* folder in the new System folder.
8. Move two *elements* from the old System folder to the *element* folder in the new System folder. Move only those *elements* that do not have a duplicate in your new System folder.
9. Restart your Mac after moving two *elements*. Make sure you remember the *elements*' names.
10. If your Mac crashes, boot it with your Disk Tools disk and remove one of the last two *elements* you moved.
11. Restart your Mac again.
12. If your Mac crashes, remove the other *element* and restart.
13. Your Mac should start. Repeat steps 8 through 10 using the *element* you removed in step 10.
14. If your Mac crashes, both of the *elements* are incompatible and shouldn't be used. If it starts, the *element* removed in step 12 is incompatible and shouldn't be used.

If you have a system *element* that is incompatible, you should contact the software publisher and get a new, updated version that is System 7.5-compatible.

If you're reinstalling System 7.5 or upgrading from an earlier version of System 7.X, the process is a little simpler but basically the same as the steps outlined for System 6.0.X. The major difference is in steps 1 through 7; from step 8 on, the process is the same.

The variations in steps 1 through 7 are:

1. Open your old System folder.
2. Open your new System folder.
3. View the contents of both System folders By Name.
4. Open the *element* folder in your old System folder.
5. Open the *element* folder in your new System folder.
6. View both *element* folders by Name.
7. Arrange your Desktop so that you can see both of the *element* folders (see Figure 6.28).

During the process described above, you have to be very careful not to replace one of your new System files with an old one. If you do, you'll have to reinstall the System to recover the lost file, because your Mac will not run properly.

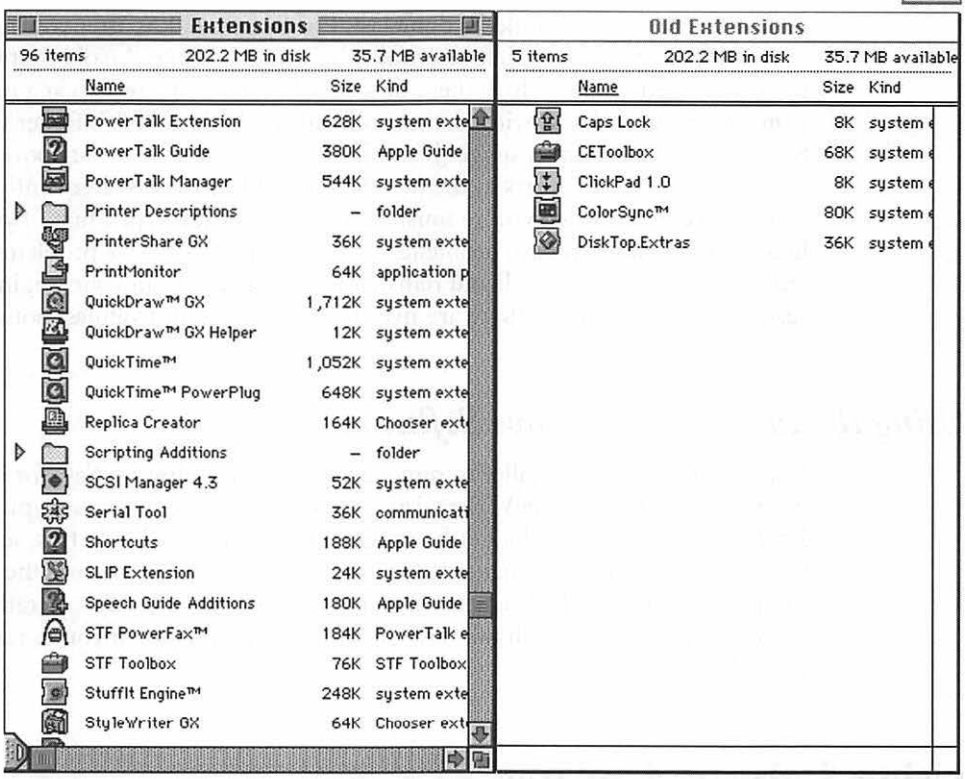


Figure 6.28 *Both* element *folders arranged on the Desktop.*

When you're moving fonts and desk accessories, there are a couple more precautions you should take. After you install a couple of desk accessories, you need to run the desk accessory. Desk accessories do not load into memory when your Mac starts, so the Mac not crashing does not mean the desk accessory is compatible. The only test is to run the desk accessory. If your Mac survives and doesn't crash, then the DA is compatible. If you're upgrading from System 6.0.X, you have to open the DA suitcase before you move the DA into your Apple Menu Items folder.

Fonts are another story. Be careful not to install duplicate fonts. Even though a suitcase does not have a duplicate name, you may still be installing a duplicate font. The fonts are inside the suitcase, so you could have one suitcase named *Chicago* and another named *New York* and still have duplicate fonts. The only way to not have duplicate fonts is to open the suitcases and compare their contents.

Fonts are tricky, so you should install them from their original disks rather than move them from the old System folder to the new.

The final part of this process is moving folders and files that do not belong in one of the other folders. When upgrading from System 7.X to System 7.5, this is a fairly easy process. But, when upgrading from System 6.0.X to 7.X, it is a lot harder to determine which files and folders should be loose in the new System folder. Again, this is another argument for reinstalling your software rather that trying to reconstruct your System folder.

Moving the extras should be done last. For System 6.0.X, after you've moved everything, all you'll have left can probably be moved from the old System folder to the new System folder. Move these files and the folder one or two at a time, testing your Mac frequently. Moving the extras from an old System 7.X folder to a new System 7.5 folder is fairly quick. Just follow the guide lines set out above; don't move anything that already exists in the new System folder, and test frequently.

If you're lucky, when you've finished, your Mac will run just fine. If you're not lucky, you're going to have problems. At this point, if you have problems, you can either do a new clean install and reinstall your software from your original disks, or read Part V of this book; there are five chapters related to troubleshooting your Mac.

Using the Installer to Remove Software

You can also use the Installer to remove your System software. Say, for instance, you want to remove the ImageWriter drivers from your System because you got that LaserWriter and will no longer be using an ImageWriter. To do this, select the Custom Remove pop-up menu item in the Installer window and use the instructions for a Custom Install. Just remember that you'll be *removing* software rather than installing it. Figure 6.29 shows how the installer should look if you're removing an ImageWriter driver.

Using Software Updates

As mentioned earlier, Apple has started using Tune-Ups to provide bug fixes and enhancements for System 7. It is installed using the Installer that comes on an 800K disk, and should be used on any Mac running System 7 or 7.0.1. You have no option except to perform an Easy Install.

Installing the System Update 3.0 for System 7.1 is very similar to the install process described in this chapter. You can customize your System Update installation but, before you do, you should read the information file that comes with the Update disks. The file contains a lot of information about what the System Update 3.0 does for your Mac.

Both of these updates can be installed while you're booted from your hard drive. After the installation takes place, you'll have to restart your Mac. Although both of the updates use a version of the installer that is older than the one featured in this chapter, the basic principles are the same.

Other Types of Installers and Installing Applications

Most software comes with an installer. However, not all software comes with Apple's Installer. There are several companies who make installers and you are likely to see some of them as you use your Mac.

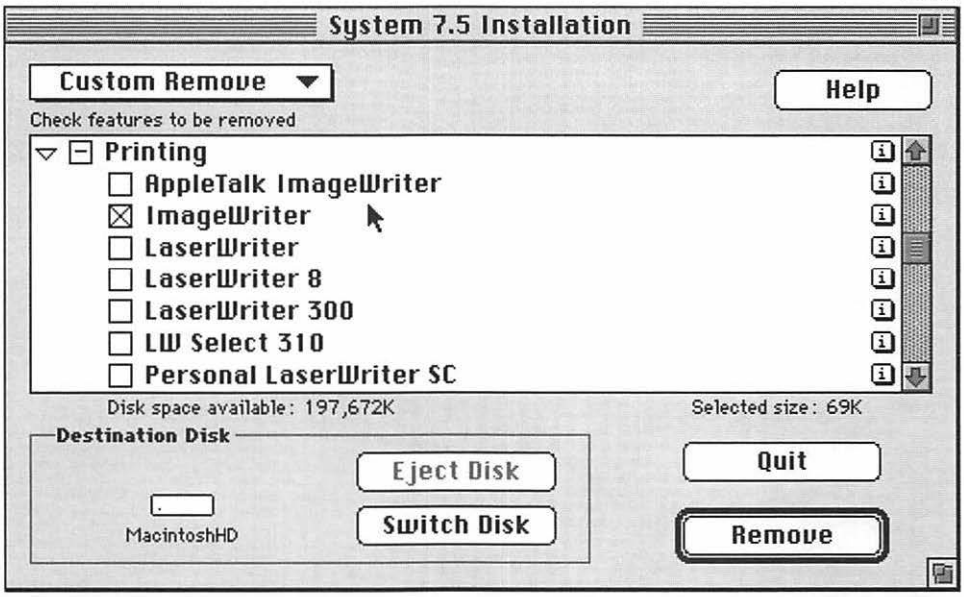


Figure 6.29 *Removing an ImageWriter driver.*

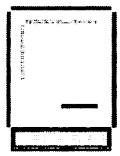
Although these other installers have their own features, they all share one feature: They will install all of the parts of a program in their proper place. Also, all software comes with installation instructions, which will tell you how to use the installers, and, if the manual is very good, it will tell you where a program's files are placed as well.

Whenever you install software, take a few minutes to see what files were installed. Check your System, Preferences, Control Panels, and Extensions folders. Also look in the folder the application creates for itself. The more you know about where the files are stored, the easier it will be if you have to rebuild your System or troubleshoot a problem with the application.

Summary

Well, there you have it. Now you know all the various ways to install the Mac's System software and, by extension, other software you'll encounter. Although very little was said about software installations or using earlier versions of Apple's Installer, the principles for using the current versions of the Installer apply to both software installations and earlier versions of Installer.

As you go through this book, remember that the examples and information presented can always be used in other computing situations. Things, such as patching the System, will be discussed again. The structure of the System folder and the elements it contains will be discussed again as well. In a sense, everything about the Mac can be circular, where one subject leads to another and eventually back to itself. So, after installing the System, we'll go back and explore more of its capabilities.



CHAPTER 7

Getting the Most from Your System

Introduction

This chapter will explore the Macintosh System software. Although this chapter is called *Getting the Most from Your System*, it is really about understanding it. You cannot get the most from your Macintosh without a basic understanding the System, so, just sit back, have some fun, and learn as you go.

When the Macintosh computer was first made available as a commercial product, it rocked the computer world with its uniqueness. What made the Mac unique was its System software, or the System. If you use your Mac and never learn about the System, you will still be able to use it. But if you take the time to learn about the System, you will have the knowledge you need to customize and fix your Mac when it does not operate the way it should. This is not a chapter just for computer nerds; it is for everyone who wants to get more from their Mac.

You control your Mac from the contents of your Mac's System folder. This control includes the sounds your Mac makes, how the Desktop looks, networking (as seen in Chapter 13), and customizing your Mac (as discussed in Chapter 9), just to name a few. In short, how your Mac functions, what it is capable of, and how it appears are all controlled from the System folder. But before you can really do these things, you need to know what is in the System folder and how it works.

This chapter is divided into the following sections:

- The Macintosh's System history
- The System
- Inside the System Folder
- Earlier versions of the System

This chapter will look at each of the items you will find in your System folder after an installation. The version of the Macintosh System that you'll be looking at is System 7.5.

The Macintosh's System History

The current incarnation of the System is version 7.5. Within each incarnation, there are usually several incremental releases as the System evolves and changes. As such, the last version of the previous System was System 7.1.2, even though it was still called System 7.1. This same process will happen to System 7.5. Each incremental change either fixes bugs, adds support for new Macintoshes, or adds features. Usually, it does all three of these.

The previous version of the System, prior to System 7, is version 6, with the last release of System 6 being 6.0.8. A version change usually means that there are substantial operating differences between the new system and the old, and the step up to System 7 from 6 had many operating differences. Advancements in operating system software represent an evolutionary process; each new System incorporates new capabilities as well as support for new, more powerful machines.

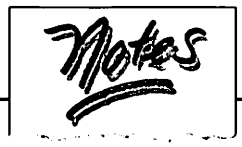
System 7 represented the long-promised and finally delivered System for the Macintosh. This is the version of the System that everyone waited for—for almost 2 years. Almost as soon as System 6.0 was introduced, System 7 was rumored. By the time the Macintosh SE/30, IIcx, and IIx were released, the Macintosh power users were ready for an operating system that would take advantage of the new hardware features included in the new machines, such as the PMMU co-processor. System 7 delivered on the promises. Although, the jump to 7.5 is not as dramatic as the jump from System 6 to 7, it is a major system upgrade. What make 7.5 a major upgrade are the enhancements included in System 7.5. Apple has included major technological advancements into System 7.5 and has made these enhancements standard. The major enhancements that Apple has put into System 7.5 are:

- QuickDraw GX
- PowerTalk
- AppleGuide

These enhancements are discussed in Chapter 8. The other major change in Apple's System software policy that is significant with 7.5 comes in the form of bundled utilities. Apple has included a number of utilities with System 7.5, which were sold as separate pieces of software. These utilities which were previously sold are:

- PC Exchange
- MacTCP
- WindowShade*
- Menu Clock*
- Macintosh Easy Open
- File Assistant

The items marked with an * are programs that were previously available as shareware and that Apple has obtained for System 7.5. Previously, purchasing the software listed above would have cost more than System 7.5. Other improvements offered by 7.5 include the removal of System Enablers, which were files that allowed the previous versions of System 7 to work with different machines. System 7.5 has done away



Should I Upgrade?

System 7.5's enhancements are the good news. The bad news is that System 7.5 requires a lot of memory if you are going to use all of its enhancements. Also, there are only a few programs that can take advantage of QuickDraw GX or System 7.5's Drag-and-Drop. So, whether you can use System 7.5 depends on your individual hardware system and your needs. There are still many people who are happily using System 6.0.X.

Upgrading your System software will mean that you'll have to upgrade your programs to take advantage of its new capabilities to have a system that can really utilize System 7.5. If you're running a 4M Mac, such as Plus, SE, or Classic, you may what to pass, even though 7.5 will run on your machine.

To run System 7.5, you really need a minimum of 8M of RAM and a 100M hard drive. Ideally, you should have 12M of RAM; 8M will let you run a fully installed System 7.5 and you'll have about 2M of RAM for applications. The larger system requirements are just another aspect of software evolution. Every time Apple has enhanced the System, it has required a more powerful Mac with more memory to run well.

If you are thinking about upgrading, you should read this Chapter and Chapters 8 and 9. After you've read these chapters, you'll know what System 7.5 has to offer and can make an educated decision.

with this annoyance, and is more Power Macintosh-compatible than 7.1.2. And, finally, on every Mac, it runs faster than the older System 7 versions.

Although this chapter focuses on System 7.5, what you learn here can be used with earlier incarnations of System 7. So, even if you do not have 7.5, don't skip the rest of this chapter because you'll miss a lot of information that you'll need later.

The System

Throughout the Mac's short history, the System has gone through several incarnations, beginning with a System that came on one 400K floppy disk. Now, it comes on six 1.44M floppy disks, yet it has managed to keep those elements that originally made and continue to denote the Mac as a unique computer. It is not the icons themselves but the way they operate that is unique. There is a feel to the Macintosh that has not been duplicated by any other computer, and this is possible only because of the System.

Before any computer can be used, it must have software that will tell it how to work and what to do. The *operating system* is the term for this software. In the Macintosh, the operating system is simply called the System.

Operating system (1) A program that organizes the actions of the parts of the computer and its peripheral devices; (2) low-level software that controls a computer by performing basic tasks such as input/output, memory management, and interrupt handling. (See also *disk operating system.*)

When this term is used, it has one of two meanings: It either means the System file that is inside the System folder, or it refers to everything in the System folder. For a Macintosh to work, it needs two things: the System file and one program.

The System file actually makes the Mac work, but without a program, the Macintosh cannot do anything. Normally, this program is the Finder, but there are times when you will use your Mac without the Finder. Usually, these occasions will be when you are installing software; then, the Finder has been replaced with the Installer. Granted, you can't do much with your Mac when it doesn't have the Finder, but your Mac will still operate because it does have a System file.

Another aspect of the Mac's System is its ROMs (Read Only Memory). The Macintosh's ROMs contain part of the Mac's operating system. Although all computers have ROMs of one type or another, very few computers have ROMs like the Mac's, which contain much of the essential information your Mac needs to operate; the System works in tandem with the Mac's ROMs.

But, even with the ROMs, the Mac will not operate unless it starts (boots) from a disk that contains a System file. The disk that starts your Mac and contains the System that is making it operate is called a *system disk* or *startup disk.* You can always tell which disk is functioning as your startup disk because it is the disk that appears in the upper right-hand corner of your screen (see Figure 7.1).

System disk A disk that contains the operating system and other system software needed to run applications.

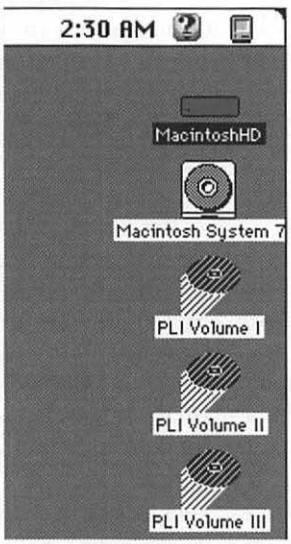


Figure 7.1 The startup disk.

Startup disk A disk with all the necessary program files—such as the Finder and System files contained in the System Folder for the Macintosh—to set the computer into operation, sometimes called a *boot disk.*

Your Mac's startup disk controls all of the Mac's operations. It is possible that you might have two or more hard drives, each with a System folder that is configured for a special purposes. Then, you would have different capabilities simply by restarting your Mac from the other disk. Controlling which disk you use to start your Mac is also a function of the Mac's System. Using different drives to start your Mac is discussed later in this chapter and in Chapter 10.

As you may have surmised, your System file can be found in your Mac's System folder. It is only one file of many, but it is the most essential file you have on your disk drive. Figure 7.2 shows the contents of the System folder and the System file.

There is very little to nothing that you can do with the System file—it just is. You can even open your System file by double clicking on it. Inside, you will see some items called *keyboard layouts* and *sounds.* Figure 7.3 shows an open System file.

The keyboard layouts determine the characters your keyboard types when you press a letter. In Figure 7.3, you saw a bunch of keyboard layouts for different countries. You can select which keyboard layout your Mac uses from the Keyboard control panel, which will be discussed in the section, "Control Panels," later in this chapter.

The sound files in your System file are the different sounds your Mac can make when it presents you with a dialog box and simultaneous alert noise. Sounds are used

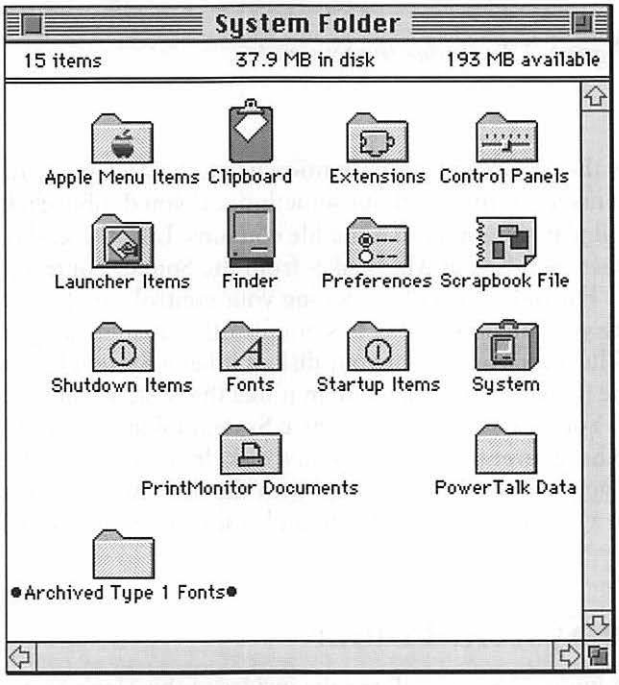


Figure 7.2 *The System folder.*

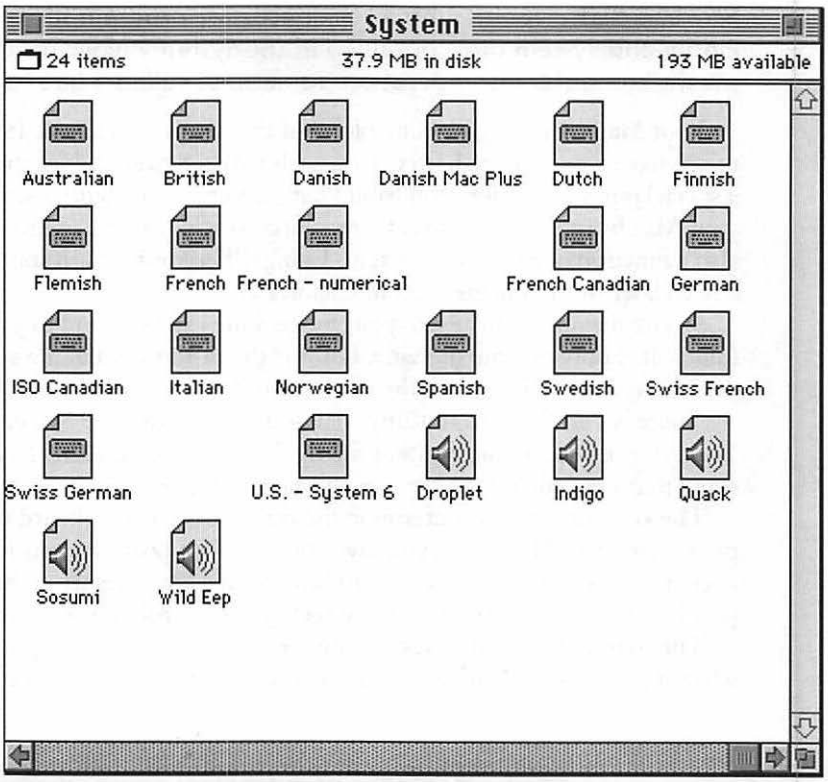


Figure 7.3 *Inside the System file.*

by the Mac to get your attention when the Mac needs more information from or wants to notify you about something. If you double click on a sound file, your Mac will play the sound that the file contains. Like the keyboard layouts, you control what sounds your Mac makes from the Sounds control panel.

The only reason for opening your control panel is curiosity. There is really nothing you can do with the System file other than making sure your disk contains one. Whenever you look at your disk, if it has a System folder with an active System file, the folder will have an icon in it like the System folder in Figure 7.4.

You can have only one active System folder on a disk drive. Although it is possible to have several System files on a disk drive, only one of those Systems can control a Mac when the Mac is started with the disk. Actually, having more than one System on a disk can cause problems and is something you should avoid.

Inside the System Folder

In Figure 7.8, you will see the insides of the Mac's System folder. It contains several folders and a few files. If you've been using your Mac for awhile and have installed

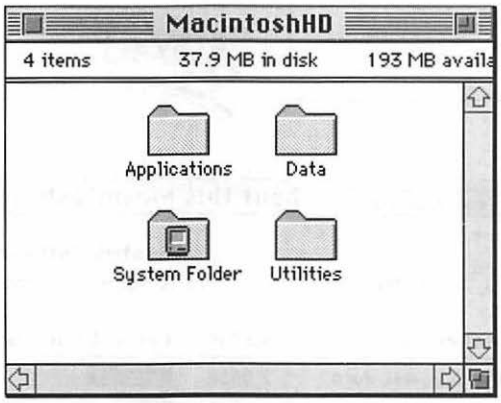


Figure 7.4 *A System folder.*



How It All Works

The Macintosh, or any computer, operates on a series of layers. There is the basic hardware, the first layer, that provides the framework within which the software operates. The software that is built into the hardware is primarily contained in the ROM (Read Only Memory), which becomes the second layer.

The ROM is an extension of the computer's RAM and is accessed like RAM, except data cannot be written to it. When your Mac starts, it performs its hardware checks and goes through the boot-up sequence. Then, as it boots, it loads the System software that runs the Mac as the third layer.

The Finder then loads on top of the System software, which includes all of the Extensions and Control Panels, and becomes the fourth layer. After this, each program you run after the Finder starts and then layers itself in memory. This layering can lead to your Mac's memory becoming fragmented. If you run a program that requires a small amount of memory and one that requires a lot of memory, after you quit the small program, the memory it used is freed to be reused. However, any program running that needs a chunk of memory larger than the small program you just quit can't utilize the newly freed memory. Nor can the newly freed memory become part of the block of memory above the large program that is running. So, you end up with a small chunk of memory in the middle of occupied memory, which can't be used.

Figures 7.5 and 7.6 illustrate this process, using the About This Macintosh... command from the Apple menu. In Figure 7.5, TeachText was started before Microsoft Word and there is 8933K of memory available for other programs.

continued

Notes

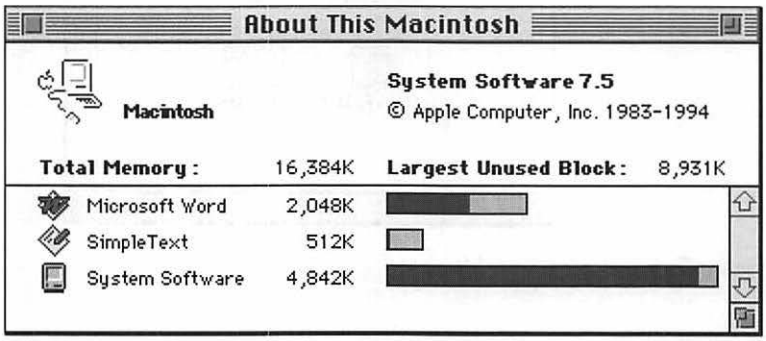


Figure 7.5 *Memory with SimpleText running.*

In Figure 7.6, you can see that SimpleText is no longer running. Yet, the amount of available memory is the same as before.

If you run a program that is smaller than the amount of memory that was freed, it may run in the memory fragment freed by quitting TeachText, like the Key Caps program in Figure 7.7.

However, it is not always the case that a small program will use memory that has been freed. Sometimes, it will load into the larger available contiguous block, reducing even further the amount of memory available. Also, each time you run a program, even if it loads into the fragmented memory, it will still affect the larger block, reducing the available amount by a few kilobytes.

The layering of Memory can be even more dramatic if you are using programs that require a lot of memory. If you are starting and quitting them often, you may

continued

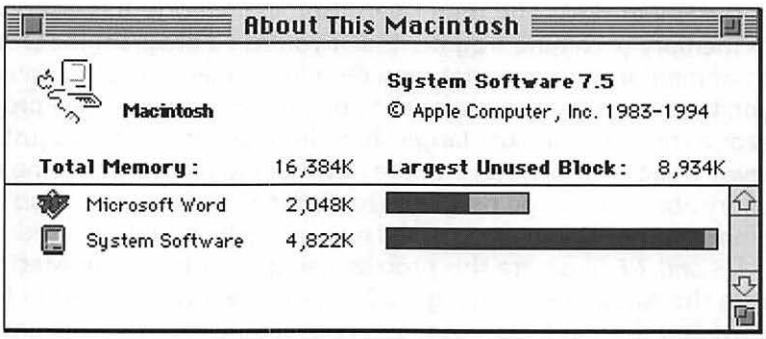


Figure 7.6 *Memory without SimpleText running.*

Notes

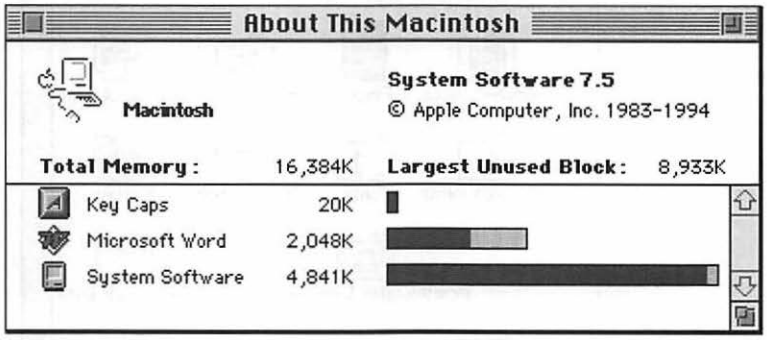


Figure 7.7 *Memory with the Key Caps running.*

find that, after awhile, you can no longer open all of them simultaneously. If you keep track of how you use memory, you will get more mileage from what you have. Most of us cannot afford huge quantities of memory, so maximizing your use of what you have could be advantageous.

Understanding these layers can help you optimize the number of programs you can run within a limited amount of memory. By first running the programs that you will be using during your entire computing session and leaving them open, you increase the amount of memory you can use for other programs and lessen the fragmentation of your memory.

software, your System folder could contain more folders and files than the one shown in Figure 7.8. Also, if you are not using System 7.5, there will be some differences between your System folder and the one Figure 7.8.

There are four files in the System folder. The most important file is the System, which we've already talked about. The other files are the Finder, Clipboard, and Scrapbook files. When a file is in the System folder and not contained within another folder, it is said to be loose in the System folder.

The Finder and System files are essential to your Mac's operation. If you move either file, your Mac will not start. The Clipboard and Scrapbook files are support files for other Macintosh functions. Whenever you perform a copy, cut, or paste command, the information is either put into the Clipboard file or it is copied from the Clipboard file into your application.

The Scrapbook file is a data file that is used by a desk accessory called the Scrapbook. If this file is moved, the Scrapbook desk accessory will not work because it looks for the Scrapbook file only in the top level of the System folder. The Scrapbook applications will be discussed later in the "Apple Menu Items Folder" section.

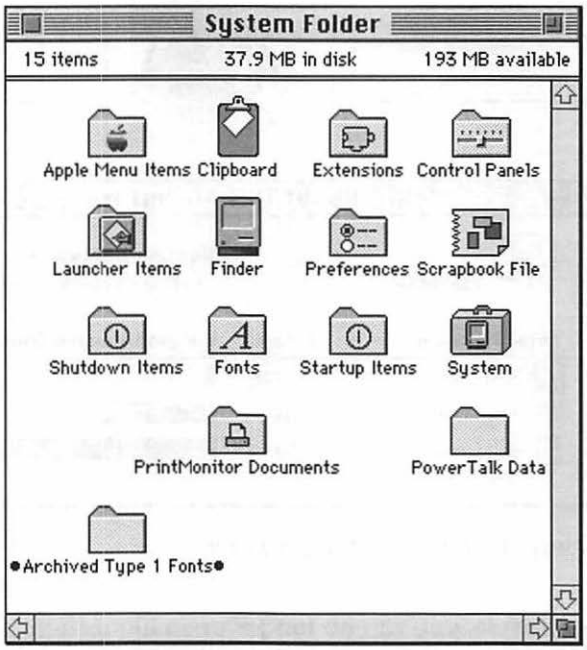


Figure 7.8 Inside the System folder.



System 7.5 Folders

System 7.5 will automatically create the following folders if they are missing at bootup:

- Apple Menu Items
- Control Panels
- Extensions
- Fonts*
- Launcher Items**
- Preferences
- Shutdown Items**
- Startup Items

Although you should not remove these folders from your System folder, if you do, the next time you start your Mac, they will reappear. The items with the * and ** are not created by System 7 or 7.0.1, the folders with ** are not automatically recreated with System 7.1.

The rest of this section will look at the folders you'll find in the System folder, and the types of files they contain. Throughout this section, you will see references to programs which may not be familiar, or utility programs mentioned that you don't have. Whenever possible, the examples will come from what you probably have as part of your System software or programs on the PD-ROM disk.

The Finder

You've already read quite a bit about the Finder; by now, you know that it is what you're looking at after your Mac has started and it creates and controls the Desktop. However, there are a few more things that you can do with the Finder that have not been discussed yet.

This section will discuss the following features of the System 7.5 Finder that have not been mentioned yet:

- Drag-and-Drop
- Stationery Pads
- Customized Icons
- Application's Memory Size
- Other Neat Tricks

Drag-and-Drop

Drag-and-Drop is a new feature of the Macintosh, introduced with System 7. It is the ability to select a document icon and drag it onto the icon of a program and release it (like moving a file to a folder), causing the application to start and open the file.

This procedure works only with applications that recognize the document's type resource (see Chapter 11 for more information on type resources). The type resource tells the Finder what type of file a document happens to be: for example, a text file, a PICT graphics file, or a Text file.

If the application recognizes the file as one that it can open, it will highlight it and, when the mouse button is released, the application will start. This is useful for opening files that do not have corresponding applications but can be read by another program. This capability has also given rise to a family of utility programs. They operate on the Drag-and-Drop principle and do such things as automatically substitute applications , trash a file or group of files, or mount unmounted drives or network volumes.

Try dragging a Read Me file onto SimpleText. Notice that the SimpleText icon is selected, just as a folder is when a file is dragged onto the folder. When the mouse is released, SimpleText will start and open the file. The other thing to notice here is that the file being dragged was a SimpleText file, which you can tell by the file's icon.

In Figure 7.9, the file that is being dragged to the Microsoft Word icon is a text file. As you can see, it too would be opened by Microsoft Word because Microsoft Word is selected. However, if you had double clicked on the document icon being dragged, it would have started the program that created the file—in this case, AppleLink.

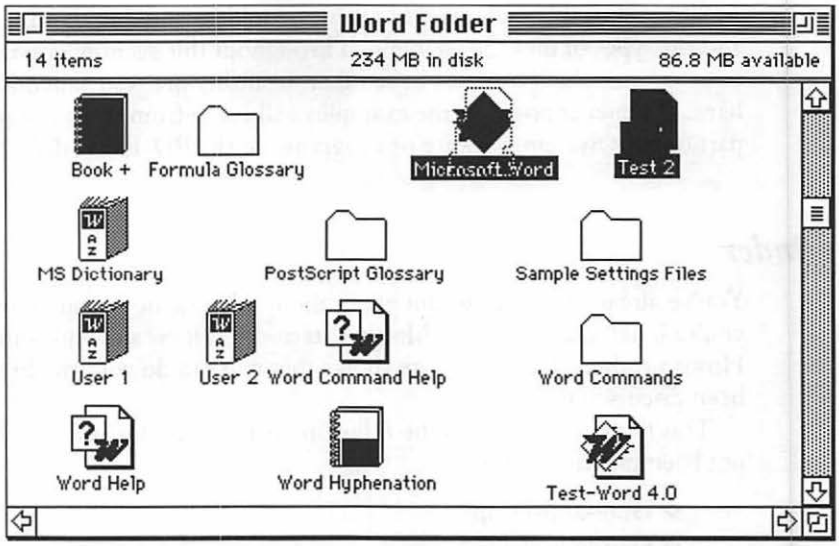


Figure 7.9 *Dragging and dropping a file onto a program other than the file's creator.*

Figure 7.10 shows a utility application called Trash Chute that will automatically delete the file icons that are dropped onto it. If you do not want to always have to empty the trash you can use Trash Chute. It will do the job for you.

With System 7.5, the concept of drag-and-drop has been expanded and is now an extension of copy-and-paste. Selecting text, sound, or a picture, in a System 7.5-compatible program and dragging it to another application will cause the selected text or picture to be moved as if you had performed a cop- and-paste. If you have System 7.5, you can try this by moving text from a SimpleText document to a Sticky note (Sticky notes are discussed in the "Apple Menu Items" section).

Drag-and-drop can also be used to store selected text or a graphic to the Desktop, where it will stay as a text clipping. You drag the clippings file into another document. Figure 7.11 shows a closed and an open clipping file on the Mac's Desktop.

Stationery Pads

A stationery pad is a file that, when opened, opens as an untitled document even though it contains information. An example is a file that has your company's logo, return address, salutation, and closing already completed, and that you use every time you write a letter. Rather than open your letterhead file, remembering to give it a new name every time, you can convert the file into stationery so that your Mac will always ask you to save the file with a new name. This is a handy tool for standardizing documents throughout an organization. You can also use stationery pads to create a core set of documents that you modify as needed. They present another small way for you to increase your productivity. A stationery file is created by making your

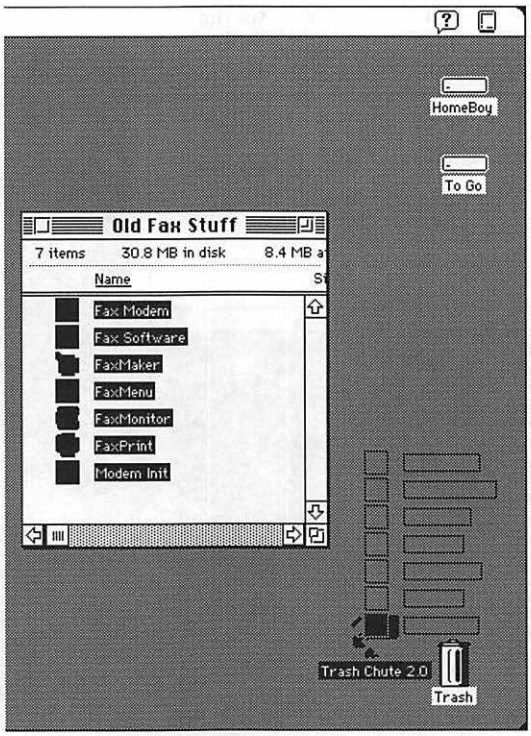


Figure 7.10 *Trash Chute, an example of drag-and-drop.*

base document and saving it to your hard drive. After you've closed the new document, go to the Finder and locate your document.

Once you've found it, perform these steps:

1. Select the file.
2. Choose Get Info or (⌘+I) from the File menu.
3. In the bottom left-hand corner of the Info window, check the box titled *Stationery pad.*

You can launch an application using a stationery pad by double clicking on the stationery file. The document will open as an Untitled window within the program (if it is System 7-compatible). When you are finished working on the file, you will have to save the file as a new document using the Save As... command from the File menu.

Customized Icons

It used to be that if you did not like an icon, you would have to drag out a utility called an *icon editor* to change it. Now you can change an icon using your Mac's copy and paste functions. Customized icons can be a means of identifying files for a special

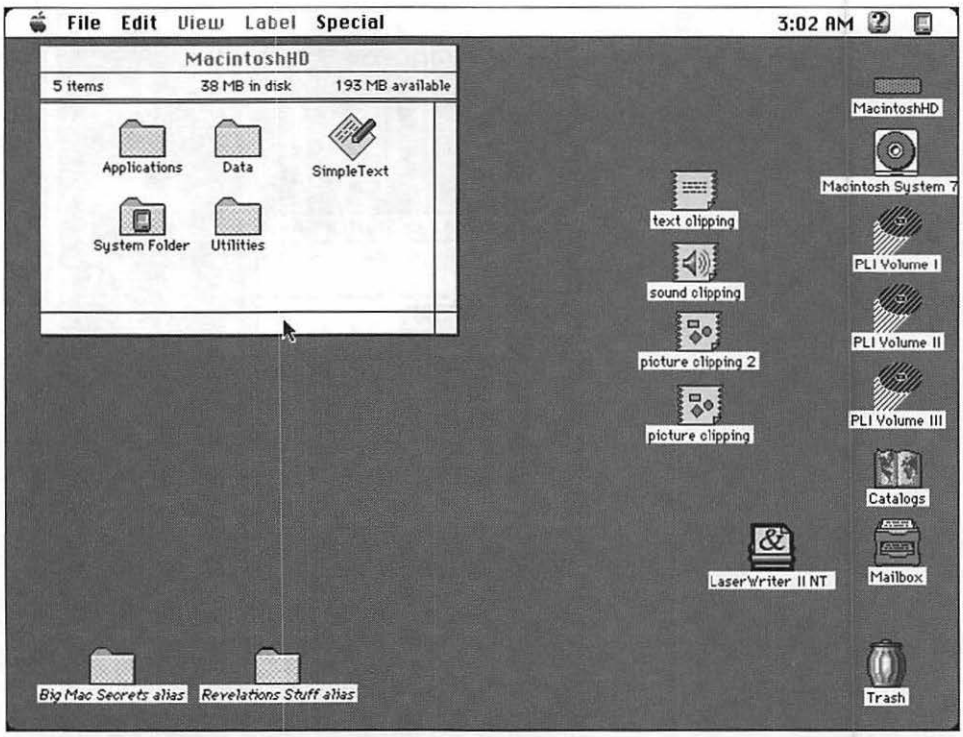


Figure 7.11 *Clipping files on the Desktop.*

purpose or changing an application's icon you happen to think is ugly. The only rules are the ones you make.

To customize an icon, you need a graphic image. For our example, we'll use a graphic image that is stored in your Mac's Scrapbook (the Scrapbook is discussed in the "Apple Menu Items Folder" section). This image was in your Mac's Scrapbook when your System was installed; if you cannot find the image used in this example, then it has been removed.

To change an icon:

1. Open the Scrapbook; it is found in the Apple menu.
2. Select the graphic shown in Figure 7.12. (Use the scroll bar in the Scrapbook window to find the graphic.)
3. Copy the graphic using the Copy menu item or ⌘+C.
4. Select the icon you want to change. You can change any icon displayed in the Finder.
5. Select the Get Info menu item (⌘+I) from the File menu.
6. Click on the icon in the Info window (a dark border will appear around the icon) and use the keyboard paste command (⌘+P).

The graphic you copied will replace the original icon, as shown in Figure 7.13.

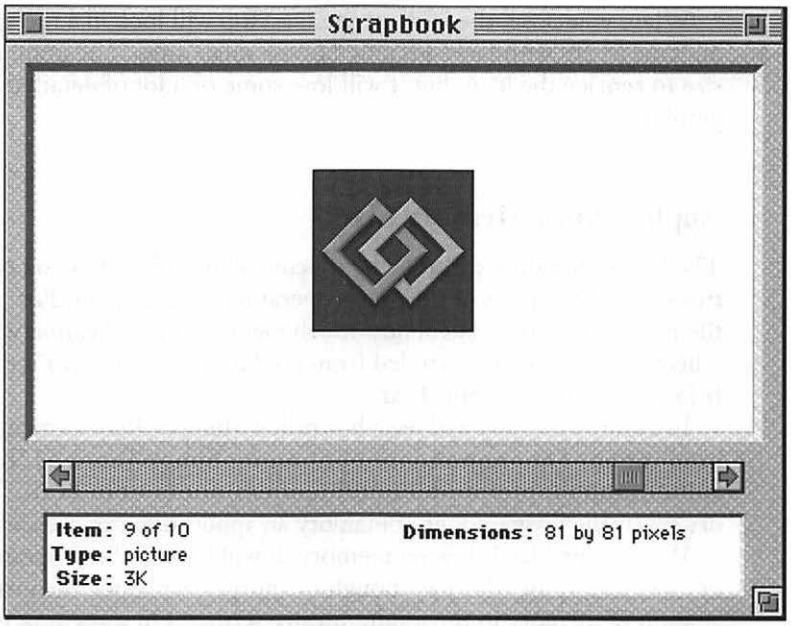


Figure 7.12 *The graphic in the Scrapbook.*

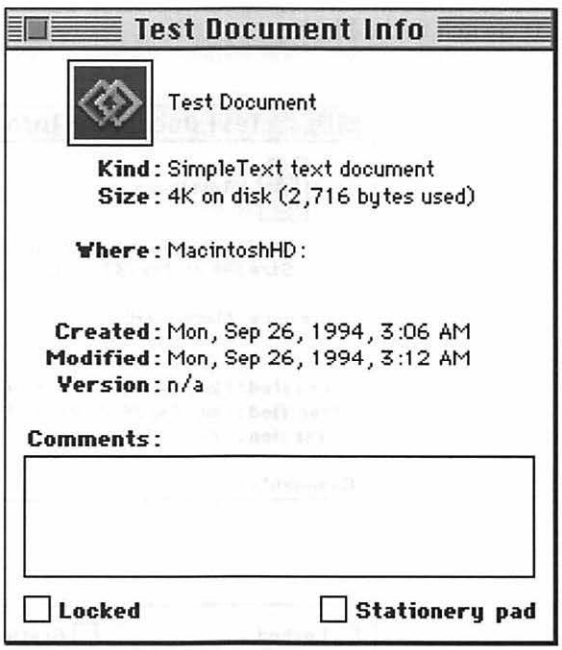


Figure 7.13 *The new icon.*

When you close, the icon on the Desktop will look like the graphic you pasted in. This works with large graphic files or small ones. The graphic will be reduced in size to replace the icon, but it will lose some or a lot of detail, depending on the graphic's size.

Application's Memory Size

The Finder not only controls the Macintosh interface, but you can also use it to control some of the parts of the Mac's operating environment. For instance, it is from the Finder that you control how much memory an application will use when it runs. This function is also controlled from the Get Info window; Figure 7.14 shows the Info window from SimpleText.

In Figure 7.14, you will see a box called Memory Requirements in the lower right-hand corner. The suggested memory size for SimpleText is 512K, the minimum size is 192K, and the preferred memory (current) size is set to 512K. The minimum memory size is the least amount of memory an application can use and still work properly.

When your Mac is low on memory, it will look at the program's minimum memory size and, if the Mac has enough memory, it will open the program using the amount of memory in the minimum size setting. On some programs, you can tell them to use less than the minimum memory size by changing the setting, but the program may not work properly. However, it does not hurt to experiment if you do not have as much memory as you would like.

To tell how much memory your Mac is using:

1. Switch to the Finder.

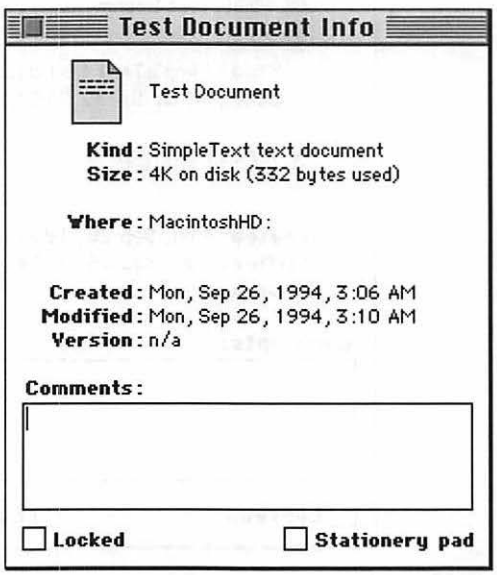


Figure 7.14 *The SimpleText Get Info window.*

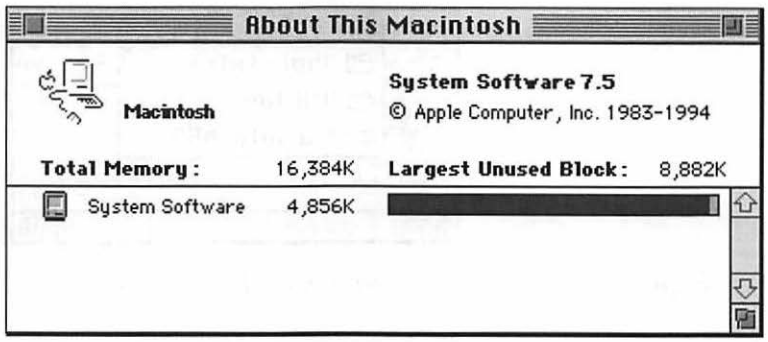


Figure 7.15 *The About This Macintosh window.*

2. Select the About This Macintosh... menu item from the Apple menu.
3. A window like the one in Figure 7.15 will appear.

The window in Figure 7.15 shows how much memory your Mac has, how much is left for other programs, and how much each running program is using. The preferred size is the amount of memory your program will normally use, and the default setting for the preferred size is the same as the suggested size. There will be times when a program will need more than the suggested amount of memory. An application usually requires enough memory to run, plus memory for each document you open. If you have several documents open simultaneously or have very complicated documents, you might have to increase the application's memory size. You'll know to increase the preferred size if your application tells you that it is running out of memory.

Other Neat Tricks

Files can be locked at the Finder level if you want to protect them from being accidentally trashed. Locking a File will also make it function as if it were a stationery pad.

To lock a file:

1. Select the file.
2. Perform a Get Info... on the file.
3. Click on the Lock check box to lock the file.

It is possible to make the Finder delete a locked file by holding down the option key as you select the Empty Trash... menu item from the Special menu. However, under normal circumstances, locked files cannot be deleted.

Another function of the Finder that is easy to miss is the pop-up menu in a window's title bar. If you click on the name of a folder while holding down the x key, the path of the folder will be displayed as a pop-up menu. Figure 7.16 shows a pop-up menu; selecting one of the names will bring its window to the front.

If you want to move a window that is behind the one you are looking, at hold down the ⌘ key and click on the title bar of the window behind the selected one (the one with lines across the title bar is the selected window) and then move the window.

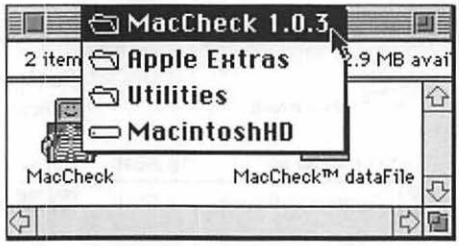


Figure 7.16 *The pop-up menu in the Finder window.*

This is great for moving or copying a file to a folder that is in a window behind the one that contains the file you are moving.

In addition to documented Finder features, it seems that every time you turn around, someone is discovering something new about how it operates, or a neat way to use its features to perform a new task. The best way to discover these is to experiment. You can also pick up tricks and tips from *MacUser* and *MacWorld* magazines.

The Apple Menu Items Folder

The Apple Menu Items folder contains everything you see in the Apple menu. The Apple Menu Items folder was modified with System 6.5 to provide increased functionality. In older versions of the System (pre-7.X), there was no Apple Menu Items folder; the items in the Apple menu were called Desk Accessories and installed in the System like the keyboard layouts and sounds mentioned in the section, "The System." For those who use System 6.0.X, you will need the Font/DA mover to install and move Desk Accessories. Instructions for using the Font/DA mover are in Chapter 9.

Today, there are no more Desk Accessories, so to speak. You will find programs that are called Desk Accessories, but they are really just small programs that can be run from any location on your hard drive. The reason that there is still a program type that is called Desk Accessories is for the purpose of installation.

Desk Accessories can be easily installed by dragging the program to the System folder icon. Your Mac will then automatically copy or move the Desk Accessories to the Apple Menu Items folder. This makes the program available from the Apple menu.

The most important programs in the Apple menu will be discussed in other sections and chapters of this book. You've already read about the Find File program in Chapter 5. However, there are some folders in the Apple Menu Items folder that are new to System 7.5, and some other tricks you can perform with this folder.

There is a control panel called Apple Menu Options that controls how the Apple menu behaves. This control panel turns on or off the hierarchical menus function of the Apple menu. The contents of any folder placed in the Apple Menu Items folder become detectable as a hierarchical menu. Figure 7.17 shows the Apple menu's hierarchical menu function.

The rest of this section will look at these folders and offer some suggestions for maximizing your use of the Apple Menu Items folder. These folders are:

- Recent Applications folder

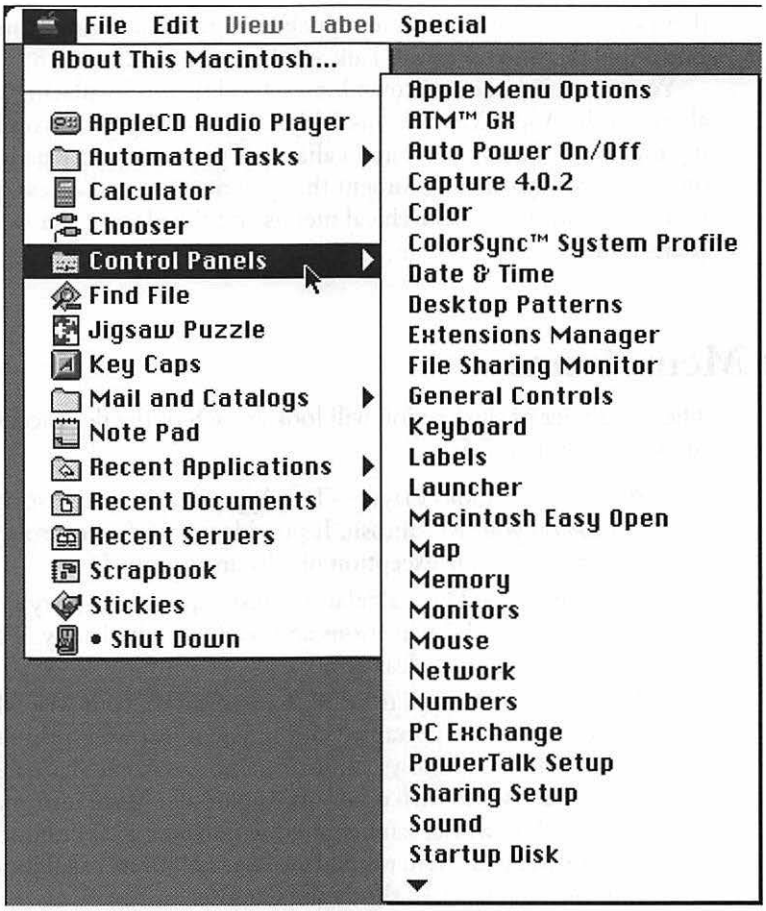


Figure 7.17 *An Apple menu's hierarchical menu.*

- ❖ Recent Documents folder
- ❖ Recent Servers folder

These folders are created by System 7.5 and contain aliases for the last 10 documents, 5 applications, and 10 servers opened by you (default settings). The folders in conjunction with the hierarchical menus let you select these recent items from the Apple menu as a shortcut for the things you use most often. The number of items that appear in a hierarchical menu for any of these folders can be adjusted from the Apple Menu Options control panel.

There are two more folders that are part of System 7.5 and installed in the Apple Menu Items folder:

- ❖ Mail and Catalogs folder
- ❖ Automated Tasks folder

The Mail and Catalogs folder is the result of installing PowerTalk and contains your PowerTalk resources. The Automated Tasks folder contains AppleScript files

that can be used for performing quick configuration changes and other useful tasks. Both AppleScript and PowerTalk are discussed in Chapter 8.

You can also make your own hierarchical menus by placing folders or folder aliases in the Apple Menu Items folder. Some of the items you might consider placing there are folders that contain aliases of your stationery pads, utilities that you often use, or any other document that you may want to access quickly. You should experiment with the hierarchical menus and the placing aliases in the Apple Menu Items folder.

Apple Menu Items

The remainder of this section will look at each of the desk accessories distributed by Apple with System 7.5:

- AppleCD Audio Player—The AppleCD desk accessory is used to play Audio CDs on your Macintosh. It provides all of the controls you'd find on your stereo, with the exception of a balance control.
- Calculator—The Calculator is just a quick-and-dirty DA that will let you perform quick calculations and really is quite handy. To clear the Calculator, hit the escape or clear key.
- Chooser—Of all of the desk accessories on your Mac, the Chooser is probably the most important. With it, you select what printer you are going to use, and it also allows you to log onto an AppleShare network. You also use the Chooser to turn on or off AppleTalk. More information about file sharing and networks can be found in Chapter 13. Without this little piece of software, your Mac would lose over half of its capabilities as a computing device. Figure 7.18 shows the Chooser.

  There is very little to using the Chooser. To select a printer, its driver must be installed in the Extensions folder (discussed later in this chapter). If it is, its icon will appear in the Chooser and you just click on it to select it. If you are printing to a networked LaserWriter, make sure AppleTalk is turned on. Using the Chooser to log onto a network is discussed in Chapter 13.
- Find File—The Find File desk accessory was discussed in chapter 5, "Keeping Track of Your Data." Find File is used to help you find those files you've misplaced.
- Key Caps—Key Caps is the tool you use to find that elusive special character that you can never remember, such as trademark or copyright symbols. You can also use it to get foreign characters, such as the tilde or umlaut. Figure 7.19 shows Key Caps with an accented Á and a Ü with an umlaut.

  To use Key Caps, select the Font you are using in your document from the Key Caps menu. Once you see your font displayed on the simulated keyboard, you can see what special characters the font contains by pressing the option, x, and shift keys in various combinations. To create a foreign letter character, such as an umlauted Ö, you need to find the special character,

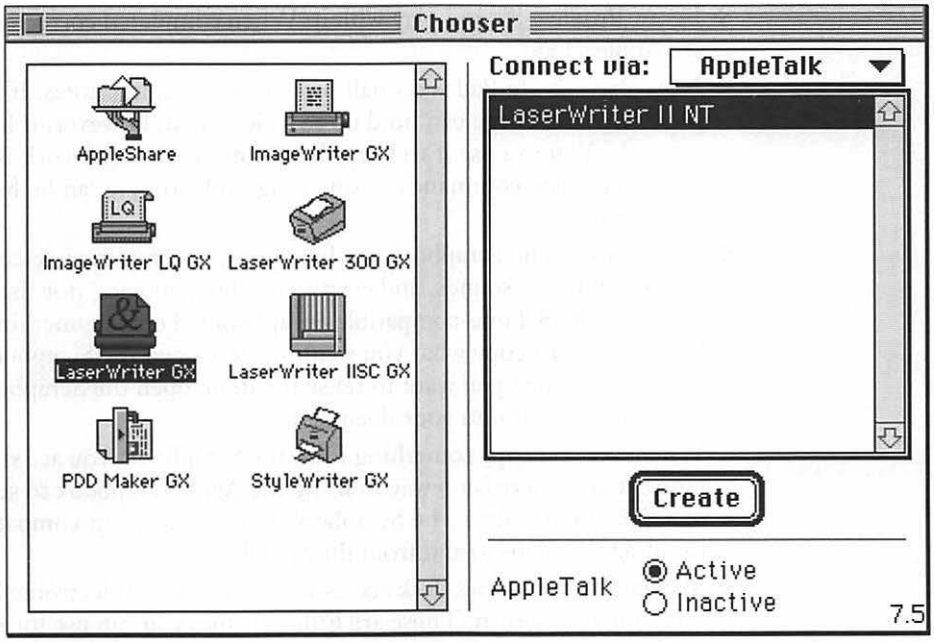


Figure 7.18 *The Chooser desk accessory.*

which in this case is an option O. After you have held down the option key and selected the letter O, press the letter you want to combine with the special character—in this example, U. The letter you pressed will appear as the accented foreign character.

This process will work any time you are typing on the Mac, not just in Key Caps. However, if you create the character in Key Caps, you can copy or cut it from the Key Caps display and paste it into your document.

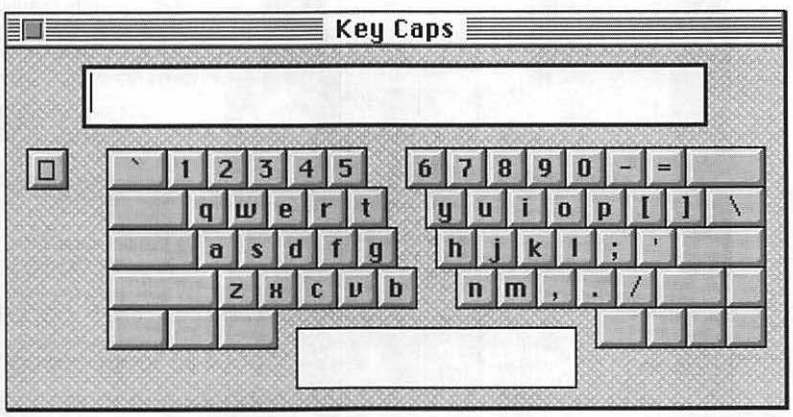


Figure 7.19 *Key Caps desk accessory.*

- Jigsaw Puzzle—Sit and play with it. When completed correctly, you should see Apple's logo.
- Note Pad—Note Pad is a small progam for keeping notes. It has eight pages and each page can hold up to 32K of text; however, it has no file controls. You can use it to keep short notes and it will work with the cut, copy, and paste commands. Using drag-and-drop, it can be handy to store text.
- Scrapbook—The Scrapbook is where you can compile an eclectic collection of text, graphics, sounds, and even QuickTime movies, (for the movies you'll need the QuickTime-compatible Scrapbook). To put something into the Scrapbook, just copy what you want to keep, open the Scrapbook, and paste it in. Later, when you want to reuse the item, open the Scrapbook, copy the item, and paste it into your document.

  Whenever you copy something from the Scrapbook, you are stuck with the entire item. There is no way of using the Apple scrapbook to select a portion of a Scrapbook entry. The Scrapbook is drag-and-drop-compatible, so you can drag the items to and from the Scrapbook.
- Stickies—The Stickies desk accessory lets you place electronic Post-it®-like notes on your screen. These are little text files you can use for reminders. Stickies are System 7.5 drag-and-drop-compatible. Figure 7.20 shows some Sticky notes.

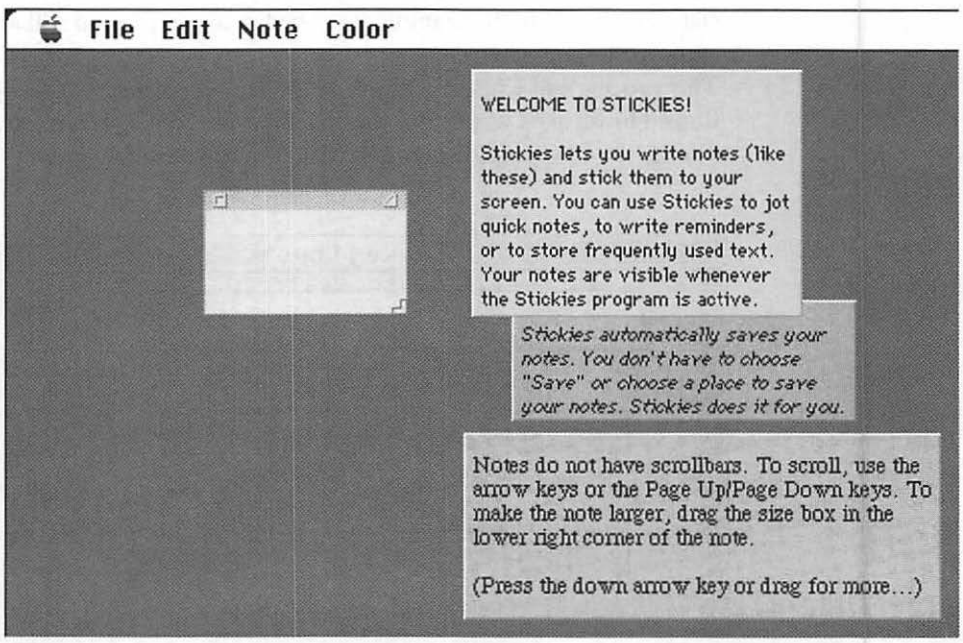


Figure 7.20 *Some Sticky notes.*

The Control Panels Folder

A control panel is a special type of program whose function is to change system, machine, or interface preferences and configurations. Some examples of what you can control are your Mac's sounds, Desktop pattern, or the time and date. The whole idea behind control panels is that they are used to control or set up your user-configurable settings. They are a primary means for customizing your Macintosh and truly making it your machine.

There are a several control panels that come as standard programs with System 7.5. However, some of the best Macintosh utilities available come as control panels. this section will look at the functions control panels fill, how they are installed, and the use of the standard Apple control panels that come with System 7.5. The breakdown of the topics will be:

- ❖ General Control Panel Guidelines
- ❖ System 7.5's Control Panels

General Guidelines for Control Panels

A good example to illustrate Control Panels is the Sound control panel (see Figure 7.21). The Sound control panel allows you to change the types of sound and the volume of the sound your Mac makes. The Sound control panel also controls the playing of audio CDs and all sound functions on AV Macintoshes.

Your Mac's beep or alert sound is a system setting and comes from the System that is controlling your Macintosh. The volume, however, is stored in the PRAM and kept alive by the battery. If you set the volume and then boot from a disk other

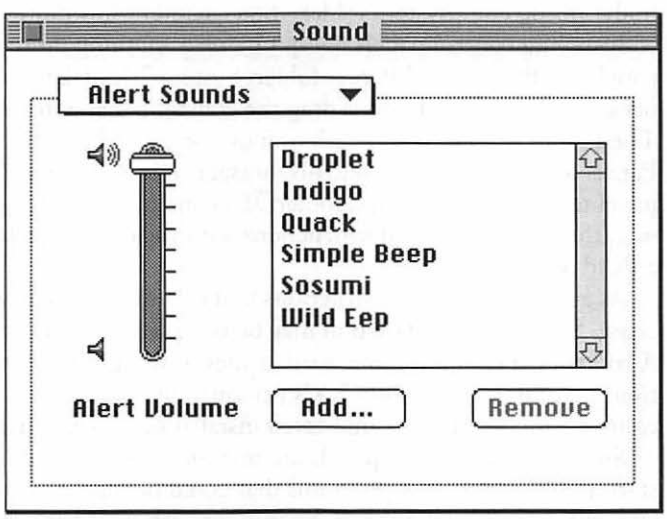


Figure 7.21 *The Sound control panel.*



Understanding PRAM

You don't have to understand a lot of technical details about your Mac to use its control panels, but sometimes a little technical background helps. Your Mac stores settings from control panels in one of two places. Settings are stored on the Mac's startup drive or in special memory. This memory is called the *Parameter RAM* or *PRAM.* The settings stored in the PRAM are maintained by your Mac's electric power, and, when your Mac is turned off, these settings are maintained by a battery inside your Mac.

than the one you were using when you set the sound, the volume of your Mac's sound would stay the same but the sound could change—especially if the sound you used was not in the System on the second disk.

Another control panel, called General Controls, allows you to change how fast the insertion point blinks, how many times the menu item blinks when it is selected, and some Desktop controls. Some of these settings are stored in the System and others are stored in the PRAM (how many times a menu item blinks is stored in the PRAM.)

Control panels are normally accessed from the Control Panels folder in the Apple menu. Selecting the Control Panels menu item will open the Control Panels folder or let you select a specific control panel through the Control Panels hierarchical menu. The Control Panels item in the Apple menu is an alias of the Control Panels folder inside your System folder. (See Chapter 5 for more on aliases.)

Installing control panels doesn't involve anything more than copying the control panel into the Control Panels folder. System 7.X makes the installation process easy because all you have to do is drag the control panel onto your System folder icon. The Finder will ask if you wish to move or copy the control panel into the Control Panels folder. When you see this message, clicking Yes will move or copy the control panel to the Control Panels folder. If a control panel should not be installed this way, there will be special instructions with the control panel in either the manual or a Read Me file.

As a rule, follow the instructions that come with any new control panel you purchase. Sometimes, installation may be complex enough to require an installer script. A control panel might require other files or modifications to the System file to function. An example is System 7.X's personal file sharing. It is implemented with several control panels and the complicated installation process justifies the installation script.

Some of your control panels are memory-resident and loaded with your system at startup. Others are just programs that could be placed anywhere on your hard drive and still work. If you want to experiment with your control panels to find out which

ones need to load with the System, you can do so by removing them from the Control Panels folder and the System folder and restarting your Mac.

After your Mac has restarted, double click on the control panel you removed. If it works, then it is one that does not load into your Mac's System memory. You can place it anywhere on your hard drive and still use it. However, if you try to launch the control panel and it does not work, or you get a message saying that it needs to be installed (Figure 7.22), you will have to put it back into the Control Panels folder and restart your Mac before you can use it. If you decide to move some of your control panels, be careful. Test each one before moving it, and then keep it somewhere handy so that you can easily change whatever aspect of your Mac it controls.

If a control panel has been installed and you try to use it only to receive a dialog box like the one shown in Figure 7.23, it means that you cannot use the control panel.

If you encounter this dialog box on your Macintosh when using a control panel, you can remove the control panel from the Control Panels folder and trash it. Usually, you will not have this problem; it occurs most often when you've installed your System so that it will work with any Macintosh rather than doing an install specifically for your model of Mac.

System 7's Control Panels

There are 43 control panels installed when you perform a complete System installation, which is one designated for any Macintosh. The number of control panels used

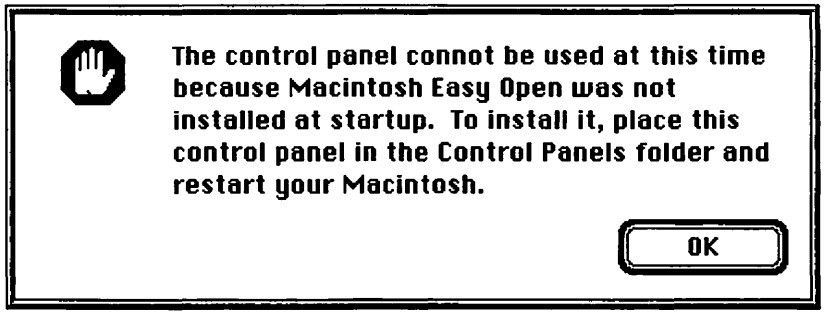


Figure 7.22 Control panel needs to be installed. Restart your Mac.

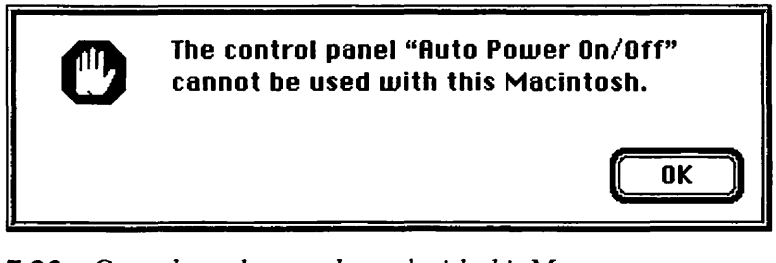


Figure 7.23 Control panel cannot be used with this Mac.

that come with System 7.5 is quite a jump from the 18 that could be used with System 7.0, and an example of the System's complexity.

There are two parts of System 7.5 that are installed separately: the control panels and other system elements used by PowerTalk and QuickDraw GX, which are discussed in Chapter 8, "System Enhancements (AppleScript, PowerTalk, and QuickDraw GX)." Otherwise, the following is a brief description of each control panel found after a System 7.5 installation. These descriptions will be brief because most of these control panels are discussed in other parts of the book.

- PowerBook Display—When using a PowerBook with the ability to use an external adapter this control panel lets you configure the external monitor. You can use is as an extra monitor or to mirror the PowerBooks monitor (where what is on the PowerBook's monitor is displayed on the external monitor).
- Apple Menu Options—The Apple Menu Options control panel controls the Apple Menu's hierarchical menus and how many items appear in the Recent... folders.
- Auto Power On/Off—You can use the Power On/Off control panel to turn your Mac on and off at predetermined times. This can be useful for having your Mac perform automated tasks while you're away.
- AutoRemounter—AutoRemounter is a control panel used with PowerBooks when they are connected to an AppleTalk network. This control panel will reconnect your PowerBook to the network when it starts automatically or when it is restarted.
- Brightness—The Brightness control panel is used to change the brightness on Apple monitors which don't have a physical adjustment. These would include the Classic and Classic II.
- Button Disabler—This control panel works only on some Macs. It is used to prevent others from using the button on your Mac to adjust the sound or screen brightness.
- CloseView—CloseView is a control panel for disability access. It enlarges a portion of the screen so that people with sight problems can use the Mac more easily.
- Color—With the Color Control panel, you can change the color of highlighted text and the color of window ornamentation. If you click on the sample text while pressing the option key, you will learn about the authors of this control panel. Click several times to read the complete story.
- ColorSync System Profile—Use this control panel to tell your Mac what type of monitor you have so that the colors remain true across a variety of Macintosh monitors. This control panel is used primarily by QuickDraw GX.
- Control Strip—The Control Strip is a PowerBook utility that provides quick access to a number of Macintosh settings. It is very useful for monitoring the battery life of the Mac's settings that affect battery usage. Clicking on the icons in the Control Strip provides access to different functions from spinning the hard drive to turning on file sharing. Figure 7.24 shows the Control Strip on a PowerBook.

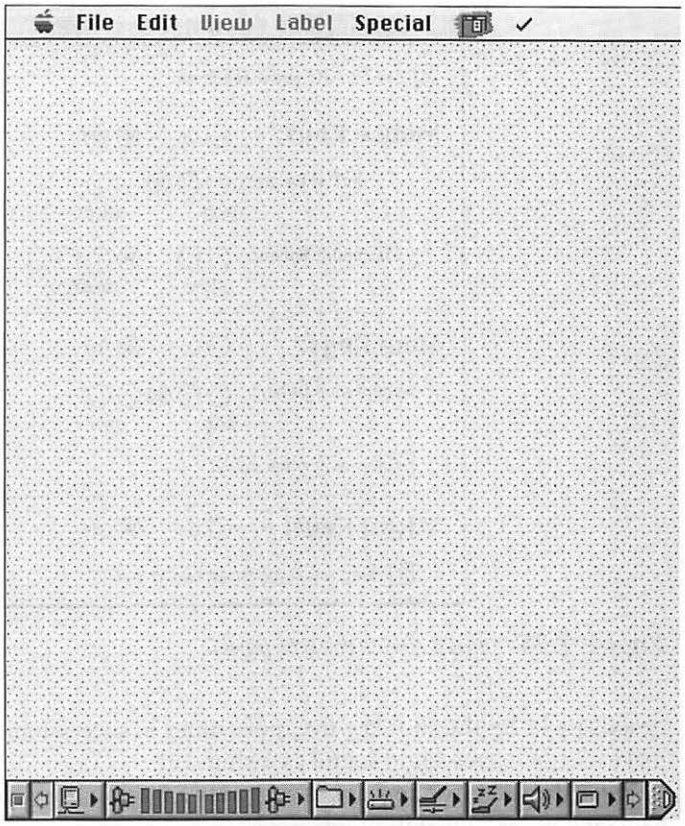


Figure 7.24 *The Control Strip on a PowerBook.*

- Desktop Patterns—This control panel lets you select your Mac's Desktop pattern. It has 56 different patterns from which to choose. If you don't find a pattern you like, you'll have to use a third-party utility to set your Desktop pattern, or paste an image into the desktop pattern's control panel. Some of these utilities are discussed in Chapter 9.
- Easy Access—Easy Access is one of those control panels that you either love or hate. Its intended use is for people who have difficulty using a keyboard or a mouse (it will not improve your typing). Figure 7.25 shows the Easy Access control panel.

Easy Access has Mouse Keys, Slow Keys, and Sticky Keys as its features. Mouse Keys let you use the numeric keypad for moving the mouse cursor. You can activate it from the control panel or with the command, shift, and clear (also the num lock key) x key option.

Sticky Keys is used to hold down a modifier key, such as the option, x, shift, and control keys, while you press another key on the keyboard. It is activated by pressing the shift key five times. When it is active, you will see a small icon appear on the left-hand side of your menu bar and hear a little crescendo sound (see Figure 7.26). To

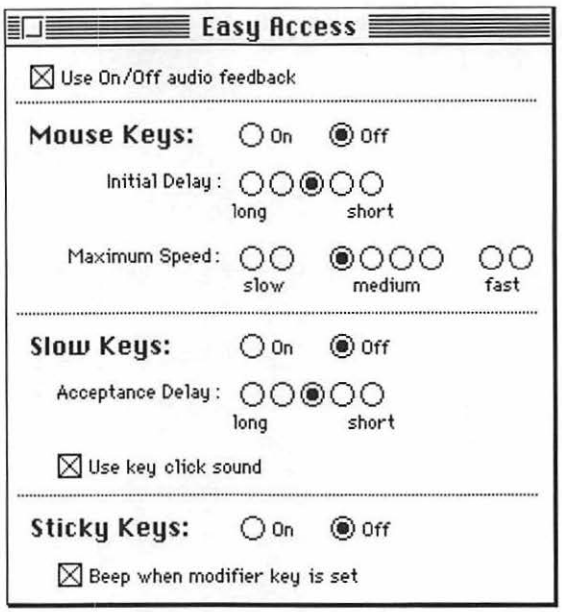


Figure 7.25 *Easy Access control panel.*

deactivate it, hit the shift key five more times in succession. It will disappear and make a little decrescendo sound as it shuts off.

After the indicator appears, if you press a modifier key, you will see the indicator icon change, as shown in Figure 7.27.

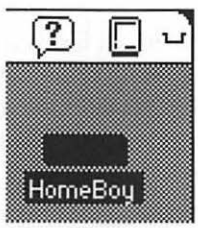


Figure 7.26 *The Sticky Keys indicator.*



Figure 7.27 *The modifier indicator in Sticky Keys.*



Figure 7.28 *Sticky Keys indicator after modifier has been pressed a second time.*

When you press the modifier a second time, the Modifier key is locked and you can then press the other key you want to use with it. Figure 7.28 shows the Sticky Keys indicator when the modifier key has been pressed a second time. Sticky Keys will stay active until you are finished with it and put it away.

Sticky Keys has caused people to think that the supernatural is somehow trying to take over their Macintosh. Though it can be useful, if you happen to just be tapping on your shift key as you try to form that thought that will change the world, your Mac might emit strange noises and you'll think that you are losing your mind. It is easy to miss the association between the strange icon and the noise the Mac makes as it appears and disappears.

Slow Keys is used to set a delay before the key you pressed is activated. It can also be used in conjunction with Mouse Keys to give you more control over the cursor's movement. To turn Slow Keys on, hold the return key down for about eight seconds. When it is activated, you will hear a little high-pitched dit, dit, dit (you really have to try it to hear the sound). It is turned off the same way it is turned on.

- Extensions Manager—The Extensions Manager is an important control panel that controls which extensions will be loaded into memory as your Mac starts. You will use this control panel for troubleshooting. To turn control panels on or off while starting your Mac, hold down the space bar to invoke the Extensions Manager.
- File Sharing Monitor—The File Sharing Monitor provides you with the ability to watch who's using your Mac and how much of its processing power they are consuming, and lets you disconnect users (if you are unhappy with how much of your CPU time they are consuming). Although this Control panel is looked at in more detail in Chapter 13, it is really a fairly simple device.
- General Controls—The General Controls control panel (say that five times very rapidly) is used to set six different aspects of the Finder's interface (see Figure 7.29). It is used to set your Desktop preferences, the blinking rate of the insertion point, the number of times a selected menu item blinks, folder protection, default folder selections, and the Shut Down warning.

The following list briefly describes the General Controls options:

- With the Desktop controls, you can determine whether to show the Desktop while using other applications, and see whether you like the results.
- The Show Launcher option will start the Launcher control panel at startup.

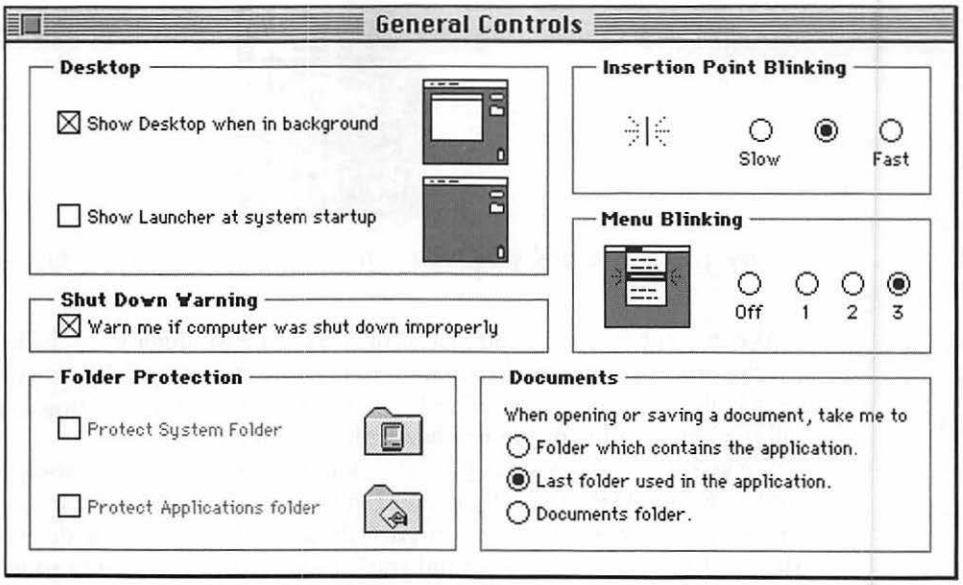


Figure 7.29 *The General Controls control panel.*

- The *Warn me if computer was shut down improperly* has your Mac tell whenever it starts if the Shut Down menu item (in the Special menu) or the Shut Down desk accessory was not used to shut down your Mac.
- Folder Protection locks the System Folder and/or your Applications folder if you do not want modifications made to either of these folders.
- The Insertion Point and Menu Blinking controls how rapidly your insertion point blinks and how many times your menu selections blink.
- The Documents section lets you select the default that will be chosen when you perform a Save As... command. If you choose the Documents folder option, a folder called Documents will be created on your Desktop and all of your files will be saved inside the Documents folder.
- Keyboard—The Keyboard control panel lets you select the keyboard you want to use, and set the delay time before a key will start repeating itself if held down. When you first install your System, it is installed with only one keyboard option, the US keyboard. However, you can get foreign character and special keyboard layouts that you can install. One of the extra keyboard layouts you can install is the Dorvak keyboard layout from Nisus Software. Figure 7.30 shows the Keyboard control panel with several foreign keyboard layouts. The US keyboard layout is the selected one; however, it would be possible to type in Swedish, French, or Dutch with this Macintosh.
- Launcher—The Launcher is a control panel that you can use to open programs, control panels, and documents. The Launcher control panel uses a folder in the System folder called Launcher Items, into which you place aliases. The aliases appear in the Launcher, as shown in Figure 7.31.

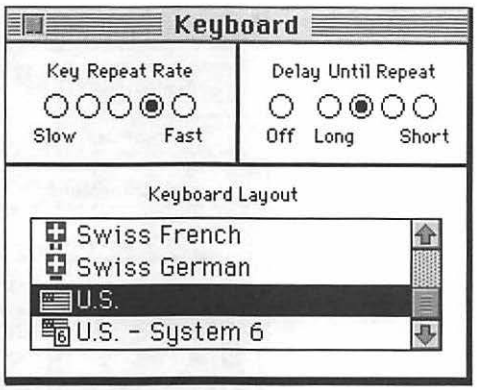


Figure 7.30 *The Keyboard control panel.*

By putting folders inside the Launcher Items folder, you can customize the Launcher. The folders you place in the Launcher Items folder place a o (option 8) in front of the folder's name, such as o Documents. Then, place the aliases you want inside the folder you just created. After you're finished, your Launcher control panel could look like Figure 7.32.

- Macintosh Easy Open—The Macintosh Easy Open control panel controls the Mac's built-in file translators. When you try to open a file for which you don't have the corresponding program the Macintosh Easy Open control panel lets you control how your Mac behaves under such circumstances. The options are fairly self-explanatory; Figure 7.33 shows the Macintosh Easy Open control panel.
- MacTCP—MacTCP is a special networking control panel. If you need this control panel, you will know. It is used for Internet access and you will probably be helped by someone who knows how to configure Internet accounts.
- Map—The Map Control Panel allows you to determine the time anywhere in the world. You can also use it to find the longitude and latitude of any of the

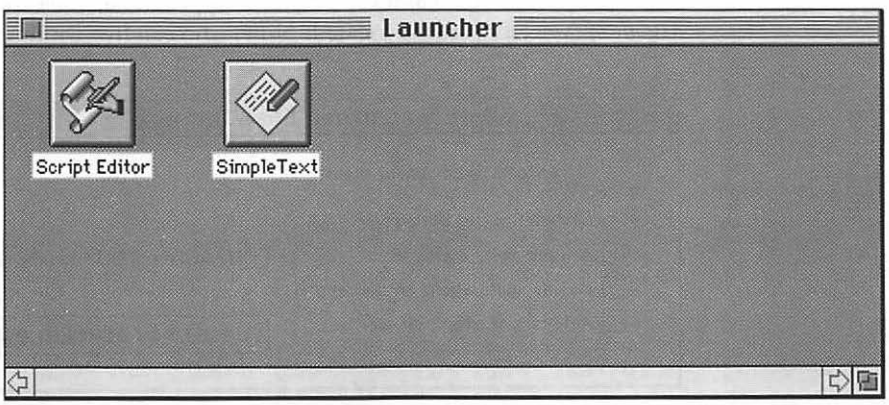


Figure 7.31 *The Launcher control panel.*



Figure 7.32 *A customized Launcher control panel.*

cities that have been entered, which is handy if you're an astrology buff. Apple added this just as a little fun device; it doesn't even merit a full listing in the System 7 reference manual (it's shown as an icon). But, if you type *MID* into the text field and click Find, or type *return*, you can learn where the *Middle of Nowhere* is really located. Now, who can live without knowing that?

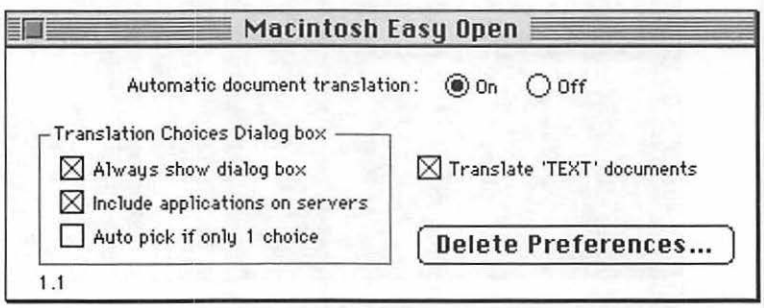


Figure 7.33 *Macintosh Easy Open control panel.*

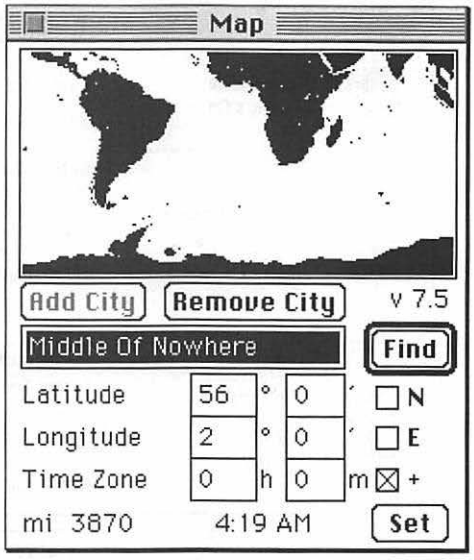


Figure 7.34 *The Map control panel.*

Figure 7.34 shows the Maps control panel. If you want to find out what cities are already entered into it, hold down the x and option keys while clicking on the Find button. By clicking on the Time Zone title, it will change to the Time Difference between two locations. Clicking on the *mi* (miles) label will change it to kilometers, or a designation called *dg* for degrees. This will cycle you through each city, giving you the information you need.

- Memory—The Memory control panel allows you to set how much memory should be used for your RAM cache. On 68030 and 68040 Macs (and let's not forget granddad, the Mac II, if Mode 32 and a PMMU are installed), it also allows you to configure your virtual memory and the addressing mode to either 32- or 24-bit. On the PowerBooks and the Macintosh Quadras, you can also set up a RAM disk with the Memory control panel. Figure 7.35 shows the Memory control panel with all of the available options.

  If you are using a Macintosh SE/30, II, IIx, or IIcx you should get the Mode 32 Control Panel device. Mode 32 will let you turn on 32-bit addressing for these machines, which means that you can access more than 8 megabytes of memory either as virtual or physical RAM. If you need Mode 32, contact your Apple dealer.

  If you care, when virtual memory is turned on, you can press the option key and click on the volume name to gain insight about its authors.

- Monitors—The Monitors control panel allows you to configure the setting for the number of grays or colors for your monitor. If you have multiple monitors, it will allow you to set the monitor on which the menu bar should appear, and which monitor should be your startup monitor (the one that the

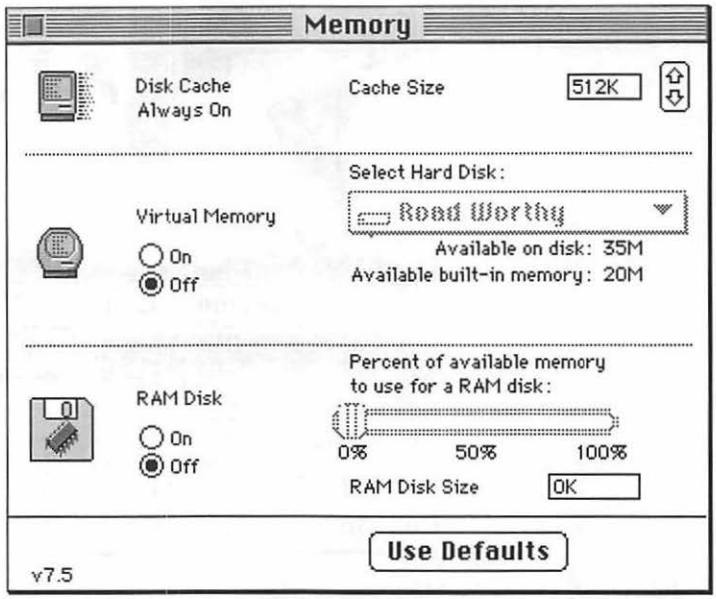


Figure 7.35 The Memory control panel.

smiling Mac appears on during the startup process). The startup monitor and the one on which the menu bar appears do not have to be the same monitor.

In Figure 7.36, you will see there are two monitors. Monitor 1 is a grayscale monitor attached to a PowerBook. It is capable of displaying 256 grays, and is set to display the menu bar. The little smiling Mac (displayed by holding down the option key) indicates that it is also the startup monitor. The menu bar indicator and the smiling Mac indicator can be moved to either monitor by dragging them back and forth. These changes would take effect the next time you started your Mac.

If you have installed a third-party monitor card, it can tap into the Monitor's control panel, and clicking on the Options button may give you additional configuration choices.

Depending on the monitor and card that you are using, you may want to experiment with your monitor settings. Turning off the color or running with 256 colors mode may provide you with a significant speed increase during screen refreshes (when the screen redraws itself). Also, there are utilities available for automatically changing the number of colors displayed based on what program you are currently running,

- Mouse—The Mouse control panel is used to set the speed at which your mouse tracks and its double-click speed. When you set the double-click speed, the visual indicator on the mouse to the left (see Figure 7.37) represents the largest amount of time that may pass between two consecutive clicks for them to be recognized as a double-click. The double click interval is another value that is stored in the parameter RAM.

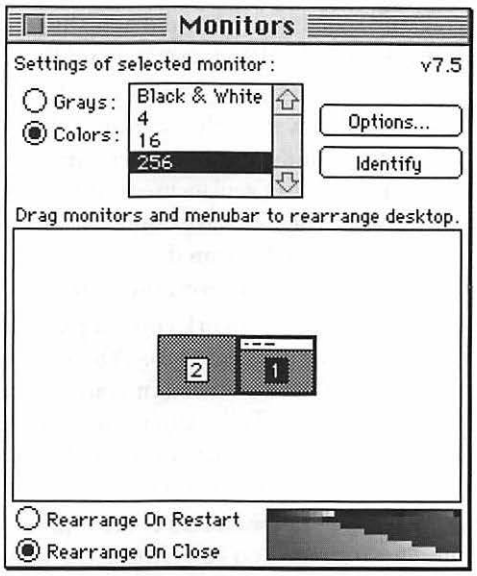


Figure 7.36 *The Monitors control panel.*

The setting for Mouse Tracking sets the ratio for mouse-to-screen representation. If you are using a large monitor, say, 19 inches, you would want it set to the fastest setting. You also want it set to the fastest setting if you want to get to where you are going in a hurry. However, if you are using a smaller monitor, such as the one on the Classic or an older PowerBook, setting the

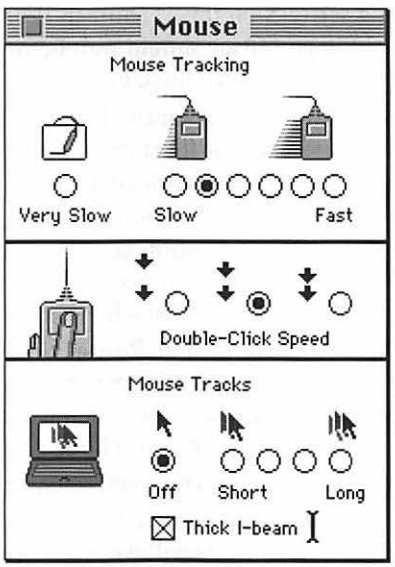


Figure 7.37 *The Mouse control panel.*

tracking speed too fast could actually be a hindrance, since you can easily lose control of your mouse and end up selecting more than you want or moving your files to places where they do not belong.

It is best to play with this setting. Select a tracking speed and use it for a few hours, then adjust it up or down until you find your optimum setting. If you are using a mouse replacement, such as a track ball or a graphics tablet, your device will probably have come with its own control panel. Sometimes, these can get quite sophisticated, with built-in velocity enhancers, where the longer your mouse moves, the faster it goes.

- Network—The Network control panel allows you to select which network you wish to be connected to. When you select it, it detects drivers for any network you have installed in your system. They can be the built-in LocalTalk, EtherTalk, AppleTalk Remote, or any driver you have installed. It is only one part of many required for using different networks. You can find more information on networking and network drivers in Chapter 13.
- Numbers—The Numbers control panel is used to set your Mac's default number format. You can choose the number format from a number of countries, as well as the currency symbol and the decimal and thousands separators.
- PC Exchange—PC Exchange allows you to use MS-DOS disks on a Macintosh with a high-density floppy disk drive. The high-density drives are the ones that will read a 1.44M floppy disk.
- Power Macintosh Card—The Power Macintosh Card control panel is used to configure Apple's Power Macintosh Card. It is used to turn the Mac on or off. You have to have a Power Macintosh Card to use this control panel.
- PowerBook—The PowerBook control panel is used to configure the power-saving settings on the Macintosh Portable and all PowerBooks. You can set how long your Mac should wait before the hard drive spins down, the screen dims, and it goes to sleep. Figure 7.38 shows the PowerBook control panel.

  The first time you open the PowerBook control panel, it will show only the Better Conservation/Performance part of the control panel, the Easy setup configuration. When you click on the Easy/Custom switch, you have access to the custom configuration shown in Figure 7.38.

  Holding down the option key when clicking on the Easy/Custom setup button will let you turn off processor cycling. Processor cycling sets the Mac's CPU to run at half speed when the Mac is not busy.
- PowerBook Setup—The PowerBook setup is used to configure three aspects of the Mac. It is used to select the internal or external modem, the SCSI disk mode, and assign an automatic wake-up time. Which options you have available depends on your PowerBook's hardware.
- Screen—Serves the same function as the Brightness control panel.
- Serial Switch—Serial Switch is a special control needed for some Macs so that their serial ports will work properly. Some of the Macs that need this control panel are the IIfx, Quadra 900, and Quadra 950.

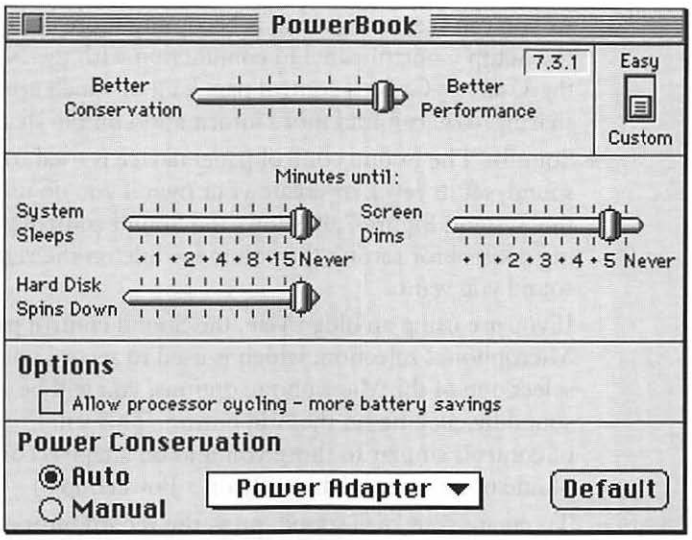


Figure 7.38 *The PowerBook control panel.*

- Sharing Setup—The Sharing Setup control panel allows you to start or stop file sharing and program linking. It is also where you set your network name, the access password, and the name for your Macintosh (see Figure 7.39). The Macintosh name is the one that will appear to others if you are printing to a networked LaserWriter and they try to print at the same time.

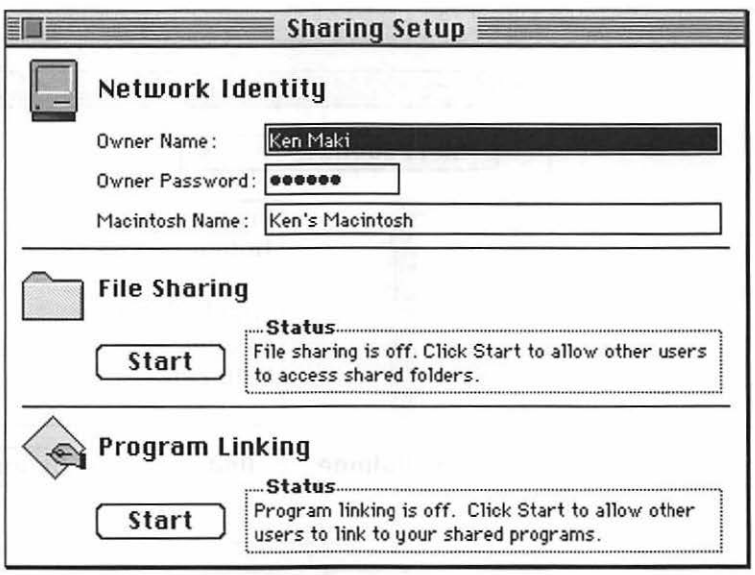


Figure 7.39 *The Sharing Setup control panel.*

As you can see, networking is becoming more complicated. Now, there is the Setup Control panel in conjunction with the Network control panel and the Users & Groups control panel, all of which are used for personal file sharing. You can find more information on file sharing in Chapter 13.

- Sound—The Sound control panel device is used to select your System's sound, set its level, or create your own if you do not like those included with the System. Figure 7.40 shows the Sound control panel. On the left is a sliding control for setting the volume, while on the right, you can select the sound you want.

  If you are using an older Mac, the Sound control panel will not have the Microphones selection, which is used to record your own sound. When you select one of the Microphone options, you will be able to record a new sound by clicking on the Add button. This will bring up a window with a set of controls similar to those you find on a tape recorder (the internal microphone option is available only on a PowerBook.)

  To create your own sound, press the record button and then talk, play music, or make noise into your microphone. You will be able to record ten seconds of sound and then play back what you have recorded. If you don't like it, you can record a new sound; otherwise, save it by giving it a name. It will be stored in your System and you can select it like any of the other sounds. Just remember, ten seconds of sound every time your Mac beeps could get old very quickly.

  If you turn the sound off completely, your Mac will still notify you by making the menu bar flash. Normally, your Mac will beep to get your attention, like the alarm from the Alarm Clock. It will also beep when you try to perform a procedure that cannot be done, such as clicking the mouse outside of

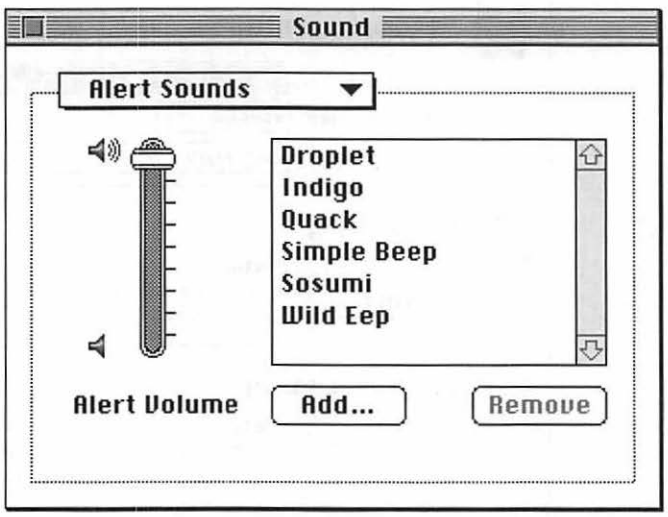


Figure 7.40 *The Sound control panel.*

a dialog box that is demanding your attention. Primarily, it beeps because it is notifying you of some action you need to perform.

- Startup Disk—The Startup Disk control panel lets you set the disk from which your Mac will boot if you have more than one hard drive attached. Clicking on one of the available volumes sets this preference. In Figure 7.41, the disk set to startup the Mac is called "To Go." A more detailed explanation of startup disks and switching between them can be found in Chapter 10.
- Text—The Text control panel is used to set up how your Macintosh handles text. You can choose which language script and the language your Mac will use. The script controls the character set. English and most European languages use the Roman script or character set.
- Token Ring—The Token Ring control panel is used for Macintoshes that have a Token Ring network adapter.
- Trackpad—The Trackpad control panel is specifically for the PowerBook 500 series Macintoshes. It is similar to the Mouse control panel; it controls the tracking and clicking speed for the trackpad.
- Users & Groups—The Users & Groups control panel is part of file sharing. It allows you to specify those people who should have access to your Mac when you turn on file sharing and whether they will be able to use program linking. Its other function is to let you put those individuals into groups so that it is easier to assign access privileges when you do decide to share a folder. A simple strategy for file access would be to create two groups *Minimal Access* and *Trustworthy* (you might want to use more tact in naming your groups). Everyone who belongs to the minimal access group would be allowed read-only access to a folder, while your more computer-literate colleagues (theoretically, more trustworthy) could be allowed to access more folders and write data as well as read it.

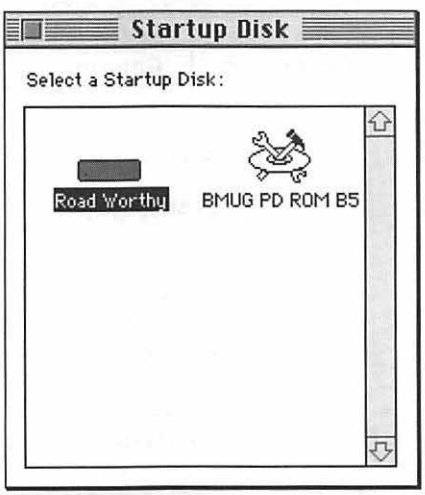


Figure 7.41 *The Startup Disk control panel.*

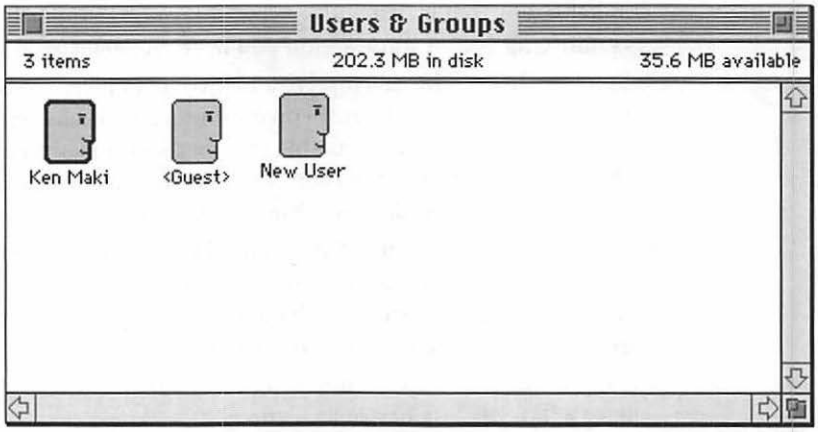


Figure 7.42 *The Users & Groups control panel.*

Figure 7.42 shows the setup for a single user. Once again, you are going to be referred to Chapter 13 or more details on networking.

- Views—Views is another program that provides options for customizing your Finder. It lets you set how icons will be cleaned up, and the type face or *font* and size in which the text in your Finder will be displayed. You can also select what information will be displayed when you view your data in a list view, plus whether to display your drive's information in your folder headers. Figure 7.43 shows the Views control panel. Experiment with the different settings until you find one you like. The Icon Views will allow you to set up how your icons will be arranged when you select Clean Up Window from

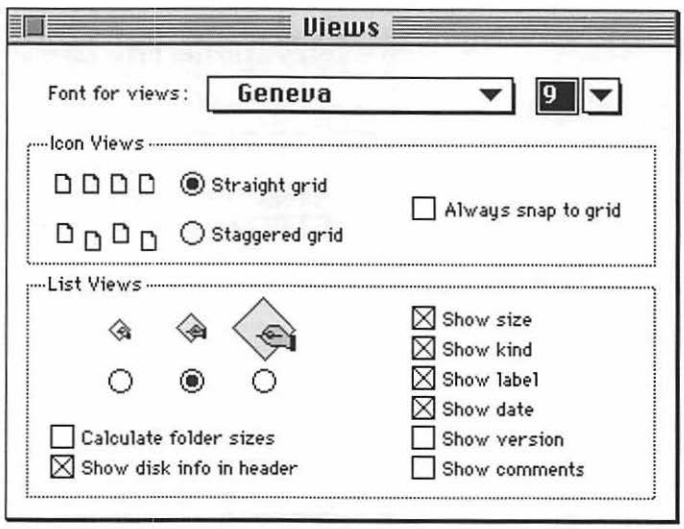


Figure 7.43 *The Views control panel.*

the Special menu. You can have them automatically arranged in a straight or staggered grid. If you set *Always snap to grid*, your icons will snap to a predetermined point on an invisible grid within your folder or disk windows whenever you move one.

Using the List Views settings, you can determine what size icon to use and what information to display with any of the list view settings. If you are thinking about displaying the folder sizes in your Finder, you should do it only when you need the information. If it is checked, the Finder will spend a lot of time adding and totaling the sizes of all the files within each folder. Not only that, it will recalculate the sizes every time you close and then open a folder or disk.

- WindowShade—WindowShade is a control panel that will make a window disappear, except for its title bar, when you double click on its title bar. This control panel determines how this function works.

Your Extensions Folder

An extension is a small program that loads into your Mac's memory as your Mac starts up. These small programs are one of the primary means for adding functionality to your Mac's system, the other method being control panels. When Apple made the System capable of using extensions, the System became extensible.

It was with System 6.0.X that the System was made extensible through the use of small software programs called Inits. In System 7, the Inits became extensions and they are now stored in the Extensions folder. In Figure 7.44, you can see all of the extensions that are installed if you do a complete install, including all network options.

As your Mac boots, the icons that you see flash across the bottom of your screen as they load into your System are either extensions or control panels. When an extension or control panel is loaded, it becomes part of your System software and operates at the same level as the System. Extensions that load at startup are the System extensions.

There are three other types of extensions, in addition to system extensions, that you'll find in your Extensions folder: Chooser, PowerTalk, and printing extensions. The PowerTalk and printing extensions are discussed in Chapter 8.

Chooser extensions are device drivers that are loaded only when your Mac needs them. Usually, these are printer drivers, but you will run across Chooser extensions for networking and sending faxes as well. There are other files that will find their way to your Extensions folder, some of which are AppleGuide files as well as other files needed by some programs. The rest of this section will discuss the extensions and other files in the Extensions folder that are standard with System 7.5. A brief description of each extension or file will be given so that you will know whether or not you want to use it. The groups that will be looked at are:

- System Extensions
- Chooser Extensions
- Other files

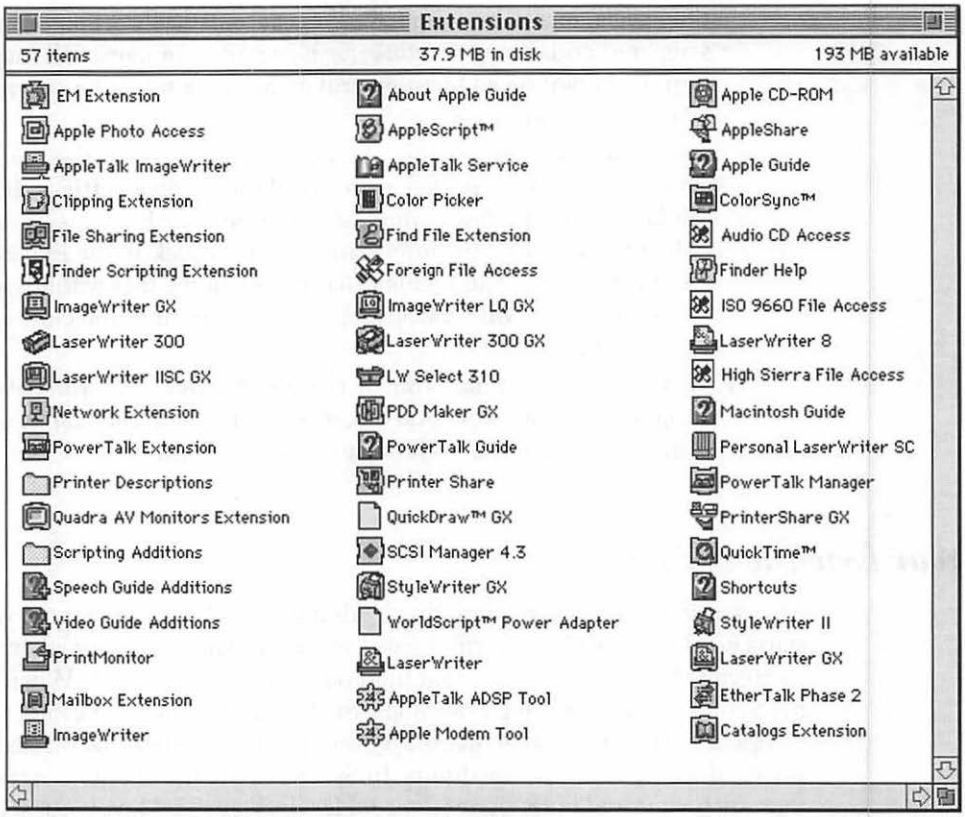


Figure 7.44 *The insides of the Extensions folder.*

System Extensions

System extensions are the extensions that enhance your System's capabilities. Figure 7.44 shows the standard Apple System extensions that are installed for any Macintosh with all networking options selected. There are 35 system extensions installed when you perform an installation for any Macintosh and we'll take a look at each of them. There are some extensions which work together, even though they have various names. All of the extensions that belong together will be discussed as a group.

- Apple CD-ROM, Apple Photo Access, Audio CD Access, Foreign File Access, High Sierra File Access, and ISO 9660 File Access—All of these extensions are used when you have a CD-ROM drive connected to your Macintosh. If you have a non-Apple CD-ROM drive, you will not need the Apple CD-ROM extension but you will need all of the others.
- AppleGuide—These extensions make AppleGuide work. You will find AppleGuide discussed in Chapter 8.
- Assistant Toolbox—The Assistant Toolbox works in conjunction with the Apple's File Assistant program.

- AppleScript and Finder Scripting Extension—AppleScript is Apple's system level scripting language. A scripting language is a programming language that lets you automate Macintosh functions. You'll find more information about AppleScript in Chapter 8.
- Caps Lock—Caps Lock is an extension that works only on the PowerBooks which do not have a light on the Caps Lock key. It places a small indicator in the Menu Bar when the Caps Lock key is down. This would really be nice if it worked on all Macs, but at the moment, it doesn't. Figure 7.45 shows the indicator that appears in the Menu Bar when the Caps Lock is down on the PowerBook.
- Clipping Extension—The Clippings Extension enables your Macintosh's Drag-and-Drop capabilities.
- Color Picker—The Color Picker is a tool that your Mac uses to select colors. The Color Picker extension adds options to the standard Macintosh color picker and works in conjunction with the Monitors and ColorSync extensions.
- ColorSync—The ColorSync extension works with and enables the ColorSync control panel.
- EtherTalk Phase 2—This is the Ethernet extension for the Quadras and it will be used by most third-party Ethernet cards. An interesting bit of information you may want to remember is that the icon for the EtherTalk Phase 2 driver is distinguished from the Phase 1 driver by a set of double arrows.
- EM Extension—The EM Extension works with the Extensions Manager control panel. The EM has a space before its name, so it will appear and load first when your Mac starts up.
- File Sharing Extension—The File Sharing extension is the integral part of Apple's personal file sharing and is installed with it.
- Find File Extension—This extension enables the Find File desk accessory.
- Monitors Extensions—There are Monitors Extensions for the following Macintosh models:

  IIci/IIsi
  LC

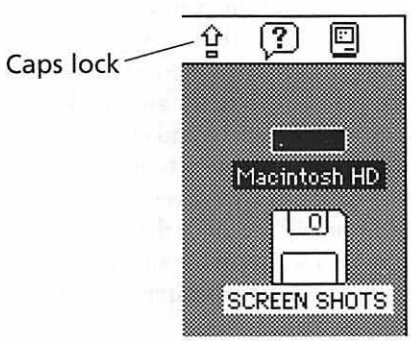


Figure 7.45 *The Caps Lock indicator for the PowerBook.*

PowerBook
PowerPC
Quadra AV
Quadra

Depending on the Macintosh you're using, each of these extensions works with the Monitors control panel to give you additional monitor options that are selectable by clicking on the Options button in the Monitors control panel.

- Network Extension—This is the software heart for the Mac's networking capabilities. This extension, in conjunction with the others, makes networking available. If the Network extension is not present, you will not be able to access the Sharing Setup control panel.
- MacTCP Token Ring Extension, Token Talk Phase 2, Token Talk Prep, and A/Rose—These are all Token Talk drivers. Unless you are connected to a Token Ring network, you do not need these extensions.
- Power PC Finder Update, QuickTime PowerPlug, and WorldScript Power Addition—All of the PowerPC extensions are special extensions that either enable or accelerate other extensions when they are used on a Power Macintosh.
- Printer Share—The Printer Share extension works some of the Mac's printer drives (Chooser extensions) to allow a non-AppleTalk printer to be shared over a network.
- QuickTime—QuickTime is Apple's multimedia software. By being included as a Find extension, it provides multimedia capabilities to any Macintosh application that supports QuickTime.
- SCSI Manager 4.3—SCSI Manager 4.3 is Apple's latest driver for the SCSI bus. You can find more information about the SCSI Manager in Chapter 10.

Chooser Extensions

Any type of device selection you find listed in the Chooser is stored in the Extensions folder. These includes all of the printer drivers, fax drivers, and AppleShare drivers. None of these, with the exception of AppleShare, are memory-resident and load only when you select them from the Chooser.

If you installed your software for any Apple Printer and do not need all of those extra drivers taking up disk space and cluttering up your Chooser when you access it, throw the bums out. If you happen to get a printer at a later date that needs a driver you have removed, you can always reinstall it.

In Figure 7.46, you will see all of the Chooser extension that are installed when you install your System software for any Macintosh printer, as well as the AppleShare extension. As Apple makes new printers, it will release new printer drivers.

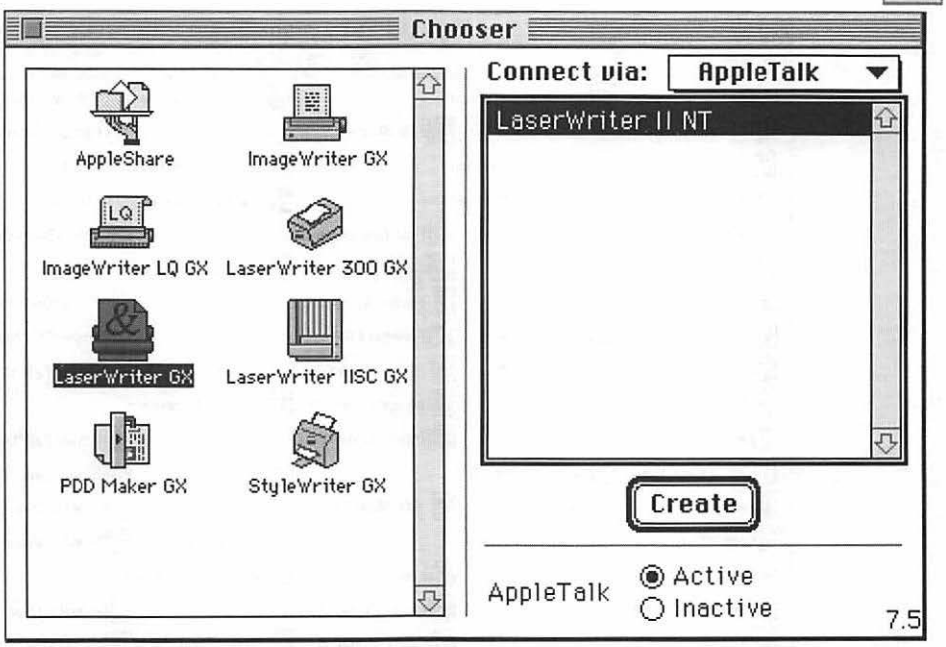


Figure 7.46 *The Chooser extensions.*

Other Files

The Extensions folder is fairly straightforward when it is first installed. However, as you add software features to your Macintosh, the Extensions folder starts to take on a life of its own. It seems to become a living organism that has the capacity to hold any number of different types of files. Figure 7.47 shows an Extensions folder for a Mac that has been modestly set up with a few system software features.

The rest of this section will look at some of the files and file types that can find their way to the Extensions folder.

- AppleGuide Documents—These are the data files that AppleGuide uses. Sometimes you'll find an AppleGuide document in the same folder as an application. However, many will be placed in the Extensions folder.
- Communications Tools—If you are using a package that accesses the Communications Toolbox, the individual communications tools are stored in the Extensions folder. The Communications Toolbox and data communications are covered in depth in Chapter 12.
- Print Monitor (background-only files)—The Print Monitor is one of the few applications that can be in the Extensions folder. It is primarily a background-only application. Background-only applications are the only programs that should be in the Extensions folder.
- Miscellaneous files—In the Extensions folder, you will find that the Finder Help file has found a home. However, in Figure 7.48, you will see that there

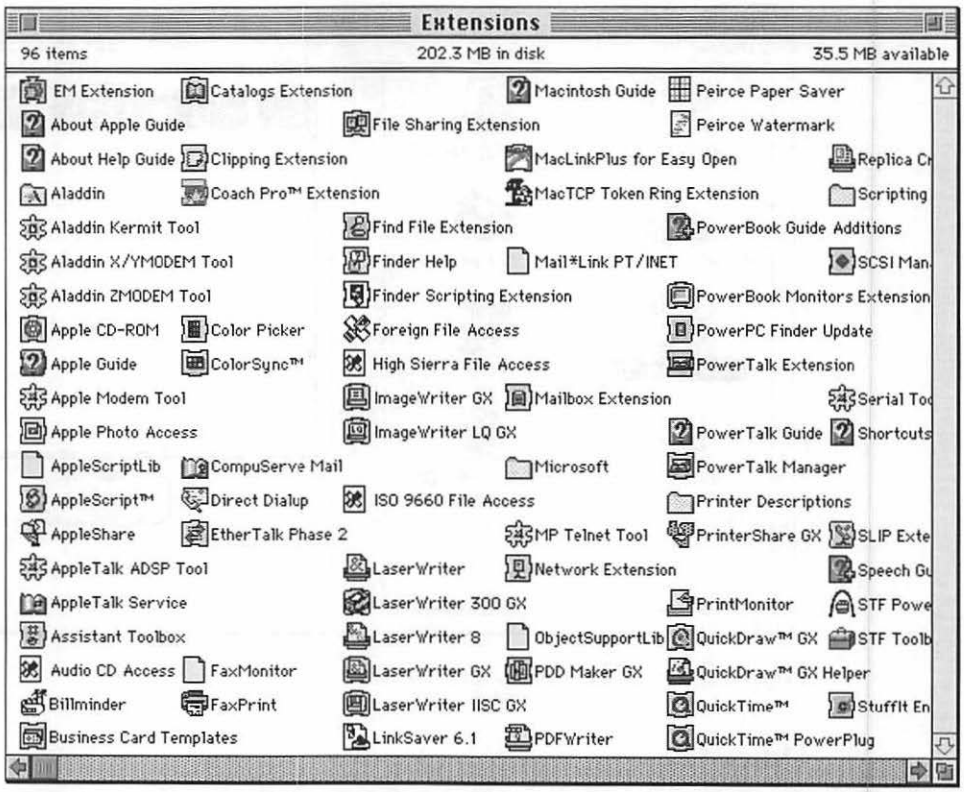


Figure 7.47 *A buffed up Extensions folder.*

are Microsoft, Printer Descriptions, and Scripting Additions folders in the Extensions folder.

In most cases, if a file can be in the Extensions folder, it can also be loose in the System folder. However, if it is put into the Extensions folder, when you drag the file's icon to the System Folder Icon, or the application's installer puts it there, it should be left alone.

- Database Extension—The DAL extension is an extension that allows for accessing data from an SQL (Standard Query Language) database. It works in conjunction with the other network extensions. The only time you will probably need to worry about this extension is if you are involved in a large corporate environment where you access a mini or mainframe computer that houses a large database. It is possible for a Macintosh to be used for an SQL database, but these types of databases are still fairly foreign to the Mac world. If you are not accessing a database, you can remove the DAL extension and free up some of the memory it takes on bootup. Removing it will not interfere with personal file sharing.

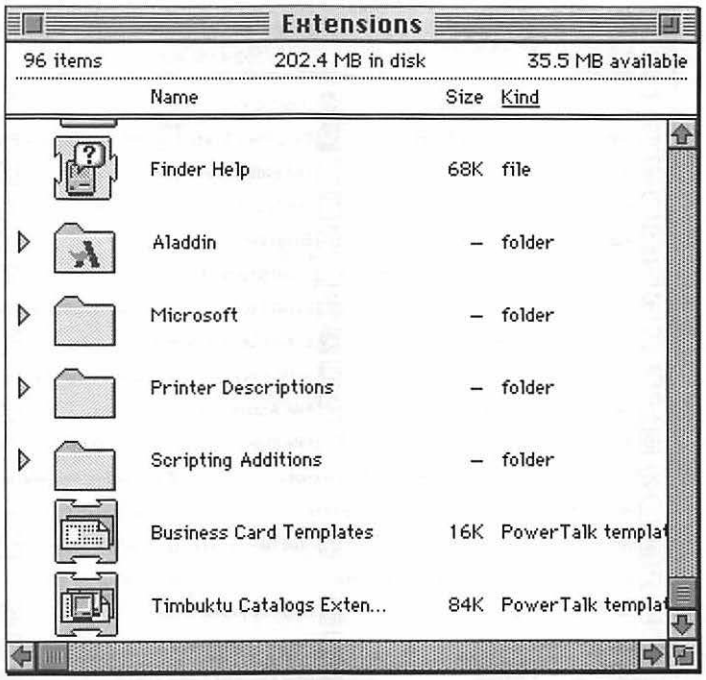


Figure 7.48 *Other folder in the Extensions folder.*

The Font's Folder

Although Fonts have not been discussed yet, other than as a selection that you can make while using a program, you need to know where they reside on your Macintosh.

All of your Mac's fonts are installed inside the Fonts folder, which is in the System folder. The only time there will be an exception to this rule is if you are using a Font utility, such as SuitCase or Master Juggler. Fonts are a complicated subject; for now, it is sufficient for you to know where they are normally installed.

The Preferences Folder

The Preferences folder is where all programs are supposed to store their preference files. A preference file is usually created by a program for storage of its configuration and user-defined settings. The Preferences folder also has a tendency to become the receptacle for all manner of miscellaneous files. Figure 7.49 shows the Preferences folder of a fully configured system. The files you see were all put there by the individual programs either after they had been run the first time or during the installation process.

The only time you should play in this folder is if you are installing software and the instructions call for installing a file (which they should not), or you are trying to fix a problem. Apple recommends to its developers that a program should still oper-

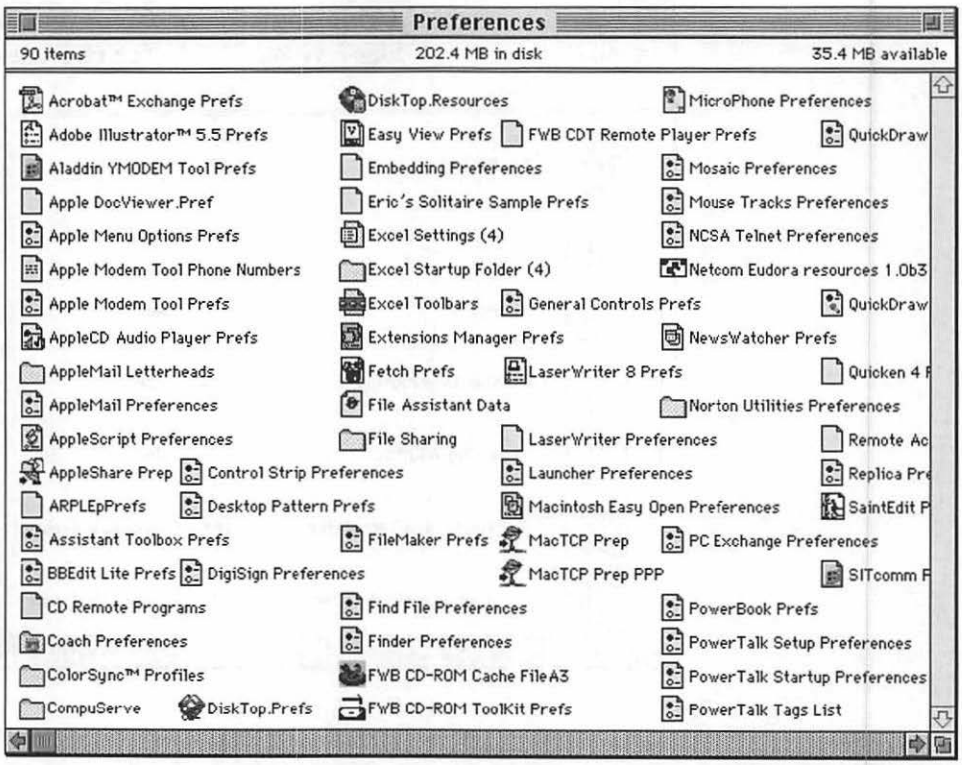


Figure 7.49 *A mature Preferences folder.*

ate even if its preferences file is deleted from the Preferences folder. This means that you can experiment, but if you do, do so very carefully.

You should delete a preferences file if the settings are wrong, if you can't reset them, or if you want to revert to the program's default settings. However, rather than deleting the file, you should just move it out of the Preferences folder, save it somewhere, and run the program. The program should create a new preferences file when it can't find its old one. The exception to this might be if the program installs a preferences file when it is installed. This would not be in keeping with Apple's guidelines, but that doesn't mean that it doesn't ever happen.

If the program does not work or you did not get the result you expected, you can always restore the old preferences file you saved. (You did save it, didn't you?) Chances are, you will not need to do this, but sometimes a preferences file can become corrupted. An example is personal file sharing. Sometimes the Users & Groups data file can become corrupted and file sharing will not work as a result. If this should happen, the only thing to do is trash the old file and re-create your groups and users. Other programs can have similar problems, so if your application is misbehaving, you might want to try moving the preferences file so that the program will be forced to create a new one. If that solves the problem, throw away the old one.

The Startup and Shutdown Folders

Startup Items is the folder in which you place any file, program, or alias to a program that you want to run every time you start your Mac. Under System 6.0.X, you could highlight a program and set it to start up from the Finder. With System 7, the same thing is accomplished using the Startup Folder.

The best way to use this folder is to put an alias for the program you want started in the Startup Items folder. The most important thing to remember about this folder is that it is used by the Finder. When the Finder starts, the applications in the Startup Items folder also start.

Do not confuse this folder with the Extensions folder. All of your Extensions (what used to be called Startup documents in System 6) belong in the Extensions folder, not the Startup folder.

The Shutdown Items folder works in a manner similar to the Startup Items folder. The programs or aliases in the Shutdown Items folder are run after you've selected the Shutdown menu item from the Special menu but before your Mac is shutdown. This folder can be useful for doing backups or performing special file maintenance with an AppleScript prior to shutting down your Mac.

Other Folders Used by Your Mac

In addition to the folders mentioned above, your System has a few more folders that need to be discussed. There are also a couple of invisible folders that the System uses that you might like to know about, called Move&Rename and Rescued Items, and one folder that you can see, called PrintMonitor Documents. These are folders you should be aware of even though you'll rarely use them.

PrintMonitor Documents

This folder is created the first time you print using a LaserWriter or StyleWriter, with Background Printing turned on (see Figure 7.50).

Once this folder has been created, you should just let it be. This is where the Print Monitor application (which lives in the Extensions folder) stores its spooled documents while your Mac waits for the printer to finish what it is printing so that the next document can be sent to the printer.

Rescued Items from (Volume Name)

This is a folder that will sometimes appear in your Trash can after a system crash. A crash has occurred when your Mac stops functioning because of a software problem. When it restarts, System 7 checks your System folder for temporary files, and it also checks an invisible folder on the top level of your hard drive, called Temporary Items, for temporary files. If it finds any files in the Temporary Items folder or tem-

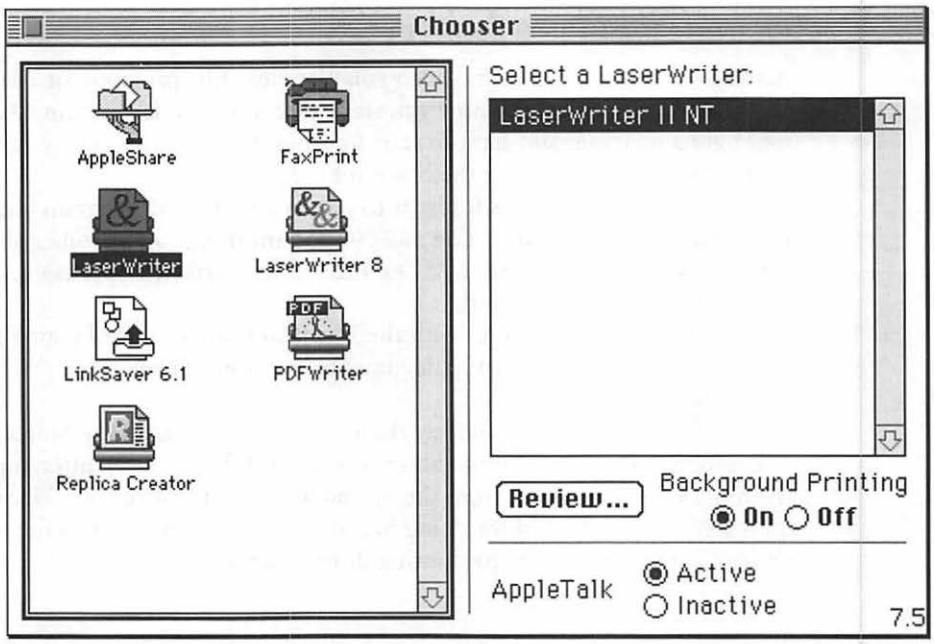


Figure 7.50 *Background Printing selection in the Chooser.*

porary files in your System folder, it puts the temporary files into a folder called Rescued Items from (your drive's name), which is inside the Trash (see Figure 7.51).

Since many programs make temporary files when they run, this feature is provided as an attempt to allow the recovery of data lost during a crash. Although most software publishers do not use this feature yet, it is one that will probably become more common.

If you crash while working on an important document and your Mac creates this folder and places a temporary file in it, there is a possibility, albeit slim, that the software publisher can help you recover data that you may have lost. It might be worth a try. Even if the publisher can't help you get the data back, it might be worthwhile to start requesting this as a feature that they put into their next version.

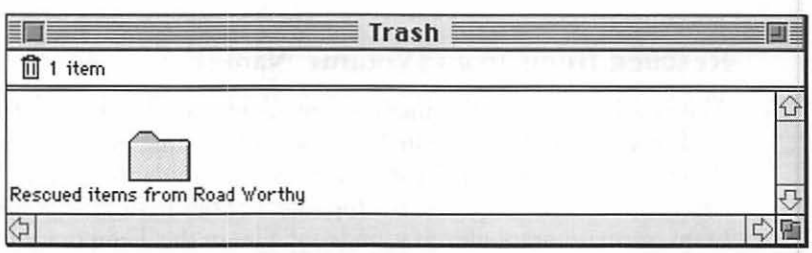


Figure 7.51 *The Rescued Items folder.*

Move&Rename Folder

The Move&Rename folder is created and used by System 7 File Sharing and is an invisible folder. Where you will see it is in some Save As... and Open dialog boxes, or with a disk utility program, such as DiskTop, or with FileTools. You should leave this folder alone. If you delete it, your Mac will just recreate it.

Earlier Versions of the System

If you are using earlier versions of System 7, such as System 7.0 or 7.1, you will find that there are some differences in the number of extensions and how some files are stored. This section is going to look at some of these differences; the topics discussed are:

- System 7.0 or 7.0.1 Printer Fonts
- System Bug Fixes
- System Enablers
- Utilities Included with Earlier Systems

System 7.0 or 7.0.1 Printer Fonts

In System 7.0, all PostScript printer fonts are stored in the Extensions folder, while in Systems 7.1 and 7.5, they are stored in the Fonts folder. PostScript printer or outline font files must be in the Extensions folder if you are using System 7 or 7.0.1. If you are not using a utility, such as SuitCase, or you are using Adobe's ATM (Adobe Type Manager) and you have a PostScript typeface font installed in your System, its corresponding printer font should be in your Extensions folder.

Since the printer fonts are recognized as System extensions, all you need to do when installing a new font is drag both the font suitcase (containing the bit-mapped screen font) and the printer font to your System folder icon. Do not drag the files into an open System folder, but to its icon. If you drag the files into an open system folder, they will not automatically be placed in the correct location.

System Bug Fixes

A bug fix is software that fixes a problem(s) in software that is too serious to ignore. With both System 7 and 7.1, Apple released System updates to cure some of the problems that were found in each of these Systems after they were released. The bug fix for System 7 and 7.0.1 was called the System Tuner, and the System 7.1's was called System Update 3.0.

The System Tuner is a bug fix. In this case, the System Tuner fixes problems with System 7 or 7.0.1. It is not on either the System 7 or 7.0.1 installer disks, but it

comes on its own disk with an installer. Version 1.1.1 should be installed whenever you install or reinstall your system.

As a bug fix, the System 7 Tuner corrects problems printing with the StyleWriter and the LaserWriter, as well as network and AppleTalk problems. It also performs one other important function: It fixes a bug with the directory structure of your hard drive. Chapter 6 has complete instructions regarding the installation of the Tune-Up and how to fix this directory bug.

Another function that the Tune-Up provides is better memory management. You will not receive as many *out of memory* error messages. It also enables the Finder to quit open applications when there is not enough memory to run the one that you are trying to open. One other minor fix improves SCSI data transfers, especially while file sharing is being used. Instructions for installing the System Tuner are in Chapter 6.

Prior to System Update 3.0, there were versions 1.0, 2.0, and 2.0.1. If you are running a version of System 7.1, you should check to see if you have a System Update extension and its version (use the Get Info command). If you are not using System Update 3.0, you should get it from your Apple dealer and install it (installation instructions can be found in Chapter 6).

System Update 3.0 was released for a variety of reasons. It corrects a variety of problems and includes performance enhancements as well. System Update 3.0 fixed and enhances almost all aspects of a Macintosh System. It will affect networking, hard and floppy drives, color problems, and many more. It is designed to fix problems, depending on the type of Mac you're updating.

System Enablers

There are many Macs that require a System enabler if you are using System 7 or 7.1. The biggest problem with System enablers is making sure that you are using the latest version. Any Mac that requires a System enabler has a specific enabler file that it needs to run.

If you have never upgraded your Mac's enabler, chances are that there is an updated version available. Installing either the System Tuner (System 7.0 or 7.0.1) or System Update 3.0 (System 7.1, 7.1.1, or 7.1.2) will update your enabler. the System enabler lives in the System folder at the same level as the System file. You can get the version number using the Get Info... menu item from the Finder's File menu.

Utilities Included with Earlier Systems

If you have not explored your System disks, it is very possible that you have missed some of the additional utilities Apple has provided. They are two control panels called CloseView and Cache Switch and a Mac-to-DOS and DOS-to-Mac disk utility called Apple File Exchange. In addition to the utilities, there are several fonts that Apple has included that do not get installed with the installer. The utilities are found on the System 7.0, 7.0.1, and 7.1 system disks.

Your Extra Fonts

The extra fonts provided by Apple can be found on the Fonts disk. The ones that do not get installed all have city names and are bit-mapped fonts, primarily for the ImageWriter printers. If you are using a LaserWriter, these fonts will not print well. The fonts are:

- Athens
- Cairo
- London
- Los Angeles
- San Francisco
- Venice

They can be installed by drag-copying them to your System folder icon.

The Extra Control Panels and Programs

There are two extra control panels on the Tidbits disk. These are special purpose devices; one is for the Macintosh Quadra only, while the other is used to magnify the screen. To install either of these, just drag them to your System folder icon. After it puts them into the Control Panels folder, you should restart your Mac. Each of them is discussed below:

- Cache Switch—The Cache Switch control panel is used to turn off the 68040 CPU's internal caches. The cache is used to store instructions and accelerate the CPU's capability to process data. The problem is that there are some applications that are not compatible with the Quadra and the 68040 processor because of the cache.

  If you are having trouble running an application on your Quadra, try using this Cdev to turn off the Cache. The problem with this utility is that it will slow down your Quadra and it is not application-specific. There are some cache controllers available that are application-specific; they will shut off the cache while a specific program is running and turn it on when the application is quit.
- Close View—Close View is a control panel that was made for the vision-impaired. It magnifies a portion of the Mac screen. When Close View is turned on, you get a rectangle around the cursor. When you invoke the magnification switch, the area inside the black frame is enlarged to fill the entire viewing area of your monitor.

  Even if your eyes are fine, you could find this utility useful for doing very precise and accurate graphics work. If you should need more magnification than what is built into the program you are using, you might want to give this a shot.
- Apple File Exchange—Apple File Exchange (AFE) is the utility that Apple provides for transferring data from MS-DOS and Apple Pro DOS disks to

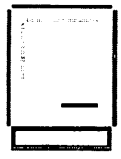
your Macintosh, and vice versa. AFE can also format disks in both of these formats and it works with the Apple 5.25 IBM drive as well (this drive requires a NuBus card plus the drive).

If you are in a situation where you need to transfer data between different types of machines, this utility may be all that you need. It will work with any Macintosh that has a high-density floppy disk drive, or SuperDrive, as Apple calls it.

Summary

Phew! We've covered a lot in this chapter. You now know almost everything about what your Mac's System folder contains. You know that it is extensible and what items go where and why. This is information you'll use and it will help you when you have to talk to others about your Mac. And if all of this information did not sink in, you have the book as a reference that you can rely upon.

But, we're not slowing down. The next chapter will walk you through the steps for installing your System, which is a very important subject if you ever have to perform maintenance on your Mac. By the time you finish this part of the book, you'll be a Macintosh System expert.



CHAPTER 8

System Enhancements (AppleScript, PowerTalk, and QuickDraw GX)

Introduction

In the previous chapters, we've discussed only the operating system part of System 7.5. System 7.5 has three more elements which are technically part of the System, but they are actually additions to the System. These additions are new software technologies that enhance and add functionality to the Macintosh.

These additions are:

- PowerTalk
- QuickDraw GX
- AppleScript

Both PowerTalk and AppleScript have been available for about a year as add-on products for the Mac. QuickDraw GX is new with System 7.5. Now, all of these technologies have converged and are available to all Mac users as a single package and part of the Macintosh System.

Because you have a choice about what parts of the Macintosh System you want to use, you should read this chapter before deciding whether or not you need or want the capabilities offered by PowerTalk and QuickDraw GX. AppleScript is automatically installed with your System and now considered to be an integral part of the System.

In this chapter, we'll look at each of these components of the Mac System. You'll learn what each of these System components is, and a brief description or instruction for using each. Each element is a powerful tool that could be the subject of an entire book. This chapter will be only an introduction, but you will have enough information so that you can go on to explore these aspects of the system on your own. They will also be mentioned in other parts of this book.

A Brief Description

Unless you already know about AppleScript, PowerTalk, or QuickDraw GX, I'm sure you're wondering what I've been babbling about. New technologies, enhancements, and integral System components can sound an awful lot like some marketing specialist's sales pitch. So, just what are these components and what do they do?

Well, that's what this section is about. Let's get rid of the smoke and get mirrors and down to business. In this section, you'll find out what each of these System components/technologies is and why you might want to use it.

AppleScript

AppleScript is a System level scripting technology. Now, that does not say a lot unless you're a computer jock, and if you are, you can skip the rest of this section—you know what AppleScript is. For the rest of you, a System level scripting technology is simply a means of automating computing tasks that would otherwise require a number of steps or be very repetitive and time-consuming.

Until Apple released System 7.1, if you wanted to automate menu selections and such processes as logging into a file server, or to control a program's actions automatically without using the keyboard or a mouse, you had to use a macro utility.

Macro (1) A user-defined command that tells an application to carry out a series of commands when you type the macro; (2) a recorded sequence of characters and commands identified by a name and possibly triggered by a keystroke. Using a macro utility, you can call upon a macro to play while you're working in an application. (See also Script.); (3) a single keystroke or command that a program replaces with several keystrokes or commands.

Macro utilities are great tools, but they can go only so far to accomplish a task and they cannot be used to control the System from the System software level. Macro utilities may be used only within a specific program and, although they are very sophisticated, all they do is make the Mac mimic commands that you would normally do manually. A macro utility can select menu commands, automatically type in text, switch windows, and execute other similar functions. But what it cannot do is send a



The Other Scripting Language

Prior to AppleScript, there was one program available that was not a macro utility, but a system-level scripting language. This program is published by UserLand and is called Frontier, which is discussed in the following section "Using AppleScript."

message directly to another program or exchange data with another program without your help or intervention.

In contrast, AppleScript actually lets the System communicate directly with other programs. It can be used to perform many of the tasks previously done by macro utility programs, but it goes beyond and is different from a macro utility because AppleScript interacts directly with a program, sending it commands rather than mimicking commands you would perform manually.

The difference between a macro utility and AppleScript is best illustrated by an example. You can have a script that will open your spreadsheet program, perform some calculations and even enter data, and then transfer the data to your word-processing program. When the script opens your word processor it takes the data from the spreadsheet, puts it into a document, formats the document, prints it, and then saves it in a special folder. To perform these steps with a macro utility is very difficult if not almost impossible. But with AppleScript all of this can be done automatically without your intervention, as long as the programs you're using are AppleScript-aware or scriptable.

One of the best and most immediate examples of AppleScript you can have is the AppleGuide program mentioned in Chapter 6. AppleGuide can operate properly only because of AppleScript; it is AppleScript that performs the automated tasks that AppleGuide walks you through as you're making an inquiry.

Although Apple started including AppleScript with System 7.1, the Finder in System 7.1 was not what is called *scriptable*, which limited AppleScript's capabilities. When an application, including the Finder, is scriptable, it will receive commands sent by AppleScript and perform those commands. It is only with System 7.5 that the Finder has become scriptable and can now be easily automated.

There is another designation for a program that is AppleScript-compatible. A program is recordable if you can record an AppleScript script from within the program. A program can be scriptable and thus AppleScript-compatible even if it is not recordable. Likewise, a program that is not scriptable is not recordable.

To use AppleScript, you have to create a script, which is really a small program that sends commands to scriptable programs. You can either record a script or write a script, depending on what you want a program to do. Not all programs are scriptable yet, but as software publishers release new versions of their software, their software will be scriptable.

PowerTalk

PowerTalk is an extension of your Mac's networking capabilities and designed specifically for enhancing communications with your coworkers and others. PowerTalk is a communications gateway that can link your Mac to other Mac's, commercial electronic mail services, and other computer-based communication systems. In addition to providing gateway services, PowerTalk also provides you with the means of digitally signing your work before you send it to someone else.

The last paragraph contains alot of jargon that needs to be explained. The first term you may be unfamiliar with is *gateway*.

Gateway A computer that connects two or more networks, especially those using different protocols.

A gateway is normally a term used in computer networking (the connecting of two or more computers so that they can share information). But the term also is appropriate for describing PowerTalk because it enables your Macintosh to be connected to different types of computers and computer services automatically. Using PowerTalk, you can exchange electronic mail (e-mail) messages with other Macs without setting up what is called an *e-mail server*.

Electronic mail (e-mail) A message sent over phone lines from one computer either over a network or via a modem to another computer with a modem.

Server A computer that provides a particular service across a network. The service may be file access, log-in access, file transfer, printing, and so on. Computers from which users initiate the service are called *clients*.

PowerTalk also enables you to exchange e-mail with commercial service providers as well as receive and send faxes. These services are being provided by companies that maintain the services, or by others who are taking advantage of the Mac's new capability and writing special software for these services. In addition to managing these services, PowerTalk also simplifies managing Macintosh network services and your communicating.

All of your faxed and e-mailed communications will appear in a MailBox that sits on your Mac's Desktop. Figure 8.1 shows the PowerTalk mailbox. This makes it very convenient to process and read your mail, because you will not have to use multiple programs if you receive mail from different sources. You will be able to receive and send messages directly from within your mailbox.

Finally, PowerTalk provides you with the ability to attach an electronic signature to any document that you send, which will positively identify the document as having originated from you. This means that you can create a legal document on your Mac and send it to someone via electronic mail or through the U.S. Postal Service if the file is on a floppy, and the recipient can confirm that you sanctioned the document.

To complement PowerTalk, all of your communications capabilities are protected with a built-in security system, where you need to enter a password before the any of the PowerTalk services can be accessed. This way, strangers will not have access to your e-mail unless they know your password. Also, if you have a PowerBook, PowerTalk can be configured for different locations modifying your services, depending on your location.

All of these features add quite a bit to a Mac's overall functionality, especially if you need to use your Mac in a networked environment. Although PowerTalk was introduced with System 7 Pro (version 7.1.1), it was not well received at first because the community of Macintosh developers (those who write Mac programs) felt that Apple was not committed to the technology.

However, by including PowerTalk as a component of System 7.5, Apple has reaffirmed its commitment and you'll soon see more PowerTalk services and PowerTalk-compatible programs. A PowerTalk-compatible program is one that will access

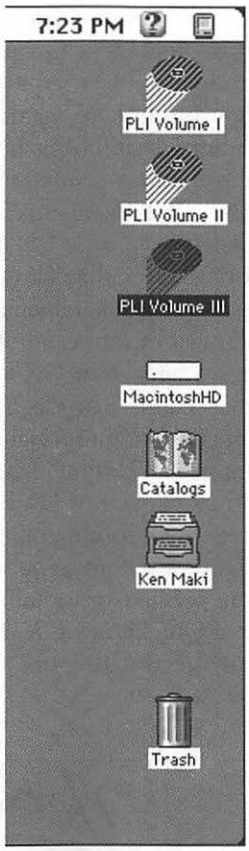


Figure 8.1 *The PowerTalk MailBox on the Desktop.*

PowerTalk's abilities while you are using the application. For example, the letter you just wrote could be digitally signed and e-mailed while you are still in the program.

PowerTalk is very powerful and fairly complex. You'll find instructions for installing and using PowerTalk in the following section "Using PowerTalk."

QuickDraw GX

QuickDraw GX is Apple's new imaging system for the Macintosh. It is a complex software addition that affects every aspect of your Macintosh; except for the improved printing features QuickDraw GX offers, you might never know it is there. Yet, QuickDraw GX radically changes how your Macintosh can handle fonts and images, how it displays color, and some of the rules that old Mac hands are used to.

QuickDraw GX, like PowerTalk, requires its own installation and is not automatically installed when you install System 7.5. Once you've installed QuickDraw GX, you will immediately see some of the changes to your Macintosh's Desktop. First of

all, you will have a printer icon on your Desktop, which is called a Desktop Printer. Figure 8.2 shows two QuickDraw GX printers on the Desktop.

The Desktop printers will be used to monitor, control, and modify any of your printing jobs. In Figure 8.2, there is a desktop printer called PDD Maker GX, which creates digital documents that look as if they were printed to a printer and can be viewed on the monitor and/or printed from any other Macintosh that is running QuickDraw GX. All digital documents are displayed using SimpleText and they can be signed with PowerTalk.

QuickDraw GX does more than allow you to create digitally and give you Desktop printers. It provides for additional document manipulation through the use of extensions, and a QuickDraw GX font can hold 65,000 different characters rather than the 256 characters in non-QuickDraw GX fonts. This means that the entire character set for a language, such as Chinese or Japanese, can be included in a single QuickDraw GX font, or the font can contain special information that controls how the font is printed by including special kerning, leading, and other typographical information.

For graphic artists, QuickDraw GX will automate and simplify much of the work they currently do regarding font manipulation. Also, with a program that will properly display QuickDraw GX fonts, you will have increased control and special-effects capabilities that were previously available only with special utilities. Programs that take full advantage of QuickDraw GX will be able to rotate, manipulate, and otherwise perform special effects with fonts.



Digital Paper

Digital documents are not new. Prior to QuickDraw GX, there were three utility programs that you could use to create a digital document:

- Replica—Published by Farallon Computing
- Adobe Acrobat—Published by Adobe Systems
- Common Ground—Published by No Hands Software

Each of these programs will provide you with the same results as the PPD Maker GX Desktop printer, but they are not yet QuickDraw GX-compatible. For other users to read a document printed with any of these utilities, either they will have to have the utility or you will have to embed a reader with the document. Embedding a reader is a feature of both Replica and Common Ground.

One other feature all of these utilities share is a Microsoft Windows counterpart that will let Windows users create and exchange digital documents with Macintosh users. This one feature alone could make using one of these utilities preferable to using PPD Maker GX, depending on your needs.

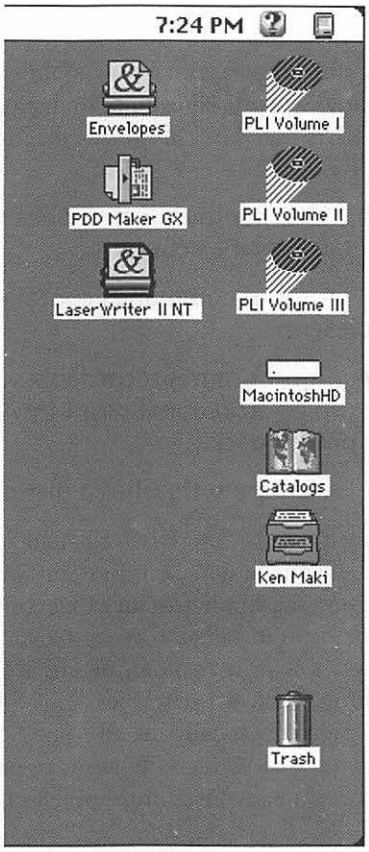


Figure 8.2 *The QuickDraw GX printers.*

Finally, another feature that QuickDraw GX provides is the ability to maintain color consistency between various Macintosh monitor models. The blue font you used in a document will appear on someone else's Mac, using the same shade of blue as when you created it on your Mac even though the other person is using a different monitor. QuickDraw GX works with the ColorSync control panel to maintain color-corrected images.

There is quite a bit to QuickDraw GX. You will find additional information and usage instructions in the "Using QuickDraw GX" section later in this chapter.

Using AppleScript

How you use AppleScript depends on how much time you want to spend learning and experimenting with it. This section will look briefly at installing AppleScript and the system elements you need. Then, we'll look at using Apple Script. This section will conclude with a discussion about the macro utilities and UserLand's Frontier.

Installation

Before diving into AppleScript, you should check out the following definitions. These definitions are prerequisite to understanding what AppleScript does and even fundamental to its use. They are terms that are used when talking about AppleScript or its capabilities.

Script A file that contains instructions that will cause the Macintosh to perform a set of specific actions.

Dictionary A set of commands contained within a program, which can be used by AppleScript.

Recordable A program is recordable when you can perform a series of actions that can be stored in a script by AppleScript's Script Editor and repeated or played back.

Scriptable A program that has a dictionary and/or is recordable.

When using System 7.1, 7.1.1, 7.1.2, and 7.5, AppleScript is automatically installed when you install your System. For Systems 7.0 and 7.0.1, you will have to install AppleScript using the Apple Installer that comes with the AppleScript Scripter's Kit. When AppleScript is installed, there are several files installed in various places on your hard drive. The primary components are the AppleScript system extension and the Script Editor. Table 8.1 describes AppleScript's files and their locations.

Although you can manually install AppleScript, you should always use the Installer. There are enough components to justify using the installer, and if you make a mistake manually installing AppleScript, it will not work.

How AppleScript Works

Although AppleScript can be quite complex, it is not necessary to be a programmer or a *power user* to take advantage of it's capabilities. There are several ways to use AppleScript, which vary in complexity. The simplest way to use AppleScript is to run a script that has been written by someone else; the next level of use is to record your own script; the third is to modify a script you've recorded or one written by someone else; and the fourth is to write your own script. Each of these levels of use is described in the next section.

AppleScript is actually a programming language, but you don't have to be a programmer to use it. AppleScript works by sending messages using a System technology called AOEC, which stands for Apple Open Events Collaboration, to Macintosh programs.

Apple Open Events Collaboration (AOEC) A technology developed by Apple to facilitate interapplication communications. With AOEC, a program can send commands to another program.

The program responds to the message by performing some actions and then sends a message back to AppleScript saying that the command has been executed. Then,

Table 8.1 AppleScript Files

FILENAME	LOCATION	DESCRIPTION
AppleScript	Extensions Folder	AppleScript's primary element
Script Editor	AppleScript Folder	The program used to create a script
AppleScriptLib	Extensions Folder	A file required only by Power Macintosh computers
ObjectSupportLib	Extensions Folder	A file required only by Power Macintosh computers
FinderLib	AppleScript Folder	This file comes with Apple's Scripter's Kit and is used to write scripts that interact with pre-System 7.5 Finders
Scriptable Editor	AppleScript Folder	A recordable text editor included with Apple's Scripter's Kit
AppleScript Guide	AppleScript Folder	A text file which contains instructions for using AppleScript
Automated Tasks Folder	AppleScript Folder with an alias in the Apple Menu Items Folder	A set of scripts installed with System 7.5
More Automated Tasks Folder	AppleScript Folder	Additional scripts installed with System 7.5
Useful Scripts	AppleScript Folder	Additional scripts installed with System 7.5

AppleScript sends its next message to either the same program, or another program depending on what you want the Mac to do.

All Macintosh programs are supposed to have a dictionary that contains a set of commands that AOEC can communicate with. The dictionary is divided into *suites*, and every program should have a Required and Standard Suite. The Required Suite contains the commands *open*, *quit*, *print*, and *run*. These basic commands correspond to the Open, Print, and Quit items in the File menu, and *run* is the equivalent of double clicking on the program from within the Finder.

The Standard Suite contains a more complex set of commands that can be used by AppleScript, but they are not as generic as those in the Required Suite. In addition to the Required and Standard Suites, a program that is truly AppleScript compliant will have an additional Suite named after the program itself. This additional Suite contains commands that are specific to the application and not general commands, such as those contained in the Required or Standard Suites.

By using the commands in the suites, it is possible to operate a program by remote control. AppleScript is the controller we're talking about right now, but it is possible for a program to control other programs using AOEC without using AppleScript. AOEC is a technology that Apple developed specifically for the purpose of letting programs communicate with each other, and it is not limited to AppleScript. AppleScript is just one implementation of AOEC.

Using Scripts

As previously mentioned, how you employ AppleScript can be at one of four levels: You can run, record, modify, or write a script. In one sense, you will always use the first level even if you are writing your own scripts, since a script is pointless unless it is used. But, if you learn to write your own scripts, you can have a phenomenal amount of control over your Mac.

Even if you don't write your own scripts, you will find, as time goes on, scripts written by others that you might want to use. Apple has included a number of useful scripts with System 7.5 that simplify many routine functions, and if you subscribe to an online service or a user group, or explore electronic bulletin board systems (BBS), you will find other scripts you can use.

Online service An electronic information service that you access using a computer and a modem, which usually requires special software and charges a fee.

User group A computer club in which computer users exchange tips and information, usually about a particular brand of computer.

Electronic bulletin board system (BBS) A computerized version of the bulletin boards frequently found in grocery stores—places to leave messages and to advertise things you want to buy or sell. One thing you get from a computerized bulletin board that you can't get from a cork board is free software.

Regardless of how you choose to use AppleScript, you will probably want to use it at one of the levels described in this section. There is no right or wrong way to use AppleScript; it is a tool which you can use to make your computing life easier.

Predefined Scripts

Predefined Scripts are data files created by the Script Editor that you run on your Macintosh. When a script is run, it will send commands to one or more programs, causing them to perform the tasks defined in the script. There are a number of scripts included with System 7.5 that can be found in the AppleScript folder. You'll also find a selection in the Apple menu called Automated Tasks, which is an alias for one of the folders in the AppleScript folder. Figure 8.3 shows the Automated Tasks menu.

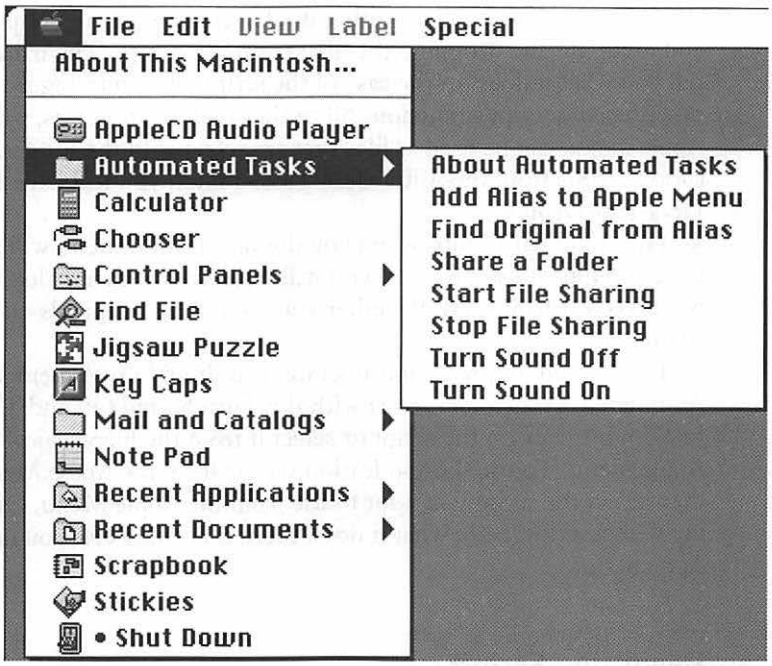


Figure 8.3 *The Automated Tasks menu.*

How a script operates depends on the person who wrote it. You will find that scripts do not have the same consistency as applications and may even contain some surprises, so experimentation is the order of the day when playing with scripts. Scripts are run in one of two ways: You will either execute a script as you would a program by double clicking on it, or you will use Drag-and-Drop and drop a file or group of files onto a script.

In Figure 8.3, you will see scripts with two types of icons. The scripts with the arrow in their icons are actually small applications that can run without accessing the Script Editor. The other scripts are called Compiled Scripts, but when they run, they have to start the Script Editor before they can complete their assigned task.

Compile To convert a program written in a high-level programming language (source code) into a file of commands in a lower-level language (object code) for later execution. To turn source code into an executable application.

Usually, when a script is run, you won't see much happen. Most scripts run as background tasks and have no interface. There are some scripts that are more complex, which will have an interface and may even act more like utility programs. At the moment, however, these types of scripts are rare.

Background A relatively inconspicuous place. A program operates *in the background* if it continues to function automatically while you use another program.

Using a script is done by either double clicking on the script or selecting a file(s) and dragging and dropping the file(s) onto the script. The name of the script should tell you what it does. In the case of the scripts shown in Figure 8.3, each script name describes the script's function. All of the application scripts, when executed from the Apple menu, can be used as files that are selected in the Finder. If you use the application scripts from the Automated Tasks folder, you will have to execute them using Drag-and-Drop.

The compiled scripts, when you double click on them, will start, perform their task, and quit. In some cases, you will be alerted with a dialog box that will tell you what has just happened. Whether you are notified depends on how the script was written.

To get used to how scripts operate, you should experiment with the scripts in the Automated Tasks folder. Start with the Turn Sound Off and Turn Sound On scripts. Just double click on the script or select it from the hierarchical menu item from the Apple menu. To use the application scripts from the Apple Menu, select a file and then select the script you want to use from the Apple Menu. Other than experimenting with a script to see what it does, there is nothing else you need to do to use AppleScript.

Recording Scripts

Once you've used a few compiled or application scripts, you might want to create your own. The easiest method for creating your own script is to record one. Scripts are recorded using the Script Editor application. Figure 8.4 shows the Script Editor as it appears when it is first started.

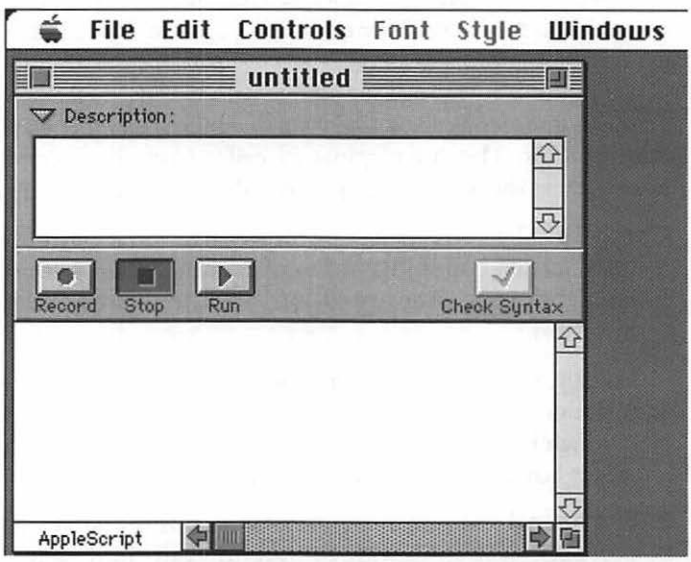


Figure 8.4 *The Script Editor.*

You will notice that there is an untitled document window open. In the Description part of the window, you can write a description of what the script does and instructions for using the script. In the window below the control buttons, your script will automatically be placed as you record the script.

Before you record a script, you have to know what you want to accomplish. Are you going to write a script that opens multiple programs? One that closes all of the windows in the Finder? One that places all of the files in a specific folder into another folder? Or some other task that is generic in nature and does not rely on filenames that will change?

Your major limitation with recorded scripts will have to do with variable values. To use variable values in a script you will have to write part of the script after it has been recorded. Modifying a script is discussed in the next section.

To record a script that will close all of the open windows in the Finder:

1. Start the Script Editor.
2. Switch to the Finder and open a few windows.
3. Switch back to the Script Editor.
4. Click on the Record button.
5. Switch to the Finder (use the Application menu).
6. Hold down the Option key and click in the Close box of an open window.
7. Switch back to the Script Editor.
8. Click on the Stop button.

Now you should test your script:

1. Switch to the Finder and open a few windows.
2. Switch back to the Script Editor.
3. Click on the Run button.

The Script will run, switch to the Finder, and close all of the open windows; and the Script Editor will display a window called the *Result*. Figure 8.5 shows what the Script Editor will look like after you test your script. If your Mac is not showing the Result window, select Show Result (⌘+L) from the Controls menu.

Now, you can save this script if you wish. If you do, you should save it as an Application; and if you do, you'll be disappointed. This script will not run as an application, except maybe from the Launcher, which means that the script will have to be modified before it will run from the Finder and work. (A discussion about saving scripts can be found later in this chapter in the section, "Saving Scripts.") This modification will be the subject of the next section.

Modifying Scripts

If you've been adventurous and tried saving the script from the last section, you should have discovered that it does not work. The script will work when run from the Script Editor but not when saved as an application. Why? Well, I really don't

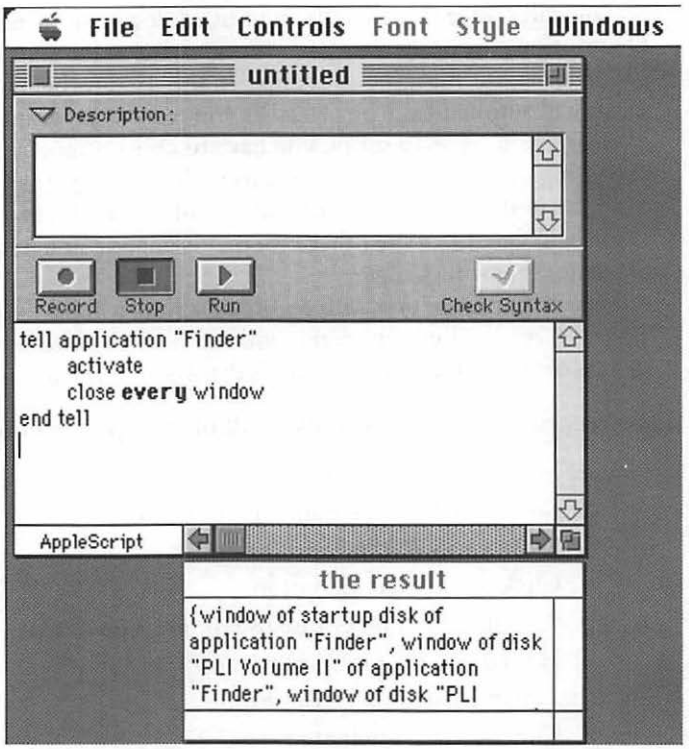


Figure 8.5 *The Script Editor after running the script.*

know; I can only speculate: When the program was run, the folder window containing it was no longer selected so that when the script activated (switched back to) the Finder, there were no windows selected and the Close All command was ignored. Here, I could be wrong—I'm not a programmer.

However, I did figure out how to modify the script so that it would work the way I wanted it to. To make my modification, I experimented a little, but by using the foregoing assumption, I was able to make a modification that works. I'm babbling on about this because you'll find yourself in similar predicaments when you start creating scripts.

There is no way to avoid this type of problem, and the only solution will be speculation and experimentation. If you're not up to or don't care about experimenting with AppleScript, you should probably just use scripts written by other people. This is where using AppleScript, any type of scripting, or macro utility becomes time-consuming. If you're not willing to spend the time to learn how these tools work, you'll never master them.

Now, lets get down to the business of making this script work. Right now, your script should read like the one shown in Figure 8.6.

Assuming that my theory about a window not being selected is correct, the next step is to tell the script to select a window before closing everything. There are two ways to do this: You can open a window, which automatically selects it, or you can try to tell the Finder to select a specific window.

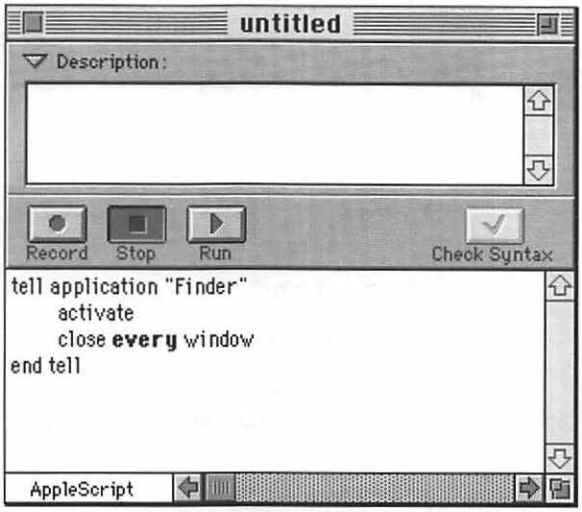


Figure 8.6 *Your script that won't work.*

To do this simply, perform the following steps:

1. Open your script.
2. Place the insertion point after the last line in your script, which should be **end tell**
3. Switch to the Finder and open some windows.
4. Switch back to the Script Editor and click on the Record button.
5. Switch back to the Finder and select a window that is not active.
6. Move the window.
7. Switch back to the Script Editor.
8. Click on the Stop button.

Now, your script will look like the one shown in Figure 8.7. You had to move the window in step 6 because AppleScript does not consider selecting a nonactive window to be significant and, therefore, the Script Editor will not record by just selecting a window. You have to move it before the Script Editor will record your actions.

The next steps are:

1. Copy the line that starts with "**set** position **of** window...."
2. Paste the line above the line that reads "close **every** window." When you've done this, the script will look like the one shown in Figure 8.8.
3. Select the text in the script that was added after the first "**end tell**" statement.
4. Press the backspace or Delete key to get rid of the selected text.

Now, your script will look like the one shown in Figure 8.9, and you're ready to run the script. Click on the Run button. The script works fine.

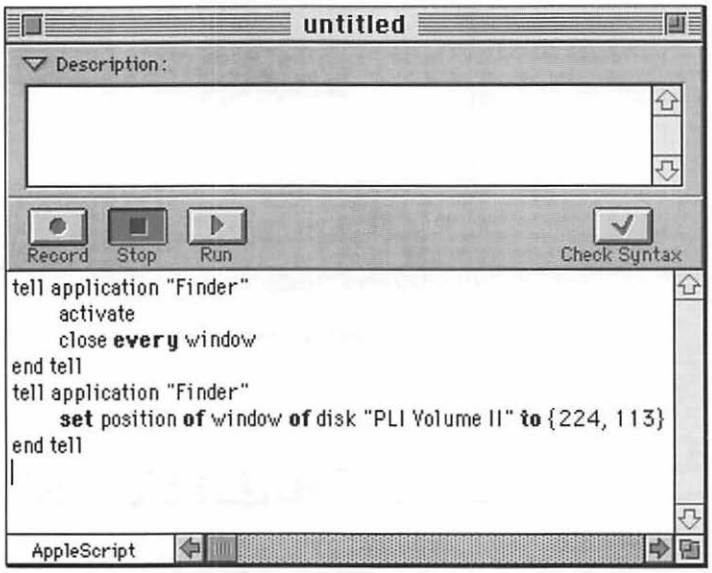


Figure 8.7 *The script, after the second recording session.*

To experiment some more:

1. Switch to the Finder.
2. Open some windows, but do not open the window you moved when you recorded the second part of your script.

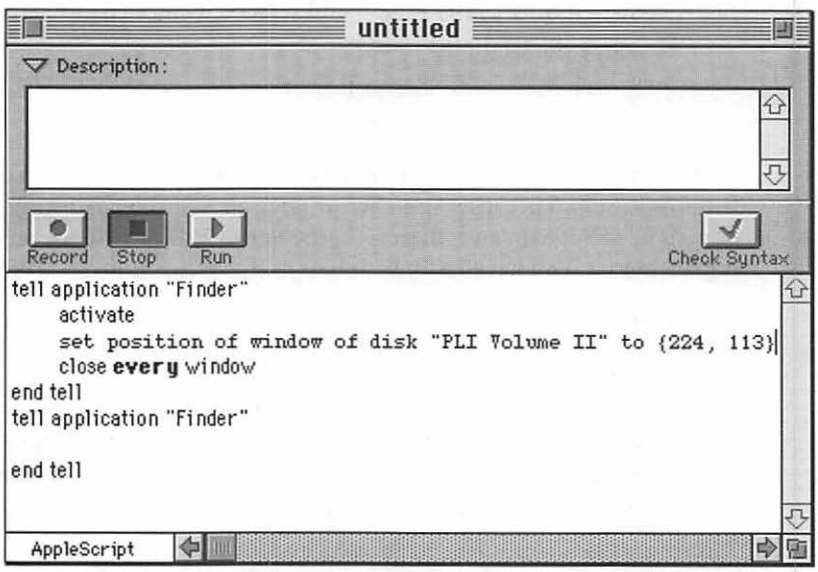


Figure 8.8 *The first modification.*

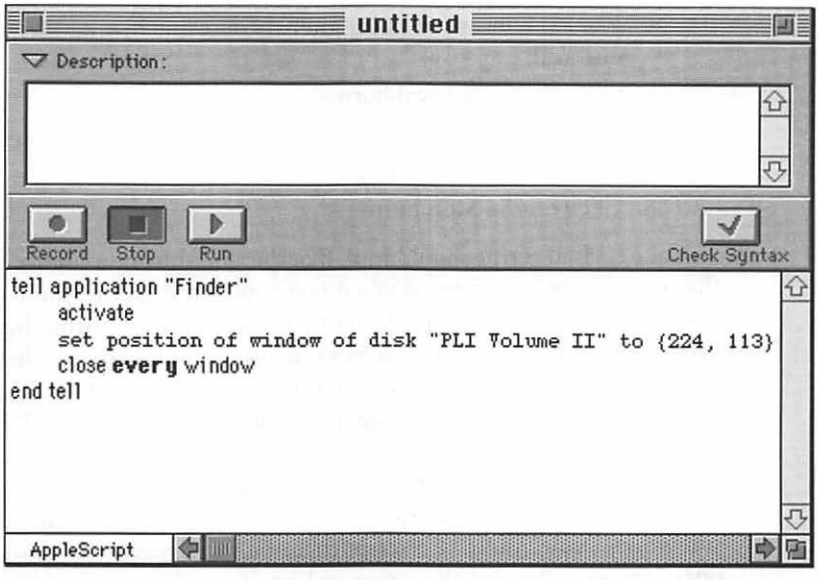


Figure 8.9 *Your modified script.*

3. Switch back to the Script Editor.
4. Click on the Run button.

This time, you should have received an error message like the one shown in Figure 8.10. What just happened is that the window you told AppleScript to select and move was not open, so the script failed. Now, you have to think of a different way to make the script work. So, rather than selecting a window, how about opening a window? Whenever a window is opened, it is automatically selected. This should make our script work, but to know for sure, we have to try it.

To make the change in your script:

1. Switch to the Script Editor.
2. Select the line "**set** position **of** window...."
3. Delete the line.

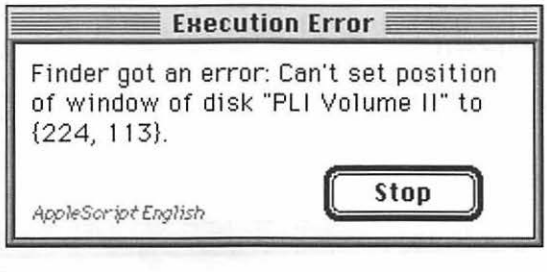


Figure 8.10 *The error message.*

4. Place the insertion point after the last line in your script, which should be **end tell.**
5. Click on the Record button.
6. Switch to the Finder and open your startup drive by double clicking on it.
7. Switch back to the Script Editor.
8. Click on the Stop button.

Your revised script should look like the one shown in Figure 8.11. Now, repeat the steps you just performed when you copied the "**set** position **of** window...." line and pasted it into the top portion of your script, substituting the line "open startup disk" for two lines that read "select startup disk" and "open selection." Once you've done that, your script will look like the one shown in Figure 8.12. It is possible that instead of the "select..." and "open selection" statements, you'll have only one that says "open startup disk."

Now, this script will work. To try it, open a few windows—even your startup disk's window—and run the script. Run the script without opening any windows; it still works. Now you have a script that will work regardless of which windows are open, and you can save the script and use it.

If you're wondering what you can do with this script, you can do several things with it. One, you can place it in the Automated Tasks folder so that you can access it anytime you want. If you want your Mac, every time it starts, to start with all of the Finder's windows closed, place the script or its alias in the Shutdown Items folder. This will cause your Mac to close all open windows before it shuts down, and your Mac will always look the same when you start it up.

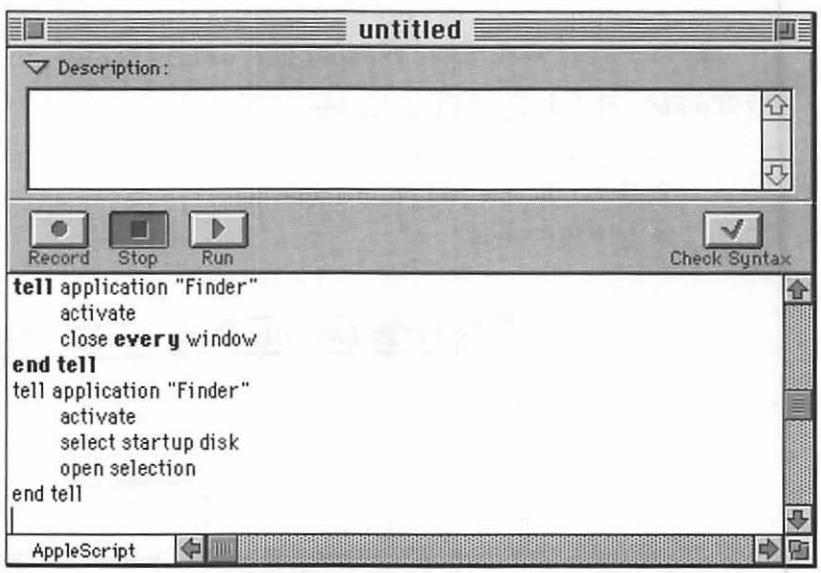


Figure 8.11 The revised script.

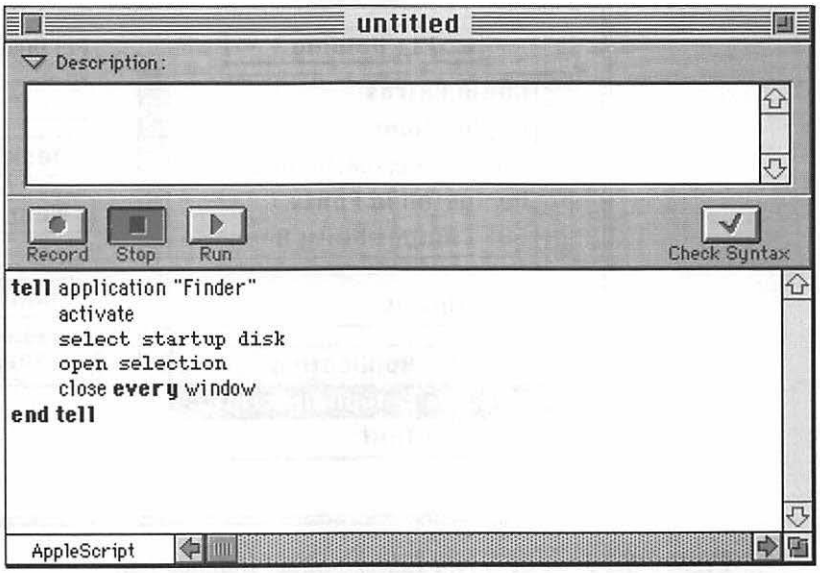


Figure 8.12 *The new and improved script.*

Although these may sound like frivolous suggestions, they're not. This it the type of task that AppleScript was made to perform. Although it does not take advantage of all of its capabilities, this is something you can do to put your signature on your Mac, making it truly yours. It is little tasks like this that will lead you to use AppleScript to accomplish more sophisticated results. Now, let's go on and save your script.

Saving Scripts

How you save a script will depend on how you want to use it. If you look in the Script Editor's File menu, you will see two Save As... menu items: One is the standard Save As... menu item and the other is a Save As Run-Only... menu item.

If you want to reopen the script and either edit it or view its contents, you must use the standard Save As... command. The Run-Only option saves the script so that the script commands cannot be read. You'd use this option to protect your scripting efforts from prying eyes, or if you were going to distribute your script as a commercial product.

Other than making a script unreadable but executable, the Run-Only option has the same options as the standard Save As command. The only option available in the standard Save As... menu item that is not in the Run-Only option is the ability to save a script as a text file. I guess it wouldn't make much sense to save a script as text if you didn't want anyone to read it.

When you select the Save As... menu command, you'll receive the Save As dialog box shown in Figure 8.13. Notice the pop-up menu, where you will select the type of file you'll be saving.

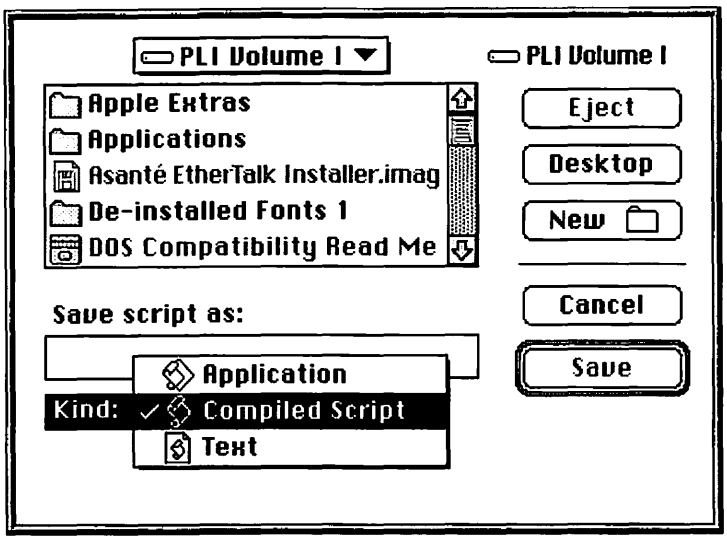


Figure 8.13 The Script Editor's Save As dialog box.

The format choices you have for saving your scripts are:

- Compiled Script
- Application
- Text

If you save a script as a Compiled Script, every time you run the script, it will launch the Script Editor and you'll have to complete the command using the Script Editor's run command. Use the Compiled Script option if you want to perform more work on the script or if you want to use the script from another script (see the following note).



Combining Scripts

The process of using a script from within another script is called *calling a script*. You can call both compiled and application scripts. (Calling a compiled or application script is an advanced scripting topic that won't be covered in this book.)

AppleScript is a very powerful and complex tool. If you want to learn more about scripting and have access to Apple's reference materials, you can purchase the AppleScript Scripter's Kit from an Authorized Apple Dealer.

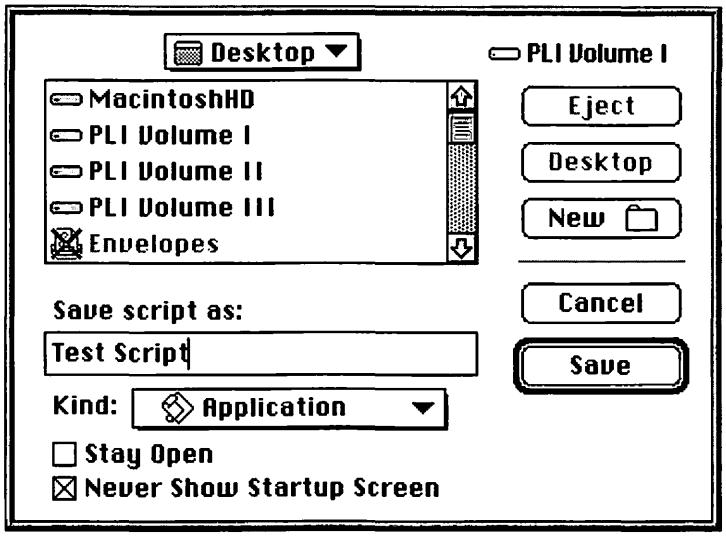


Figure 8.14 *Saving your script as an application.*

When you select the Application option, you're telling AppleScript to save your script as a double-clickable application. When you run the script, it will run like any other program, without starting the Script Editor. Selecting the Application option causes the Save As dialog box to change and you'll have two more options. Figure 8.14 shows the additional options.

The two additional options you have are Stay Open and Never Show Startup Screen. The Stay Open command is for scripts that perform tasks in the background. (Writing a script that stay's open is an advanced scripting topic that is not covered in this book.)

The Never Show Startup Screen option prevents your script from displaying what is in the Script Editor's description box and asking if you want to run the script. Figure 8.15 shows a Startup Screen for the script we just wrote. If you want your

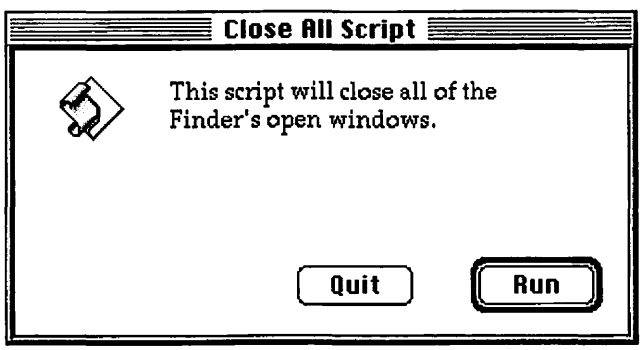


Figure 8.15 *A script's Startup Screen.*

script to run without requiring human acknowledgment, check the Never Show Startup Screen check box.

The final option you have is to save the script as a text file. Use this option if you want to work on your script with a text editor, such as SimpleText, instead of the Script Editor. Sometimes, programming editors, such as BBEdit (which is on the CD-ROM), are better suited than the script editor for writing a program. This is purely a matter of personal choice.

Chances are that you'll use only the Save As Application option unless you're going to do some advanced scripting. But, heck, who knows? Maybe you're the next AppleScript wizard.

Writing Scripts

As you've probably surmised, it is possible to write a script in addition to record one, or to perform a combination of both recording and writing. Writing a script lets you perform tasks that cannot be recorded, such as extracting data from a database program and placing it into a page layout or word-processing program to create a catalog.

Every scriptable program has script commands that can be accessed only by writing a script. You can view these commands and get an idea of what they are by using the Script Editor's Open Dictionary item from the File menu. A program's dictionary shows all of the additional AppleScript terms that program employs. Figure 8.16 shows the dictionary for the Finder in System 7.5.

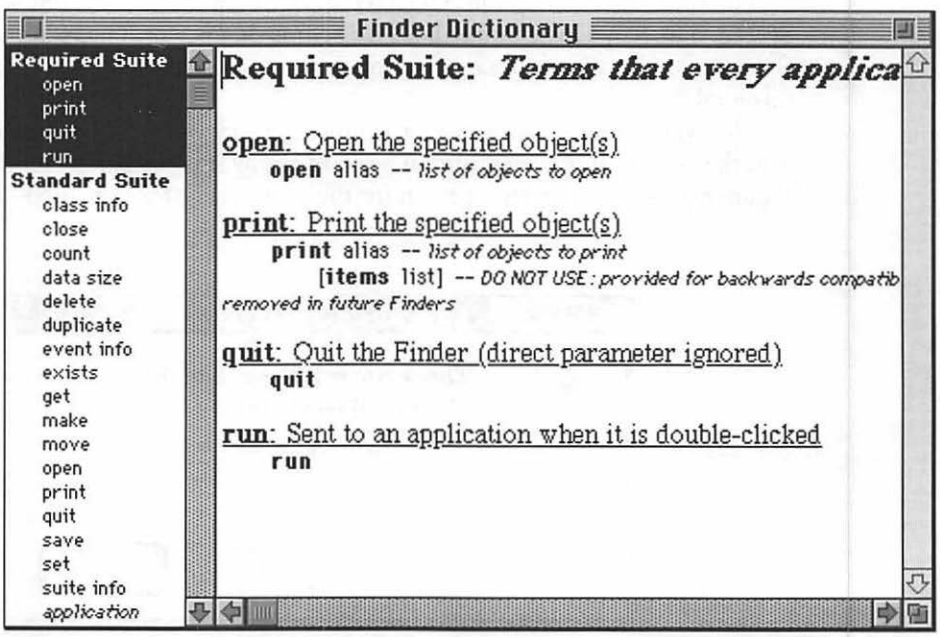


Figure 8.16 *The Finder's dictionary.*

AppleScript is also a programming language. If you have any inclination for programming, take a closer look at what you can do with AppleScript. The nice thing about AppleScript as a programming language is that it is more accessible than some of the other programming languages that you could use on a Mac.

AppleScript was written to use English commands and syntax. This doesn't mean it is easy for everyone to use AppleScript, but it is easier than using a traditional programming language. To see what a more complex script looks like, open one of the scripts in the Automated Tasks folder. You'll immediately see what I'm talking about. Figure 8.17 shows the Share a Folder script.

Code The statements or instructions that make up a program.

Syntax The rules governing the structure of statements or instructions in a programming language.

Writing scripts is where you will have to exercise real time and patience. Whether you're writing programs using a traditional programming language or AppleScript, you're embarking on an endeavor that requires additional study, experimentation, and the perseverance to see the job through. It is not for everyone, but everyone who has a Mac should know about AppleScript and what it can do.

By having an idea of what can be done with AppleScript, even if you don't write the scripts, you can look for Scripts that will do what you want or even hire someone

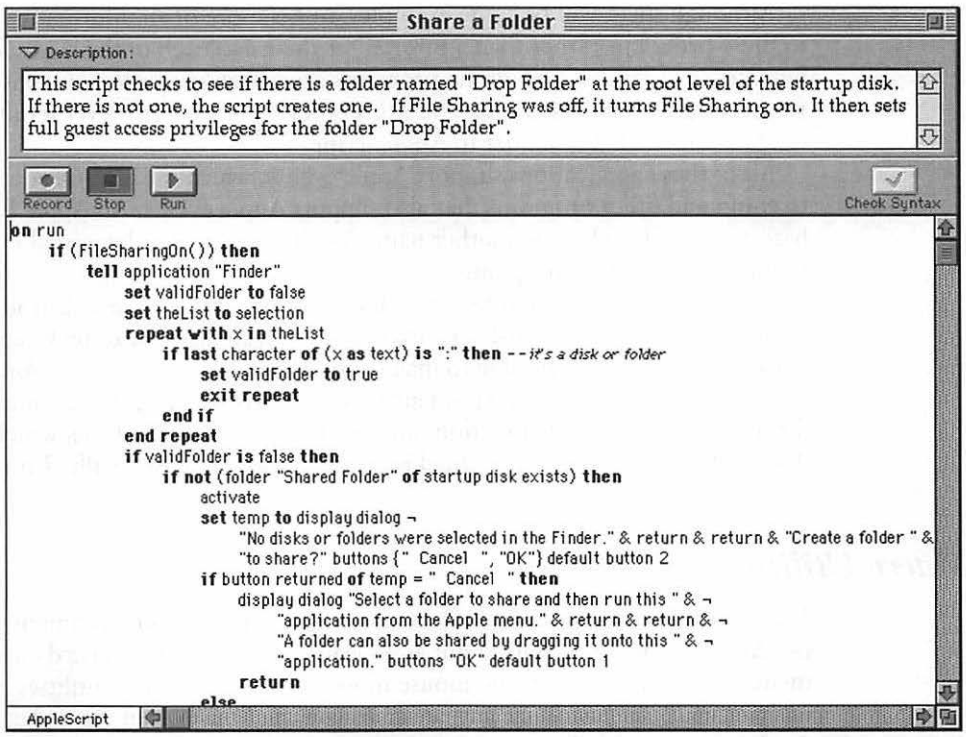


Figure 8.17 Share a Folder.

to write a script. If you're a member of a Macintosh users group, you might find someone in the club who likes writing scripts for the heck of it.

As more programs become scriptable, it will be possible to write scripts that will automate more of your work. One of the goals behind AppleScript was not to just make a scripting language to perform some simple maintenance task, but to create a system that would let you control other programs and even programs on other machines over a network.

AppleScript is not a programming environment. AppleScript can be used to write useful utilities that will allow you to automate tasks, allow programs to interact, and otherwise do useful things. It is not a tool with which to write a word processor, database, or some other application. For those jobs, you need a programming package. You will find some of the programming tools available for the Mac mentioned in Chapter 9.

Other Scripting and Macro Utilities

This section covers three programs. Actually, it is about these programs and using them to enhance your Macintosh operations. Automating your Mac is only part of what this section covers.

With the tools mentioned in this section, you will be able to do such things as change your type face by pressing a few keys, perform most Finder functions automatically, back up your data folder to a file server, and much more.

Although there will be some examples, this is more of an informative introduction to these programs rather than a tutorial for their use; each of them would require a book to do it justice. Two of the programs are macro generators: One is called Quick Keys and the other is Tempo. The third program is a system-level scripting language called Frontier that is similar to AppleScript.

All of these applications support Apple events, which means that you can use them to command other programs that also support Apple events. An Apple Event is the basis for AOEC, which is another name for the same technology used by AppleScript to interact with other programs.

These utilities can also interact with each other. If you have a clear idea about what you want to accomplish and are willing to take the time to make any of them work for you, you will be able to make your Mac do amazing things. And if you are not concerned about making it do amazing things, you can still use QuicKeys and Tempo to perform basic functions automatically, thus saving time, which is money. This section will look first at QuickKeys, then Tempo, and, finally, Frontier.

Macro Utilities

Macro utilities are programs that can automate your work environment with or without AppleScript. They started out as a means for assigning keyboard commands to menu items and for recording mouse movements. Now, macro utilities are used to interact with and customize any program you might use, even those that are not AppleScript-compatible.

An example is the use of a PowerBook at work. You connect it to the network and, with a keystroke or menu selection, you can log onto the server and mount the AppleShare volume(s), get your mail, and start all of the applications you will be using throughout the day. When it is time to go home, another command can quit your programs, log you off of the server, and put your Mac to sleep. All you have to do is unplug it from the network and go home.

The intent behind these programs is to take the drudgery out of routine and time-consuming tasks that you constantly do. You can even use the full-featured macro utilities to automate tasks at a specific time. Maybe you want your Mac to call an online service every night and get your e-mail messages while you're snug in your bed. When you're ready and sit down in front of your Mac, there's all of your e-mail just waiting for your reply.

With any of these utilities, your imagination is the limit. What you have to remember is that none of this is magic. Making macros requires time and patience on your part; any of the macro utilities will be as useful as you make it. The hard part might be to keep from being overwhelmed by everything you can do with a macro.

The following sections will briefly discuss two macro utilities.

QuickKeys

QuickKeys, published by CE Software, is a keyboard macro program. It lets you assign keyboard commands to a macro that you create that performs some action, such as changing the font you are using, or it can be used to change your page layout from portrait to landscape and print the document—all with one keyboard command.

It can be used to mount your networked volume or automatically save your work. In a sense, QuicKeys is like a command construction kit. You can use it to make enhancements to any program you use, not just the Finder. With QuicKeys, you have a powerful utility for creating a custom work environment. The possibilities with QuicKeys are endless. Should you be motivated, you can put together a macro that could almost be a program. If there is some utility that you wish you had to perform some special task, QuicKeys could be the answer.

Tempo

Tempo comes in two flavors. You can get Tempo II Plus or Tempo•EZ. Tempo•EZ is a scaled-down version of Tempo II Plus for those who don't wish to become macro wizards but still want to create a few macros to automate menu selections, automatically enter text, or some more complex macros that record mouse movements and clicks.

Tempo II Plus is EZ's big brother. It is more like QuicKeys in its overall capabilities and can be used to create more complex macros. The macros created with Tempo II Plus can check for specific conditions, such as a graphic, before continuing, and batch process files.

Batch processing is where you select a group of files and perform the same action on all of the selected files. You could move them from one folder to another or copy



Buying Software

Whenever you purchase software, which package you choose when competing products are available can be a real dilemma. If you don't subscribe to either *MacWorld* or *MacUser* magazine, go to the local library or your users group and check back issues for product reviews and comparisons. Go your local computer store and look at the different programs to see which one you feel most comfortable with. Finally, when you do buy, make sure that you can take the software back within 30 days for a full refund.

When you reserve the right to return software, some vendors have requirements about the package's condition and want a blank registration card and undamaged packaging returned before you'll get a refund. Find out the company's conditions for returning software before you purchase, and don't fill out or send in the software's registration card until you're sure you're going to keep the software.

them to another drive for backup. Batch processing is handy for environments where lots of files are created and it is difficult to keep track of what belongs where.

UserLand's Frontier

UserLand named its scripting package Frontier because it brought capabilities to the Macintosh that are truly new. UserLand introduced its system-level scripting system more than a year before Apple put AppleScript into the System. On all other computing platforms, there is a system-level scripting language with which it is possible to write small programs to perform file maintenance, automatic processing, or batch processing functions. These are capabilities that the Mac did not have prior to AppleScript.

Frontier, as already stated, is a system-level scripting language—actually, it is a programming language. But, forget that for a minute. If you think too hard about it as a programming language, you might get scared and disregard what the package can do out of hand.

First of all, if you do not think that you want to write scripts, there are a lot of people who do and some of them are available to the public. So, you can get scripts to perform such tasks as reconciling two folders on separate drives, making sure they both contain the same files. Most needs for batch processing are common. How do you find duplicate files, locked files, or aliases without associated files? These are just a couple of the things you can do with Frontier, in addition to adding menus to the Finder, such as the one shown in Figure 8.18. This menu adds searching, backup, and other file maintenance capabilities to your Finder. Frontier can also be used to set up

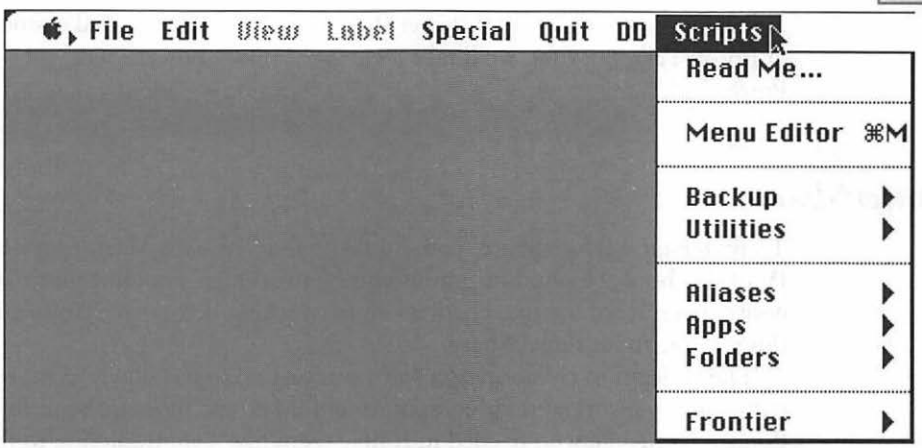


Figure 8.18 *Frontiers Script menu in the Finder.*

to-do lists, launch multiple applications, search your hard drive for specific documents that it then places in a specific folder, or control applications via Apple events.

Because Frontier is a programming language, it is not easy to get into. But the possibilities for creating system-level utilities make it worthy of consideration. Even if you're using AppleScript, you might consider using Frontier as well. Frontier offers some features you won't find in AppleScript, such as a database and a scripting language, that are really more powerful (have more capabilities) than AppleScript.

If you want to try it out, UserLand has a Frontier runtime package as shareware. Using the runtime, you can run scripts that others have made to see if they are useful, or you can distribute scripts you might write. The runtime is on the CD-ROM that comes with this book, and you can also find it on Compuserve (an online service) in the UserLand Forum where you will also find scripts that have been released for public distribution. If you think that you might benefit from Frontier's capabilities, you should look into it.

Using PowerTalk

PowerTalk, as mentioned previously, is Apple's personal gateway software—but PowerTalk is more than just a personal gateway. It is part of Apple's collaboration network services strategy. How's that for technobabble?

PowerShare will be of interest to those in an office environment, where all of the Macs are networked, different groups of people have to share information to accomplish their jobs, and a secure method for sharing the information is needed. Collaboration services will be explained in the following section, "PowerShare." For the individual user, PowerShare is a side issue and probably of nominal interest, whereas PowerTalk can be a very powerful tool by itself, without PowerShare.

Using PowerTalk as an individual tool is the primary emphasis of this section, but we're going to describe PowerShare before talking about PowerTalk because

understanding a little about PowerShare actually helps you make more sense out of PowerTalk. So, first, we'll take a cursory look at PowerShare, then dive into PowerTalk.

PowerShare

To understand PowerShare, you should be familiar with Macintosh networking. Part IV of this book, "Communications and Networking," contains information about networking. Read the two chapters on networking if you have trouble understanding this section about PowerShare.

The concept of collaboration software has developed slowly as more and more companies networked their computers and it became more difficult to get information to the people who needed it. It may seem like a contradiction to think that this would be a problem, since the assumption is that computers are supposed to make information distribution less of a problem, but that is not the case. As more people use a network, it becomes more difficult to make sure information is distributed to those who need it.

In a way, it is the same problem every large company faces with incoming mail. The problem is usually dealt with by receiving all mail in the mailroom and then distributing it throughout the company from that central location. Where the computing information problem differs from the mailroom is that the same information often goes to several people and responses often go to others throughout an organization. It can become quite a nightmare as the organization grows.

To tackle this problem, Apple has provided PowerTalk for each Macintosh and the PowerShare Collaboration Server for information distribution. PowerShare is an extension of AppleShare, Apple's networking system, where data can be made available to groups and individuals more easily. This is done through a process of cataloging the files that can be stored on single or multiple PowerShare servers and making them available to others.

When using AppleShare to make information available, the person looking for a file has to know where it is located before he or she can access the information. With PowerShare, it does not matter where the information is located; it will automatically be made available to those who need it through a catalog. Catalogs can contain the files and folders that are on different PowerShare servers located in different buildings or even halfway around the world, making all of the information, regardless of its location, available in a single location from the individual user's point of view.

Besides providing access to information, PowerShare also enhances AppleShare's security so that only authorized users can access a PowerShare catalog; access to both AppleShare and PowerShare servers has been simplified by PowerTalk. For someone to have access to various catalogs and file servers, even ones requiring different passwords, can now all be accessed with a single password using PowerTalk on the Mac.

A PowerShare server also functions as an e-mail server, which is a computer dedicated to the purpose of receiving and distributing electronic mail. Although any Mac with PowerTalk can receive and send e-mail to other Mac's using PowerTalk on the same network, the PowerShare server can connect various networks and distribute

the e-mail throughout an organization. A PowerShare file server can also access other e-mail systems, such as Internet e-mail, and can be used as a central distribution point for handling all of a company's e-mail needs.

PowerShare has a lot of capabilities, and figuring out how to use them or if you need them can be a challenge. If you have a need to compartmentalize how data flows though your company or a need for more security than what is provided by AppleShare, you might want to look at PowerShare.

PowerShare, like PowerTalk, has not been taken too seriously up to this point, so the add-on features for a PowerShare server are still limited; but soon there will be new and interesting tools for collaborative workgroup environments appearing. At the moment, however, a PowerShare server's main function is to provide catalog services to PowerTalk users, as well as to act as an e-mail environment for your company network(s).

PowerTalk

By now, you know enough about PowerTalk to be dangerous—or at least confused? You know that PowerTalk can function as a gateway for e-mail services and faxes, and can make using an AppleTalk network easier. Now, it is time to see how the PowerTalk system works. Once you've read this section, you'll know whether you want to use PowerTalk and its basic ins and outs.

Because PowerTalk is used primarily for e-mail and network services, you should read Part IV, "Communications and Networking" before you read this section. Otherwise, you are bound to bump into terms and concepts you're not familiar with; also networking basics are not going to be discussed in this section. Unfortunately, this section fully uses the technical jargon associated with networks and communications.

PowerTalk is a powerful system-wide technology and it defies a quick explanation. The information in this section will cover only PowerTalk's most important features. After you read this section, you will have to experiment with PowerTalk to really learn its full capabilities.

Installing PowerTalk

When you install System 7.5, PowerTalk is not automatically installed and requires an additional installation. When you install PowerTalk you have no choices; you either install it or you don't. Your Mac needs to have a minimum of 4M of memory to run System 7.1.1 or 7.5, and PowerTalk, with 5M, is Apple's recommended minimum. If you have only 4M, you'll find that you will have only enough memory to run one program at a time. Ideally, you should have 8M of memory, and, of course your Mac has to have a hard drive.

Once PowerTalk is installed, it has to be configured and optional PowerTalk services must be installed. If you're not going to use any of the PowerTalk services or the Digital signer, or to need access to a PowerShare server, there is really no reason to install PowerTalk. PowerTalk services are electronic mail or fax gateways that you can install. The Apple Mail program is installed automatically with PowerTalk.

If you're installing System 7.5 from the CD-ROM you will also have the following PowerTalk gateways:

- ExMachina Notify! Pager Gateway—Sends text messages to a pager (the pager and paging service must support text messages).
- StarNine QuickMail Gateway—Allows QuickMail, an e-mail system from CE Software, to send and receive messages using the PowerTalk mailbox (60 day trial version).
- StarNine Internet Gateway—Sends and receives your Internet mail messages from you PowerTalk mailbox (60 day trial version).
- STF PowerFax Gateway—Sends and receives faxes from your mailbox.
- CompuServe Gateway—Sends and receives your CompuServe Mail from your PowerTalk mailbox.
- Apple PowerTalk Direct DialUp—Allows you to call another Mac using Apple PowerTalk Direct DialUp and exchange mail messages.

For each of these additional PowerTalk services, you'll need a modem and/or an account of some type. For the STF PowerFax Gateway, you'll need a fax modem.

At the moment, these are the primary PowerTalk gateways that are available. As time goes on, there will be more companies competing for your PowerTalk dollars with more gateways. The best way to keep informed about new software is to subscribe to a Macintosh magazine, such as *MacWorld* or *MacUser*.

Setting Up PowerTalk

Once you've installed PowerTalk, you will notice some changes to your Mac's Desktop. Upon restarting your Mac, it will look like the one shown in Figure 8.19. The PowerTalk installation makes some substantial changes to your Mac, such as the following:

- A Mailbox and Catalog will be on your Desktop.
- In your Apple menu, you'll find a folder called Mail and Catalogs.
- A PowerTalk Setup control panel is added to your Control Panels folder.
- Your Finder's Special menu will have two new menu items: I'm at... and Unlock Key Chain.
- In your Apple Extras folder, you'll find a folder called PowerTalk that contains the AppleMail program, an AppleMail Guide (used by AppleGuide), a Demonstration Signer, the DigiSign Utility, and an Untitled Info Card.

The following steps assume that you are not connecting to a PowerShare Collaboration Server and will take you through a basic setup.

Once you've completed step 6 , the Mailbox on your Desktop will change and the word Mailbox will be replaced with the name you entered into the name field in step 4 (Figure 8.23).

At this point, you should make sure your Mac's date and time is correct. Any mail you send will contain the date and time displayed in the Date & Time control panel.

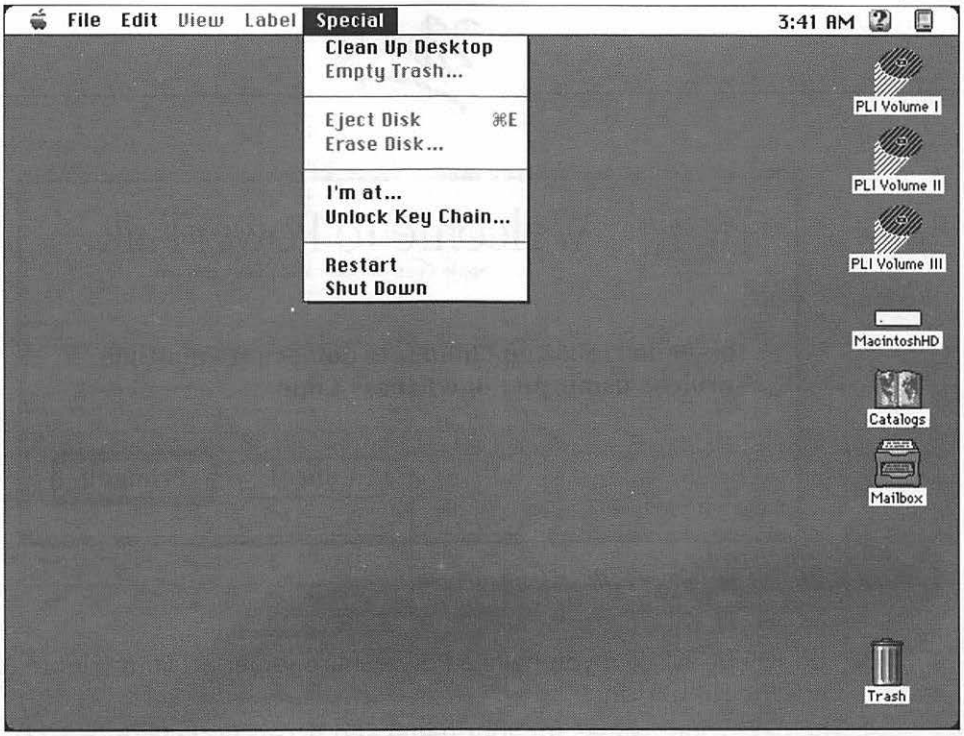


Figure 8.19 *Your Desktop, after installing PowerTalk.*



Setting Up PowerShare

If you are connecting to a PowerShare Collaboration Server, the steps are a bit different. You should check with your System Administrator before configuring PowerTalk. He or she will tell you what name and password to use to initially set up PowerTalk, and will also be able to tell you how your PowerTalk setup will differ from what is described in this chapter.

To set up PowerTalk:

1. Select the Unlock Key Chain... menu item from the Finder's Special menu. You will see the PowerTalk welcome screen, as shown in Figure 8.20.
2. From the welcome screen, click on the Proceed button.

continued

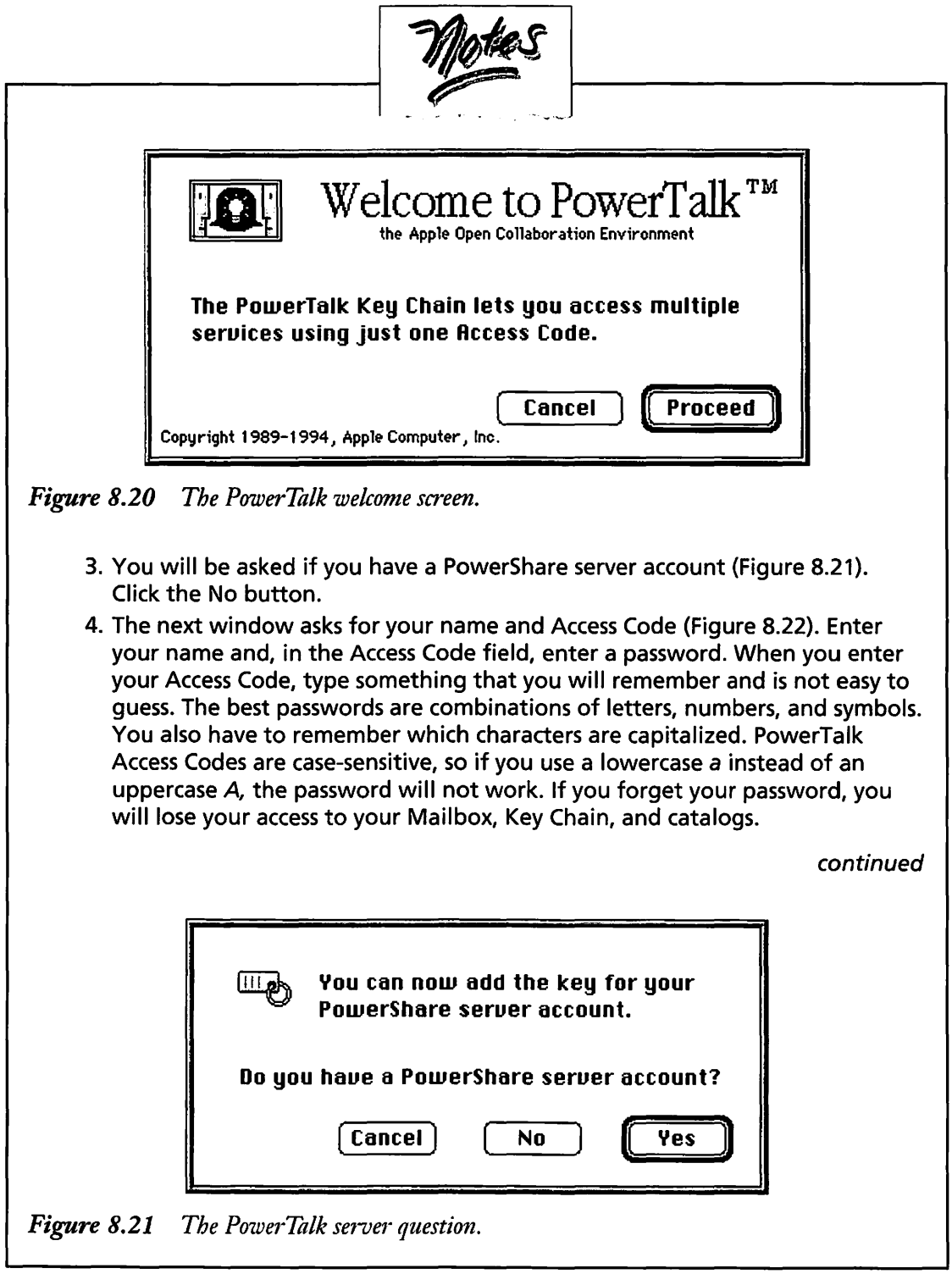


Figure 8.20 *The PowerTalk welcome screen.*

3. You will be asked if you have a PowerShare server account (Figure 8.21). Click the No button.
4. The next window asks for your name and Access Code (Figure 8.22). Enter your name and, in the Access Code field, enter a password. When you enter your Access Code, type something that you will remember and is not easy to guess. The best passwords are combinations of letters, numbers, and symbols. You also have to remember which characters are capitalized. PowerTalk Access Codes are case-sensitive, so if you use a lowercase *a* instead of an uppercase *A*, the password will not work. If you forget your password, you will lose your access to your Mailbox, Key Chain, and catalogs.

continued

Figure 8.21 *The PowerTalk server question.*

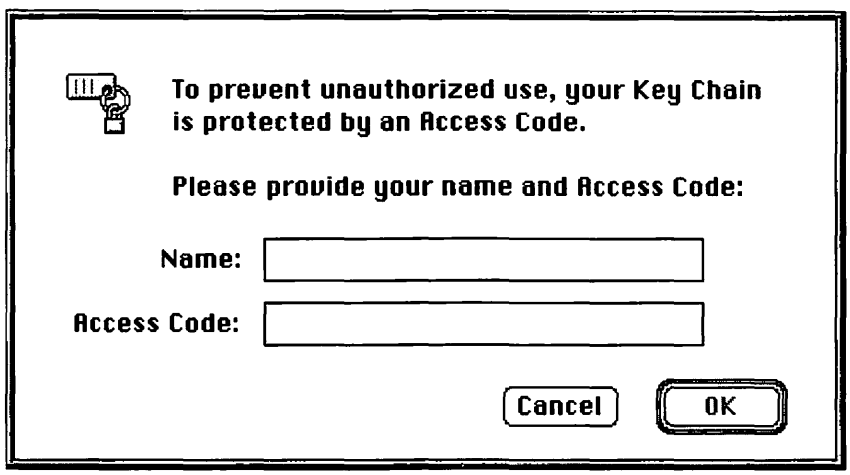


Figure 8.22 *Entering your name and password.*

5. Press the OK button. You will be asked to confirm your Access Code. Type your password into the Access Code field and press the OK button.
6. Once you've confirmed your Access Code, you'll see a message that tells you that your Key Chain will be placed in the Apple menu and that you'll have to use your Key Chain to make changes. Actually, your Key Chain is placed inside the Mail and Catalogs folder that is accessed from the Apple menu. Click on the OK button.

You can also check the date and time in the Finder's menu bar. The time is automatically displayed, and if you click on the time the date, will be displayed.

Another control panel that should be configured is the Sharing Setup control panel. The Macintosh Name field in the Sharing Setup control panel is how others will send AppleMail to your Mac. Instructions for configuring the Sharing Setup control panel can be found in Chapter 13.

The final control panel to be configured is the PowerTalk Setup control panel shown in Figure 8.24. There are three parts to this control panel: The first, Collaboration Services, turns on or off PowerTalk. If you turn off PowerTalk and restart the Catalog, Mailbox will not be visible on your Desktop; and if you try to access your Key Chain, you will be told that the Key Chain, cannot be accessed.

The next section controls your Key Chain, which can be locked after a specific amount of time if you're not using the Collaboration Services. By checking the Ask for Key Chain... check box, you will be asked for your Key Chain Access Code

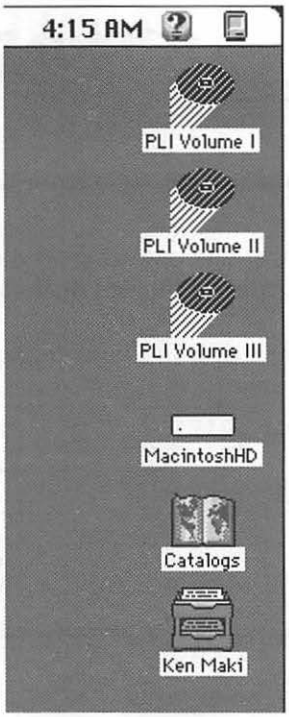


Figure 8.23 *Your personalized mailbox.*

when your Mac starts up. The last section of the PowerTalk Setup control panel is used to open your Key Chain so that you can add PowerTalk services or change your Access Code.

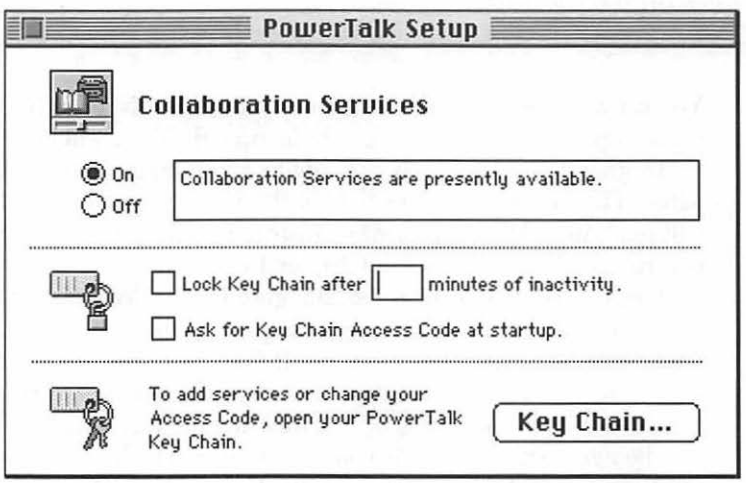


Figure 8.24 *The PowerTalk Setup control panel.*

Installing PowerTalk Services

When PowerTalk is installed, the only services that are installed are PowerShare, which allows you to connect to a PowerShare server and Direct AppleTalk Mail, which lets you send e-mail to other Macs on your network. Any other service you'd like to access has to be installed. Each of the services mentioned in the foregoing section, "Installing PowerTalk," comes with an Installer.

Before you install a service, read the Read Me file that comes with the software. The Read Me file should tell you what you need to use the service. This way, you won't waste your time installing something you can't use. To install a service, run its installer; you'll have to restart your Mac after each installation. When you've installed the services you want to use, you'll have to configure them.

Configuring Your PowerTalk Services

Now, it is time to configure all of those PowerTalk services you're going to use. In Figure 8.25 you'll see a rather empty Key Chain. The only installed service is Direct AppleTalk Mail. Your Key Chain will look like the one shown in Figure 8.25 even if you've just installed a service. Even though a service has been installed, it is not available until you add it to your Key Chain.

When you add a service to your Key Chain you will click on the Add button, after which you'll see a window like the one shown in Figure 8.26, from which you'll select the service you want added to your Key Chain and click on the OK button. You'll have to configure the service after it is added to your Key Chain. Each service has its own configuration. Some configurations are very straightforward, while others are complex. For each of the services you add, read the manual or documentation that comes with the service. If you don't, you could spend a fair amount of time trying to make a service work while missing some small but crucial aspect of its configuration.

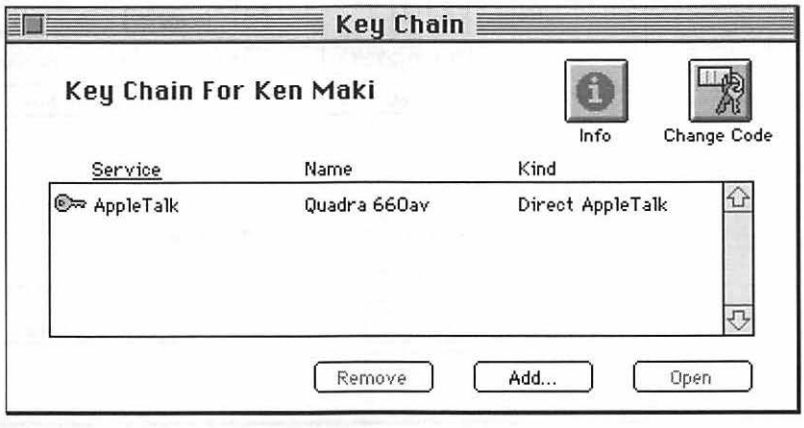


Figure 8.25 *An (almost) empty key chain.*

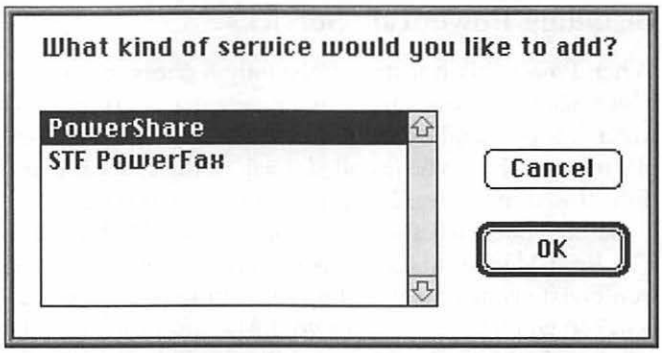


Figure 8.26 *The Add Services window.*

To configure a service:

1. Open the service by selecting it and double clicking or clicking on the Open button.
2. Fill out all of the fields, as described in the service's manual.
3. Close the service.
4. Close your Key Chain.

Figure 8.27 shows the initial configuration window for the CompuServe Mail service. In the CompuServe Mail configuration window there are three setup buttons

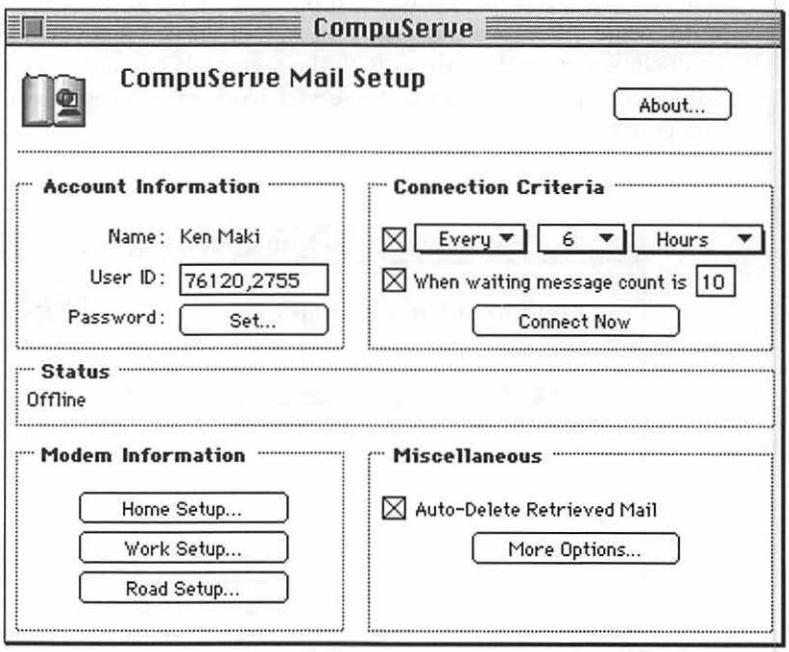


Figure 8.27 *The CompuServe Mail service configuration window.*

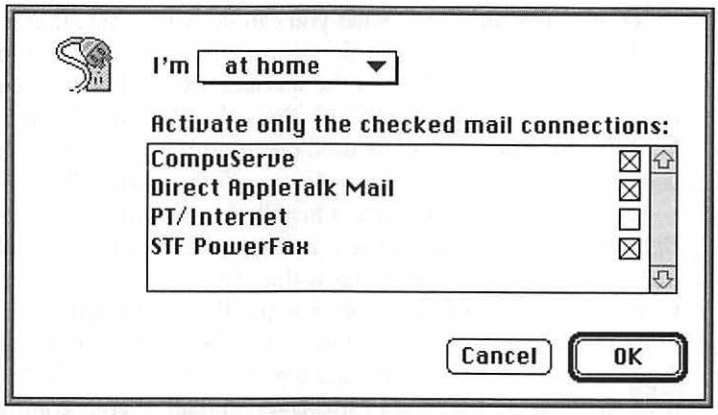


Figure 8.28 *The I'm at... dialog box.*

labeled Home, Work, and Road. These buttons correspond to the locations listed in the I'm at... menu item in the Finder's Special menu. Figure 8.28 shows the dialog box for the I'm at... menu item.

The I'm at... menu item is intended to make it easy to alter your PowerTalk configuration, depending on your location. This is especially handy if you have a PowerBook, but it is also useful for customizing how PowerTalk works for you by choosing which services are active for each of the different locations. I use two of the locations, Home and Work, not because I travel but because the StarNine Internet Gateway installed on my Mac works only after I've connected to the Internet. If I leave the service turned on while I'm not connected to the Internet, the service will give me an error message (this is discussed in the next section) that I have to correct before I can use the service. It is easier to switch locations rather than continually correct the error.

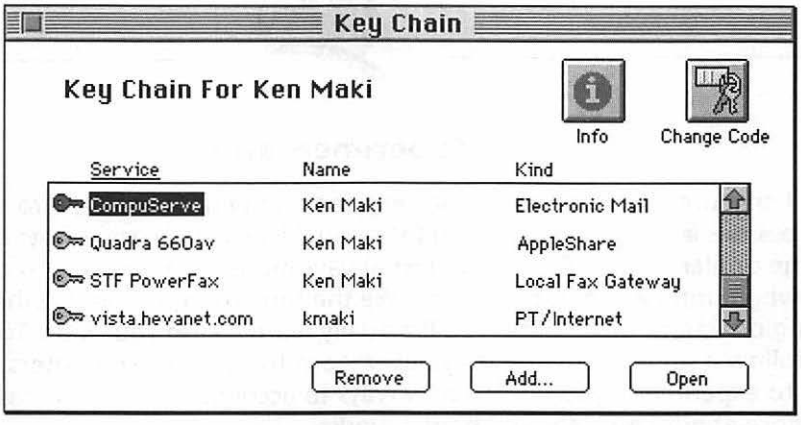


Figure 8.29 *A populated Key Chain.*

To give you an idea of what you can do with a Mac that is not connected to a network, look at Figure 8.29, which shows my Key Chain. Although my Mac is connected to a network, three of the services installed do not require an AppleTalk network. The CompuServe, STF PowerFax, and StarNine Internet Gateway (the kind PT/Internet) can all be used on a nonnetworked Mac. How these services work is discussed in the next section, "Using Your Services."

Once you have your services installed and configured, you're almost ready to go. Before you can send someone e-mail or a fax, you have to tell your Mac where the message is going. There are tools that Apple has provided to simplify these tasks: One is the Info Card and another is the Personal Catalog. Info Card contains the e-mail addresses and other information about people to whom you're sending message and files, and Personal Catalogs are used to store the Info Cards. AppleMail is used to create and send your messages, and all of your communications are stored in your Mailbox.

The following steps will take you through the process of creating an Info Card in your Personal Catalog and then sending a message with AppleMail.

To fill out someone's Info Card:

1. Open your Personal Catalog by selecting the Personal Catalog item from the Mail and Catalogs folder in the Apple Menu.
2. When your Personal Catalog opens, you'll see a new menu in the Finder called Catalogs (see Figure 8.30). From the Catalogs menu, select the New User item.
3. The New User command creates an untitled Info Card in your Personal Catalog. The Personal Catalog is similar to a folder, but it holds only Info Cards, addresses, and groups. The concept of users and groups comes from computer networking, and the New Group command has a result similar to



Experimentation

I encourage you, after you become familiar with PowerTalk, to experiment so that besides learning to use PowerTalk, you'll learn alternative ways of accomplishing the similar results. There is almost always more than one way to accomplish a task when using a computer. If you take the time to experiment rather than just following directions given here, you'll actually learn to use your Mac. Too often, people just follow a set of steps and they never learn to use their computers. If you take time to experiment, you'll learn new ways to accomplish the same tasks, while learning more about your Mac and how it works.

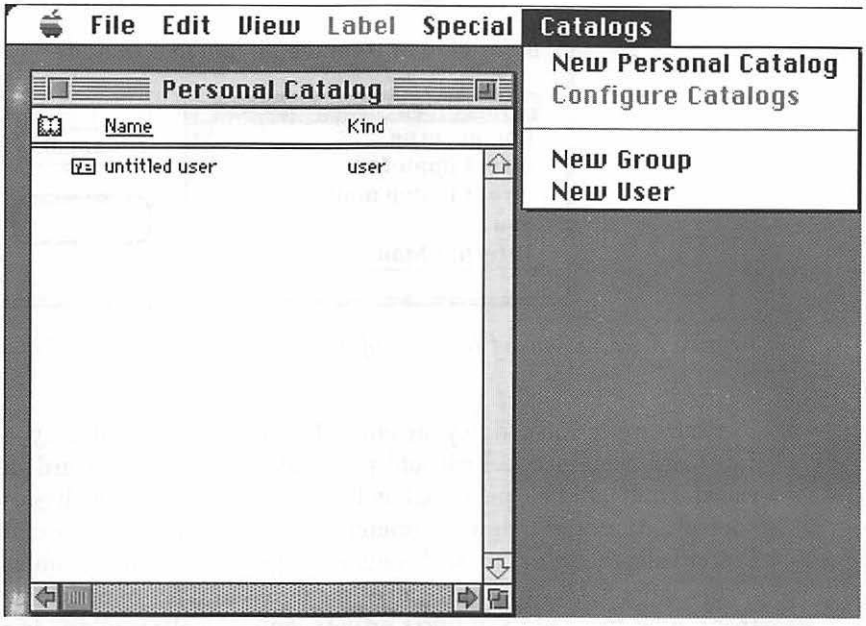


Figure 8.30 *The Personal Catalog and the Catalogs menu.*

creating a group with the Users & Groups control panel. The Users & Groups control panel is discussed in Chapter 13.

4. When you double click on the untitled Info Card, you'll see a window like the one shown in Figure 8.31. The Info Card can store all kinds of information and is an electronic business card. You can enter whatever information you want in the card, but the Info Card also contains phone numbers for faxes and addresses for electronic mail. The different portions of an Info card are accessed through its pop-up menu.

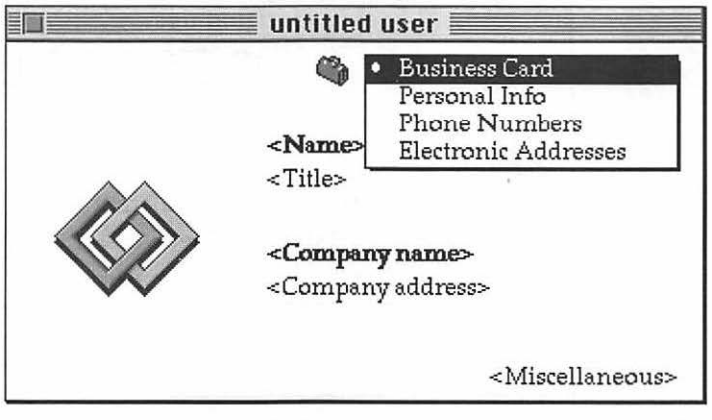


Figure 8.31 *An untitled Info Card showing its pop-up menu.*

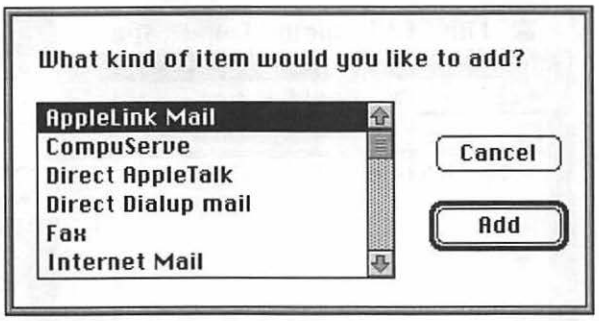


Figure 8.32 *Some of the types of addresses that can be added to an Info Card.*

Each service you add to your PowerTalk Key Chain modifies your options for the Info Card. Some services will add a new category to an Info Card. There is a program called Timbuktu Pro, published by Farallon Computing, which is used to remotely control a Mac or Windows computer. When Timbuktu Pro is installed on a Mac with PowerTalk, the Info Card will contain a page for assigning a Timbuktu host.

In Figure 8.32, you will see all of the different types of electronic mail addresses that can be assigned to an Info Card. Assigning an electronic address is done by clicking on the Add button of the Electronic Addresses page (Figure 8.33). When you have several electronic addresses for someone and you enter them all into his or her card, you'll have to pick the address that is preferred. Once you've filled out someone's Info Card, you can then send that person e-mail or a fax. The preferred address is the one that will automatically be used when you send that person a message using AppleMail.

After you've filled in all of the information on an Info Card, there is still one last step you'll have to perform: You will need to give the card a name. All Info Cards remain untitled until you give them a name, and they are named in the same way you rename a file in the Finder.

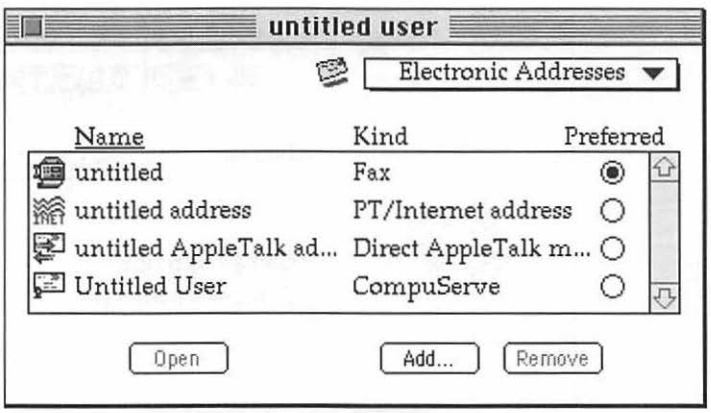


Figure 8.33 *An Info Card with electronic addresses added.*

Using Your Services—Sending a Message

Unless you're using a program that is PowerTalk-compatible and can mail your document without exiting the program, you'll have to use the AppleMail program or a mail program substitute, such as CE Software's QuickMail AOCE. Regardless of which program you use to mail a message, the principles are the same whether you're mailing a message to someone down the hall using AppleTalk Direct Mail, or sending an Internet message to someone in Australia.

This is what makes PowerTalk such a great tool. You no longer have to use a half-dozen communications and mail packages to send and receive electronic mail or faxes. However, until the rest of the world catches up with Apple, you'll probably have to use AppleMail to send your messages. The following steps will demonstrate how to send an AppleMail message and some of its features. As you read about AppleMail, remember that some of the information you'll receive applies to any mail program, not just AppleMail.

To send a message:

1. Open AppleMail. It can be found in the Mail and Catalogs folder that is in your Apple Menu.
2. An untitled AppleMail document will open like the one shown in Figure 8.34. If the mail window does not show the header section, click on the expand arrow.
3. The From field is automatically filled out with the name on your PowerTalk mailbox. If you want to change the name in the From field, you'll have to change your PowerTalk name or select a name from a PowerShare account. In the Subject field, enter something that will describe your message; you cannot send a message without something in the Subject field.
4. Click on the Recipients button to address your message, which opens your Catalog, as shown in Figure 8.35.
5. Select your Personal Catalog using the Personal Catalog button. From there, select the Info Card you just filled out.
6. If you want to send this person a file, you can include the file as an enclosure. Clicking on the Enclosures button will bring up a file dialog box that is similar to the Open File dialog box. Navigate to the folder or file you want to mail and include it with your mail message.

   Anything you send as an enclosure is copied into your mail message so that the original file stays in place. You can also include an enclosure by dragging the items you want enclosed into the the Enclosures window just as if you were dragging a file to a new folder.
7. After you've finished with the header information, you can include a message to go with the enclosure. Figure 8.36 shows a message ready to go with an enclosure.
8. To mail your message, select the Send command from the Mail menu (⌘+M). A dialog box like the one shown in Figure 8.38 will appear and you'll have to make a few more decisions. You can sign the message if you

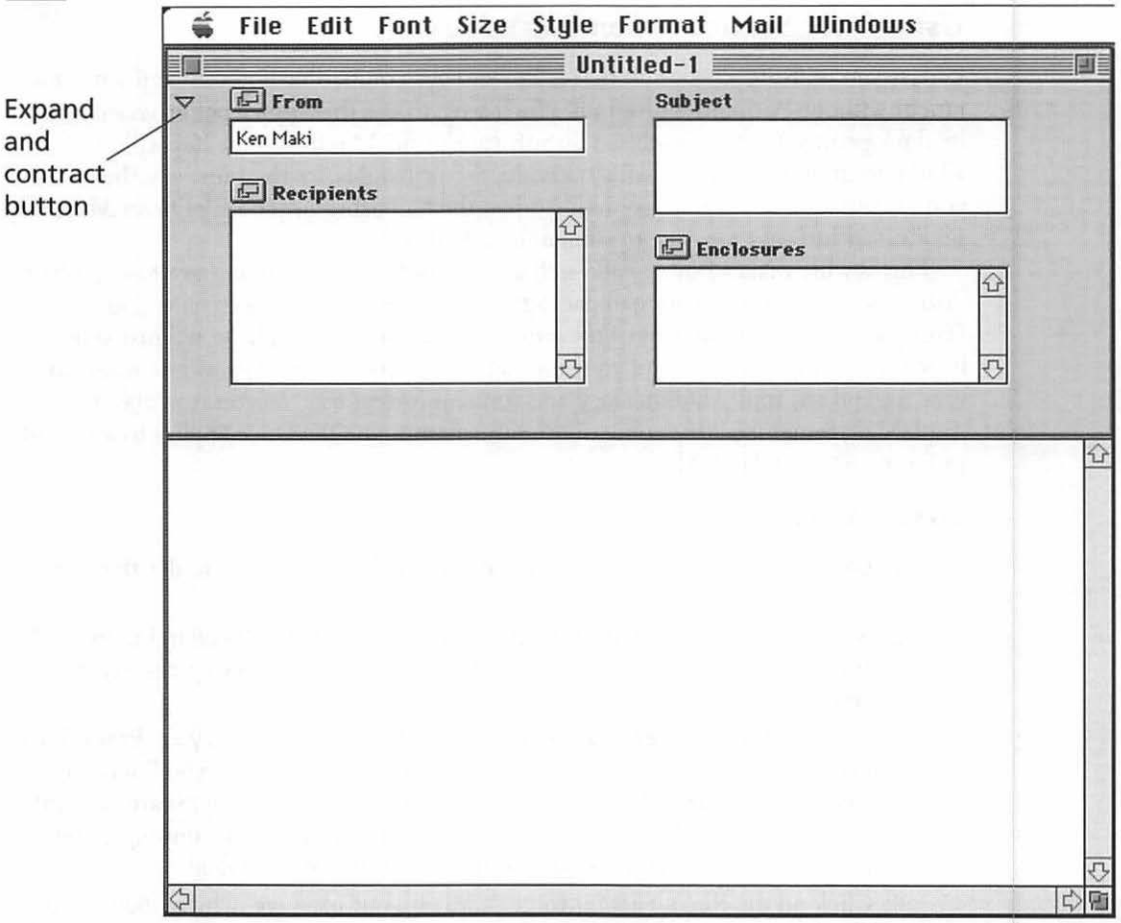


Figure 8.34 *An untitled AppleMail document.*

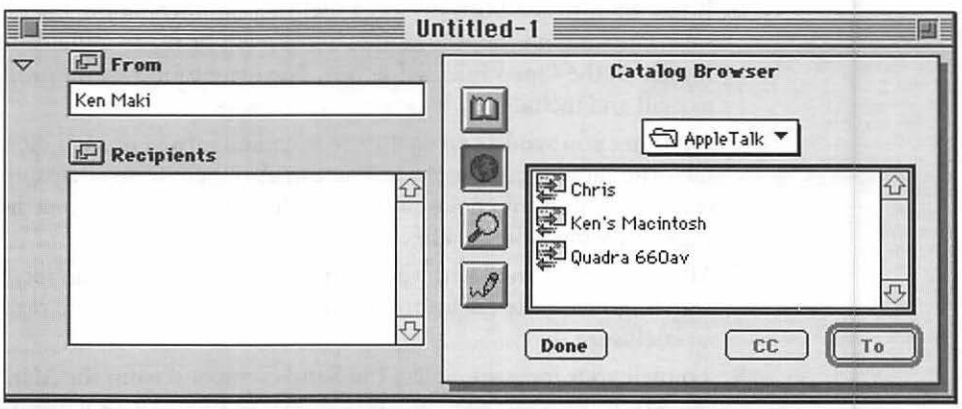


Figure 8.35 *Using the Catalog access panel to address your message.*

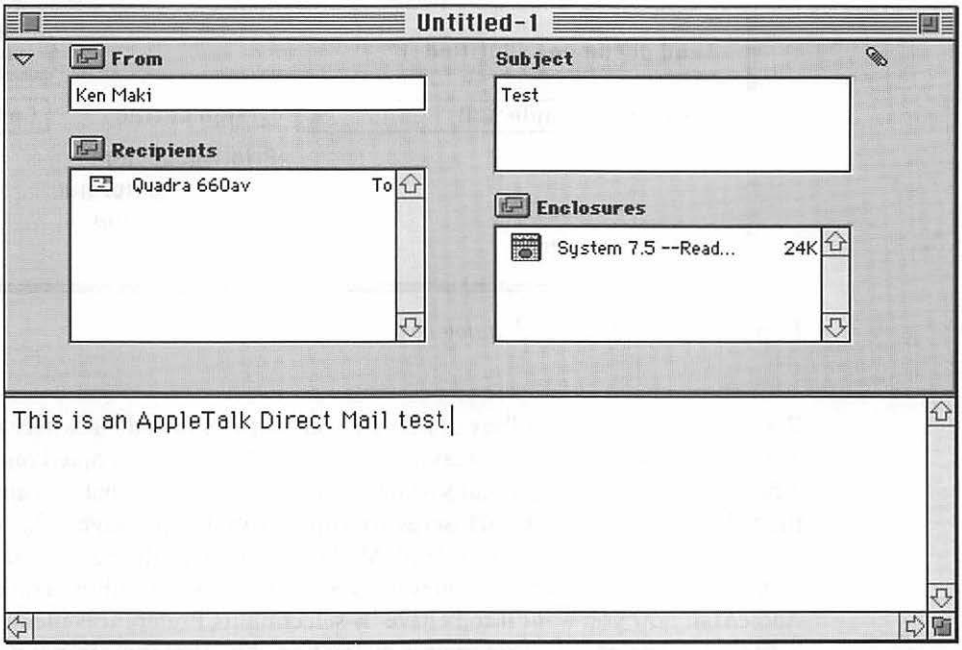


Figure 8.36 *A message ready to go with an enclosure.*

have a Digital Signer, determine the format, and assign the message's priority. Clicking on the Send button places the message into the Out Tray of your mailbox, and the message is then sent to its recipient.

9. After your message is sent, you can either save a copy of it or close the message. You don't have to save a copy of your message unless you need a copy for some specific reason, because a copy of the message is saved in the Out Tray or your mailbox even after the message is sent.

All of the messages you send and receive end up in your Mailbox. The Mailbox works just like a Finder folder, except you cannot put anything into your Mailbox.

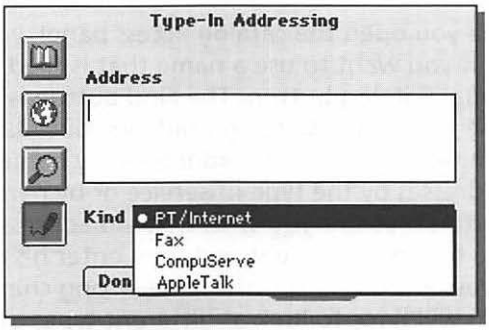


Figure 8.37 *The manual Type-In Addressing window.*

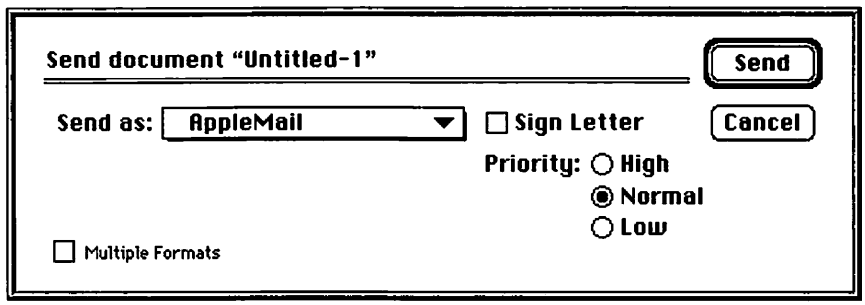


Figure 8.38 The Send dialog box.

But anything in your Mailbox can be dragged out and stored elsewhere on your hard drive. Whenever you drag a message out of the Mailbox, it is copied onto your drive. The copy of the message retains its original name, which is what was entered into the Subject field, and any enclosures are copied with the message. This means that you really do need to save your AppleMail messages with the Save or Save As command; just copy any message you want to save from your Mailbox. You can tell AppleMail how you want it to behave by selecting its Preferences menu item. Figure 8.39 shows AppleMail's Preferences dialog box. The Preferences menu item is in the Edit menu.

There is a lot about Apple Mail that is not covered in this section. You should play with it to discover its features. Send several test messages and have a few sent to you. As you add services to your PowerTalk Key Chain and read the documentation that comes with the services, you'll learn more.



The Catalog Browser

The first time you open the catalog access panel, your Mac will open your Catalog Browser. If you want to use a name that is filed in your Personal Catalog, click on the Personal Catalog button. The Find button is used to search for recipients, and works just like the Find in Catalog utility in your Mail and Catalogs folder—except you are limited to finding the addressee by name. The Find in Catalog utility is used to find addresses by the type of service or by name. (Experiment with it.)

The final button presents you with write-in address field. You will have to choose the service for your recipient and then enter his or her e-mail address (Figure 8.37). E-mail addresses are very specific;, one wrong character and the mail will not get delivered. You will have to look at different types of e-mail addresses and make sure you have the right address and that it is formatted properly.

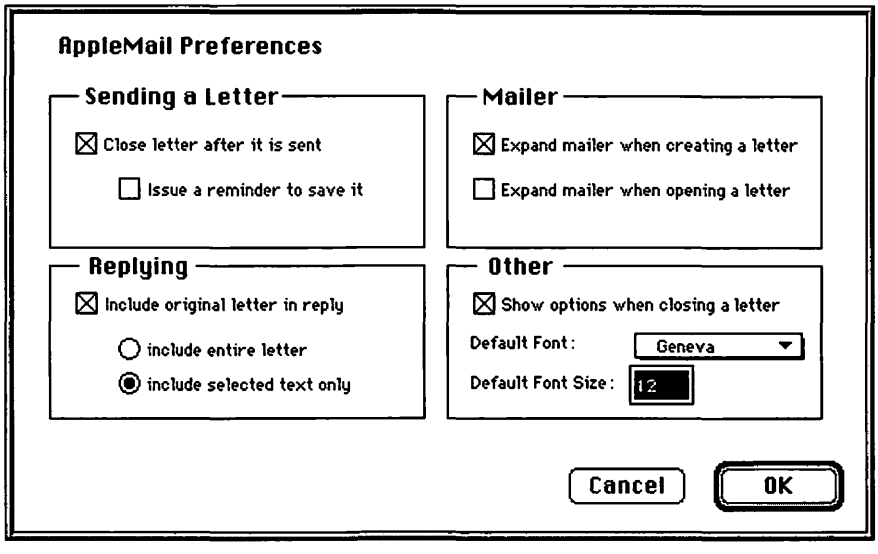
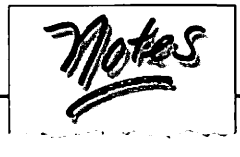


Figure 8.39 AppleMail's Preferences dialog box.

Your Mailbox

As mentioned in the last section, all of your PowerTalk messages are received in and sent from your PowerTalk Mailbox. When you receive a message, it will appear in the In Tray of your Mailbox and you'll be notified that mail has arrived by an icon that looks like the Mailbox blinking over the Apple of the Apple Menu.

Because your Mailbox is a Finder element, opening it produces a new menu in the Finder called Mailbox and your In and Out Tray windows behave like other Finder windows. Your View menu automatically provides view commands specifically for controlling Mailbox content views. The Mailbox menu provides commands specific to your Mailbox. Figure 8.40 shows an open Mailbox with messages. Both the In and Out trays are visible, but only one can be selected at a time.



Info Cards

If you are going to be corresponding regularly with someone, you will want to have an Info Card for that person. You can either ask that they mail you their info card or create one. If they mail you their Info Card, they will have to place it inside a folder and mail you the folder. If you create one, you can drag their address from a mail message they've sent you (the address is in the From field) and drop it on an Info Card, or you can place the address without an Info Card in your Personal Catalog.

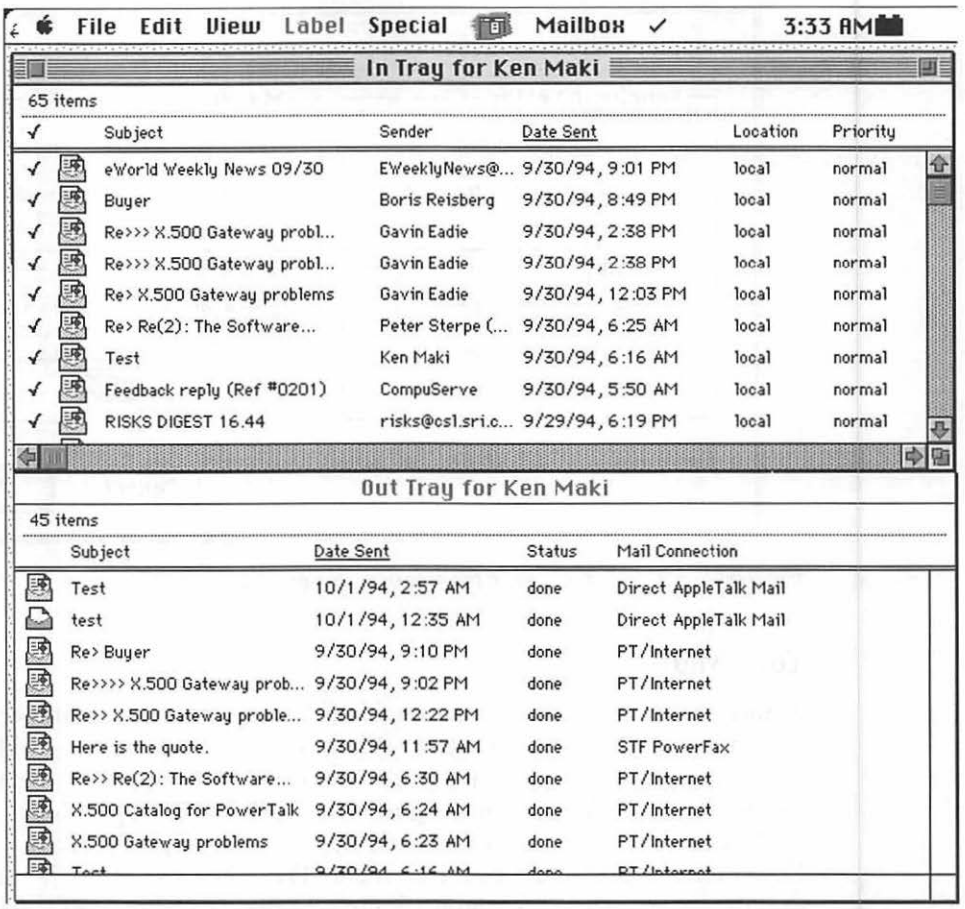


Figure 8.40 *The MailBox.*

In the Mailbox menu, there is a Preferences... menu item, which provides you with some options for how your mail is displayed, what type of alert you receive when mail arrives, and how long to wait before mail is automatically removed from your Mailbox. Figure 8.41 shows the Mailbox Preferences dialog box.

The most important aspect of the Mailbox Preferences is the Out Tray Aging section. If this setting is too low, your mail will be deleted before you're ready to dispose of it. Any mail messages you want to keep should be copied onto your hard drive because eventually they will be deleted. The maximum number of days you can keep a mail message is 99. After opening a mail message you've received, you'll be asked if you want to Tag the message or move it to the Trash (Figure 8.42).

Tagging a message is one way to keep together messages pertaining to a specific topic or project. Once your messages have been tagged, the tags are remembered and you can choose to view your messages by their tags. When viewing messages by their tags, you will see only those messages that have a specific tag.

This section has covered only the most important aspects of your Mailbox. As you should do with all software, experiment with the various features of your Mailbox. If

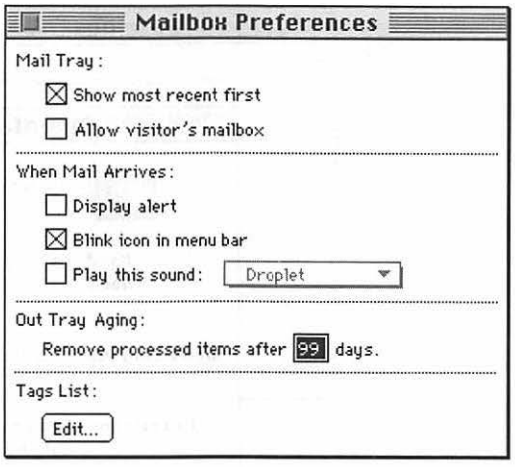


Figure 8.41 *The MailBox Preferences dialog box.*

you're using System 7.5, don't forget to check out the PowerTalk Guide. When PowerTalk is installed on your Mac, the PowerTalk Guide is installed. If you don't explore the PowerTalk Guide, chances are you won't get the most from PowerTalk.

About Your Catalogs

One of the key components to PowerTalk are its Catalogs. When PowerTalk is installed a Catalog Browser is installed on your Desktop; and the first time you use your Key Chain, a Personal Catalog is created in your Mail and Catalogs folder.

The Catalog Browser is used to display the network services that are available to anyone connected to your network. These services can be AppleTalk, PowerShare, or others, such as gateway services for other types of networks. Your Catalog Browser is actually deceiving in its simplicity. It allows you to access all of your network's data and network services. Each of the your network's services, networks, or data collections is stored in catalogs within the Catalog Browser. Figure 8.43 shows the Catalog Browser.

The Catalog Browser window is a read-only window, which means that you cannot place anything in the Catalog window. The AppleTalk Catalog that is displayed

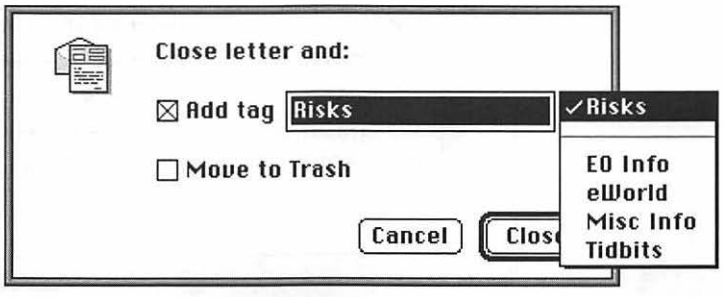


Figure 8.42 *Assigning Tags.*

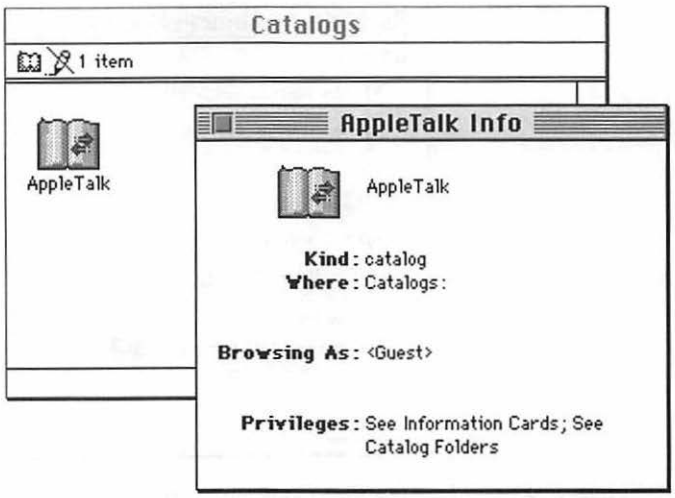


Figure 8.43 *The Desktop's Catalog Browser with a Get Info wondow for the AppleTalk Catalog.*

in the Catalog Browser contains all of the AppleTalk services active on your network. Figure 8.44 shows the AppleTalk Catalog's contents. In Figure 8.44, you'll see that there are file server's, Direct AppleTalk mail addresses, and a Timbutu Host. All of these are services you would have potential access to if they were in your Catalog Browser. Your ability to access a service depends on whether the System Administrator has given you access. You would need to know the correct names and passwords before using a file server. The Direct AppleTalk mail addresses are the addresses for the Macs on the network.

If you haven't accessed a file server before, double clicking on it will result in a log-in dialog box. After you log in to the server, you'll be asked if you want to place the server onto your Key Chain. Once the sever is placed on your Key Chain, it will

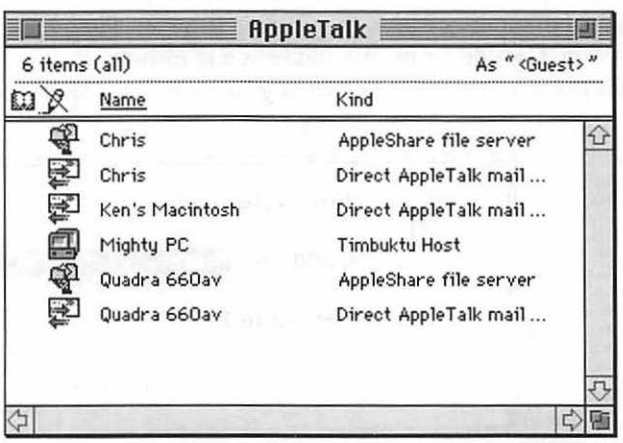


Figure 8.44 *The AppleTalk Catalog's contents.*

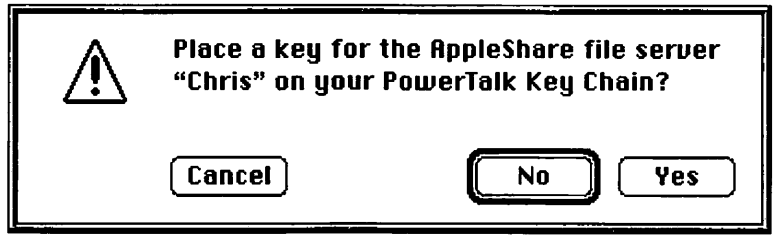


Figure 8.45 Assigning a server to a your Key Chain.

be available whenever your Key Chain is unlocked and you will not have to repeat the standard AppleTalk log-in process (Figure 8.45)

All of the items in the AppleTalk Catalog can be copied to the Desktop, Personal Catalogs, or even folders. They are like other items in your Finder in this respect. The addresses for Direct AppleTalk mail can be dropped onto Info Cards, dragged into the Recipients window of a mail message, or used without an Info Card in one of your Personal Catalogs.

Personal Catalogs are used to store your services, catalog aliases, and mail addresses. If you try to copy a catalog from the Catalog Browser into your Personal Catalog, you will be told that you cannot copy the catalog. But, you will be offered an opportunity to place an alias of the catalog into your Personal Catalog. Likewise, if you should make several Personal Catalogs, you won't be able to store all of them in a single catalog. However, you can put their aliases into your primary Personal Catalog.

Personal catalogs are an organization tool you can use to store addresses and services pertaining to a specific project, division, or group of people. By creatively using Personal Catalogs, you can organize your communications and increase efficiency.

The Digital Signer

The final part of PowerTalk that we're going to discuss is the Digital Signer. When you install PowerTalk, a Demonstration Signer and the DigiSign Utility are placed in the PowerTalk folder. The Digital Signer is a method for identifying any communication or document as having originated from you. Not only does it identify your document, but a personalized Signer can be a means for affixing a signature to your work. But, before you can sign your documents, you have to use the DigiSign utility to create a Signer Approval Request Form.

This form is sent to an approval agency, such as the company RSA Certificate Services, along with a signed and notarized statement to verify your identity. RSA will return a form and a file that you then use to create your personalized Signer. The process takes about three weeks. The PowerTalk AppleGuide will walk your through the steps for creating your personal Signer file.

Once you get the file back from RSA, it is used to create an application that can be used to sign any Macintosh file. However, using a digital signature as a legal signature has some dangers and has not been tested in court yet. But, with the assistance of an attorney, you can probably make an agreement with someone to accept your



Digital Signatures

Digital signatures are new to the computing world. Because they can be used as legal signatures (under the correct circumstances), you will need to make sure your Signer is secure. For this reason, all Signers require a password before they can be used. If your Signer and password should fall into someone else's hands, they could fraudulently sign documents with your Signer. For this reason, you need to keep your password and Signer approval form and file secure. After you make your Signer file, you should store the original disk, the one returned by RSA (or another approval agency), and all forms in a secure place, such as a safe-deposit box. There are procedures for revoking your signature if you should lose your Signer file; these instructions are included with your returned Approval file.

digital signature instead of a physical signature. Under such circumstances, it is conceivable that you can use your Signer as a legal signature.

When you have a Signer, you can sign any document by dropping the file onto your Signer or its alias. PowerTalk-compatible programs and the AppleMail utility will also interact with your Signer to sign a document. When a file is signed, it is also locked so that modifications cannot be made to the file. If a file is unlocked and modified, the signature will no longer be valid.

Anyone with a Mac can verify your signature even if they don't have PowerTalk installed. The signature on signed files are verified using the Finder's Get Info function. A signed file's Get Info window will look like the one shown in Figure 8.46.

Signature verification is done by clicking on the Signature button in the Get Info window. When a signature is valid, you'll see a window like the one shown in Figure 8.47. If a file has been altered or the signature changed, when you verify it, you'll see a dialog box like the one shown in Figure 8.48.

If you receive a file that has been signed and need to determine that a signature is still valid, you can call the approval agency that issued the signature. In some cases, your company can act as an approval agency, rather than using RSA, providing employees with signatures. Whom you contact will depend on the approval agency. This information is included with the signature.

Digital Signatures are a new technology and have the potential for changing how business is done. Just think about the possibility of sending a letter of intent that will arrive at its destination in ten minutes instead of one or two days? The impact on business could be phenomenal. It will take some time before this technology is widely accepted, but it is the beginning and Apple brought it to you first.

Well, almost first. There is one other method for signing documents that uses a different program called MacPGP, which will be discussed in Chapter 12. But MacPGP is integrated into the Macintosh system in the same way as PowerTalk and its digital signatures.

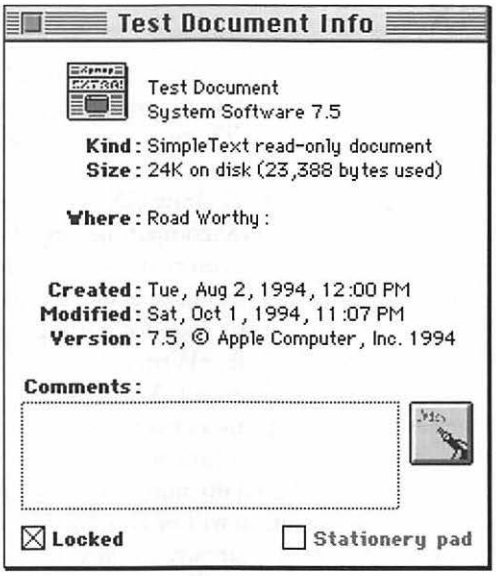


Figure 8.46 *A signed file.*

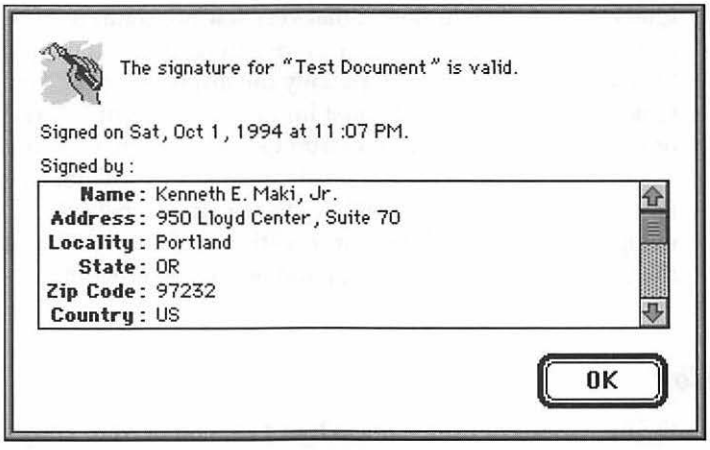


Figure 8.47 *Verifying a signed file.*

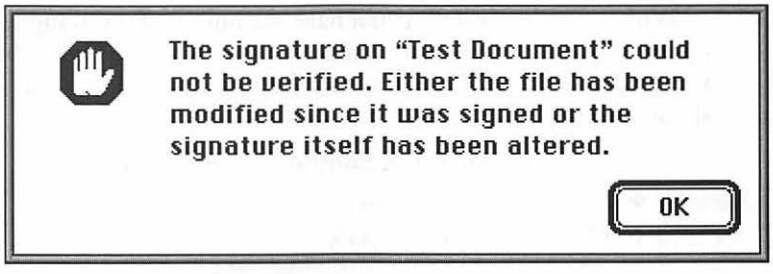


Figure 8.48 *Unable to verify a signature.*

QuickDraw GX

In the beginning of this chapter, I said that QuickDraw GX was Apple's new printing and imaging system. That hasn't changed. However, what QuickDraw GX changes is quite a few things. There are some details that don't change, but many details do.

One of the features of QuickDraw GX is printer independence. Once all programs become QuickDraw GX-compatible, any document you print will look the same regardless of the printer you're using. This does not mean that you'll get more dots per inch, since that is a printer-specific, but a document printed on a LaserWriter will have the same page formatting and look identical when the same document is printed on an ImageWriter.

Another feature of QuickDraw GX will help small offices to better use their hardware resources by sharing printers over a network, even though the printer itself is not an AppleTalk printer. And for those situations where a paper document is not needed, you can send a digital document and save a tree.

Finally, all of your printing will be controlled from your Desktop, where you'll use the same techniques you already employ when using the Finder to control your printing. This means that you will not have to learn new techniques or skills to better use your Mac.

Unfortunately, none of this happens without some cost. The cost of using QuickDraw GX right now is that very few programs use QuickDraw GX technology. It will be at least a year or more before program upgrades fully employ QuickDraw GX features, especially the displaying of and on-screen use of QuickDraw GX fonts. The first implementations of GX technology will be the use of GX fonts, even though you won't see the effects until your document is printed.

So, rather than go on and on about what GX will do, let's look at what it is and how it works right now. You have to remember that QuickDraw GX is a new technology and using it will be a process that evolves over time as programs incorporate the QuickDraw GX technology and become compatible.

Installation

Before we look at using QuickDraw GX, you need to know how to install it. QuickDraw GX uses the Apple Installer and you can perform an Easy Install or a Custom Install. Choosing an Easy Install will install all of the QuickDraw GX printer drivers and utilities.

With a Custom Install, you'll have the option of installing some or all of the QuickDraw GX elements. If you don't want all of the QuickDraw GX printer drivers installed, you should perform a Custom Install. For a Custom Install, you should install:

- Base QuickDraw GX Software for this Macintosh
- QuickDraw BX Utilities
- ATM for QuickDraw GX

- All QuickDraw GX Fonts
- The QuickDraw GX printers you need for your system

Don't forget to install the QuickDreaw GX portable digital document maker. If you forget this driver, you can't create digital documents. After you've installed QuickDraw GX, you'll have to restart your Mac. When it starts, you will find a Desktop printer icon for the printer that was selected in your chooser. You'll have to create Desktop printers for any printer you want to use. Figure 8.49 shows how your Desktop could look after installing QuickDraw GX. The black lines around the LaserWriter IINT Desktop printer in Figure 8.49 mean that the LaserWriter IINT is the default printer.

The installation process does several things to your Mac's system. Any PostScript and non-TrueType or bitmapped fonts that were installed are converted to QuickDraw GX fonts and the originals are placed in a folder called De-installed Fonts. Some utilities and files that you might want to gather and place in a folder are installed onto the top level of your hard drive. These are:

- LaserWriter Utility
- Paper Type Editor

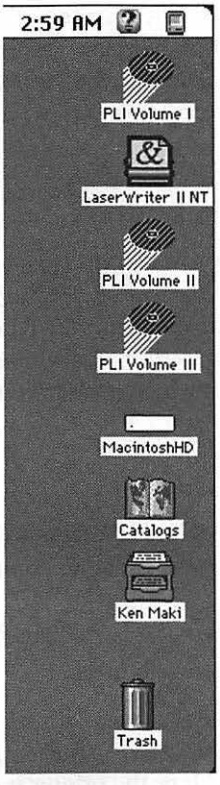


Figure 8.49 *The Desktop, after installing QuickDraw GX.*

- ❖ QuickDraw GX—Read Me
- ❖ Type 1 Enabler

After you've installed QuickDraw GX, read the Read Me file; it contains information about QuickDraw GX that could save you time and prevent problems. And, inside the System folder, you will find the files that were mentioned in Chapter 7.

At the moment, there are only a few QuickDraw GX printer drives. If you're using a non-Apple printer and it will not work with an Apple printer driver, you will have to obtain a QuickDraw GX printer driver from the manufacturer to use the printer with QuickDraw GX. Within a year, all printers should come with QuickDraw GX printer drivers. Until this happens, you'll just have to harass the printer's manufacturer to get a QuickDraw GX printer driver.

To use QuickDraw GX on your Mac, you'll need at least 8M of memory. If you try to install QuickDraw GX on a Mac that has less than 8M, you'll probably be disappointed with your Mac's performance and you'll have problems printing. Each Desktop printer you create uses memory, and it is recommended that you install no more than 7 Desktop printers if you also have PowerTalk installed and only 8M of RAM.

Creating and Using Desktop Printers

Now that QuickDraw GX is installed, it's time to learn how to use it. You need to know how to create, configure, and print to your Desktop printers. The basic task of printing is very similar to what you've already learned, but everything else regarding selecting printers and configuring them has changed with QuickDraw GX.

Creating DeskTop printers

First, let's create two more Desktop printers: One will be the portable digital document maker and the other will be a second LaserWriter Desktop printer. All Desktop printers are created from the Chooser; unless you're using the Chooser to access an AppleTalk file server, this will be the only time you'll use the Chooser. It is no longer used to select which printer you're using to print.

To create a Desktop printer:

1. Open the Chooser.
2. Select the type of printer you're going to create.
3. Choose how you're going to connect to the printer from the Chooser's pop-up menu.
4. Select the printer if it is an AppleTalk printer.
5. Click on the Create button.

Figure 8.50 shows the Chooser with a LaserWriter IINT selected. When you click on the Create button, the Desktop printer is placed on your Desktop and named after the printer you choose. Once the printer is created, you can rename it in the same way you would rename a file. Any new printer you create automatically becomes your

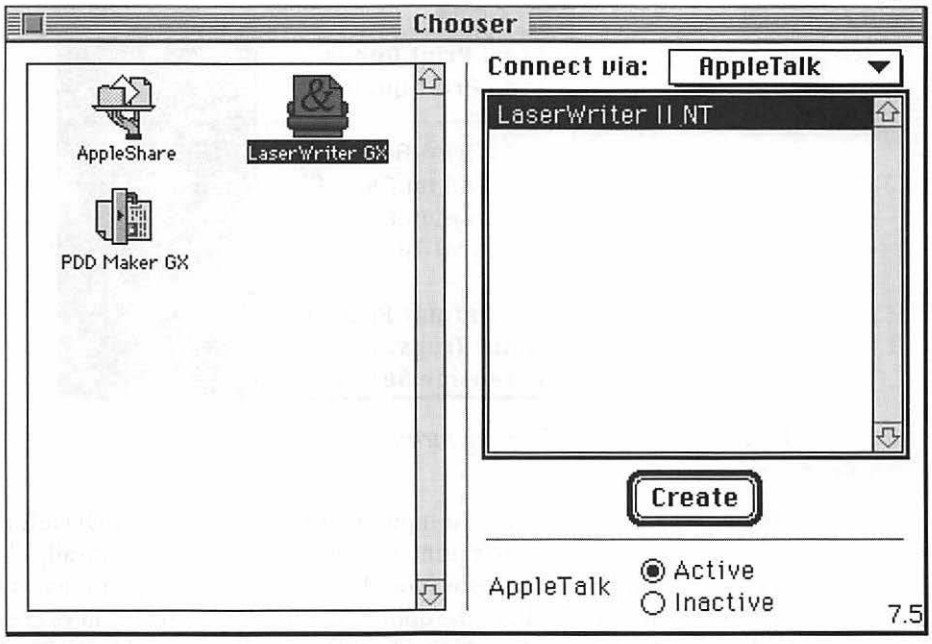


Figure 8.50 *The Chooser with a LaserWriter IINT selected.*

default printer, shown on-screen with a black border around it. Now create a portable digital document maker using the previous steps. When you're done, you will have three Desktop printers: One portable digital document maker and two regular printers. Part of this process is to look at your printer options and configure your printers.

Configuring Your DeskTop Printers

Because Desktop printers are Finder items, selecting one creates a new Finder menu called Printing. You will use this menu to configure your Desktop printers. Figure 8.51 shows the Printing menu. The two menu items we're interested in right now



The GX Paper Type Editor

The QuickDraw GX Paper Type Editor lets you create new paper sizes. When you've created a new paper size, it will be accessible from the Input Trays... menu item in the Printing menu. New paper sizes can be created for any QuickDraw GX printer installed on your Mac.

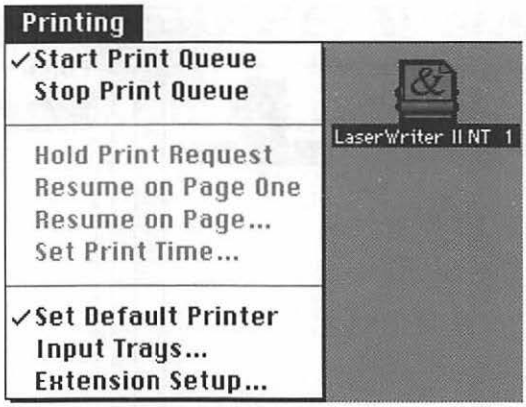


Figure 8.51 *The Printing menu.*

are the Set Default Printer and Input Trays... items. The Set Default Printer selects which printer is your default printer or the one that is automatically chosen when you print from within an application. If you're using a program that is QuickDraw GX-compatible, you'll have the option to select any printer you've created from within the Print dialog box. Non-QuickDraw GX-compatible programs will automatically select your default printer. If you want to use a different printer, you'll have to cancel your printing and then assign a new default printer. This is done by selecting the printer on the Desktop and selecting the Set Default Printer item from the Printing menu.

The Input Trays... menu item (Figure 8.52) lets you preconfigure a printer to use a specific paper tray or paper type, which is why you might want to have two Desktop printers that correspond to the same printer. You could configure one printer for

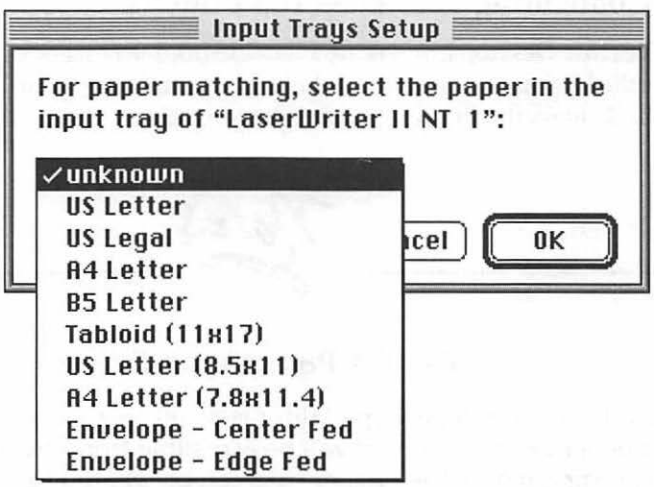


Figure 8.52 *The Input Trays dialog box.*

envelopes and the other for regular paper. Then, when printing from a QuickDraw GX-compatible program, you can just switch printers to print your envelopes.

Some companies have several printers and/or printers with multiple paper trays. By creatively setting up your printers, you can set up a printer for letterhead, another for envelopes, and others, depending on the type of paper you want to print on. Also, you can create and name the printers for their location.

One more feature of QuickDraw GX is its built-in printer sharing capability. You can share any of your Desktop printers except the portable digital document maker. Sharing a Desktop printer is just like sharing a file or folder—just select the Desktop printer and share it with the Sharing... item from the File menu. Using the Users & Groups control panel and the sharing access settings, you can determine who can use your printer.

Printing to Desktop Printers

The best way to learn how printing with QuickDraw GX works is to print a few documents. SimpleText is a QuickDraw GX-compatible program insofar as it uses QuickDraw GX print dialog boxes and it will print QuickDraw GX fonts, properly, even though it doesn't display the QuickDraw GX fonts. A program that is fully QuickDraw GX-compatible will properly display QuickDraw GX fonts.

In Figure 8.51, there are two menu items named Start Queue and Stop Queue. These commands let you print a document yet store it on your computer until you want it to go to the printer, rather than having it print immedately. For your example, select the Stop Print Queue menu item. Your default Desktop printer will change to display the queue status, displaying a small stop sign (Figure 8.53).

Now, open a SimpleText document—one of the Read Me files on your hard drive will work just fine. Print the document twice. Don't print two copies, but actually perform the print command twice. While you're printing, explore the Print dialog box. Figure 8.54 shows the Print dialog box. If your Print dialog box does not look like the one in Figure 8.54, click on the Choices button. We'll quickly review your choices starting with the pop-up menus. This example uses the choices for the LaserWriter GX print driver; if you're using a different print driver, you'll have dif-

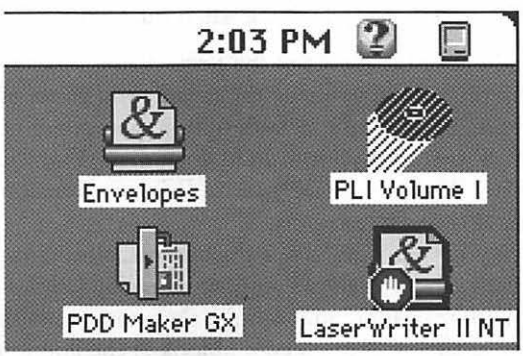


Figure 8.53 *A stopped printer queue.*

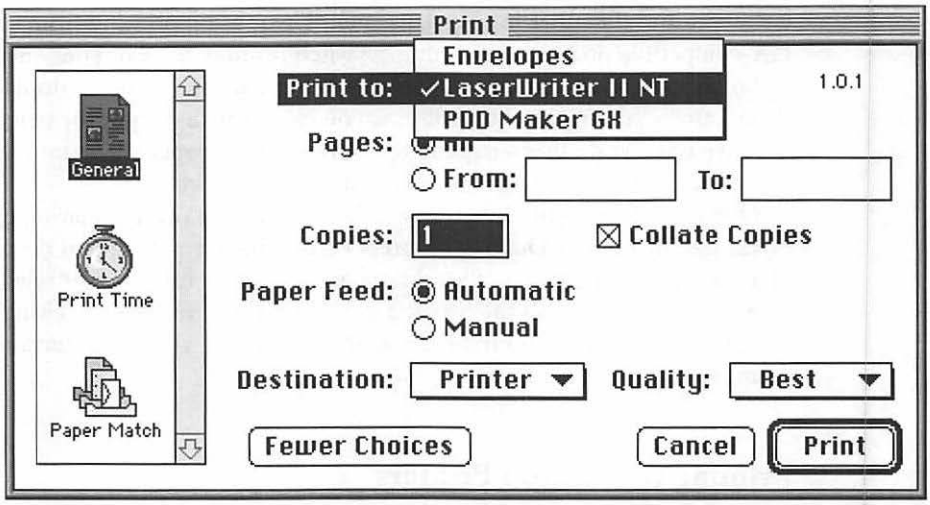


Figure 8.54 *The Print dialog box.*

ferent choices based on the icon selected in the right-hand side of the widow. The General options are:

- Print to—Lets you select the printer you're going to use.
- Pages—Selects all of the pages or a print range.
- Copies—Sets the number of copies you're going to print.
- Destination—You can print to the printer or you can print a PostScript file.
- Quality—Best is your only option. Some printers will let you select the quality, which usually relates to DPI.

When you select Print Time, you'll see a dialog box like the one shown in Figure 8.55. The options for Print Time are:

- Print Time Priority—You can select one of the options to determine when your document will print.
- Show Alert—You can choose to be notified when your document has printed and determine when the alert is presented.

The Paper Match part of the Print dialog box lets you determine which tray to print to, or you can override the default you've set for a printer and choose another tray. If you override the default option, you can choose whether you want to Crop, Tile, or Scale to Fit your printed document. You will have additional options if you've installed printer extensions. Printer extensions are discussed in the following section, "Printer Extensions."

Once you've printed a few documents, close SimpleText and open your Desktop printer. Figure 8.56 shows an open Desktop printer and the Printing menu. You'll see that additional menu items are now now available. I had you stop the print queue before printing so that you could look at the contents of a Desktop printer and see it in action. The first thing to do is double click on one of your spooled documents;

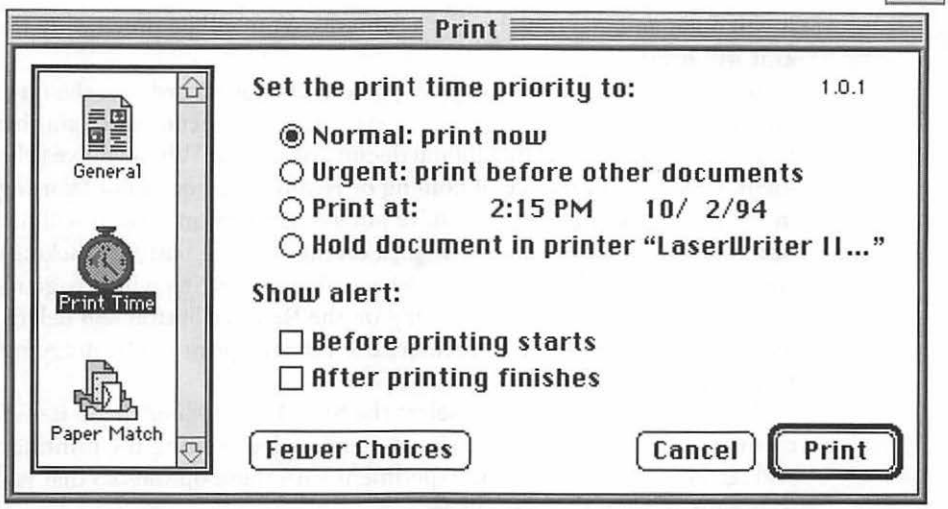


Figure 8.55 *The Print Time options.*

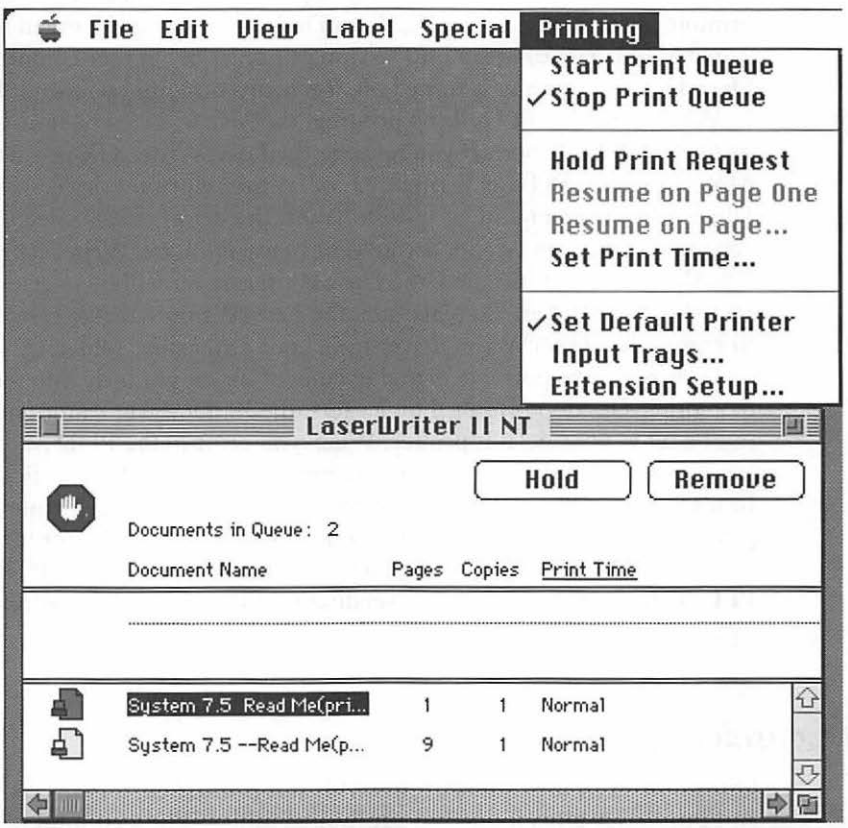


Figure 8.56 *An open Desktop printer.*

it will open and you can check it's contents. You will be previewing the document as it will print.

Before the document is printed, you can change its order in the queue by dragging it to a new position, or you can even drag the document to another Desktop printer, except the portable digital document maker. When you've selected a document, you have the choice of holding or removing a document by using the buttons in the Printer window. Once you've put a document on hold, it will not be printed until you select the document or click on the Resume button. Clicking on the Resume button will present you with a dialog box asking which page number you want to start printing from. Clicking on the Remove button will delete the document. You can also delete a document or cancel a print job by dragging the document's icon to the Trash.

To start the printer queue, select the Start Print Queue menu item from the Print menu. Other options from the Print menu include setting the printing time, holding, and resuming your print job. Experiment with these options so that you know how to use them when the need arises.

If you are printing from an application that is not QuickDraw GX-compatible, it is possible that the program will not print properly. When this happens, you may have to turn off Desktop printing before you print your document. Shutting off Desktop printing is done by selecting the Turn Desktop Printing Off menu item from the Apple Menu. You can turn off Desktop printing only in non-compatible programs. Once Desktop printing is turned off, it remains off until you turn it back on.

When you turn off Desktop printing, the Mac will use the non-QuickDraw GX printer for your printer. If you're using the LaserWriter GX printer driver, your Mac will select the LaserWriter or LaserWriter 8 printer driver. The driver is selected by version number; unfortunately, the driver that is selected is the oldest version, not the newest. So, if you want to use the LaserWriter 8 drive and have the LaserWriter driver installed, the LaserWriter driver will be selected instead of the LaserWriter 8 driver. To make sure the LaserWriter 8 driver is selected, you'll have to remove the LaserWriter driver from your Extensions folder.

Printing to the portable digital document maker is a little different from printing to another Desktop printer. For starters, the PDD Maker cannot be opened, yet it can be set as your default printer. When you print to the PDD Maker, you will be asked to save a file. The resulting file can be opened by double clicking on it, and the result is exactly like opening a document queued for printing from within a Desktop printer. You can even drag the PDD file onto a Desktop printer to print a paper copy. Also, PPD files can be digitally signed with the PowerTalk DigiSigner. The PPD Maker is a perfect tool for sending documents to others without having to send a paper document.

Font Considerations

QuickDraw GX uses its own fonts. When it is installed, it converts any bitmapped and PostScript fonts found in your System folder. The attributes of the QuickDraw GX fonts are somewhat incompatible with older printer drivers. So, if you're using a

noncompatible program and turn off Desktop printing, you should use a TrueType font or one that is installed in your printer; otherwise, you'll get unpredictable printing results.

QuickDraw GX does not use Type 1 PostScript fonts. Any PostScript font has to be converted into a QuickDraw GX font. This is done with the Type 1 Enabler utility that was installed with QuickDraw GX.

When you run the Type 1 Enabler, you will be asked to select the font suitcase of the folder that contains the Type 1 font you want to convert. Do not select your hard drive; select only the folder that contains fonts you're going to convert, and do not place the fonts into your System folder until you've converted them.

The Enabler will ask you where to put the new enabled font. This should be your Fonts folder inside the System folder. If the new font is placed elsewhere, you'll have to put it into the Font folder before you can use it. After you've installed the new font, you'll have to restart your Mac before it can be used.

If you decide to deinstall QuickDraw GX or turn off the QuickDraw GX extension so that you can print using non-GX printer drives, you will have to reinstall the fonts in your Deinstalled Fonts folder. This also means that you'll have to reinstall your QuickDraw GX fonts or use the Type 1 Enabler before you use QuickDraw GX again.

All of this font manipulation means that you'll want to make sure you're going to use QuickDraw GX before installing it. Otherwise, switching font setups will quickly become a problem and result in lost time and frustration. Also, using GX fonts without GX will result in dialog boxes that don't look right, and you could experience other strange font-related problems.

Printer Extensions

Printer extensions are like System extensions, except they modify how your documents are printed and can add printing options. Two printer extensions are included with the System 7.5 CD-ROM installation disk. You should install these and then play with them. As time goes on, more printer extensions will become available.

Printer extensions are installed by dragging the extension onto your System folder's icon. Your Mac will automatically move or copy the extensions into your Extensions folder. Once installed, the printer extensions are active and, by default, selected.

If you do not want to use an extension with a particular printer:

1. Select the Desktop printer.
2. Choose the Printer Extensions... item from the Printing menu.
3. Deselect the extensions you don't want to use by unchecking their check box.
4. Close the Printer Extensions dialog box.

Printer extensions can be used to print a watermark, place a border around your document, rotate, print four copies to a page (4-up printing), as well as provide many more options. The two extensions that come with the System are examples of what can be done with extensions.

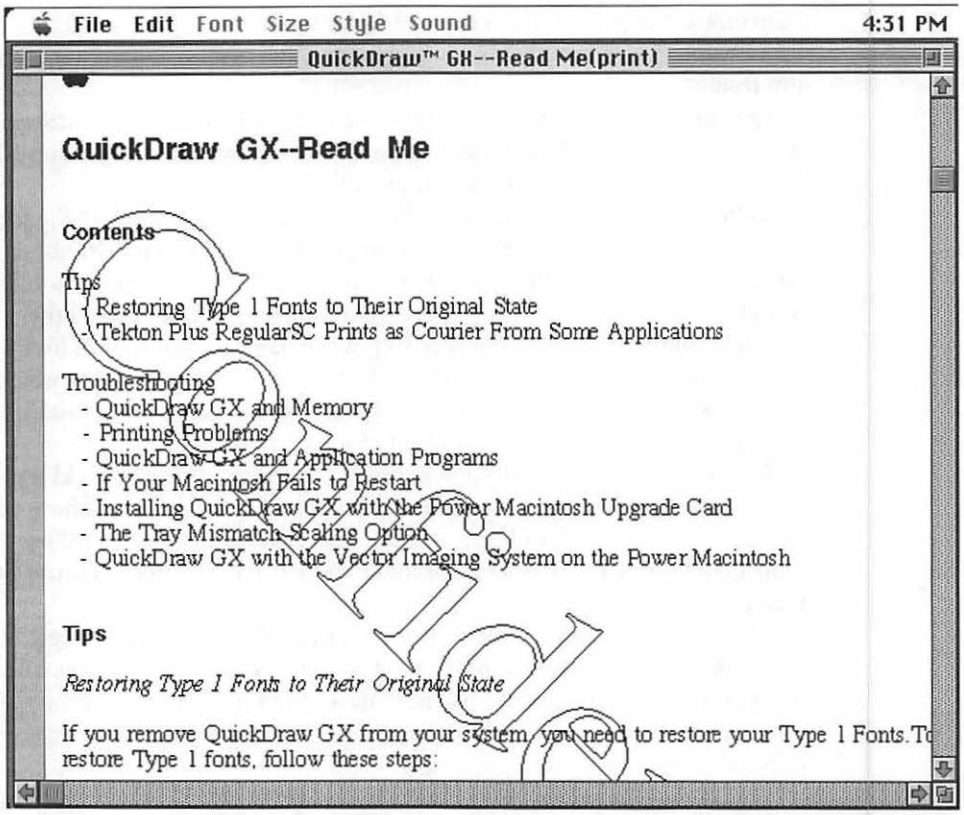


Figure 8.57 *A document with a watermark.*

When you print with an extension, you can always look at the result before you print by opening your document from within the Desktop printer. Figure 8.57 shows what using the Watermark extension can do.

Summary

Although this chapter does not contain everything there is to know about System 7.5's new enhancements, you have a good overview of AppleScript, PowerTalk, and QuickDraw GX. Use this chapter as a starting point for exploring the power of these tools. The more you learn about how they work, the more productive you'll be in the long run.

Keep in mind that setting up your System and learning how to use it is a time-consuming process, but the more time you invest now, the more you'll save later when you really start using your Mac. For example, if you spend a few hours with AppleScript, you will find ways of using it to enhance how your Mac operates and you'll develop or find some scripts that will save you time.

QuickDraw GX can be used to enhance your printed output and make your documents look more professional, not to mention making the printing process easier and more controllable. And PowerTalk will make communicating with others a lot easier and more efficient. You'll spend less time dealing with your communications, have the ability to communicate using more services, and spend less time overall.

So, as you use your Mac, keep these goals in mind. Remember, the way these enhancements work employs principles you'll find in other programs and builds on the Finder's operations as well.



CHAPTER 9

Customizing Your System

Introduction

Now that you have a nice, clean System installed and know all of its different elements and tools, you are ready to really make it jump through its hoops. The whole purpose of having a computer is to make your life easier, your business more productive, or maybe just have fun. Whatever your reasons, you want to get the most from your Mac. The question is: What does it mean to get the most from your Mac? For some, it means learning everything they can without becoming a programmer. For others, it is finding the most expedient way to get a particular job done, while still others will look to squeeze the maximum efficiency from their System. Usually, the answer is a combination of these possible responses.

No matter how many answers are given to the question, one thing is sure, the answer is different for each Macintosh owner. Therefore, there is no way to meet everybody's expectations or answer everybody's questions. However, it is possible to give you an idea of your Mac's potential. Maybe you will find that there are things you can do that will make your Mac more than a glorified calculator or very sophisticated typewriter.

This chapter explains some of the advanced features of System 7.5. In addition, it will look at software utilities for enhancing your System and there will be a discussion about programming, which may be more accessible than you think.

Figure 9.1 is a picture of the Finder, but it is not the picture you are used to seeing. There are three additional menus and a couple of indicators not found on the standard menu bar. The figure is offered here as an example of what can be done; it is up to you to decide if you want to expand your Mac's native abilities. One thing to consider as you read this chapter is that a lot of what is discussed will require a time commitment. It is one thing to install a utility that will allow you to customize your working environment; that will take only a few minutes. Making the utility really work for you, however, will take more time, experimentation, and a certain amount of dedication. Most of what is discussed in this chapter will make this demand on

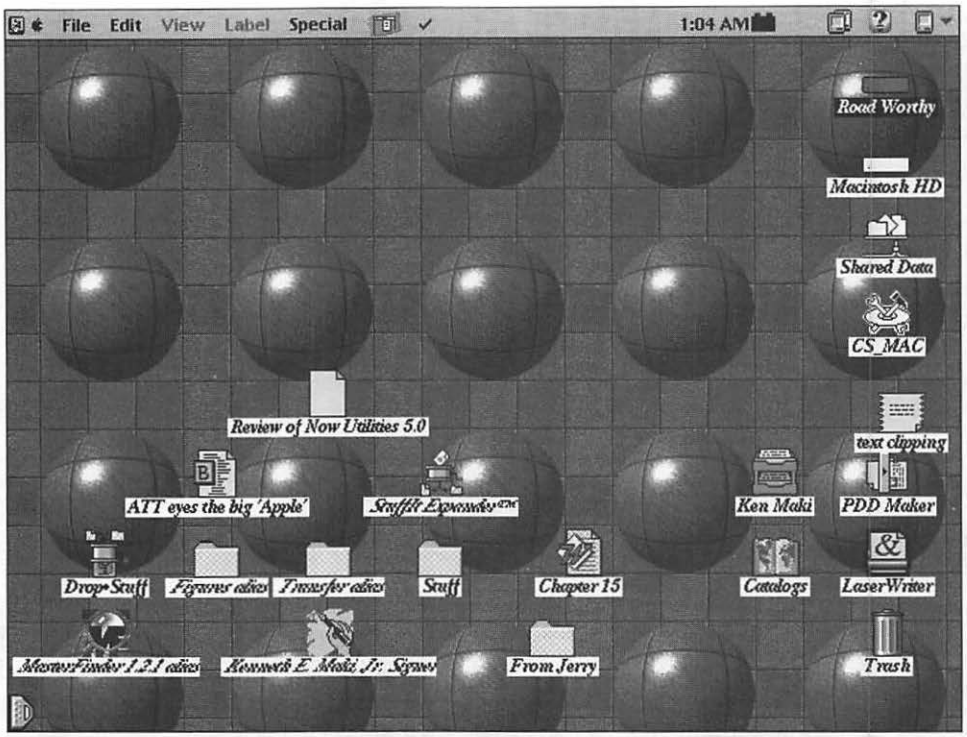


Figure 9.1 *An enhanced Finder.*

you. Don't expect to install some of these utilities, and experience a magical transformation of your Macintosh; the technology is not yet advanced enough for that to happen. Your Macintosh is *still just a computer*, which means that no matter how advanced the operating system may be, it will do only what you tell it to do. Sometimes, the telling takes time, but once it has been told how to do something, it will not forget.

To determine if the amount of time it takes to customize your system is worth the effort, weigh the time spent teaching your Mac its new tricks against the time the customization will save. Unfortunately, this is also a catch-22. You won't know how much time you'll save until you've installed the utility. This can be determined only by how you use your Macintosh and whether you're willing to put the time in at the beginning or while later doing your work.

The topics of this chapter are:

- Advance System 7.5 Features (A World of Possibilities)
- System Utilities
- Beginning ResEdit
- Programming

Don't let these scare you; there is nothing here that cannot be mastered. Even programming can be simpler than you might think. If you can make your Mac do

something you really need but can't find off the shelf, then you have really accomplished something.

A World of Possibilities

Apple has included some features in System 7.5 that make it stand head and shoulders over any other personal computing platform. The Mac was fairly versatile using System 6.0.X, but System 7.5 has made it possible to: 1) use your Mac as a collaborative tool for working with others on a common project; 2) automate tasks that used to be repetitive and boring; 3) have different programs interact with each other to increase productivity and save time; 4) easily modify the Mac to meet your needs.

This section will talk about some of the advanced features of System 7.5. To utilize these features, all you need are applications that are System 7.X-friendly, meaning that they can recognize that they are being used with System 7.X and can take advantage of its abilities. Most programs are at least System 7.X-compatible, which means that they will run on a Mac with System 7.X but may not be able to use the new capabilities of System 7.X or 7.5. (The next step beyond System 7.X-friendly is System 7.X-dependent, which means that an application requires features in System 7.X to run.)

When you go shopping, if you are looking for programs that will take full advantage of System 7.X's features, you will have to ask some questions. Does the program use Publish and Subscribe? Is it Apple Events-aware? Can it use Drag-and-Drop? Is it System 7.5-friendly? Not all applications have evolved to this stage, but soon a given application will have to take advantage of these features or the publisher will be out of business.

This section will look at the following System 7.X features:

- Publish and Subscribe
- Apple Events
- QuickTime
- Making Your Mac Talk to You

These are not all new features of System 7.X or System 7.5, but ones you can use to make your life easier or to have fun.

Subscribe and Publish

System 7 has a feature called Subscribe and Publish, which is similar to the Copy and Paste commands. Rather than being a one-time Copy and Paste, however, using Publish and Subscribe creates a live link between what you would copy and the document in which you've pasted the information. When you change the original, the item that you would have copied, its counterpart that you would have pasted is also changed automatically. You use Subscribe and Publish by selecting part of a document and creating an *Edition*. Creating an Edition is called *Publishing*. The Edition is then placed into another document, created by a differ-

ent program, by *Subscribing* to the Edition. Subscribing is like pasting the data from another file into your document, except that you won't be able to edit the information contained in the Edition. Information in an Edition can be edited only in the Edition's original document.

To edit the information from a subscription, you have to open the original document from which the edition was created, edit the file, and save it. When you save the file after you've edited the section from which the Edition was made, the Edition is automatically updated, which in turn will update any documents that contain the Edition as a subscription. This feature works over networked volumes, so if several people are working on a project, such as a newsletter, one person can be working on the graphics, another on the page layout, and a third on the copy. Since all of the information comes together in the Page Layout process, each of the different elements can be sent to the layout person via an Edition. Then, when revisions need to be made, the people responsible update their files to automatically update the newsletter.

Using Editions is useful for any document that uses data from various programs and is updated frequently. An example of this might be a quarterly report, where the spreadsheet file needs to be changed every quarter but the word-processing document it is placed in remains the same. You would update your spreadsheet file and print the word-processing document to complete your report. This can save time if you have several reports that use the same data or a standard report in which the information is frequently updated. Editions are useful if you have several publications that share graphics. If you Subscribe to Editions of the graphics rather than placing them individually into each manual, when you update a graphic, it will be updated in all of the manuals.

The following steps graphically represent this process:

1. Select the text or graphic you want to publish and select the Create Publisher... item from the Edit menu (Figure 9.2).
2. In the Save dialog box that appears, save your Edition file.
3. Open the other program you're going to use.
4. Choose the Subscribe... item from the Edit menu.
5. In the Open dialog box that opens, find and open the Edition file you just created.
6. The contents of the Edition file will be placed into your document.

When you've published an Edition, the text or graphic is marked so that you know that it is also being used in another file. Figure 9.3 shows the text and markers after an Edition has been published. When you've subscribed to an Edition, the section of your document is also marked. Remember, you can't change the contents of an Edition from the Subscribing program. Figure 9.4 shows how a subscribed Edition appears in your document.

As always, you are constrained only by the limits of your imagination when using Subscribe and Publish. You can use it with databases, spreadsheets, word processing, and any other program that is fully System 7.X-compatible.

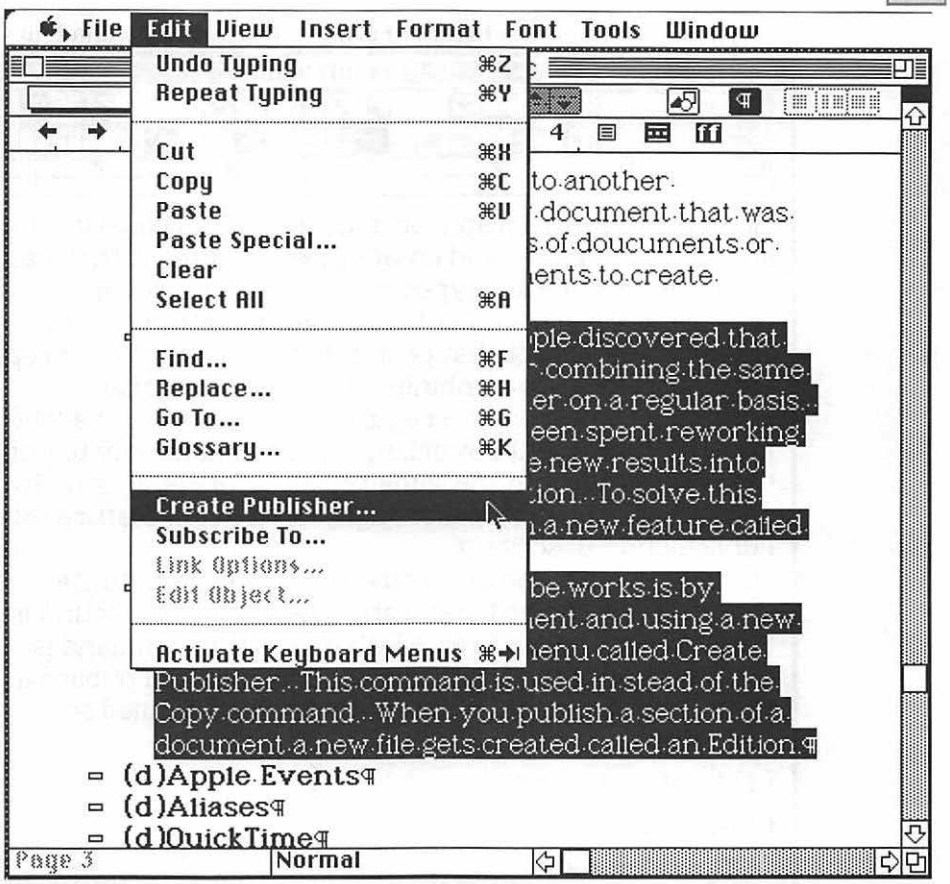


Figure 9.2 *Creating a Publisher in Microsoft Word.*

Apple Events

With System 7.5, Apple implemented a set of requirements for all applications to support the ability to send and receive commands to each other. This new feature is called Interapplication Communications (IAC). The commands that are sent are called Apple Events, and every application is supposed to be able to respond to at least the following four commands:

- Open Application
- Open Documents
- Print Documents
- Quit Application

If you have installed the System 7.5 (or System 7.0 with the System 7 Tune-Up), you can see a good example of how Apple Events work. Start up as many applications as your Mac can handle, and then try to open one more. If you get a message like the one shown in Figure 9.5, you will be witnessing an Apple Event in action.

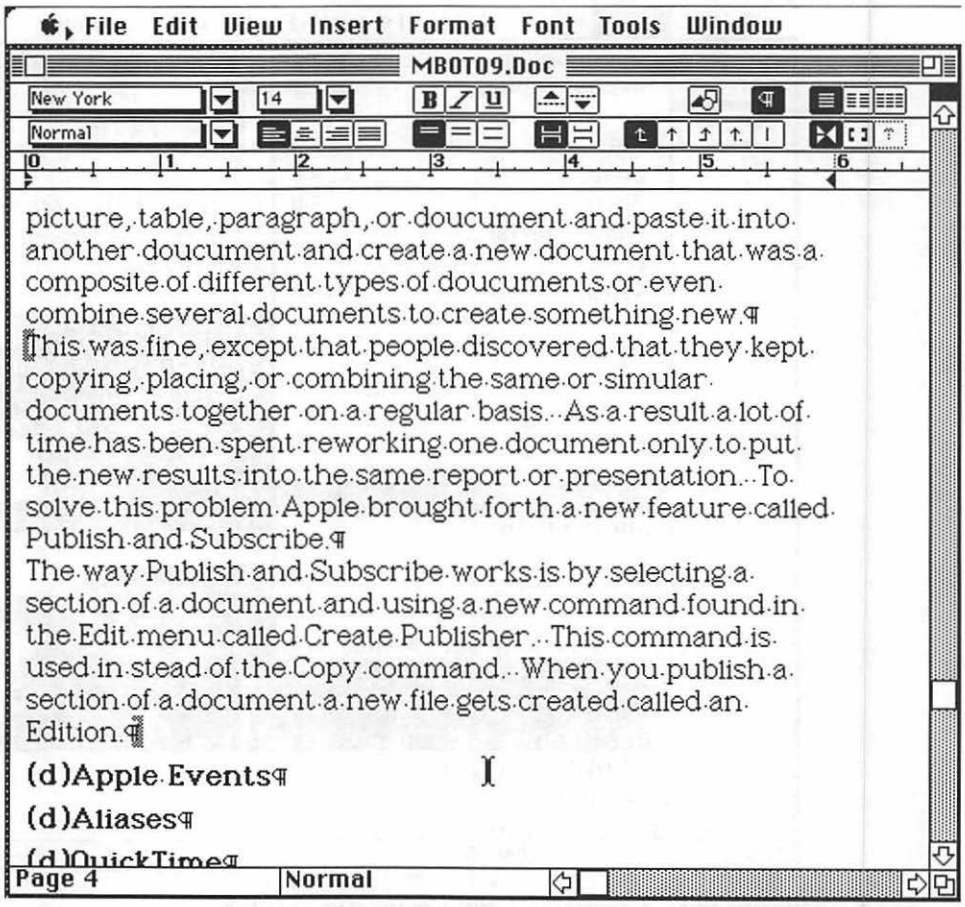


Figure 9.3 *The text used in the Edition and its markers.*



More about Apple Events

Actually, you've already seen Apple Events in action. AppleScript, as discussed in the last chapter, is based on AppleEvents, which is a subset of the Apple Open Collaboration Environment. This section is intended to provide you with more information about inter-application communications (How's that for technobabble?).

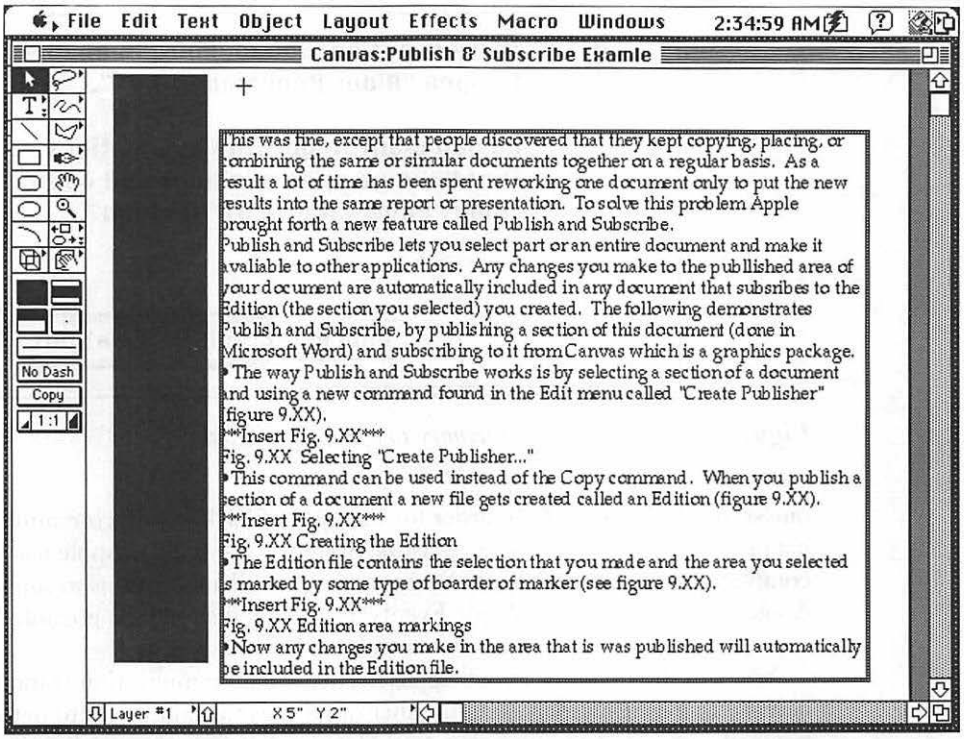


Figure 9.4 *The text from the Word document in a graphics document (the graphics program is Canvas).*

In the foregoing example, the Finder is requesting permission to send an Apple Event command to TeachText. It is going to tell TeachText to quit so that Word can open. If you're using System 7.0 or 7.0.1 and do not have the System 7 Tune-Up installed, Apple Events won't work quite right and you will get a message like the

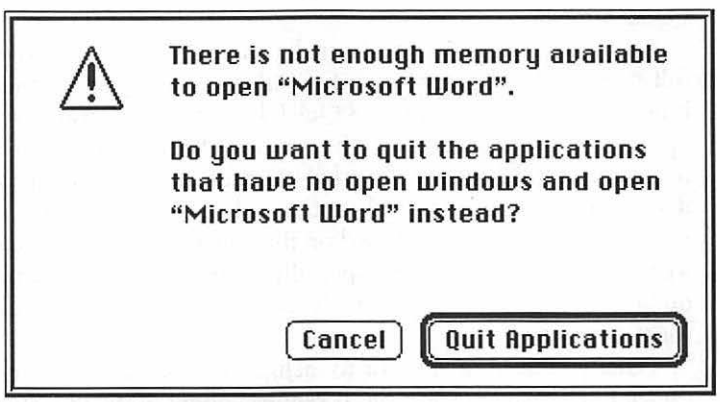


Figure 9.5 *Apple Events example.*

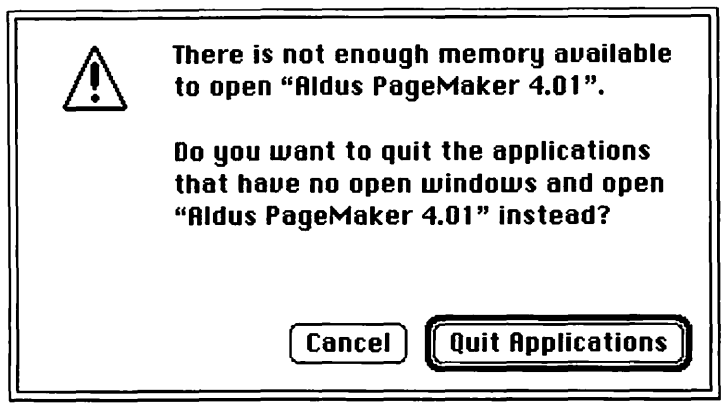


Figure 9.6 *Not enough memory to open application.*

one shown in Figure 9.6. In order for this type of background communication to happen, the programs involved must be System 7.X-friendly. Apple has published a complete set of standard Apple Events and wants all applications to support a suite of Apple Events called Core Apple Events. In theory, it should be possible for one application to almost completely control another.

You will should know about Apple Events and interapplication communication because there are an increasing number of utilities that allow you to perform all kinds of automated actions using Apple Events. You'll find a number of them on the CD-ROM that comes with this book.

QuickTime

Previously, QuickTime was not part of the System proper but a product that you had to purchase and add. However, with System 7.5, it is now included and considered to be a basic part of the System. It is installed when you install Apple's multimedia software while performing a custom install. So, now that you have it: What is QuickTime?

QuickTime is Apple's Multimedia engine that enables your applications to use full-motion video, graphics, and sound as integral parts of their functions. It has built-in data compression, so a QuickTime move, although still a disk hog, will take up as little space as possible. The uses for QuickTime are numerous: It can be used to include a slide show with verbal commentary in a word-processing or spreadsheet document. You can put a full-motion video, complete with sound, into the quarterly report. The whole idea is based on the concept that a picture is worth a thousand words, and several pictures, especially if they are motion pictures, are worth a few million. QuickTime represents the next stage in the evolution of business and personal computing.

What you need to view, or to include, QuickTime in your documents is the QuickTime system extension. It requires about 400K of system memory to work, and you need to be able to use 32-bit QuickDraw. In other words, you need a



QuickTime's Usefulness

QuickTime is not yet used as an everyday tool. QuickTime files require too much disk space and inflate the size of a document dramatically. They are too big to effectively send over a network or a modem and they cannot be printed. Until we reach the day when paper is no longer the primary medium for business and personal communications and data networks can handle the increased traffic load created by the large data files that QuickTime demands, it will remain a tool for specialists who work with video, desktop presentations, and other areas where moving images are needed. In the next few years, as video conferencing replaces physical conferences, we'll begin to see a real need for QuickTime.

Macintosh with a 68020 or higher processor. QuickTime will not work on a Plus, SE, Portable, PowerBook 100, or Classic. Most of the uses of QuickTime are in the business world, where QuickTime is an essential component for Desktop presentations, and in video animation and production.

Apple is continuing to work on QuickTime. The next version of QuickTime, which may be out by the time you read this, is QuickTimeVR. QuickTimeVR is the first of several substantial upgrades to QuickTime; VR stands for Virtual Reality. QuickTimeVR will move Apple's multimedia software into three-dimensional imaging and video movies. Where this technology will end up is anyone's guess, but, for the time being, you can use QuickTime to make and play movies on your Mac. Because QuickTime is as complex as some of Apple's other technologies, you will have to find more information about QuickTime from other sources. However, for fun, you will find some QuickTime tools and movies on the CD-ROM included with this book.

Making Your Mac Talk to You

On the System 7.5 CD-ROM inside the CD Extras folder, you'll find another folder called Other Extras. Inside that folder is one called Upgrades, and inside Upgrades is another folder called PlainTalk 1.3. If you read the Read Me file in the PlainTalk folder, you might think that the PlainTalk software cannot be used on your Mac. If you don't have a Power Macintosh or one of the Quadra AV models, this is partially true.

If you run the PlainTalk Installer, you can custom-install the Text to Speech part of PlainTalk on almost any Mac. The Text to Speech installation will place files into your System folder that let your Mac talk to you; it will even read to you. It is sometimes fun and useful to have your Mac read what you've written. Most of the text

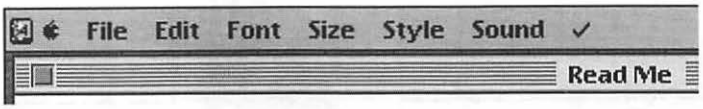


Figure 9.7 *SimpleText's Sound menu.*

editors, including SimpleText, and word-processing programs have the ability to read back part or all of the text in a document. One quick way to see if the Text to Speech software is installed on your Mac is to run SimpleText. If the Text to Speech software is installed, SimpleText will have an additional menu item called Sound (Figure 9.7). By selecting text, you can have it read to you in a variety of voices.

For those of you lucky or prosperous enough to have a Quadra AV or Power Macintosh, you can also issue voice commands to your Mac. To issue voice commands, you need the full installation of PlainTalk. Although the voice recognition features of PlainTalk are mediocre, this feature is still fun to play with. I'm not sure I would trust the technology to be a productivity tool yet. PlainTalk, however, does represent the future: That day when we will talk to our computers rather than use a mouse and keyboard. But it will be several years before the technology is perfected to the point that you'll have a Voice Macintosh. If you have the equipment and practice, you should be able to make your Mac do some tasks vocally. It is fun to talk to your Mac—it will drive those around you nuts.

System Utilities

There are almost more utilities for enhancing your System and work environment than you can shake a stick at. When you consider all of the shareware, freeware, and commercial programs that are out there, you will find that you have many choices regarding what packages to use.

There are several different types of utilities that you should seriously consider using. Many of the packages are discussed in other parts of this book, and some of them are even included on the CD-ROM that comes with it. However, rather than providing in-depth tutorials for each type of utility, this section will discuss the utilities available and briefly outline their features.

The different types of utilities listed are:

- Finder Enhancements and File Tools
- System Utilities
- Memory Management
- Adding Control Panels
- Adding Extensions

Although this section will not cover all of the programs available, it will give you a good idea of the types of enhancements you can make to your Macintosh operating environment. If you want a different way to access your applications and files, or if you're tired of the Desktop pattern and want something different, you can have what

you want. Someone is always coming up with some new feature for your Mac, so if you don't see anything you like here, read the topical magazines.

Finder Enhancements and File Tools

A Finder enhancement utility is one that replaces the Finder or changes how the Finder operates. The programs discussed here are not single function utilities; they have multiple features that change or replace the Finder interface or can act as a Finder replacement for the purposes of file management. The Finder will neither display all of the information about a file nor let you change file attributes. Because there are times when you may want to view your files in a different format or get more information about a file, you may want to use one of the utilities listed in this section.

The programs listed in this section are representative of what you can find in computer stores and from mail-order houses. It is not a market survey but an example of what is available.

At Ease

At Ease is an Apple product that replaces the Finder. It allows you to limit access to your hard disk and the programs someone else (such as your children or coworkers) may use. If you wish to have the Finder available to you, you can password-protect it. While At Ease is running, your Desk Accessories and any other folder alias in your Apple Startup Items folder are unavailable without a password.

The real advantage to this program is that your hard drive will be protected, and once you have arranged all of your files, you will be the only one who can change them. If you wish, you can force the person using your machine to save all of his or her work onto floppy disks. For a quick means of protecting your Macintosh from prying eyes and safeguarding your data, you would be hard-pressed to do better. Figure 9.8 shows the At Ease application. Remember that you determine what applications are available.

DiskTop

Although DiskTop, published by CE Software, is mentioned in other chapters as a file maintenance utility, it is really a mini-Finder for use in other applications. With DiskTop, you can perform the most essential Finder functions without returning to the Finder.

You may want to use DiskTop instead of the Finder because it is faster at many of its operations because it does not display icons. Using it to find that lost file, retrieve a folder on the fly, move a file or folder, and so on is much faster than using the same function built into the Finder. Figure 9.9 shows DiskTop and its menu. By double clicking on a drive, you are presented with a list of its folders and files. You can even use it for launching applications, as you would in the Finder.

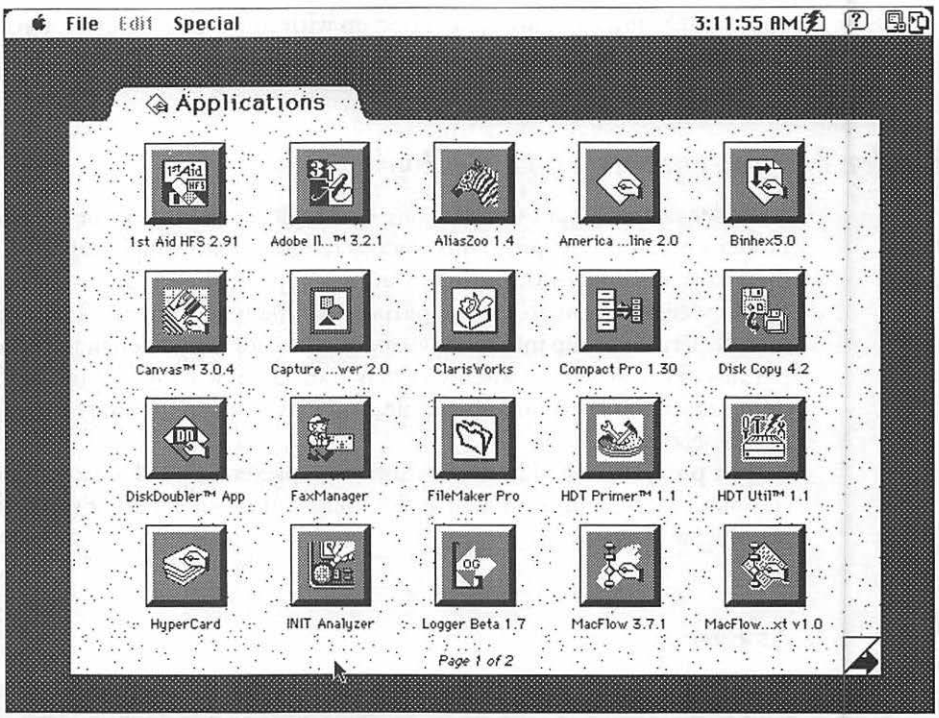


Figure 9.8 *The At Ease Desktop.*

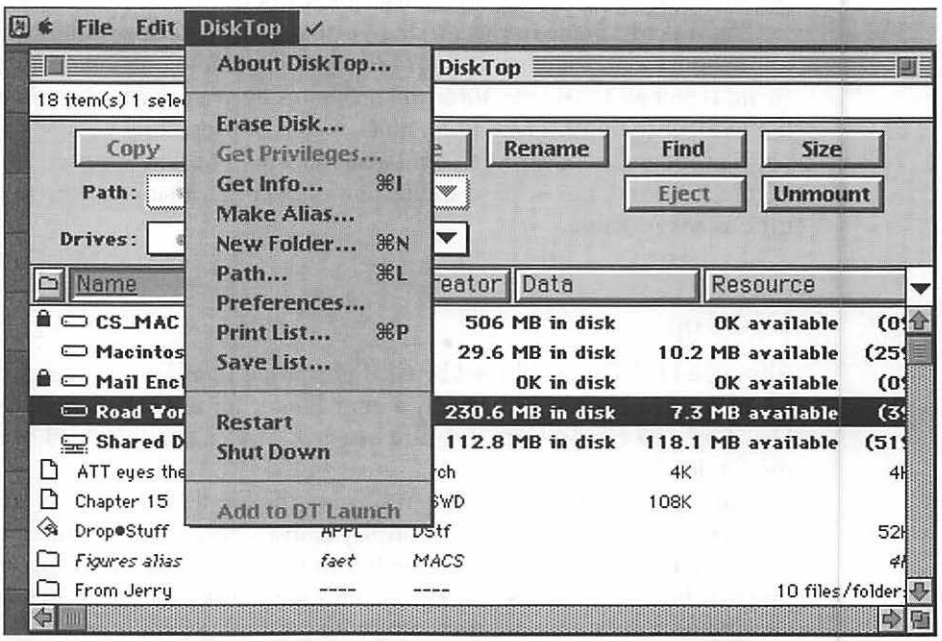


Figure 9.9 *DiskTop with its menu.*

DiskTop also allows you to change the attributes of files, find files, and perform most Finder functions without going to the Finder. DiskTop also comes with another program called Gopher, which is a program that will search for text strings in all of the documents it can read. If you have forgotten the name of a file but know a name or a phrase in the document, you will be able to find it using Gopher. It is a handy utility to use when you have hundreds of documents and need only one that contains a specific reference.

MasterFinder

MasterFinder is a program from Olduvai Software that is similar to DiskTop but with a few twists. There are certain features almost all of these File utility/Finder replacement programs share. Each one will have different ways of displaying your files, finding files, and usually includes a launcher. Where they differ is in how they display files, their options for finding files, and what information they will offer you. Whereas DiskTop offers only a list view that is similar to the Finder's list views, DiskTop can display more information about a file. MasterFinder uses a hierarchical method for displaying the contents of a hard disk. Figure 9.10 should help make this clearer. Compare Figure 9.10 with 9.9.

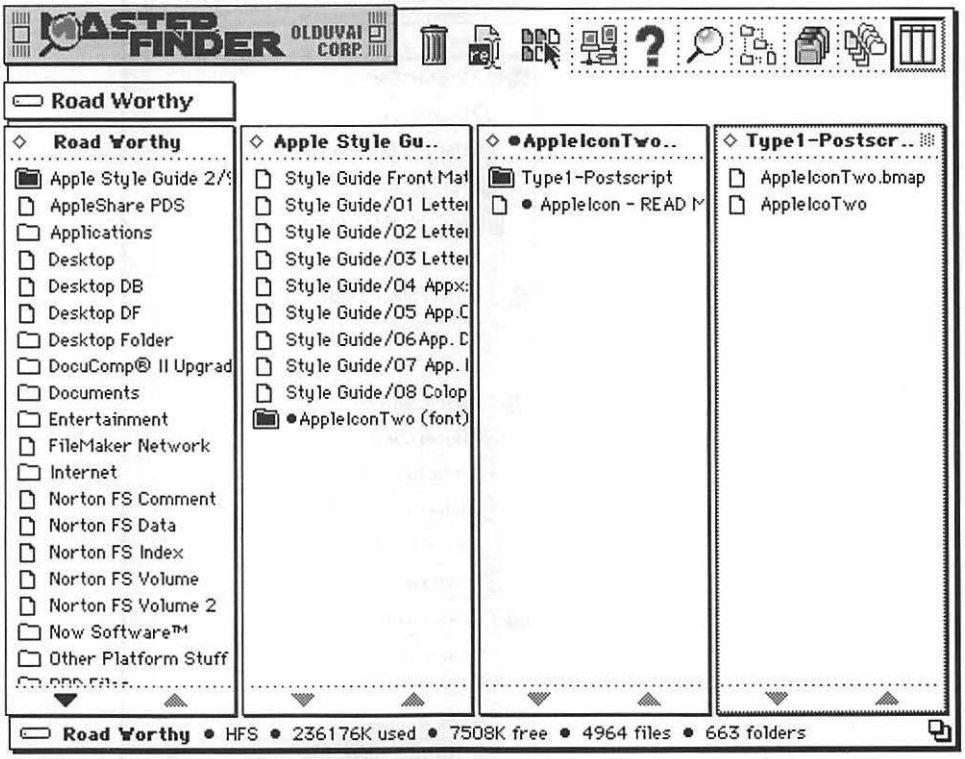


Figure 9.10 *MasterFinder's interface.*

The icons across the top of MasterFinder's window represent one way of switching views and getting information about a particular disk, folder, or file. Its commands can be accessed by menus or by icons, but how it displays information is very different from DiskTop.

Deciding which file utility to use can be difficult. Before you buy, go to a good Macintosh store and check out the different programs available and try them out.

ProFiles

ProFiles is yet another File utility designed around the idea that traditional methods for organizing data are inadequate. So, rather than having to use the standard list views, you can use ProFiles to create a series of views for data that you organize, even though the data is in different folders or on a server on the network.

ProFiles is a program that requires some practice to use but, once you've mastered it, it is the more creative of the File utility programs. It takes advantage of Drag-and-Drop as well as providing some speedy tools. It will even synchronize folders that might be on different volumes.

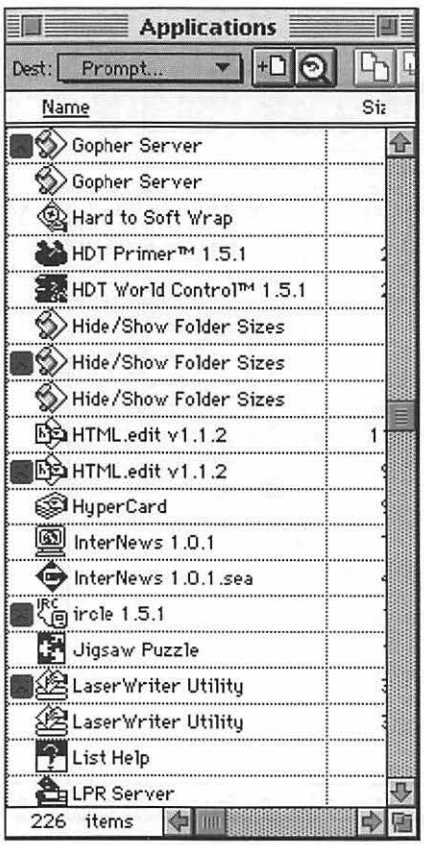


Figure 9.11 *An application list created by ProFile.*

Figure 9.11 shows a ProFile that lists all of the Applications on a disk drive. ProFile can create a list for any type of file.

System Utilities

System utilities enhance or modify how your Macintosh system operates. They do not do anything radical and, in some cases, they perform some of the same functions as the Finder enhancements. The difference is that these utilities are extensions that directly modify the Finder. Hence, they work at a system level, not as an application running on top of the Finder.

The idea behind any set of utilities is to increase your productivity, save you time, and make using your Mac easier. When you purchase a set of utilities, you're getting a set of software tools that a company has put together because it thinks it is what the computer user will need. But, what you will need in a set of utilities is highly individual; what one person finds to be useful, another will consider an annoyance. So, carefully evaluate any set of utilities before you purchase.

This section will look at three utility sets, and some single utilities will be briefly listed. These programs have been selected so that you can see the wide variety of tools and get an idea of what can be done to customize your Mac.

Now Utilities

Although some of the features of Now Utilities are mentioned in other areas of this book, they are all described here. Now Utilities is a collection of utilities that can be used selectively or all together. Now Utilities has one of the most popular utility suites available for the Mac. The various tools included in this package are listed here:

- NowMenus—NowMenus turns all of the folders or their aliases in your Apple Menu Items folder into a hierarchical Menu. It will also work with subfolders as well. NowMenus also let you make custom menus for launching programs and slecting documents.
- NowSave—Remembers to save your work for you. You set the interval in keystrokes, minutes, or mouse clicks. NowSave also protects your work by recording your keystrokes. At least you can recover your text.
- Profiler—Searches out all of the details of your system. It looks at the hardware, your applications, Cdevs, and extensions, and then provides you with a report. This can be very useful for troubleshooting.
- Startup Manager—Startup Manager is an extension and Cdev manager. It lets you turn on or shut off any of your extensions and Cdevs. Startup Manager can also help you isolate an extention or control panel that is causing problems.
- Super Boomerang—Modifies all of your open or save dialog boxes so that you can quickly perform some Finder functions, such as finding and creating new folders. It also lets you quickly select folders you access often, among other tricks.

- Now FolderMenus—Turn any menu into a hierarchical menu. This is a nice implementation of a useful utility.
- Now QuickFiler—Replaces the standard Find utility. You have more options and a faster search through your hard drive.
- WISIWIG Menus—The final utility in this package will enhance the Font Menu in any of your applications. It will combine font families, let you reorder how they appear, and show you the font in its typeface.

WizTools

WizTools, published by ASD Software, Inc., are a set of utilities that duplicate some of the features that are now part of System 7.5; however, there are a couple that are interesting. Many people have found these utililtes to be valuable and perish the thought of being without them. These utilities are:

- ColorSwitcher—Changes the number of colors your monitor displays with a keystroke command. You can store two commands to switch from one setting to another or open the Monitors control panel.
- Finder Tools—This utility does several things, all of which can modify the Finder. Some of your options with Finder Tools are to speed up Finder copying, add a Quit command to the Finder, display all Desktop icons (the icons for those files you drag to the Desktop) as small icons. Finder Tools will also let you switch between applications with a keystroke command, and it will link documents created with a program you may not have with another compatible program.
- Keystroke Recorder—Keeps a text of every keystroke you make so that you can recover your work if your computer should crash before you save your changes. It is good for retrieving raw data and similar to Now's NowSave.
- Launcher—A quick and dirty program launcher.
- SubMenu—Creates hierarchical menus for your AppleMenu and also lets you turn the contents of any folder into a hierarchical menu.
- Twins—A disk synchronization utility that compares two folders or two disk drives and makes each folder and drive the same. More information can be found in Chapter 11. Twins is not as full-powered as other disk synchronization utilities but does a good and quick job.
- WatchFolder—A network utility that will let you know when someone has placed a new file inside a networked folder. If you do a lot of work where data is passed from one person to another, WatchFolder is a very useful tool.
- WorldClock—A menu clock that also displays the time for other cities around the world. You can configure it to display the time for cities of your choice.
- PowerBook Utilities—Most PowerBook users find that Apple has not provide enough utilities for managing battery life, traveling, or dealing with dis-

play issues caused by LCD screens. PowerBook Utilities provide the PowerBook user with a battery level indicator, a sleep and hard disk spin-down command key, a keyboard shortcut for turning AppleTalk on or off, and cursor options which make seeing and finding the pointer easier.

Super Seven Utilities

Super Seven Utilities is another set of utilities that have different features from those we've been discussing. Yet, like the others, these are all system-level tools intended to add functionality to your Mac. The utilities included with Super Seven Utilities are:

- Alias Assistant—Watches all of your alias files and will delete an alias when you delete its original. If you wish, you can also reassign the alias to another file instead of deleting it.
- Desktop Extras—A multifaceted utility that makes moving and copying files from various locations easier. By adding an Extras menu to the Finder with commands for Move, Copy, Make Alias, and Move to Trash, Desktop Extras lets you select and perform these functions on a number of files even though they are not in the same folders. You can also change the suffix for copied (Duplicated) files and aliases.
- Helium Pro—Used to configure how your Mac displays the Balloon Help menu, the balloons, and a command key to turn on and off the menus.
- Mighty Menus—Lets you tear off an application's menu and place the menu on your screen for easy access. You can also collapse the menu once you've torn it off.
- Speed Beep Pro—A utility that enhances how your Mac talks to you. You can assign Macintosh sounds to events, such as emptying the Trash and inserting or ejecting floppy disks; you also get a few new sounds.
- Super Comments—Lets you attach comments to a file's Get Info box when you save or open a file. This is the first utility that I've seen that makes those comment fields in the Get Info window useful.
- Window Master—A utility for managing an application's windows when you have more than one open. It will automatically stack your windows and it lets you quickly switch from one window to another.

Other Utilities

In the remainder of this section, we'll look at a few other utilities. These utilities are single-purpose tools, utilities that have only one function rather than several. Often, you'll find the single-purpose utility does a better job than a Swiss Army Knife-type of tool, because the single-purpose tool is worked on with more care and focus than a complete set of utilities. Usually, they have more features for their dedicated task

and are better throughout. So, make sure that you're not buying a suite of utilities just to get one specific function. Chances are that you can find a single utility that will do a better job.

Once again, the utilities in this section are listed as a representation of what is available. This is by no means a market survey or tutorial on using these tools.

- KaBoom (Nova Development)—A sound utility that you can use to create, edit, and otherwise modify sound files. It controls which sounds play when certain events take place and it provides a good editor for you to make your own sounds.
- MultiClip (Olduvai Corporation)—A utility that provides an (almost) unlimited number of clipboards and acts as a Scrapbook replacement. With MultiClip, you can retrieve that item you cut from your document 45 minutes ago and thought you lost. It can also be used as a graphics catalog.
- Screenscapes (Kiwi Software, Inc.)—A Desktop Pattern control panel replacement. With Screenscapes, you can place patterns and pictures on your desktop and even have them change while you're working on your Mac. It can be interesting to have a series of pictures or patterns rather than just one.
- Chameleon (Logical Solutions, Inc.)—Another Desktop Pattern control panel replacement that is quite different from Screenscapes. Chameleon has a built-in editor so that you can change your images. It also comes with its own variety of Desktop patterns.
- PopupFolder (Inline Software, Inc.)—Works like the Apple Menu Options control panel, only it goes a bit further. PopupFolder makes the contents of any folder and your hard drives available as a pop-up menu. Just click and hold down the mouse button while the pointer is on a folder and its contents pop up like a menu and are selectable.
- Icon-It! (Olduvai Corporation)—Can be used to replace Apple's Launcher control panel. It is a utility that places a palette of icons on your Desktop that can be used to execute macros as well as launch programs. You can also use it to perform menu commands by clicking on a button rather than selecting the menu. Icon-It! can be used with any program to convert menus to icon buttons.
- ClickChange (Dubl-Click Software)—A utility that lets you customize your Mac's display elements. You can customize windows, scroll bars, pointers, and buttons, just to name a few. If you work hard enough, you can make your Mac look like it's not a Mac at all.

From the utilities listed in the foregoing you should have a better idea of how you can modify your Mac's interface. Utilities are being developed and revised all the time, and only some of the companies that make utilities are represented in this chapter. Before you dive into installing a bunch of utilities, read the following sections, "Adding Control Panels" and "Adding Extensions." If you neglect to read these two sections, you might find that you've bitten off more than you can chew, especially if things don't work right.

Memory Management Tools

Memory management is always a topic of concern for Mac users. It seems that no matter how much RAM you have, you never have enough. And if you have enough now, it won't be long until you don't. So, anything you can do to make your use of RAM more efficient will help you make more efficient use of your Mac.

This section is about memory management utilities. After you read it you'll have a better idea of how your Mac uses memory and some of the tools that you can get to make it even more efficient.

RAM Disks

Besides using your RAM more efficiently, there are some utilities that will let you use your RAM as a disk drive. Using RAM as a disk drive can dramatically increase the speed at which your Mac operates, especially when you put your System and programs onto the RAM disk.

A RAM disk is created by taking some of your memory and making your Mac recognize that memory as a disk drive. A RAM disk can be created on any Macintosh that has enough memory. However, you might need a special utility to make the disk. The advantage of a RAM disk is speed. Using a RAM disk, you will be able to run any applications and access any files on it at the same speed that your Mac processes anything in memory. The only limitation is the speed of your CPU and the minimum amount of time it takes to process the instructions or launch the program. Using a RAM disk, your Mac will run at its absolute fastest.

The disadvantage of a RAM disk is that it is volatile. If you crash, anything in the RAM disk could be lost and unrecoverable. Although Maxima saves your data by copying it to your hard drive when you shutdown or restart, if you crash and restart, it is possible to lose everything. This means that you must make sure that you periodically save a copy to your hard drive or to a floppy. Do this at comfortable intervals and points at which it will be easy to resume should you have to start over. If you have a RAM disk and you have used it without a problem for some time, it is easy to become complacent and not make copies—but you will probably make that mistake only once.

If you are using a PowerBook, PowerMac, or a Quadra, the Memory Control Panel will let you create a RAM disk. There is an additional advantage in using a RAM disk with a PowerBook, because your Mac will not be starting, running, and stopping your hard drive. By keeping hard disk access to a minimum you will gain extra usage time when operating from batteries.

Following are a couple of utilities that you might want to use if you are using a RAM disk:

- ❖ Maxima (Connectix)—A RAM disk utility that will save the contents of your RAM Disk to your hard drive when you restart or shut down your Mac. Not only that, but the people at Connectix know almost as much about the Mac's memory as the folks at Apple.
- ❖ RAM Disk Saver (Atticus Software Corp.)—The biggest danger you face when using a RAM disk is that if your Mac crashes, you will lose the con-

tents of your RAM disk. RAM Disk Saver can minimize this danger, because it copies the contents of your RAM disk to your hard disk while you are working. This happens automatically so that you don't have to think about the process once you've installed RAM disk Saver. This is a must-have if you use a RAM disk.

Memory Management Utilities

As previously mentioned memory management will become a concern to you at some point in time. The problem you'll be faced with is that you just won't have enough memory. This happens to everyone regardless of how much RAM they have installed. It is the way of the computer world. When you consider that the first Macintosh had 128K of RAM ten years ago and now that you can't buy a new Mac with less than 4M of RAM, you'll begin to see what I mean. RAM and hard disk space are the two things you'll never have enough of. It is kind of like not having enough time in a day—only you can buy more RAM or another hard disk.

Now, we're going to discuss two utilities that just might help you with your RAM problems (maybe you don't need to buy that RAM just yet):

- RamDoubler (Connectix)—A program that will make your Mac think it has twice as much RAM as it really has. Good trick, no? RamDoubler works by using a combination of technologies. It will compress your RAM, use virtual disk space, and take advantage of RAM that is not being used by other programs. If you have a Mac that can have only 8M of RAM, such as one of the earlier PowerBooks, RamDoubler was made for you.

  There are some things to consider when using RAMDoubler: One, you do not really have any more RAM. RamDoubler makes your Mac think it has more RAM and performs technical tricks to conserve RAM, but if you have only 4M of RAM and want to run a full System 7.5, including QuickDraw GX and PowerTalk, RamDoubler will not help you. You have to have enough RAM to start your Mac without RamDoubler. Another concern can be performance. If you are using all of your RAM, RamDoubler will use virtual memory (a process where your hard drive is used as RAM) which can slow down your Mac. Also, any program that uses virtual memory, such as PhotoShop, will not work with RamDoubler. Finally, if you have a lot of RAM, say, 20M, and install RamDoubler, you'll notice that some functions, especially starting programs and switching programs, will slow down. But, even with these caveats, RamDoubler is a great utility for those Macs that do not have enough of the right stuff.
- OptiMem (Jump Software)—OptiMem does not make your Mac think it has more RAM, it just makes more efficient use of the RAM you have. When OptiMem is installed, you will be able to open almost twice the number of applications that you can right now. OptiMem works by using the memory that a program might reserve for itself but not use. Remember in one of our earlier discussions, where we covered setting the preferred memory size for

an application in a program's Get Info window? Well, OptiMem starts a program using its minimum memory requirements and then gives it more RAM if it needs it. The RAM that is not used by the program is then made available to other programs.

Some programs don't like what OptiMem does, but OptiMem deals with that by letting you tell it which programs to leave alone and which ones to steal memory from. Although OptiMem does not free as much memory as RamDoubler, you do get better performance.

Adding Control Panels and Extensions

Any progam or utility that you add to your Mac's system will either come with an installer or you will have to install it manually. If you're installing with an installer, everything will be placed where it belongs. Should you have to manually install the utility, it is still an easy process that takes only a couple of steps. However, before you install any control panel or system extension to your System, you should read the documentation that comes with the utility and any Read Me files that are on the disk. The utilities we've been discussing are control panels and system extensions that get loaded into your Mac's memory as it starts up. Another term for referring to these types of programs is *memory-resident.* When a memory-resident program is loaded, it becomes part of your Mac's System and is always available for use.

Part and parcel of being memory-resident is the possibility for one extension or control panel to conflict with another. This happens when two memory-resident utilities want to occupy the same location in your Mac's RAM. Quite often, the manufacturers know about other programs that will conflict with theirs and put this information in either their manual or the Read Me file. This is why you need to read everything before you perform your installation. If you don't read the documentation, you'll have to learn about possible problems the hard way—when your Mac crashes.

Now that you have the technical information you need, on to performing a manual installation. To manually install any item that belongs in your System folder, just drag the item to your System folder icon; your Mac will automatically place the file in its proper folder. Control panels will go in the Control Panels folder, while extensions will find their way to your Extensions folder. The same thing happens with fonts and sounds. When an item gets placed into the System folder, you'll receive a message like the one shown in Figure 9.12. After you've installed an new extension or control panel, you will need to restart your Mac.

As you start to install utilities, keep a few things in mind. If you install a utility that has the same function as one that is already installed, there is a good chance that the new utility will conflict with the one that's installed. An example would be installing a hierarchical menu utility while the Apple Menu Options control panel is active. If you don't remove or turn off the Apple Menu Options, the next time you select one of the hierarchical menus in the Apple menu, your Mac might crash. This is another reason to have an idea of what your Mac's utilities do. If you install a utility that somehow interacts with the Mac's Trash and then install another one that will also affect the Trash, you'll probably have a problem, but this becomes a matter of experimentation.

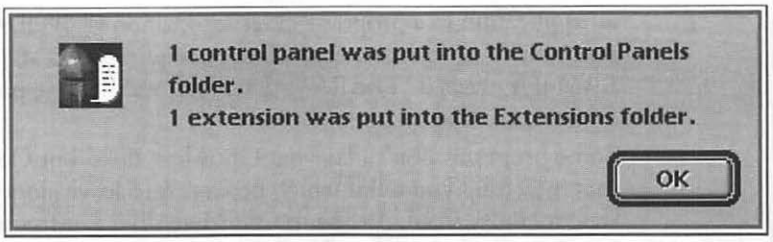


Figure 9.12 *The dialog box telling you that a system element has been installed.*

You probably won't know that you have a problem until you try to use one of the utilities, but if you don't know that one or both of your utilities affect the Trash, you could search a long time for the problem caused by this conflict.

So, try to learn what your system extensions and control panels do, in a generic or general sense, and watch what you install. If you do have problems you, read Chapter 21, "System and Application Troubleshooting," where you'll find specific steps for fixing these types of problems.

Remember the following points when installing memory-resident utilities:

1. Read the documentation.
2. Know what the new utility will do.
3. Remove any utilities you have installed that have similar functions.
4. Install only one utility at a time.
5. Restart your Mac.
6. Use your Mac for awhile before you install another utility.
7. Repeat these steps for any memory-resident utility you install.

Summary

The purpose of this chapter was to give you some ideas about how to customize your system. The areas covered are quite broad—utility programs, using ResEdit, as well as programming. Since this chapter covers so much ground, you should do a little outside research before you commit to any software. As always, check the reviews and articles in your favorite Mac magazine to evaluate the software you're thinking about, and then decide if you want to spend the time with it.

Whether you want to customize your system or do programming, remember that you will have to make a time commitment or your efforts will not lead to much. (but that's the way it is with anything in life). If you take the time, you will increase your productivity, have some fun, and be well on your way to complete mastery of your Mac.



CHAPTER 10

Macintosh Disk Drives

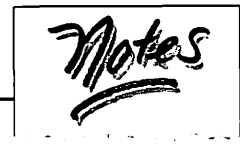
Introduction

It is difficult to say which part of your Mac is more important, especially since a Mac is not much good without any of its subsystems. But, if there is one aspect of your Mac that is more important than all of the others, it would probably be your Mac's disk drives. In a sense, your drives are your Mac's heart. If your drive develops trouble, all of your data is at risk. Being able to use your computer is important—that is how you do your work. Knowing about your hard drives is an aspect of using your computer that is almost as important as using your computer, because your hard drive holds all of your hard work.

Learning about your drives is an important subject; you will have the ability to detect problems early, perform some minor maintenance, and have the peace of mind that your data is safe. In this chapter, you'll learn how your disk drives work, tips for using them, and how to get more from your Macintosh drives. In addition to learning about your floppy and hard disk drives, this chapter also looks at other storage mediums, including Optical Disk drives, CD-ROMs, and tape drives. By the time you finish reading this chapter, you will have a working knowledge of Macintosh storage systems.

The sections in this chapter are:

- A History Lesson—This section is a brief history about the development of the disk drive. Here you'll learn what your drive is and how it works.
- The Macintosh Floppy-Disk Drive—Here you will find a detailed guide for your Macintosh floppy drive, including information on floppy disks, the drive mechanisms, and how your drives read and write data. In addition, this section has information regarding disk formatting, after which you will find more material on using, taking care of, and troubleshooting your floppy drives.
- You and Your Hard Drives—In this section, you will find everything you need to know about your hard drives. The subjects covered include the differ-



Dire Warning

It is probably not in good form to start a section with a dire warning, but when talking about hard drives it is unavoidable. Your hard drive is the weakest link, the most fragile device, the least dependable peripheral attached to your Macintosh. If something is going to go wrong, it will be with your hard drive, so you should always be ready for your hard drive to die. Period.

However, if you always back up your data (this will be discussed in Chapter 11, you need not be so paranoid. If you don't back up your data, you should learn disk recovery, because, when your drive crashes (malfunctions), it is too late to start learning about backing up your drive. So, consider yourself forewarned.

ence between the floppy- and hard-drive formats, the SCSI bus, and tips for getting the most from your drives. Some of the discussions will be technical but, in between the technical explanations, you'll find practical tips as well.

- Your Storage Options—Just what are your options when it comes to data storage? Well, if you really want to know about optical drives, CD-ROM disks, tape drives, or other data storage options, you'll just have to read this section.

A History Lesson

History Repeated *The following brief history was partially included in Chapter 1, but I've decided it is worth repeating. A brief history about the hard drive provides a framework for understanding how the future might develop. Just as disk drives have been made smaller and faster over the years, computers are constantly being made faster and smaller, too.*

Regardless of how fast your CPU can process data, there first has to be a way to quickly put your data into the computer. To truly make your Mac useful, it needs a way to store data and to reuse it. In the early days of computing, this was a serious problem. Hard drives did not exist and data was stored on paper ticker tape and/or punch cards. To input data into computers, the cards or paper tape had to be processed through a machine that would read the paper input, and the output was almost always a printer. Sometimes, the output would be paper tape or punch cards, but there was always a paper report as well.

It didn't take long to realize that those punch cards and reams of printer paper were inadequate, so they (the computer wizards of the day) developed tape drives that would work with the computers. These tape drives were similar to the old reel-

to-reel tape recorders that audiophiles used in the 60s. The computer tape drives were used for both data input and storage (which is a form of output). However, as computers became faster, using tapes became inefficient. Tape drives just couldn't access data fast enough, so the hardware engineers went back to work and developed a very large disk drive to meet these new needs.

This new drive was the size of four metal desks, two with their ends placed together and the other two stacked on top. The disk was a very large drum that rotated at about 200 revolutions per minute (rpm), and the disks looked like very early phonograph cylinders from an Edison phonograph—only this disk was not removable. The disk stored data on a magnetic material that could be easily modified, like the surface of a recording tape, and this new drive's total storage capacity was about 20 megabytes. During the 1960s, it became possible to reduce the size of the disk drive to that of a small filing cabinet, and the disks were both removable and fixed. This new technology tripled the disk drive's overall capacity, and it was a great day when IBM developed the first drive of this type. The new drive had a 30-megabyte fixed disk and a 30-megabyte removable disk. Hence, IBM called it a 30–30, but the new drive quickly became known as a Winchester, nicknamed after the 30–30 rifle. Thus, the name Winchester became the designation for any drive that used the same technology developed for this IBM drive (the hard drive section describes this technology).

Having a large hard drive solved only half the problem; a convenient means for inputting data was still needed—punch cards just didn't make it. It wasn't until the late 1970s that the floppy-disk drive was developed. This new disk drive used a disk made of heavy mylar with a ferrous-oxide coating, similar to the coating used on recording tape. The disk was 8 inches in diameter and it held about 80K. Because the disk looked like a large LP record but was flexible, it was called a floppy disk. Since then, engineers have continued to miniaturize disk drives. From the 8-inch disk, the size was reduced to 5.25 inches. Now, the Macintosh has a 3.5-inch floppy drive; the technology has progressed a long way but not stopped.

The research and advances in floppy-drive technology is going in two directions: One direction is the continued miniaturization, making the drives smaller and faster. The other is putting more data onto a disk or increasing a disk's density. As time goes on, you can expect to see new floppy disks and drives that will be smaller and hold more data.

While floppy drives were being developed and their technology improved, hard-drive technology did not stand still. The same era that gave birth to the floppy also witnessed the miniaturization of the hard drive. By the early 80s, hard drives became small enough for use with the new personal computers. A 20-megabyte drive was 5.5 inches cubed, and considered to be large enough to meet most computing need. However, the early optimism displayed for personal computing rapidly gave way to the realities of the technology: Access to data creates more data, and there may never be a storage medium large enough.

Even today, depending on the type of work you do, your hard drive will soon be too small. Moreover, a drive that holds a gigabyte of data, which, by the way, is the same physical size as the first 20-megabyte drives, will presently be too small. And, speaking of today, small is what the new drives are becoming—the smallest drives are

the size of a pack of cigarettes and hold 500+ megabytes. All of which leads to the maxim, "Data abhors an empty disk." The process of miniaturization continues.

Your Macintosh Floppy-Disk Drive

To fully understand your disk drive, you need to know what a floppy disk is and how it works, which is what this section is about. You will gain a working knowledge to help you avoid making mistakes with your floppy disks that could lose data or ruin your drive. Also, you will gain some basic skills to help you troubleshoot your system if and when something should go wrong.

Why Call It a Floppy Disk?

When you look at the floppy disk used in your Macintosh, you have a 3.5-inch square piece of plastic with a movable trapdoor on one side. You can identify the bottom of the disk by the quarter-sized spindle, while the top has an indent that occupies about half of the total space of the disk where you place the label (see Figure 10.1).

If you hold the disk so that the trapdoor is facing you and the disk is right side up, you will see a small, square hole in the upper right-hand corner of the disk—the disk's write-lock indicator. On the opposite side of the disk is a movable tab. When the tab is moved so that it blocks the hole, the disk is unlocked or write-enabled, which means your computer can write data to the disk. When you move the tab and expose a hole through the disk, your disk is write-disabled, or locked. Your Mac can read a locked disk but it cannot write or put information onto a locked disk.

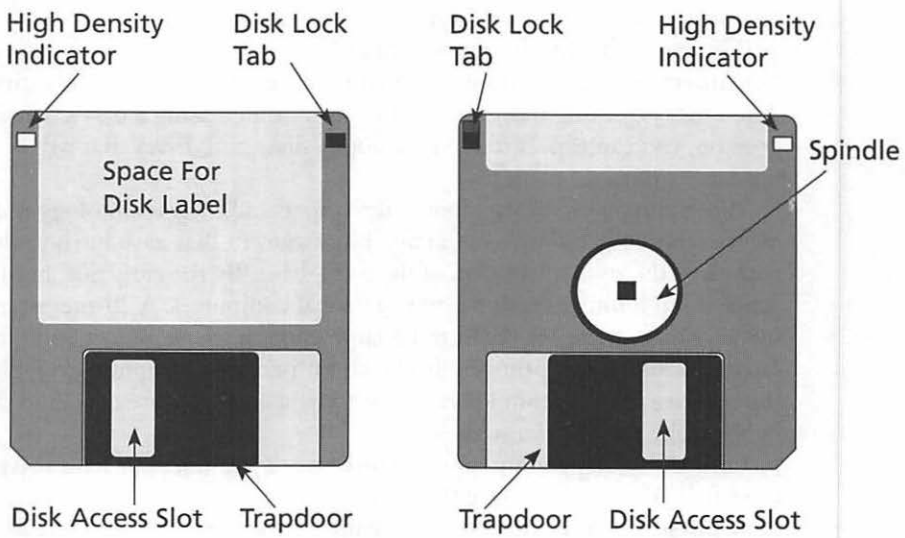


Figure 10.1 *Floppy Disk top and bottom view.*

When you insert a disk into your Mac, the drive mechanism automatically opens the trapdoor so that it can access the disk. You can do this yourself by moving the door to the right if the trapdoor is facing you. What you see is the disk itself; the plastic surrounding the disk and protecting it is called the housing. **Caution:** Be careful not to touch the actual disk. It will be visible in the vertical slot revealed by moving the trapdoor.

Floppy disks are made of mylar, a plastic material similar to that used for recording tape, and coated on both sides with a ferrous material so that they can hold a magnetic charge. Data is stored occurs on this ferrous material similar to the way the grooves in a phonograph record hold the sound reproduced by a record player. The data consists of little pieces of magnetic material (usually iron or cobalt) being charged (on) or uncharged (off); each piece of material represents a bit, 8 bits become a byte, and all of this is recognizable to the computer.

High Density and Double Density

Disk size is determined not by the physical size of the drive, but by how much data it holds. A disk's data capacity is directly related to its density, which is determined by how much magnetic material is on a disk. The very first Macintoshes used a single sided 3.5-inch disk drive that was 400 kilobytes in size. Some of these disks are still in use and any Macintosh floppy drive can read them, but if you have a Mac running System 7.X, you can't format or write to one of these early disks.

The next generation of Macs used a double-sided, double-density disk or an 800 kilobyte disk. The Mac's that have an 800K disk drive are the Mac 512KE, Plus, SE, and II. This size increase occurred because these drives could read both sides of a diskette; hence, the designation *double sided.* All new Macs produced since the SE/30 and the Mac IIcx have a high-density floppy drive (HDFD), also called a SuperDrive. The designation high-density versus double-density (the 800K floppy) describes an increase in the number of magnetic particles on a diskette. A high-density floppy disk holds 1.44 megabytes of data; you can differentiate an 800K floppy by observing the small, square hole in the upper left-hand corner of the disk (see Figure 10.1).

How a Floppy Drive Works

At its simplest, a floppy-disk drive can be compared to a phonograph. Instead of reproducing (reading) sound (data) stored on the record (disk), it can also record (write) to the same record. Instead of reading and writing music, however, the disk drive reads and writes data. How a floppy drive works is described in this section.

Every floppy drive consists of a spindle motor, an actuator arm, a read head, and a write head (see Figure 10.2). The spindle motor, which acts like the motor in a record player that turns the platter, turns the disk. The actuator arm contains the read and write heads in the same way the arm of a record player holds the needle. The actuator arm moves the drive's heads with an in and out motion over the surface of the floppy as it spins.

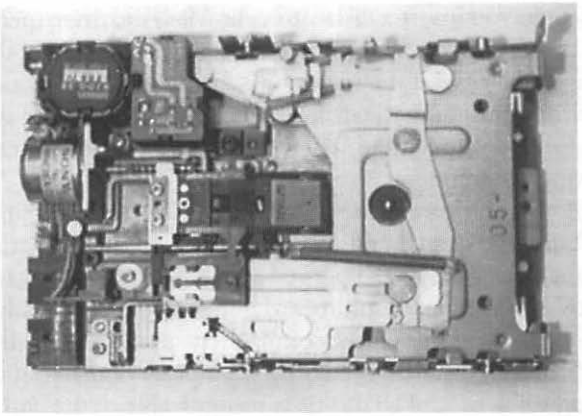


Figure 10.2 *Diagram of a floppy-disk drive.*

All Macintosh floppy drives, except the Macintosh 128 and 512, can use double-sided diskettes. The disk drive has two actuator arms, one for each side of the disk. The actuator motor moves both arms simultaneously, positioning them in the same spot on opposite sides of the disk. A logic board on the drive controls the movement of the actuator arms and heads, which is, in turn, controlled by the logic board on the computer.

When you insert a floppy into your Mac, the trapdoor opens as the disk drops down onto the spindle, which starts the disk spinning. When the heads of the drive move, they rest on the floppy disk—actually, the floppy disk is pinched between the heads. At this point, your floppy disk is spinning at about 300 rpm while the actuator arms move in and out along the vertical slot in the disk's housing when they read or write data to the disk.

Reading and Writing Data

Very small electronic coils of a ferrous material in the heads are turned into small electromagnets when electricity is passed through them. Your Mac records (writes) data to the floppy by charging (turning on) the electromagnet, which, in turn, charges a small particle in the magnetic coating on the disk. As a result, each particle is either on or off. When the drive reads a disk, it senses a disruption or lack of disruption in the magnetic field of the disk and can tell if a particle is on or off. The on and off charges are binary signals that the computer then interprets and turns into output that can be meaningful.

Formatting Your Diskettes

Usually, when you buy new floppy disks, they will be unformatted. Your Mac cannot read a floppy disk until it has prepared it for use. The preparation process is called

formatting or *initializing* the disk. When you format or initialize a diskette, your Mac writes tracks and sectors to it and then adds boot blocks, a file directory, and the Desktop file.

If a disk has never been formatted, when you put it into your Mac, your Mac will automatically detect this and ask you if it's okay to initialize the disk. You will be presented with a dialog box like the one shown in Figure 10.3. If you are sure the disk you've inserted is blank, then click on the *Initialize* button; otherwise, click on the Cancel button.

The dialog box in Figure 10.3 automatically appears whenever your Mac cannot read a disk. If you happen to have a damaged disk that you know contains data but get this message, pressing the Initialize button will destroy all of the data on the disk. There are times when you will want to erase all of the data on a disk and restore it to a blank or empty condition.

To erase a disk:

1. Insert the disk into your Mac.
2. Select the disk.
3. Select the Erase Disk menu item from the Special Menu. You will see a dialog box like the one shown in Figure 10.4.
4. Your Mac will inform you that all of the data on the disk will be lost with a dialog box like the one shown in Figure 10.5. If you are sure you want to erase the disk, click on the Initialize button. **Caution**: Always stop and think before you click the Initialize button; once you start formatting a disk, there

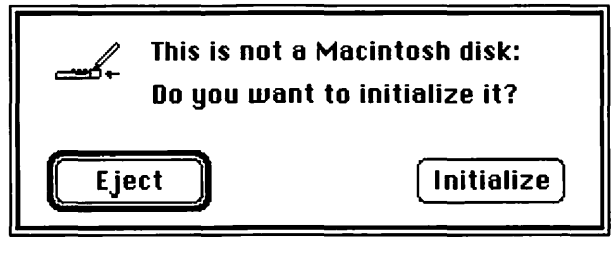


Figure 10.3 *The Disk initialization dialog box.*

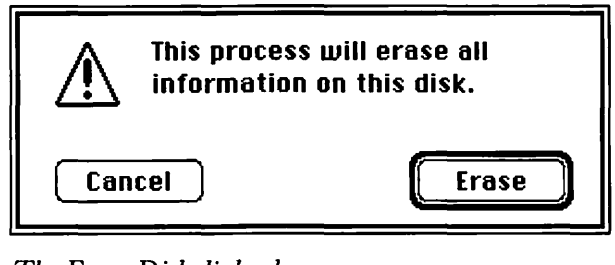


Figure 10.4 *The Erase Disk dialog box.*

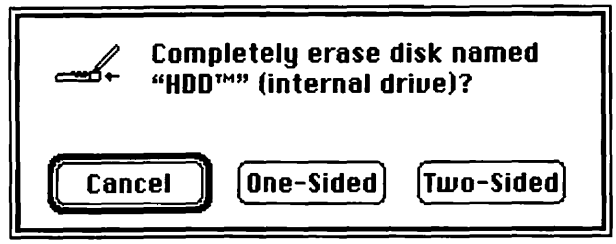


Figure 10.5 The Disk Initialization dialog box (second chance).

is no way to stop the process and it is *impossible* to recover the data from a formatted floppy.

5. After you've told the Mac to proceed, it will ask you to name your disk. You can give it a name that is up to 32 characters long (Figure 10.6).
6. As your Mac formats the disk, you will see a message that says "Formatting disk." After a minute or so, it changes to "Verifying format," and then it will say "Creating directories." You cannot interrupt the formatting process.
7. After the Mac finishes the formatting process, your newly formatted disk will appear as an icon on your Desktop.

What Formatting Does

Although some of this information is academic, it serves the purpose of introducing you to data structures and lays the groundwork for recovering data on your disks. Even though there are programs available that do not require this knowledge to recover data on a disk, it is helpful to know what the program is doing if it tells you that there is problem with the directory, a sector, or your Desktop file.

The topics in this section include discussions about tracks and sectors, boot blocks, and the directory information. This is basic information and all of it, except where noted, is applicable to hard drives as well. If you have ever had a deadline and been working hard on your project at 2:00 A.M. when, you suddenly have a problem with your disk, you might appreciate this section—especially when combined with the recovery procedures discussed in Chapter 18, "Disk Crashes and Data Recovery."



Figure 10.6 Naming your disk.

Around the Track and Through the Sectors

Formatting does several things to a disk. First, the Mac creates tracks, which are concentric rings placed on the disk. After tracks have been placed on your disk, the Mac divides each track into sectors (see Figure 10.7). A sector is a section of a track that is at least 512 bytes long. Each sector is then given a data storage area, a formatting mark, a CRC block, and a sector tag.

All of the data stored on your disk occurs within the sectors. However, most files are larger than 512 bytes, so files will usually occupy two sectors or more. Thus, if you have a file that is 1,888 bytes in size, it will occupy four sectors and use a total of 2 kilobytes of disk space. This means that you will never really use all of the space on a disk; there will always be some free space in sectors holding file fragments. In Figure 10.8, you'll see that the file occupies 2K on the disk but is really 1,888 bytes in size.

Tracks A series of concentric circles that are magnetically drawn on the recording surface of a disk when it is formatted. Tracks are further divided into 8 to 12 consecutive *sectors.* A track corresponds to one ring of constant radius around the disk.

Sector (1) Part of a track on a disk—when a disk is formatted, its recording surface is divided into tracks and sectors; (2) disk space composed of 512 consecutive bytes of standard information and 12 bytes of file tags.

Tip To look at the size of one of your files and to see how much space it takes up, select a file from your disk window by clicking on it. After selecting the file, go to the File menu and select the Get Info menu option. The result will be a window similar to the one shown in Figure 10.8.

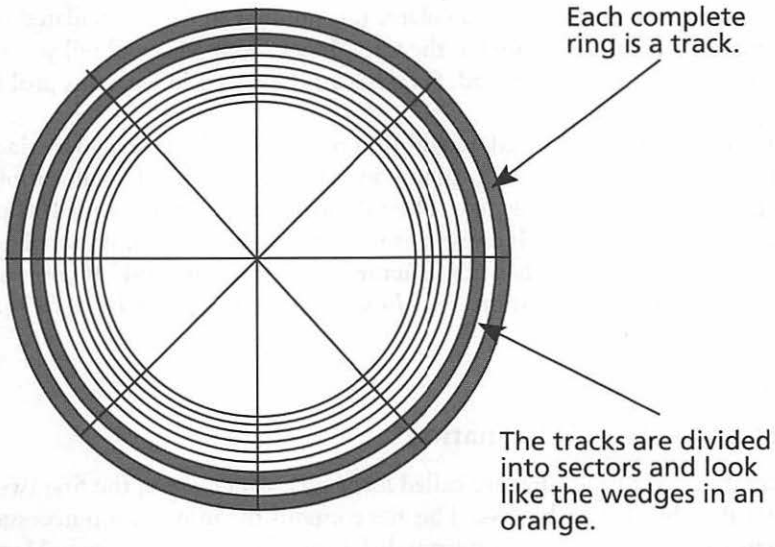


Figure 10.7 *Tracks and sectors on a disk.*

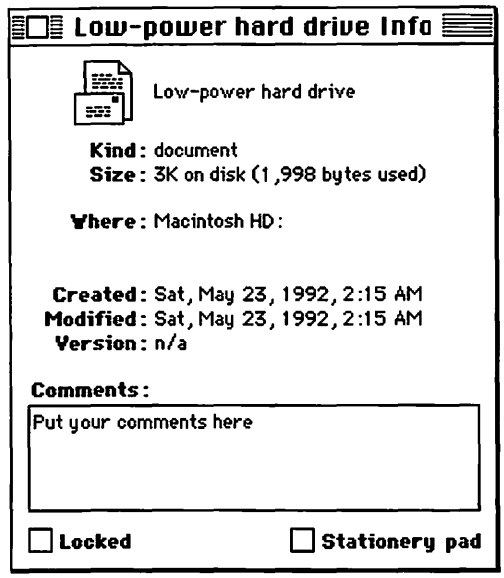


Figure 10.8 *Get Info window for a file.*

The additional information in a sector is used by your Mac to keep track of where your data is stored. The formatting mark is a sector identifier; it contains the number of the individual sector. The sector tag occurs only on floppy disks and stores file identification information that can be used in some data recovery processes. Your Mac uses the CRC block, which stands for Cyclical Redundancy Check, to check your data's integrity by storing a number in the sector CRC block. This number is calculated from the number of bytes in the sector and is called a *checksum*. Every time your Mac reads a sector, it recalculates this number. If the recalculated number does not match the number stored in the CRC block, your Mac will tell you that you have a damaged file that it can't read. (You'll learn how to deal with this problem in Chapter 18.

When a disk is formatted, in addition to tracks and sectors, your Mac puts system startup information, a volume information block, a file allocation table, and the Desktop file onto your disk. The following information is not 100-percent accurate in a technical sense. However, it is correct from an informational point of view; it accurately describes the structure of a Macintosh disk. If you want more specific technical information, read *Inside Macintosh Volumes IV and VI* published by Addison Wesley.

System Startup Information

Every disk must have what are called *boot blocks*, which are in the first two sectors (also called blocks) of the disk. This file contains the information necessary for your Macintosh to use the disk. A startup disk is capable of running your Macintosh. In order to do that, however, it must have a System file and a Finder (or other applica-

tion) file on the disk. If the disk is not a startup disk, there is no data in the boot blocks. Regardless of the disk's ability to start your Macintosh, the boot blocks are still there.

Volume Information Block

The next set of blocks that your Mac puts on a formatted disk are called *volume information blocks.* These blocks contain critical information about your disk, including its name, size, the creation date and time, modification date, the number of files on the disk, plus other information necessary for the Mac to use the disk.

Volume information block (VIB) A nonrelocatable block that contains volume-specific information.

Volume Directory (Volume Bit Map)

The next file created is the volume bit map, which contains a 1-bit record for each block or sector on the disk. If the bit for a specific sector is turned on, the sector is in use and not available for data. If the bit for a sector is turned off, then the sector is free and available for data. Sometimes, the sector indicator in the volume bit map does not get turned off after deleting a file. When this happens, some of the space you freed by deleting the file is unavailable for new data. However, it is not a serious problem for floppy disks.

File Allocation Table

The file allocation table is where the Mac keeps track of all the data on your disk. It consists of two files called the *extents tree file* and the *catalog tree file.* The extents tree file, working in conjunction with the catalog tree, keeps track of your files. It uses a database structure called a *bee tree* to keep track of the files on your disk. This is a complicated process, since a single file usually spans several sectors and these sectors do not need to be side by side (contiguous) but scattered all over the disk. This method for keeping track of your files is the HFS, or Hierarchical File System, and provides for the nested folder structure on your disks.

Desktop File

The Desktop file is a resource file used by the Finder. It links your applications with their data files and keeps track of all of your icons and the Finder's window positions. There are other functions performed by the Desktop file but they are not important at the moment.

The Macintosh cannot use a disk without a Desktop file. Because the Desktop file is constantly being modified, there will be times when a disk will not work as expected and you will get an error message saying: "This disk is damaged. Do you

wish to repair it?" If you get this message, click OK. When your Mac rebuilds the Desktop file, everything will be fine and the disk will work normally. However, if your Mac cannot rebuild the Desktop file, you will get a message stating so, and the disk will be ejected from your Mac.

When a Desktop file cannot be rebuilt, the only thing you can do with the disk is recover it using a file recovery utility (described in Chapter 18, "Disk Crashes and Data Recovery"). After you've recovered the disk, your only hope of ever using it again will be to have someone with a DOS machine (definitely not a Macintosh) format the disk. When you get your disk back, try formatting it again. If it still doesn't format, give it back to the person with the DOS machine or throw it away. If your Mac has PC Access installed, you can try to format the floppy as an MS-DOS disk.

External Floppy Drives

Older Macs came equipped to use two floppy drives, and all Macs have one floppy drive built into the CPU. The built-in drive is the internal floppy drive. If you connect a second floppy drive to your Mac, your Mac automatically detects the drive and can detect the drive's size. If you attach an additional floppy to your Mac, it should be the same size as the internal drive. The exception to this is when you attach an 800K drive to a Mac with a SuperDrive. The Mac will detect and use the 800K drive.

If you have a Mac SE or a Mac II with an 800K floppy, you can upgrade your drives to the SuperDrive. Apple has provided an upgrade that replaces the 800K drive and adds the necessary components to your logic board so that the Mac will work with the new drive. However, this is an old upgrade and it may be hard to find.

Care and Feeding of the Floppy Drive

When used and maintained properly, your floppy drive will probably never give you any grief. However, it is easy to make a mistake without knowing you've done something improperly and cause damage to a disk, your drive, or both. This section is about taking care of your drives and your disks. It covers such mishaps as spilling liquids on your disks; disks that are unreadable; and general drive maintenance.

Formatting Different Size Disks

We previously mentioned the three different types of Macintosh floppy drives. With the introduction of each new drive, Apple increased their drives' data capacity. Also, each new drive could read and write to a disk formatted by one of its predecessors. However, there is no downward comparability. A 400K drive can't read an 800K disk. Likewise, a 400K or an 800K drive cannot read 1.44M disk. The SuperDrive can format a 400K (only if you're using System 6.0.X), an 800K , or a 1.44M disk. An 800K drive can also format a 400K disk (when you're using System 6.0.X).

With an 800K DSDD (double-sided, double-density) disk drive, it is very important to make sure you're not using a high-density disk. An 800K drive will format a

high density disk as an 800K disk. If this should happen, the high-density disk will be readable by other 800K drives, but a SuperDrive will not read the disk and want to initialize it. The SuperDrive detects the presence of high-density (HD) disks by the little hole opposite the write-protect tab and automatically tries to read it as a 1.44M disk. If you formatted the disk as an 800K disk, the SuperDrive will not recognize it and will want to erase the data.

The other problem you could encounter by using high-density disks in an 800K drive is data instability. Because the high density disks use a denser magnetic material than an 800K disk, it is possible for a HD disk to lose its format when formatted in an 800K drive, although this will rarely happen when it does you could important data. It is better to avoid this potential problem by using disks made for your drive, besides you will save money the DSDD disks are less expensive than HD disks.

How to Protect Your Floppy Drive during Transport

Whenever you move your Macintosh, protect your floppy drive by putting an expendable floppy disk into the drive after turning off the Mac. Apple used to ship all of its Macs with 800K drives with a yellow, hard-plastic drive protector. These protectors work on the 800K drives but will destroy a SuperDrive. The other danger posed by the plastic protector is in inserting it upside down. To do so requires that you force it into the drive, but that will destroy an 800K drive. Even though it has "This Side Up" boldly printed on the top, accidents do happen. Rather than risk an accident that could destroy your floppy drive, it is strongly recommended that you use an inexpensive floppy disk instead.

Apple no longer ships its drives with a protector because all of the new drives are SuperDrives. However, even with your SuperDrive, it's a good idea to use a floppy disk when transporting your Mac. This will prevent any damage to the drive if your Mac gets jarred while it is being transported.

X-Rays Cannot Hurt Your Disks

Before you send your Mac down that airport conveyer belt, make sure the security scanner is not a magnetic scanner and that it is using X rays, which are nothing more than a form of light and cannot harm your Mac or your disks. You actually stand a greater danger of damaging your disks by walking through the metal detector that uses magnetic fields to detect metal objects. Since some of the new scanners are magnetic you need to exercise some caution but, if it's an X-ray scanner, your Mac is in no danger. You might even save a few minutes because the Security Guard will not ask you to power up your computer to make sure it doesn't contain explosives.

Don't Force That Disk In

One of the biggest mistakes you can make while using your Macintosh floppy drive can happen when removing or inserting disks. On older Macintoshes, the drive auto-

matically accepts and ejects its disks. If, when inserting a disk, you force it in, you can cause irreparable damage to your floppy drive. As you put the disk into the drive, there is a point where some resistance begins. At this point, the drive starts opening the trapdoor on the disk. Immediately after the resistance begins, the disk drive will grab the disk and pull it into the drive. If, for some reason, the drive does not accept the disk, do not force it into the drive. Forcing a disk into your drive can damage it, probably requiring it to be replaced.

With newer SuperDrives, you have to insert the floppy all the way into the drive before the Mac will accept the disk, so you don't have to worry about the Mac grabbing the disk. But you should still be cautious and never force a disk into your Mac, regardless of the type of SuperDrive. When inserting a disk, if you encounter resistance, remove the disk. After you remove the disk, check the trap door by sliding it open; if the trapdoor opens smoothly, try to reinsert it into the drive. If the drive still refuses to accept the disk, remove the disk and try another. If the same thing happens with another disk, you may have a damaged floppy drive. Take your Macintosh to an Apple Authorized Service Center and have them check it out.

Don't Pull Your Disk Out

Another way you can get into trouble with your floppies is when they do not eject properly and you try to force the disk out of the drive. When a disk does not eject properly, one of two things has probably occurred; either of these occurrences can happen individually or together. When you unmount a disk by dragging your floppy icon to the Trash and it does not pop out all of the way, do not grab the disk and try to pull it out. Sometimes, the Mac will reinsert the disk and at other times it stays part of the way out but the Mac still has hold of it. If you grab the disk and it does not freely slide out of the Mac, gently push it in—90 percent of the time, the Mac will reinsert the disk. If the disk will not reinsert, turn off your Macintosh and take it to an Apple Authorized Service Center.

Another problem that sometimes happens is that the Mac will go through the motions of ejecting your disk but it never comes out of the drive. This problem is similar to the one just described. You should turn off your Mac and take it to a Service Center.

Manually Ejecting Diskettes

If your floppy disk is stuck and you feel brave (I'm not recommending you try this), there is one more trick you can try. There is a very small hole to the right of the slot where you insert your floppy disks. Behind this hole is a manual eject lever that you can push with a straightened paper clip or a jeweler's screwdriver. If you choose to try this, do so with great caution. There could be a problem with the disk or the drive, and it is possible to irreparably damage both the disk and the drive.

To manually eject the disk, insert your device of choice into the hole. As soon as you feel it press against the eject lever, gently begin to apply pressure. As the lever goes back, the disk will begin to rise from its seated position and start to pop out just

as it does when being ejected in a normal manner. If the disk pops out only part way when you've pushed the lever as far as it will go and then jumps back into the drive, **stop**. The drive needs professional attention. If, however, the disk pops all the way out, turn your Mac back on and insert a different disk after checking the trapdoor. If this disk works properly, initialize it from the Special menu. You can be sure that the disk drive is OK only after you have formatted and copied data to and from the floppy disk. Once you've manually ejected the stuck floppy, you should throw the floppy away. If the disk has data you need, try using it—but with great caution. Remember, *never* force a disk into your drive.

Using IBM Disks

One of the SuperDrive's advantages (for some people) is that it can format, read, and write disks formatted for an IBM or MS-DOS computer. There are two ways to take advantage of this capability: You can use either a utility, such as PC Exchange that mounts the disk on your Mac's Desktop, or the Apple File Exchange program.

If you're using any System version prior to 7.5 and you do not have Apple File Exchange, you can get it from your local Apple Dealer or you can purchase a utility, such as PC Exchange. PC Exchange is included with System 7.5.

Inserting Damaged Disks

At some point in time, you will insert a disk into your Mac and receive the dialog box shown in Figure 10.9. This dialog box means that your disk is damaged. If you format the disk, you will lose all of your data.

If you want to salvage your data:

1. Press on the Cancel button. The Mac will eject the disk.
2. Reinsert the disk.

If you get the same dialog box, proceed to the Chapter 18, "Disk Crashes and Data Recovery," and read about recovering disks. If you press the Initialize button, you will erase your disk.



Figure 10.9 *A damaged disk's dialog box.*

Trying to Read a Wet Floppy

It is unavoidable: Some day, you will spill something on a floppy disk. When this happens, first wipe it dry, then set the disk aside and let it thoroughly dry overnight. After your disk has dried, make sure the trapdoor is not stuck by sliding it open—be sure not to touch the disk. If the trapdoor sticks, carefully rip it off. All the trapdoor does is protect the floppy inside the housing; a disk without a trapdoor will work just fine in your Mac.

Next, turn the spindle on the bottom of the disk—it should turn easily. If the spindle does not turn, do not put the disk into your Mac—the disk is probably ruined. Set the disk aside for another 24 hours to make sure it is dry and then try to turn the spindle again. If the spindle still doesn't move, pray you have a backup.

If the spindle does turn, hold the trapdoor open (being careful not to touch the disk) and turn the spindle. As the disk turns inside its housing, visually check the disk for moisture and water marks. If the disk still has moisture on it, set it aside and let it dry fully. If it has water marks, the disk is probably ruined and you should just throw it away.

The critical issue in all of this is what you spilled on the disk. If it was a sticky liquid, such as soda or coffee with cream and sugar, and your disk has water marks, your disk is probably sticky. If you put this disk into your Mac, there is a chance that the residue on the disk will get on your drive's heads. However, if you just spilled water or black coffee on the disk and it is completely dry, you can try reading it. If you try to read the disk and *anything* unusual happens, eject the disk immediately.

If you spilled a sticky liquid on your disk and the data on it is critical, there is one more thing you might try. Rinse off the disk using cold water with the trapdoor open, then set it aside to dry. After the disk has dried, go through the above steps again.

If your disk fails after trying all of this, it is probably dead—there is no guarantee that the above steps will work. *Just putting a disk that has had something spilled on it into your Mac could ruin the floppy drive.* Try this only if you are desperate and willing to pay for a new disk drive.

Head Alignment

Sometimes, a floppy drive malfunctions for no apparent reason. One of the causes for this is because the heads are out of alignment. When this happens, the heads do not align properly on the floppy disk and it is unable to recognize the tracks or the data on a disk. A very clear indicator of this problem is when you can read a disk that you formatted in your machine but the same disk is unreadable in a different Mac, and vice versa.

If this happens to your drive, you have two choices: One is to take your Mac to an Authorized Apple Service Center and have the drive replaced. Apple Service Centers do not realign the heads on Macintosh disk drives. Or, your other option is to find someone who does do this type of repair; there are usually several technicians in any metropolitan area who work on Macs, even though they are not Apple authorized. The difference is cost—having the drive repaired can cost half that of a new drive. If you choose to use an independent technician for your repairs, make sure you check

his or her references. The only people trained by Apple to work on your Mac are Apple Authorized Service Providers and, as I said, they do not perform this type of repair. *Caveat lector*.

Replacing a Drive

Floppy drives die—this is a fact of life. They wear out, the heads get knocked loose, the mechanisms get bent, and so on. When they do, your only choice is to replace the drive. To replace your drive, your first choice should be the Apple Authorized Service Center. If you want to save a little money, it is possible to buy a reconditioned drive at about half the cost of a new drive from Apple.

Once again, there are usually people in any large metropolitan areas who recondition Macintosh drives. Sometimes, they are not easy to find but, if you are persistent and look in the independent computer newspaper published in your area, you might find one of these ambitious service people advertising. These drives should have a 90-day warranty.

If you only occasionally use your Mac, be careful buying anything with a 90-day warranty. You may not use it enough within 90 days to really give the component or peripheral a good workout. If this picture reflects your Macintosh usage, make sure you buy accessories and peripherals that have a one-year warranty.

Avoiding Magnets

Remember, all the data on your floppy disk consists of magnetically charged particles being in very exact positions, so you should be very careful not to expose your floppies to magnets. A lot of people have magnetic paper-clip holders on their desk. This type of device has a twofold danger: First, the holder has a magnet that does not need to come in direct contact with the floppy to destroy the data on it. It is possible that just knocking the holder over or placing a floppy too close to it could damage the disk. The other danger is in the paper clips themselves: While they sit in the holder, the paper clips can become magnetized. Although the possibility is remote, it is possible for a magnetized paper clip to damage a floppy.

People often forget other magnetized devices, such as screwdrivers and other tools. Small appliances, such as dustbusters, electric pencil sharpeners, or shredders, can also produce a magnetic charge strong enough to damage your disks. The list of devices that can cause magnetic damage is really quite long, so I won't list all of them. However, one more source of potential danger that needs to be mentioned is your telephone. There is a speaker in the handset of your telephone, and although the chances of it damaging a floppy may be slim, remember that all speakers have a magnet. Also, the effects of a magnet need not be immediate, you might keep a floppy by some device with a magnet for a day and nothing happens, but, if left for a week, it could damage the disk.

The moral here is to find a safe place to keep your diskettes, preferably a special storage box that is in a location away from magnets and electrical appliances. If you are careful, you will have very few problems. If your desk is as messy as mine, on

occasion you'll lose a floppy either because you can't find it or because your paper-clip holder fell on it.

Placement of Your Mac

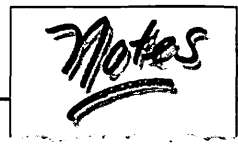
Where you place your Macintosh can affect both the machine and your floppy drives. First of all, never place your Macintosh in direct sunlight—heat is not your computer's friend. This also means that you should not position the Mac too close to heating vents. Because your floppies are actually thin mylar disks, even though enclosed in plastic, extreme heat can warp them and make them unusable. So, keep them out of direct sunlight and heating vents, too.

Another potential source of floppy-disk trouble can be your Mac Plus, SE, SE/30, or Mac Classic. All of these models have a power supply on the left-hand side (when viewed from the front). The power supply is a step-down transformer that converts your household current to a lower voltage that will work with your Mac. One of the by-products of this process is a magnetic field. If you keep your disks on the left-hand side of one of these computers, beware. It is possible, especially over a long period of time, that some of the disks will become unreadable. The best thing to do is find another place for your disks.

One more placement issue pertains to the Macintosh IIcx, IIci, and Quadra 700. Each of these models have a fan that sits directly behind the floppy drive. As a result, the fan draws a lot of dust that gets into your machine through the floppy drive. In these Macs, I've seen hair, dust balls, and other large particles of dirt entangled in their drive mechanisms. The danger of getting some foreign particle in your drive increases if, to save desk space, you place the CPU near the floor. So, if you have one of these Macs, take it into a Service Center for cleaning at least once a year—once every six months would even be better. If your drive should fail, chances are very good that it is due to dust. Do not let an unscrupulous technician sell you a new drive until you are sure the old one not just dirty.

Dirt and Your Floppy

Your floppy drive has enemies—dust, more dust, and smoke. Actually, these are computer enemies in general. As a rule, the Macintosh floppy disk does a good job of cleaning itself, but the drive does not. It is a good idea to take your Mac to a Service Center about once a year to have it cleaned, which will increase its overall life, and your floppy drive will be much more reliable. If too much dust builds up in your floppy drive, bad things will happen: Your drive can act as if its heads are damaged, failing to read and/or write; the eject mechanism can jam; or your drive could behave erratically. Also, the spindle motor might be unable to maintain a consistent speed because of dust built up. Usually, when one of these problems occurs, the drive will not work. It is also possible for a drive to get so dirty that the only cure is replacement. To prevent this problem, have your Mac professionally cleaned about once a year. It is like getting the oil in your car changed every 3000 miles or every three months whichever is less.



More Dust Dangers

Every Mac made since the Mac Plus, except PowerBooks, has a fan to cool the components inside the machine. This fan draws air—and dust—into and through the Mac. The dust also settles on your logic board and the Mac's other internal components.

As the dust buildup gets thicker, the dust will act as an insulator that increases the heat of your logic board's components. As the heat increases it will shorten the life of your Mac's components and, at some point in time, one of them will fail. If the failed component is on the logic board, your Apple Service Center will automatically want to exchange it.

I mentioned smoke as an enemy to your disk drive, and I do not recommend that you smoke around your Mac. The particles of smoke can be large enough to cause a problem if it should get between the heads and the disk, so, if you smoke, smoke with care.

Your Hard Drive(s) and You

This section is about your Mac's hard drive(s). As stated in the chapter introduction, your hard drive is like your Mac's heart. If your drive works properly, your Mac works properly. If your drive has problems, your Mac has problems. So, you owe it to yourself to learn about your hard disk so that you can take care of it properly.

To get the most from this section, read the previous section above floppy drives. It contains information about disks in general that is not repeated here. In this section, we will discuss how your hard drive works, the different types of hard drives, how to set up your Mac with its internal hard drive, and how to attach multiple hard drives to your Macintosh. We will also discuss basic information about how data is stored on your disk and provide you with some tips on how to use your hard drives more effectively.

Note: If you are having trouble with your hard drive, read this section and then go to Part V, the Troubleshooting section, for more detailed information about hard disk problems.

SCSI (Small Computer Standard Interface)

All Macintosh hard drives use the Small Computer Standard Interface (SCSI) called a *scuzzy* interface, bus, or chain. This is Apple's chosen means to connect the

Macintosh to external peripheral devices. The SCSI bus is used to connect hard drives, scanners, printers, and other peripheral devices to your Mac. It can even connect other computers to your Macintosh.

The SCSI bus is fairly simple, but if it is not set up properly, your Mac will not work. In the following sections, we'll concentrate on setting up your hard drives, using the SCSI bus. Any additional devices that use the SCSI bus will be mentioned in their appropriate sections. However, in this section, we'll talk about all of the ins and outs of the SCSI bus.

There are some basic rules to follow when using any SCSI device and connecting it to your Mac. And, to all *basic* rules there are always execptions. The first rule is that any device attached to the bus has a number, and no two devices can have the same number. Second, the first and last device on the bus need a terminator. A third is that there should be only 18 inches between SCSI devices. And the final rule is that the entire SCSI chain should be no longer than 15 feet in total length.

Of all these rules, termination can be the most mysterious, and sometimes all the rules go out the window. However, in most cases, you can depend on these rules above. Later in this section, there will be a discussion of the exceptions.

Number of SCSI Devices

Let's begin with the number of devices you can attach to the Macintosh SCSI bus. You can connect seven additional SCSI devices to your Macisntosh. If you have an internal hard drive and it is a SCSI drive, you already have one SCSI device and can attach only six more.

SCSI ID Numbering

Next, each SCSI device has a SCSI ID number. You can use the numbers 0 to 6. The Macintosh always uses 7 as its ID number. When you attach several devices to the SCSI bus, the entire system is called a SCSI chain. The reason for calling it a chain is because all of the connected peripherals are in serial, with one device being connected to another in a daisy chain. Figure 10.10 shows how several devices are connected to a Macintosh.

SCSI chain A group of SCSI devices linked to each other through SCSI peripheral interface cables and linked to the SCSI port on the computer through a SCSI system cable.

If you have an Apple hard drive installed in your computer, the ID number of the hard drive should always be 0.

To check the SCSI ID number by using the Get Info command:

1. Highlight your hard drive icon.
2. Go to the File menu and select the Get Info command.
3. An information window will open, like the one shown in Figure 10.11.

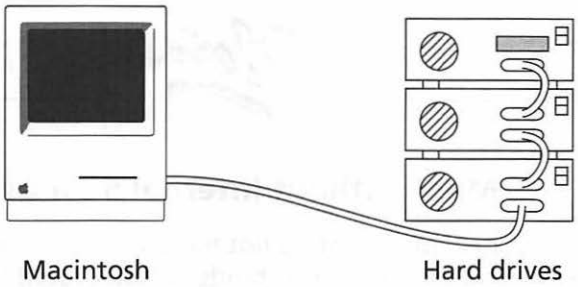


Figure 10.10 *Diagram of a SCSI chain.*

In Figure 10.11, you will see the name of your hard drive next to its icon. Next to "Kind," you will see the word "disk," under which is the disk's size information. What you're interested in right now, however, is the "Where" description, where you will find the name of the hard drive, the type of driver (usually the drive's manufacturer), and the drive's SCSI number. There are two windows in Figure 10.11. The one that says "Road Worthy, SCSI ID 0" identifies the drive as number 0 and "Macintosh System 7.5, FWB SCSI 3 v1.09."

Sometimes, a drive's Info window will not identify its SCSI number. When this happens, it is best to use your formatting software or a good shareware utility, such as SCSIProbe, written by Robert Polic, to determine your drive's SCSI ID number. SCSIProbe (which is on the CD-ROM included with this book) gives you good information about the SCSI devices attached to your Mac. It tells you:

- What ID numbers are in use
- The type of device

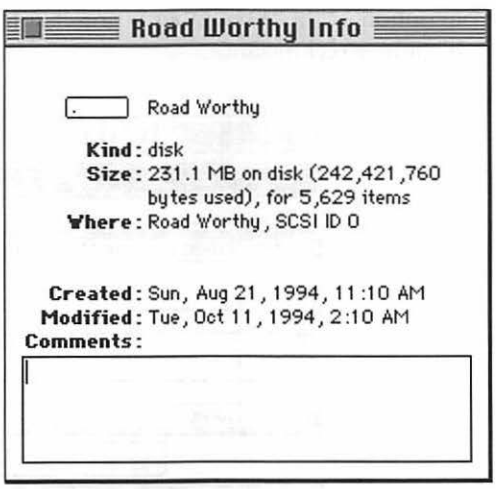


Figure 10.11 *Hard Drive Info window.*

Notes

Macs without Internal SCSI Drives

There are two new Macs that do not have an internal SCSI hard drive. Instead, they use a standard called IDE, which stands for Integrated Drive Electronics. The Macintosh PowerBook 150 and Quadra 630 both have IDE internal drives. The only functional difference between an internal IDE and an internal SCSI drive is that you cannot use a third-party formatter; you'll have to use the version of Apple's HD SC Setup that comes with these Macintoshes.

However, both of these Macs use the standard SCSI bus for connecting external devices. So, all of the information in this section about SCSI does apply. The only exception is that their internal hard drives do not use a SCSI ID number (SCSI IDs are discussed later in this section).

- Who manufactured the mechanism
- The ROM version of the SCSI device

In Figure 10.12, you can see that there are three devices in use with ID numbers 0, 1, 3, and 7—SCSI ID 7 is the Macintosh. SCSIProbe also shows that there are four free SCSI numbers that can be used by other devices.

Once you have figured out which ID numbers are in use, you will know what numbers to assign to other devices. How you assign ID numbers depends upon the device itself. Most hard drives have a switch of some type that allows you to change the ID number. Your options for setting the ID for any SCSI device are as follows:

- No option—The ID number is preset at the factory and cannot be changed except by a technician.

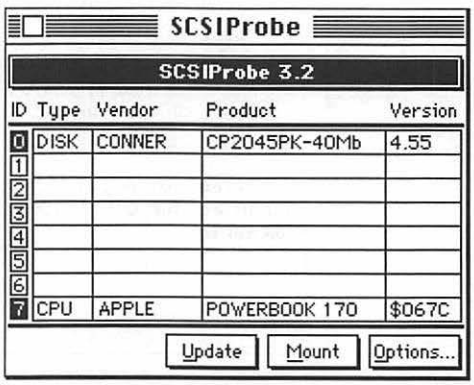


Figure 10.12 *Drives viewed with SCSIProbe.*

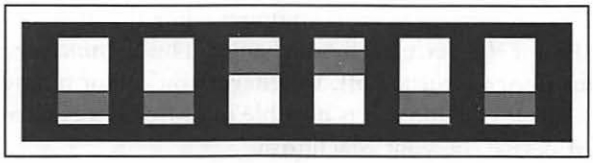


Figure 10.13 *A drawing of a dip switch.*

- Dip switches (see Figure 10.13)—You will need the manual to configure.
- Rotary Switch (see Figure 10.14)—Change the ID number by pushing a button.
- Your SCSI ID number is set by your formatting software.

Whatever method your SCSI device uses to set the SCSI ID number, rest assured that as soon as you have a new drive, scanner, or other SCSI device to attach, you will have a SCSI ID conflict. This is a derivative of Murphy's Law which states: "Whatever your existing SCSI ID numbers might be, any new SCSI device you purchase will be set to a number already in use."

What happens when you have two devices trying to use the same number is very simple. No SCSI device on the chain will operate and usually your Mac won't start. Some Macs will display the blinking disk icon, indicating it cannot find a startup disk, and others will just freeze. There is no way to determine how any specific Mac will react when there is an ID conflict. But, whatever the Mac does, it won't work properly. Always check your SCSI ID numbers when adding a new SCSI peripheral.

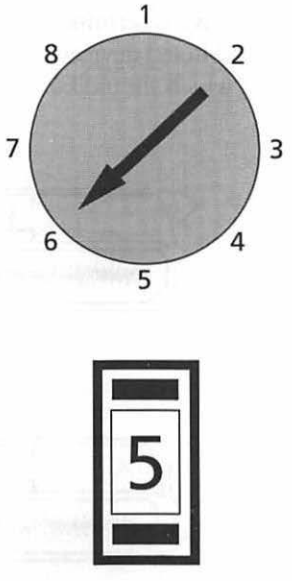


Figure 10.14 *A drawing of a rotary switch.*

Never change a SCSI ID number while the drive or device is turned on. If you do, the ID for the device will not change. The ID numbers change only when the power to the device is turned off. Whenever you add or remove a SCSI device, turn your Mac off. If you don't, it is possible to cause a short circuit that will damage both the SCSI device and your Macintosh.

Termination

Termination is the placement of a set of electronic resistors either on the logic board of the SCSI device or contained in an external device called a *terminator* (see Figure 10.15). A terminator stops the electric signals as they travel down the cables, preventing signal echoes and amplifying the power of the signal at the same time. The rule of thumb is that the first and last devices in a SCSI chain must be terminated.

Termination The placement of impedance matching circuits on a bus to maintain signal integrity.

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. Also called a *cable terminator.*

Another rule associated with termination is that there should not be more than two terminators on any Macintosh SCSI chain. If you place a third terminator on the SCSI bus, you stand an excellent chance of damaging your Mac or your drive. Some drives are more sensitive to excessive termination than others. It is possible to damage your Macintosh with too many terminators. If you do, you may need a logic board replacement.

Your internal hard drive is terminated and counts as the first terminated device on your SCSI bus. Any additional devices you add to your Mac need to be unterminated, except the last device, which should be terminated. The exceptions to this rule are:

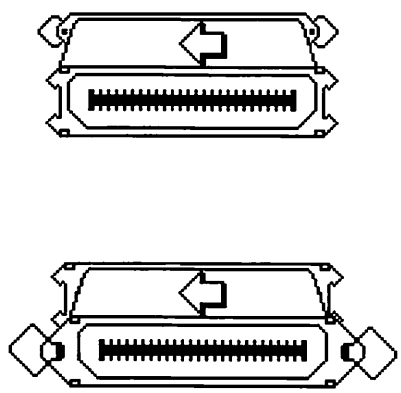


Figure 10.15 *External SCSI terminator.*

- Macintosh Quadra 900s and 950s—These Mac's have internally terminated logic boards, which means that their internal hard drive should be unterminated.
- The Macintosh Quadra 630—The internal drive is not a SCSI device, so the first device in your SCSI chain has to be terminated.
- Macintosh PowerBooks—Although the internal hard drive on a PowerBook is terminated, it is only partially terminated. The first and last external SCSI devices need to be terminated to work properly on a PowerBook.

In almost all instances, termination is straightforward. You can go to your local computer store and pick up a standard external terminator and everything will be fine—unless you have a Macintosh IIfx that requires a special terminator. If you are still confused about termination, the following is a list of the rules:

- There should be no more than two terminators on a SCSI chain.
- The first and last devices need to be terminated.
- Unless you have one of the Macs listed previously, first device will be your internal hard drive if you have one.
- A Macintosh IIfx requires a special terminator for the last device on the chain. This terminator was supplied with your IIfx when it was new, or you can get one from your local Apple Dealer.
- Do not put more than two terminators on your SCSI chain except as noted in the following "Cables" section.

SCSI Cables

All that connects your Macintosh and its SCSI peripherals are the cables. And, just as the strength of a chain is determined by its weakest link, the integrity of your SCSI chain is determined by the quality and condition of your cables. Unfortunately, all cables are not alike—nor are the SCSI connectors on the different devices.

Cables come in lengths of 1 to 15 feet; they also come in different thicknesses and can be shielded or unshielded. All these factors affect how well your drives and other SCSI devices operate. Cable quality can be determined by two factors: First, your SCSI cable should always be shielded. A shielded cable has a metal foil wrapped around the insulation inside the cable. You cannot see the shielding when you purchase a SCSI cable, so request a shielded cable. Also, a shielded cable can usually be determined by its thickness. An unshielded cable is about a quarter of an inch thick, while a shielded cable is about half an inch.

Second, it is a good idea to have the same manufacturer's cables to connect all of your SCSI devices. If that is not possible, then the next best thing is to have cables of the same type—that is, shielded. Mixing different types of cables can cause problems with signal strength, and different types of cables will have different resistance ratings, also causing signal inconsistency. Most SCSI peripheral manufacturers ship their devices with unshielded cables to save money. So, if you purchase a SCSI peripheral and it comes with an unshielded cable, purchase a new shielded cable.

Notes

SCSI Connector Caution

Even though this connector looks like the parallel connector on a DOS or IBM machine, it is not. Do not connect a parallel printer cable to this Macintosh port; if you do, you will seriously damage your Mac—especially by connecting the cable to a parallel printer and your Macintosh.

The process of connecting SCSI peripherals to your Mac is fairly straightforward—you use a cable that connects your Mac's SCSI port to the SCSI peripheral. All Macs have a SCSI port; Desktop Macs have a 25-pin SCSI port, while the PowerBooks have a special 30-pin SCSI port that is distinguished by a symbol. Before you can connect a PowerBook to a SCSI device, you'll have to get a special cable called an HDI 30 SCSI Disk Adapter. This cable is inserted into your PowerBook's 30-pin SCSI port and ends with a 25-pin connector port that is the same as the 25-pin SCSI port found on all other Macs.

Most SCSI peripherals you can buy have two SCSI ports—one for an incoming cable and the other to connect the device to another SCSI device. Figure 10.16 shows how SCSI devices are daisy chained using their ports.

External SCSI devices can have SCSI ports that are different from your Mac's. The most common port is a standard 50-pin SCSI port, but some devices will have a 25-pin port like the one found on your Mac. And there is a third type of port called a SCSI II port that is a 50-pin port that is smaller than the current standard.

When you buy a SCSI peripheral, be sure you have the proper cables. You'll need a cable to connect the device to your Mac and any other SCSI devices you own. Because there different types of SCSI ports, make sure you have the proper cables. The different combinations you could end up using are:

- 25-pin to 50-pin
- 50-pin to 50-pin

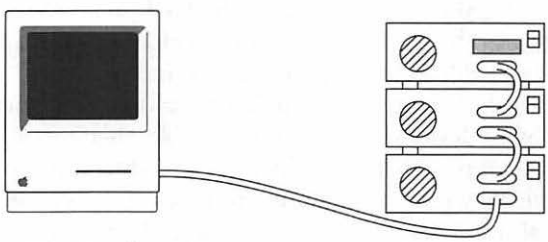


Figure 10.16 *A SCSI daisy chain.*

- 25-pin to SCSI II
- 25-pin to 25-pin
- SCSI II to 50-pin
- SCSI II to SCSI II

If you have a Mac and two external hard drives, where one drive has SCSI II ports and the other has 50-pin ports, you would need:

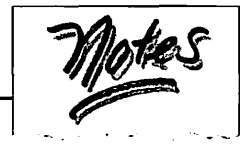
- A cable to connect your Mac to one drive
- A cable to connect the two drives

It does not matter how you position the drives or which SCSI drive ports you use, as long as each is connected as shown in Figure 10.17 above. So, you could use a 25-pin to SCSI II to connect the Mac to the SCSI II drive, and a SCSI II to a 50-pin cable to connect the SCSI II drive to the 50-pin drive. Or, you could reverse the order, using a 25 pin to a 50 pin cable and a SCSI II to a 50-pin cable, and achieve the same results. What's important here is that each device connects to the next. However, there are some SCSI devices that have only one SCSI port. If you happen to get one, it will have to be the last device in your SCSI chain, which means that you can use only one device, other than your Mac, that has a single SCSI port. Just be careful. Know how many and what types of ports your SCSI devices have so that you can plan the expansion of your computer system. If you don't know how your devices are configured, you'll end up making more than one trip to the computer store for cables.

The next concern is the length of your SCSI Chain, it should not be longer than 18 feet in total length with a maximum distance between devices of 1.5 feet. These are Apple's recommended guidelines and very good guidelines they are. But, as always, there are exceptions and the real world to contend with. Quite often, it is not possible or desirable to place all of your SCSI devices within 18 inches of your CPU. The considerations involved with placement of SCSI devices are numerous: The CPU is on the floor, the shelf to hold the scanner is 5 feet away, the hard drive is too noisy, *ad infinitum*. There are as many reasons as there are people for wanting to place the SCSI devices somewhere else.

Real-world configurations usually involve the use of 3- to 6-foot cables, and quite often the 18-foot length limit is exceeded. So if your SCSI chain is longer than 18 feet, see if you can shorten it. Remember that the length is not the actual physical distance, but the length of the cables connecting the devices. You can have three drives stacked one on top of the other and still exceed the length limit, because the cables between each of your devices are 6 feet long.

If you are having problems with your SCSI devices and your SCSI devices exceed the 18-foot limit, you might want to try adding a third SCSI terminator. Because the terminator can also act as an amplifier, it can sometimes cure the problems you are experiencing. However, this is something you should try only in desperation and with caution. The warnings in the section on termination are real—you could short out your system. So, if you try this, be careful. If anything (your Mac or your drives) acts strangely, shut down the system and remove the extra terminator, then shorten your SCSI chain—the best advice is to shorten your SCSI chain. *If you must try this,*



Hard Drive Questions

Two questions that always come up are: "What port on my hard drive should I use?" and "Does the SCSI ID number indicate where the device should be in the SCSI chain?" Neither of these questions matter; you can connect your SCSI cable to either port on the SCSI peripheral, and it does not matter what the ID number of the device has in relation to its position in the SCSI chain. There is no correct port—they are equal and any number can be anywhere on the chain.

do so with full knowledge that you could need a new drive(s) and/or a logic board before you are finished.

The final note about SCSI cables pertains to the Macintosh PowerBook, which requires a special cable connector for connecting with external SCSI devices. Most of the PowerBooks can be used as an external hard disk (all except the 140, 160, and 170), but this also requires a special cable. For any of the cables needed for a PowerBook, contact your Authorized Apple Dealer.

Your Macintosh Hard Drive

Presently, it is almost impossible to use a Macintosh without a hard disk drive, especially if you are to running System 7. Your hard disk is an electromechanical device designed to hold and very quickly access large quantities of computer data. Although most of the principles that apply to floppy disks apply to hard disks, there are some very major differences. The similarities are that hard drives have disks coated with a magnetic material to hold your data just as floppy disks do. The differences begin with the hard drive disk's being constructed of metal or glass *platters*. A hard disk can have one or more platters, depending on the data capacity of the drive.

A hard disk also has read and write heads, but they do not rest on the platters and you should never touch them while the Macintosh is running. Instead, the platters spin at a minimum speed of 3,600 rpm, with newer disks spinning at 5,000 rpm. The spinning platters create a cushion of air strong enough to float the heads on a cushion of air just above the surface of the platters. The distance between the platter and the head is between 10 and 20 millionths of an inch, and the heads never touch the platters except when the power to the Macintosh and/or drive is turned off. When your drive loses power, its heads will automatically move to a landing zone and, after the platters stop spinning, come to rest.

The heads are attached to the end of an actuator arm just like a floppy drive's, and a stepper motor moves the actuator arm in short, rapid, concise strokes for accurate

positioning. The specially designed motor moves the heads based on predetermined lengths, which makes it easier for the drive and computer to rapidly access your data. The heads keep their position because of special encoded tracks called *servos* or servo encoding.

On a standard hard drive, a metal air-tight case encloses the entire mechanism. It is air-tight so that no air from the outside can get into the drive and interfere with the heads or the platters. The average piece of dust is several times larger than the space between the heads and the platter, and if one should get into the drive assembly, it could cause disastrous results. However, some hard drives have removable platters with exposed drive assemblies. The later section "Optional Storage Devices," on removable media hard drives describes these drives.

Each hard drive, like its floppy counterpart, has a logic board that enables it and the computer to communicate. If the drive is external to the Macintosh, it has its own box and power supply; an internal hard drive uses the same power supply as the Macintosh. All drives that use this technology are the Winchester drives mentioned at the beginning of this chapter; almost every drive used on a Macintosh is a Winchester-type drive. The only exceptions are a removable media drive (manufactured by Bernoulli) and optical drives.

How Fast Is Fast?

As with every component of the Macintosh, your hard drive has a speed rating. Every manufacturer assigns a rating, measured in milliseconds (ms), to their drives; these ratings are called *access time* and *seek time*. Access time is the speed with which the drive can reposition its heads from track to track, and seek time is the length of time it takes the drive to find a file. Current average access time for most Macintosh drives is from 10ms to 19ms; most Quantum drives operate at this speed. As a rule of thumb, the larger the drive's capacity, the faster the drive. Some of the fastest drives have an access time of 4 or 5ms, which exceeds the capacity of most Macs.

In addition to the access and seek time, each drive also has a *data transfer rate* measured in megabits per second. However, these numbers are confusing. They represent an ideal data transfer rate, which is determined by sending data to and from the drive at the fastest possible rate without concern for error checking or other factors that would affect the drive's overall speed. Even the high-end Macs, such as the Power Mac, cannot take advantage of a fast drive's optimum speed capacities.

These numbers represent the drive's speed as an independent subsystem operating under optimum conditions. The numbers are useful for making comparisons between different drives. As a rule, the faster the seek, access, and data transfer times, the faster the drive will work with your Mac. Because the transfer of data requires communication between the devices involved, your data will transfer at the lowest common denominator within your system. You can copy data from a slow drive to a fast drive and the entire system will operate at the speed of the slow drive. On the other hand, if you are using a Quadra, a slow drive, and a fast drive, but you use only the slow drive to back up your data, the slow drive will not interfere and slow down the process.

Unless you have a PowerMac or a Quadra, you can easily purchase a hard drive that can run faster than your Mac. When you are looking at a drive's capabilities, both the access time and the data transfer rate are important. The faster the access time, the quicker the drive will operate; the same principle applies to the data transfer rate. If two drives have equal data transfer rates, the one with the faster access time will operate more quickly on your Mac.

Several programs are available that can help you analyze the speed of a disk drive. One shareware program, called SCSI Evaluator, is an extensive disk drive tester that determines the access time and data transfer speed of your hard drive. You must use this program with care because it can damage the data on your hard drive. Another utility called BenchTest, included with FWB's Hard Disk ToolKit, has functions similar to SCSI Evaluator. Of the two programs, the more stable one is BenchTest.

Today's hard disk technology is getting so good that you don't have to be as concerned about drive speeds as you might have been a couple of years ago, but it never hurts to check these numbers and do some comparison shopping.

Form Factors

One of the terms that will pop up when you start looking for drives is the term *form factor*, which refers to the physical size of the drive. Currently, there are five form factors or physical sizes for hard drives. Table 10.1 lists these different sizes.

These descriptions are only approximations; drive specifics vary slightly from one manufacturer to the next. The capacity of each of these different sizes is constantly changing. The numbers in the table provide a range for determining the capacity of drives with different form factors. A drive's form factor determines whether or not a drive will fit in your Mac or how much desk space it will require. Today, all new Macintoshes come with a 3.5 HH or LP drive except PowerBooks that have a 2.5 LP drive. Although some Macs can hold a 5.25 HH drive, you're better served to pur-

Table 10.1 Physical Size of the Hard Drive

SIZE	DESCRIPTION	CAPACITY
5.25 FH (Full Height)	5.25 inches wide by 8 to 10 inches deep by 5 inches high	500M to 9GB
5.25 HH (Half Height)	5.25 inches wide by 8 to 10 inches deep by 1.75 inches high	80M to 3.5GB
3.5 HH (Half Height)	3.5 inches wide by 6 inches deep by 1.75 inches high	20M to 4.2GB
3.5 LP (Low Profile)	3.5 inches wide by 6 inches deep by 1 inch high	20M to 2.1GB
2.5 LP (Low Profile)	2.5 inches wide by 4 inches deep by .75 of an inch high	20M to 540M

chase an external drive if you need one this large. Using an external drive—although it will require additional desk space—is an easier solution for using this drive size than trying to mount the drive internally.

Warranties

Every hard drive has some original manufacturer's warranty. Usually, the manufacturer—the company who puts the drive in a box—supplies the formatting software and, when it sells it to you, will pass the original equipment manufacturer's (OEM) warranty on to you. When you purchase a new drive, check the drive's warranty. If the vendor does not pass the full warranty on to you, find another vendor. Because your hard drive is more likely to fail than any other component in your computer, a warranty is a sound investment. Before purchasing an extended warranty, however, evaluate whether the additional cost is worth the money.

Prices generally decrease—you could pay more for a two-year extended warranty than you would pay to replace your hard drive a year after you purchase it. A little over a year ago, a 1G external Mac drive at its best prices cost about $1500; it now costs less $1000. A year from now, it will probably cost around $500. Evaluate the cost of a long-term warranty versus the cost of fixing or replacing the drive without a warranty.

Starting Up

The discussion up to this point has been about your drive and its physical attributes, but not much has been said about using it with your Mac. To start your Mac, you need a System Startup disk. Apple assumes that you will be using a hard disk drive with any Macintosh you purchase. (The days of running your computer on floppy disks are over.) You cannot be productive on a Macintosh without a hard disk drive, and that drive must be properly formatted and contain a System Folder. Chapter 6, "Installing Your System and Software," covers the process of installing your system. As long as you have a System and a properly attached drive, your Mac should start up and run without a problem.

When more than one drive is attached, you need to make sure that any internally terminated drive is turned on; if it is not, your Mac will not recognize any of your drives or that one of the drives contains a System Folder. (Termination was discussed in the earlier section, "The SCSI-Small Computer Standard Interface.") When your Mac starts, you will notice a drive icon in the upper right corner of the Desktop. This icon represents the hard disk drive that contains the System that is running the Mac. Even if all the other drives have System Folders, only one System Folder at a time controls the Mac.

There are several reasons why you might have multiple drives. Because any drive with a System Folder can boot your Mac, you can configure your additional drives for different purposes. You can set up one System Folder to run with the maximum amount of memory and another to provide specific memory-intensive utilities. A third can run System 6.0.X to access programs or devices that are not System 7-compatible.



Bootable Disks

Even if a drive appears in the Startup Disk window and you select it, the drive still may not be a bootable disk. To be bootable, it must have a System file installed on it. If the Mac does not boot from your selected drive, refer to Chapters 16 and 17 about troubleshooting.

Setting the Default Drive

To select your startup drive:

1. From the Apple menu, select Control Panels.
2. From the Control Panels folder, double click on the Startup Disk control panel. A window opens that displays the drives currently on your Desktop (see Figure 10.17).
3. Select the drive you want to use to run your Mac, then Close the window.
4. Restart the computer.

The selected drive becomes the *default drive* or *default startup drive.*

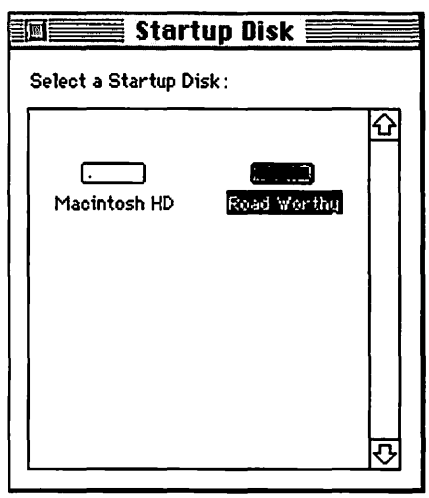


Figure 10.17 *The Startup Disk window.*

Desktop Files

The section on floppy disks explained the different data structures that are added to a floppy disk during formatting. With System 7.X, your hard drive has two additional files that you will not find on System 6.0.X disks. These files are created by the System 7 and serve the same function as (therefore, replace) the Desktop file in System 6.0.X.

The Desktop file under System 6.0.X could keep track of only 6,000 files and often failed when the number of files reached 3,500 to 4,000. A disk with a large capacity and a lot of small files could soon have trouble under System 6.0.X. This problem could be solved by using the Desktop Manager from AppleShare, Apple's file server software. But, because the Desktop Manager is licensed and can be used only with AppleShare, you could have a problem using it to manage your Desktop file.

System 7.X adds two files—Desktop DB and Desktop DF—to the hard drive. These files enable you to keep more than 6,000 files without causing your hard disk drive to crash. You can see these files if you use a utility that displays invisible files (see Figure 10.18).

Hard Drive Sectors

The format on a hard drive is the same as a floppy drive, with a couple of exceptions. One difference is that the sectors do not contain sector tags. However, the main difference is that the sector size of a hard disk can vary; it is usually between 512 bytes

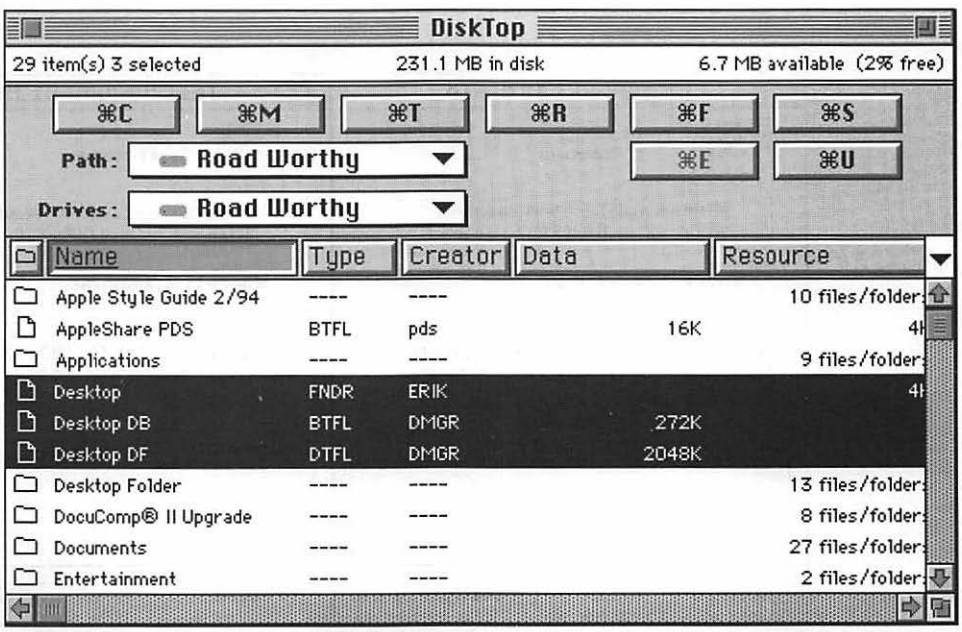


Figure 10.18 The Desktop DB and Desktop DF files.

Notes

Using a System 7 Drive with System 6.0.X

If your hard disk drive will not boot when you take it from a System 7.X environment to a System 6.0.X environment, you may have too many files for System 6.0.X. Take the hard disk drive back to a System 7.X environment; if the hard disk drive works, you probably do have more files than System 6.0.X can handle. This problem generally occurs only with large drives—300M or greater.

and 2K but it can be as large as 4K. The sector size on your hard drive depends on the size of the drive. The larger the drive capacity, the larger the sector size. Figure 10.19 shows the same file, except that the drive on the right is on a 40M hard drive that uses 1K sectors, and the drive on the left uses 2K sectors and is 320 megabytes. Files sizes are not measured by their actual size but by how many sectors they occupy. Sector size can be a big problem, especially, if you consistently use small files on a large hard drive. You could be losing a lot of hard-disk space because of your disk's sector size. If you have this problem, you can partition your hard drive. Partitioning is a procedure that makes two or more smaller drives, called logical partions, out of a large disk drive. The procedures for partitioning a drive are in the later section, "Formatting a Hard Disk Drive."

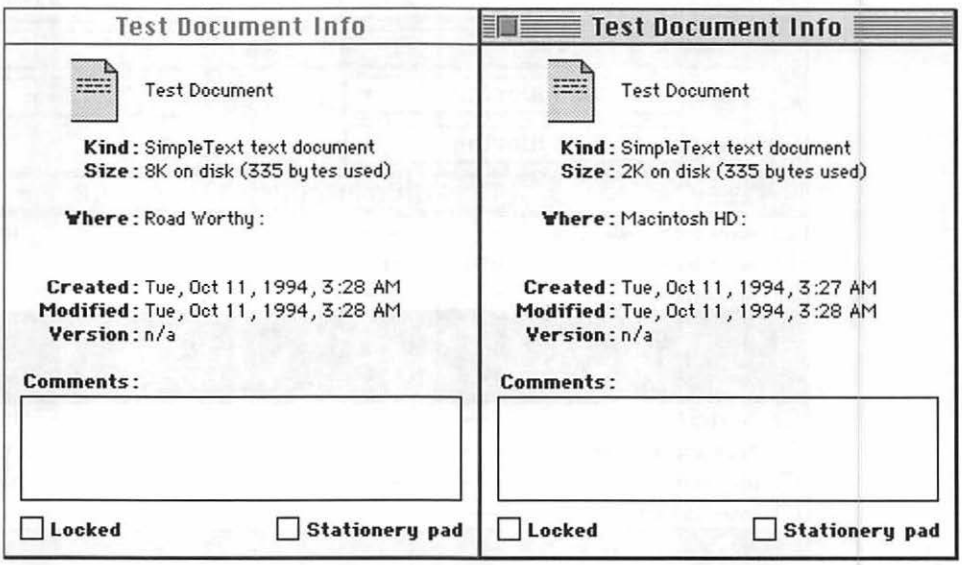


Figure 10.19 *File size and sector size comparison.*

Hard Disk Drivers

All disk drives and other computer peripherals require a means of sending data to and receiving data from the CPU. This peripheral communication is accomplished via a driver, which is a program that tells the computer how to interact with the peripheral. Any peripheral device attached to your computer requires its own driver, even when the driver is a part of the Macintosh System Software or built into the Macintosh ROMs, as is the driver for floppy drives.

The driver for a hard disk always resides on the hard drive. The driver is installed onto the drive during the formatting process. When the Macintosh starts up it looks for a hard drive. When it finds one, the Mac reads the driver into memory and keeps it there during the entire computing session. The Mac can then access its hard drive whenever it needs to. If you have multiple hard drives attached to your Macintosh, the Mac stores the driver for each drive in memory when it starts up.

Driver Corruption

You might start up your computer—with the hard disk drive attached—and find that the Mac does not recognize your drive and your Mac doesn't start. This situation might be a result of either a cabling problem or a corrupted driver. (For more information about this problem and other possible solutions, see Chapters 14 and 17.) The driver is software and, like other software, it can become corrupted due to a system error, a bad sector, a power loss, and so on.

Another indicator that your driver has failed is if you see a Sad Mac icon when you turn on the computer (see Figure 10.20). The Sad Mac icon is a substitute for the Smiling Mac icon that you see when your Mac boots, only the Sad Mac appears when your Mac is having either hardware or software difficulty during the startup process. Procedures for dealing with the Sad Mac can be found in Part V, "Troubleshooting." If you're sure the problem is with your hard drive, Chapter 18 will help you.

Driver Compatibility

If you're upgrading to System 7.X, from System 6.0.X your hard disk's driver must be System 7-compatible and 32-bit clean; if you have multiple hard disk drives on your system, the driver for each must be System 7-compatible and 32-bit clean. System 7 uses a different boot block structure than System 6. Consequently, if you use your hard drive on a Mac with System 7 without updating the driver, you will probably experience strange behavior, such as system freezes, hard disk drive crashes, and disk errors.

If your driver is not 32-bit clean and written to Apple's specifications, you will be unable to use virtual memory or 32-bit addressing reliably. You may also have problems using System 7's File Sharing features. As a rule, System 7 will not install on a drive that has an incompatible driver, but the driver still might not be 32-bit clean. Make sure that your driver is compatible before you install System 7; installing System 7 on a drive without compatible drivers could cause a crash and a total loss of data.

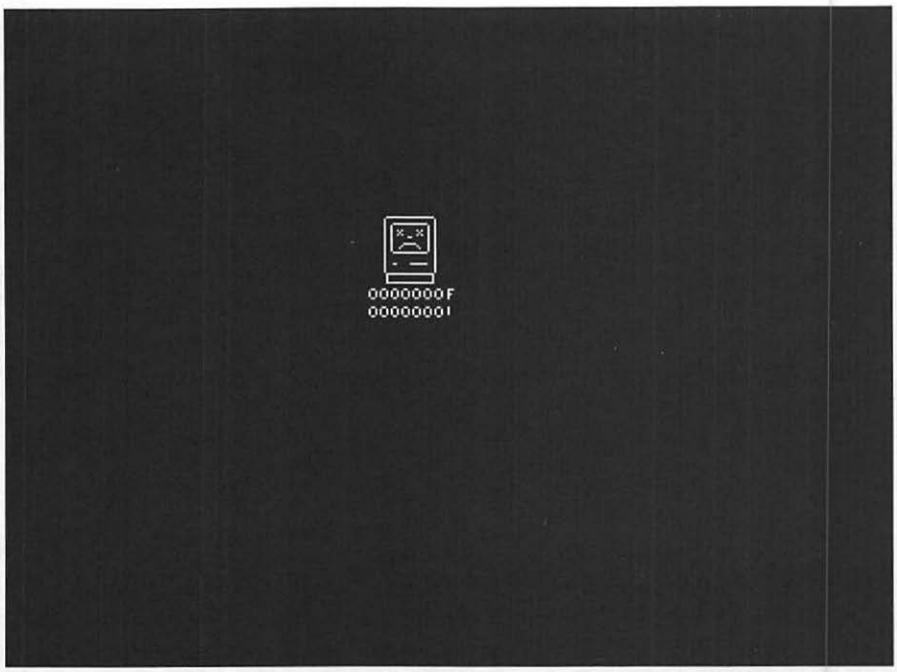


Figure 10.20 *The Sad Mac icon.*

If you have an Apple hard disk drive and the Apple formatter HD SC Setup, you can use the instructions in the following section, "Reinstalling the Driver," to upgrade the driver. If you have a third-party hard disk drive or driver, you must contact the manufacturer to determine whether your driver is 7.0 compatible. If your driver is not compatible either have the manufacturer send or purchase a third-party driver that is System 7-compatible. If your driver is compatible, install System 7 and then follow the instructions for running Disk First Aid in the following section.

Reinstalling the Driver

You might need or want to reinstall or upgrade the hard disk drive driver for several reason. Two of these reasons are to fix a corrupted driver or when upgrading to System 7.X.

If you are using an Apple Drive (HD SC Setup works only on an Apple Drive), follow these steps to upgrade the driver:

1. Boot the Mac by using the System Tools (System 6.0.X) or Disk Tools (System 7.X) disk.
2. After the system boots, open the disk and double-click on the Apple HD SC Setup_icon.
3. The HD SC Setup will display a message saying it is scanning for a hard drive. When HD SC Setup finds a drive, it will enable the buttons on

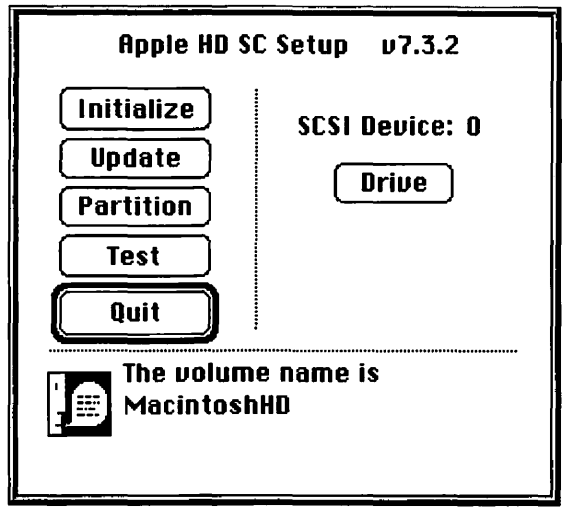


Figure 10.21 *The Apple HD SC Setup window.*

the left (see Figure 10.21). This procedure is the same for Systems 6.0.X and 7.0.

4. Make sure the drive you select has the correct SCSI ID. You will find it on the right-hand side of Figure 10.22 labeled SCSI Device: X. Otherwise, click on the Drive button until the proper drive number appears. If you do not know the SCSI ID of the drive you want to work on, stop everything. Either disconnect all external drives (if you are trying to work on your internal drive) or use one of the techniques described in the next section about the SCSI bus to determine your drive's number.
5. After you select the correct drive, click on the Update button. The Installer updates the driver and tells you when it finishes.
6. Click on the Quit button, then restart your Mac.



Driver Updating Cautions

Whenever you run your formatting software, be careful not to format your drive accidentally. If you format your drive, you will lose all your data and nothing on earth will return it except a backup. Make sure that you have a backup, and never try any hard-drive maintenance when you are tired or distracted. One click of a button will send all of your data to Never-Never Land.

To update your driver on a third-party drive, refer to the reference manual for your hard disk drive. There are as many formatters (formatting software) as there are hard disk drive manufacturers, and each has its own method for updating the driver. With some formatters, such as Hard Disk ToolKit from FWB and Drive 7 from Casa Blanca Works, you can *sometimes* upgrade your driver, even if your drive is formatted with and has a driver from a different hard drive manufacturer. If you try to do so, use caution. There is no guarantee either of these packages will upgrade your drive's driver, so back up your data. Read each message that appears on-screen, and if the program asks to initialize your hard disk, cancel the procedure. All formatting software will give you an option to cancel prior to initializing or formatting a hard drive.

After you upgrade your hard disk drive driver, use Disk First Aid, which is located on your System 7 Disk Tools disk. Earlier versions of the System software contained bugs in the extents and catalog tree files. These bugs caused minor problems, such as the inability to trash empty folders. These errors, which occurred only occasionally, have been corrected in System 7. Unless you run Disk First Aid after you upgrade your driver, the problem will persist.

To run Disk First Aid:

1. Boot your Mac using the Disk Tools disk, then locate and double-click on the Disk First Aid icon.
2. In the window that appears, select your hard drive (see Figure 10.22).
3. Click on the Repair button.

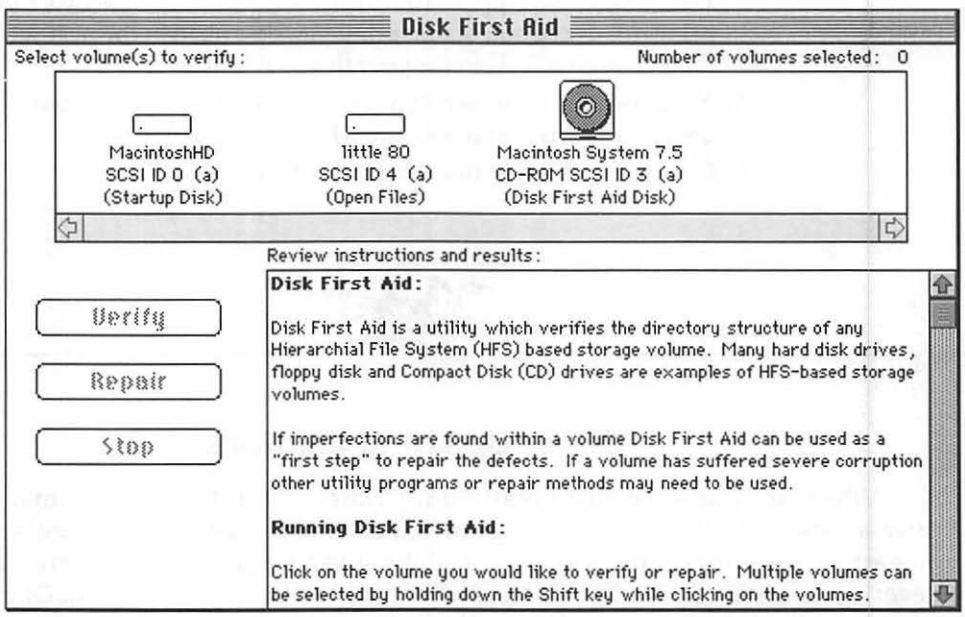


Figure 10.22 *The Disk First Aid window.*



Damaged Drives

Disk First Aid is the first tool to reach for if your hard drive is misbehaving. It does more than correct problems caused by System 6.0.X—it can fix a hard drive that is malfunctioning. It will not *always* fix your drive's problems but it will work about 80 percent of the time. If Disk First Aid is unable to repair your hard disk drive, you have serious problems. Back up all critical data (if you haven't done so yet) and format your hard drive. Although you might be able to repair your hard disk with a utility, such as Norton Utilities from Symantec or Disk Tools from Central Point Software, you should not just repair your drive and continue to work. (Using Norton Utilities is discussed in the troubleshooting chapters.) If Norton Utilities did not completely fix the problem, you could have hard disk problems or a crash sometime in the future.

Disk First Aid checks and verifies your drive's directory . If your hard disk drive requires repairs, the program then informs you either that it was unable to repair the drive or that the repairs are complete.

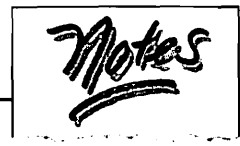
The foregoing procedure uses the Disk First Aid utility that comes with System 7.5. If you're using an earlier version of Disk First Aid, check your Mac's manual for instructions.

Formatting a Hard Disk Drive

Every hard disk drive comes with formatting software. In fact, what distinguishes one Macintosh hard disk drive manufacturer from another is the formatting software and the case of the hard disk drive. It is not uncommon to find several manufacturers using the same drive mechanism—and even the same case—and yet use different formatting software.

In addition to installing the driver, the formatter also formats your hard disk for use with the Mac. In this sense, it performs the same functions as the initialization process for a floppy disk (refer to the section, "How to Format Floppy Disks," earlier in this chapter). In addition, the formatter also sets up the following:

- The interleave—The interleave setting directly affects the speed of your hard disk drive by determining how the drive stores data.
- The size of the drive's sectors—Each disk has sectors, and the size of the sector can affect the performance of the hard disk drive.
- The size and number of partitions—The size of the bit-map partition determines the overall size of the hard disk drive. If your formatting software predetermines this size, you might not be getting the maximum available space on your drive.



Voice Coil Actuators

The voice coil actuator is a small motor that operates on the same principles as sound used in your stereo speakers. The strength of the electric current passing through an electromagnet pulls the actuator arm or armature backward, thus positioning the heads. Some drives now have actuators positioned opposite each other, so there are two heads; the result is that you can access data twice as fast.

- Initializing your drive—After your drive has been formatted and partitioned, it needs to be initalized. The initalization process creates the hard drive's directory.

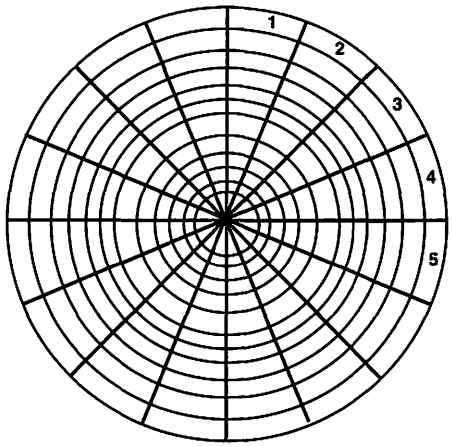
Selecting the Interleave Settings

Of the processes listed in the preceding section, the most important is the interleave setting that determines how hard your hard disk drive has to work and directly affects the drive's access time. Because the platters in your hard disk drive are rotating at speeds from 3,600 to 5,000 rpm, the heads must be able to determine when they need to read and write data. The actuator arm performs part of this process by moving back and forth at predetermined intervals controlled by either a voice coil actuator or a stepper motor. The logic board on the drive performs the rest of the process.

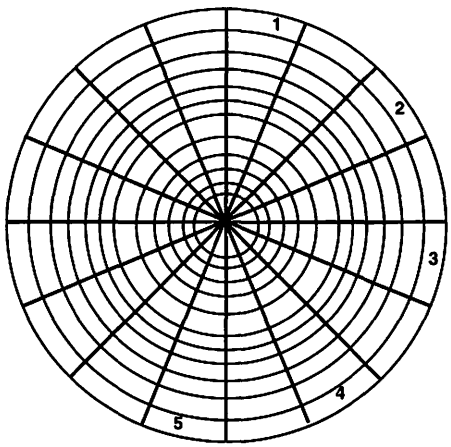
There are three standard interleave settings: 1 to 1, 2 to 1, and 3 to 1. These ratios determine where data is written on your drive. Each track is divided into sectors where your drive must write and read its data as the sectors pass underneath the drive's heads. If the Mac is not fast enough to read data written in contiguous sectors (1 to 1), it will have to wait while the platter spins an extra revolution before it can read the next sector. If the data is contained in every second (2 to 1) or third sector (3 to 1), your Mac will read these sectors without waiting for the platter to make an entire revolution, and the larger interleave will (in this case) enhance the drive's access time. On the other hand, if your Mac can take advantage of a 1 to 1 interleave setting and your drive is formatted with a 2 to 1 or a 3 to 1 interleave, you will be slowing down your access time. Figure 10.23 shows the different data storage patterns for a disk with each of the different interleaves.

Each Macintosh also has an optimum interleave setting with which it will work best. An SE/30 works best with an interleave of 1 to 1, but when attached to a drive with an interleave of 2 to 1, the overall performance, or data throughput, changes radically.

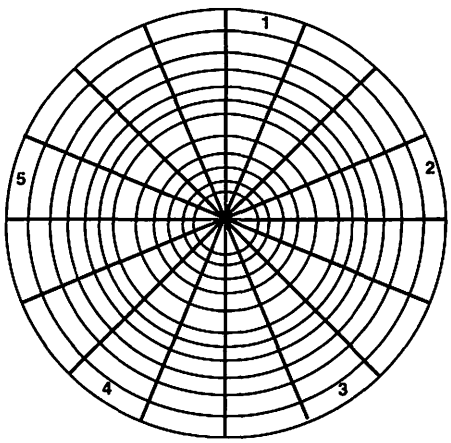
Your formatting software should format your drive at its optimum interleave on the basis of the Macintosh model you are using. Suppose, however, that you have a



1:1 Interleaving Consecutive sectors are written.



1:2 Interleaving Every other sector is written.



1:3 Interleaving Every third sector is written.

Figure 10.23 *Different interleave settings often affect how quickly information is accessed.*

Table 10.2 Macintosh Interleave Settings

MODEL	INTERLEAVE
Plus	3 to 1
SE	2 to 1
Classic	2 to 1
Portable	2 to 1
Entire LC family	1 to 1
Classic II	1 to 1
SE/30	1 to 1
Entire Mac II family	1 to 1
All Centris, Quadras, and Power Macs	1 to 1
PowerBook 100	2 to 1
All other PowerBooks	1 to 1

hard disk drive you take between the office and home. The Mac at home is an SE, but you use a Mac II at the office, or vice versa. If you formatted your drive for the SE and you use it more on the II, you will spend a great deal of time waiting for the drive to catch up with the computer. The only cure for this problem is to determine for which Mac you format the drive and then understand that when you use the drive with the other machine, it will not work as quickly.

Setting the Sector Size

The sector size affects how much disk space you are using. If you use a large sector size on a small drive, for example, you might waste some hard disk space. The type of data files you use should dictate the size of your drives sectors. If you have large database files, use larger sectors, which are read more quickly. If you are keeping only small word-processed files, use smaller sectors so that you will not waste disk space.

The setting for your sector size is usually a transparent function of your formatter, and most formatters will not allow you to change it. To change the sector size, you



Wrong Interleave Setting

If you format your drive and select the wrong interleave, you can solve the problem only by reformatting the drive.

must use a formatter, such as Hard Disk ToolKit from FWB or Drive 7 from Casa Blanca, which is a third-party formatter that allows you to customize your drive's format. Most formatters, even third-party formatters, do not allow you the type of control you can get from Hard Disk ToolKit.

Setting Up Partitions

Some formatters enable you to partition your hard drive. When you partition your drive, the formatting software creates two or more bitmap partitions on your disk and tells the Mac that you have two drives instead of one. Because you do not have two physical drives, the partitions are called logical partitions or logical drives.

In addition to creating logical drives, a partition can have security features as well. You can generally password-protect a partition so that it will not mount without the correct password. Some formatters and partitioners can also encrypt the data in the partition, so that someone else cannot see the contents of the drive without knowing the correct password. On the downside, password-protecting a drive or a partition (regardless of the encryption factor) makes it very difficult but not impossible to access that drive without the password. If it is just password protected and not encrypted, you can use a disk-recovery package to access all of the data. However, if your partition is encrypted and you forget your password, it will be very difficult, if not impossible, to recover your hard drive.

Partitioning your disk drive can also provide increased speed. To create a partition, contiguous disk space must be available. Because the space is contiguous and occupies a specific physical section of your hard drive, the heads have a shorter distance to travel to locate data. Each partition is positioned at a separate logical drive, but only one partition—the primary partition—can be the startup drive. The primary partition is the first partition created and contains the physical track numbered 0. The Mac looks to this track for startup information when it is booting from a disk.

Another reason for partitioning your hard drive is so that you can use it both on a Mac and on another type of computer, such as a PC. You can do this by partitioning your drive when you format it, leaving part of your drive free and unused. When you hook it up to another computer, it will recognize the partitioned part of the drive and the other computer's formatter should be able to recoginize the remainder that is free. You can then partition the remaining space on the drive for the *other* computer. Creating this type of partition is an esoteric use for a Mac's hard drive. If you really want to do something like this, you will have to experiment.

Low-Level Formatting

When you use formatting software to format your drive, you are performing a low-level format. This process creates the tracks and sectors on the drive, installs the driver, and writes the other necessary files to the hard disk. The formatter also checks the disk for actual physical defects and maps out any problematic sectors, which prevents data from being stored in these sectors. Most formatters automatically map out bad sectors; however, some will ask you to perform the dirty deed.



Hard Disk Flaws

Over time, every hard drive has or can develop flaws in its magnetic media so that it cannot hold a charge. When you format your drive, the software finds these flawed sections by testing the drive after it has divided it into tracks and sectors. Whenever it finds a bad sector, it maps it out or makes it unavailable for use.

A bad sector table tracks the locations of the bad sectors; unfortunately, this table has a limited amount of space for storing the addresses of the bad sectors. If your drive should suffer a head crash (where the heads strike or come in contact with the media) or—through normal wear and tear—develop too many bad sectors, your drive will not format. You then must purchase a new drive.

A low-level format clears the disk and erases any data that the disk contains. Rather than perform a low-level format, you can initialize your drive, which is a high-level format. A high-level format erases and recreates the directory but does not erase the data on the disk. Therefore, although the Mac does not recognize the data, the data is recoverable. This same process occurs when you erase a single file: The directory reference for that file is deleted, although the file data is not actually deleted until the space that the file contains is needed for another file.

To initialize a hard disk:

1. On the Desktop, select the icon of the hard disk you want to format. You cannot erase your Startup disk.
2. From the Special menu, choose Erase Disk.
3. In less than a minute, your drive will be wiped clean and appear on the Desktop as an empty drive.



Accidental Initialization

If you accidentally initialize a disk that contains data you need, turn off the computer and read the section on disk recovery in Chapter 18. Do not save, copy, or write any data to your hard disk until you have recovered the files.

If you want to reformat your drive because you are having trouble, do not initialize it. You cannot fix a problem with your driver or the boot blocks by erasing the disk. You must reformat the disk to repair problems on this level. Trouble can be anything from system errors that will not go away even after you've reinstalled your system (covered in Chapter 6), to frequent read and write errors. Before formatting your drive, be sure to read the troubleshooting chapters.

Purchasing a New Formatter

Because your formatting software is responsible for the performance of your drive, you might want to purchase a new formatter. Apple's formatting software is fine, but it does not give you the control over your hard disk drive that other formatters offer. Drive manufacturers often do not write the software that accompanies their drives; instead, a company might license formatting software from a vendor that is selling different versions—with only minor interface modifications—to several different manufacturers. To get the most from your hard drive, you might want to consider purchasing new formatting software.

There are several companies that publish hard drive formatters, they are listed in the following table. The inclusion of a publisher in the table does not constitute a recommendation.

Almost all of the software publishers listed in Table 10.3 make several hard-disk enhancement products in addition to their formatters.

Optional Storage Devices

Several different types of drive technologies are available for the Macintosh. To select the correct drive for your needs, you need to know the pros and cons for each

Table 10.3 Hard Disk Formatters

PUBLISHER	PRODUCT NAME
CharisMac Engineering	1-Anubis
Bering Technology	Disk Café
Ontrack Computer Systems, Inc.	Disk Manager Mac 3.0
Golden Triangle Computer, Inc.	DiskMaker
Casa Blanca Works, Inc.	Drive7
Software Architects, Inc.	FormatterOne
FWB, Inc.	Hard Disk ToolKit
Surf City Software	Lido 7
Peripheral Land, Inc.	PLI Formatter

of the different technologies. The following sections look at the different technologies and their strengths and weaknesses.

Winchester Drives

The Winchester drive is the most popular drive used in any computer system, including the Macintosh. Winchester drives are very fast and, as a whole, reliable. The fastest drives have access times of around 3 milliseconds, and they have capacities from 20M to 9 gigabytes.

Bernoulli Drives

Iomega Corporation produces a series of drives called Bernoulli drives. These drives use a patented removable media technology, and they were the first removable media drives available for the Macintosh. A removable media drive enables you to remove and replace the platter (much like a floppy disk) without interrupting your computing session.

What makes the Bernoulli drive unique is that it cannot have a head crash. The heads not only float on a cushion of air, but the air flow created by the spinning of the platters makes it impossible for the heads to touch the spinning disk, even if the drive should lose power. Because the first Bernoulli drives were slow, they did not get a large Mac following. Their primary use was as backup drives. In recent years, the drives have become reasonably fast—19ms—but they have yet to really make inroads into the Mac market.

If you need a removable media drive, the Bernoulli is a viable option. SyQuest drives (mentioned in the following section) were the first removable media drives to become popular with the Mac; consequently, Bernoulli drives have not become a standard. In addition, Iomega does not offer the Bernoulli drive for OEM development and there is no competition in price or product range, which has also kept them from being popular. (OEM stands for Orginal Equipment Manufacture. When a drive is offered for OEM development, the orginal manufacture, in this case Iomega, would let third-party vendors sell their drive mechanisms in their own boxes—with the vendor's name instead of Iomega's. Because there is no competition between vendors selling the same product, there is no price fluxation of market adjustments based on supply and demand.)

If you want to use a Bernoulli drive and share your disks with other users, those users will also need a Bernoulli drive. The Bernoulli drives have capacities in both 45M and 90M.

SyQuest

SyQuest, a company in Fremont, CA, developed a removable media drive based on Winchester technology. The first drive they produced had a capacity of 10M, but it

was not available on the Mac. When the company developed a 45M drive several years ago, it became a popular storage medium because it was fast (25 ms average access time), and the total data storage capacity was unlimited. If you need more disk space, you just buy a new disk. In addition to the 45M drives that continue to be popular, SyQuest has a 90M and a 200M drive with a 19 ms access time. The 45M, 90M, and 200M drives use a 5.25-inch HH drive with a 5.25-inch square disk enclosed in a plastic housing.

SyQuest has also developed a 105M and a 270M 3.5-inch HH removable media drive that operates like their 5.25-inch siblings. The smaller drives are nice, compact drives and highly portable. The SyQuest drive is a primary means for easily moving large data files from Mac to Mac, and it is the most popular method used by graphic artists to transport large projects to prepress shops. SyQuest also makes an excellent backup and archive device.

The biggest drawback to the SyQuest technology is in the disks, which tend to fail more often than a regular Winchester disk. A SyQuest disk that is used constantly will last only about two years and, although SyQuest drives come with a two-year warranty, the disks have only a one-year warranty. The other drawback is that a SyQuest drive is easy to damage through improper usage—trying to force a disk out before the disk has stopped spinning or while it is still on. One of the nicest features of the SyQuest disk, however, is that you can change disks without restarting your Mac.

SyQuest does not market its drives to the public. You can get a SyQuest-based drive only through hard-drive vendors who market a disk drive based on the SyQuest mechanism under their own name and label. Because a large number of vendors offer these drives, the market and prices are competitive. Almost every major and minor Macintosh hard-disk vendor sells a model based on the SyQuest mechanism. These devices are a little more expensive than a fixed disk drive, but you also have unlimited storage capacity. However, if you want to back up a 1.2 gigabyte drive, do not use SyQuest disks; there are better backup strategies for high-capacity drives.

Optical Media Devices

Optical media devices all use a technology similar to that found in an audio compact disk player. All optical media devices are variations on a single theme: Optical media data is encoded in such a way that a laser can read the disk. The different types of drives and disk are:

- Compact Disc-Read Only Media (CD-ROM)—A CD-ROM drive reads only prepared CD-ROM discs; it will not write data.
- Erasable Optical Drives—These drives read and write data to an optical disk similar to the CD-ROM disk.
- Write Once Read Many (WORM) disks—These disks are a cross between the Magneto Optical and the CD-ROM drives; the disks are written to only once but read as many times as you want.

The following sections provide a more detailed discussion of each of these drive types.

CD-ROM

CD-ROM drives are slow. The fastest drives have an access time of around 150 ms. The disks can, however, disseminate large amounts of data. Each CD-ROM disk can hold over 600M of data, which makes them perfect for providing large amounts of data to any number of users.

Currently, you can obtain large collections of shareware and public domain programs from user groups on CD-ROM disks, such as the one included with this book. Apple uses CD-ROM disks to keep its dealers and developers up to date regarding the changes in its machines and technical information. Both Adobe and Microsoft distribute programs and fonts on CD disks, and other companies distribute mailing lists, collections of books, encyclopedias, and databases of all types, to name a few, on CD-ROM disks. Within a few years, a CD-ROM drive will be a business necessity—much like a hard disk drive is today, and CD-ROM drives are very close to being a necessity for any Macintosh. More and more software is being distributed on CD-ROM disks. Also, every desktop Macintosh available today can be purchased with a CD-ROM drive installed. Soon, you won't have an option. Every computer will have a CD-ROM drive as part of its standard configuration.

Erasable Optical Drives

Erasable optical drives are the future for data storage. These devices use a disk similar to the CD-ROM disks, except that they use a magnet to write data. The process works by using a laser to heat a section of the disk where a piece of magnetic material is embedded. When the temperature is high enough to free the magnetic particle, an electromagnet charges the particle, causing the partical to change position. The plastic material around the particle cools and freezes the particle in its place. Then, the drive uses a laser to read the reflected light off the disk, which is refracted at different angles, depending on the position of the particle. The different angles are the bits of data similar to charged magnetic particles on a hard disk.

The advantage of this medium is that it is sensitive to magnetic fields only when it is hot or heated by the laser. As a result, the data is more stable than data on a hard disk. Manufacturers of erasable optical disks claim that the disks have a 10-year life, although the disks could last for 100 years. Because the disks are removable, they act like floppies, and you can use multiple disks.

Finally, the disks have high capacities. A 5.25-inch disk holds from 600M to 1.2G of data. Large corporations with huge databases are using erasable optical drives attached to a juke box that can hold up to 100 disks providing online access to hundreds of gigabytes of data. In addition to the 5.25-inch drives, 3.5inch drives became available at the end of 1991, each with a capacity of 120M. These disks are the same size as the standard Mac floppies, except that they are twice as thick.

Erasable optical disk drives are slow, although not as slow as CD-ROM drives. The basic drives are capable of access times in the 30 ms to 120 ms range, which makes them anywhere from 3 to 10 times slower than a Winchester hard drive. Currently, then, the erasable optical disk drives are best used for archiving data, because the slow speed makes them difficult to use in real-world situations.

As this technology develops, speeds will increase. The first Winchester hard drives used on the Mac had access times in the 50 ms range—and this was only five and a half years ago. In addition to the speed increasing, the erasable optical drives also will soon be capable of reading CD-ROM discs—eliminating the need for a CD-ROM drive and an erasable optical disk. These disks and drives are the technology of the future.

WORM Drives

WORM drives are a cross between CD-ROM drives and erasable optical drives. Data gets written to the disks just once, and then read as many times as you wish. The disks have the same long life and use the same technology as erasable optical drives for writing and reading data.

WORM drives have the same advantages and disadvantages as the erasable optical drives. Because their data is permanent, they are acceptable as evidence in a court of law. If you keep your accounting records on a WORM disk, the Internal Revenue Service will accept the disk because you cannot alter the transactions. Therefore, if you need to keep an audit trail for accounting or legal purposes, the WORM drive offers an excellent way to keep your records. Just think: One disk could replace boxes and boxes of stored paper records.

Tape Drives

A tape drive is another storage medium. These devices are good for backing up your hard drives and archiving critical company information. Several types of drives are available, but one type is taking over the tape drive market in the Macintosh world: the DAT or Digital Audio Tape drive.

When compared to a DAT drive, all other tape drives pale. The DAT drive, like the CD-ROM drive, originated in the music industry and then moved into the computer world. The DAT is capable of very high speeds, and a single tape can hold from 1.2 to 8 gigabytes of data. All other tape drives can hold only from 60M to 250M of data, and their speed is about a quarter of the DAT's.

Although DAT drives cost about twice that of other tape drives, these drives pay for themselves in time saving and media costs. A cartridge costs approximately the same and holds approximately 10 times the data of other devices.

SCSI RAM Disks

A couple of companies make large-capacity external RAM disks that connect to the Mac via the SCSI port. A SCSI RAM drive uses memory chips instead of a hard drive mechanism. These disks are very expensive but very fast. They are usually 20M to 512M in size, and their primary advantage is that they are not mechanical—access times are zero when tested with hard-disk testers.

The main disadvantage of this type of storage medium is its instability. If you experience a serious crash, you will be unable to recover your data. Although these disks usually have a battery backup in case of power failures, if the battery does not function, your data will disappear and it is not recoverable. Justifying the cost of one of these systems is difficult, but if you are using large programs, such as CAD/CAM, rendering programs, or very large graphics files, and screen-refresh rates and overall speed is critical, you might consider purchasing one of these drives.

Additional Floppy Disk Drives

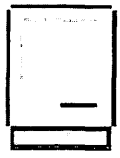
With the advent of the Macintosh SuperDrive, several companies started producing floppy drives that are capable of reading high-density disks. These drives work on any Mac (Mac Plus or newer) with the SCSI bus, while others use the external floppy port. One of the drives made by Kennect Technology enables you to double the space on a high-density floppy disk.

Because Apple floppy drives are reliable and most users need only one drive, there are only a few floppy disk drive vendors. If you find yourself copying a great deal of disks and want to purchase a second floppy disk drive, however, consider one of the alternatives now available.

Summary

This chapter covered most of the operating and technical aspects of your Macintosh drive subsystems. You should now know how both a floppy disk and a hard drive are formatted and how they operate. You also will have learned how to prevent and remedy some of the more common disk-drive problems you may experience. In addition to an increased knowledge of your drives, you will also be a more informed shopper, and able to get the most for your money. And, perhaps more importantly, you will be able to decide what type of drive you need.

And, if you should have problems with your hard disk drive, you have the first building blocks for correcting the problem and saving your data. If you run into trouble with your hard drive, remember that, in most cases, all is not lost. Relax, review this chapter, and think before you do anything. If you panic, the situtation will only get worse.



CHAPTER 11

Essential File, Disk, and Data Information

In the last chapter, we talked about your Mac's disk drives. Now, it is time to look at what is stored on your drives: all of your files and programs. This chapter is not about where your files are located, configuring your hard disk, and using the files. It is about the structure of your files and how to keep your data safe. Knowing about the structure and attributes of your files is an esoteric subject—even though it is fundamental to how your Mac works. The information in this chapter about file formats and attributes will help you use files that come from other types of computers and were created by programs you don't have. This information is like knowing that there are other streets you can take when the one you normally use has a traffic jam.

The other part of this chapter, which discusses keeping your data safe, will provide you with a lot of information about backing up your data, safely storing it, and providing strategies for making this task as painless as possible. Your work is valuable; if you don't safeguard it, no one else will.

Document Formats (or The Anatomy of Macintosh Files)

In Chapter 7, "Getting the Most from Your System," there were several different types of files mentioned, each file had its own icon representing the data files function. In addition to each file having a function, it also has a format. A file's format is how the program that created the file writes the data to the disk.

When you are using a word processor your data files contain more than just the words you write—it also contains all of the data necessary to format your document. If you used **bold-face** characters, underlined some of your text, or emphasized a point with *italics*, the program must somehow restore those attributes to your document so that it looks just the same as it did the last time you worked on it. As such, each program creates files that use different formats. As of yet, there is no universal

document format. Some programs can interpret the formats of files created by different programs, but none can read all of the different types of files. Another aspect of a Macintosh file is that, as you view it in the Finder, you will see a single file, but it could really be a collection of files. Complex data created by Page Layout, Spreadsheet, and some Database programs fall into this category.

If you should have to recover one of these files, as described in Chapter 18, the file's complexity is why a recovery could be partially unsuccessful, especially if you end up with only some of your files recovered successfully. It also means that the complex files: are more fragile, the more complex the file, the greater is the likelihood of it becoming corrupted. By the time you finish this section, you'll have a better understanding of how complex a Mac file really is.

This section will look at how files are constructed and where they obtain their attributes. The topics covered are:

- Data and Resource Forks
- Creators and Types
- Missing Applications
- How to Use Different Formats
- Changing Type and Creator Codes
- Other Attributes

Data and Resource Forks

All Macintosh files can have a Data and a Resource fork. A Resource fork is the part of a file that contains machine code or data that is composed of program-like information; the data in the resource fork is not accessible by you, but it is used by the file's program. Most applications have only a Resource fork. The information contained in a resource fork is there so that it can make your Macintosh perform some specific function.

The Data fork is the part of a file that contains raw data. The data is used by the file's program or another program that can read the file's format. An example would be one word-processing program (for example, Microsoft Word) being able to read a file created by another word-processing program (for example, MacWrite). Both of these programs store their data in different formats, and it is only because the format information is shared between the two companies (Microsoft and Claris) that each program can read files created by the other.

In Figure 11.1, you will see a series of files as viewed through DiskTop (a disk utility that will be discussed in the later section on software). With DiskTop, it is possible to see the size of a file's Data and Resource forks. As you can see, all of the data files only have Data forks, while the Microsoft Word application has a large Resource fork and a small Data fork. As a Macintosh user, the importance of the Data and Resource forks is probably nominal. You should be aware that they exist and that the Resource fork contains the data necessary to make a program run while the Data fork contains the actual data that a program uses and presents to you for

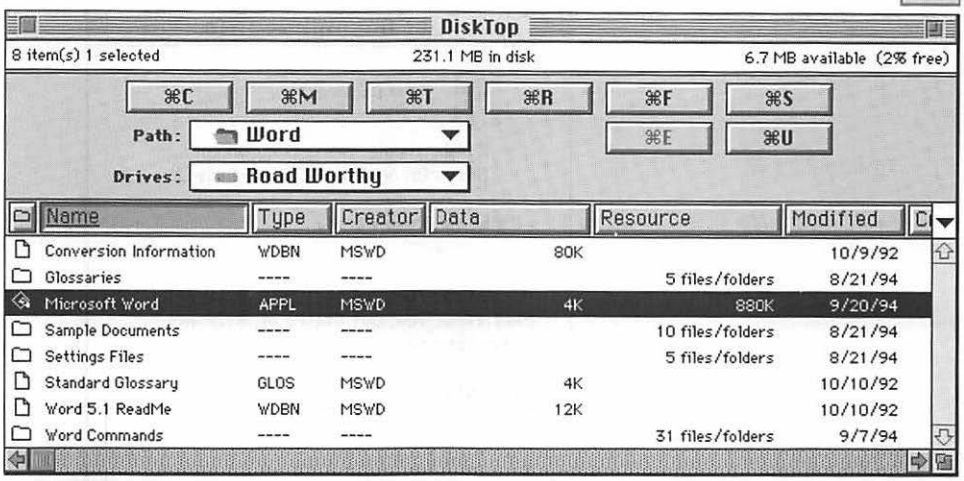


Figure11.1 *Displaying Data and Resource information.*

processing. When you use a program like ResEdit (discussed in an earlier chapter), you are actually changing some of the data contained in a Resource fork.

The resources contained in a program's file are actually separate files all contained within a larger file that is the program itself. When your Mac runs a program, it uses the resources in the Resource fork by loading them into memory. The resources let your Mac load part of a program into memory, rather than the whole file. If the Mac needs a part of the program that is not in its memory, it will go to the disk drive and get the resource it needs.

The advent of the Power Macintosh has brought some changes to the structure of Macintosh programs and how they run. Because the Power Mac uses a different type of CPU, it does not handle programs—if they are native Power Mac programs—in the same way. You will still see a Resource fork in a Power Macintosh program, but when a Power Mac runs a program, it will load all of the program's code into memory. This means that a Power Mac needs more RAM than the 680X0 based Macs when running the same programs.

Creators and Types

If you have ever wondered how your Mac keeps track of the different types of documents, launching the correct program when you double click on a file, you are not alone. This section is about how your Mac connects your documents with its appropriate application.

In Figure 11.2, you will see the standard Get Info window and that the Kind designation for the document shown is SimpleText. This means that the document was created by SimpleText. Figure 11.3 shows the same file viewed in DiskTop. There you will see two codes, one each for Creator and Type. The Creator code for this file is "ttxt," the code that identifies all files created by the application TeachText, or

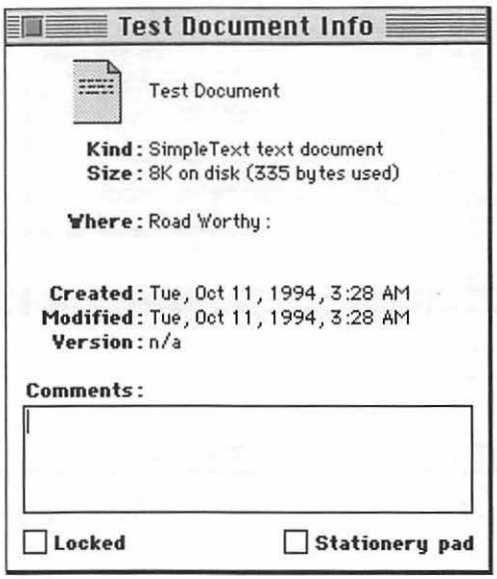


Figure 11.2 *A Get Info window displaying file kind.*

SimpleText if you're using System 7.1 or 7.5. The association made by the creator code can be described as a parent and child relationship: every parent knows its own children, and every child recognizes its parent. So, when you double click on a document, it automatically looks for the application that created it.

If you look at Figure 11.3 again, you will notice that the Type designation for this file is "ttro." The Type code is the file's format designator, which is what any application looks for to see if it can open a particular file. Figure 11.4 shows an Open dialog box from Microsoft Word that displays all of the files that Microsoft Word can

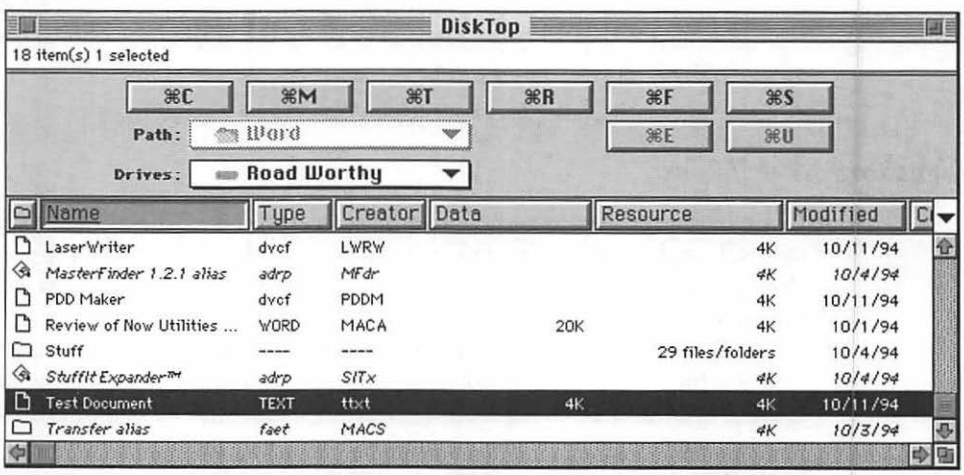


Figure 11.3 *Viewing a file's creator and type.*

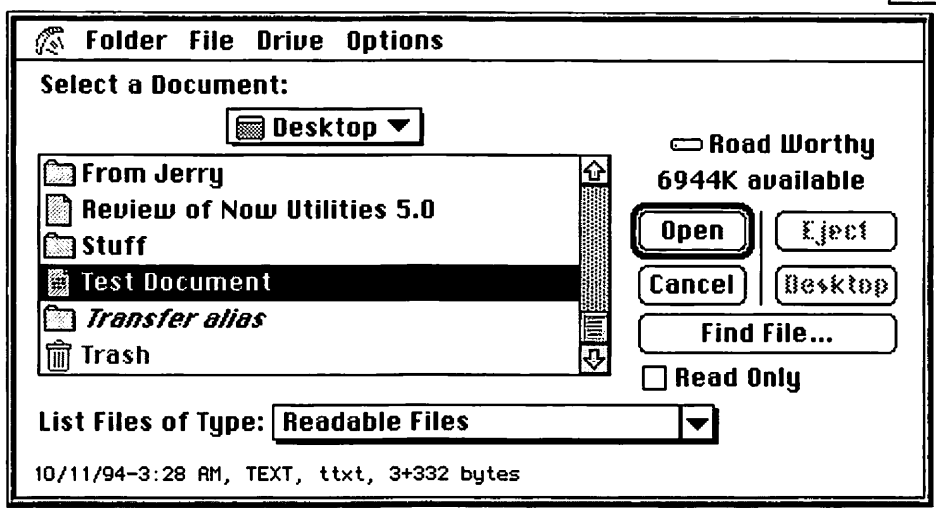


Figure 11.4 Files viewed in Microsoft Word's Open dialog box.

read. Notice that the SimpleText file we've been looking at is listed. Word looks at the Type code for each of the files to see if it can read a specific file type; if it can, it will then display all of the files types it can read and open. If you double clicked on the SimpeText file, it will launch the SimpleText program, but you can open a SimpleText file with almost any Macintosh word processor.

Missing Applications

If you have not run across the dialog box in Figure 11.5 yet, you will. This is the dialog box you get when you double click on an orphaned document that doesn't have a corresponding application. When using System 7.0 or 7.1, if you try to open a document that does not have a corresponding application that can be opened by TeachText, you will be asked if you want to use TeachText to open it, as shown in Figure 11.6. TeachText will open text and graphics files that are in the PICT format. (File formats are discussed in the next section, "How to Use Different Formats.")

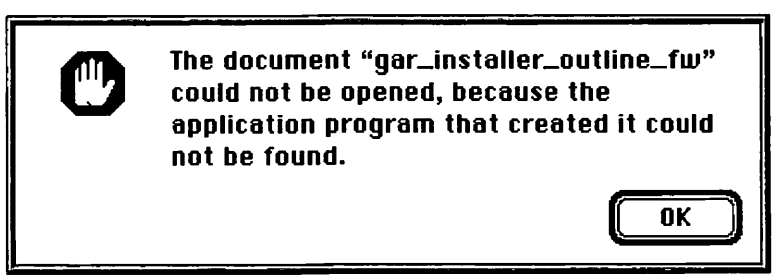


Figure 11.5 Missing application dialog box.

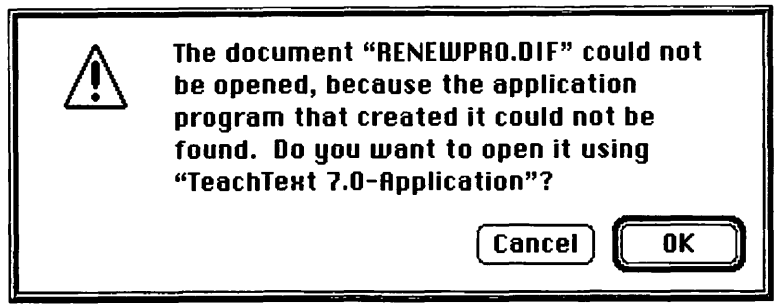


Figure 11.6 Open with TeachText dialog box.

Either of these dialog boxes can be annoying when they appear. In many cases, you will want your PICT files to be opened by your graphics package, such as Mac Draw or Canvas. And, for other types of files, you may have a program that will open them but, because the file has a different creator code, you have to use the Open command from the application instead of just double clicking on the data file. To help eliminate this nuisance, you can do a couple of things: One way to open these obnoxious files is to drag and drop, dragging the document's icon onto the icon of the application you want to use. Another is to use a utility that will map document types to applications other than their creators. One such utility is System 7 Pack!, which is a shareware program included on the CD-ROM included with this book. There are other utilities, both shareware and commercial, that have a similar function. One of the commercial utilities is Hand Off II from Connectix.

How to Use Different File Formats

Because there are so many different file formats in use, it is possible to get a file from one of your friends and be unable to read it, although most programs can open a variety of formats. Unfortunately, if the program you are using will not open the document, you will either have to get the file in a format that your program can read, or purchase the program that created the document. Both of these are time-consuming and possibly expensive options.

General Concepts

This section discusses some general file format concepts and some of the various file formats you'll probably encounter. There are Macintosh formats that are standard and can be used with a wide number of Macintosh programs. The following is a set of guidelines for working with various formats, but you'll have to experiment with your applications and files to see which procedures will work for you.

Opening Files Created in Other Formats—To determine if a program you're using can open a file created in another format, use the following procedure. These are general steps that may not work with every program; for these types

of procedures, experimentation is the order of the day. If you take time to experiment, when you need to translate that file, you'll be ready.

1. Open the program you want to use.
2. Select the Open or Import menu item from the File menu.
3. From the Open dialog box, select the file you want to open. Some Open dialog boxes have an Options button or a pop-up menu to use to select the file format you want to work with.
4. Open the file.

If you can't see the file you want to open in the Open dialog box, it means that your program can't open the file you want to use. In this case, you'll either have to get a file format translator or get a new copy of the file in a different format. If you are going to be sending a file to someone and you're not sure what format to use, you should use one of the formats listed in the next few sections. To save a file in a format other than the program's native format, follow the preceding steps, substituting the Save As... or Export menu item for the Open or Import menu item. In either instance, whether you're exporting or importing foreign file formats, you may have to check your program's manual. If you do, look in the manual's index for the Importing or Exporting topics.

Word-Processing Formats—Most word-processing programs can open files created by other word processors, but when your word processor can't open the other word-processing document, you can always request that the file's creator save the document as an RTF file. RTF stands for Rich Text Format; RTF files will work with every word processor I know.

Another format that is popular and can be opened by most programs is the MacWrite file format. MacWrite was the first word-processing program made for the Macintosh. If there is a program format that is universal to the Macintosh, other than RTF, it is MacWrite.

One other word-processing format that is almost as universal as MacWrite is Microsoft Word, which is the most popular word processor used on the Mac; its popularity has forced the publishers of other word processors to provide format compatibility.

The biggest problem you'll encounter with files created by MacWrite or Microsoft Word is the program's version. MacWrite is now called MacWrite Pro and Microsoft Word is at version 6.0. The files created by the latest versions of these programs will probably create files that are not compatible with other word processors until the other word processors are updated. In the meantime, the file versions that are most compatible for these programs are files in MacWrite II format and Microsoft Word 4.0.

Graphics Formats—There are three file formats that are popular on the Mac. Each of these formats can be used by almost all Mac programs, even those that are not graphics programs. These formats are:

- PICT—The PICTure file format is a high-resolution image format used by high-end photo-editing programs. The PICT format is used with color images.
- TIFF (Tagged Image File Format)—The TIFF format is a cross-platform format that can be used on all types of computers, as long as they have the right software. It is primarily a black-and-white format but can be used with color images. It is as close to a universal graphics format as you'll find.
- MacPaint (A bitmapped graphics file format)—MacPaint was the first graphics package created for the Mac. It uses what is called a *bitmapped file image* and is a Macintosh standard. It is not used very often, however, because MacPaint images do not produce the high-quality images you can get from TIFF or PICT images.
- EPS (Encapsulated PostScript)—The EPS format is a standard created by Adobe Systems and uses the PostScript page description language to create images. EPS is a Macintosh standard that many Mac programs can access. EPS is usually used by graphic artists and for high-end graphics production work.

Every graphics program—unless it is an EPS graphics program—will use one or all of these formats. Although graphics files and their formats are a fairly complex subject, you should have no problem using any of these formats. SimpleText will open PICT files if you don't have another program that uses the PICT format, but you can't edit the image.

Spreadsheet Programs—Although a discussion about spreadsheet formats is almost academic, spreadsheets need to be mentioned. The reason the discussion is academic is due to Microsoft Excel being the dominant Macintosh spreadsheet program; there is no other program that even begins to compete. However, if you're receiving files from someone who has a PC or Windows system, you will have to deal with format translations. There is one format that is universal to spreadsheets on almost all computing file platforms: SYLK, which stands for Symbolic Link format. If you're having problems with a spreadsheet file from another program, try to get a copy of the file saved in the SYLK format; it will work when all others fail. Although Excel will read Lotus and some other file formats, the SYLK format will always work.

Macintosh Easy Open

To make data translations easier, System 7.5 Apple includes a utility called Macintosh Easy Open. Macintosh Easy open is a control panel that, when you attempt to open an orphaned document, delivers a dialog box that lists any application that can open the file. Figure 11.7 shows the Macintosh Easy Open dialog box.

A System 7.5 easy install will automatically install Macintosh Easy Open onto your Macintosh. To configure Macintosh Easy Open open the Macintosh Easy Open control panel. Your choices are:

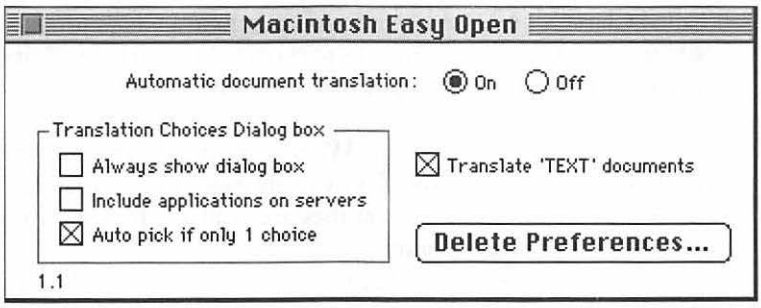


Figure 11.7 *Macintosh Easy Open.*

- ❖ To turn Easy Open on or off
- ❖ Always show the dialog box in Figure 11.7
- ❖ Search file servers for compatible applications
- ❖ Auto-pick the application if there is only one
- ❖ Translate TEXT documents

You'll have to experiment with some of these settings. When you have multiple applications that can open a particular file type, Macintosh Easy Open can be irritating when you're working with a lot of orphaned files—especially with the DataVIZ translators installed. Every time you open an orphaned file, even if it is from a program's Open dialog box, Macintosh Easy Open presents you with its translation choices. However, if you use a utility that will map—assign specific document types to applications—Macintosh Easy Open will be less irritating and a more useful tool.

Included on the System 7.5 CD-ROM, you'll find an additional set of translators that work with Macintosh Easy Open from DataViz. These translators are primarily for translating MS-DOS and Microsoft Windows documents into Macintosh formats. You'll find more information about translating documents from other platforms into Macintosh documents in the next section.

MacLink Plus

Another option that will help you deal with files from other programs is to use a program that will translate one file format into another. The most popular program for performing this task is called MacLink Plus from DataViz. This program, with its included file translators, will enable you to convert a variety of Macintosh formats into other Mac formats; you will also be able to convert Mac documents into MS-DOS files, and vice versa.

The Claris XTND System

Apple, through its subsidiary Claris, is trying to establish a system for translating documents with different or foreign formats by instituting a translation standard

called Claris XTND. Whenever you purchase a Claris product, you have the basic system plus several translators as part of the software. In addition, there are several manufacturers who are adopting this system as a means of providing file translations for their customers as well.

If you use MacWrite, Claris Works, or other Claris products, you can also add to your file translation capabilities by using MacLink translators. You can install all of the MacLink translators so that they are available for use with your Claris- or XTND-compatible programs.

The following is a list of the Claris translators available (this list does not include the MacLink translators):

Acta 3.0
AppleWorks
EPSF PLFT (Encapsulated Postscript File)
MacDraw II 1.1
MacPaint
MacPaint 2.0
MacWrite
MacWrite 5.0
MacWrite II
Microsoft Word 3.0
Microsoft Word 4.0
Microsoft Word PC 4.0-5.0
Microsoft Works
Microsoft Works DB
PICT
RTF (Rich Text Format)
TIFF (Tagged Image File Format)
WordPerfect
WordPerfect PC 4.2
WordPerfect PC 5.0
WriteNow

All of these translators will work with any program that supports the use of XTND translators, such as Nisus's word processors, Nisus and Nisus Compact.

Apple File Exchange

On the Tidbits disk from your System Disks (7.0.1), you will find a folder called Apple File Exchange. You have to look for it because this program is not installed when you install your system. The Apple File Exchange is a program for converting files from Apple Pro-DOS and MS-DOS formats to Macintosh formats; it is also the program that will allow you to read floppy disks of both types mentioned earlier (you must have a SuperDrive to read disks formatted on non-Mac machines).

There is nothing exceptional about the Apple File Exchange, except that it will also work with translators from MacLink. If you need Pro-DOS translators (for the Apple IIe series), you can get them from your Apple Dealer.

Changing Type and Creator Codes

Before you set out to change a Creator or Type code, you need to know what you are going to change and why. Otherwise, you will be telling your Macintosh something completely erroneous, which can result in problems. You also need a program that will let you change the Creator or Type codes. DiskTop by CE Software is an excellent program for doing this and other file maintenance procedures. Also, Master Finder by Olduvai Corporation has a great utility for editing file information. If you only want to change the Creator and Type codes, there are also shareware and public domain utilities available on the CD-ROM that will do the job.

To find out what Creator and Type you want to use, save a file from the program that you plan on using and check its codes with your file utility. Make sure you save the file you are going to use as a reference, using options that match the file you are changing. If you are changing a TeachText file to a Word file, be sure you know the Creator and Type for a Word text file. Otherwise, things will not work as expected.

For the following example, DiskTop will be used, but the procedure is basically the same with any utility that has the ability to change these codes.

To change the Type and Creator:

1. Open DiskTop.
2. Select the file you want to change (in this case, the Read Me file).
3. Use the DiskTop menu and select Get Info.
4. You will see a dialog box like the one shown in Figure 11.8.

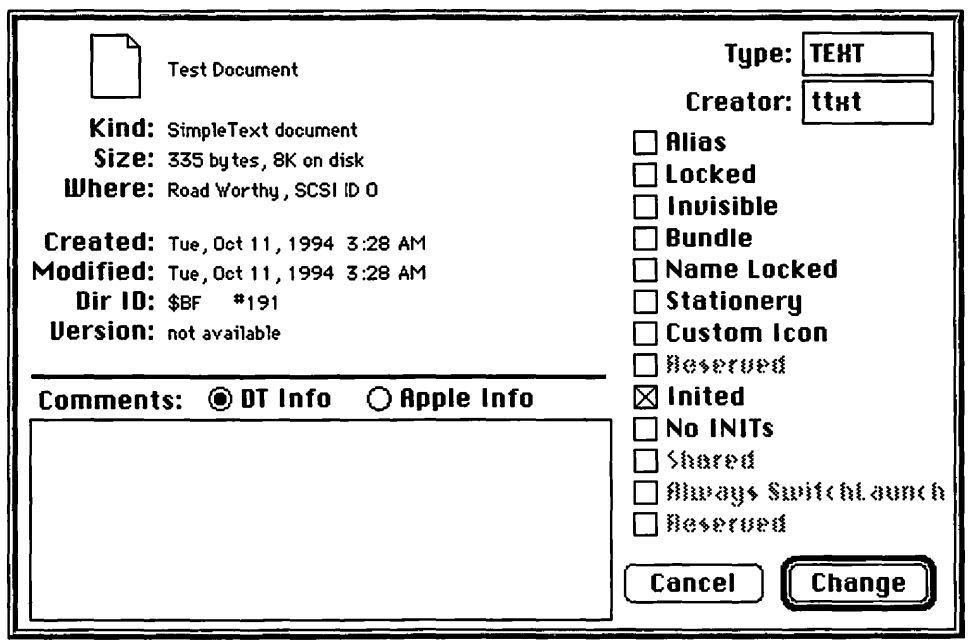


Figure 11.8 DiskTop's Get Info window.

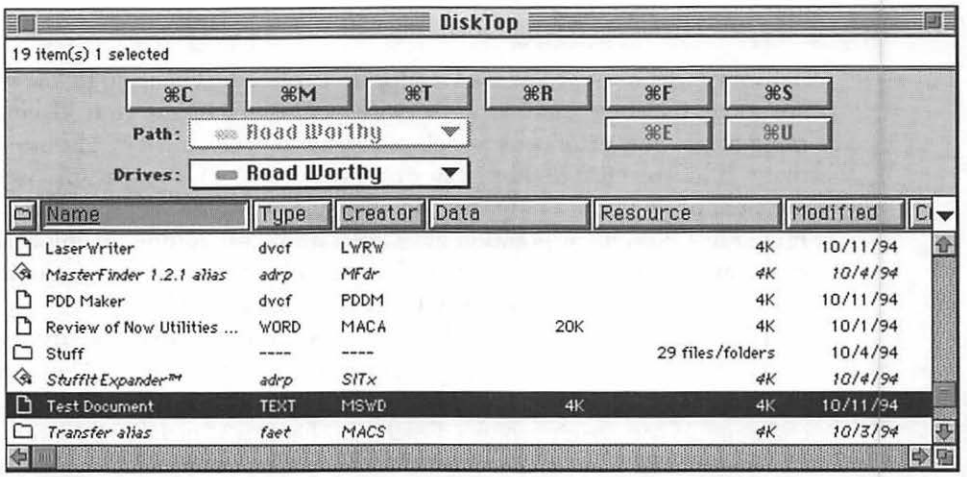


Figure 11.9 *After the change.*

5. In the dialog box, you will see the Type and Creator codes clearly marked in the upper right-hand corner.
6. Enter the new Creator and Type codes into their respective boxes.

Figure 11.9 shows the same file with the Type and Creator changed to "TEXT" and "MSWD" respectively. The Type change designates the file as a text file, while the Creator change tells your Mac that the file is a Microsoft Word file. After you make your changes, be sure to click the Change button.

After the Creator has been changed, the file will appear as a Microsoft Word document on your Desktop. Figure 11.10 shows the Read Me file as a Microsoft Word document, and it will open in Word by double clicking on it.

These are basic procedures that will work with any Macintosh file. All of the programs that let you change file attributes will have the same basic interface, and you should have no problem using them. You will have problems if you use an incorrect code; doing so could cause the wrong application to open or the file to lose its association with all programs. Remember that changing the Type and Creator codes



Figure 11.10 *The Read Me File icon after the change.*

does not change a file's contents, only which program it is associated with and the file-type identification. If you change a text file into a PICT file, your graphics programs will recognize the file as a graphics file and may crash if you attempt to open the file.

Other Attributes

The Type and Creator codes are not the only attributes that a file has. A file can also be locked so that it cannot be trashed, and it could be invisible. If you refer to Figure 11.8 or 11.9, you will see a list of attributes associated with the file. Although there is a whole list of attributes there, we are going to discuss only the Locked and Invisible ones. The rest of the attributes are system related; if you do not know what you are doing, do not change them.

Locking or Unlocking Your Files

Sometimes, you will copy a file onto your disk and, when you try to trash it, find out that it is locked. When this happens, you will get a dialog box like the one shown in Figure 11.11. If you want to trash the file without unlocking it, just hold down the Option key as you select the Empty Trash menu item. The Trash will empty, erasing the file—regardless of its status.

You will want to lock a file so that changes cannot be made to it, but it will give you the warning in Figure 11.11 if you try to trash it. You can lock a file by using DiskTop or a similar utility, or you can lock it by performing a Get Info on the file from the Finder. When you get the Info window, you will see a check box in the bottom left-hand corner that indicates whether the file is locked, the file in Figure 11.12 is locked. To lock any file, just check this box by clicking on it with your mouse.

When you view your files by Icon or Small Icon, you will not be able to tell if they are locked. However, when they are viewed in a list mode, such as By Name, at the end of all of the displayed attributes, you will see a Lock icon like the one shown in Figure 11.13 This means that the file is locked; the problem here is that most people display the information beyond the size of their windows, so it is easy to miss this little indicator.

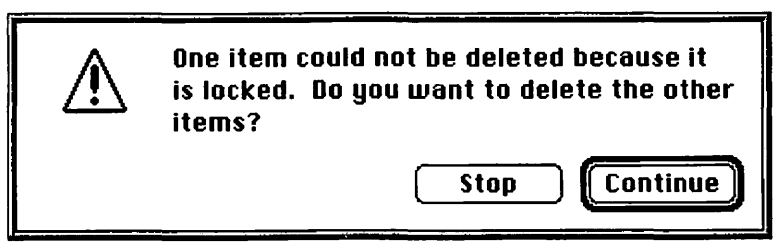


Figure 11.11 *What happens when trying to trash a locked file.*

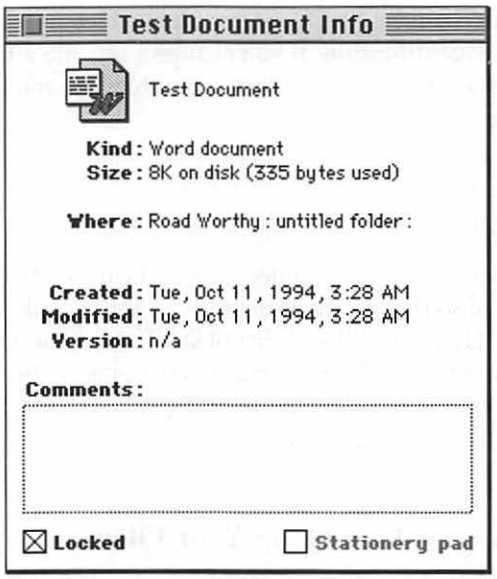


Figure 11.12 A locked file.

Invisible Files

Invisible files are just that: files that you cannot see from the Desktop. Usually, invisible files are system files that you do not need access to. However, one of the least expensive forms of data security is to make invisible a file you want to keep secure. If you do, just remember where it is. If you trash a folder with an invisible file in it, you will lose the file.

To make a file invisible, you need a utility, such as DiskTop. Follow the same steps as you would to change a file's Creator or Type code, only check the Invisible box, as shown in Figure 11.14 instead of changing the codes. Once you click OK, the file will no longer be visible in the Finder.

With some programs, you will be able to see invisible files from the program's Open file dialog box. Figure 11.15 shows an open dialog box where the invisible file can be seen. If the file can be seen in an open dialog box, it can be opened—but someone would have to know where to look.

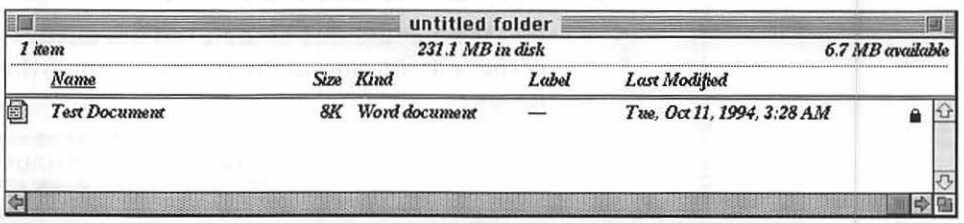


Figure 11.13 A locked file in a Finder's list view.

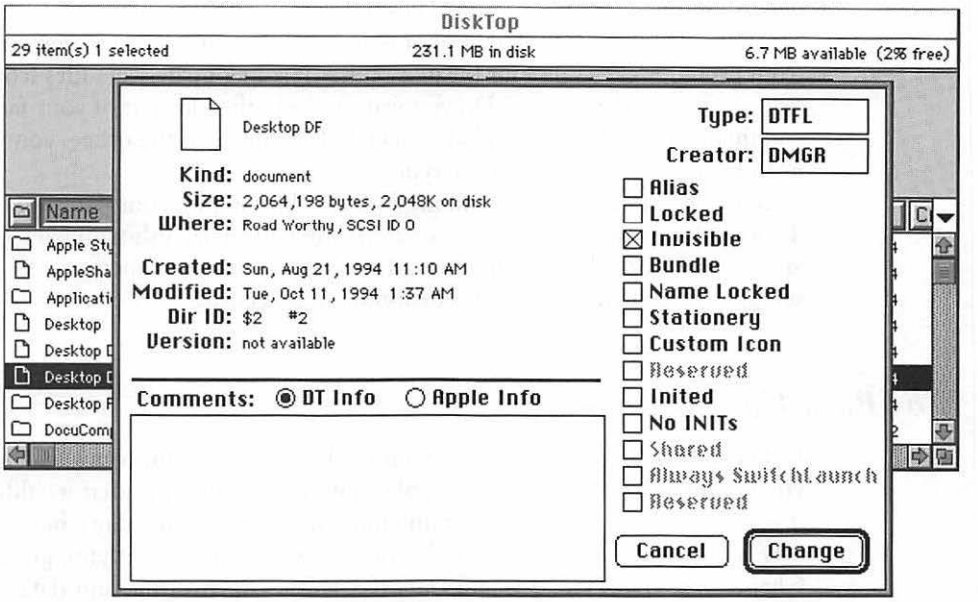


Figure 11.14 *An invisible file seen in DiskTop.*

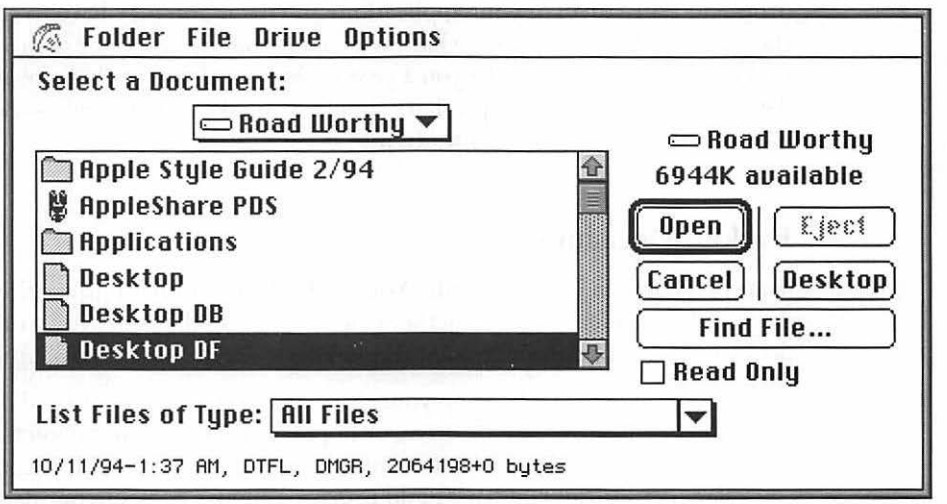


Figure 11.15 *Open dialog box with an invisible file.*

Keeping Your Data Safe

Besides organizing your files, there is another aspect of file management you should carefully consider: safeguarding your data. Hard drives die, floppies become cor-

rupted, and files are accidentally trashed. There is only one way to make sure your data is safe: Back it up—several times if it is really important.

Another issue you should ponder is security. Do you need to keep your data away from prying eyes? Will your business suffer if someone delivers files from your hard drive to the wrong person? Do you want to keep the kids out of your family's letters and financial records? If you have locked file cabinets in the office, you probably need a security strategy of some type.

In this section, strategies and methods for backing up your data will be explored. There will be a short section about archiving your data; although backups and archives are related, they can have different purposes and functions. And, finally, this section will conclude with a discussion on data security.

Why Back Up? Paranoia!

If there were some way to scare you into always backing up your data, besides telling you horror stories about other people's misery, I would. But that wouldn't work. So, if you do not care about backing up your data to survive the day when your hard drive crashes and all of your files become scrambled bits and bytes, go straight to Chapter 18, "Disk Crashes and Data Recovery." Recovering your data can be expensive in time, potential data loss, and even dollars if you hire someone to do it. This, of course, assumes that your data is retrievable; sometimes, it isn't.

If you have to recover your data, you need to completely reconfigure your hard drive and reinstall all of your applications and data. You may have to sort through thousands of files to find out what they contain before you can use them. If the situation is very bad, it could take you a year to find out if you really recovered all of your data. Regarding data backups, there should be no decision to make—except how you will back up your data and how often.

Backup Decisions

Your first decision has been made: You *will* back up your hard drive. Now, you have to decide what medium to use, whether you will back up the entire drive or just selected data, how many backups you will make, and how often you will back up your data.

The Medium—To back up your drive, you can use another hard drive, a removable media drive, a tape drive, or floppy disks. Of all your choices, using a hard drive is the easiest, most convenient, and most expensive. It is convenient and easy because all you have to do is make a Finder copy of your data. It is expensive because you lose the use of an expensive piece of hardware. And it is basically inadequate because you have only one backup.

Removable media hard drives are a much better solution. The removable disks are basically inexpensive, and you can make multiple backups and have an extra drive to boot (no pun intended). The different drives that use removable media are described in chapter 10, "Macintosh Disk Drives." Any of the removable drives would work for backup purposes. However, the Rewritable Optical dri-

ves provide the best data security because of the longevity of the media—you can keep an optical backup for years.

Using a tape drive can be a two-edged sword: The media is inexpensive and easy to use. However, tapes can fail and they can be easily corrupted. In order to *know* that your data is secure, you will have to restore some of the data from your backup because you can't look at the files. If you have lots of data to back up, such as a 1.2 gigabyte drive, or want the most reliable tape drive possible, use a DAT Drive. It is very fast and can hold a lot of data (up to 8 gigabytes), and DAT tapes are reliable. Their disadvantage is price—a good DAT drive costs from $800 to $2,000, depending on capacity. With a DAT, check your backups to make sure you can restore your data, and then make multiple backups.

Finally, if you do not have massive amounts of data to backup and do not want to incur the expense of additional hardware, your floppy drive is the way to go. Backing up to floppies can be tedious, especially the first time you back up your drive. Yet, it is still one of the most reliable methods available. Regardless of which media you choose, it is easy to backup and verify your data.

What to Back Up—If you have spent hours and hours configuring your hard drive, making Aliases, and meticulously arranging your data, you will want to back up your entire drive. If you have just a couple of applications and a fairly stock System folder, you may want to back up only your data. The criteria for this decision is based on how long it will take you to restore your data if you have to. Usually, it's easiest to just back up the whole drive. But, if you are concerned only about the data and willing to take the time to reinstall your System and applications from scratch, then back up only your data. All good backup programs allow you to perform a selective backup.

You may want to do two backups—one of your System folder plus your applications, and another of your data. This way, you will have to do backups of your data only once you have a stable working environment—meaning you are not adding new applications and changing your system. This strategy offers you a means for first restoring your System and applications and then your data. You will not have to continually back up your applications and System files when you do incremental backups, yet everything will still be as you configured it so that you do not lose all of your working system environment.

How Many Backups Should You Make?—There is always a possibility that your backup could be corrupted. Scary thought, huh? Your drive has the ill grace to let you down and then your backup turns out to be sour. You are not having a good day. And, as we all know: Just because you're paranoid, it doesn't mean that they're not out to get you. So it is with your data. Make two backups, then put one off-site, in a safe place. If your work place should suffer from a fire, earthquake, tornado, or theft, if you have an off-site backup, at least your data will be secure. Equipment can be replaced, your data cannot.

The moral here is to make at least two backups. This task is not as bad as it sounds and, in the next section, some different ways of backing up your data will be discussed.

Keeping Your Backups Current

After you have made your initial, complete backups, your backup software will let you do incremental backups. If you are using a tape drive, you can schedule your backups to take place when you are not working on your system. If you have to supervise your backup program, set aside some time for the chore.

The way to determine how often you perform an incremental back up depends on how much data you can afford to lose. If losing more than a day's work is unacceptable, then you need to back up each day before you are finished. Should re-creating a week's worth of work pose a risk you are willing to live with, then you can back up once a week. The key here is how much data will you lose if you do not back up regularly, and how much will it cost you to re-create it?

All backup software knows if a file has been backed up and has been modified since it was backed up. This is done by modifying the backup date for each file when it is backed up. When you perform an incremental backup, the backup program compares the file's date modified with the backup date; if the backup date is equal to or older than the date modified, the file is not backed up. Thus, if you are maintaining two backup sets and you want them both to be incremental, make sure that one of your incremental backups does not modify the backup date; otherwise, your backup sets will not contain the same data.

The only way to do this is if the software package you are using offers an option called a *differential* backup. The differential backup option backs up all data that has changed since the last backup, but it does not change the file's backup date. So, if you perform a differential backup and then do an incremental backup, it will be easier to maintain two or more incremental backup sets. This capability also allows you to make a separate backup of specific files, using your backup software, without skipping them when you do an incremental backup. It effectively allows you to have two sets of your critical files while maintaining a complete and up-to-date backup. If your software does not allow for this type of backup, you will not be able to keep two incremental backups that are in sync. Instead, you will have to use the software's archive or full copy capabilities for making your second backup.

Most software packages, when performing an incremental backup, build on the full backup you've already made. The incremental backup then makes a subset of the data that has changed, and each subsequent incremental backup also makes an additional backup set. Because of all the incremental backup sets, you will want to make on a regular basis, a new, full backup; otherwise, you will have so many additional data sets that it will be difficult to keep track of them.

Off-Site Backups

Once you have determined what an acceptable data loss would be, then you have to determine how often you want to cycle your off-site backups. It is possible that you will want to perform a weekly backup and, at the end of a month, take the last weekly backup home, returning with the old off-site backup to use for your next set of weekly backups. With such a cycle, you would not lose more than a month's worth of data in a worst-case scenario. For this process to work, when you recycle your off-site backup, you will have to do a full backup to reset the backup date on

all of your files. If you perform only an incremental backup, you will backup only those files that have changed since you last performed an incremental backup. After a while, your two data sets could contain a variety of files that exist on only one of the two sets.

Only you can determine the frequency of your backup schedule. If you perform a procedure similar to the one just outlined, your data will be as safe as possible.

Backup Software

Efficient backups require some type of utility software that will make your backups for you. Without one of these utilities, you would have to copy your files to a hard disk or floppies in groups of files. Unless you use a hard drive to make periodic copies of your existing hard drive, you will never have a complete backup, and using a hard drive has the disadvantages noted.

Before you purchase a backup program, be sure it has some features that will make your life easier:

- Device compatibility—Decide what type of backup device you want to use for your backups, and then make sure the program you use supports it. Most backup programs will support any of the devices previously mentioned, but it is best to check first.
- File selection—It should be easy to select the files you want to backup. The more options you have for file selection, the better. You should be able to select the files by file type, date, kind, or any other attribute you want to use.
- Unattended and scheduled backups—If you want your data to be backed up while you are at home, then make sure you can schedule such a backup. If this feature is not important to you or if you are going to use floppies, you can waive this particular feature.
- Data compression and verification—Compressing your data can save a lot of space on your backup volume, especially if you use floppies or have several drives to back up. Good data compression can enable you to put twice as much data on your backup volume. Whenever you do a backup of critical data and/or compress it, it is a good idea to ensure the data's integrity by using the backup program's data verification option.

  Verification can double the length of time it takes to perform the backup, but it is better to be safe than sorry. When you use data verification the program double-checks each file and the backup medium, making sure the original file matches the backup's. You should always use the data verification, option. The only other way to verify your back up is to restore selected portions of your backup and manually verify your data—which you should do from time, to time anyway.
- Network-compatible—Most backup software will let you back up a file server, but not all packages will remotely back up other Macs on a network to a single storage device. If you need to back up several Macs over a network, you should look for software that is made specifically for backing up networked Macs.

- ❖ Data encryption—If you have high security needs, then your backup software should also have the ability to encrypt your data as it backs it up. Once again, if you use an option like this, you must always perform a selective restore of your data to verify it. Encrypted backups require extra steps to restore the data, and you can't forget the password. Always perform a limited restore of data you've encrypted.
- ❖ Selective restores—There will be occasions when you might want to restore only one or two files from your backup. Your backup software should allow you to perform selective restores to your hard drive.

The following is a list of some of the backup programs available on the market:

DiskFit Pro—This is one of the oldest backup utilities made for the Mac. Made by Dantz Development, it has been around for several years and is a tried and proven backup utility. If you have only one Mac to backup and are going to use floppy disks, it is probably the best backup utility you can get. It does not have all of the features of some of the other programs but, for a home office or a Personal Mac, it will provide you with the data security you need.

DiskFit Pro also offers a few additional features that make it unique: One, it will let you perform incremental backups between two different backup sets, yet keep all of your files on both sets complete, avoiding the problems previously mentioned. Two, it will allow you to add disks to your backup set and resolve file differences without creating new incremental backup sets. This means that you have only one backup data set. Finally, it creates finder-readable files, rather than a single backup file, that may be divided across tens of floppies or several backup volumes.

FastBack II—This is another long-standing backup program made by Symantec. It offers most of the capabilities previously listed, with the notable exception of backing up networked Macs to a single device. One feature it does offer that is unique is the ability to restore files backed up from an MS-DOS machine to a Macintosh, and vice versa. If you have this as a need, you will find this software invaluable.

MacTools Deluxe—One of the utilities included in MacTools, made by Central Point Software, is a backup utility. It is a complete and useful backup utility with a full set of basic features. If you select MacTools as your basic disk utility package, check out the backup program to see if it meets your needs before purchasing a different backup utility.

Norton Utilities—Like MacTools, Norton Utilities by Symantec also includes a backup utility. All of the comments made about MacTools apply to Norton's program. Each of these utilities can perform differential and scheduled backups, recognize various backup devices, and perform selective restores. Both packages also include data compression and verification.

Retrospect and Retrospect Remote—Retrospect is also made by Dantz Development. What it provides that the other packages do not is the capability

to back up remote devices over a network. It is not dependent on a file server and has most of the features previously listed, plus some extra capabilities. One feature is the ability to put files that have not been modified over a certain period of time onto your backup device and then delete them from your hard disk.

Special Tricks

When it comes to protecting your data, the more weapons you have in your arsenal, the more secure your data will be. As such, here are some suggestions that might make your data more secure.

Backing Up to a Server—One way to back up several Macintoshes on a network, or even if you are using System 7, is to have your backup software perform the backups to a file server. Because the networking capabilities of System 7 are so flexible, you could even have one drive dedicated to the task of holding backups from ten other Macs on a network, without using an AppleShare file server. After all of your Macs are backed up, you could then back up the drive that contains all of the data from the other machines to a tape or another hard drive.

Since all of the software previously listed will perform scheduled backups, most of your backup needs could be done automatically and, if you use an SCSI device that has the capacity to hold all of your data, you can then have the Mac that is acting as the server make another backup, which will easily provide you with two backups. This type of system works well if you just back up the data from the other Macs, ignoring their system and application files. It is one way to reduce the headache of system backups for anyone with limited time for network administration.

Disk Mirroring—If you require that your equipment and data always be available regardless of circumstances, consider using a second hard drive and a process called *disk mirroring*. Disk mirroring is where your data is backed up to another hard drive as you perform your work so that you can immediately have access to your data. Sophisticated disk mirroring systems can even automatically switch to the backup drive, preventing any interruption in the computing process.

Almost all of the hard drive manufacturers have devices and software specifically for this purpose. It is expensive, but if going off-line (not being able to use your computer for any period of time) means a substantial loss of business or could result in some type of liability, you will want to check out this technology.

Data Synchronization—The popularity of the PowerBook has created some new problems in the world of data management. Quite often, people who have PowerBooks also have desktop Macs. The problem these people have is how to make sure the data on each of their Macs is the same? If you are in this position, you will want to synchronize the data on your PowerBook with that on

your desktop Mac. There are several commercial programs that will do this, or you can use Apple's File Assistant program that comes with System 7.5. All of these programs will compare the contents or a folder of disk drive with another folder or disk drive, and then reconcile the two folders or drives. The reconciliation process creates two identical drives or folders. Some sets of PowerBook utilities come with synchronization utilities.

Archives

Under certain circumstances, you may want to archive your data rather than just back it up. Usually, this is done when you are running low on disk space, need to provide an audit trail, or you want an additional copy of all your data for security purposes.

Whatever your reasons, you can use any of the preceding backup programs to create your archive. It should be done on some type of removable media so that it is easy to store, easy to access, and easy to make multiple archives. If you need to keep a copy of your data for legal or tax purposes, you should consider using a WORM (Write Once Read Many) drive, since they are accepted by the IRS and the courts as a permanent record of your data transactions.

If you decide to archive your data, you should keep at least two archives. If you make only one copy and something happens to it, well....

When you make an archive, if you are using backup software, use the Full Copy option if it is supported. This option works like a differential backup. After you have made your archives, treat them like your backups. Keep copies in different locations; if all of your data copies are in one place and something happens, won't be happy.

Security Is Peace of Mind

Data security can come in many flavors. Your needs will dictate what security measures you must take. Simple security can be password-protecting your screen saver so that no one can look at your screen while you go to lunch, while high-level security software will encrypt your data and your archives.

This section will look at the different levels and types of security that you can employ and the software that you can use. One of the strongest arguments for using some of the following security methods is this question: If your Mac were stolen, would you want whoever swiped it to be able to access your data? The answer is probably "No."

Different Types and Levels of Security

Your security needs will determine what type of security options you might want to employ. The U.S. government has procedures for disposing of sensitive materials that include the destruction of actual documents. When documents are created by computers, and the computers used in sensitive areas are replaced, the disk drives

from the computers are physically removed and dismantled, and the platters are then destroyed.

Erasing and even formatting a drive will not make it impossible to get the data or part of the data back. It just depends on how badly someone wants the data and what resources are available to them. However, for most of your needs, one or a combination of the following methods will be more than adequate to protect your data from prying eyes or industrial espionage.

Locking the Screen—If all you want to do is keep someone from looking at your work in progress while you're away from your Mac, a screen saver that can be password-protected will be more than adequate. This will prevent anyone who does not know the password from taking a casual look at your work. If someone really wants to see what's on your Mac, however, all they have to do is turn it off and then turn it back on. If you really want to keep your work private, you should also use one of the following methods:

File Security—The most basic form of file security is locking a file from the Get Info dialog box. This will protect the document from being accidentally trashed and prevent it from being changed. The next step might be to make the file invisible as previously mentioned. This will make it invisible from the Desktop and some open dialog boxes. However, if you can see the Desktop DB and DF files from an open dialog box, then all of your invisible files are visible.

The next step is to use a data-encryption utility, such as the ones included with Norton Utilities or MacTools. These will allow you to encrypt a file or folder so that it cannot be read without the proper password. Encryption scrambles the data in a file and works just like a key. The key you supply is your password, which the program uses to compute how it will scramble your data. If you forget your password, you will never get the file unscrambled. Usually, a program that has encryption capabilities will offer two types of encryption: A quick encryption scheme of some type and a U.S. government standard called DES that offers the most secure method of encryption used by most programs.

Encryption Security—Given a large enough computer, such as a super computer, and enough time, any encrypted file can be opened. However, for most people's needs, the software presently on the market is more than adequate. If you are a spy trading in national secrets, however, none of the data security software on the market is good enough. This is what security really means. As long as you do not give out your password, no one can access your data without the help of the National Security Agency.

There is only one possible exception to this: There is one program on the market that *may* offer unbreakable encryption. I say "may" because I don't think anyone knows for sure. All reports say that data encrypted with this program is impossible to access, but I'm not willing to say that the NSA cannot break the encryption scheme. The program is called MacPGP from ViaCrypt and it is a difficult program to use effectively. To use MacPGP, you create a private or secret key that you have to keep secure; then, you make a public key which you distribute to others who use MacPGP.

By exchanging public keys with someone, you can encrypt a file designated specifically for someone else, using their public key. Once you've encrypted the file, the only people who can access the file will be you and the person who's public key you've used. No one else can use the file. Even if someone should discover your private key, they'll need your password to access the file. It is said that even the NSA cannot access data encrypted in this manner—and maybe it is true. Regardless of the NSA's capabilities, MacPGP is the most secure data encryption program you can use.

Another aspect of MacPGP is its key-verification technology. MacPGP uses the verification method used by PowerTalk's digital signature, only the verification keys are distributed by people verifying the authenticity of someone's key. If I gave you my public key and you knew me personally, then you could vouch for my key with someone you might know. A chain of trust is therefore built by people passing public keys to other people. Although this is not the same as having some agency authenticate an individuals key, it can be quite trustworthy.

Partition Security—If you have more data than just a folder to secure, you can create a partition on your hard drive and encrypt the data in the partition. You do not want to encrypt a huge folder, because it will take half the morning to decrypt. But if you use a password-protected partition, you can prevent others from mounting your drive—unless they have the password.

There are different ways of encrypting a partition. Some formatting utilities, such as FWB's Hard Disk Tool Kit, offer the option of password-protecting and/or encrypting a partition. La Cie's Silverlining offers partition password-protection but not encryption of the partition. The difference between encrypting and password-protecting a partition is that a passworded volume's data is not encrypted and it is possible to recover the volume to get the data. On an encrypted volume, even if it is recovered, the data will be scrambled and unusable.

Remember, safeguard your data with a backup. If you encrypt a partition and it crashes, it is gone. *The chances of ever recovering encrypted data from a crashed volume are almost nonexistent, especially if you encrypt a partition.*

Hard Drive Security—Partition security is actually part of hard-drive security, and the same methods can be employed for an entire hard drive as for a partition. However, there are some security utilities that will go a step further, preventing someone from even starting your Mac unless they have a special startup floppy that contains the key to unlock the drive and allow it to boot.

The main utility of this type is The NightWatch by Kent Marsh Ltd. Using their method, it is not possible to access a drive—even with a recovery program. Without the magic floppy, the drive is completely inaccessible. If you run across a drive that has been locked in this manner and want to use it, without the key, all you can do is reformat it.

File Deletion and Security Erasing—When you trash a file, it is still accessible. Anyone with a recovery utility or a disk editor (a utility that actually looks at

the sectors of a drive) will be able to access the file or the data it contains. If you want the deleted file to be truly erased and inaccessible, you will need a utility that not only deletes the file, but also overwrites it.

Norton Utilities and other security utilities include programs that will perform this task. These programs or their aliases can be put on the Desktop so that you can drag and drop a file or folder on top of them to activate the program and overwrite the file with nonsense characters. They will also usually provide a couple of levels of wiping security that will determine how many times the space can be overwritten; the more times a file is overwritten, the harder it becomes to get back.

Don't think that you can really get back any file that has been overwritten—you can't. However, as mentioned at the beginning of this section, the government can. Your hard drive will hold a ghost image of data that has previously been written to it and, with the right type of equipment, it is possible to read the ghost images and retrieve data.

The Risks of Encrypting Your Data

Using data encryption utilities poses some risks that need to be weighed against the benefit of keeping your information private. If you encrypt data and then forget your password, it is the same as losing the data forever. Unless the utility you use provides for a master password to unlock anything your program encrypts, it is gone. At the same time, this makes the encrypted data less secure: Anyone who knows the master password for your program, or someone who has another copy of the program with their own master password, stands a chance of breaking in.

You should keep an unencrypted backup of the data in a secure place, such as a safety deposit box, to avoid such a possibility. If the data is too sensitive to keep any unencrypted copies, then keep an encrypted copy using a password that you will not forget, and make sure it is not written down.

In your work environment, change your password from time to time, using these same criteria. Also, do not use words that can easily be guessed, such as derivatives of your name, birth date, social security number, and so on. These are the first types of passwords data thieves will try.

Security Software

When you get ready to shop for your security software, first decide what level of security you want. The range of products varies from encrypting files and folders to locking and encrypting your hard disk. If you just want something to keep casual eyes from getting into your private files, then all you need are the utilities that come with Norton Utilities or the MacTools package. But if your needs are really heavy duty, then consider the Kent Marsh line of products—they are the Macintosh security experts. Cassidy and Greene has a package called AIM, which will provide excellent security as well. And, for your most sensitive data, you can always use MacPGP.

Accessing DOS Files and Disks on the Mac

The previous section represents the school of hard conversion. If you are lucky, you will never have to use these conversion techniques. Most of your data conversion needs will be accomplished by the software you use. The major software packages that create cross-platform-compatible files will be looked at in the last section of this chapter.

However, before we get to that, there are additional ways to get data from a Mac into a DOS system, and vice versa. This section will look at software that you can use in conjunction with Mac's floppy drive to transfer data. Some of the hardware available for cross-platform work will be discussed as well. We will also look at a couple of ways to turn your Mac into an IBM clone.

This section is about getting the data into your Mac. The subsections will be:

- Software
- Using Your Mac As a Clone

Software

Every Macintosh in recent history was shipped with a SuperDrive, which is a floppy drive that has the capability to read Macintosh HFS and MFS formats, DOS 760K and 1.44 Mg disks, and Apple ProDOS disks (the Apple IIe and GS). With this built-in ability, your Mac can read 3.5-inch floppy disks. The focus of this section will be on using your Mac drive to read disks from a DOS machine. Its subsections are:

- Apple File Exchange Utility
- PC Exchange
- AccessPC
- DOS Mounter
- MacLink Plus

Apple File Exchange (AFE) Utility

First of all, you do not need to purchase any additional software to read a DOS-formatted disk. All you need came with your System software in the form of the Apple File Exchange utility, which is on your Tidbits disk. With this utility, you can perform the following functions:

- Initialize diskettes in DOS, Macintosh, or Pro DOS formats
- Transfer data from your Mac to 3.5-inch disks within the preceding formats
- Perform data translation using either MacLink Plus or the built-in binary, text, or DCA/RFT formats

The basic operation of AFE is fairly straightforward. You run the program and get a window with two lists. When you insert an MS-DOS floppy, you will get a

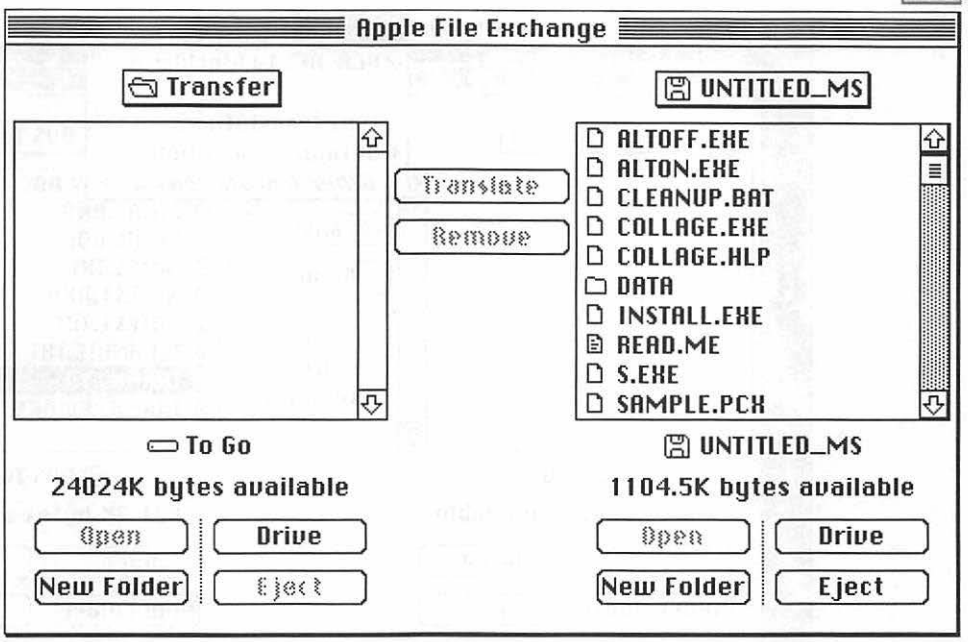


Figure 11.16 *AFE after a DOS disk is inserted.*

window like the one shown in Figure like 11.16. If you put a DOS disk into your Mac before running AFE, your Mac will not recognize the disk and will want to initialize it. The next step is to select the file you want to transfer by highlighting it. If the file is one you are going to use without translation, you would select the Default Translation mode from the MS-DOS to Mac menu (see Figure 11.17.)

The types of files to use with the Default Translation are any files that you would use directly in other programs, such as Microsoft Word or Excel documents. If you are going to transfer a text file, use the Text translation capabilities of AFE to strip out the linefeeds. Figure 11.18 shows the different options available when you select Text translation.

Your main concern will be replacing carriage returns and linefeeds with carriage returns. Your other options include changing special characters with diacritical marks. The options are limited, and changing them to their closest single character is probably the best selection.

With the last selection, you can replace tab characters with spaces, spaces with tabs, or leave all the spaces and tabs alone. You would use the last selection if you wanted to change the formatting to use the text data in a spreadsheet or database. To get a feel for how this setting works, play with it. Using AFE to translate text files goes only halfway. If you want to use the document with a word processor, you will still have to do the translation procedure in the last section.

The other option that is available is the DCA-RFT to MacWrite menu selection, but this is almost useless. You can use it only if you save the document you are going to transfer in the DCA-RFT format, which is specific to some word processors. You

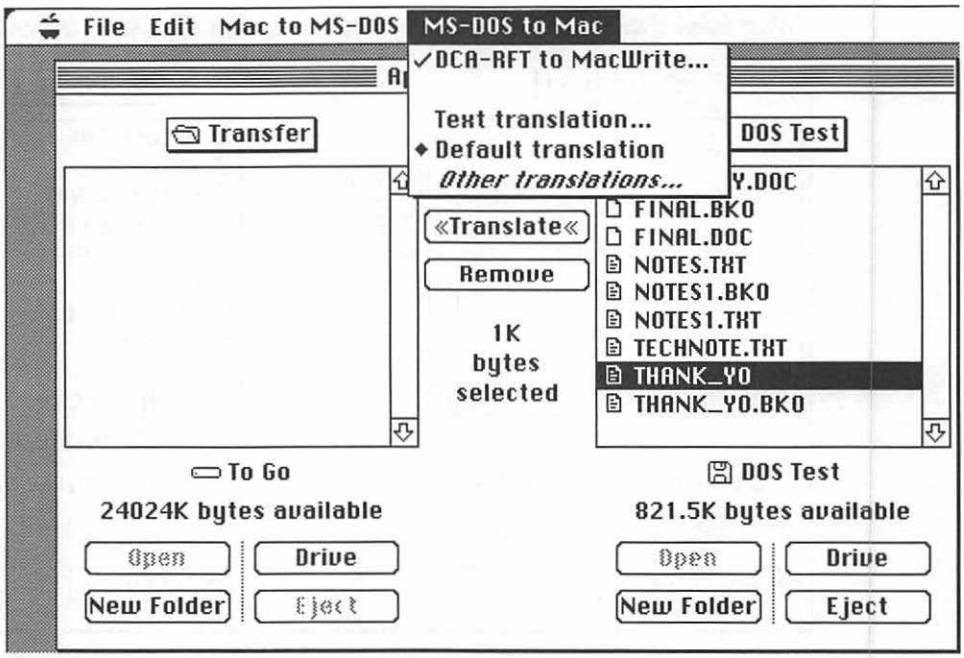


Figure 11.17 *The MS-DOS to Mac menu.*

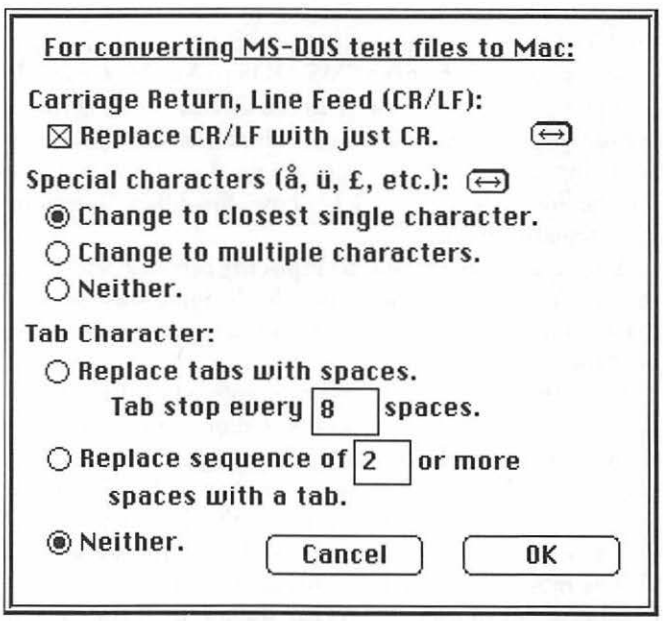


Figure 11.18 *The Text translation options.*

are better off using a Word-for-DOS format or an RTF format, and performing a binary translation. Both of these formats will retain formatting and every Macintosh word processor can read them.

Finally, you can use the MacLink translators with AFE. But if you have MacLink Plus, you would be better off using DOS Mounter that comes with it and the MacLink program directly. If you do decide to use the translators with AFE, make sure the translators are in the same folder as AFE. It will take AFE much longer to start up with the translators.

PC Exchange

PC Exchange is a new Apple Control Panel that will mount a DOS disk onto the Desktop just as if it were a Mac disk. It will also let you format DOS disks from the Desktop. Figure 11.19 shows a DOS disk mounted on the Desktop using PC Exchange. The best part of using PC Exchange is the ability to automatically assign an application to specific Mac programs. Figure 11.20 shows how to assign Microsoft Word to the .DOC extension. In Figure 11.21, you can see the extensions that have been assigned to PC Exchange.

Once you have made assignments for the DOS extensions and you open the disk, you will see the files in a window with the appropriate icons for the assignments you have made. If you double-click on a file that you have assigned to an application, it will launch that application and open the file at the same time. Figure 11.22 shows the same disk used in the AFE example with all .DOC and .TXT files assigned; you can see the different icons for the assigned files. Those icons with the "PC" are unassigned.

Again, you will have the problem described in the previous section on translating text files. DOS text files will retain the carriage return and linefeeds when you open them with PC Exchange. Figure 11.23 shows the text file used in the foregoing

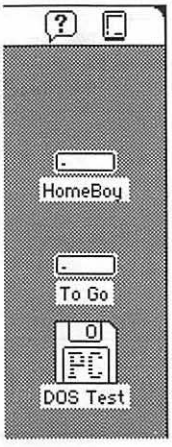


Figure 11.19 *A DOS disk on the Desktop using PC Exchange.*

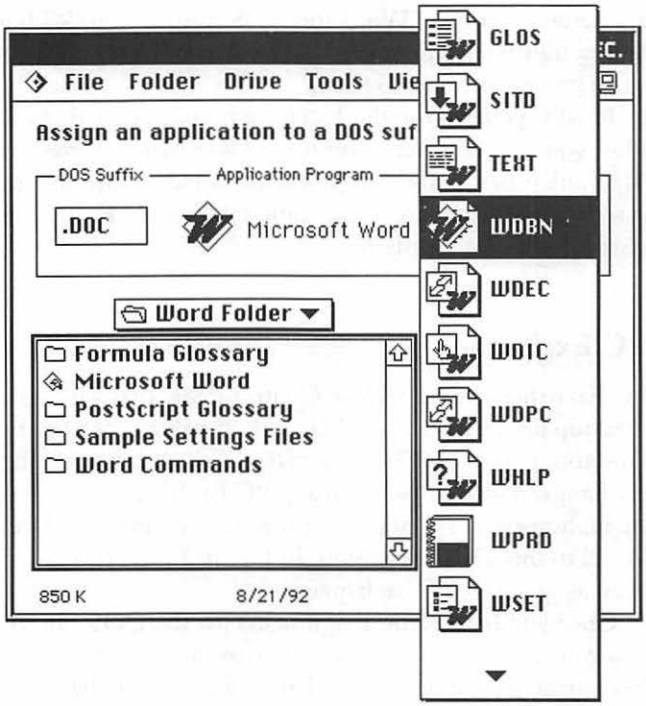


Figure 11.20 *Selecting the extension type.*

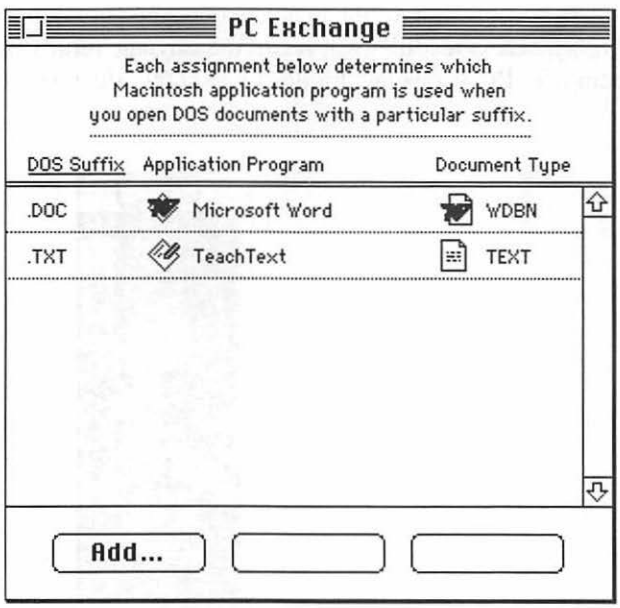


Figure 11.21 *The assigned extensions in PC Exchange.*

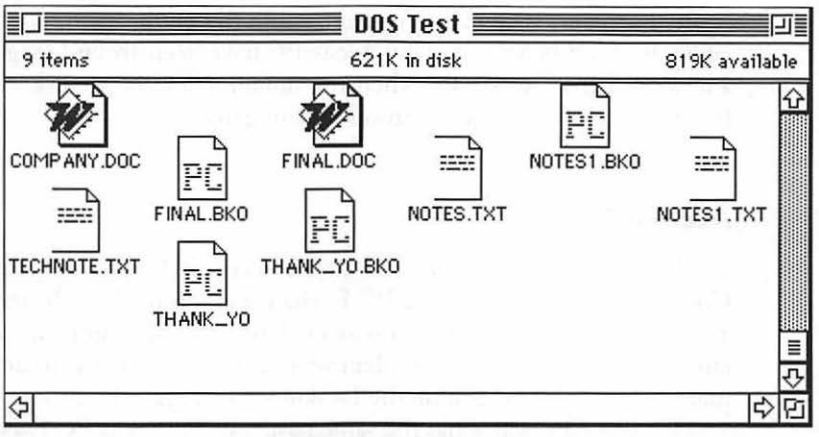


Figure 11.22 *File icons on a DOS disk with their appropriate assignments.*

example. It is the same one that was moved from the Mac to the PC after formatting it for the PC. To use the file with a Mac word processor, you will have to perform a translation.

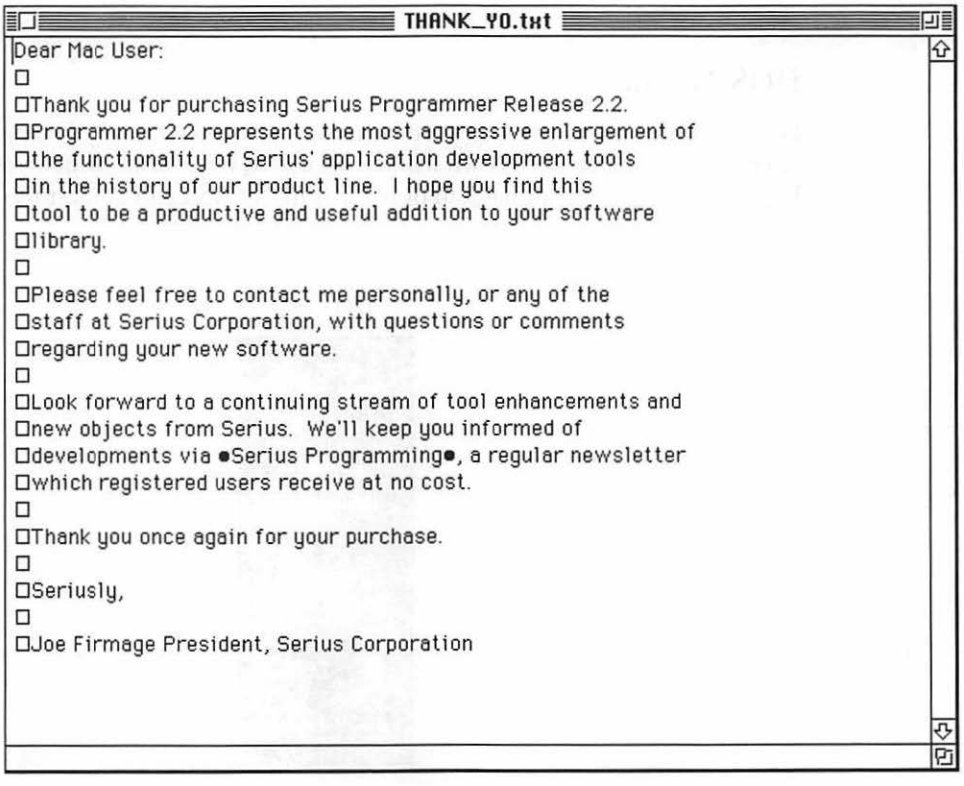


Figure 11.23 *A MS-DOS text file.*

PC Exchange is actually a late entry into the DOS-on-the-Desktop software game. Both DOS Mounter and AccessPC have been around longer. PC Exchange is a bit slower than Access PC when you double-click on the disk icon to open it for the first time; otherwise, their features are comparable.

AccessPC

Of all the Desktop DOS disk mounters, Access PC is probably the best. It is a Control Panel device just like PC Exchange and is made by Insignia Solutions. It also has all of the same functions as PC Exchange, with implementation that is almost the same. The one problem with AccessPC is that you cannot tell what format a floppy is by its icon on the Desktop. (see Figure 11.24.)

The AccessPC Cdev has the same basic capabilities as PC Exchange; however, it also has a couple of additional abilities. One is that it can mount a SoftPC hard disk, and it will also mount hard disks that have been formatted with a DOS partition. This could be useful if you have a hard disk that you want to use on both a Mac and a PC so that you can format half of it with a Mac partition and the other half with a DOS partition. Using AccessPC, you can access the DOS partition from the Desktop. Finally, AccessPC will save the disk's information to the floppy itself so that the next time it is used on a Mac, it will open quickly.

DOS Mounter

DOS Mounter is another Cdev similar to the other two made by Dayna Communications. It has its own icon for mounted DOS disks, which you can see in Figure 11.25. It does not have all of the features of AccessPC, but it too will allow



Figure 11.24 *A DOS disk mounted with AccessPC.*



Figure 11.25 *The DOS Mounter icon for DOS disks on the Desktop.*

for the assignment of Mac applications to DOS extensions. Figure 11.26 shows the DOS Mounter Control Panel. As you can see, it has the same functions as the other two applications. Since all three of these programs are basically the same, it does not matter which one you use unless you need the special capabilities of AccessPC. DOS Mounter will also work with some Syquest disks, such as AccessPC. If you have any questions about the capabilities of any of these programs, call their manufacturers or your local dealer.

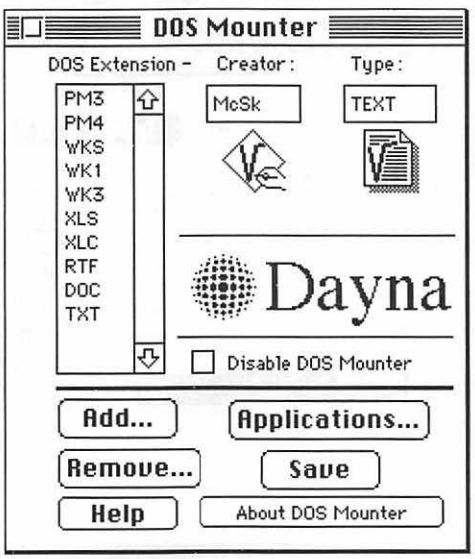


Figure 11.26 *The DOS Mounter control panel.*

MacLink Plus

MacLink Plus is a DOS file-translation utility made by DataViz. It comes with DOS Mounter and can translate almost any DOS file format into a Macintosh file format. MacLink works in two steps: In one, it selects the translators; in the other, it selects the files. You can select SUN, NEXT, or IBM PC formats and translate them into Macintosh formats. Figure 11.27 shows some of the PC word-processing formats that can be changed into Microsoft Word's format.

MacLink offers the ability to translate a large number of documents from one format into another. It is its batch processing capabilities that make it so useful. If you have to move a lot of files from the Mac to a DOS machine, or vice versa, you will appreciate MacLink Plus. If this is something you do only occasionally, then you probably do not need this utility.

The version of MacLink Plus that comes on the System 7.5 CD-ROM is not the same as the version described in this section. The version that comes on the CD-ROM works in conjunction with Macintosh Easy Open to convert your documents, while the version described here can be used with a serial connection on an MS-DOS machine to transfer and translate files.

Using Your Mac As a Clone (Ugh!)

It is possible to turn your Macintosh into an MS-DOS machine, in a manner of speaking. There are two ways to do this: One is to use a software emulator that cre-

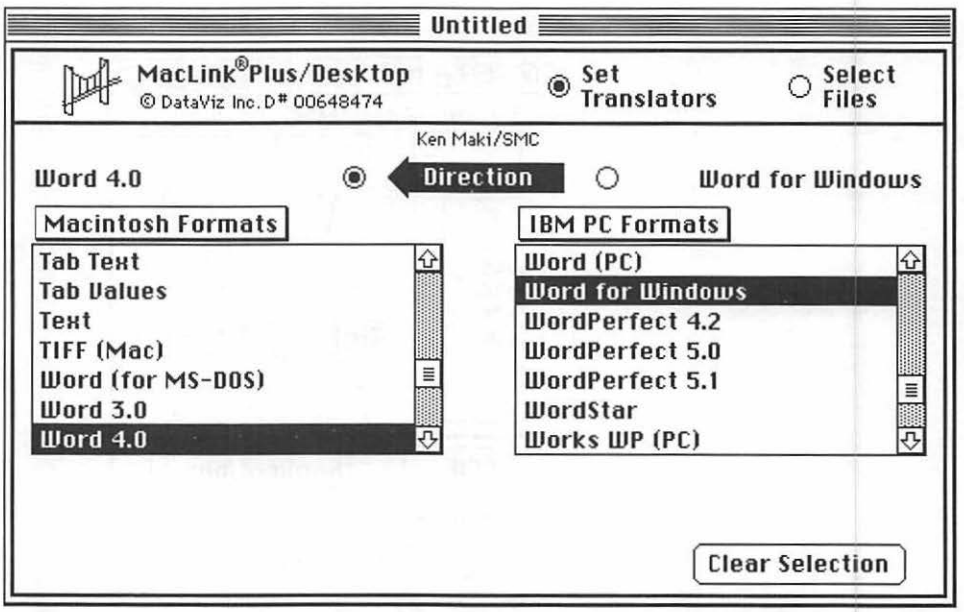
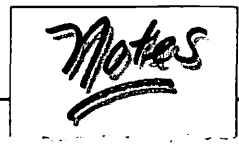


Figure 11.27 *MacLink Plus format selection.*



The Mac versus Windows

The differences between using a Mac and a DOS-based machine are profound, even if the DOS-based machine is running Windows. This not a feature-for-feature comparison, but all that really needs to be said is that the Macintosh is a computer that was created from the ground up with a graphic user interface (GUI). Every design aspect of the Mac, both hardware and software, is designed to work together so that the hardware compliments the software, and vice versa.

Windows is a layer that is placed on top the DOS operating system, and there is no cooperation between the hardware and software manufacturers. The fact that Microsoft licensed essential elements of the Windows interface from Apple only brings the profound philosophical differences into bright contrast. Windows is an attempt to provide for DOS machines what the Macintosh has had all along.

To really contrast the differences, think of a DOS machine with Windows as an economy compact car that has been customized and turned into a sports car. The body is removed and replaced with a fiberglass custom body. The engine is reengineered to be really powerful and it is all put together with the best parts available. The new car looks great, sounds great, and is very fast. But when it is driven down the road, the ride is rough because the frame and suspension is still that of a cheap compact.

The Macintosh, on the other hand, is more like a luxury car designed with the driver in mind. It is given a powerful engine so that it can easily move its custom-designed body and interior. It was designed with the suspension as the starting point. No matter how fast or bumpy the road, the ride will always be smooth.

The Mac is constructed with total computing vision in mind, while DOS machines running Windows represent what happens when a screwdriver is used as a hammer. As a computer that uses a character-based operating system, a DOS machine is great and has a place in the world. But to use one with a GUI is like trying to put on a pair of shoes that are too small—they don't quite fit.

ates a virtual DOS machine that exists only in software on your Mac. The other way is to physically put one inside your Macintosh.

The next question you might ask is "Why?" The answer is really quite simple: to be able to run MS-DOS software for some facet of your work. If you have only to run one or two DOS applications for your work, while a Mac will perform the rest of your tasks without a problem, you might want to use one of these solutions. An example would be if your e-Mail system is DOS-based but all of your other work can be done on a Mac. Another example would be if your company has a proprietary DOS-based application that will never be turned into a Mac application. Except for this one application, the rest of your work can be performed more quickly and with better results on a Mac.

This section will briefly look at these products, but most of the section will be spent on the software emulator rather than the hardware products. Because not much time will be spent on the PC in a Mac hardware option, it will be discussed first, then this section will look at the virtual PC.

SoftPC and SoftWindows

If you really have to run MS-DOS software on your Mac, look at Insignia Solution's products. They make three different MS-DOS emulators for the Macintosh, making it possible to turn any Mac—from the Plus up—into an MS-DOS clone. This interesting feat is done with software only, which creates a virtual MS-DOS machine that runs on your Mac.

If your company uses DOS software for which there is no Macintosh counterpart, or if you wish to explore the world of DOS, then you need to look at this software. The three different versions are:

- SoftPC
- SoftWindows for the Macintosh
- SoftWindows for the Power Macintosh

All of Insignia's products are 100-percent IBM PC/AT real-mode-compatible. The only time they will not work properly is if the DOS application makes a specific hardware call, where it interrogates a real PC for some specific hardware function in order to run. This is not a common occurrence and you will probably not have a problem.

SoftPC is designed to run on any Macintosh and is the least expensive of these products. SoftWindows for the Macintosh requires an MC68020 as a minimum processor and works best on a 68040 machine. It has VGA graphics support, expanded memory emulation, and math co-processor support. SoftWindows for the Power Macintosh has all of the features of SoftWindows for the Macintosh.

Any of the Insigna products works just like a standard DOS machine. It recognizes your SuperDrive as an IBM floppy drive and creates an MS-DOS hard drive partition on your hard drive. You can also assign a Macintosh hard drive, a folder, or a networked volume as an additional drive. This can be helpful for transferring files between your virtual MS-DOS system and your Mac.

When you're running Windows with SoftWindows, it emulates a 286 running in Windows standard mode. By the end of 1994, Insignia is supposed to have released a version of SoftWindows for the Power Macintosh that will emulate a 486. The current version of SoftWindows for the Macintosh runs at about the speed of a 12Mhz 286 when run on a 25 Mhz or better 68040 Macintosh. SoftWindows for the Power Macintosh version will run at 386/33 speeds when run on an 8100/80 Power Mac.

Basically, if you have an occasional need for access to an MS-DOS machine, you can have it with your Macintosh. If you do a lot of work in MS-DOS or Windows, you will probably want to get one as a second computer.

Summary

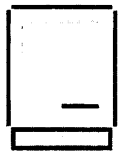
Although this chapter was steeped in paranoia, you should think about some of the issues it raised. Is your data safe? If you are relying on your equipment and not making backups—don't! While writing this book, I had a 300M hard drive stop working in the middle of the afternoon. It stopped dead and all of the data on it was lost.

Another incident that happened to me, also while writing this book, was the loss of a PowerBook. This loss was more serious because it contained my communications software and all of my passwords for my online services. Once again, the data was lost and someone else could have accessed my accounts, received my mail, and sent messages in my name.

I usually have two or three copies of my data. The loss of a machine or hard drive can happen to anyone—don't lose all of your data because you didn't make a copy.

On the lighter side, you now know how your Mac links files with programs, and how to change those links. If you need to share files with someone who doesn't have the same programs that you do, you now know what to do. It may take a little experimentation, but you know the basics that will see you through your task.

Whatever you do with your data, back it up!



CHAPTER 12

Reaching the Outside World

Introduction

It is now possible to pay all of your bills without writing a check, to obtain marketing demographics for a project at work, to purchase airline tickets, and to communicate with people all around the globe by way of your computer. Data communications enable you to reach a rich and diverse realm of information. Would you like to read the news before it reaches your newspaper? Do you want to send memos to salespeople on the road? Would you like to acquire software without leaving your home or office?

These are just a few of the things that data communications make possible; more possibilities will be discussed in this chapter. If you are curious about what is available, this chapter is for you. In it, you will find the following topics discussed:

- Data Communications Basics
- Communications Hardware
- Communications Software
- Communications Utilities
- Communications Services
- The Internet

Data Communications Basics

Most people are aware of the potential of using their computer to communicate with other computers and, by extension, with other people. However, the process of doing so is often awkward. Since most of the computers you will contact are not Macintoshes, venturing into data communications is like visiting a foreign land. It is getting better, but is still more alien than the average Macintosh user would like.

To connect with computers that are not Macintoshes requires a device that acts as an equalizer that makes computer-to-computer communications possible, so data can be exchanged. This section will deal with these equalizers, which consist of hardware devices and software . The discussion will provide a basic primer on data communications. More advanced capabilities will be mentioned but left for you to explore on your own. This section has the following subsections:

- The Equalizer
- Basic Communications Terminology
- The Macintosh Communications Toolbox

The Equalizer

All computers can communicate because they have a common language. No matter what differences you may see on the screens of dissimilar machines, there is always a way to exchange data. The easiest means for doing this is through a hardware device called a *modem.* The word modem is actually an acronym for Modulation and Demodulation. It has become a common name for a hardware device that converts the digital data from your Macintosh (or other computer) into sound signals (*modulates*) that are then sent over regular telephone lines. It also converts these sound signals back into digital data (*demodulates*) for the receiving computer to use.

To connect your Macintosh to other computers via your telephone lines requires a modem. (There is more information on these devices in the upcoming section.) But, just as your Mac will not work without a System folder, your modem needs software as well. The software that enables a computer and modem to work together and connect to another computer-modem combination is called *communications software.*

Basic Communications Terminology

The concepts that form the basis of data communications are really the same for all computers. If you are not familiar with data communications, many of the terms used here may seem confusing. Even if you have some experience with data communications, some of the terms are going to be new to you . This section will attempt to make sense of them.

Although a thorough understanding of these terms is not a prerequisite to using your Mac with a modem, if you take the time to become familiar with these concepts, your explorations should be easier and more enjoyable.

Data Speed

There are two different measures of how fast data is transferred from one computer to another. One is BPS, or bits per second, and the other is Baud rate, which is a

measure of the signal speed. BPS and Baud rate are not always equivalent. BPS means that a specific number of bits per second, usually ranging from 300 to 19,200, are being transmitted from one computer to another. At 300 BPS, you are sending 37.5 bytes per second, or 2250 bytes per minute. This is equivalent to about two pages of text in a minute. 19,200 BPS sends 2400 bytes per second, or 144,000 kilobytes per minute. This is usually the maximum speed at which two computers connected with a serial cable can communicate.

Baud rate is the signal speed that modems use to communicate. It is the number of signals sent per second. This means that a 300-Baud modem will send 300 signals per second, a 9,600-Baud modem 9,600. How much data is actually sent depends upon how many bits are sent per signal. With older modems, the Baud rate and the BPS are usually the same. However, most modems can send multiple bits with each signal, which means that a 2,400 BPS modem may be operating at 600 Baud and sending four bits with each signal.

The confusion between these two terms is that they are used interchangeably. Every communications package you use will ask you to set the Baud rate at which you want to communicate and never mention BPS, while all of the modems are actually rated at BPS and do not talk about their Baud rates. It gets worse: You can use a 9,600 BPS modem that has error correction and data compression protocols that enable you to set your communications software's Baud rate at 57,600. It's no wonder that Macintosh users get confused and frustrated by all of this. In the discussion on modems, it should get clearer.

Synchronous and Asynchronous Communications

This concept pertains to how your data is sent. Synchronous transmission means that every byte will be sent immediately after the other, with a regular and scheduled interval between each byte. Asynchronous transmissions occur when the bytes sent can have a delay between them, although not every byte sent may have a delay between it and the following one.

Asynchronous communication is easier to perform and is the method used by older, less expensive modems. It is also slower than synchronous communications. Synchronous data transmissions are faster but require special hardware. Many of the newer modems are capable of synchronous communications. To achieve the highest data transmission rates possible, your modem must be capable of synchronous data communications.

Parity

Parity is a simple method of error detection. There are several different types of parity, which are listed here:

- Even—A method for maintaining the number of ones in a byte to be even. Remember, every byte is composed of 0s and 1s. If the number of 1s in a byte is odd, the parity bit is set to 1; if they are even, the parity bit is set to 0.

- Odd—This is the exact opposite of even parity. Instead of keeping the number of 1s even, they are kept to an odd number.
- Mark—This error-checking method always sets the parity bit to 1.
- Space—Space parity is the opposite of mark parity; the parity bit is always set to 0.
- None—In this case, no parity bit is set and more effective means of error detection are used.

With error correction and data correction being built into modems, the use of a parity bit will someday disappear; but for the time being, it is still necessary. The parity setting for your software and the computer or modem you are connecting to must be the same.

The other significance regarding parity is that the number of bits per character will be determined by whether you are using a parity bit. If you are, you must use 7 bits per character; if not, you can use an 8-bit character.

Duplex Modems

There are two types of duplex modems: Full and half. A full duplex modem can receive and send data simultaneously, while a half duplex modem can send data and receive data—but not at the same time. With a full duplex connection, your modem will send any characters you type back to your computer so that you can see what you are doing. If you have it set to half duplex, you will not see what you are typing unless you specifically instruct your computer to display the characters as you type them. The software displays the characters through a feature called a *local echo.*

Stop Bits

A stop bit is a bit that is added after a byte has been sent. The number of stop bits can be 1, 1.5, 2, or auto. This is another communications parameter that you need to set in your software. If your software is intelligent enough, it will use the auto setting and you do not have to set the stop bit. However, some software cannot detect the number of stop bits, so you will have to know what they are in order to connect successfully to another computer.

Flow Control, Pacing, or Handshaking

Every device—modems and computers—has a buffer that can hold a specific amount of data. If the devices couldn't tell each other when their buffers are full, data sent after the buffer is filled would be lost. The method of communicating this information is called *flow control, pacing,* or *handshaking.* There are three types of flow control: hardware, software, or none.

Software flow control is also called X-on/X-off. Using software flow control, you can type ⌘+S to signal the other computer to stop sending data. By typing ⌘+Q, you can restart the transmission. Typing ⌘+C will momentarily break the connection.

Hardware flow control sends an electronic signal between the devices to indicate whether they are ready to receive data. Even though it is always the receiving device that controls how the data is flowing, the flow control settings must be the same for both computers.

Hayes-Compatible

Modems that are Hayes-compatible are called smart modems and use what is called the *AT* command set developed by Hayes Microcomputer. These modems have features that are controlled by using AT commands. Because the AT command set is standard, most communications packages take care of it transparently.

Commands can be used to make your modem automatically answer or dial the phone. They are also used to reset the modem, set the flow control, and for other features. However, the most important feature of Hayes-compatibility is what Hayes calls an Improved Escape Sequence with Guard Time. The escape sequence is the set of commands that allows for a modem to be placed in a command mode so that it can be configured. What makes the Hayes escape sequence unique is that the modem cannot be accidentally placed into its command mode. Other modems can unexpectedly be placed into their command modes by the data being transmitted through them.

The other major escape sequence is called Time Independent Escape Sequence. This is a different escape technology and does not necessarily offer the same security as the Hayes standard.

The concept of Hayes-compatibility has been confused with the AT command set for configuring your modem. There are other AT command languages and software designed for a Hayes modem that will work with a compatible modem if the AT command language is the same.

Communications Toolbox

Apple introduced the Communications Toolbox as an add-on for System 6.0.X and built it into System 7.X. The Communications Toolbox is a set of standardized communications tools and procedures established by Apple to bring consistency to Macintosh communications.

Even though you may be using System 7, you will not be able to use the Communications Toolbox unless you have the special communications tools installed in your Extensions folder. These tools include the following:

- Apple Modem Tool—This is the tool that controls the modem. It will recognize an Apple, Hayes, or Hayes-compatible modem and uses the built-in serial ports of the Macintosh. The Modem Tool provides for configuring all of your data communications parameters.

- AppleTalk ADSP Connection Tool—This tool is used for making AppleTalk connections using the AppleTalk Data Stream Protocol. This is actually a network tool even though it uses the Communications Toolbox. It will let two Macs on the same network connect using terminal emulation packages if both packages support the Communications Toolbox.
- Serial Connection Tool—The Serial Connection Tool is for establishing computer-to-computer connections. Like the Apple Modem Tool, it also provides for all configuration parameters.
- Text File Transfer Tool—The Text File Transfer Tool is used to control how text files are transferred from the computer you are connected to. A text file is a file that contains only text with no formatting or font definitions. TeachText creates text-only files.
- TTY Tool—TTY stands for TeleType. This tool is used to configure your terminal, which will control how the data you receive from another computer appears on your monitor.
- VT102 Tool—The VT102 is another terminal emulation tool. It is made specifically for controlling the connection to DEC (Digital Equipment Corporation) VAX computers, which have special requirements regarding keyboard mapping and commands; the VT102 is required if you are going to log onto a DEC system and actually use that VAX computer with your Macintosh functioning as a terminal.
- XMODEM File Transfer Tool—This tool controls how binary (applications and compressed files) transfers are made between your Mac and another computer. If you are downloading (receiving) a file from another computer and it is not a text file, you will have to use a file transfer protocol, such as XMODEM.
- Third Party Tools—Manufacturers of modems and other computers can make Communications Toolbox tools to meet any special requirements their hardware might have. These tools could be special terminal emulators or a special connection tool. An example would be the Hayes Modem Tool that was written by Hayes for use with the Communications Toolbox.

Programs that require the Communications Toolbox usually supply the communications tools necessary for their applications to work. Almost all communications software either use or offer the option of using the Communications Toolbox, because the Toolbox makes it a lot easier to write programs that have communications capabilities.

Communications Hardware

The essential hardware component for data communications, other than your Mac, is your modem. There has been a lot of change in modems over the last few years. They have gone from speeds of 1,200 bps to 28,800 bps in the last seven years. It is possible that they will probably go faster, but 28,800 is getting close to the maximum capacity that standard phone lines can handle.

There is a wide variety of modems available, each with different features. This section will look at these features and help you determine what you'll require for your data communications needs.

What Is a Modem and What Can It Do?

The modem works by connecting to your telephone lines and to your Macintosh. It is a hardware bridge between your Mac and the rest of the world. In the simplest fashion, you can use a modem to connect to another computer. Each user can type, and whatever is typed is sent to the terminal of the connected computer.

More complex operations include transferring text and binary files. Transferring binary data is quite sophisticated and requires special protocols. Binary files can consist of any type of computer file that has been compressed to save space and transmit faster.

Some of the most advanced operations involve using a modem to take control of another Macintosh remotely, or connecting to a remote network. In addition, it is possible to get modems and software that will turn your Mac into a fax machine, an answering machine, or a complete voice mail system.

Then there are the goodies that the online services and bulletin board services (BBS) provide. Through these, you can have an e-mail account so that others can send you information, obtain shareware and freeware programs, have ongoing discussions with people who have similar interests, or get information on almost any subject.

Hardware and software manufacturers often maintain BBSs so that their customers can get technical support, software upgrades, utility programs, or just to make it easier to exchange information with their customers and vendors. Other people run BBSs as a hobby, using the BBS to bring together people with similar interests who might not otherwise communicate. Large companies may have a BBS for their employees and use it as a means of keeping everyone informed about company matters.

There is one more very important use for modems that should not be overlooked: They can and are used to connect physical networks that are in two different locations. Sometimes, it is a matter of dialing into a network to get e-mail; other uses include keeping an open line between two locations so that the two networks can appear to be one. Where there is a need to communicate and the people are not in immediate physical proximity, a modem can be the tool to keep everyone in touch.

Protocols

Making modems work together has been achieved only by the establishment of standards. Each time it becomes possible to use a higher BPS rate, there has to be an industry-wide consensus before the modems are released to the public. The standards make it possible to use the same type of modem on any computer, which is what makes the modem an equalizer.

The protocols and standards that are established determine everything about the functionality of the modem. Where differences may occur is in how the modem interacts with the computer at a software level. Even the commands that the modem

can accept have a basic standard that will and can deviate somewhat from manufacturer to manufacturer.

The other areas where standards apply are error correction and data compression. Some of the new high-speed modems have these capabilities, while others do not. Because the same types of designations are used to describe a modem's various capabilities, you need to be very clear regarding what you want. The rest of this section will cover the following topics:

- Modem Standards
- Data Compression Protocols
- Modem Speed

Modem Standards

The first set of standards establishes that all modems have the same characteristics for operating at different speeds. One of the most important characteristics is the frequency speed. The ability to recognize different frequency speeds determines the operating speed of the modem. Table 12.1 lists the various standards that are used by most modems. (If a modem does not use these standards, it will probably not work with those that do.)

Table 12.1 Modem Standards

STANDARD AND SPEED	DESCRIPTION
Bell 103 (300 BPS)	The first standard used in the early stages of modem development.
CCITT V.21 (300 BPS)	The international standard for 300 BPS data communications. This was established after the fact for compatibility purposes.
The 212 Standard (1,200 BPS)	Established to accommodate 1,200 BPS transmissions; has backward compatibility to the Bell 103 standard.
The Bell 212a Standard (1,200 BPS)	Uses a different frequency than the 212 standard; usually has the ability to connect with a modem that uses the 212 standard.
The 224 Standard (2,400 BPS)	International standard (Europe and the U.S.). All modems designed in accordance have the ability to drop back to the a speed of 1,200 BPS. This is also called the CCITT* V.22 bis in Europe and the U.S. as well.
CCITT* V.32 (9,600 BPS)	An international standard for full duplex synchronous or asynchronous communication that uses a two-wire dial-up or leased line environment. Also includes automatic drop back to 2,400 BPS.
CCITT* V.32 bis (14,400 BPS)	This is similar to V.32 but defines the standards for data communications up to speeds of 14,400 BPS with a fall back to 12,000 BPS.

*CCITT stands for the Comité Consulatif International Télégraphique et Téléphonique (International Consultative Committee on Telegraph and Telephone). This is an international organization for the establishment of protocols and standards for telephone and communications related industries.

Table 12.1 will familiarize you with the terminology used to describe modems. When you open the manual for your modem, you will find several pages talking about the standards and their associated attributes for each of your modem's operating speeds. It is easy with the high-end (faster) modems to get confused between V.32 and V.32 bis. If you really want a V.32 bis modem and get one that is only V.32, you will be disappointed.

Currently, there is a new standard emerging for 28,800 BPS modems. Although these modems are available and the standards have been set, they have not been ratified and proclaimed as standard. By the time you read this, the standards for 28,800 BPS modems will be in effect.

Data Compression and Error Correction Protocols

Some modems have built-in data compression capabilities. The ability to compress data as it is sent can increase both the Baud rate and the bits-per-second speed of your modem. Because it is the modem that performs the data compression, the modem receiving the data and the one sending it must use the same protocols to achieve this task.

Another task that your modem will automatically perform is error correction. There are several standards for error correction, and some of the error correction protocols also provide data compression. Although you could probably live the rest of your life without ever knowing these things, it may help to demystify one of the most arcane areas of Macintosh operations.

Table 12.2 lists the different error correction and data compression protocols used in modems today.

Modem Speed

Modems have continuously evolved, with each stage resulting in a device capable of sending data at increasingly faster speeds. The lower-speed modems (2,400 BPS) are full-duplex asynchronous devices, while the high-speed modems (9,600, 14,400, and 28,800 BPS) are full duplex synchronous or asynchronous devices. Speed becomes an issue when your modem has V.42 bis or MNP 5 capabilities. With V.42 and MNP 5, you can, if your software sets up your modem properly, double the effective speed of a 2,400 BPS modem to 4,800 BPS; the same applies to 9,600 BPS modems.

Using a 9,600 BPS modem with V.42 bis, your data rate can jump to 38,400 BPS (this provides a theoretical speed of 2,250K per minute), while your Baud rate can be as high as 57,600. Remember that Baud is not the same as BPS; Baud is the rate of the frequency signal you use to connect There is a correlation between Baud and data rates: The higher the Baud, the faster the data transfers.

To obtain the maximum data rate possible for your modem, there are a few other factors to consider: One is the condition of the phone lines. If the phone lines are not *clean*, meaning there are fluctuations in the signal strength, or there is static or noise (such as hearing another conversation while you're talking to someone else), your modem will not operate at its best. The error correction will kick into effect and ultimately reduce your overall speed.

Table 12.2 Error Correction and Data Compression

PROTOCOL	DESCRIPTION
MNP* Class 1	Error correction for asynchronous half-duplex communications.
MNP* Class 2	Error correction for asynchronous full-duplex communications.
MNP* Class 3	Error correction used to convert data into a synchronous protocol even though the actual data link is asynchronous. This protocol increases data transmission speeds because it eliminates the need for stop bits.
MNP* Class 4	Error correction that is basically the same as MNP 3, except that it has the added capability to negotiate the size of the data packet** sent.
MNP* Class 5	This is the first data compression standard established. It enables a modem to achieve a 2 to 1 rate of data compression. You should not use this protocol if you are transferring files that have been compressed by software.
CCITT V.42	This is another international standard; however, this one is for error correction. It provides better error correction than MNP 4 and works better over poor-quality phone lines. If V.42 cannot be used, the modem will automatically try MNP 4. If that fails, it will not use any error correction.
CCITT V.42 bis	This is a data compression protocol that is referred to as LAP-M***. It is also compatible with MNP 5 so that your modem will try to use MNP 5 if it cannot use V.42 bis. The difference is that V.42 bis is much more effective (compression rates of 4 to 1) than MNP 5; it can automatically detect files that have been compressed by software and will not try to compresses them again.

*MNP is the Microcom Networking Protocol.
**A data packet is a predefined number of bits or bytes all sent as a group.
***LAP-M is the Link Access Procedure for Modems.

Next, your computer has to be able to keep up with the data transfer rates. If you are running your communications program in the background and working with a CPU-intensive application while receiving a file, your data transfer rate will decrease because it will not be able to process the data it is receiving at its optimum rate. Also, if you are using virtual memory, or if your terminal package has a small data buffer, you will be impeding the speed at which your Mac can process the data it is receiving, thus slowing down the modem.

Also, if you have a choice, use the modem port rather than the printer port. The modem port, on all Macs since the SE, supports synchronous data transmissions; however, the Printer port does not. If you do have to use the printer port, make sure AppleTalk is turned off in the Chooser. It is possible for AppleTalk to interfere with data transfers, because the AppleTalk driver takes control of the entire Mac.

The AT Command Set

Throughout the industry, there is a set of commands called the AT command set—a standard set of commands used to configure a modem. With the command set, you

tell your modem to automatically dial, what error correction and data compression protocols to use, and other modem-controlled aspects of the data-communications process. The command set is in the public domain. It is available for any manufacturer to use and should not be confused with Hayes-compatibility. Hayes uses the Hayes Standard AT Command Set, and only those modems that use the same AT command language as Hayes are compatible. If a modem manufacturer claims to be Hayes-compatible, it must also use the patented escape sequence previously mentioned. There is a lot of confusion in the industry about this point.

If you have a modem that does not use the standard AT command language, you will probably have problems with it. Most software is written to take advantage of a full AT command language, rather than a subset of it. The set of AT commands your modem uses will be found in your modem manual. Usually, your software will take care of all your configuration issues. However, if your communications software requires special drivers to work, make sure it has a driver that will work with your modem.

The AT command set is not going to be listed here. It can differ in subtle ways from one manufacturer to another, and a list with an explanation of how each works would take its own book to describe.

Status Lights

Most modems have *status lights*, which are used to tell you at what speed the modem is operating, if it is set to auto-answer, whether it is sending and receiving data, and so on. These are useful for keeping you informed and for troubleshooting. The problem is that there are no standards. Each manufacturer makes up its own combination of lights and assigns its own meanings to them. You will have to read your manual to figure out what they mean.

If the modem you are thinking about buying does not have status lights, think twice about purchasing it. Unless you feel comfortable with your data-communications skills, you could find yourself in a position where you are unable to determine what is going wrong. The only reason you might not want status lights is if you have an internal modem on a Macintosh Portable or PowerBook, or if you are using a battery-powered modem with a portable Mac. In this case, the lights will be another drain on your battery.

Fax

In the last few years, it has become possible to send and receive faxes using your Macintosh. If you are sending documents that originated inside your computer, using your Mac as a fax machine can be a real time-saver. However, if most of the faxes you send to others are not generated on your Mac, you may be better off using a standard fax machine. The time it takes to scan a document, not considering the cost of the scanner, may add up to a poor decision. Also, if you need paper copies of any faxes you receive, factor in the amount of time it takes to print a fax. But if this won't be a problem for you, the technology is great. You can get hardware and software that will let you network your fax/modem so that several people

on your network can use it. If you have a small business, a fax/modem can enable you to see documents without leaving your desk to send or receive them.

All fax/modems serve double duty as data modems. The newest breed of fax/data modems operates at 14,400 or 28,800 BPS and can send faxes at the same rate. They are usually group 1 and group 3 fax-compatible devices, which means that they can communicate with all standard stand-alone fax machines—and operating one is as easy as using the Print command from within any application.

The only applications that will not work well with a fax/data modem are those that require a PostScript printer. Sometimes, setting up the software for your fax/modem can be a bit confusing, but some patience will pay off. Each software package usually consists of an extension that sets up the fax/data modem to automatically receive, a Chooser extension that will let you print a fax from almost any application, and a fax manager to set up phone books and view and print the faxes you receive. You can also convert graphics (PICT and MacPaint) into faxes, and vice versa. In addition, your fax/data modem will probably have a Control Panel device for monitoring and notifying you of incoming faxes.

It usually takes some time to set everything up, but once it is done, you won't have to fuss with your setup. The one big drawback to most fax/modems is that when they are set to receive faxes, they cannot receive data—and vice versa. If you want to have a system that can receive faxes while using the same modem to let someone call in and have access to your network, you will probably need two modems—using one with the serial port and the other with the printer port. You will also need a line-switching device of some sort. The line-switching device will then route incoming faxes to the fax/modem, and data calls to your data modem.

The final drawback with a fax/modem is disk space. If you need to keep copies of your faxes for legal or other purposes, and especially if you receive a lot of them, you will find that they use a fair amount of disk space. You will either have to plan for this, or be prepared to store old faxes on floppy disks.

Quick Guide for Data Communications

This section will cover the following areas and try simplify your software options.

- ❖ General Discussion on Communications Software
- ❖ Your Data Communications Guide
- ❖ Macintosh Data Communications Software
- ❖ Data Communication Utilities

General Discussion on Communications Software

You will have to use your software to set up the Baud rate, configure your modem, and make the data connection. So, you need software that you are comfortable with, which could easily be none of the packages available. (In that case, you will have to go with the one that is the least uncomfortable.)

There are three parts that are absolutely necessary for a communications package to work: One part is setting up the communications parameters for your modem, another is configuring your terminal display, and the third is the terminal itself. Now, if you're new to data communications, there are additional terms used here that will be new to you.

All of the basic terminology, as it relates to modems, is discussed in the foregoing. What you need now are those terms that are used in conjunction with communications software.

Software Terms and Protocols

Table 12.3 lists the terms you need to understand in order to be able to set up your communications software and make it do what you want it to.

Table 12.3 Data Communication Terms

THE WORD	THE MEANING
8th Bit	When communicating in modes that do not ignore the size of the byte, meaning that they use stop bits, you will want to strip the 8th bit from every character you send. This makes it easier for different error-correction protocols to process your data, and it is usually a default setting.
ASCII	ASCII stands for the American Standard Code for Information Interchange, and it is used as the acronym for the representation of numbers, characters, and control characters used in data or digital communications. There are 128 characters in the ASCII standard set and 256 in the extended set. Your modem manual or your software manual should have a chart of the ASCII set. There is a direct relationship between the 128 characters and the number of bits per byte your modem and communications package are using. The number of bits per byte can be represented as 128, being equal to 2^7, which is the maximum number of character representations for a 7-bit byte, while 256 equals 2^8, or the total possible for an 8-bit byte.
Auto Wrap	Auto Wrap is an option you have when receiving text that exceeds the number of columns you have set for your terminal. Your options will include whether to have a line feed and carriage return placed at the end of each line as it is wrapped.
Binary	Binary is the standard (for the non-Macintosh world) format when transferring data. It is in contradistinction to MacBinary.
Capture	Capturing saves the data that you are receiving on your terminal to a text file as you receive it. You can open the capture file and read it at your leisure.
Carriage Return	This term is a holdover from the days of typewriters (Remember them?). It now refers to the ASCII character that tells your terminal or word processor

(continued)

Table 12.3 Data Communication Terms *(continued)*

THE WORD	THE MEANING
	to start at the beginning of the next line when combined with a line feed. If you use a carriage return by itself, your terminal will just move the cursor back to the beginning of the row it is on and will not start a new one.
Columns	In data communications, a column is the space used by a single character. The standard column setting is 80, meaning that your terminal will display 80 characters across. You will often have to tell the host how many columns you want displayed. If you are capturing data that you want to move to a spreadsheet or database, you may need to use a column width of 132 to 180.
Control Character	A control character is an ASCII number that represents a nontyping control code, such as a carriage return or a tab. The ASCII number for a carriage return is 013, while the number for a tab is 009.
CRC	Cycle Redundancy Check or checksum. This method adds the number of bytes in a data string. The receiving computer performs the same calculation and checks the results against the number transmitted. If they are not the same, an error has occurred. This is the fundamental procedure for all error detection and correction protocols.
Display Buffer	This is an area where data that has scrolled off of the terminal's screen is kept. You can usually define the size of your display buffer, which enables you to go back and look at messages that have come and gone. Using a display buffer can save you time, because you will not have to ask for data to be retransmitted.
Echo	Setting the echo on for your terminal, which means that it will display each character as you type it. If you are using a full-duplex modem, it will usually echo the characters you type so that you do not have to set the *local* echo. However, if you have a synchronous connection, you will need the local echo turned on to see what you are typing and sending to the host computer. Most asynchronous connections will echo what you type so that the local echo can be turned off. Echo is also the term used when you have data that you receive sent directly to your printer and printed as you are receiving it; this is called a printer echo.
Host	The host is the computer you are having the communications session with. You are the remote computer if you initiated the contact.
IBM PC/ANSI	Terminal configuration that will use the ANSI standard for displaying text and graphics.
Kermit	This is a special file transfer protocol to send 8-bit data while using a 7-bit environment. It is used primarily in government and universities. It has error correction and the ability to send multiple files.

(continued)

Table 12.3 Data Communication Terms *(continued)*

THE WORD	THE MEANING
MacBinary	This is a special binary protocol that allows a Macintosh file to be transferred so that it retains all of its file information, such as Creator and Type. It will also keep the data and resource forks separate. If you receive files that are not in MacBinary format you will have to convert them to MacBinary format, to use them on your Mac. Similarly, if you are using an MS-DOS machine to receive Macintosh files, the files you receive will not be in MacBinary format.
Packet	A packet is a group of bits or bytes that are looked at as a complete unit. Data transfer protocols use packets of varying sizes up to 1,024 bytes to speed up data transmissions.
Remote	The remote computer is the computer that initiates the contact.
Row	A row is a line of text as it is displayed on your terminal. You can set how many rows of data you want displayed, and you will tell the host computer how many rows to send before it waits for you to tell it to send another set. Each set of rows is often referred to as a screen.
Scripts	A script is a macro that can be used to automate the log-in process. Some packages will let you automate your entire communications session by using scripts. If the package you are using has a powerful scripting language, you can actually use it to create your own special-purpose communications application.
Terminal	Generic term for the window that will display what you type or any text you receive during a communications session. Your terminal can be set up to interact with other computers, which also means that your keyboard will be remapped to conform to whatever the host computer requires.
TTY	Abbreviation for TeleType. This is the term used to describe a basic terminal configuration.
VT 52 thru VT 320	These are designations for different terminal emulation configurations. They are primarily used with DEC (Digital Equipment Corporation) computers, also known as VAX computers.
XMODEM	A data transfer protocol for sending either text or binary files. It was one of the first protocols to include automatic error checking and correction during the data transfer.
YMODEM	An extension of XMODEM. Its added abilities include sending multiple files, as well as the files names and sizes.
YMODEM-G	This is a variation on the YMODEM protocol that sends files in rapid bursts without error correction. If an error occurs, the transfer is terminated, making it suitable only for error-free connections.

(continued)

Table 12.3 Data Communication Terms *(continued)*

THE WORD	THE MEANING
ZMODEM	ZMODEM is the latest in data transfer protocols. It works like YMODEM-G, except it can retransmit data that has an error. If the transmission is interrupted, it can resume where it left off. This is the protocol to use with the V.42 bis modem.

Your Data Communications Guide

This section will guide you through a simple terminal session for logging on to a local bulletin board. Since using BBSs or commercial services are probably the primary activity you will perform with your modem, this might take some of the pain out of the process. This section will go through the steps of configuring your software, automatically and manually dialing into the BBS, the log-in procedure, and logging off. It will also demonstrate the same procedures using the Macintosh Communications Toolbox. The steps are:

- Your communications configuration
- Your terminal configuration
- Logging in and signing on
- Logging off and hanging up

Your Communications Configuration

Before you can begin, you need to tell your Macintosh what type of modem you're using, its speed, where it is connected (serial or printer port), and all of the other information shown in Figure 12.1. Figure 12.2 shows the settings using the Macintosh Communications Toolbox (MCT). In both figures, you will see that the Baud Rate, Data Bits, Parity, Stop Bits, and Flow Control are set here. Each allows for the specific modem selections—in this case, a Hayes modem—even though the modem being used is a Maxlite 96-144 pocket modem made by Macronix, Inc. This model is Hayes-compatible and will work with this configuration.

Before you start, you should know what Baud and other communications settings you need in order to connect to the host computer. Regardless of what your modem is capable of, you must match the setting of the terminal you are contacting. The Flow Control is set to XON/XOFF because the modem does not have a hardware handshaking cable attached and the MCT does not support hardware handshaking in this configuration. (It would if the Hayes Modem Tool had been used instead of the Apple Modem Tool.) If you are going to use a high-speed modem, make sure you are using the modem port.

In Figure 12.2, you will also see that the MCT settings include the phone number you want to dial, how many times and how often to retry the number, and whether to auto-answer the phone. The other setting is for pulse or tone dialing. (Under

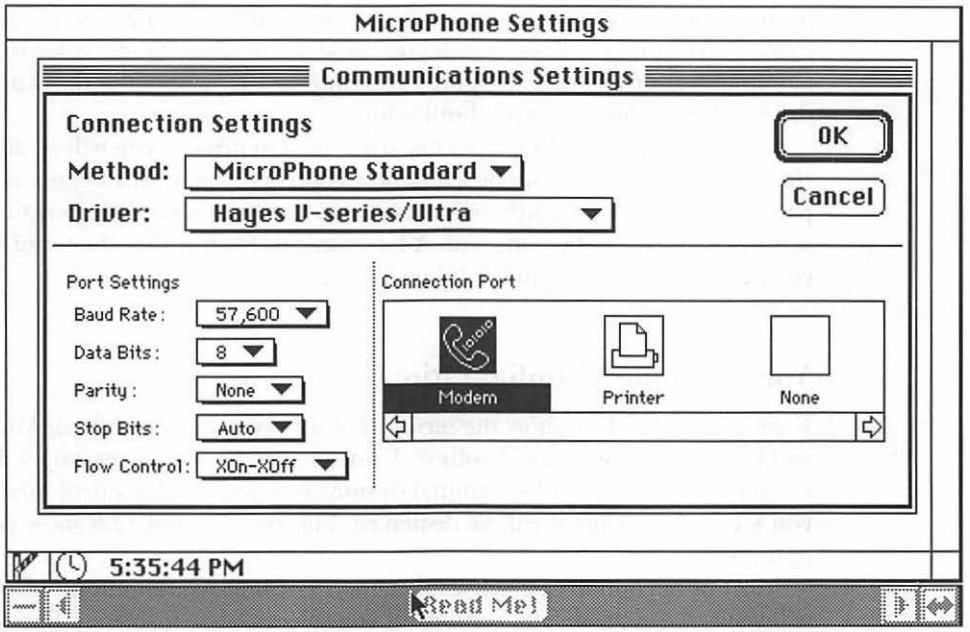


Figure 12.1 *Communications settings in MicroPhone II.*

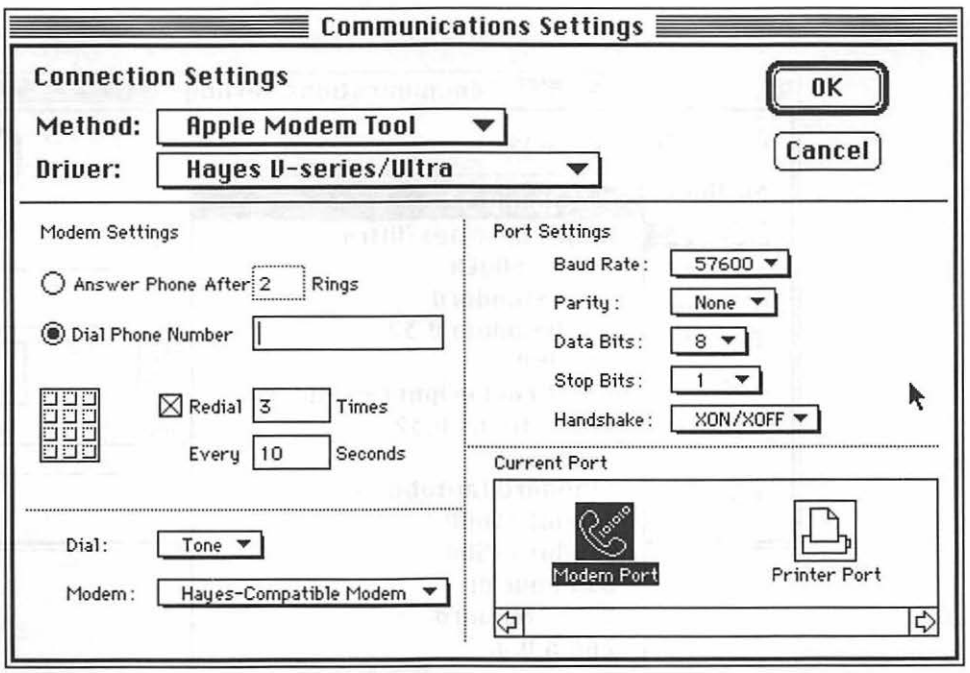


Figure 12.2 *Communications settings in the Communications Toolbox.*

most circumstances, you will want to use tone dialing.) You will have to select the modem driver that will work with your modem in MicroPhone or for the Communications Toolbox. Figures 12.3 and 12.4 show some of the different modem drivers that are included with both setups.

If your software package does not have modem drivers, you will be able to set only the basic Baud, parity, stop bits, and flow control settings. Most communications packages allow for this, although sometimes they are preset. The remainder of your settings will have to be done with AT commands from within the terminal. This procedure will be discussed in the following section.

Your Terminal Configuration

Figures 12.5 and 12.6 show the terminal options you have with both MicroPhone and the Communications Toolbox. Under most circumstances, you will want to use the TTY setting. The terminal options you select will control how the data you see in the terminal will be displayed. Figures 12.7 and 12.8 show your basic options.

Most of the options are self-explanatory. For basic communications sessions, you will want to use the default settings. If you select Delete instead of Backspace for the Backspace key you will probably be a bit happier with the session. It is always disconcerting to hit the backspace key, and not have finished before the cursor disappears. For the example, the settings will remain at their defaults.

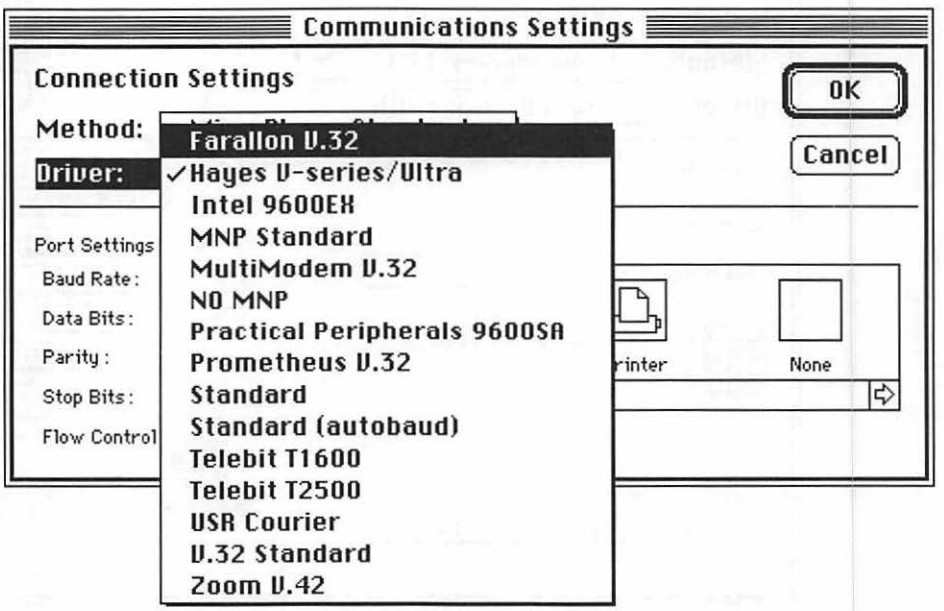


Figure 12.3 *Modem selections for MicroPhone.*

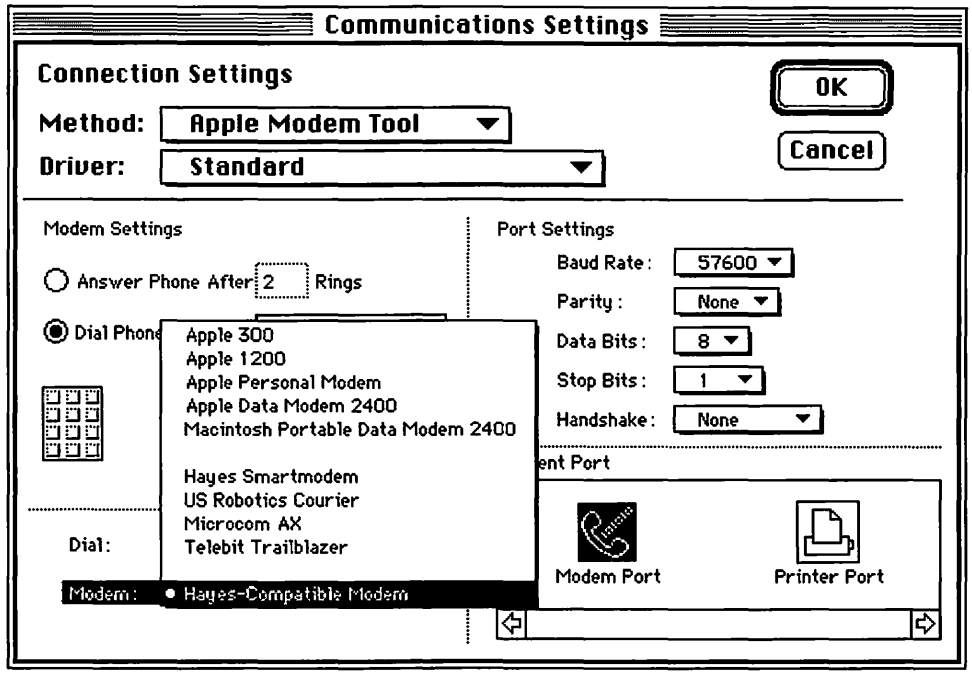


Figure 12.4 *Modem selections for the Apple Modem Tool.*

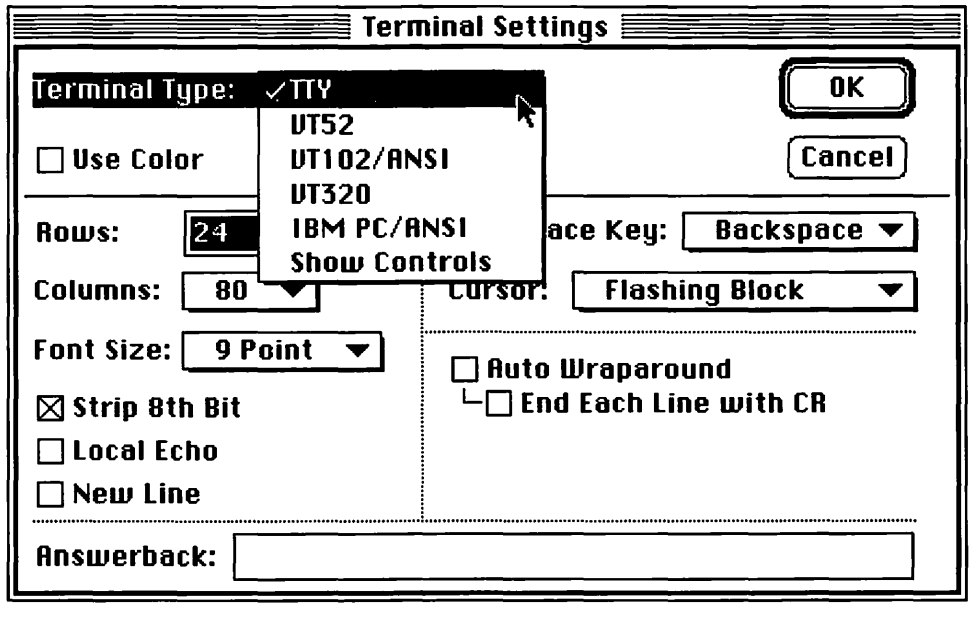


Figure 12.5 *Terminal options in MicroPhone.*

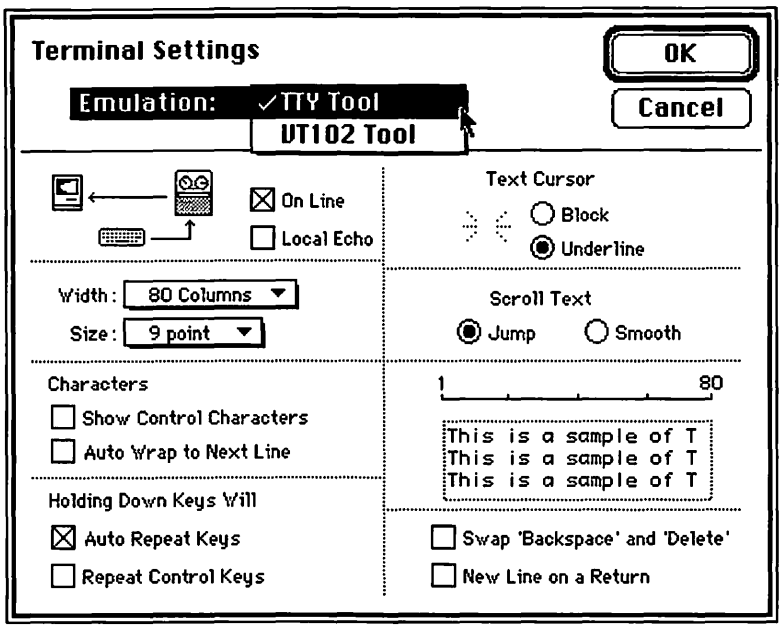


Figure 12.6 *Terminal options in the Communications Toolbox.*

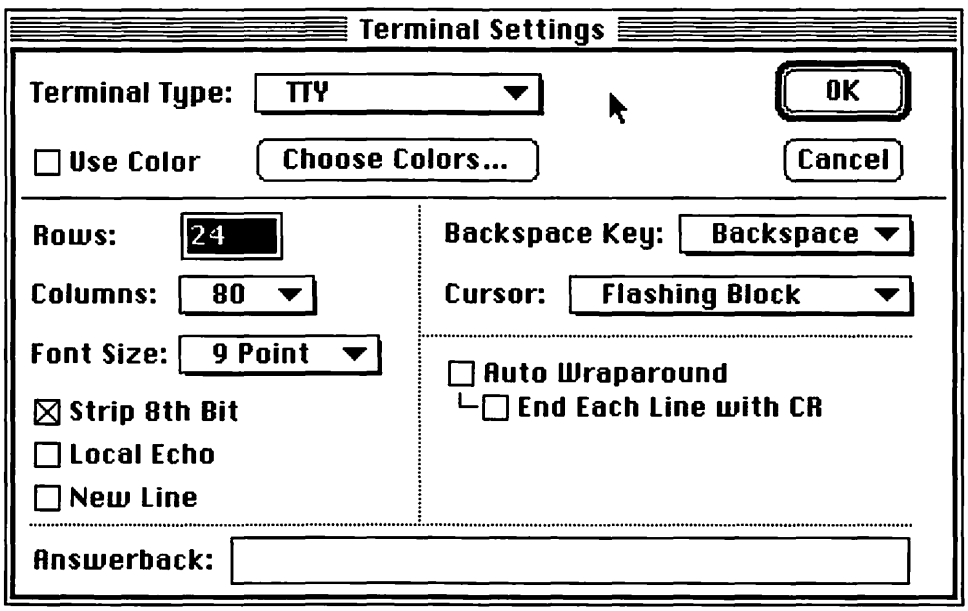


Figure 12.7 *Terminal settings in MicroPhone.*

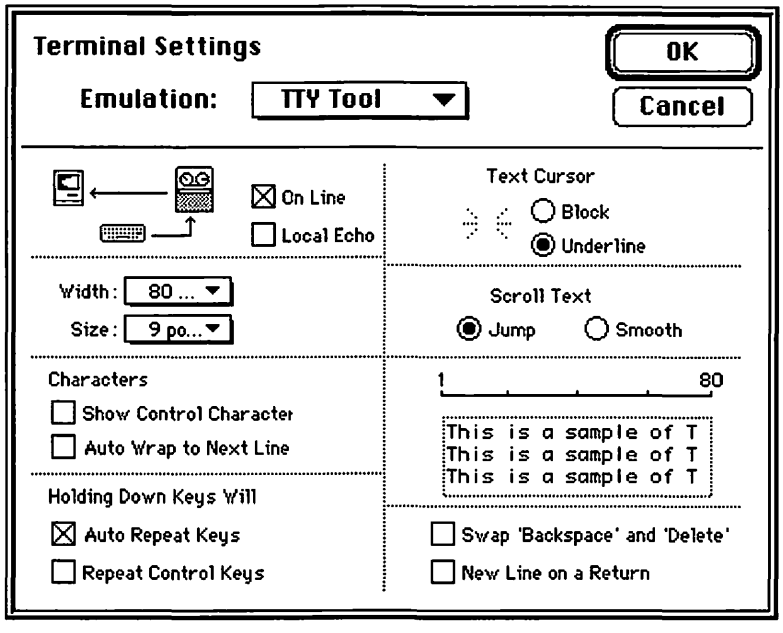


Figure 12.8 *Terminal settings in the Communications Toolbox.*

Dialing In and Signing On

There are several steps involved with dialing in and signing on to a BBS. First, you have to initialize the modem; then you have to dial the number; finally, you will have to perform the steps required by the host computer to sign on.

Initializing the Modem—Figure 12.9 shows the AT commands that MicroPhone uses to initialize the modem. This prepares the modem to use all of its features. If you have to enter this data by typing it into your terminal package, make sure you use the proper AT commands from your modem manual. If you enter the AT commands by typing them in the terminal, AT is used to tell the modem that you want to send it information directly. You can enter an AT command up until the modem has started dialing; once a communications session has started, you will not be able to send commands to the modem unless you first send it the escape sequence. This will most likely end the session as well.

The Communications Toolbox initializes the modem automatically as it dials your number. You cannot send any special AT commands with the communications toolbox other than those entered into the modem initialization field.

Dialing the Number—Now, you are ready to call the BBS. If you are using MicroPhone, you can enter the number of the BBS by creating a New Service from the Phone menu, as shown in Figure 12.10. If you are using the Communications Toolbox, the number can be set while in the Connection window (see Figure 12.2). There is usually an option to Open Connection in programs that use the Toolbox, which will prompt you for the phone number.

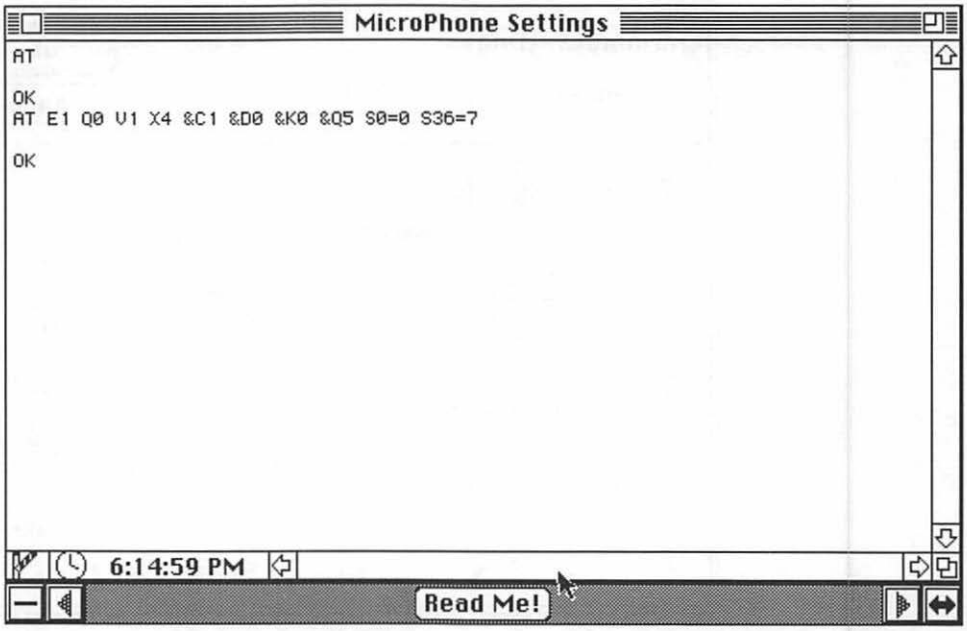


Figure 12.9 *Initializing the modem.*

Should your communications package not contain these niceties, you will have to use an AT command to dial your number. The AT command to dial a number is commonly ATDT 18005551212. (Don't be literal with this number, or you will get directory assistance). If you have call-waiting service on your line,

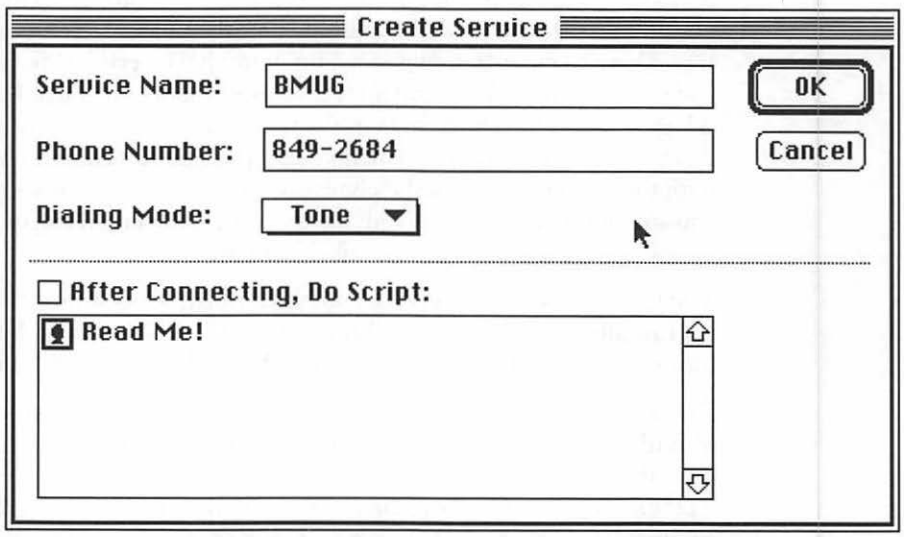


Figure 12.10 *Creating a service in MicroPhone.*

you will have to turn it off before dialing in. If a call comes in while you are connected to the host, call-waiting will most likely disconnect your session. In most areas, you can disable call-waiting for the duration of the phone call by entering "*70," before the phone number. In this example, *70 disables the call-waiting, and the comma tells your modem to pause for two seconds before executing the rest of the dial command. If you are entering the commands from your terminal, your command might be ATDT *70, 1800-555-1212. The modem will ignore all spaces and hyphens in your command. If you have to dial 9 to get an outside line, you would enter "9," before the phone number. If you have several numbers to dial, enter those and put a comma after any number that would cause you to have to wait before continuing if the wait is longer than two seconds; use as many commas you need to make the connection. The AT command will be executed when you press the Return or Enter keys if you are doing it by hand. In MicroPhone, just select the service you want from the Phone menu.

Logging On—Unless you turned off the speaker, your modem is going to make a racket once you dial the number. To begin with, you should probably leave the speaker turned on, which can be annoying, but it is another way to tell if everything is going according to plan. You will hear the modem dial, hear the other phone answer, and then you'll hear the *negation process*, where the two modems shriek at each other until their shrieks kind of merge and a connection is made. Then, the modems will shut up. Be sure you have the correct number. If you don't, you might dial a wrong number early in the morning and hear a sleepy voice answer the phone as your modem screams computer obscenities at the poor soul.

Connected—After the host's modem answers your modem, your modem will display the connection speed for the session, and you will have to log in. Figures 12.11 and 12.12 show the connection and the log-in process. You will have to give your name and whatever other personal information the service asks for; you will then be asked to enter a password.

On most BBSs, you will have to be validated, meaning that your membership may be checked, the information you provided during the initial log-in process scrutinized, or the Sysop (System Operator) may want to validate you. If nothing else, validation will be a process where you are given access to certain areas of the BBS. Once you are on, there will be messages and miscellaneous information, and then you will be able to go to the areas you are interested in. You might want to read the messages, check your mail, or download files. This is where your fun begins.

Playing Around, Logging Off, and Hanging Up

Now that you are connected, you can explore the BBS; there is no telling what you will find. If it is a special-interest BBS, you may want to talk to the people who use it,

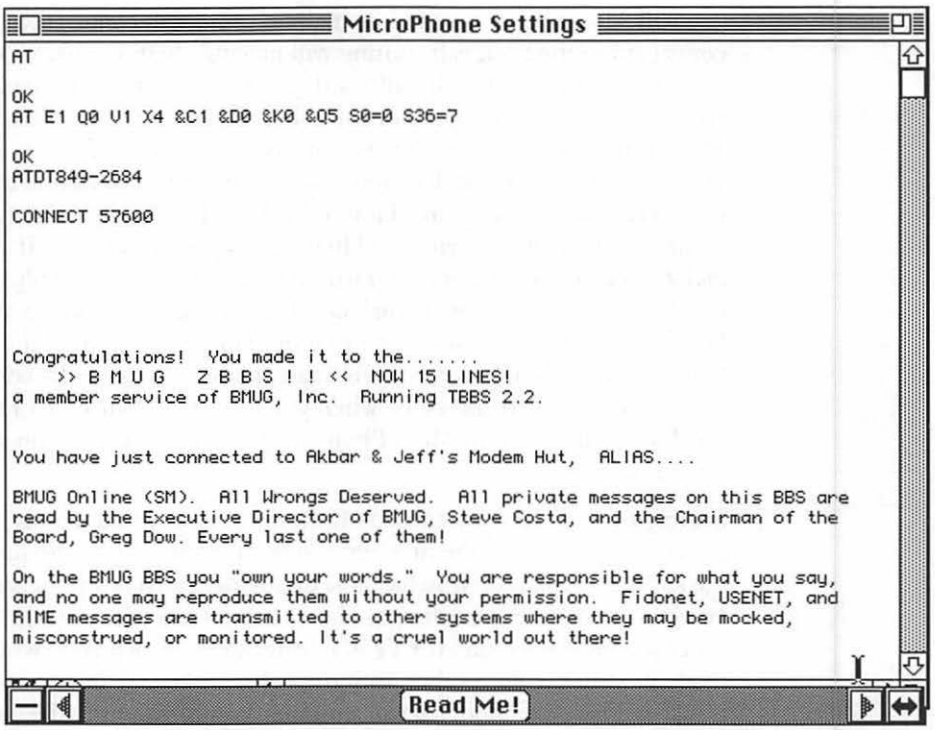


Figure 12.11 *The initial log in.*

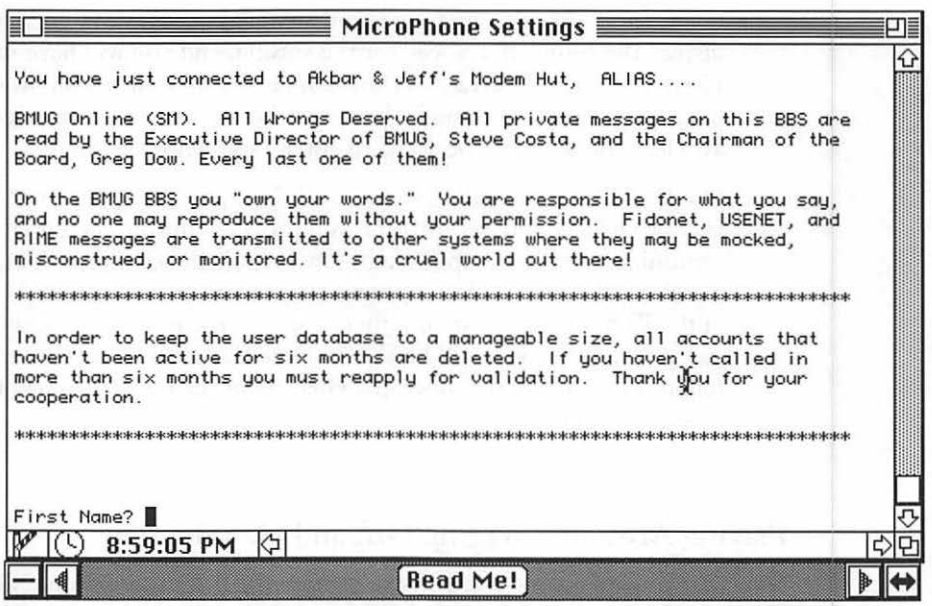


Figure 12.12 *Signing on.*

leave messages, or enter into ongoing debates. This is the land where you meet new and interesting people; what you do with it is up to you.

One of the things you will probably want to do is download files. In addition to showing you how to log off and hang up your phone, this section will briefly cover downloading files.

Downloading Files—This is a wonderful way to get shareware, freeware, or demo software. First, find your way to the file area and browse. Once you have found a file you want to download, select what protocol you want to use. If you have a halfway decent communications package, you will have some choices. If not, you may have to use XMODEM or, preferably, ZMODEM.

When using ZMODEM, MicroPhone will automatically receive the file. When using the Communications Toolbox, you can use XMODEM only for your file transfers. Figure 12.13 shows the status window you will see when you perform a download. Any communications package will give you a status window of some type. If possible, the amount of time required for the download will be displayed so that you know if you have time to take a break before the process is completed. Once you have your file, you can go on about your business.

Logging Off—When you are finished, you need to log off the host computer and hang up your modem. Logging off the host computer is easy: Just enter in the appropriate command. Figure 12.14 shows the final log-off from the sample session. After you have left the host system, your modem should tell you that the connection is broken, as shown in Figure 12.15.

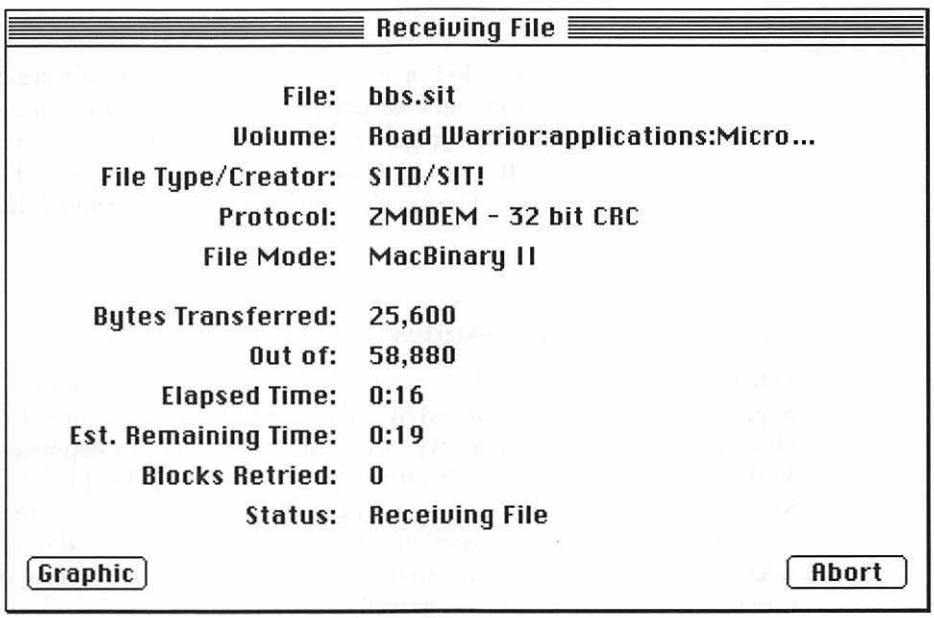


Figure 12.13 *A download status file.*

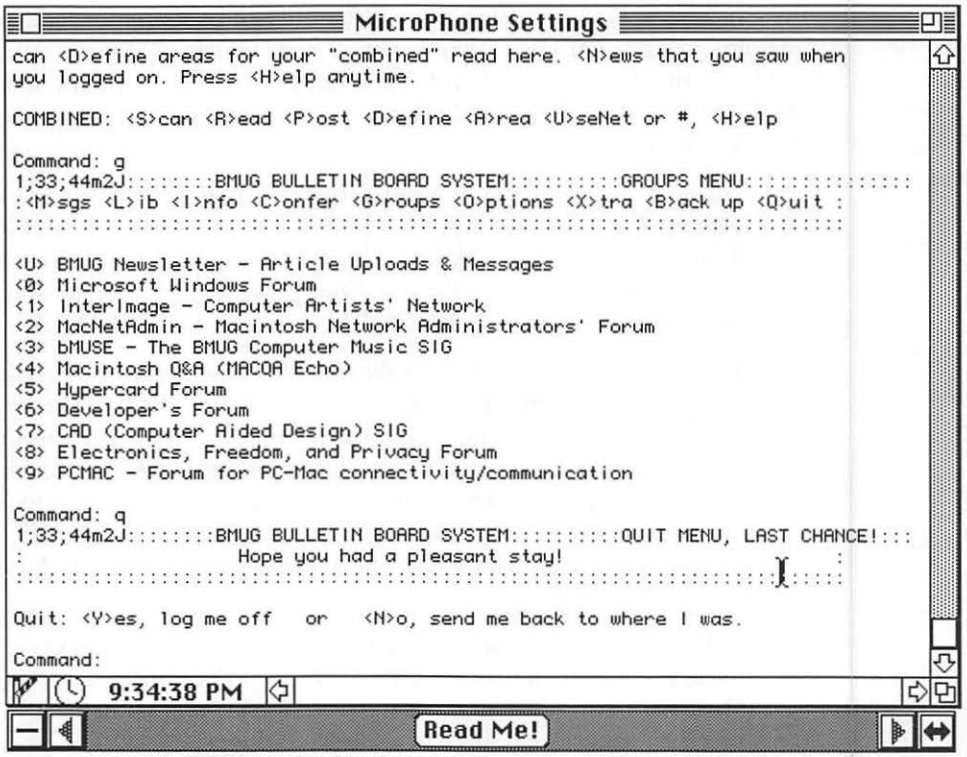


Figure 12.14 *Logging off.*

Now, all that is left to do is hang up your phone. Most software has a menu selection that will hang up your phone, but if you have to do it manually, type in the escape sequence to regain control of your modem. The standard escape command is +++. After you type the escape command, type ATH0, which hangs up your phone. Figure 12.16 shows what your terminal should look like after hanging up.

Courtesies and Suggestions

When you participate on BBSs or use online services, there are some courtesies and implied rules that have developed over the years. One rule you might want to observe is to be sure you don't type with your Caps Lock key depressed. WHEN YOU DO THIS, IT GIVES PEOPLE THE IMPRESSION THAT YOU ARE SHOUTING AT THEM. If you are joking but want to make sure the other person understands, the following notation is often used :). It's supposed to represent a sideways smiley-face. You can also use ;) to indicate a wink. You can, of course, use the standard punctuation marks as well.

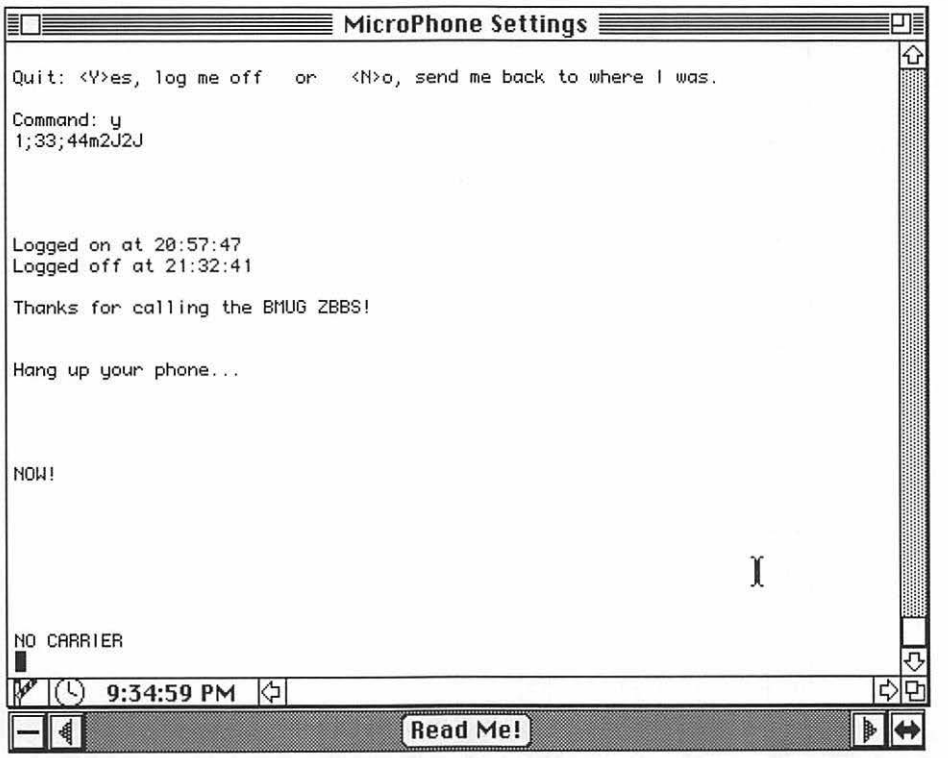


Figure 12.15 *Your session is finished.*

Going online and exploring can be like entering a foreign land or joining a club where they have a secret handshake that you have to figure out. Take notice of what others do; it is kind of like watching the host or hostess at a formal dinner.

Compression Utilities

There are only a few data compression utilities that are widely popular: Stuffit, Stuffit Deluxe, and Compactor. Although they all perform the same basic function, they do it in different ways and are not necessarily compatible.

Archived files usually have an extension added to the filename. Compactor files have .cpt as an extension, and Stuffit files usually have the extension .sit. The other extension that some Stuffit files can have is .sea, which stands for self-extracting archive. These archives are programs that you double-click to extract, so you do not need to run the utility program. The use of extensions help identify what type of archive you are working with.

Stuffit Deluxe—This is the most comprehensive of all available compression utilities. The original author of Stuffit, Ray Lau, wrote the program while in

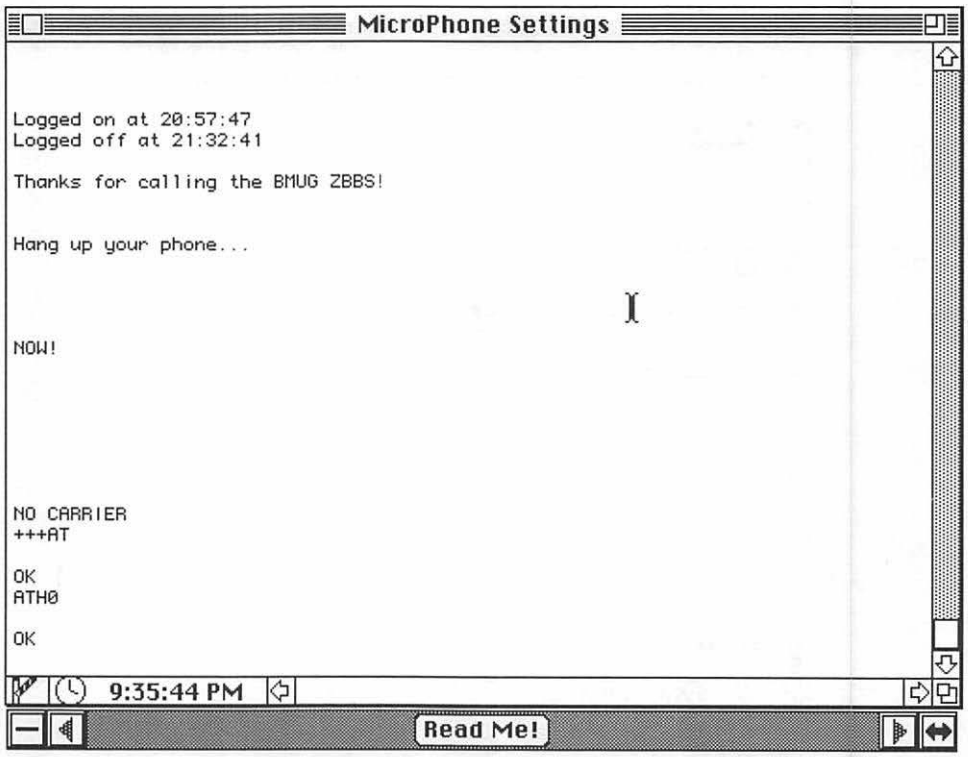


Figure 12.16 *After hanging up.*

high school. He distributed it as shareware and is one of the shareware success stories. For several years, Stuffit was the only standard for data compression.

Stuffit Deluxe is the latest incarnation of the original Stuffit. It is System 7-friendly and will decompress a variety of different archive formats, including those for MS-DOS machines and UNIX formats. Figure 12.17 shows the basic working window for Stuffit Deluxe.

Stuffit Deluxe also comes with a useful utility called SpaceSaver, which will automatically compress files that have not been used for a predetermined amount of time (see Figures 12.18a and b). It works in the background and is an excellent utility.

Stuffit Lite 3.0—This is the latest version of the shareware version of Stuffit. It is System 7-compatible and can be accessed via Apple Events, so it can be used with Frontier or QuicKeys (Deluxe is also Apple events-aware). Figure 12.19 shows the file downloaded in the example above ready to be extracted by Stuffit Lite. Stuffit Deluxe and Stuffit Lite are published by Aladdin Systems, Inc.

Compactor—Published by Bill Goodman, Compactor is emerging as a new standard for data compression and is extremely easy to use. It is distributed as shareware and available on most BBSs and online services.

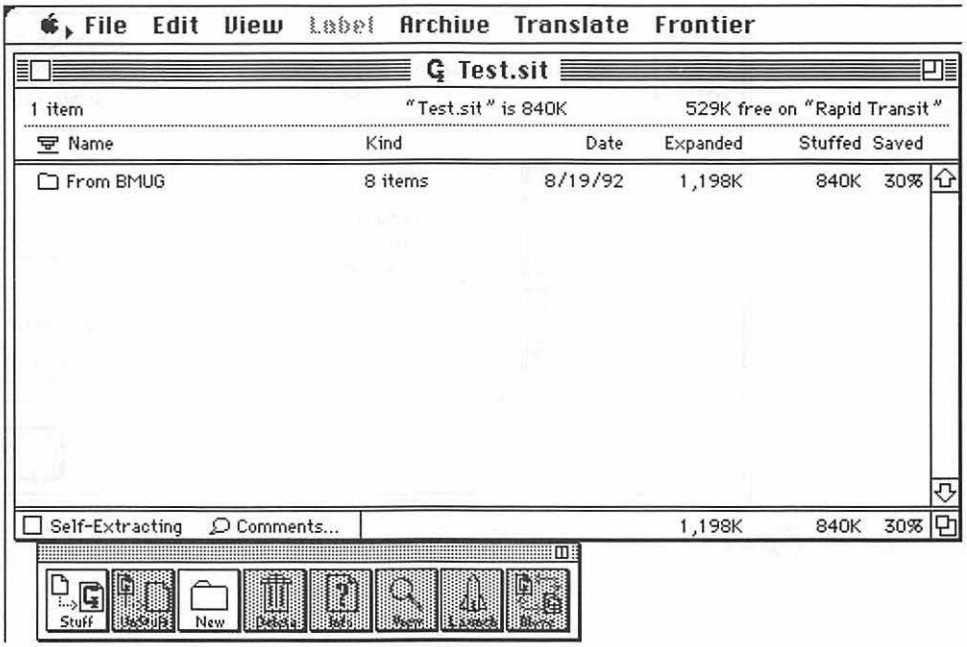


Figure 12.17 *Stuffit Deluxe's main window.*

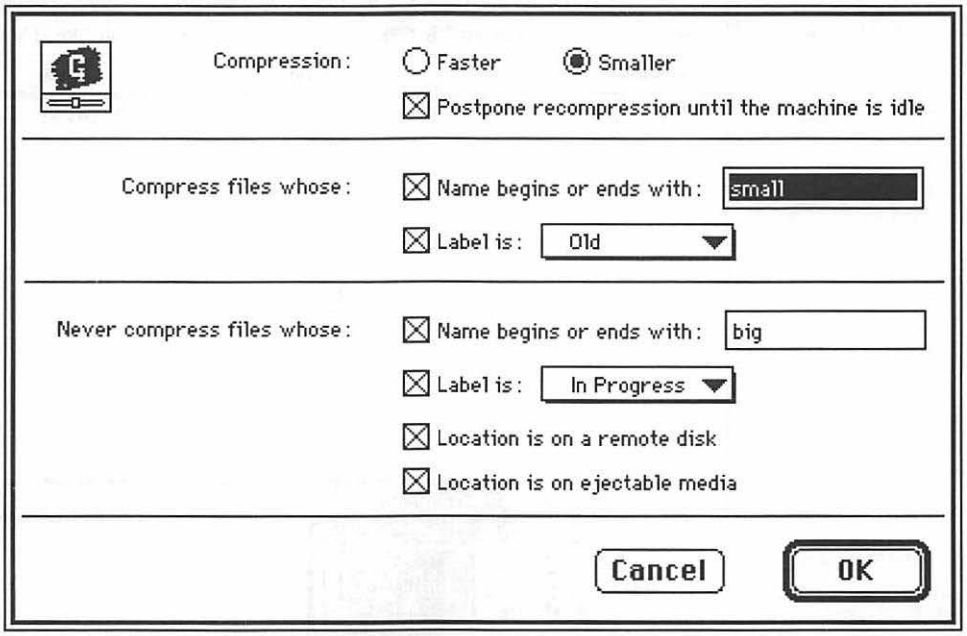


Figure 12.18a *Stuffit SpaceSaver's control panel.*

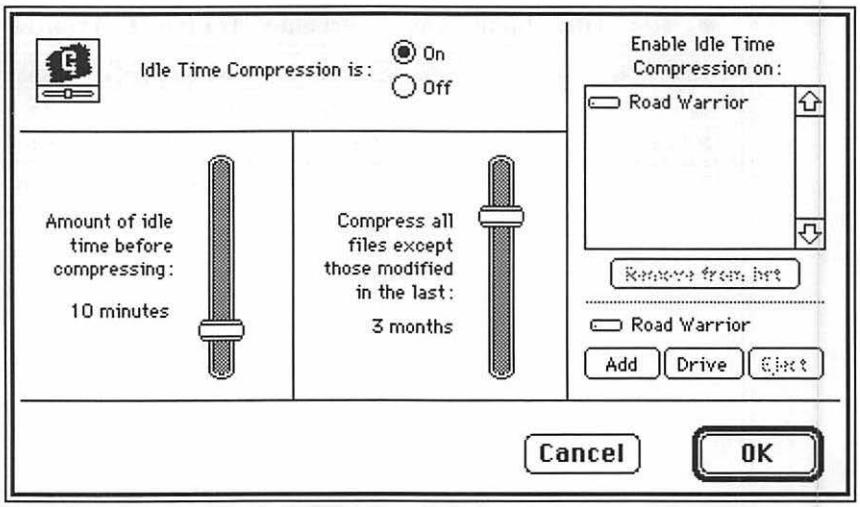


Figure 12.18b *Stuffit SpaceSaver's control panel.*

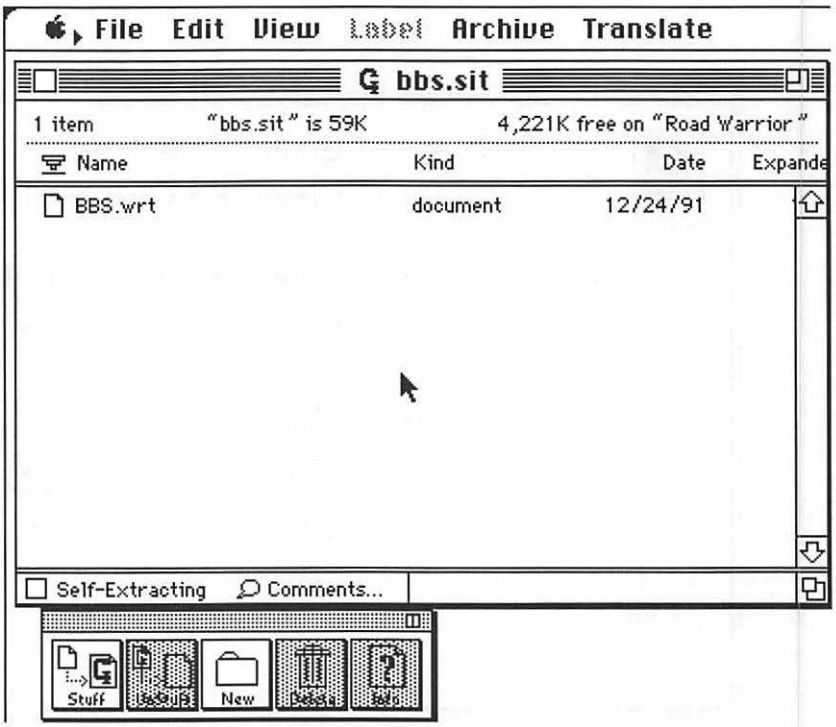


Figure 12.19 *Stuffit Lite's main window.*

The Internet

By now, everyone has heard about the Internet—a collection of networks that span the globe. With your modem and a service provider, you can communicate with people the world over. There is so much to the Internet that this small section won't even begin to do it justice, must be mentioned when talking about data communications.

Although we're going to look at only four attractive aspects of the Internet, there is much more that could be discussed. If what is written here sparks your interest, you might want to pick up Paul Gilster's book, *The Internet Navigator*, published by John Wiley & Sons.

This section will look at the following:

- Internet E-Mail
- Newsgroups
- World Wide Web
- Different Types of Accounts

Internet E-mail

With an Internet account, you can send and receive mail to anyone who has an Internet mail address or who has an account on any of the services mentioned in the last section. Because the Internet spans the world, you can easily communicate with people in almost any country. As this book is being written, each chapter is sent to my editor in New York via the Internet.

E-mail is really the backbone of the Internet and the primary reason it exists. In the beginning, the Internet was used so that scientists at universities could communicate with each other. And the U.S. government used it so that defense contractors, the military, and other branches of the government could communicate. Now it is a primary tool of business, education, and government. If you have access to the Internet, you can send e-mail to the president of the U.S., business contacts, and others who have accounts.

Newsgroups

On the Internet, you can find forums—called *newsgroups*—about any interest you might have. If you want to exchange messages with like-minded people, you will find a place to discuss topics as diverse as German usage of Macintosh computers. Actually, discussions about Macintosh computers are divided into topics about applications, System software, hardware, and portable Macs, just to name a few.

All in all, there are more than 7,000 newsgroups that you can access. Although no service provider can provide access to all 7,000+ newsgroups, you can easily subscribe to 100 or more—if you have time to read all of the correspondence. Newsgroups are an excellent way to keep up with current developments in an industry or your favorite hobby. There are several newsgroups devoted to bicycling, literature, computers, and

other subjects. Although a large number of the newsgroups focus on computer technology and academic subjects, there is something for everyone. Most metropolitan locals have several newsgroups for their area, where people talk about things going on in town, sell all kinds of items, and have other discussions.

World Wide Web

The World Wide Web is a function of the Internet where you can search for information using hypertext, a process where key words are linked to other documents or parts of a text about similar subjects. With the World Wide Web, you can hopscotch around the world looking for and finding information about everything from law to archaeology. The World Wide Web is set up using a series of World Wide Web servers and is usually run by businesses or universities, but commercial interests are using the World Wide Web to sell their products and distribute information.

The World Wide Web is the one service on the Internet, besides e-mail and newsgroups, that is getting everyone excited. This is because almost every Internet service provider is capable of setting up a World Wide Web server and letting you and me make our own World Wide Web pages to distribute whatever type of information we want (as long as it is legal).

If you know someone with an Internet account, have them show you the World Wide Web—you just might get your own account.

Different Types of Accounts

Two years ago, you couldn't get onto the Internet unless you were a student or faculty member at a university, or unless your company gave you an account. Today there are service providers who, for very reasonable rates, will provide you with an account.

There are two types of accounts you can have: One is a dial-in account, where you use your modem to log in to a host computer from which you get all of your e-mail and access the other services of the Internet. The other type of account is called a SLIP (Serial Line Internet Protocol) or PPP (Point to Point Protocol) account. The SLIP/PPP accounts let your computer become another node on the internet and, rather than access the Internet services via a host computer, you access them directly from your computer.

All of the services are brought directly to your Mac and you will use special programs to access the various services. On the CD-ROM included with this book, you'll find several programs for use with the Internet. There are utilities for both dial-in and SLIP/PPP accounts. To find a service provider in your area, check with your local Macintosh Users Group.

Summary

You now have enough information to participate in the world of data communications. In a sense, it is a step into virtual reality. You can get to know people and discuss with them anything under the sun—without ever seeing or actually speaking to them.

Communicating in this manner means that prejudices and visual impressions do not apply. You will experience a new way of communicating that may take a while to get used to, but you will become more adept at expressing yourself without hand movements and facial expressions.



CHAPTER 13

Networking for the Beginner

Introduction

Unless you have more than one Macintosh, or work in an office environment where there are other Macs, you'll probably want to skip this chapter. Don't. This chapter is about connecting your Macintosh to other Macs, but it also contains information about your Mac that you'll need later on. Besides, it is also a subject with which you should be familiar because there is a good chance that, at some point in the future, you'll want to connect your Mac to other Macs.

Connecting your Mac to other Macintosh computers can be a central part of using your Mac. This is one of the easiest ways of sharing data with other Mac users, and there are programs that take advantage of this capability to facilitate communications with an office environment.

In this chapter, you'll find basic information about connecting and using your Mac under these circumstances. It is eminently practical, and you'll find the information you need to successfully connect your Mac to other Macs to share data without having to learn an entire lexicon of esoteric terms. The topics that are covered are:

- What a Network Is
- Connecting Your Mac
- Using the Network

What Is a Network?

A network, in the simplest sense, is connecting two computing devices together. However, the term really means more than just establishing a simple connection. A network means connecting a few computers to many so that they can share peripheral devices and data, and exchange information. Everything shared by networked computers is called shared resources.

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.

The simplest Macintosh network is one that connects your Mac to a PostScript LaserWriter. As soon as you have done that, you have created a network. If you have several people in your office, and their Macs are connected a LaserWriter, your office has a network. Once you have connected a Mac and a PostScript LaserWriter, you have a **LAN** or a **Local Area Network**. (The term LAN usually means more than just one Mac and the LaserWriter, but, technically, you have a LAN with just your Mac and these devices connected.) Figure 13.1 shows a basic network.

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.

LAN is the acronym used to describe a single network and all of the devices it contains for one, *Local* physical location. The connection of all these different devices in such a way that they can send data between the different machines or share common *network services* or *resources* makes it a LAN. If , for instance, your office has several Macintoshes, a couple of LaserWriters, and one very stubborn person who refused to give up his or her DOS machine all connected together, you have a LAN.

To have a network, you need three basic components—the physical connection between the computers (cabling), hardware in the computers to utilize the connection, and the software that makes the connection operate. Your Mac has networking software and hardware built into its ROMs and System. All you need to provide is the cabling.

In environments where users have networked their Macs, they are not often concerned with the terminology associated with a network and couldn't care less that the network is called an AppleTalk network. The cause of this apathy is due to the fact that it doesn't matter if you know the technical nomenclature. However, all Macs,

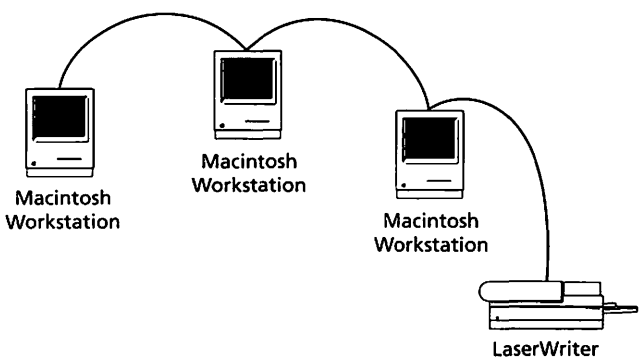


Figure 13.1 Diagram of a basic network.

when networked, constitute an AppleTalk network. AppleTalk is the name of the networking protocol employed by all Macs.

Protocol: Short for *communications protocol;* a formal set of rules for sending and receiving data on a communication line. For example, binary synchronous communications (BSC) is a protocol.

Protocol is a word you'll find used at different times, and one that you should know if for no other reason than to impress your friends. However, when talking about networks, protocol simply defines the software that the computers are using to communicate with each other. Because Macs use only one software protocol, most people never learn these little esoteric terms. Usually, in the Macintosh world, they will define their network by the cabling standard used rather than the software standard.

Another reason you should know about AppleTalk is so that you can determine whether a device will work on your network. There are several peripherals in addition to printers that you can connect to your network. Some of these peripherals are modems, scanners, and serial port sharing devices. All of the network devices are collectively refered to as AppleTalk-compatible or AppleTalk devices.

Connecting Your Macs

Apple has made all of its Macintoshes using a concept called *Plug and Play*, meaning that, for most connections—networks included—all you have to do is plug in the cables and the Mac is ready to go. Now, it's not really that simple, but almost.

Intro to Network Cabling

Every Macintosh ever built can be networked via its printer port. In addition to using the printer port, some of the newer Macs have a special network port called an Ethernet port. The physical network consists of the connectors and cabling that connects all of the Macs and the LaserWriter. There are three cabling standards commonly used for this task:

LocalTalk
PhoneNET
Ethernet

LocalTalk is the oldest cabling standard used for Mac networks and it is no longer sold. It consists of a connector called an AppleTalk connector and round cabling, about the width of a pencil, that linked each of the Macintoshes and the printer together. PhoneNET is a very close cousin to LocalTalk. PhoneNET uses PhoneNET connectors, using regular telephone lines for the cable that connects all of the networked devices.

LocalTalk connectors and cabling were made by Apple; PhoneNET connectors are made by a company called Farallon. PhoneNET is now the primary means for connecting all Macs together. It has proven so popular that even Apple has licensed

PhoneNET technology from Farallon, and sells PhoneNET connectors with the Apple logo.

Network connection A combination of hardware and software that lets you set up a particular implementation of the AppleTalk network system, such as LocalTalk or EtherTalk.

Ethernet is another wiring standard, which, unlike PhoneNET and LocalTalk is an industry standard for all computers—not just Macs. It is a bit more complicated than PhoneNET, and if you have an office where Ethernet is employed, your company will probably have someone who sets up and maintains the network. It is very unlikely that you would be expected to know about hooking your Mac into an Ethernet network.

PhoneNET or LocalTalk are low-speed networks, while Ethernet is a high-speed network. For now, it is enough to know what type of network cabling you're using (you'll sound like a genius). If your office has an Ethernet network, your company probably employs someone who takes care of it.

Cabling Mechanics

This section discusses how to physically connect your Macs with PhoneNET (or LocalTalk). The term *topology* is used to describe the physical layout of networking cables. In this section, we're going to look only at setting up a PhoneNET network using a daisy-chain topology. Although this sounds complicated, it is nothing more than connecting Macs with phone wire. Figure 13.2 is a diagram that illustrates a daisy-chain network.

Daisy chain **(n.)** A colloquial term for a group of devices connected to a host device, where the first device in the *chain* is connected to the host, the second device is connected to the first, the third device is connected to the second, and so on.

There is nothing complicated about using PhoneNET connectors for networking your Macs. Basically, all you need are connector boxes like the ones shown in Figure 13.3 and enough phone wire to go from one Mac to the next. There are two types of PhoneNET connectors shown in Figure 13.3. The PhoneNET connector is the

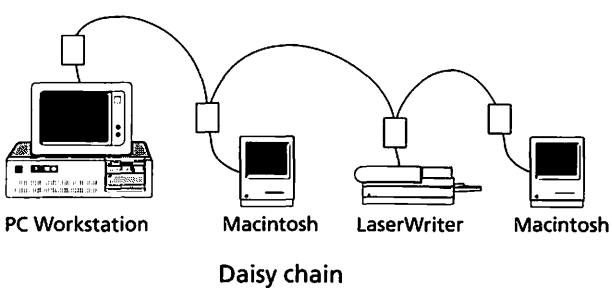


Figure 13.2 A daisy-chain network.

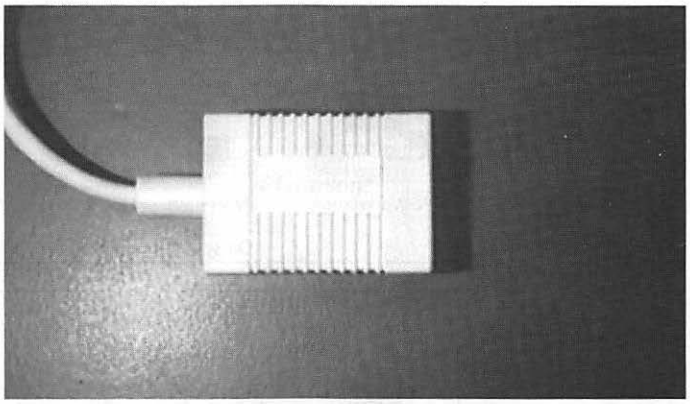


Figure 13.3 *PhoneNET connectors.*

most common connector used. The Star connectors are used only at each end of a network, or to connect two Macs or a Mac and a printer together. So, if you are buying connectors, your job will be easier if you purchase the standard PhoneNET connectors. You will need one PhoneNET connector for each Macintosh or printer on your network (you must make sure your printers are AppleTalk-compatible to use them in a network). The connector is plugged into the Mac's printer port, and then each Macintosh is linked to the next with telephone wire. Figure 13.4 shows how the phone wire is connected from one Mac to the next. At each end of the network (daisy chain), there is a small plug called a terminator in the open hole of the connector. The terminator is an electrical resistor that completes the connections for the network. The terminator is not always essential, but you should install one, regardless—you don't want to have to troubleshoot your network as soon as it is set up. A terminator is included with every Farallon PhoneNET connector. Once all of your AppleTalk devices are linked together, your network is complete.



PhoneNET Connector Clones

As mentioned earlier, Apple makes a connector just like Farallon's. There are also other companies that make PhoneNET-like connectors as well. All of the connectors that use telephone wire use the same technology and can be interchanged.

The reason there are so many companies using the same technology is because Farallon has a patent for its PhoneNET connector technology, and it licenses to other companies, Apple included, the right to make and sell similar products. Because everyone is using the same technology, all of these connectors are interchangeable.

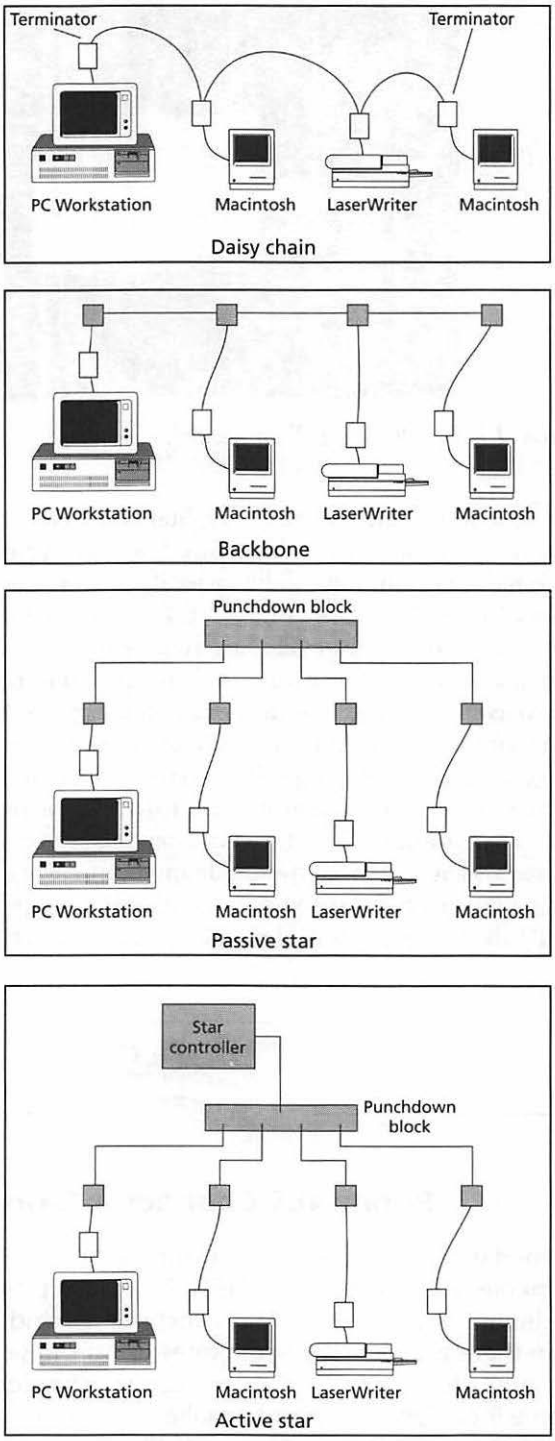


Figure 13.4 *How the network is wired.*

Troubleshoot To locate and correct an error or the cause of a problem or malfunction in hardware or software.

Using the Network

The previous sections provided some information on connecting your hardware to form a network. Now, it is time to look at using the Mac's networking capabilities and some more networking concepts. Unless you are using your network just so that several people can use a printer, your network will have a file server. The file server is a shared hard drive that holds files which can be shared with other Mac users on the network, which is one of the primary reasons for having a network. It is usually easier to put data that needs to be shared onto a file server for others to access than it is to put the data on a floppy disk and pass it around the office. If sharing data is something that has to be done regularly, a network enables everyone to work more efficiently.

File server (1) A specially equipped computer that allows network users to store and share information; (2) a combination of controller software and a mass-storage device that allows computer users to share common files and applications through a network. AppleShare software, Macintosh computers, and one or more hard disks make up a file server on an AppleTalk network system.

There are two basic types of file servers: One type is called *peer-to-peer* and the other is a *dedicated server*. A peer-to-peer network is one where any machine on the network can be a file server and a client at the same time, while a dedicated file server is a Macintosh that is set up to function as a file server only. Finally, you can have a mixture, where your network has a dedicated file server, plus users who are sharing files with System 7.X. Figure 13.5 illustrates both peer-to-peer file sharing and a dedicated file server.

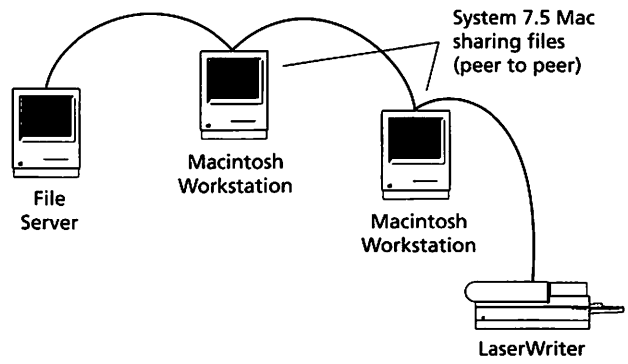


Figure 13.5 Three networks.

Client A computer that has access to services on a network. The computers that provide services are called servers. A user at a client may request file access, remote log-on, file transfer, printing, or other available services from servers.

Apple has provided every System 7.X user with peer-to-peer file sharing software, which is based on Apple's dedicated file server software, AppleShare. Whether you use System 7.X's personal file sharing or a dedicated AppleShare file server doesn't matter; your interaction with the server is the same. But, if your Mac is going to be a file server, then there are some things you need to learn—namely, how configure your system so that you can share files with other Macs.

System 7.X gives you the ability to use your Mac as a file server and to use the shared volumes from hard drives others have made available. (Using System 7.X's file sharing as a client or accessing an AppleShare file server employs the same procedures.) To use this capability, you will either have to have installed file sharing when you installed System 7.X, or you can install it now. If your Mac is new, file sharing was installed at the factory. But you should read the installation section, anyway; then you'll know how to install file sharing in the future should the need arise.

Volume A general term referring to a storage device or to part of a storage medium formatted to contain files; a source of or a destination for information. A volume can be an entire disk or only part of a disk. A volume has a name and a volume directory with the same name. Its information is organized into files.

If this is your first time using the System 7.X's file sharing, you might find it all a bit confusing; you have to become familiar with several control panels, the chooser, and some special functions of the finder. All of the file sharing controls are interconnected, and the order in which they are presented here is not set in stone. Like most things Macintosh, there are usually several ways to accomplish any task.

This section will cover all of the steps to use the file sharing capability that comes as a part of System 7.X, or to access an AppleShare file server. The topics covered are:

- Installation
- Setup
- Sharing
- Mounting a Shared Volume
- Program Linking
- Security and Performance

Installation

Before any computer can connect to a network, it must have networking software. The Mac is no different than any other computer in this respect. If you need network access only to print, all you need to access the printer is it's driver. Instructions for installing the printer driver are included in this section.



The Installer

Whenever installation of System software is discussed in this book, the examples presented will use System 7.5's Installer. The Apple installation program went through a dramatic change when Apple released System 7.5.

Apple changed the Installer's interface and added more installation options. If you are using a version of the Installer that looks different from the examples in this chapter, you should look at Chapter 6, where you will find a section about using earlier versions of the Installer.

Since the basic installation requirements remain the same from one version of the System to the next, you should be able to read about using the earlier versions of the Installer and understand how to use the earlier version, even though most of the illustrations in this book use the newer Installer.

Driver (1) A program, usually in a System Folder, that lets a peripheral device and a computer send and receive files. Printer drivers control printers; a hard disk driver controls exchanges between a hard disk and a computer; (2) synonymous with resource.

To install System 7.5's file sharing, you need the Install 1 disk of your System Disks set. Insert it into your Mac (you do not need to boot from the installation disk) and double click on the Installer. After the install starts, you will see the Installer's main window (Figure 13.6).

Once the main window appears:

1. Select Customize from the pop-up menu.
2. You will see a window that looks like Figure 13.7.
3. From the list of installable options, click on the triangle next to Networking Software to expand a list of options, as shown in Figure 13.8.
4. Click in the checkbox next to File Sharing and any other networking option that you might need, such as Ethernet (install only the software you know that you need; you gain nothing from installing software you can't or won't use).
5. Make sure your startup hard drive is the one selected by checking the disk selection section of the Installer's window.
6. Click on the Install button.
7. After the installation is complete, you will be asked to restart your Macintosh.

   Once you've clicked on the Install button, the Installer will install the software you need to share files, both as a server and a client. To install printer

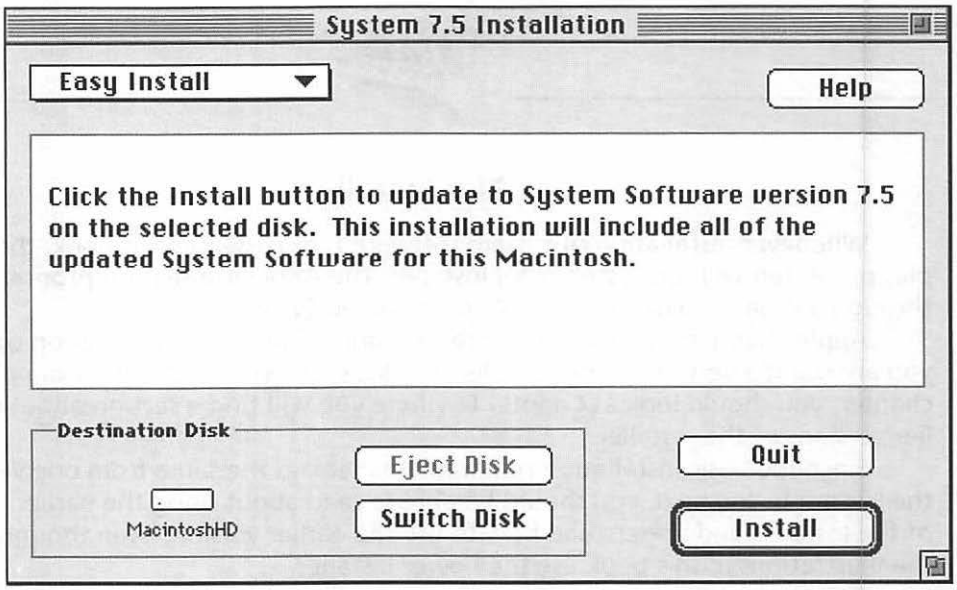


Figure 13.6 *The Installer's main window.*

software, follow the preceding steps, but replace steps 3 and 4 with the following:

8. From the list of installable options, click on the triangle next to Printing to expand a list of options, as shown in Figure 13.8.

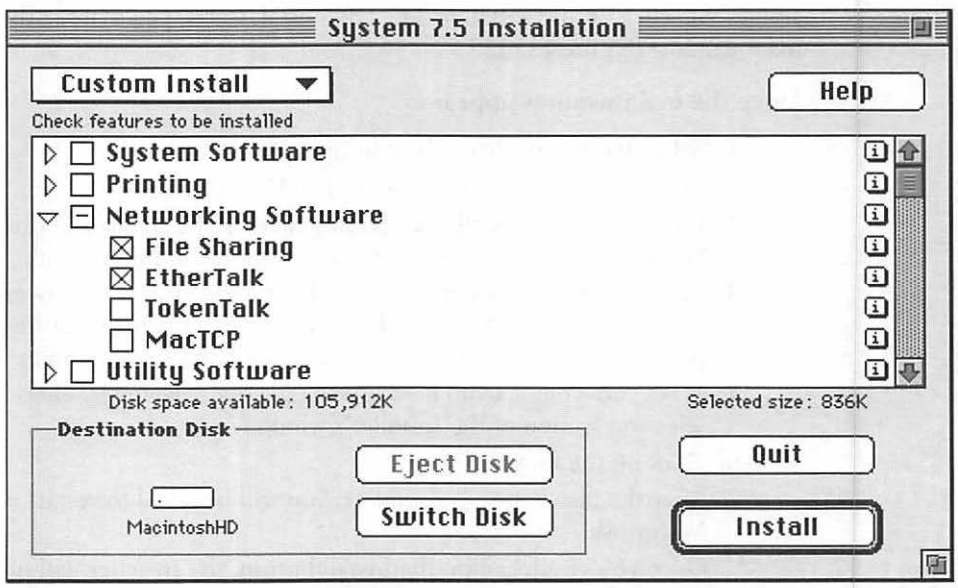


Figure 13.7 *The Installer's Networking Software options.*

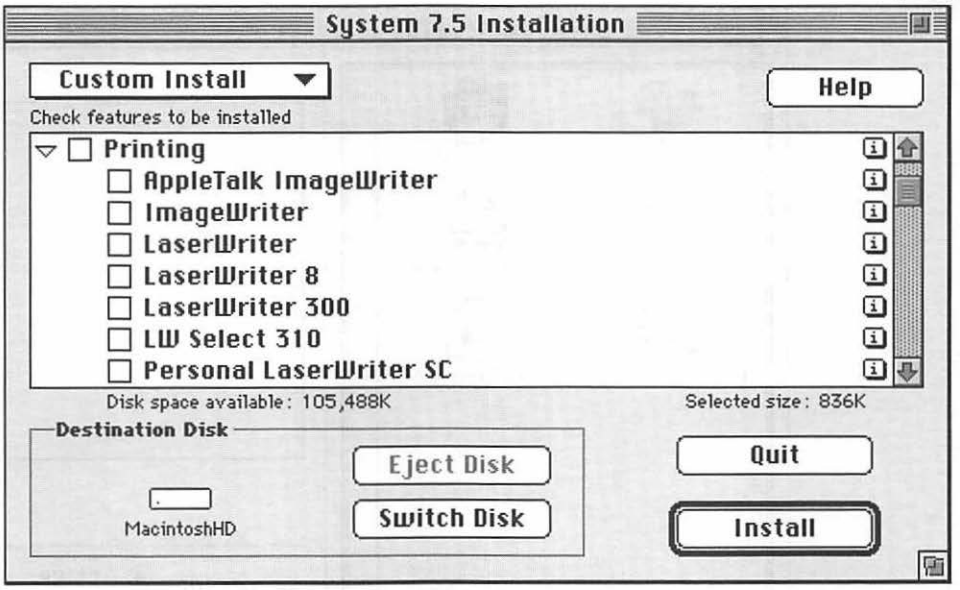


Figure 13.8 *The Installer's Printing options.*

9. Click in the checkbox next to File Sharing and any other networking option that you might need, such as Ethernet (install only the software you know that you need; you gain nothing from installing software you can't or won't use).

If you have a network in which both Systems 6.0.X and 7.X Macintoshes are used, you can use the Macintoshes with System 7 as file servers and access them from all of the Macs on the network. Those Macs using System 6.0.X will need the Workstation software for System 6.0.X. The installation for the Workstation software is accomplished via the steps outlined previously, using the older version of the Installer.

Once you've installed the software and rebooted your Mac, you're ready to use the network. If you're using System 6.0.X, your Mac cannot act as a file-server only as a client. And, the steps for mounting a file server volume on your Mac is the same whether you're using System 6.0.X or 7.X. So, System 7.X will be used for the rest of the networking section.

Configuring Your Mac for File Sharing

Now that your Mac has the software it needs for networking, you have to configure the software before you can use it. These steps are usually a one-time procedure, but there will be times when you might have to reset some of them. As such, you need to be familiar with the configuration process.

Once you've installed your file-sharing software and restarted, you have to turn on AppleTalk from the Chooser, which is found in the Apple menu. Figure 13.9 shows the Chooser; turning on AppleTalk is just a matter of clicking on the button.

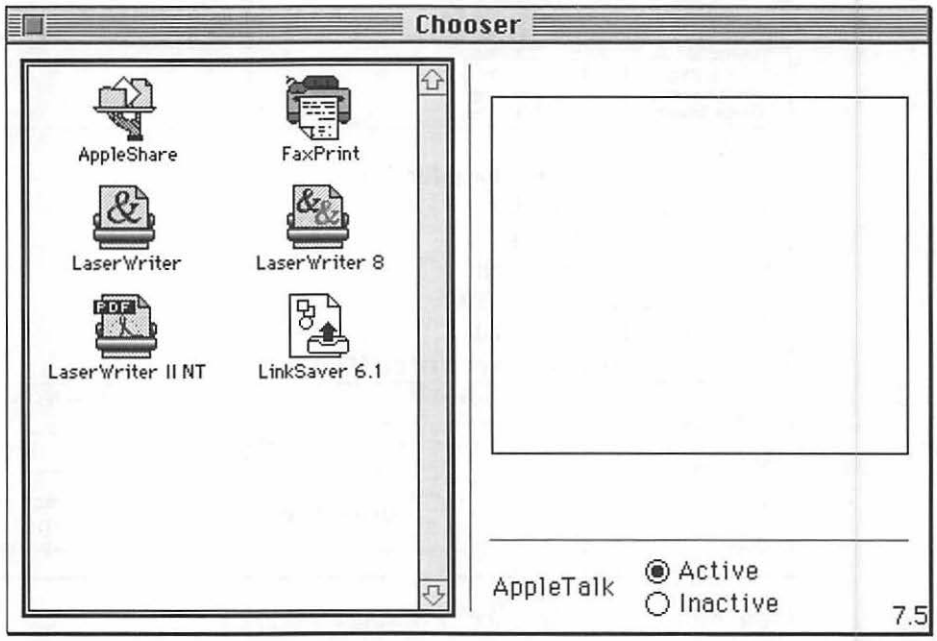


Figure 13.9 *The Chooser.*

If the title next to the button says "AppleTalk active after restart" instead of "Active," you will have to restart your Mac before you can use the network.

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, use the Chooser to connect and disconnect from the network and choose among devices connected to the network. You can also specify a user name that the system uses from time to time—when you're printing on a LaserWriter, for example.

Once AppleTalk is turned on, use the Sharing Setup control panel so that you can share files. From the Sharing Setup control panel, you give yourself and your Macintosh a name, plus a password. Remember, all of the control panels are accessed from the Control Panels menu item in the Apple Menu.

Figure 13.10 shows the Sharing Setup control panel. The Owner name is the name that your Macintosh uses when you access file servers, while the Macintosh name is the name that others will see when they use your Mac if it is functioning as a file server. Use the Sharing Setup control panel to turn on your Mac's server function if your Mac is going to be a file server. Regardless of whether you're going to be a file server, you need to perform the following steps. Complete step 5 to also function as a file server. If you're using System 6.0.X, name your Macintosh from the Chooser; you will not have a Sharing Setup control panel.

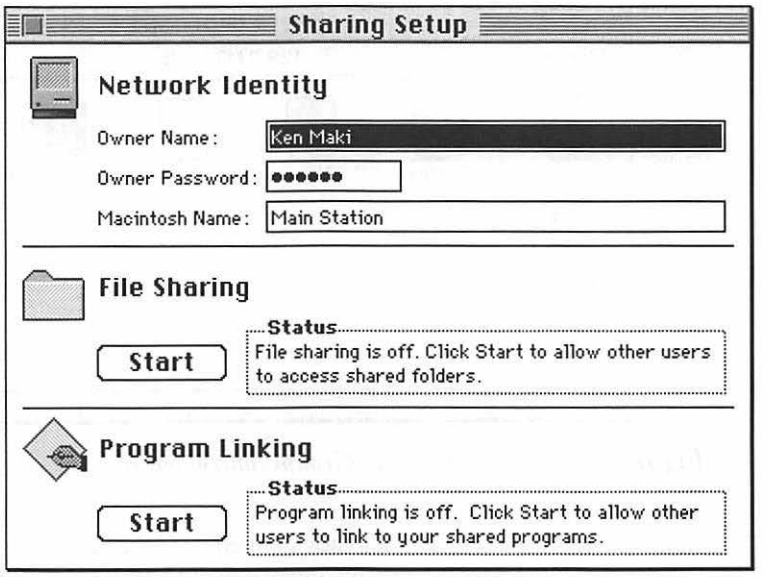


Figure 13.10 *The Sharing Setup control panel.*

To share files using the Sharing Setup control panel:

1. Open the Sharing Setup control panel.
2. Give your Mac an Owner Name. This can be your name, the name your network administrator tells you to use, or any name you want to use. This is the name you'll use when accessing file servers.
3. Enter an Owner Password. You will use this password if you're accessing your Mac from another Mac on the network.
4. Enter a Macintosh Name. The Macintosh Name is the name others will see when your Mac is acting as a file server and they access its volumes.
5. Click on the Start button in the File Sharing section of the window. This turns on the file sharing functions of your Mac. When the Status box says that file sharing is turned on, your Mac broadcasts the Macintosh Name, and other Mac users will see your Mac on the network.

Next, you have to tell your Macintosh who you're going to let access the files you're going to share. To do this, use the Users & Groups control panel (Figure 13.11). You're going to do four tasks from the Users & Groups control panel: Define new users, define a group, configure your access, and set up guest access to your Mac. This is where file sharing begins to get complicated—the Users & Groups control panel is deceptively simple in its appearance, but it is not simple.

To use the Users & Groups control panel:

1. Open the Users & Groups control panel.

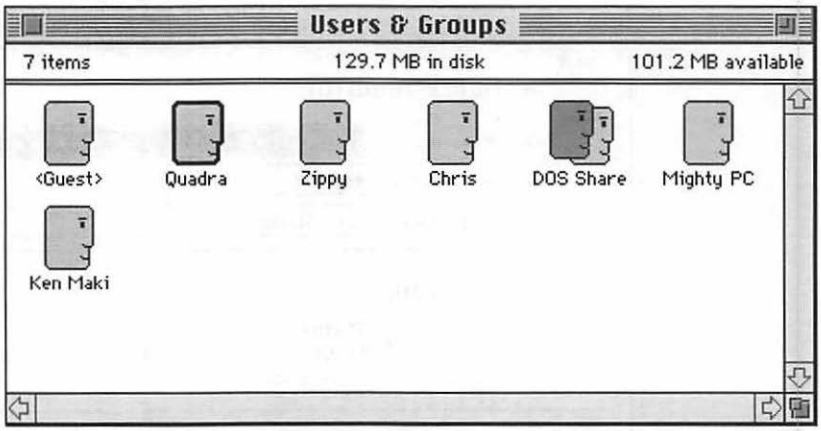


Figure 13.11 *The Users & Groups control panel.*

2. Notice that a user is already defined with the same name as the Owner Name from the Sharing Setup control panel. Double click on the Owner's icon.
3. A window will open, as shown in Figure 13.12. Inside the Owner's window, you will see three checkboxes that are all selected. Each of these checkboxes represents an option that specifies a connection condition, should you want to access your Mac from someone else's. Your options are:
   - ❖ Allow user to connect—If this box is *not* checked, you will *not* have access to your Mac.

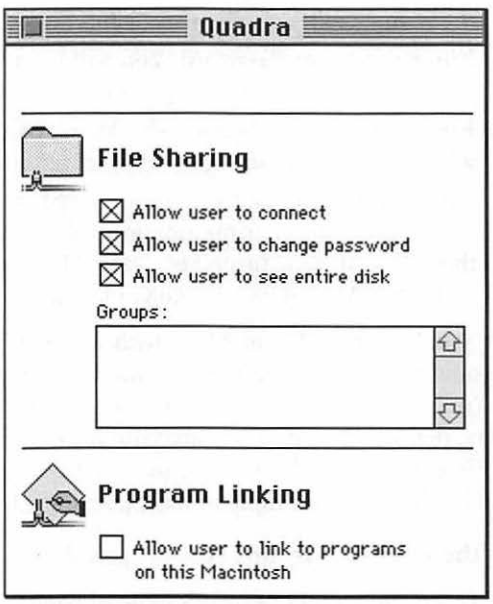


Figure 13.12 *The Owner's window.*

- ❖ Allow user to change password—This option let's you change the Owner Password assigned in the Sharing Setup control panel, which means that you could change your password from some else's Mac when you access yours.
- ❖ Allow user to see entire disk—This option lets you see and mount any hard disk connected to your Macintosh from another Mac. If it is *not* selected, you will have access only to the folders you've made available to others.

If you make any changes to an item in the Users & Groups control panel, when you close the item, you'll be asked to save the changes. Closing the Users & Groups causes all changes to take effect.

4. Close the Owner's window and open the user labeled Guest. The Guest window has one option: Allow guests to connect. If this option is selected, it is possible for any Macintosh on the network to access the files you're sharing. If this option is *not* selected, then only users you set up in the Users & Groups control panel will have access to files you're sharing.
5. Close the Guest window and create a new one with the ⌘+N command key, or by using the New User menu item from the File menu.
6. Give the New User a name and open the dialog box; you will see a window like the one in Figure 13.13. This is done as if you were naming and opening a folder in the Finder. The names you choose should be descriptive enough so that the people who log in will be able to do so easily.

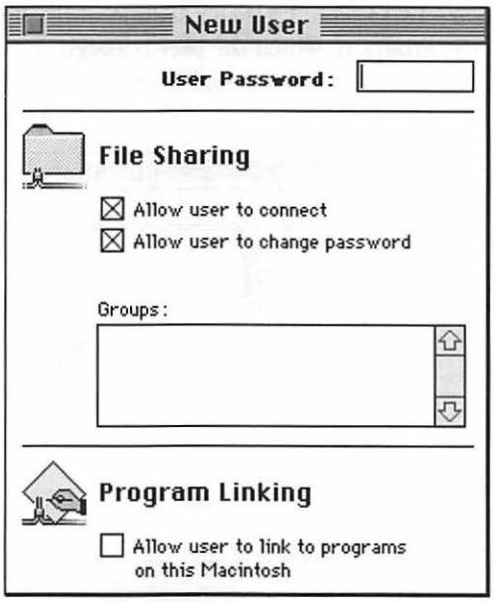


Figure 13.13 *The New User's window.*

There are three options in the New User window: The "Allow user to connect" and "Allow user to change password" are the same as the options described in the preceding step 3. The "User Password" is where you assign a password that will be required before the user can access your Mac. Passwords are case sensitive.

Case sensitive: Able to distinguish between uppercase and lowercase characters.

You determine which user can access your Mac by the name and password you give the New User. Before others can access your Mac, they will need to know their user name (whatever you named the User icon) and their password. At this point, you've just become the system administrator for your Mac. Create as many users as you need. You can have up to ten different users connected to your Mac at the same time. You can create up to 100 different users, but it is highly recommended that you do not name more than 50 users. Otherwise, people accessing your machine may notice speed (performance) problems.

7. From the File menu, select the New Group item. The purpose of a group is to control access to the volumes you create. When it comes time to set up a volume for sharing, you can grant access by assigning a group instead of a user.
8. Copy a user or two to the group you just created. Groups act like folders by holding users; you add a user by dragging the user to the group and it is copied into the group. You also name a group just as you would a user or a folder in the Finder. Once a group has been named, it is called a *registered group*. Figure 13.14 shows a group with two users.

In Figure 13.13, you'll notice a section of the User window called Groups, which displays the groups to which the user is assigned. A user can be included in several groups, because you cannot assign multiple users or groups to a shared volume. You

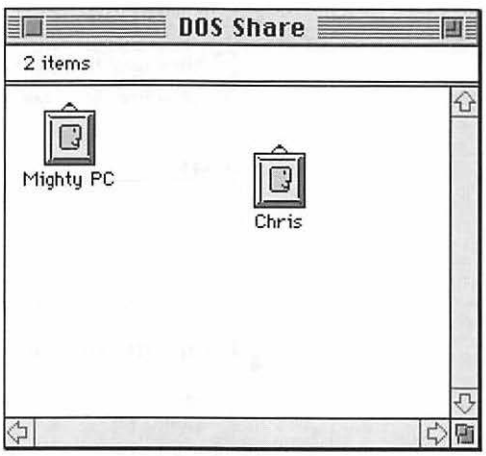


Figure 13.14 *The New Group window.*

must choose a single user, a specific group, or allow everyone access to your files. So, think about how you will configure your groups and users; it may take some experimentation until you have it the way you want it.

Once you have set up your users and groups, you will be asked to save your changes as you make them. All of this information is stored in a Users & Groups Data File that is stored in the System's Preferences folder. Make a copy of this file; if something happens to the Users & Groups Data File, file sharing will not work and you will have to set up everything again. It is easier to replace the file with the copy than to make a new one. Make your copy immediately after setting up and after you make any changes to your users and groups.

Sharing Your Data

Now that you have your users and groups set up you're ready share the data on your hard drive. You can share an entire hard drive, a single folder, or several folders. When sharing files, you need to think about your sharing strategy. Sharing will affect your Macintosh's overall performance, so you need to make sure you are not causing yourself problems. Performance issues will be discussed along with security.

Before you can share a volume, be sure sharing is turned on from the Sharing Setup Control panel. You do not need to open the control panel to turn on sharing—your Mac will do that for you when you assign your first folder to be shared Just highlight the folder you want to share and select the Sharing menu item from the Finder's File menu. If sharing has not been turned on, your Mac will present you with a dialog box like the one shown in Figure 13.15. After you start file sharing, it will take a couple of minutes to start. During this process, Sharing Setup will display the message shown in Figure 13.16.

Once sharing is turned on, it will remain on until you turn it off. This means that, every time you start your Mac, the first thing it does is start up file sharing. Also, if you share anything on a disk—whether it is a floppy, SyQuest, hard drive, or optical disk—you will not be able to unmount the disk until you unshare the disk or the folder it contains that is being shared. If, after unsharing a removable disk, it will not unmount, turn sharing off from the Sharing Setup Control panel.

When Sharing has started, reselect the folder you want to share and select Sharing from the file menu. At this point, your Mac will ask you to assign its access

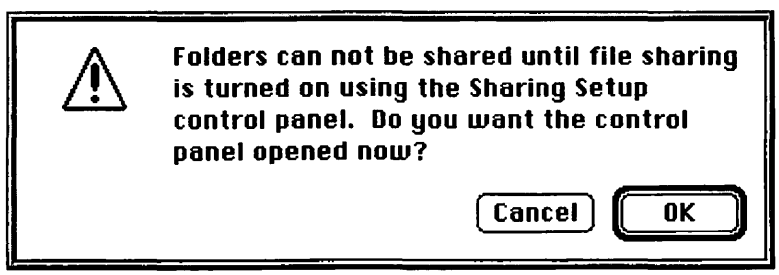


Figure 13.15 *Autostarting the Sharing Setup control panel.*

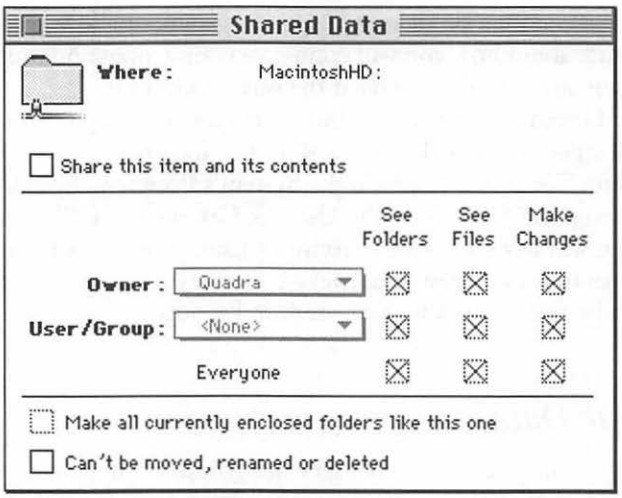


Figure 13.16 *The Sharing window.*

privileges. You will be presented with a window like the one shown in Figure 13.16. In this window, you have the option to assign the Owner and the User or Group who will have access to the folder. The Owner field is automatically set up with you as the owner and the User/Group field is set to None. If you click on the name of the Owner, you will have the option to assign any group or user as the owner, as shown in Figure 13.17. Who you assign as the owner is important. If you make yourself the owner and you have several users who are going to be creating folders within the shared folder, folders created by one user will not be accessible by other users. In this case, make the entire group the owner. The inaccessibility of a folder occurs

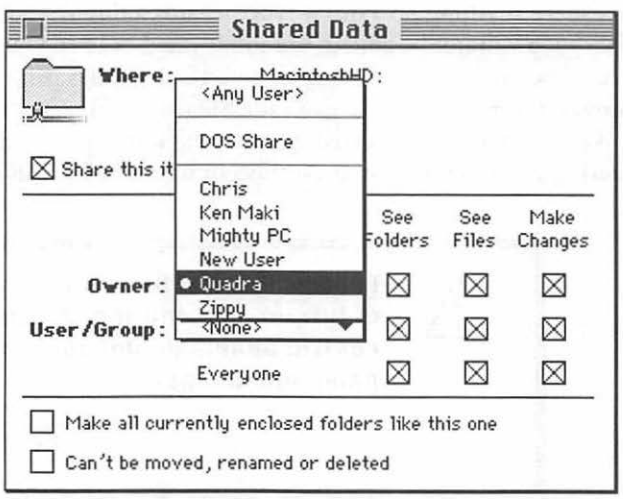


Figure 13.17 *Assigning an Owner.*

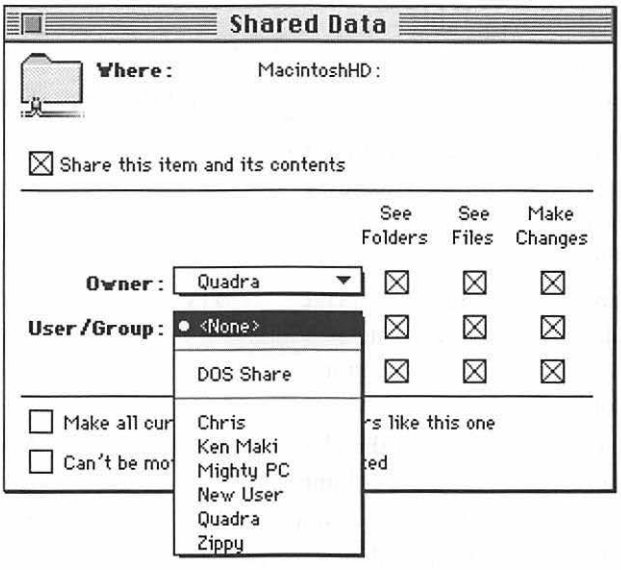


Figure 13.18 *Assigning a User or Group.*

when someone drags a folder to the shared volume from their Macintosh or creates a new folder using the New Folder item from the File menu.

Next, you want to assign the User or Group. Figure 13.18 shows that options for this selection are the same as the Owner. Once you have assigned a user, the next step is to set the access privileges. If you leave the User/Group set to None, and all of the checkboxes after Everyone turned on, you will be allowing anyone to have access to the folder you are sharing. If you make no changes to the default window, you will be giving everyone access to the folder.

Access privileges The privileges to open and make changes to folders and their contents; they are given to or withheld from users. By setting access privileges, you can control access to confidential information stored in folders on a server.

The next step is to determine what type of access users can have. The following Table 13.1 lists all of your different options and their effects. This table is made assuming that you have left the folder options "Make all currently enclosed folders like this one" and the "Can't be moved, renamed, or deleted" options checked. These two options will be explained after the table.

Of course, all of the preceding is meaningless if you leave the options for everyone turned on. The preferences listed apply to any of the assignment groups: Owner, User/Group, and Everyone. As you can see, since you can set up three different sets of privileges, it can rapidly get confusing. If possible, follow the KISS philosophy (Keep It Simple, Stupid or Keep It Stupid, Simple) for assigning access privileges.

The option, "Making all currently enclosed folders like this one," assigns to all of the folders in the folder you are going to share the same attributes you are setting. If you do not set this option, the attributes you set will apply only to the folder you

Table 13.1 Preferences Table

PREFERENCES EFFECT FOR EVERYONE WITH ACCESS	SEE FOLDERS	SEE FILES	MAKE CHANGES
Can see folders and files and make changes to any folder that is created after the attributes have been established, and can change the contents of any file.	Yes	Yes	Yes
Can see all files and folders but cannot make changes to any file. This is like creating a template for a specific file; the user cannot add any files or folders.	Yes	Yes	No
The user can see the folders but not the files. Files and folders can be added to the volume.	Yes	No	Yes
The user can see only the folders, but cannot see any files or add anything to the folders	Yes	No	No
The user cannot see the folders; the only files seen are those that are loose inside of the folder that will be shared. All of its subfolders will be invisible. The user will be able to add files or folders, but make changes only to the files that can be seen.	No	Yes	Yes
The shared folder will not be available for anyone except the Owner.	No	No	Yes

are going to share and not to its contents. If you change the attributes of a folder and do not force the change to apply to the enclosed folders, the enclosed folders will retain any attributes previously assigned. So, if you are going to change the attributes, you should force the change to all of the folders. Otherwise, you will have two or three different sets of attributes working all at once, which could be very confusing. If any folder that has set attributes is moved into another folder with different attributes, it will retain its attributes until the attributes for the enclosing folder are changed.

The final option of "Can't be moved, renamed, or deleted" will prevent anyone from altering the name, putting them in different folders, or throwing files into the Trash. This is a safety feature you should probably always leave turned on.

The best way to get all of these attributes straight is to experiment. Sit down and play with two Macs; change the attributes of a shared volume and then see what effects they have on the other. Move folders into and out of the mounted volume to see what happens. If you are methodical, you will quickly get a handle on what the attributes do.

Accessing a Shared Volume

The process of accessing a folder someone else has shared is called *mounting a shared volume.*

This process is done through the Chooser:

1. Open the Chooser.
2. Select the AppleShare icon.
3. The available file servers will appear on the right-hand side, as shown in Figure 13.19.
4. Select the file server you want to log into by clicking on it and then clicking on the OK button, or you can double click the file server's name. When you select a file server, you will get a dialog box like the one shown in Figure 13.20.
5. Enter your user password; this is the registration dialog box. In this box, you must enter your user name that is assigned to you by the person sharing their files, or by the system administrator. At this point, you can change your password if you have been given access to do so. To protect your data and prevent others from logging in as you, you might want to set your own password (Figure 13.21). Also, if the attributes have been set for guest access you could log on as a Guest.
6. Select the volume you want to mount; you will receive a dialog box like the one shown in Figure 13.22. In this dialog box, you will see every available

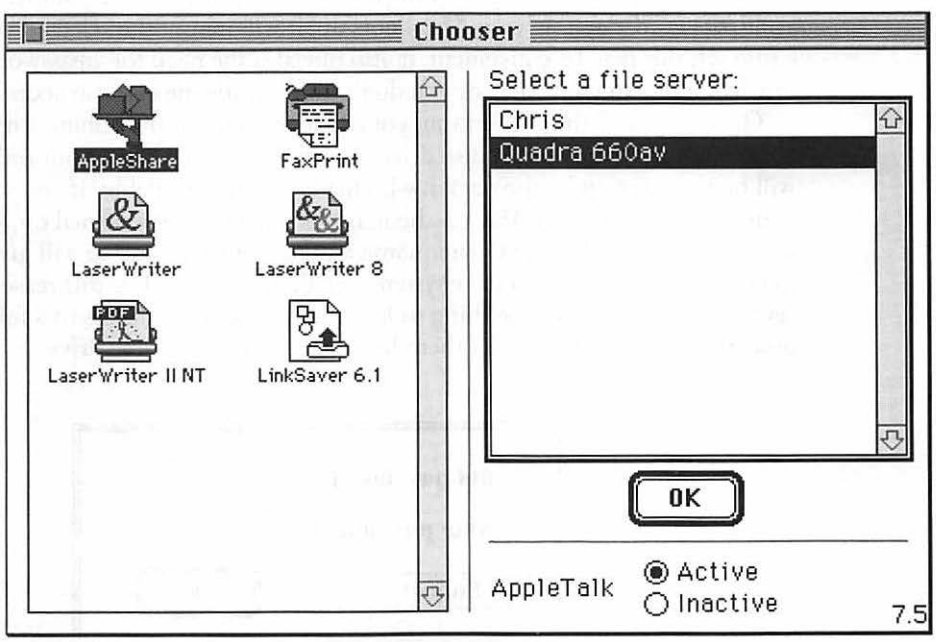


Figure 13.19 *Selecting AppleShare in the Chooser.*

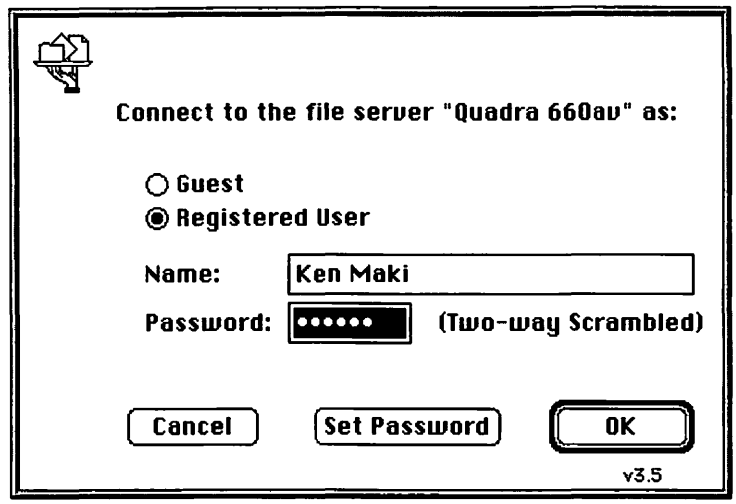


Figure 13.20 *The file server registration dialog box.*

volume on the selected file server. Since several folders can be assigned, a server can have several volumes.

At this point, you have the option to set the volume(s) to be mounted at startup. This is useful if you are working off a dedicated file server or a shared volume that you will use all the time. If you select this option, you will be asked if you want the Mac to remember your name and password (Figure 13.23). If you have your Mac remember your password, anytime your Mac boots up, it will mount the selected volume. Although this may be convenient, it also obviates the need for a password unless no one has access to your Mac, or you don't care if someone else can access your data.

Once you click the OK button, your Mac will mount the volume and you will be able to use it like any other disk drive connected to your Mac. Your only restrictions will be those set up by the person who made the files available. If you want access to your Mac from another Mac on the network and sharing is turned on, you can log onto your Mac with your Owner name and password. Doing so will give you access to every drive and disk on your system (see Figure 13.24). For this reason, you should set the password—it is one thing to let other people have access to a folder as a volume; it is quite another to let them have access to your whole drive.

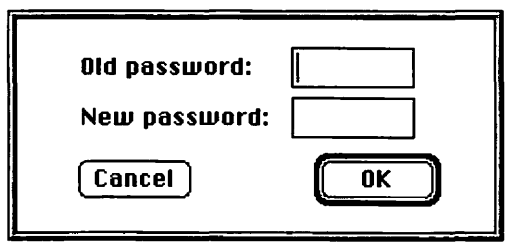


Figure 13.21 *Setting your password.*

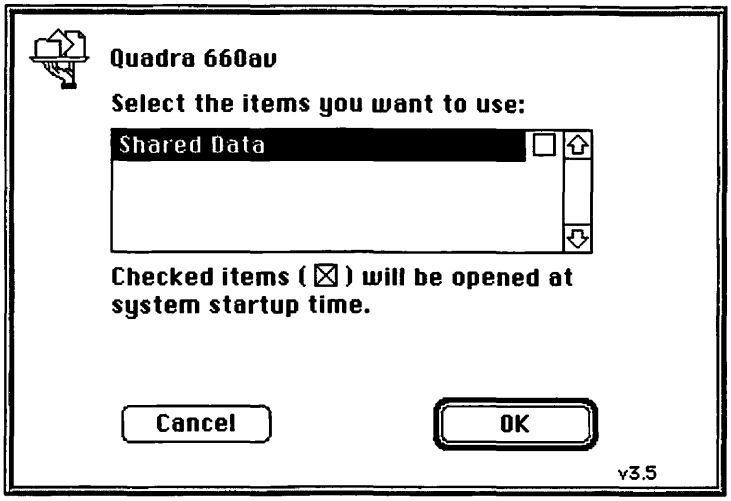


Figure 13.22 Selecting the volume.

An Advanced Network Primer

This chapter is about the nuts and bolts of Macintosh networking. What you will see is more terminology that may be unfamiliar and even confusing. Just like the language that is used with data communications, the language used with networks can be a problem because it rapidly exceeds the boundaries of the Macintosh. This section will attempt to clarify the concepts that are essential to understanding networking.

Apple has gone to great lengths to make Macintosh networking as simple as possible. After you read this chapter, pick up a book on networking DOS machines and glance through it. Networks have the capacity to span computer platforms, and, once

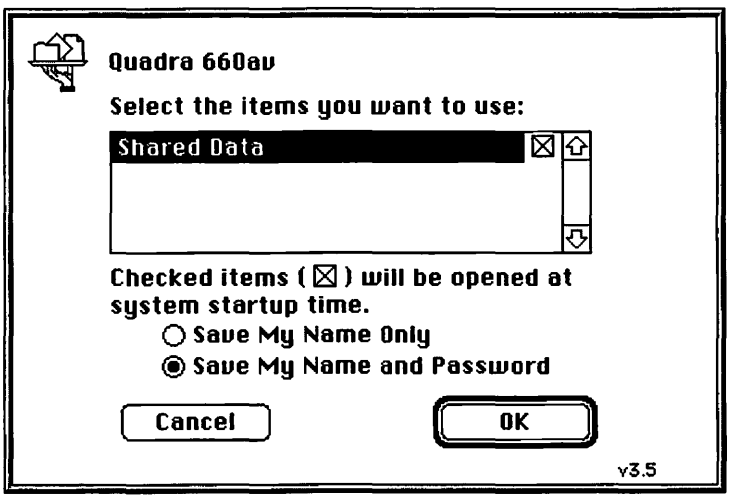


Figure 13.23 Remembering your password.

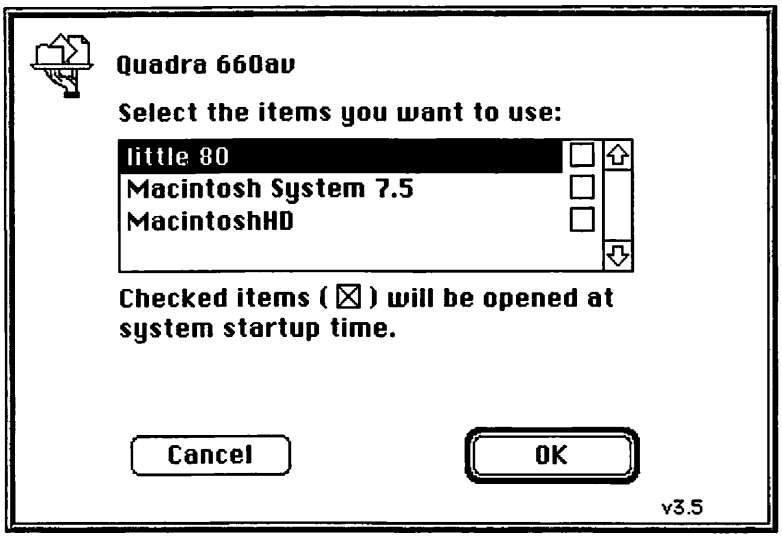


Figure 13.24 *Logging in as an owner.*

you reach beyond the Macintosh, a network becomes much more complicated and more difficult to use and manage. This section will look at what a network is generally, while defining networking-specific terms.

Basically, to have a network, you need three components: the physical connection between the computers, the hardware in the computers that will utilize the connection, and the software that makes the connection operate. Your Mac has the software for operating on a network built into its ROM or the System. Built into the logic board is the basic hardware for communicating via a network accessed through the printer port so that all you need to provide is the cabling. Figure 13.25 shows a basic network.

The term LAN, for Local Area Network, is used to describe a single network and all of the devices it contains for one physical location, hence the word *local*. It does

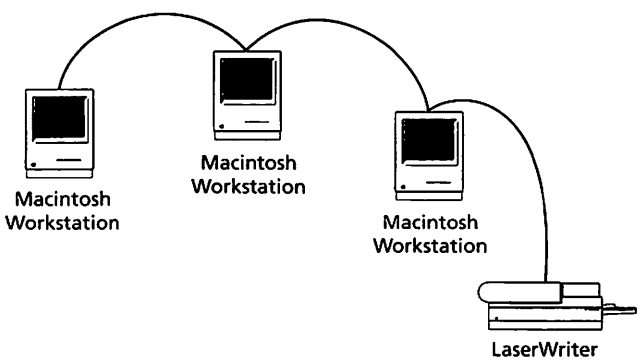


Figure 13.25 *Diagram of a basic network.*

not have to consist of only Macintoshes; it can include DOS, UNIX, Mainframes, and other machines. It is the connection of all these different devices, in such a way that they can send data between the different machines and share common *network services* (any device that is provided for common use by the networked computers), that constitutes a network.

It is possible to extend your network to include computers that are not connected directly to your LAN. You can even connect several LANs to create a networking environment called an *internet*. An example of an internet would be two LANs on different floors of the same building connected to each other. To connect them, you have a hardware device called a *router* or a *local gateway* that makes the network services of the two networks available to all of the users. Figure 13.26 shows how two networks are connected.

The next extension of the networking concept would be two networks in different geographic locations that are connected by modems that act as routers (see Figure 13.27). This configuration is called a *wide area network* or *WAN*. (This acronym is used primarily in writing, not conversation.)

With a Macintosh network, whenever a router or a gateway is used, each of the different networks is called a *zone*. The difference between a router (sometimes called a *bridge*) and a gateway is that a router is used to connect two networks that use the same network protocol, while a gateway connects two networks that use different protocols, and translates the protocols so that each network can communicate

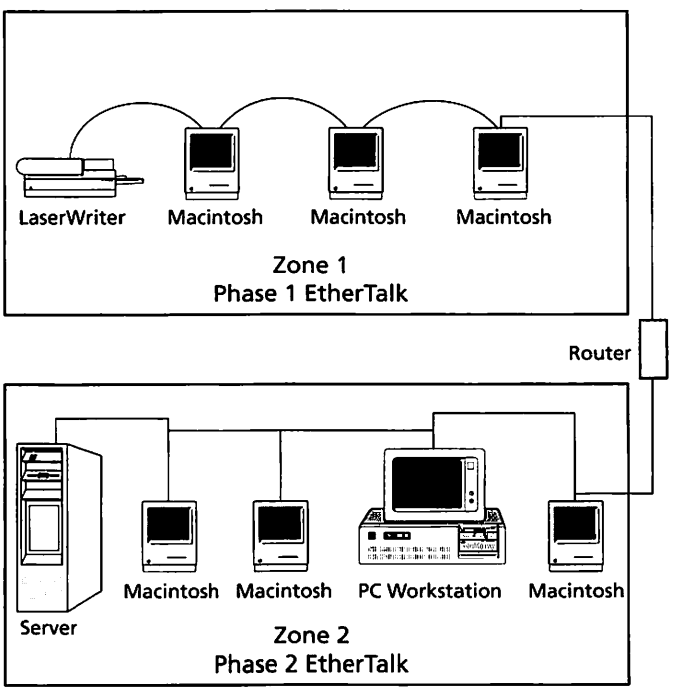


Figure 13.26 *Two networks connected via a router or a gateway.*

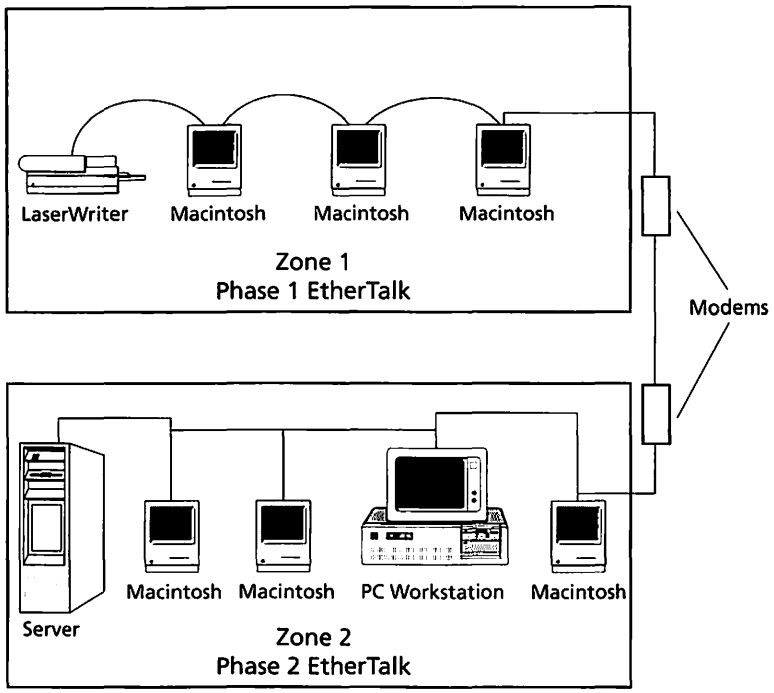


Figure 13.27 Using modems to connect two networks.

with the other. In this chapter, a router and gateway will be used very specifically. Often, you will find that all three of these terms—router, bridge, and gateway—are used interchangeably.

Networks are often labeled by the name of their protocol or the type of cabling used. As such, you will hear Macintosh networks referred to as AppleTalk, LocalTalk, or PhoneNet networks, unless they are operating on an Ethernet or another type of network.

Networking Protocols

There are several different types of networks. Each type is usually described by the type of protocol it uses; the *protocol* is the set of rules under which the network operates. In most cases, the protocol is an established standard that is recognized within the industry. Sometimes, a company will establish its own protocol. When it does, it also has to provide gateways so that other networks can operate in conjunction with theirs.

This happened with a DOS network manufacturer named Artisoft, which produces a very popular network called Lantastic—one of the best-selling networks for DOS machines. The Macintosh finally became so popular that it could no longer be ignored. As a result, there now is a gateway that will connect an AppleTalk network

with a Lantastic network. The gateway provides the translation between the Lantastic network operating system (or NOS, as it is called in the DOS world) and AppleTalk, which is the native protocol of the Macintosh. The Mac is capable of using other protocols, but every Mac has AppleTalk built into it. If you need to use a different protocol, you will have to get the appropriate hardware and software.

AppleTalk

AppleTalk is Apple's protocol for the Mac; it has been a part of the Mac since the Macintosh 128K. It has also gone through a couple cycles of evolution. There are two versions of AppleTalk: Phase 1 and Phase 2. AppleTalk Phase 1 is the version used anytime you set up a LocalTalk or PhoneNet network. LocalTalk and PhoneNet are two different cabling standards. Regardless of the type of cabling, if you are just plugging cable connectors into the printer port of your Macintosh, it is using Phase 1 AppleTalk. System 7 includes AppleTalk Phase 2, but it is used only if you are on an Ethernet. If the version of AppleTalk is equal to or greater than 53, then it supports the basic elements of AppleTalk Phase 2.

Determining this number can be a bit difficult. However, you can use a program, such as Now Utilities Profiler. As you can see from Figure 13.28, the current version of AppleTalk for the tested Mac is version 58; it is Phase 2-compatible. Remember, just because the version of AppleTalk is Phase 2-compatible does not mean that it is operating in a Phase 2 mode.

Phase 2 differs from Phase 1 in how it handles network identification. A Phase 2 network uses a *network range number* rather than a single network number. This extends the ability of the network to address a theoretical maximum of 16 million

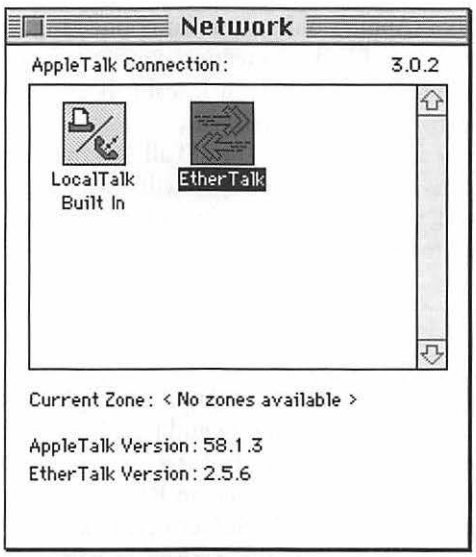


Figure 13.28 *Checking the AppleTalk version.*

devices, rather than the maximum of 255 under Phase 1. The network range number is a 16-bit number (2^{16}), selected from a possible range of numbers, such as 1,456:1,600. If the full range of possible numbers were used in a network (possible in theory only), each of the numbers in the range could then address up to 255 network devices. This would make the possible number of addressable devices represented by a 24-bit number 2^{24}, or 16 million.

The reason that a standard LocalTalk or PhoneNet network cannot take advantage of Phase 2 addressing is because it would take forever to find a device on a network so large, even if it were possible to put so many devices on a network. The speed at which LocalTalk or PhoneNet networks operate is 230.4 kbps (kilobits per second), which equals about 235,969 bps (bits per second). This is not blindingly fast. In theory, you should be able to send a 1,728K file over the network in one minute. Because real life and theory do not coincide, the actual real-world rate will be about half of the theoretical limit.

It takes 103 seconds to send a 1,440K file from a local machine to an AppleShare server—when there is no other network traffic and it is a small network. The speed rate for this transfer is about 114 kbps. The reasons for the speed degradation are due to the error-checking that has to take place, the types of Macs involved, and other network activity. There is definitely a relationship between the CPU's speed and how fast a data transfer will take place. If you are sending data from a Mac Plus to a Quadra, the Quadra will have to slow down to a speed that the Plus can deal with.

There are two cabling types used with AppleTalk networks when connecting to any Mac through the printer port. You can use LocalTalk cabling or *twisted pair*, which is standard telephone wire.

LocalTalk

LocalTalk is Apple's old system for connecting Macs and their networked devices together. A LocalTalk connection consists of a LocalTalk adapter and cabling. There is nothing special about LocalTalk and, in some ways, it is more difficult and expensive to use than twisted pair.

The one advantage that LocalTalk has over twisted pair is that LocalTalk cabling is more heavily shielded, and you will have fewer interference problems. On the other hand, the cable is more difficult to use, and you have a maximum length of 1,000 feet for the network, with a recommended 32 nodes or networked devices.

PhoneNet

PhoneNet is the implementation of an AppleTalk network, using PhoneNet connectors from Farallon Computing and telephone wire, also called twisted pair. The wire itself is the same as the wire used to connect your telephone to the wall plug; the type of connector used is called an RJ-11.

The advantages of a PhoneNet network is that it can support lengths of 1,800 to 4,500 feet, depending on the *topology*, or wiring configuration. It is easier to install cabling with a choice of different topologies, and you can get additional technical

support from Farallon. All of this makes PhoneNet the cabling system of preference for most installations. In addition, Farallon has received a patent on its connectors and has licensed the technology to other manufacturers who make PhoneNet-like connectors.

As far as its disadvantages are concerned, a standard PhoneNet network is still constrained to approximately 32 nodes. If you have more than 32 network devices, you will have to set up two networks and a router to connect them. And, of course, there is the speed issue: If the speed of the network is an issue, you need to install an Ethernet network.

Topologies

When setting up an AppleTalk network, you need to be concerned with the network topology. First, there is the overall length of the network, measured in terms of actual cable length. You may have a physical distance of only a few feet between the different devices to be networked. But if you are going to be running the cable through a false ceiling that will traverse the entire office, you could find that you will be bumping up against the limitations quite quickly.

The four topologies that are possible are:

- Daisy Chain
- Backbone
- Passive Star
- Active Star

This is where your network layout becomes a serious consideration. Before you go running off to get cable and connectors, think about how you are going to hook everything up. If you are going to use LocalTalk, you have only one choice for a topology—called a daisy chain. A *daisy chain* is where the cable runs from one networked device to another, as shown in Figure 13.29. The daisy chain can also be used with PhoneNet.

The remaining topologies are possible only using PhoneNet, and two of them require additional PhoneNet hardware. The first is called a *backbone*, which is a single twisted-pair wire that is used to span the entire length of the network. Attached

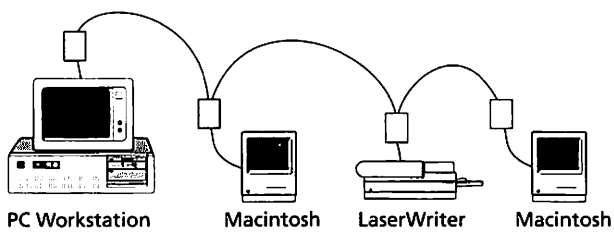


Figure 13.29 *A daisy chain topology.*

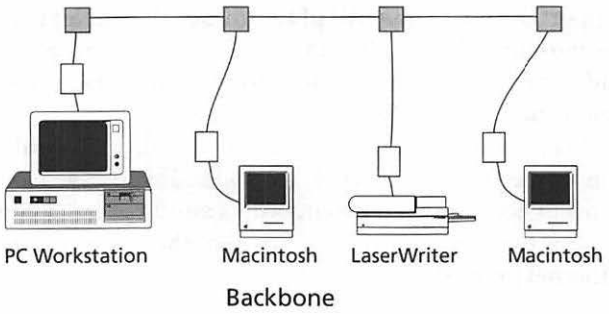


Figure 13.30 *A backbone topology.*

to this wire is a series of RJ 11 jacks into which you plug a Macintosh. The maximum length of the backbone is 4,500 feet. Figure 13.30 shows how a backbone might look. The backbone offers the ability to easily install or remove a Mac from any spot on the network. Using a backbone, it is possible to set up a network connection in every office, even though only some offices will be used. This allows you to set up and remove a Mac or other network device without affecting other people on the network. If you have to reconfigure a daisy chain, the network is down and unusable until all of the connections have been reestablished.

Another option is a *passive star*, which is created by running telephone lines to a *punchdown block*, which is a device used to interconnect phone wires. Figure 13.31 shows a punchdown block. With a passive star, you need a special punchdown block from Farallon. It enables you connect as many as four 1,125-foot branches of wiring, for a total distance of 5,000 feet. Each branch comes from the punchdown block and terminates at a phone-type jack in an office.

This is usually set up in the same place as the rest of your phone equipment, since there will probably be at least two unused wires coming from each location to which you want to network. From the terminus of each branch, you can then attach a daisy chain or backbone to service your network devices. Figure 13.32 shows a passive star

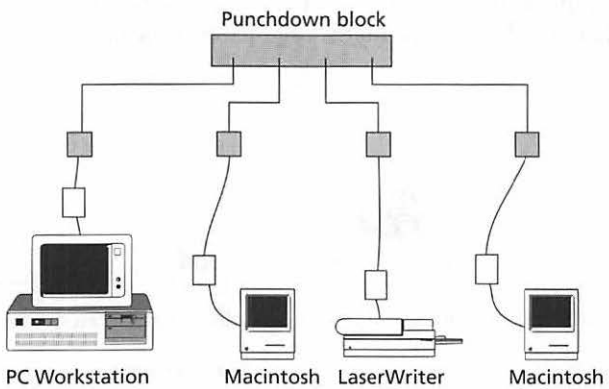


Figure 13.31 *A punchdown block.*

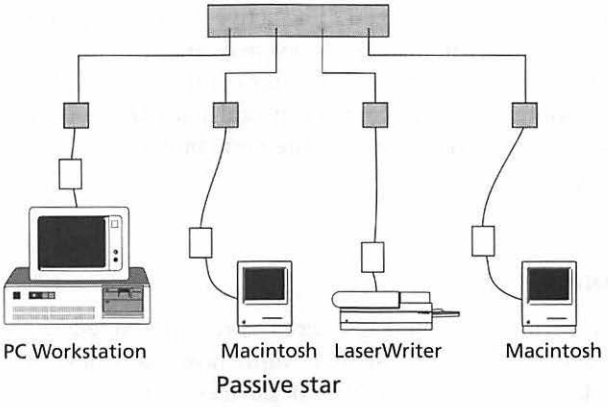


Figure 13.32 *A passive star topology.*

topology. The number of devices on a passive star is limited by the amount of network traffic, but you are probably looking at about 32, which is Apple's recommendation for a straight AppleTalk network.

The other topology you can set up is called an *active star*, which is basically the same as a passive star, except you can have up to 48 branches (although, this exceeds the recommended limits for an AppleTalk network). The active star configuration works by having what is called a *star controller*, which has 12 ports. Each port can support four branches of up to 750 feet each, three branches of 1,000 feet each, two of 1,500 feet each, or one of 3,000 feet. Figure 13.33 shows an active star configuration. Like the passive star, each branch of an active star can have a daisy chain or backbone topology as well. The primary concern here, once again, is the number of network devices that

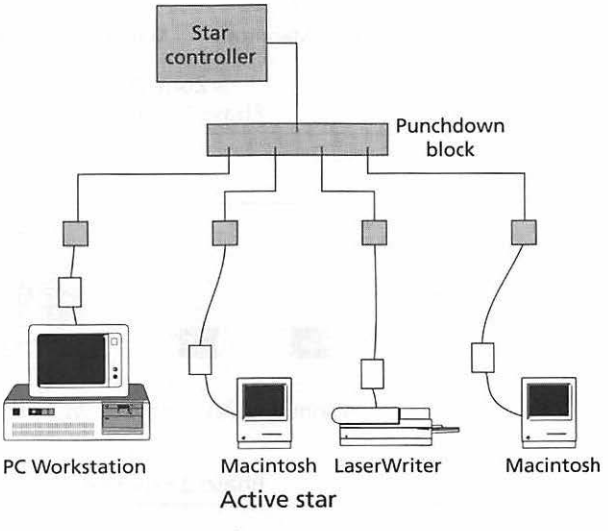


Figure 13.33 *An active star topology.*

will be attached to the star. The active star can improve network performance, because the controller will manage data signals and help prevent data collisions.

The other advantage that a star controller provides is that it can also act as a hardware router. You can connect several star controllers together and create an internet that spans different floors of the same building, or even connects several buildings together.

Zones

As mentioned previously, there is a recommended 32-device limit for an AppleTalk network. What will truly determine how many devices you can have on a single network will not be the number of devices, but rather the amount of network traffic you have. If you have a multiuser database, and ten people are using it all of the time, you might find that you have reached the limits of your network. If, on the other hand, there is very little activity, you could have 40 devices on a network with very little speed degradation.

If your network is slow or you have more devices than are recommended, you may consider making two networks out of the one and connecting them via a router. This will create two zones, where each zone represents one network. However, the resources from each zone will be available to the other users on the network. Figure 13.34 shows two networks connected together with a router; the two zones are outlined.

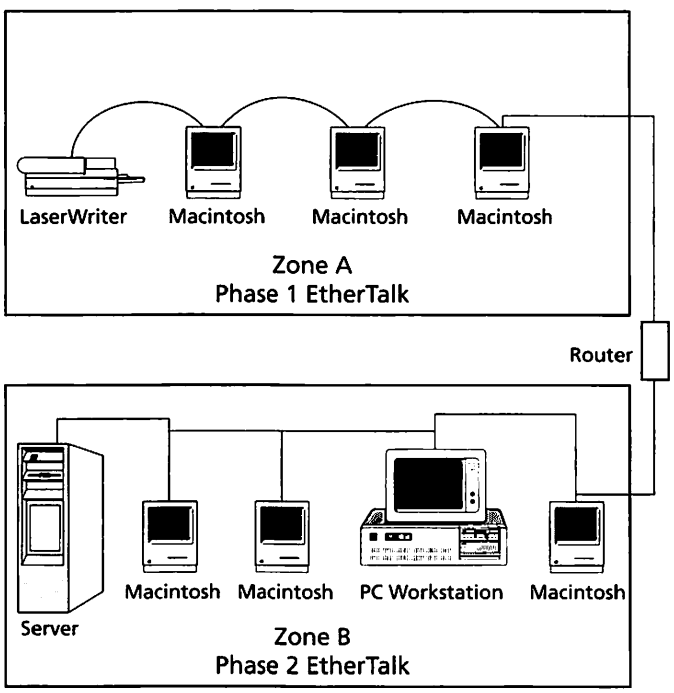


Figure 13.34 The two networks as zones.

If you need data from a file server in another zone, just log into the zone and then onto the server. The use of zones adds extensability to your network. You are constrained by the limits of AppleTalk, but you can still have a network that will connect everyone together through a series of networks.

Termination

Whenever you are using a PhoneNet network, make sure that each end of the network is terminated. The terminator is a 120-ohm resistor that is installed in an RJ-11 plug. This is inserted into the open port of the PhoneNet connector at each end of the network. All LocalTalk connectors are internally terminated, so you do not need to worry about them. Termination prevents the signals on the network from being reflected or echoed back down the network. On small networks, termination is probably the first thing you should look at if you are having problems.

With a backbone or star topology, your termination configurations can be done a bit differently. With the backbone topology, you must terminate each end of the backbone itself. At the same time, put a terminator in the last device attached to wall plug as well—especially if you happen to be running a daisy chain from one of the plugs. If you have just a single device attached to the wall plug, you do not need to put a terminator in the PhoneNet connector. Figure 13.35 shows how to terminate a backbone topology.

Star configurations should be terminated at the terminus of each wire in the wall jack. This means that you do not have to worry about termination for the device attached to the jack. This is similar to the backbone, except each wall jack should have a terminator, which is true for both an active or passive star.

Security and Performance

Whenever you are working with a network, you need to be concerned about its performance and security. This section will look at things you can do to get the best performance while protecting your data.

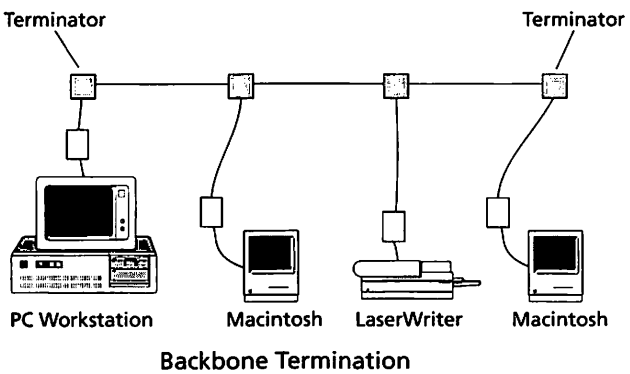


Figure 13.35 *Termination with a backbone topology.*

Security

Although no one likes passwords, they are a necessary evil. There are few people who want anyone to have access to all of their data; so you might consider some of the following as possible guidelines.

- Always give your Mac a password from the Sharing Setup Control Panel so that you can access it if you are on another Mac, and no one will be able to log in using your Macintosh name without your password.
- If you want only specific people to access the folders you share, do not let them change the password. If the user can change the password, they can remove it altogether.
- Do not turn on program linking unless you have a specific reason for doing so. If someone has access to linking, it is possible, with the proper Apple Events, to use an application to access data on your Mac.
- Learn to use the file-sharing attributes, and never give "Everyone" complete access to a shared volume. Always set up your users in groups and give access to a group.
- Never share your entire drive.

Performance Considerations

Using personal file sharing, you can assign up to 100 users and groups. You can also make available as many folders for sharing as you wish. However, the more you share, the more work your Mac will have to do to service network requests.

If your work requires that a lot of people have access to large quantities of shared data, look into a dedicated file server and something like AppleShare. Otherwise, consider the following suggestions. Some of these are also good security options as well as performance enhancing suggestions.

- When using personal file sharing, do not set up more than 50 users and groups. Even though 100 is the limit, more than 50 will have adverse performance effects.
- Share only a couple of folders and never your entire hard drive.
- Restrict access to only those people who need it. The fewer users logged into your system, the better. Each additional user will slow down your Mac, especially if they are all accessing data.
- Distribute the shared data over the network, rather than keeping it all on one machine, unless you are using it as a file server.
- Use small networks for groups of people who consistently share data. Install a router to connect the different networks as zones, and create an internet.
- If you find that your network is too slow, consider using an Ethernet.
- Do not mount more than a couple of volumes at the same time, and try not to transfer data from one networked volume to another. Rather, perform file transfers (especially large files) from a networked volume to a local drive. If

you go from networked volume to networked volume, you might have to take the afternoon off, and all network functions for everyone on the net will slow to a crawl.

Miscellaneous Thoughts

Networks are a complex subject; theory and real life do not coincide. What's worse, everyone you talk to has a different story. In researching this chapter, I asked a few people about how much faster an Ethernet is over LocalTalk. I received answers that ranged from twice as fast to 20 times as fast, and no one was being dishonest.

Your network will be like no other, and the factors that affect it will be unique to how you work and how data flows through your office. What you really need to be concerned with is being able to modify your network as your needs change. If you have a few machines that are causing the rest of the network to slow down, then you might want to isolate them and put them on their own network so that they will not impact everyone else.

As you add computers, be prepared in advance for making them part of the network; compromise between what you want to do and what is possible. To save time and money, think out your network. Plan it, map it, and make sure you know where you going now and in the future. It is hard to predict where the technology is going and what your computing needs are going to be, but you can develop something that works in conjunction with your business plan.

Network Software

All kinds of network software is available. The most important, in addition to file-sharing software, is probably e-mail. But you can also get different network software that will work with other vendors' file servers, such as Novell and Vines. There are also utilities for mapping, checking network traffic, and troubleshooting. Networking is much more extensive than what can be covered in one chapter.

The remainder of this chapter will list and give a brief description of some of the additional network software you can get for your Mac. The purpose of this list is to give you an idea of what is available, and some comments will be made about some of the products. As always, a product's inclusion or exclusion for the list does not mean that it is recommended. There is just too much software available to have everything included; only you can be the judge of a product's suitability for your needs.

Apple's Networking Software

Apple has published a lot of networking software. This section looks at some of Apple's software and explores what you can do with it. Although Apple is not the only publisher of Macintosh networking software, they do provide excellent tools.

AppleShare

AppleShare is Apple's software for creating a dedicated file server. It works on the same principles as personal file sharing. Anyone who has file sharing installed can access an AppleShare server.

Using a server has several advantages: First, all of your organization's data can be kept in one location for easy retrieval. This also makes it easier for backing up your data and keeping it safe. Second, it has more powerful security features than personal file sharing, and you can have more users and groups. Finally, it is about 25 percent faster than personal file sharing, which will still be slow on a LocalTalk or PhoneNet network. Figure 13.36 shows some of the preferences you can set with an AppleShare file server.

Because the file server works on the same basic principles as personal file sharing, there is no reason to go into all of its particulars. Some of its advantages have already been mentioned; some of the others are as follows:

- Improved Remote Access—By installing AppleTalk Remote Access onto your server, people who work outside—clients or anyone you want—can access and use your network via a modem.
- AppleShare Print Server—AppleShare now has a print server included with it. This is a *spooler* that uses the server rather than individual Macs. Using a network spooler means that you can spool data to the server drive and free your Mac to improve its performance. Figure 13.37 shows how the spooler appears in your Chooser's window. Although it will take longer to print because a document will go from your Mac to the file server and then to the printer, you will be able to free your Mac and not have it slowed down by background printing.

Here is another trick you can use if you have a noisy printer and you want to turn off your printer but continue to print. Start the print spooler and, after it is up and

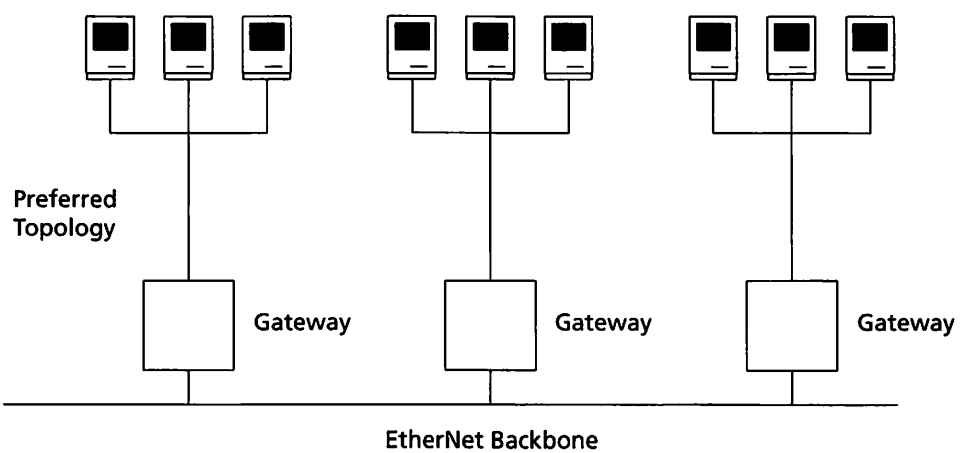


Figure 13.36 File server preferences.

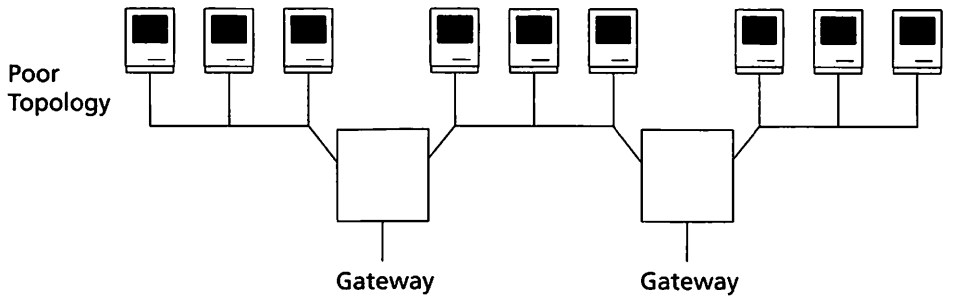


Figure 13.37 Choosing the print server.

running, turn off the printer itself. The spooler remains active so that it can be used as a printer by other Macs, but you can wait and turn on the printer later. You can print everything while you go to lunch.

PowerTalk and PowerShare

PowerShare, which is discussed in more detail in Chapter 8 "System Enhancements," is an extension of AppleShare. The combination of PowerTalk and PowerShare is used to provide a networked collaboration environment. PowerShare makes it easier to share related data that is in different locations.

A PowerShare server can be used in conjunction with an AppleShare file server or by itself. If you are thinking about installing an AppleShare file server, look into using a PowerShare server as well. Its primary advantage is being able to collect folders and servers into a single shared environment and specify who will have access to your data.

Internet Router

Apple's Internet Router is a protocol router that will let you use both Ethernet and LocalTalk (PhoneNET) on your network. The Internet Router can be used on the same Mac as your AppleShare file server, or on another workstation.

If you're going to use an Internet Router, it needs to be placed on a Mac that can handle the traffic. You also have to carefully consider how much data will be going though the router; it can quickly become the most congested machine on your network.

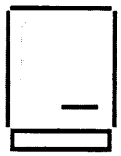
AppleSearch

AppleSearch is Apple's network document-retrieval system. AppleSearch indexes all the contents of selected documents on an AppleSearch server, and makes them available to others via the network. If you are a client and know that there is a document with a specific phrase but you don't know in which document, you can search for the document from your Mac.

When AppleSearch finds the document, you can view it, retrieve the entire document, or just select part of it. This tool is great for environments where lots of documents are created and need to be frequently accessed. It can greatly speed the process of document retrieval by eliminating the trial and error of getting one document and then another, repeatedly, until you've found the right one.

Summary

Well, that's it: Your introduction to file sharing and networks. From this chapter, you learned how to set up a basic Mac network, configure your Macintosh for file sharing, and how to mount volumes from other Macs. As mentioned at the beginning of the chapter, all you got here were the basics. If you're saying to yourself: "If those were the basics, I'd hate to see the real stuff," you're not alone. Networking is a complicated subject, and the casual user generally does not need to know much about networking.



CHAPTER 14

Avoiding Problems

If you want to be prepared for the time when when your Mac fails, read this chapter. Macintosh problems are more than inconvenient; they always seem to happen at the worst possible time—when you have a deadline on a report or a term paper, or right before that big presentation is due. If you're are not prepared, your problem will be a crisis—just like the tax preparer who, on April 15 at 5:00 P.M., had his hard disk crash. Although he was able to recover his data and get back to work by 9:00 P.M., he suffered, he aged, he became a bit grayer. The purpose of this chapter is to keep you from doing the same.

There are two ways to do this: One is to provide you with the tools for solving the most common problems you may run into. The other is to set up a maintenance program that will keep your Mac in top notch condition. Although there will never be any guarantee, you will be able to operate with the confidence that you will have a minimum of problems, and the knowledge to correct the ones that you may have. This chapter covers the following areas:

- What You Need
- Maintaining Your System
- Determining if You Have a Problem
- Getting Help (When to Call Tech Support)

What You Need

Just as you probably have a screwdriver, hammer, and pair of pliers around the house for taking care of pesky household problems and emergencies, you should have some basic Macintosh tools kicking around. To be equipped for any emergency, you should have both software and hardware tools. A lot will depend on your equipment configuration, so if a tool listed does not apply to your setup, don't spend the money on it.

Software Essentials

The software tools that you will need are various types of utilities, as well as a clean System disk. The following are three types of utilities that should be in any Mac system:

- ❖ Antivirus
- ❖ Disk and File Recovery
- ❖ Extension or Init Manager

In addition to these, you might also want to have a utility for determining what SCSI devices and ID numbers you have attached to your Mac, such as SCSIProbe or HDT Prober from FWB. A file utility that allows you to change the Type and Creator Codes of your files, such as CE Software's DiskTop, could be useful, as well as a network utility if you have a large network.

The software you choose to have on hand for troubleshooting will depend largely on your system configuration. If you don't have a network, then a network utility is a waste of money. However, almost everyone has a hard drive, and it will take only one mishap to convince you that the money spent on a disk recovery utility is well spent. Likewise, when you accidentally trash a critical file at midnight and want to retrieve it, you will wish that you had an *unerase* utility. So, as you read this chapter, be paranoid. Any of the problems described could happen to you.

Hardware Essentials

Hardware problems cannot be cured with software tools; this is an unfortunate fact of life. Now, some hardware problems will be beyond your ability to repair. Although, for some described in this chapter, the only fix will be to take your Mac to the doctor. There are all kinds of bits and pieces that can have problems or fail, such as SCSI cables, LocalTalk boxes, and terminators, not to mention hard drives and other peripherals, and some of these can use home remedies.

Once again, the hardware essentials you need depend on the equipment you have. The following is a list of the most common extra accessories you should have.

- ❖ SCSI cables
- ❖ An extra terminator
- ❖ Printer cable
- ❖ Network cables and connectors

Having extra hardware is important. The real issue, besides money, is how critical your data is and your ability to continue work if a piece of hardware should fail. In extreme cases, you should have duplicate systems so that, no matter what, you can continue to be productive. In some cases, you may want an extra hard drive to store your backups, while someone else may be able to get by with just a set of floppy backups.

Happiness Is a Clean System Disk

When things go awry, the most important software tool you can have is a clean System disk, which is a floppy with a System and Finder that will operate your model of Macintosh. You got one with your Mac when it was new, but you might want to make one if your originals have been lost. Most people find themselves in a predicament when their Mac will not boot from their hard drive, and they cannot find their current System Tools disk. If you do not have a System floppy that has the same System you are currently running on your hard drive then you should make one now. Follow the instructions in Chapter 6, and perform a minimum install of the System onto a floppy disk.

If you are using System 7.X, your Installer disk is useless as a troubleshooting tool; it is good only for installing your System. The disk you need is your Disk Tools floppy, which has a minimum install System that will boot your Mac. When dealing with several Macs, each should have its own startup floppy.

If and when you start having problems, first reach for your startup disk. As a matter of fact, make a couple of them; it never hurts to have a backup. For your startup diskette to be useful, make sure that it has the same version of the System that you are currently using, and that it is virus-free. To troubleshoot your System, you *must* have a clean startup disk.

After you make or find your startup disk, check it with a virus checker. This is a critical step, because a computer virus could be your problem and it can very easily be passed from your hard disk to your floppy disk, and vice versa. The method for checking your disk depends on the antivirus program you are using, and, here, you can run into a real catch-22.

The Viral Catch-22

Computer viruses are small programs written by programmers who have a sick sense of humor and little or no regard for others. These programs are designed to be self-replicating: They make copies of themselves and hide them in your System and on your disks. One way a virus gets transmitted is by inserting a floppy disk in a System that has been infected, and then inserting the same diskette into a noninfected System, thus passing the infection along. The catch-22 is that these highly virulent programs cause all kinds of problems, and you must make sure you are not the victim of one of them. If your hard disk is infected with a virus and your *clean startup disk* is in the same condition, you cannot troubleshoot your System effectively.

The only protection you have from viruses, since they have even been inadvertently distributed with brand-new, shrink-wrapped software, is a virus checker. Viruses can cause any number of problems, from random System errors to printing problems. If your Mac is acting in an erratic manner, it is possible that a virus is causing the problem—especially if you share disks with other people and do not use a virus checker consistently.

The only way to be sure your Macintosh is not infected is to check it with an antivirus program. Usually, an antivirus program comes with an emergency disk that

is locked and, therefore, cannot be infected. First, check your hard drive with the anti-virus program on the disk to make sure it is clean (virus-free). After checking your hard drive, you can install the program and use it to check your floppy disks, including your emergency System startup disk.

If you do not check your System startup disk, it could be infected, and using it with your Mac could infect the hard drive. If this is the case, you will never be able to determine whether your problems are caused by a virus. Once you are sure your System startup floppy is virus-free, unmount it from your Mac and lock it. This disk should be forever locked. If you upgrade from one System version to another, you should make a new startup disk at the same time.

Booting with the Disk

The sole purpose of the clean System disk is to have a System disk that has only the essential files necessary to run your Mac. The clean startup disk is the only way to determine if the problem you are trying to solve is System-related, caused by something in your System folder, or a problem with your hard drive. It can also be used to isolate some hardware problems. If it is a System 7.X disk, all you need to do is boot your Mac with it. However, if you are using System 6.0.X, then you must boot your Mac with the clean startup disk, and then move the System file that you may have on any attached hard drive into a folder other than the System folder. It is probably best to make a special folder for this purpose, naming it something like Troubleshooting, so that later you can easily find and move your System back into your System Folder.

The reason for doing this procedure with Systems prior to 7.X is because of the capability the Mac had called *Switch Launching*. With Switch Launching, a disk other than the one that booted up the Mac becomes the primary disk controlling your System. It will occur automatically if you start from a floppy and then run an application disk off your hard drive that contains a version of the System equal to or greater than the System that started your Mac. This will not happen if either System is 7.X. (If you want to switch launch, run an application from a drive that contains the version of the System you want to switch to, while holding down the command and option keys.)

If you try to troubleshoot your System using your clean System disk only to have it switch launch back to the drive that you are troubleshooting, you will have a very difficult time finding out what is wrong.

System Installation Disks

Just as you need a special disk for troubleshooting your Mac, you need quick access to your System installation disks. Most of your troubleshooting efforts will end by installing a new System on your hard drive.

Not having your System installation disks will greatly hinder both your maintenance and/or troubleshooting efforts. All too often, Mac users can't locate or don't have their System disks. These are the most important disks you have, so make copies and always have them close by.

General Maintenance

Finding a problem before it becomes a disaster is your best line of defense after making a backup of all your data. Just as your car needs periodic oil changes and tune-ups, your computer should have both hardware and software inspections from time to time. Although there are never any guarantees that your drive will not crash, you can probably catch a potential problem before it becomes serious if you check your equipment on a monthly or bimonthly basis.

This section provides a thorough maintenance plan that, if followed, will keep your Macintosh in tip-top condition. Whatever you do, take the time to check your system.

The basic drill is to:

1. Physically check your Mac and all of its connections.
2. Check it for viruses.
3. Make sure your hard drive is okay; periodically reformat your drive (at least once every year).
4. Check your drives for fragmentation.
5. Reinstall your system to keep it healthy.

If you do all of this on a regular basis, it is possible, you will never need to use any of the troubleshooting procedures in this chapter.

Periodic Inspections

When you get ready to do the software maintenance that follows, check your Mac for excessive dust in its air vents; clean the screen, case, and keyboard; and check all of your connections. If it is excessively dusty, with dust bunnies crawling out of the air vents in either your external hard drive or your Mac, you might want to take it to the shop for a cleaning. And, if you haven't cleaned the monitor screen in a while, you will be surprised at the detail you can see once it is cleaned.

To clean the monitor and the case, spray a mild cleaner onto a lint-free cloth and wipe down your Mac. Do turn it off before you start, and never spray a cleaner or any liquid directly onto any component of your computer. Besides providing the potential for a shocking experience, spraying a cleaner directly onto your Mac can discolor your equipment. After you have moved the Mac about to check for dust and cleaned it, reconnect all of your cables. By checking your cables periodically, you will be familiar with your equipment's configuration.

Viruses

Begin your software maintenance with a virus check. But, before you do, contact the company who made your antivirus software to make sure that you have the latest version. It does not make a lot of sense to check for viruses that your software cannot

detect. If your software is out of date, and you need to add virus definitions, do so. After you are sure your software is current, check all of your hard drives for infection. If you are conscientious in performing this task, you may never get infected with something that will cause grief and require hours to repair.

File Maintenance

Periodic checks of your hard drive's data structures is the best thing you can do to avoid trouble. Hard drives develop problems over time, and Macintosh hard drives are particularly sensitive. The checks in this section should be done on a monthly basis for Macs that are heavily used.

Getting Rid of Bad and In-Use Sectors

As time goes on, your hard drive will develop bad sectors. If you do not check for them and render them harmless, you will end up storing an important file in a sector that has gone bad, and it will take your file with it. Norton Utilities for the Macintosh is particularly good for this. It will find any bad and in-use sectors and will verify the integrity of your directory in a single scan of your drive. Then, it will map out any bad sectors, free all in-use sectors, and repair any minor directory damage.

Of all the periodic checks you can perform, this one is the most important. All hard drives deteriorate over time. This is something that can and will happen; unless you check your drive regularly, you are courting disaster.

Checking for Fragmentation

As you remove and add files to your hard drive, it has a nasty tendency to become fragmented. Fragmentation occurs when a file is split up and placed in noncontiguous sectors, which slows down data access. If you rebuild your Desktop and your drive does not go any faster, or it is not accessing your data as fast as it did when you first set it up, then it is probably fragmented. The more fragmented it gets, the slower it goes; and the slower it goes, the more unhappy you become.

By checking for this condition when you do your periodic maintenance, you will know how badly your drive is fragmented. In Figure 14.1, you will see that the drive is over 5 percent fragmented, with only 1.3 megabytes as the largest contiguous block of free space. The remainder of the free space is represented by the white spaces in the figure, and each is smaller than 1.3 megabytes. A good guideline for judging if your drive is too fragmented is when over ten percent of it is fragmented. When it reaches this point you might want to do something about it.

If your drive is fragmented, you have two options: use an optimizer; or back up your data, reformat your drive, and restore the data. The second choice is the safest way to defragment your drive, and it also creates a good backup so that you know

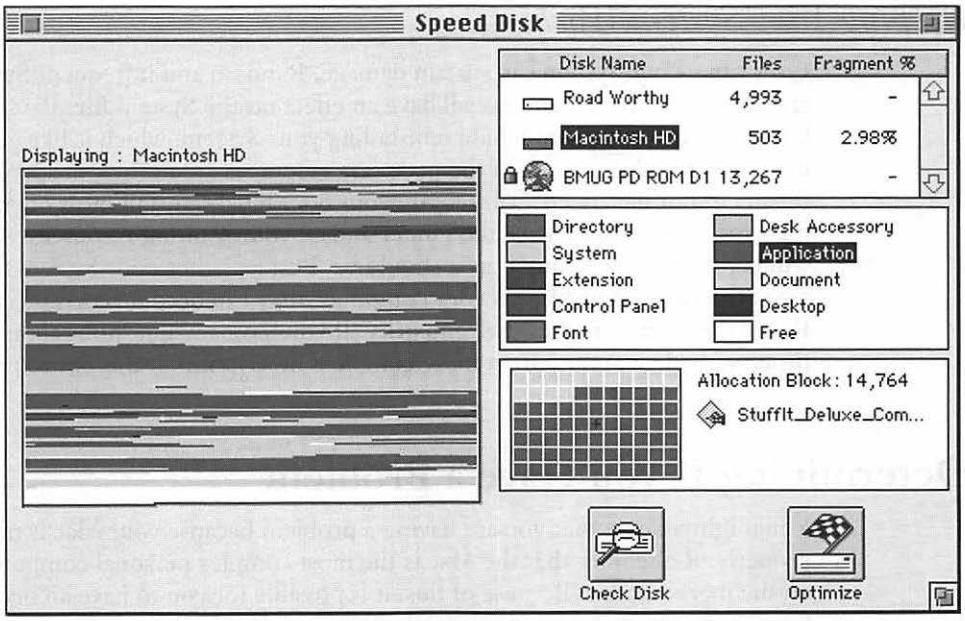


Figure 14.1 *Norton's Speed Disk window with statistics.*

your data is safe. If you use a backup utility, you will more than likely have a couple of options for the type of backup you perform. One will be an image backup, and the other a file-by-file backup.

With an image backup, your data is backed up sector by sector, which means that, when you restore your data, it will not be defragmented and you will have achieved nothing. Use the file-by-file method if you have a choice so that, when your data is restored, each file will be placed back on your drive contiguously.

If you choose to use an optimizer, back up all of your data and archive the backup (store it away and do not use the disks). This is because the optimization process lifts your files from the drive and rewrites them to contiguous sectors. The optimizer could accidentally place data in a bad sector (even though the manufacturer would vehemently deny this), and you could be risking your data. This is especially true if you have not accessed some files for a long time. Not only will your file be corrupted, but also the next time you back up your drive, you will be backing up a corrupted file. By the time you discover the damage, you may not have a good copy of the file unless you archived one prior to the optimization.

Another warning about optimization software is the possibility of losing all of your data. If your Mac should crash while the software is optimizing your drive you will probably lose all of your data and, worse, it may not be recoverable. You could use Norton's Speed Disk (part of Norton Utilities) 100 times and have no problems, but it is that *one time* that you have to be careful of. Reformatting is the safer method of optimizing your drive.

Keeping Your System Working

Over time, your System can sustain damage. Random and infrequent System errors, and improper restarts and use all have an effect on the System file. Part of your regular maintenance should include reinstalling your System, which is like getting a checkup. It makes sure all of the necessary resources are in their proper places, and repairs minor damage. It will rewrite your boot blocks, install most of your System file's resources, and replace the Finder and all your printing resources. All in all, it will make sure everything is as it should be. Besides, since your System files are used more than any other files on your computer, they can become corrupted more easily. Reinstalling only ensures their integrity. If you have any questions about this process, read Chapter 6 for a more complete description of this entire process.

Determining If You Have a Problem

You might assume that you are having a problem because your Mac is not working properly. Remember that the Mac is the most complex personal computer available on the market today. Because of this, it is possible for you to have an occasional System error, which occurs randomly. Something went wrong momentarily, and restarting your Mac will correct the problem. This is the computer equivalent of a hiccup, and not really a problem. Besides, there is no way to determine the cause if it doesn't occur consistently.

Your main concern with the occasional, random System error is data loss. If you are working on an important document, performing a database sort, or saving your work to a file when this occurs, you can lose data. You should save your work frequently and make backups of all important files.

If you are getting frequent or consistent System errors, then you have a real problem. Only after the problem becomes consistent will you be able to fix it. If you cannot duplicate the problem, your chances of fixing it are slim. You will have to live with it until the problem gets worse, which is not unlikely. If your problem does not get worse, you might be able to fix it by performing a general maintenance check, as described at the end of this chapter.

Before You Call Tech Support

Almost every hardware and software manufacturer provides technical support by telephone for their products. When you having problems with your computer, they can be very helpful and, at the same time, frustrating. Helpful, because they often know what is wrong. Frustrating, because you may have to wait a long time on hold to speak to someone and get lost in a phone voice-mail system; and, once you do get through, you may not get the answer you need. But, when you're stumped, give them a call.

The purpose of this section is provide you with an extra edge so that you can get the most from your call to tech support. If you know what information is needed by

the people at the other end of the phone, you can make their job easier and your experience more satisfying by having your questions ready in advance.

What to Have Prepared for Tech Support

The following itemizes the information almost any tech-support department will want. It will help if you make notes as the problem occurs. Keep a record of things, such as what programs were running, whether you can duplicate the problem, if it is random, what error codes you are receiving, and so on. By keeping a good record of what happens, you will have a much better chance of getting the help you need. The other information a technical-support person will need is listed in the following. If you make a list of all this information, you won't need to scramble for it when you really need it.

Machine Configuration

Put together a complete description of your Macintosh's configuration. Include the Macintosh model you are using, the type and size of hard drive, plus the amount of memory it has. Also, list the peripherals attached to your Mac, such as scanners, printers, external drives, and communications devices. If your Mac is networked, don't forget to include in your list what type of network you are using.

For each piece of equipment, include the serial number on your list. If you call the manufacturer about a peripheral device, they may want your serial number. It is really inconvenient to try and untangle your drive or modem so that you can look at the back or bottom of it while on the phone. For all SCSI devices, write down whether they are terminated.

System Configuration

In addition to your hardware configuration, you will also need the details of your System configuration. In this list, include all of your extensions and control panels and the System software version you are using. It would be a good idea to include in your list the version numbers of each of these System devices as well so that, if you are having a problem because one of your extensions is old, the version number will alert the technician.

Registration Numbers

If you are calling on a software package, chances are that tech support will want your registration or serial number before they help you. If it is a package you just purchased, they may want to register it while you are on the phone. They may even want you to fax the registration card to them. After you have decided that you are going to keep the package, send in your registration card.

Software licenses are becoming more of an issue all the time. Some companies are very particular about registration and their licenses, so be sure to read the license agreement with each software package and send in the registration cards as soon as possible.

Detail the Problem

As stated, make a record of what is happening at the time it happens. Do not rely on your memory, because you will forget the error code or exactly what you were doing when the error occurred. The more information you have, the easier it will be to fix the problem.

If you can duplicate the problem, so much the better. If not, still call tech support. Random errors are more frustrating than consistent errors but, with enough information, maybe the technician will have an answer—it never hurts to try.

Tools That Make This Easier

If you are using an extension manager of some type, you will probably have a tool that makes the process of detailing your System environment easier. Both StartUp Manager, which is part of Now Utilities by Now Software, and Init Manager by Baseline Publishers have system profilers as well. Also, System 7.5 now comes with an extension manager.

Another handy software device is one that looks at your system and makes a complete record of what type of Mac you are using and what Extensions and Cdevs you have installed. Now Utilities comes with a program called Profiler, and Apple's Personal Diagnostics will make a System record for you. Once again, if your system is unstable, you might not be able to check it when you have a problem, so run the profiler in advance of needing the information and keep the information on hand.

Apple's Personal Diagnostics, in addition to compiling information about your system, is a hardware diagnostic utility. It will check your Mac's disk drives, memory, logic board, and video subsystems for problems. It can be a handy tool, especially if you have several Macs that you're taking care of.

Calling the Doctor

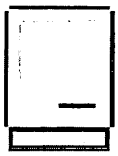
When all else fails, you may need to get professional help from a consultant who has experience in troubleshooting. If you find yourself in this position, find someone you can trust, with references you can check. When you are having problems with your Macintosh proper, your options for tech support are a bit limited. Apple relies on its dealers as the source for user information and support, but dealers are not always as informed as you might wish. If your dealer can't help you, Apple has another avenue for providing support that is not as well publicized. This is a group of consultants who are part of Apple's Consultant Relations program.

For consultants to become members, they must apply to Apple. Apple then checks their applications and references. If you don't know a consultant and need to find one, check with your dealer. If that doesn't work, call Apple and see if they have any consultants listed for your area, who have any expertise with your particular problem.

The other thing to keep in mind about consultants is that they will have full access to all of your data. If you are in a position where the data on your drive is sensitive, have consultants sign a nondisclosure agreement that states that they will not tell anyone, including their significant other, about your data. If security is a concern, be sure to protect yourself.

Summary

As the beginning chapter of the troubleshooting section, it provides you with the preliminary information you will need when it comes time to fix your System. If you follow the advice in this chapter, and have performed the maintenance discussed here, you will have an easier time dealing with problems later. Consider the procedures in this section as computer exercise; it will keep your Mac in top-notch condition so that it will be there when you need it.



CHAPTER 15

Common Macintosh Problems

If you rarely or never have problems with your Mac, you will be amazed at the myriad problems that can occur; the list is almost endless. Troubleshooting your Mac can be a lot like putting together a jigsaw puzzle. First, you need a piece or place to start. When looking for a problem with your Mac, the best place to start is with some knowledge about what can go wrong, which, in turn, will provide you with a starting point for troubleshooting your system. The symptom that you perceive to be the problem is usually just the starting point. Often, the error code or crash is just a manifestation of a problem that is somewhere else and you have to proceed backward from the symptom to the actual problem.

In addition to knowing about the specific problems you can run into, you need to develop a strategy for determining what is causing the problem. After you find the offending software or hardware component, you can then fix it. Sounds simple, doesn't it? In principle, it is; in practice, it has the potential for being one of the most frustrating experiences of your life. It is like looking for anything you have misplaced—the thing you are looking for is always found in the last place you look. Troubleshooting is no different. Sometimes your problem will be fixed by the last thing you try.

In addition to specifics on fixing a number of problems, this chapter endeavors to give you a technique to find and fix problems that are not listed. The following are the most common software and hardware problems you will encounter:

- Macintosh Error Codes
- Desktop Problems
- Viruses
- Extension and Control Panel Conflicts
- A Corrupted System File
- Application Problems
- Hardware Problems

Sometimes, these problems can be distinguished by their basic symptoms, and fixing them is relatively easy. Therefore, this section will deal with what these problems are, giving a description of your machine's behavior when they occur, and any quick fixes that may apply. If the problem is more complex, you will find more comprehensive help in the next three chapters.

This chapter contains preliminary information about troubleshooting. To use this information effectively you will need to read this chapter and Chapter 17. For some problems, the information in this chapter will be all you need, but the entire subject of troubleshooting is like a four-course dinner—this chapter is the soup.

What Is an Error Code?

An error code is the number that you see when your computer has a crash and you get the dreaded bomb dialog box (see Figure 15.1). Usually, when this happens, you have no choice but to restart your computer. The error code is the number (shown in Figure 15.1) that appears with the bomb, which is a code for the particular malfunction. Sometimes, there is a written description in addition to the error code number. In most instances, the error code is meaningless, except to a programmer in the process of writing an application.

By being familiar with the different error codes and their meanings, you might get some insight into what has gone awry and have a better idea of where to look for the problem. An example would be anyone who is having consistent *Bus Errors* with ID 01. One of the first things to look at is the version of the System software, it is quite possible that you are running a version of 6.0.X that is not really best for the Mac on which the crash happened.

There are three types of error codes: System error codes generated by the Macintosh operating System; hardware error codes that occur when a hardware malfunction has occurred (these are also called Sad Mac codes); and error codes generated by application software that will have meaning only to the software manufacturer. Consistently receiving any of these error codes and having your Mac crash is a pain, which is, of course, the reason why you will want to troubleshoot your System.

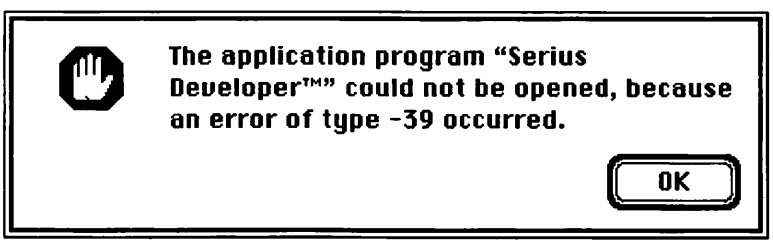


Figure 15.1 *Figure System Error dialog box.*

Apple's System Error Codes

Because the list of error codes that can be generated by the System is so large, only a few of the most common are listed here. Some of the descriptions are almost self-explanatory. The error code can provide an idea of what happened in some cases, but you should be careful in assuming they have real meaning by the time you see them. As the Mac crashes, there is a cascading effect very much like an avalanche. The error code you receive could be one of the rocks off the top or the bottom of the pile. The cause of the avalanche may have long been lost in the noise and carnage of all the falling rocks.

The following list is provided for general information, and to provide you with a better idea of all the things that can go wrong.

Error Code	Description
1	Bus error
2	Address error
3	Illegal instruction error
4	Zero divide error
5	Check trap error
6	Overflow trap error
7	Privilege violation error
11	Miscellaneous hardware exception error
12	Core routine error
13	Uninstalled interrupt error
14	I/O core error
15	Segment loader error
16	Floating point error
25	Out of memory
26	Can't launch file
27	File System map has been trashed
28	Stack has moved into application heap
30	Request user to reinsert off-line volume
40	Welcome to Macintosh greeting
41	Can't load the Finder error
51	Unserviceable slot interrupt
81	Bad opcode given to SANE Pack4
85	SysErr—Cannot find MBDF
87	Could not load WDEF
88	Could not load CDEF

Error Code	Description
89	Could not load MDEF
90	FPU instruction executed, but machine has no FPU
98	Can't patch for particular model Mac
99	Can't load patch resource
101	Memory parity error
102	System is too old for this ROM
103	Booting in 32-bit on a 24-bit system
104	Need to write new boot blocks
105	Need at least 1.5MB of RAM to boot 7.0
20000	User choice between Shut Down and Restart
20001	User choice between Switch Off or Restart
20002	Allow the user to Exit To Shell, return if Cancel
32767	General System error (catch-all used in DSAT)
Error Code General System	
–1	Queue element not found during deletion
–2	Invalid queue element
–3	Core routine number out of range
–4	Unimplemented core routine
–5	Invalid queue element
–8	No debugger installed to handle debugger command
Error Code I/O System	
–17	Driver can't respond to Control call
–18	Driver can't respond to Status call
–19	Driver can't respond to Read call
–20	Driver can't respond to Write call
–21	Driver reference number doesn't match unit table
–22	Driver reference number specifies NIL handle in unit table
–23	Requested read/write permission doesn't match driver's open permission
–24	Close failed
–25	Tried to remove an open driver
Error Code File System	
–33	Directory full
–34	Disk full

Error Code	Description
–35	No such volume
–36	I/O error (bummers)
–37	There may be no bad names in the final System
–38	File not open
–39	End of file
–40	Tried to position to before start of file (r/w)
–41	Memory full (open) or file won't fit (load)
–42	Too many files open
–43	File not found
–44	Diskette is write-protected
–45	File is locked
–46	Volume is locked
–47	File is busy (delete)
–48	Duplicate filename (rename)
–49	File already open with write permission
–50	Error in user parameter list
–51	Reference number error
–52	Get file position error
–53	Volume not on-line error (was ejected)
–54	Permissions error (on file open)
–55	Drive volume already on-line at MountVol
–56	No such drive (tried to mount a bad drive number)
–57	Not a Mac diskette (sig bytes are wrong)
–58	Volume in question belongs to an external file server
–59	File system internal error: during rename, the old entry was deleted
–60	Bad master directory block
–61	Write permissions error
Error Code Disk	
–64	Drive not installed
–65	R/W requested for an off-line drive
–67	Couldn't find valid address mark
–68	Read verify compare failed
–69	Address mark checksum didn't check

Error Code	Description
-71	Couldn't find a data mark header
-72	Bad data mark checksum
-75	Step handshake failed
-76	Track 0 detect doesn't change
-77	Unable to initialize IWM
-78	Tried to read 2nd side on a 1-sided drive
-79	Unable to correctly adjust disk speed
-80	Track number wrong on address mark
-81	Sector number never found on a track
-82	Can't find sector 0 after track format
-83	Can't get enough sync
-84	Track failed to verify
Error Code Memory Manager	
-108	Not enough room in heap zone
-110	Address was odd or out of range
-113	Address in zone check failed
Error Code Resource Manager	
-185	Extended resource has a bad format
-192	Resource not found

If your Mac is crashing and you are consistently getting one or two error codes, you can be pretty sure that you are experiencing a system-level error. Your next task would be to try to determine the cause of the problem.

Software Error Codes

Error codes generated by a particular piece of software are fairly rare. If and when you get one of these, the dialog box will usually say that the error is caused by the particular program you are using. Sometimes, however, a manufacturer will use its own numbers in place of the numbers generated by the Macintosh operating system. If you have an error code that is not included in the preceding list, it may be a manufacturer's error code, and you should contact the technical-support department of the company that wrote the package you are using.

Hardware Error Codes

These are called Sad Mac codes (see Figure 15.2), and they occur when you start your Macintosh. They mean a hardware malfunction has occurred, usually during



Figure 15.2 *A Sad Mac (very sad).*

bootup. The number under the Sad Mac icon can sometimes be used to isolate what part of the startup diagnostic procedure failed, and thus locate the specific problem.

The two types of hardware faults that are most common are bad memory chips and hard disk driver problems. Even though a problem with your hard disk driver is really software-related, the Macintosh will generate a hardware error code if your drive's driver is corrupted. Sad Mac error codes can be generated by software when the software causing the error is required to run the Mac at a preoperating system level. This happens with hard drive drivers when they are corrupted. The booting process is interrupted prior to the Mac looking at the boot blocks of your disk for its necessary startup information. Since the System is not yet loaded, it cannot generate a normal System error.

Anytime you have a hardware problem or a Sad Mac at startup, you will get the Sad Mac icon shown in Figure 15.2, with an error code. In addition to the Sad Mac, your Mac will make a chiming noise if it is an SE or greater. Although the chimes have a specific meaning, it is sufficient for our purposes to just detail the Sad Mac codes.

Interpreting a Sad Mac Code

The type of Sad Mac you might get depends on the type of Mac you have. The older Macs have a Sad Mac with one line of digits under the Sad Mac. The digits are six characters, which are hexadecimal numbers used to identify the problem. The format for the numbers is *XX XXXX*, where the *XX* is the Class Code and the *XXXX* is the Sub Code. The Sub Code corresponds to System Error codes, while the Class Code specifies if it is software or a hardware problem. The following table details the old-style codes; they apply only to Macs with 128K ROM or smaller:

Table 15.2 Sad Mac Code

CLASS CODE	REFERENCE	CLASS CODE MEANING	SUB CODE	SUB CODE MEANING
01	ROM	ROM test failed	Varying Hexadecimal Number	Identifies the ROM chip that failed usually Meaningless
02	RAM	Bus test failed	Same as above	Identifies the RAM chip that failed
03	RAM	Write test failed	Same as above	Identifies the RAM chip that failed
04	RAM	Pattern test failed	Same as above	Identifies the RAM chip that failed
05	RAM	Address uniqueness test failed		Same as above Identifies the RAM chip that failed

		SYSTEM ERROR NUMBER	SUB CODE	ERROR MEANING
0F	Software	01	0001	Bus error
		02	0002	Address error (odd address)
		03	0003	Illegal instruction
		04	0004	Zero divide
		05	0005	Check trap (CHK instruction)
		06	0006	Overflow trap (TRAPV)
		07	0007	Privilege violation
		08	0008	Trace trap
		09	0009	Trap dispatcher error
		10	000A	Line 1111 trap
		11	000B	Miscellaneous hardware trap
		12	000C	Unimplemented trap executed
		13	000D	Interrupt button pressed

This is not a complete list; however, it should give you an idea of what the codes mean. On all newer Macs, those with 256K ROM or larger, the format for the Sad Mac code occupies two lines, with the top line being the Class Code and the bottom line the Sub Code, both with the format *XXXXXXXX*. Other than there being more Class and Sub Codes, the meanings are the same as the old Sad Mac codes. The numbers just have more zeros in front of them. For example, the old Class Code for a software error is 0F, while the new one is 0000000F; the same applies to the Sub Code.

Desktop Problems

It is possible for your Desktop files to become corrupted and not operate properly. If you add and remove a lot of applications and files from your hard disk, this can be a persistent problem, causing your drive to slow down and your icons to be improperly displayed. The Desktop file holds all of the information about your files, which is displayed in the Finder. This includes icons and Finder comments displayed in the Get Info window (see Figure 15.3).

Desktop Issues

On your hard drive, you'll find two invisible files—the Desktop DB and Desktop DF (see Figure 15.4). These files are created by System 7.X and are more reliable than their System 6.0.X counterpart, the Desktop file. The Desktop files are critical to

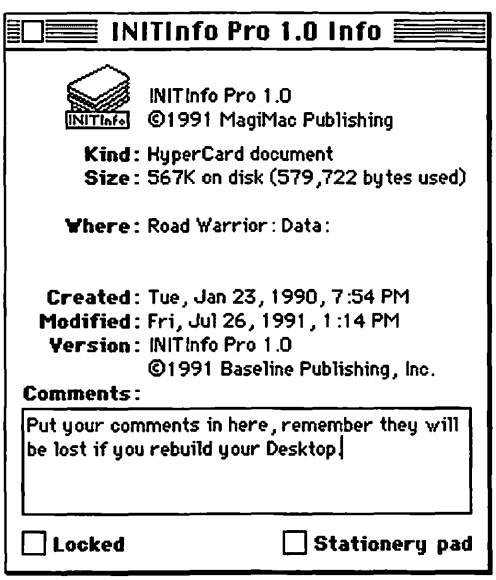


Figure 15.3 Get Info window with comments.

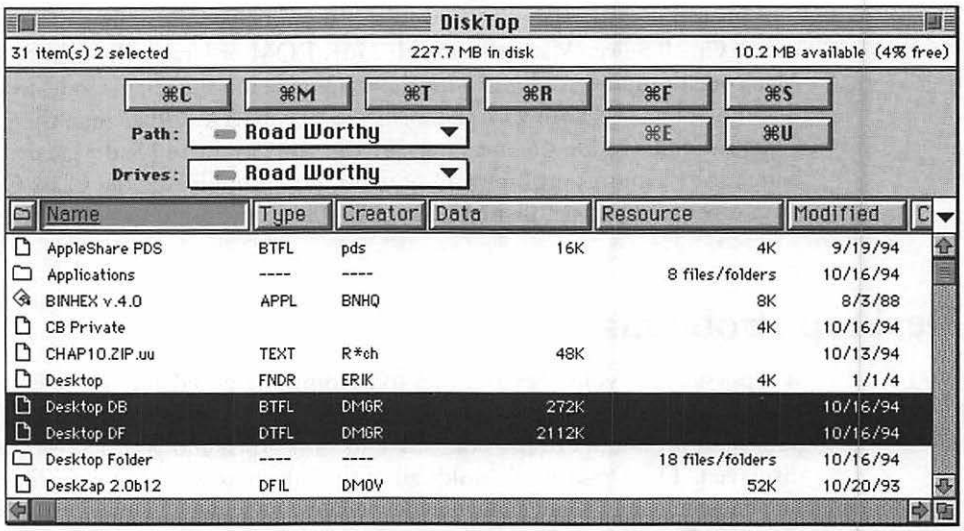


Figure 15.4 *The Desktop DB and DBF files (visible in DiskTop).*

your Mac's operation and contain information about your files, including their Get Info comments and a file's icon.

When the Desktop files become corrupted, you can have some strange problems that can vary from files losing their icons to your Mac crashing as the Finder starts. If you suspect that your Desktop file is damaged, then rebuild it. Also, rebuilding the Desktop file is a good maintenance procedure. Rebuilding the Desktop is covered in Chapter 17.

Another Desktop issue has to do with your Mac's performance. If you find that your drive is slowing down and not performing as fast as it used to, you should rebuild, this can enhance performance. Rebuilding the Desktop will also reassociate your files with their related icons and programs, eliminating any excess baggage held in the Desktop files. This maintenance procedure is even more critical for System 6.0.X, since its Desktop file is more fragile than System 7.X's.

Too Many Files (System 6.0.X)

When using System 6.0.X and large hard drives, you can have a problem by having too many files on the hard drive for the Desktop file to handle. In theory, the Desktop file is supposed to handle 6,000 files. In actuality, it can deal only with 3,500 to 4,000. When you have exceeded the capacity of the Desktop file, your hard drive will not mount. This can happen with drives as small as 300 megabytes. If you have this problem, the easiest cure is to switch to System 7.X. If you cannot switch to System 7.X, you can still use System 7.X to get your data back.

To do this, you will also need a second hard drive:

1. Connect both hard drives to your Mac.

2. Boot with the System 7.X Disk Tools disk.
3. Copy all of your data to the second hard drive.
4. Reformat your hard drive.
5. Partition your hard drive into partitions that are 300M in size or smaller.
6. Copy the data back to the volumes of the newlyformatted drive.
7. Reinstall your System.

After completing these steps, you should no longer have problems with your Desktop file.

Repositioning Your Windows

Another function of the Desktop file is to keep track of where the windows from your disks were last positioned. If you have used your drive on a Mac with a large monitor and then returned it to your Mac, which has a smaller display, you could have moved a folder window to a position that you cannot see on your monitor. If you have done this, rebuilding the Desktop will make all of your folder windows visible.

Extension and Control Panel Conflicts

Anytime you install a new piece of software, especially utility software, that puts an application or file in your Extensions or Control Panels folders, there is potential for a conflict. Extensions are not programs, because you cannot run one by double clicking on it. Extensions must be loaded as part of the System at startup.

Other types of software that often behave like your extensions are your control panel devices. Control panels load with your extensions, but some of them do not. For this reason, all control panels should be kept in your Control Panels folder inside your System folder, even though some can be run without loading at startup.

Control panels or extensions can conflict with each other or with the System. A conflict happens when the piece of software that loads into memory tries to use a memory location that is used by another extension or control panel. Every extension



System 6.0.X Extensions

In System 6.0.X, an extension is called an Init or StartUp Document. The word Init comes from the software being an initialization device. In System 7.X, initialization devices are called *Extensions*.

uses memory and stakes out its own special section of memory in an area created by the System, called the *System heap.*

System 7.X handles extensions and control panels much better than System 6.0.X. Conflicts are less frequent, but they still occur. In general, the troubleshooting techniques for either System version are the same; anything that is System version-specific will be noted.

Extension and Control Panel Conflicts

As the Macintosh boots up, it looks for the System extensions and places them in memory. Sometimes, an extension will tell the System where it needs to reside within the System heap. If an extension must reside in a specific place in memory, and another extension also wants that same memory address, you will have a conflict. When this happens, your Mac will crash as it tries to start up. The control panels that must load after your extensions at startup can cause the same types of problems, but with a slight difference. Sometimes, a control will load but it won't cause your System to crash until you run it from within the Control Panels folder.

Not all of the files in either folder (Extensions or Control Panels) get loaded. Programs, such as the Map, Sound, Startup Device, and Monitors, do not load into memory. The Cdevs that load into memory are usually third-party utilities, such as SuperClock, Adobe Type Manager, or Norton's File Saver. The way to test if a Cdev loads into memory is to remove it from the Control Panels folder, place it outside of your System folder, and reboot your Mac. After you have restarted, double-click on the Cdev. If it runs, it does not need to be loaded into memory.

Extensions, on the other hand, must remain in the Extensions folder, regardless of whether they load into memory. Since they are all memory-resident programs, device drivers or fonts will not function outside of the System folder. The items that get placed in the Extensions folder are there for a reason—either they load into RAM at startup, or other programs need the files to be located in the Extensions folder. For example, printer drivers (other than QuickDraw GX drivers) are not loaded into memory until you print a document. But, if the driver is not in the Extensions folder, the Chooser will not find it and your Mac won't print.

Unless you're using an extensions manager that will reorder the loading order of your extensions and control panels, they will load in the following alphabetical order as your Mac boots:

- ❖ All System extensions in the Extensions folder.
- ❖ All memory-resident control panels in the Control Panels folder.
- ❖ All extensions or control panels that are loose in the System folder.

A Quick Extension and Control Panel Fix

If you install a new extension or Cdev; and your System starts to crash on startup, you can be reasonably sure that the new addition to your System is part of the problem. To find out for sure, follow these steps (this procedure works only with System 7.X.):

- Turn off your Mac.
- Turn it back on and hold down the Shift key as soon as you see the Smiling Mac.
- When the "Welcome to Macintosh" appears, it should also display "Extensions Off."

If your Mac starts without a problem, you can be pretty sure that the problem was with an extension or control panel. Open the Extensions or Control Panels folder, remove the new extension or control panel, and restart your Mac. When it restarts, you will have only partially solved the problem. The next step to will be to determine which extension or Cdev the new one was conflicting with, or if it was conflicting with the System in general. This is a more complicated process and is covered in the Chapter 17.

With System 6.0.X, you will be able to remove the Init or Cdev only by booting from your *clean startup* disk. open the System folder on your hard drive, remove the new extension or control panel, and restart your system. If it starts without a problem, then you have removed the culprit. If this does not work, you need to go to the section in Chapter 17 on Bootup Troubleshooting, where you will find a complete procedure detailed.

Using an Extensions Manager

The same result as previously discussed can be accomplished by using the Extensions Manager that comes with System 7.5, or any one of several extension/startup managers that can be found in the commercial market place. With any of these packages, it is possible to hold down a hot key—usually, the Space key—as your Mac boots up, and disable any, some, or all of your extensions and control panels.

These types of utilities make it much easier to figure out what is wrong. All of the commercial extension/startup mangers will automatically disable any startup device that causes a crash as the Mac is booting up. When you restart, you will have the option of leaving it turned off or turning it back on. These utilities work the same with Systems 6 or 7.

There is one startup/extension manager made by Casady and Green called Conflict Catcher, which goes beyond all of the other extension/startup mangers. Conflict Catcher will automatically test all of your extensions and control panels for conflicts, reorder them, and restart your machine with a configuration that works. In addition to providing automatic conflict testing, you can manually adjust how your Mac loads extensions and control panels.

A Corrupted System File

It is possible for any file to become corrupted. If you are having frequent yet random System errors, one of the causes could be a corrupted System file. To determine whether your System is causing the problem, turn off or remove all of your non-Apple extensions and control panels from your System folder. This can be done eas-

ily using an extensions manager; otherwise, follow the preceding instructions for disabling your extensions and control panels. If you're using System 6.0.X, move all of your extensions and control panels out of your System folder while booting from your clean System disk; if you place them in another folder it will make life easier.

After you have disabled all of the extensions and control panels, restart your Mac. Use it with the applications with which you have been having problems. If it continues to crash, you have a problem with the System file, Finder, or application. Any one of these files could be damaged, or you could have a problem that is related to your hard disk's directory.

To make the final determination, you will need your clean startup disk. Boot from it and run your application(s). If your Macintosh still crashes, you can assume it is your application that is corrupted and needs to be replaced. If you are using System 6.0.X, boot from your floppy, then move the System file from the System folder on your hard drive to a temporary folder; then reboot from your floppy. (Your Mac will not boot from the hard drive if the System is not in the System folder.) This will prevent your Mac from switch-launching back to the hard drive.

If your Mac runs without problems while booted from the floppy, then your System file is probably corrupted. Perform a clean System install and see if the problem goes away. Otherwise, if your Mac still crashes, replace your application and try again. If you still have no joy, go to Chapter 17 for more System and application troubleshooting techniques.

Application Problems

In the last section, a quick reference was made about problems with applications. Just as System software can be the source of your misery, your programs can cause problems also. The following are possible problems you could have with your programs:

- A corrupted or incompatible application
- A corrupted data file
- A conflict between an application and a System element

When you have a problem with a specific application, it will usually crash or behave strangely when it is run. The range of symptoms can be very diverse, from slow or inadequate performance to crashing your Mac.

Hunting down application problems can be very frustrating because you also have to troubleshoot your System in the process. There is no way to rule out a System problem unless you're running a stock Apple system. Only after you have a clean System can you troubleshoot an application.

Incompatible Applicatons

When you have an application that is bad, it will usually crash regardless of what you do. This is especially true of incompatible applications. If you install a new program

and every time you try to run it, it crashes, you can be fairly sure that the program is incompatible with your System.

Remember that just because a program crashes does not mean that anything is wrong with your Mac or System; it just means that the program will not work with your System. Be aware that repeated attempts to run a program that is incompatible can cause problems.

To determine if a program is truly incompatible, follow these steps after the program has crashed with your regular System configuration:

1. Boot with your extensions or a clean system.
2. Reinstall the program.
3. Run the program.

If your Mac crashes, call the program publisher's technical-support department. If the program is shareware or public-domain software, you'll have to write it off.

Corrupted Applications

Usually, when a specific application you've been using starts giving you trouble, it is because the program itself has suffered a mishap—a Preference file could be corrupted or you might have been fortunate enough to have found a minor bug. Also, if you have installed a new utility, extension, or control panel, the new arrival could cause a problem with the application.

Many applications have support files, such as dictionaries and file translators, and sometimes they use extensions or other types of files. If any of these files or the application file gets damaged, your program will cease to work properly. The procedures for troubleshooting an application can be found in Chapter 17.

Corrupted Data Files

Some application problems are very easy to figure out. If your Mac crashes every time you attempt to open a specific file, there is a very good chance that the file is your problem, not your System or even the application. Try opening a different file or creating and new one. If you don't have any problems with another file, you can be fairly sure that the problem was caused by the file and it probably needs to be replaced.

To double-check a problem with a file, copy the file onto another disk and try running the file again. If, while you're copying the file to another disk, you receive an error dialog saying that the file could not be read, it means that the CRC check failed as your Mac was reading the file. There is a possibility that the problem is a temporary hiccup; try copying it again. If the problem persists, its failure to copy could be an indicator of more serious problems, such as a bad sector or a corrupted directory. At this point, leave the file alone. Don't trash it and don't use it. Go to

your backup, get a copy of the file, and try using it. It is possible that your copy is damaged, especially if it is an old file.

There are several ways files can go bad. Often, a file is damaged when your applicaiton crashes while the file is open. Old files are also susceptible to damage due to disk deterioration. Usually file problems are indicative of a problem with your hard drive. If you suspect that the problem is more than just a bad file, perform a maintenance check on your hard drive.

Hardware Problems

As a rule, hardware problems are straightforward and easy to diagnose. You know you have a hardware problem when your Mac doesn't start, the monitor makes funny noises and flickers, a key does not work on the keyboard, or smoke comes from one of your peripherals. These are all immediate and obvious problems.

Where hardware problems become a bit more obscure is when you have a Sad Mac when the computer is first turned on every morning. Or, you can work for several hours, and suddenly your Mac or the video goes out; yet, when you come back after a couple of hours, it is fine. Another type of problem is where your Mac worked perfectly yesterday, but today it will not turn on. All of these consistent and intermittent problems could be hardware-related.

The Mac is a well made machine, but there are times when it will break. Because the Mac is usually a reliable machine, hardware problems are not usually suspected, which makes them harder to detect. Chapter 16 goes through detailed steps for troubleshooting your hardware. The rest of this section will look at some problems that could be hardware- or software-related. Since it is software that drives your Mac, sometimes what appears to be a hardware malfunction is really a software problem; the same applies to the software.

This section offers some specific suggestions, but the real intent here is to alert you to some of the problems and to get you to think about what might be going on. As some of these problems are discussed, think about possible solutions.

When Hardware Is Most Likely to Fail

There are two times when your Mac is particularly vulnerable to hardware problems. The first is when it is newly unpacked. All new components are more likely to fail than those that have been in service for several months. The other problem time comes after you upgrade your system in some way, such as adding memory or installing a new hard drive.

After your Mac has been operating with a specific configuration for a period of time, changing it can result in failures with the power supply or other components. This is largely because new additions put an additional strain on the power supply. Although this is not a common occurrence, it does happen from time to time. So, if you just had an upgrade and your Mac goes on the fritz, you can bet it is your upgrade.

Intermittent Failures and Memory

One possible hardware problem you are likely to encounter is a bad memory module. Sometimes, a problem with memory is an intermittent failing, occurring after your Mac has been on for a couple of hours of when you first start it up. This is due to the components (memory chips) expanding as they warm up, or contracting when they cool down. The result is that a component fails to make a good connection, causing the Mac to register an error.

If the problem happens after the Mac has been on for a while, it will crash with a System error and then register a Sad Mac when you try to restart it. After it has had a chance to cool down, it will start as if nothing had happened. The opposite is true if the component is not connecting while your Mac is cold. It will register an error on the first few startup attempts, then, either after you have left the power turned on for a few minutes or after a couple of startup attempts, the Mac boots and all the problems disappear.

In either instance, you should take your Mac into an Apple Authorized Service Center and have a technician check out the problem. One way to minimize the chance of this problem developing is to leave your Mac on all the time. Leaving it on minimizes the wear and tear on the internal components caused by repeated heating and cooling. The risks in leaving your Mac on are about the same as leaving a television on. I have left my Mac turned on for about three years, turning it off only when I'm out of town for a week or more.

However, if you choose to do this, you must have a good surge protector that will shut off your Mac if your power drops below a safe operating level. This is to prevent your Mac from being struck by a power surge while you are away, or even while you are there working on it. Usually, a power surge (an extra high amount of power coming through your lines) occurs after there has been a drop in power.

Power Supply Failures

The power supply is the component in your Mac that converts your household current to a voltage that your Mac can use; it is a *step-down transformer* that takes the power down from 110 volts to 12 volts. When the power supply burns out, your Mac will not work. It can also fail intermittently as previously described.

The Mac Plus is especially susceptible to this type of failure. As a matter of fact, if you have a Mac Plus, you can bet that your power supply will fail because Apple did not put a hearty enough power supply into the Plus. When this occurs, the first indication of a problem will be with your monitor behaving erratically—it could start to shrink, either vertically or horizontally, get wavy, or pulse. Sometimes, it will just display a single vertical line with no image, because the board that controls your video is part of the same board as the power supply.

To get your Mac Plus power supply repaired, find an independent technician to do it. An Apple Authorized Service Center will want to sell you a new one for two to three times the cost of a repair, while the independent technician will actually repair the power supply.

The Mac Plus is also more susceptible to problems when its memory is upgraded than are the other Macs. Upgrading its memory puts an additional drain on the power supply; whoever upgrades your Plus should also adjust the power supply for the additional power drain. This is also the reason why your Plus should not have an internal hard drive installed, even though a creative technician may say it is possible.

Logic Board Problems

If you try to start your Mac and you do not hear the startup *boing*, you have a logic-board problem that can be fixed only by an Authorized Apple Technician or an independent computer repair technician. If your Mac is under warranty, go to your Apple Dealer; otherwise, it will probably cost less to find an independent repair technician to fix your problem.

Hard Drive Problems

Next to problems with your System, hard drive problems are the most common. This is because everything your Mac does is controlled by your hard drive or, rather, the software on your hard drive. If you have a hard drive that is unreliable, your Mac will be unreliable; anything serious that goes wrong with your hard drive will have an immediate effect. If your hard drive crashes and asks to be reinitialized, you know that you have problems; if you reinitialize it, you have worse problems. These things happen more frequently than you might imagine. For this reason, your first line of defense against hard drive problems is a current backup of your data. If you're not maintaining a regular backup schedule, you are begging for a time-consuming and possibly expensive data recovery attempt—all data recover procedures are attempts; it is not a successful data recovery until you've gotten all of your data back intact.

The problem with data recovery is that you never know if it works until the data is actually retrieved. If you've hired someone to perform the recovery, you'll have to rely on his or her judgement, and, even if the technician cannot get your data back, you will still have to pay for the time—$60 to $100 per hour can be a very hefty bill.

Otherwise, hard drives are not suspected of being the cause of problems as often as they should be. Any problem your Mac has that appears to be System-related can actually be a hard-drive problem. What is worse is that you can check a hard drive using the best software utilities around and not detect a problem, which is why you should reformat your drive at least once a year and preferably once every six months.

Usually, to find a hard-drive problem, if it is not detected by your hard-disk utility (Norton Utilities or Central Points MacTools), you have to go through the entire System and Application troubleshooting process. Only after you've eliminated the other possibilities will you suspect your drive.

If your drive is booting and your System is running, it does not mean that you don't have a hard drive problem. The obvious problems are a total crash as described at the beginning of this section. Drives that will not start your System at all are

always immediately suspect, but, beyond the obvious, you'll have to carefully consider all of your Mac's symptoms and then decide what's going on.

The more subtle things that happen to hard drives are corrupted directories, damaged drivers, and data errors caused by bad sectors. All of the low-level data structures mentioned in Chapter 10 can sustain damage. And, just because they are damaged, it does not mean that your Mac will not work. People have run their Macs with drives that have problems for months and have never known. But, these same drives will one day crash unless the trouble is detected during a maintenance check.

If you have any of the following symptoms, you should check your hard drive immediately:

- ❖ Files or folders that cannot be found
- ❖ Files or folders that cannot be trashed, even though they are not locked
- ❖ Files or folders that disappear
- ❖ Files or folders that will not open
- ❖ Frequent System errors while in the Finder, especially after you've reinstalled your System.
- ❖ Requests to repair a hard disk at startup

When you experience any of these problems, perform a complete maintenance check as described in Chapter 14, "Avoiding Problems." After the maintenance check, the next step is to troubleshoot your SCSI bus as described in Chapter 16, "Macintosh Hardware Problems." Finally check Chapter 18, "Disk Crashes and Data Recovery."

Hard Drive Failures

Most hard drive problems are software- or System-related; although this is not always the case, it should be your first assumption. However, if you use computers with any regularity, you will also probably experience a hard-drive hardware failure. Hard drives, on a hardware level, can have a variety of problems. External hard drives have been known to have power-supply failures, head crashes, logic-board failures, and *stiction* problems (stiction is a computer term for sticky platters in a drive; see Chapter 18 for more details). An internal drive can also suffer from all of these ills, except for the power supply, since it is powered by the Macintosh power supply. Sometimes, it is not easy to tell what has happened, other than that the drive suddenly no longer works.

Most of the hardware-level problems you could experience are detailed in Chapter 18. Here, it is enough to say that hard drives are electromechanical devices and that they can and do fail. There are only a couple of things you can do to determine its condition without removing the drive from its case or from the Mac and checking it out. If the drive is under warranty, removing it will void your manufacturer's warranty, so checking it at this level will not be covered here.

Basically, if you cannot access your drive with your formatting software, it is in serious trouble. If your cables are properly attached and you cannot access your drive

with its formatter, you probably have a dead drive. However, caution should be exercised before you pronounce any drive dead. If it has a stiction problem, it is still possible to make it work and get your data. Also, if you are getting the Sad Mac, your drive is not dead—it has just lost its driver.

Internal Hard Drives

It is harder to tell if your internal hard drive has died rather than your external drive, because you have no fan to listen to and cannot hear the drive power up. You will have to rely on software or a technician to make a final determination.

Forcing the Mac to Ignore the SCSI Bus

If your hard-drive driver (or drivers) is bad, you will find yourself in a catch-22. You will not be able to turn on your Mac without a Sad Mac, and, if the drive with the bad driver is external, the only way your Mac will start is to remove the drive. However, Apple anticipated this problem and provided a means to access your drive.

If you have a bad driver, you can boot your Mac by using a clean startup disk. Make sure your formatter is on it, and hold down the Command+Option+Shift+Delete or Backspace keys simultaneously as you start your Mac. Although you have to be manually dextrous to accomplish this procedure, once your fingers are capable, your Mac will ignore the SCSI bus as it starts. Your Mac will boot off the floppy, and none of your hard drives will be mounted.

At this point, use your formatter to reinstall your driver. Of course, you have to know which drive ID is the one with the bad driver. Follow the instructions that came with your drive, and be careful—the process of reinstalling your driver can cause all of your data to be lost. So, if you need to perform this procedure, be sure to recover your data first (see Chapter 18 for more on data recovery).

Printer Problems

The report is done and you have to present it in ten minutes. You select Print from the File menu and nothing happens. Now, you're in trouble. What do you do?

Most printer problems result in the inability to print. It is very easy to know that you have a problem, but figuring out why is another story. There are several reasons why you could have printing difficulty—they range from being out of toner or ink to a bad cable connection to improper system configurations. Chapter 16 has a section about printer troubleshooting.

Network Difficulties

Like printing problems, network problems are immediately manifest. This manifestation is the inability to connect to any of your network resources. If you're working

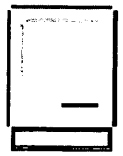
in a collaborative environment, network problems can be serious because they prevent access to data that people need.

Networks are a combination of wires, connectors, your Mac's System software, and configuration settings. All of these elements make them difficult to troubleshoot. Once again, you'll find network troubleshooting discussed in Chapter 16.

Summary

This chapter lightly touched on some of the problems your Mac can have. Sometimes, Macintosh problems are like a flat tire on a car. You go out one day to drive somewhere, get into the car, and it is not until you've started down the road that you hear and feel the flat tire. And, even then, you may go a block or two before it really dawns on you that something is wrong.

You don't think much about car problems because you're usually so familiar with your car that you know when something is not right, even when you don't know what the trouble might be. But, with your Mac, you may not know when things are wrong. From the information in this chapter, you will have a better idea of what can go wrong and what to look for. Think about what you've read in this chapter. Try to figure out some of the principles at work, and think about what your Mac is doing or not doing when these problems occur; it will help as you set forth to fix any problem.



CHAPTER 16

Macintosh Hardware Problems

This chapter will discuss some of the most common hardware problems and their solutions. This section will briefly look at how to distinguish hardware malfunctions from software errors. Usually, when you have a hardware failure, there is very little question that something is very wrong. The only question is—what? This chapter will help you through the process of figuring out what is wrong and how to fix it in the following sections:

- First Steps (Hardware Troubleshooting)
- Peripheral Troubleshooting
- Troubleshooting the SCSI Bus
- Printers
- Troubleshooting Your Network
- Special Considerations (or Odds and Ends)

Because your Mac is a combination of hardware and software, some of these sections discuss software and configuration problems.

First Steps (Hardware Troubleshooting)

Hardware problems are either very obvious or very subtle. There are times when the Mac just dies, and there is no doubt that the machine has suffered some type of mishap. If you plug in or turn on your Mac and it begins to smoke, there is little doubt that something is broken. The nontechnical terminology used by technicians for this type of occurrence is "The Mac fried, or smoked."

If your Mac isn't smoking but it's not working, either, you have to determine what's wrong. If your Mac does not completely boot, review the entire startup sequence described later in this chapter. By carefully watching your machine boot, you will be able to determine at what stage of the startup process the error is occur-

ring. If you accurately pinpoint where your Mac crashes, you will know what caused the crash.

The next section will outline the basic troubleshooting steps that you have to go through when dealing with hardware problems; then, the actual steps for fixing some of the problems will be discussed.

Basic Troubleshooting Steps

As elementary as this may sound, the first things to check when something is not working properly are each of your hardware connections. Say that you have a Macintosh of any type and a couple of hard drives all connected to a master switch so that all you have to do is turn on one switch and go to work. One morning, you sit down and turn on your master switch, your Mac goes *boing*, and all you get is the blinking disk icon with a question mark.

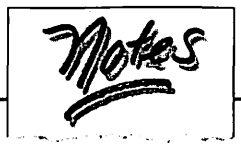
Assuming that everything is as you left it, you would not discover that your external hard drive had somehow had its power cord disconnected during the night. As a result, you could spend several hours trying to get your system working and conclude that something was broken; you would probably end up calling someone in to fix it. Always make sure that everything is connected properly; check each of the following:

- Power switches
- Power cables
- Printer cables
- Modem cables
- Network cables
- Monitor cables
- SCSI cables

Turn off, disconnect, and reconnect the cable for each device; then, turn it back on. Work methodically, going from left to right or right to left, and check each cable. Do this yourself, or you will have no way of knowing if everything is connected. This step is so critical, that if you call a good consultant because your system is not starting, the first question he or she will (or should) ask is: "Is the power turned on?" followed by "Is the Mac plugged in or the (generic) device connected?" The consultant will probably ask you to physically check these items while you're still on the phone. Check your cables and power sources; only once these are eliminated as potential problems can you go to the next step.

Troubleshooting Sequences

In this section, you will find a set of troubleshooting sequences. The sequences contain steps and are designed to help you either fix the problem or identify what is wrong; this process is usually quick and simple. Four troubleshooting sequences are presented; each sequence is a starting point. Pick the one you need; it is possible that you will have to work through a couple of the sequences.



When Connecting and Disconnecting Cables

Whenever you connect or disconnect cables from your Macintosh or any peripheral, shut down your Mac and turn off the power. Failure to do so could result in damage to your Mac and possible injury to you. *Never* connect a cable to any device that is turned on.

The only time these sequences can't be used is when your Mac has a monitor problem. If you have no visual display, it is best to take your Mac to an Apple Authorized Service Center, unless you have a second monitor you can use to test your Mac.

To troubleshoot your Mac, start with Sequence One and follow the instructions.

Sequence One

If your Mac is not starting at all, with no light and no sound, the first part of the troubleshooting process involves these steps:

1. Disconnect and reconnect all of your cables and connections. If your Mac has an internal NuBus or PDS card that you can easily access, open your Mac and make sure the card is firmly seated. (You'll find instructions for installing a card in your Macintosh's manual.) When your Mac is not responding in any way, check the power outlet by plugging in a lamp. Make sure that, if the outlet is controlled by a light switch, the switch is turned on.
2. After checking all cables and your power source, try starting your Mac again.
3. If it doesn't start, there is only one more question: Were you trying to start the Mac using your keyboard's Power On switch? If you were, try to start the Mac with its power switch.
4. If the Mac starts, your problem is either your keyboard or the keyboard's cable.
5. If the Mac does not start, with no noise of any kind or video image, you will have to take it to an Apple Authorized Service Center.

Sequence Two

If your Mac displays some sign of life, such as a Sad Mac icon, musical chimes, video flickering, or some other noise (anything other than the blinking disk icon), follow these steps:

1. Complete step 1 from Sequence One.
2. Did you get a Sad Mac?

3. If the answer is yes, was the Sad Mac accompanied by musical chimes?
4. If the answer is yes, is the Sad Mac's class code 0F?
5. If the answer is yes, then go to Chapter 18, "Disk Crashes and Data Recovery."
6. When the answer to any of the questions for 3, 4, or 5 is *no*, disconnect any external SCSI devices and start over.
7. On your second pass through this process, one of the following conditions will occur:
   - ❖ Your Mac starts. If your Mac starts, go to the Section, "Troubleshooting the SCSI Bus," later in this chapter.
   - ❖ Your Mac did not start and the Sad Mac code was the same as the first time. This means that you probably have a memory SIMM which has gone bad, or there is a problem with your logic board; take your Mac to an Authorized Service technician.
   - ❖ Your Mac did not start and the Sad Mac code is different, but it does not have the class code 0F. This means that the Mac's internal diagnostics have found more than one problem. This could also indicate an intermittent problem which is heat-related; take your Mac to an Authorized Service technician.
   - ❖ The Mac starts to display the Smiling Mac icon and then crashes. This means that the driver for the internal hard drive is probably damaged; go to Chapter 18, "Disk Crashes and Data Recovery."

Sequence Three

Your Mac displays the Question Mark icon, or it repeatedly displays the Smiling Mac icon.

The Question Mark icon means that the Mac's internal diagnostics all passed, but the Mac does not recognize the internal hard disk. The repeating Smiling Mac icon means that your Mac recognizes the hard drive but the System file is missing or damaged.

You should:

1. Perform Step 1 from Sequence One.
2. Insert your clean System floppy disk and start your Mac. Any one of the following events could occur:
   - ❖ Your Mac starts and your hard drive is visible on the Desktop. Your System file and/or your boot blocks are corrupted; go to Chapter 17, "System and Application Troubleshooting."
   - ❖ Your Mac starts and, as it starts, it crashes and you receive the Sad Mac icon. This means that your hard disk's driver is damaged; go to Chapter 18, "Disk Crashes and Data Recovery."

- ❖ Your Mac boots and everything appears to be okay. If you disconnected any SCSI devices, you probably have a SCSI problem; go to the section, "Troubleshooting the SCSI Bus," later in this chapter.

Sequence Four

If when you boot with a clean System floppy, your Mac does not start or rejects your clean System floppy, try these steps again with another floppy disk:

1. If your Mac rejects the floppy disk, it either does not have a System file or the floppy disk is damaged.
2. Listen to the floppy drive to see if it is reading the disk; you will hear the drive make noise as it reads the floppy disk.
3. If you hear the Mac finish reading the floppy—this process could take several minutes—and you do not see anything on your monitor or your Mac still doesn't boot, you either have a video/monitor problem or some other problem that exceeds the scope of this book. You'll have to take your Mac to an Apple Authorized Service Center.

   During this last sequence, if you need to eject your floppy disk, hold down your mouse button as you turn on the Mac. The first thing your Mac should do is eject the floppy disk.
4. If your Mac starts, the first floppy you were using was bad.

Peripheral Troubleshooting

When you have only one Mac and one of your peripherals decides not to work, you can have a real problem; it is very difficult to test a peripheral without a second Mac. If your Mac is the problem, you can't completely test the peripheral. An example problem would be a modem that suddenly fails to work: You don't know whether the problem is the serial port on your Mac, the modem, the cable that connects your Mac to the modem, or the software you're using, so you have to check four things before you have an answer.

When you have a problem with a peripheral device, the cause will usually be a poor connection or a bad cable, which is why you should always have at least one extra cable for each of your peripherals. If you have a peripheral that isn't working, always test it with a different cable and, if possible, on a different Mac. It is also advantageous if you have another peripheral that you can use to test the Mac as well.

The following sequences can be used to test a peripheral device. Start with Sequence One and follow the instructions. If you are testing a serial device and have Power Book with only one serial port, or a Power Macintosh, make sure AppleTalk is turned off. Open the Chooser desk accessory and turn AppleTalk off before starting these sequences.

Sequence One

Check your cable and power connections as follows:

1. Disconnect and reconnect all of your cables and connections. If your peripheral is not responding in any way, check the power outlet by plugging in a lamp. All peripherals have some type of light as an indicator so that you can tell if they are receiving power.
2. If the peripheral is receiving power, make sure it is turned on.
   - ❖ If your peripheral indicates that it is not receiving power, call the manufacturer's technical support department or take it back to the computer store.
3. Some peripherals have the capacity to perform a self-test; all printers and some scanners have this ability. If your device has this ability, perform a self-test (check its manual for instructions).
4. Double-check all of your peripheral's software settings.
5. Try to use the device.

Sequence Two

If the device does not work, suspect the cable:

1. Use a different cable with the peripheral.
2. Repeat Steps 2 through 4 in Sequence One

Sequence Three

If the device does not work, try using it on a different Mac if you have access to one:

1. Repeat all of the steps in Sequence 1 using a different Mac.
2. If the peripheral does not work on a second Mac, it is a fair bet that the device is broken.
3. If the device works on the other Mac, then your problem is either your Mac or your software.

Sequence Four

If the peripheral is a serial device, try using it on your Mac's Printer port:

1. If you're connected to a network through your Printer port, open the Chooser and turn off AppleTalk.
2. Connect the peripheral to your Printer port.
3. Set the peripheral's software so that it will use the Printer port.
4. Try using the device.

Sequence Five

If your device still doesn't work, the problem could be its software:

1. Reinstall the peripheral's software.
2. Repeat steps 2 through 5 in Sequence One.
3. If you were able to test the peripheral on another Mac and it worked, the problem is either your Mac's logic board or your System software.

If your System has not been crashing and works properly for everything else, it is fair to assume that the problem lies in your Mac. But, before you can even be sure that the Mac is the problem, you will have to test it with another similar peripheral. If the second peripheral doesn't work, then the problem is quite likely your Mac and it is time to call an expert or take your Mac to the service center.

Troubleshooting the SCSI Bus

Your SCSI bus will probably cause you more grief than any other aspect of your Macintosh system, because the SCSI bus, although a standard, does not always work according to the rules. Some manufacturers do not adhere to the standards, and Apple implements its own modifications as well.

Problems with the SCSI bus range from devices not being accessed to shutting down your entire system. Since it is possible to have up to eight devices on the SCSI bus, you could have a problem with the bus itself, any of the devices on it, or any of the cables connecting the devices.

Some of the the information that follows has been covered in Chapter 10 in relation to hard drives. Since SCSI principles are the same for hard drives as well as other SCSI devices, the following is a brief review, with the addition of a section on bad SCSI chips.

SCSI Cable Problems

If you are lucky, your problem will be only a bad SCSI cable. But, if you do not have a good or new SCSI cable to use in the troubleshooting process, you could spend hours trying to find the problem. This is why you are urged to keep a new or known good one on hand.

A known good SCSI cable is one that has been used on your system or another system without problems. If you know your cable is good, the problem is somewhere else.

SCSI Termination

Technically, your Macintosh SCSI bus should be terminated at the beginning and end of the SCSI chain, with the first and last physical devices. Your Macintosh is not considered a part of this equation unless you are using a Quadra or a PowerBook. In the case of the Quadra, your Mac is the first device on the chain and is already termi-



PowerBooks and the SCSI Bus

If you're using a PowerBook, you may have to experiment with SCSI termination. The internal hard drive in a PowerBook is only partially terminated, and PowerBooks do not provide termination power to the SCSI bus. When you connect external SCSI devices to your PowerBook, the rules say that the first and last external devices must be terminated, and it is likely that one of your external devices will have to supply termination power.

Also, there are some SCSI devices that will be incompatible with your PowerBook. In a sense, all bets are off. If you try the recommended termination scheme (the first external device and the last) and your Mac won't boot or you can't see all of the drives, you will have to experiment by removing termination and maybe even using a third terminator in the middle of the chain.

Because PowerBooks can be a problem, before you start experimenting back up your PowerBook. SCSI problems can cause hard-disk directory damage on any Macintosh, and you stand a chance of damaging your hard drive's directory and other low-level data structures. Be careful.

nated. This means that your internal hard drive is not terminated. The only device that should be terminated is the last one in the chain. Also, the Macintosh IIfx requires a special terminator on the last device in your chain, which can be obtained from your Apple Dealer.

Any internally terminated device on your SCSI bus must be turned on, or none of your SCSI devices will be visible to the Macintosh. On too many occasions, someone has turned on their Mac, had no hard drives, and thought they were all dead. Their only problem was that an internally terminated drive was not turned on, or the power cord had slipped out. Always check for this if you are having a problem.

There are times when an external SCSI device will act as if it is terminated, although it is not. Two devices that act this way are the NEC CDR 35 and CDR 36 portable CD ROM drives. Both of these drives have caused people to lose hair, along with their patience, because these drives will not work in the middle of the chain, with an external terminator attached, or with an internally terminated drive between the drive and the Mac if the Mac has an internal drive.

Microtech Scanners can also act in a similar manner. Even though Microtech says they are unterminated, in most circumstances, the scanner acts as if it is terminated. So, it, too, has to go on the end of the SCSI chain without an external terminator.

Finally, a cable can sometimes act as a terminator. The cables that are most likely to do this are long cables of six feet or so. If you find a cable that causes this problem, take it back to the manufacturer and get a new one. All in all, if you are having trou-

ble and you arrive at a solution that works, even though it does not conform to the standard rules, follow the philosophy: If it works, don't fix it.

SCSI ID Numbers

The rule governing SCSI ID numbers is very simple: You can have any SCSI ID number from 0 to 6, with no two numbers being duplicated on your SCSI bus. If you duplicate SCSI ID numbers on your SCSI bus, none of your devices will work and you might even get the Sad Mac on bootup. If you need to determine what your ID numbers are, follow the instructions in your manual for setting the ID number, use a software utility, such as SCSIProbe, or contact the manufacturer of the device and have them help you.

A Bad SCSI Chip

The hardest problem to troubleshoot is a SCSI chip that has gone bad on your logic board. In most instances, if the chip that controls all SCSI communication fails, no SCSI device will work on your machine but will work on another Mac.

Another way that the SCSI chip can fail is when only your internal drive works; all external devices fail to operate but are fine when attached to another Mac. In either of these instances, you will need to find a technician who can repair your logic board. If you elect to take your Mac to an Apple Dealer, they will tell you that you need a new logic board because they do not perform component or board-level repairs. There are also companies who provide exchange logic boards at prices much lower than your Apple Dealer's. One such company is Pre-Owned Electronics in Bedford, Massachusetts.

The Troubleshooting Steps

You will have found your way here if your Mac was not booting properly or if you were having problems with a SCSI device. In principle, troubleshooting the SCSI bus follows steps similar to troubleshooting peripheral devices. Where the steps differ is in the number of devices you have to troubleshoot. To troubleshoot SCSI devices and the SCSI bus, use the following sequences. If you are testing multiple SCSI devices, write down the SCSI ID number and whether the device is internally terminated for each device you test.

Sequence One

Run your Mac without any external SCSI devices:

1. Disconnect all SCSI devices from your Mac.
2. Start your Mac and confirm that it and the internal hard drive are working properly

3. If the Mac is okay, check the SCSI ID number of your internal drive(s) and go to the next sequence. Otherwise, go back to the Hardware Troubleshooting Section or to Chapter 18, "System and Application Troubleshooting."

Sequence Two

Testing a device for internal SCSI termination:

1. Check the SCSI ID of the external device. Change the number if it has the same ID as one of your internal drives. Usually, your internal hard drive will have SCSI ID 0 and the CD-ROM will be SCSI ID 3.
2. Check the SCSI termination of the external device. If it is not terminated, put an external terminator on it.
3. Attach the device to your Mac.
4. If you do not know whether the device is internally terminated, turn it off.
5. Turn on your Mac; if you see the Blinking Disk icon, the drive is internally terminated.

Sequence Three

Testing the device:

1. Turn on the external device.
2. Turn on your Mac.
3. If your Mac boots and the device mounts or works, it is okay.
4. If your Mac does not boot there is some problem with the SCSI device, your cable, or its driver.

Sequence Four

Change the cable:

1. Put a different cable on the SCSI device.
2. Repeat Sequence Three.
3. If your Mac does not boot, there is still some problem with the SCSI device, your cable, or its driver:
   - ❖ If you know the cable is good because it works on other SCSI devices, you have a known good cable and that is not the problem. It is possible to have more than one bad SCSI cable.
   - ❖ If you're trying to connect a hard drive, you probably have a bad driver. Perform the steps in Sequence five.
   - ❖ If you're using a SCSI scanner or printer, reinstall the device's driver software on your Mac and repeat Sequence Four. If the device fails to work after a second try, it probably has a problem and needs to go in

for repair. Before sending the device off for repair, test your Mac with another SCSI device.

- If this is the only SCSI device you're using, there is a possibility that your SCSI chip is bad and not working with external devices. You will have to take both your Mac and the device into the shop.

Sequence Five

Testing an externally terminated hard drive's driver:

1. Connect your hard drive after double-checking the SCSI ID number; do not turn on the drive.
2. Turn on your Mac.
3. After the Mac boots, turn on the external hard drive.
4. Run the formatting software for the external hard drive.
5. You can use the formatter to mount the disk or reinstall the drive's driver; reinstalling the driver is recommended.
6. If you mount the drive *before* reinstalling the driver and the Mac crashes, then the driver is bad. Repeat this sequence and reinstall the driver.
7. If you mount the drive *after* reinstalling the driver and the Mac crashes, then the drive needs to be reformatted. To recover data from the drive, go to Chapter 18, "Disk Crashes and Data Recovery."

Sequence Six

Testing an internal terminated hard drive's driver:

1. Connect your hard drive after double checking the SCSI ID number. Turn on the drive.
2. Insert your clean System disk into the Mac.
3. Turn on your Mac and hold down the Option+Command+Shift+Backspace or Delete keys simultaneously. You should be holding the keys down when the Mac sounds it startup chime; this is difficult to do and you may have to repeat these first three steps several times before you can start.
4. After the Mac boots, release the keys.
5. Run the formatting software for the external hard drive.
6. You can use the formatter to mount the disk or reinstall the drive's driver; reinstalling the driver is recommended.
7. If you mount the drive *before* reinstalling the driver and the Mac crashes; then the driver is bad. Repeat this sequence and reinstall the driver.
8. If you mount the drive *after* reinstalling the driver and the Mac crashes; then the drive needs to be reformatted. To recover data from the drive, go to Chapter 18, "Disk Crashes and Data Recovery."

This is a very difficult sequence to perform. The command key sequence forces the Mac to ignore the SCSI bus during the boot sequence, but your drives will mount when the Mac boots. It is possible, even likely, that the external drive will try to mount as well. If the external drive's driver is damaged, it is likely to crash your Mac as it mounts. There is a way around this, but it is a *try at your own risk* procedure. If you try this and fry your Mac or your hard drive, you are 100 percent responsible for the damage: Repeat the steps in Sequence 6, but start with step 2 and, in between steps 4 and 5, perform these steps:

- Turn on the hard drive.
- Connect the hard drive to the Mac.

Then, proceed with the rest of the steps; reinstall only the driver—do not try to mount the hard drive.

Sequence Seven

After reinstalling the driver:

1. Turn on the external drive.
2. Boot your Mac.
3. If everything works, the drive is okay.
4. If the Mac crashes as the external drive mounts, it will have to be reformatted. To recover data from the drive, go to Chapter 18, "Disk Crashes and Data Recovery."

Sequence Eight

Testing additional devices:

1. If you have several drives or SCSI devices, you need to test each one before you put your SCSI chain back together.
2. Perform Sequences Two through Seven for each device you have.

Sequence Nine

After you've tested each device, you can put your SCSI chain back together. Repeat this sequence for each device that you're putting onto your SCSI bus. As you add devices to your SCSI chain, make sure your total cable length does not exceed 18 feet.

To rebuild your SCSI chain:

1. Check the device's SCSI ID number against those of the other devices on your SCSI chain. Make sure each device has its own number.
2. If the device is not the last one on the chain (please note the exceptions in the Termination section above), make sure it is not terminated.

3. Make sure the last device on the chain is terminated either externally or internally.
4. Insert the device into your SCSI chain.
5. Turn on all of your external SCSI devices.
6. Turn on your Mac.
7. If your Mac crashes as it starts up, double-check steps 1 through 6; then, try again.
8. If your Mac crashes again, or a device is not visible on the Desktop through its software or in a SCSI checking utility, you probably have a bad cable.
9. Repeat steps 1 through 6 while using a different cable.

If your Mac still fails, start Sequence Nine over, using the last device added as your first device. At some point, you will find the other conflicting device. It is likely that you have the rare pleasure of having two SCSI devices that do not like each other and are incompatible. At that point, you will have to talk to their manufacturers to see if they are indeed incompatible or if one of them is defective.

If you go through these sequences in the order in which they are presented to troubleshoot your SCSI bus and still have trouble, take your entire System to the shop or have a technician come to you. There is little else that can be done at this point, except for one more trick: You can try experimenting with the order of your devices in the SCSI chain. Sometimes one drive has to physically precede another before it will work. This, too, is a rare occurrence but it does happen.

Printers

When you have problems printing, there are a few quick steps you can go through to find the problem. Usually, this is not a difficult process, but you must start with a plan. This section will cover troubleshooting problems for both an ImageWriter and a LaserWriter. The steps are basically the same, though the causes of the problems can differ greatly.

Defining and Fixing the Problem

Before you can fix anything, you must figure out the problem. With printing, the problems are fairly straightforward. Use the following to plot your troubleshooting strategy.

If you can't print at all, your problem can be either software or hardware. Unless you know your problem is software-related, you will have to rule out hardware as a problem first.

Checking the Hardware

1. First, check whether or not the printer is turned on.
2. If the printer is turned on, turn it off and then turn it back on.

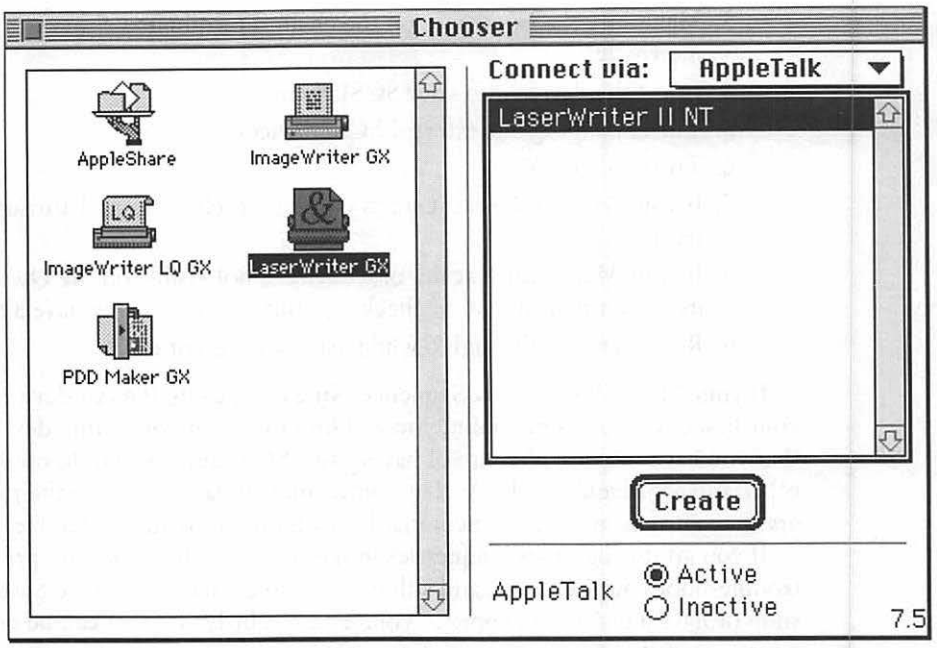


Figure 16.1 *Locating your printer in the Chooser.*

3. If it still doesn't print, check the cables. Is everything attached properly? If you are using an AppleTalk printer, you must be able to see it from the Chooser, as shown in Figure 16.1.
4. Open the Chooser and highlight the type of printer you want to use.

When you open the Chooser, if you do not see your printer icons, then your Mac has started from a System other than the one you normally use. This means that you either started from a disk drive you normally do not use, or you have a second System somewhere on your hard disk. If this is the case, restart from the Disk Tools disk included with your System disk and trash the second System folder. After you do that, reinstall your System just in case there was damage done in the process.

If you can see the networked printer in the Chooser, then you know that the Mac and the printer are connected and communicating; your problem is probably software-related, not hardware.

If you are using an ImageWriter or a printer that is not an AppleTalk device, perform the following steps to see if you are having a hardware problem:

1. Is the printer on-line? Almost all printers can be taken off-line, which means that they are turned on but not communicating with the Macintosh. A printer that is off-line will talk only to itself. If you do not know how to tell if your printer is on-line, check your manual.
2. Force the printer to run a self-test. Every printer has the ability to test itself. If you do not know how to do this, follow the instructions in the printer's manual; if it completes the self-test, the printer is probably okay. If the

printer fails the self-test, then it is probably broken. Proceed with the next step. If the next step is not the problem, you will probably have to take the printer to the shop for repairs.

3. Check the ribbon, toner cartridge, or ink cartridge. Several models of printers will not work if they sense that they are out of their imaging media. This is not the case with the ImageWriter; it will happily print even if the ribbon is dry.

By this point, you will know if you have a hardware problem with your printer.

Software Problems

The first rule for troubleshooting a printer software problem is to start from the Finder. Since you are probably having a problem printing from a specific application, you are actually several layers away from knowing where the breakdown is taking place.

The following steps are essential in pinpointing the area where the trouble is actually occurring:

1. Turn off any print spooler you are using. If you have a print spooler installed, it is possible to print all day long and have the output disappear into the printer and never make it out. Turn off the spooler; if you are using a StyleWriter or a laser printer, turn off the background printing in the Chooser (See Figure 16.2). If you can't turn off the spooler, remove the extension or Cdev that makes it work from your System folder, and reboot your Mac.
2. Go to the Chooser and select the printer. If your Mac forgot which printer to use, it may not print. When you use the print command, the Print dialog box always contains the name of the device to which you are trying to print. Figure 16.3 shows a Print dialogue box.
3. Print a window from the Finder. For the moment, forget the problem you are having with any application that will not print. Go to the Finder, open a folder or disk window, and use the Print Window command from the File menu in the Finder (Figure 16.4).

If your printer prints at this point, either you have fixed your problem or the problem is within the program you were using. The other possibility is that everything you were printing is queued up in your print spooler. If this is the case, turn on the spooler and use it to check the queue; maybe all you have to do is instruct it to print.

If, on the other hand, you cannot print from the Finder, your problem will be either with your hardware, or your System. If you are absolutely sure that everything is connected properly,and that the printer is turned on and it is on-line, then reinstall your printer drivers. The best way to do this is to open your Extensions folder, view the contents by type, find your Chooser extensions, and trash your printer drivers. After you have put them in the trash and emptied it, reinstall your System. When you reinstall your System, be sure to install the printers you want. After you have installed the System, repeat the preceding steps. If it still does not print, perform a clean install of your System, as described in Chapter 6.

Once you have a clean System, if you still can't print, you probably have a hardware problem. Try printing from the modem port (ImageWriter or StyleWriter

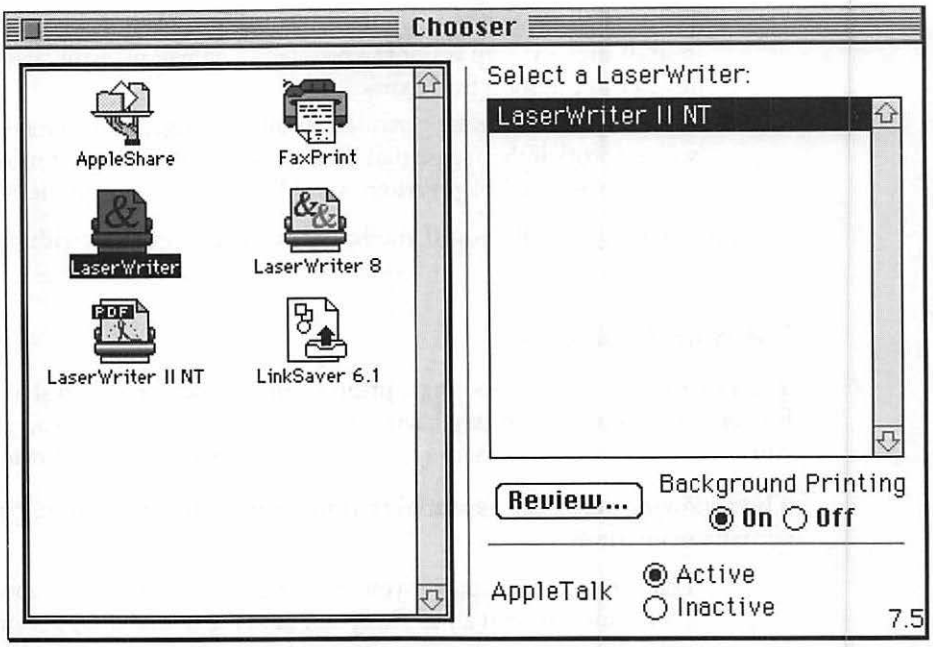


Figure 16.2 *The background printing option.*

only). Make sure you change the port setting in the Chooser. If you can print from the modem port but not from the printer port, you need to have your Mac repaired; this is a rare problem—the author has seen it happen maybe once in five years.

At this point, if you still can't print, you may want to take your Mac and printer to a local service shop. There is a possibility, however, that the problem is a bad cable; if you have an extra one or can get one from another Mac, try swapping cables. But most home users have only one cable, printer, and Mac. Since you would have to go to the computer store to get another cable, you might as well take your System with you. The dealer can help you troubleshoot the problem and check the cable at the same time. You might be saving yourself a second trip if it turns out there is some obscure problem with your Mac or printer.

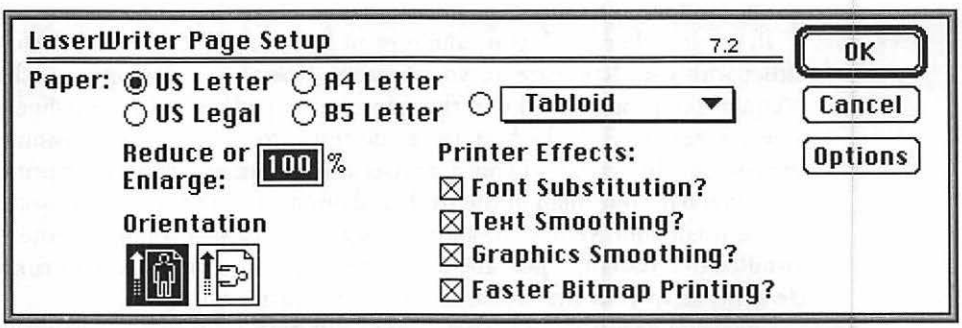


Figure 16.3 *The print dialog box; notice the printer type and name.*

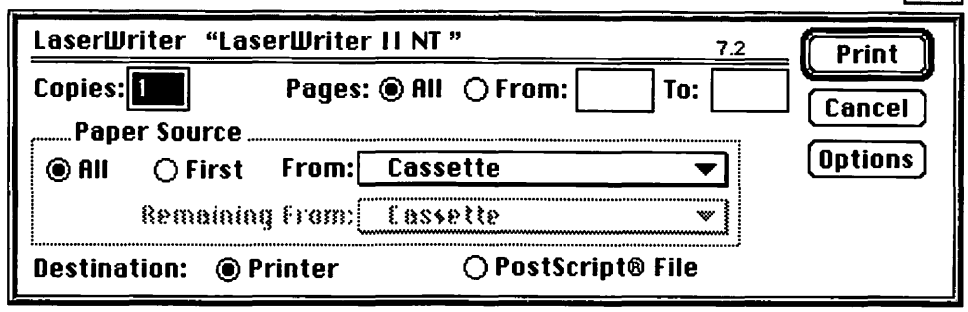


Figure 16.4 The Print Window command.

If you have a second Mac, hook it up to the printer and see if it works. The likelihood of two Macs not working with a printer are very slim. If both Macs fail to print, then your printer is having the problem. Likewise, if your printer works with the second Mac, the problem is the original computer. Check out your System folder, check for multiple System folders, and reinstall the System.

If you can print from the Finder and everything looks okay, see if the problem still exists with your application. Start the program you were having trouble with and try to print. If you cannot, the problem is with the program—some program setting is incorrect or the application is corrupted and should be reinstalled.

If you reinstall the program and it still does not print, make sure you installed it properly, and check the instructions in the manual for printing. If you are sure everything is correct, then call the application's technical-support department. As long as your Mac can print from the Finder, there is nothing wrong with it. Do not let a tech-support representative convince you that it is your computer rather than the program.

If you are at this point and have not been successful, pack up the works and take it to the shop, or call in your repair guru to fix things. Remember that there are no guarantees; it is possible to have done all of the preceding things and still have a problem. The author is not responsible for the success or failure of any of these steps because of all the possible variables involved. However, experience implies that following the given procedures will remedy 98 percent of all printing problems when the printer will not print.

Getting the Printing Output You Want

If you are printing but not getting the output you want, the problem can almost always be determined by what the printer is or is not doing. Before we start, it is assumed that you can print and that the output is recognizable. If you keep getting total garbage from the printer, go to the previous section before starting here. Your problem is quite likely to be hardware- or System-related.

Most of the time, poor output can be remedied by replacing the toner, ink cartridge, or ribbon if the output is too light, splotchy, or otherwise inconsistent. Other common problems are poor output caused by a dirty printer—this is especially true with laser printers. This section assumes that your printer is not dirty. With that assumption, some common output problems will be discussed according to printer type.

ImageWriters

There is one problem you will run across with your ImageWriter II: It will consistently have a lot of paper jams. You will be merrily printing along and, all of a sudden, the paper will twist and everything will become a mess. There is no surefire fix for this, but you can keep the problem to a minimum by loosening the tractor lock on the right-hand side (as you are facing the front of the printer). When you load your paper and adjust the tractors, don't lock the one on the right; let it float freely. This will prevent 80 to 90 percent of the jams.

Another problem you may run across is where every line you print has a thin, straight, white line through it. Should this occur, a pin in your printer head has died. The pin is no longer functioning and, as a result, it is not moving in and out as your printer prints. Using a head cleaner will fix this if the head is dirty and the pin just got jammed. If, after you get a head cleaner from your local dealer and clean the printer head, the problem persists, the pin is probably broken. In this case, you will need a new print head. This is not cheap, but costs much less than a new printer.

Another problem people sometimes have is not making the proper selections in the Page Setup window. If you are not getting the results you want, double check the settings. Be sure to check the paper size and page orientation, then check your Print Window options. The one setting that could drive you crazy is the Draft mode setting. If you use draft, the printer will not print with the fonts you have selected, nor will your page formatting mean anything. In draft mode, the printer just prints the text of the document using its internal font.

Another tip: Do not try to save paper when your print job is done. After you have printed your document, hit the select button to take the printer off-line, then hit the form-feed button. This will advance one page through the printer. Now, rip off the pages you have printed and put the printer back on-line. Do not roll the page backward to try to save it; this puts strain on your printer and will only rip the feed strips for the tractors.

Laser Printers

Laser printers are great but they, too, can have problems. Once again, most problems are due to a dirty printer, but there can be other problems.

The most common print-quality problems are due to an empty or almost-empty toner cartridge. Blotchy or inconsistent toner coverage can be temporarily fixed by removing the cartridge and gently rocking it. Hold it on each end and rock it vertically (do not tip it!) to distribute the toner more evenly. The one caution that goes with this method is that the toner is also a lubricant, so don't run the cartridge when it is too dry.

Here are some common print-quality problems:

- Printing too dark or too light—Every laser printer has an adjustment that determines how much toner is used when you print a page. If your output is consistently too light or too dark, try using this adjustment. It is in different places on different laser printers, so you will have to look at your manual.

  If your printer has a Canon CX engine (check your manual), it will not do a good job of printing large areas of black. Unfortunately, there is nothing you can do about this limitation; it is just a fact of life with these printers.

- Thin vertical lines—A vertical, black line can be caused by a scratch on the drum, lint on the corona wires (the very thin wires that horizontally cross the paper path), a dirty fuser cleaning pad, or a scratched fuser roller. One way to try to get rid of the problem is to clean the inside of the printer. Follow the instructions in your printer manual or those that came with your toner cartridge. If that does not work, change your toner cartridge and cleaning pad. Also, be sure to check your fuser rollers; if they are damaged, get them repaired. Should none of these suggestions work, have your printer serviced.
- Thin horizontal line—A thin horizontal line can be caused by some of your printer's memory having died. If the line is in the same spot on each page, have it checked in the shop. If the line is in random locations, it could be a scratch on your toner drum.
- Consistent paper jams—The most common reason for consistent paper jams is dirty rollers inside the printer. This is caused by wear and tear over time and a good cleaning will take care of it.

Something else you should be aware of is that, on many custom-printed letterheads, the paper is coated with a fine dust to keep the paper from sticking together as it is printed. This dust then coats all of the rollers inside your printer. Check with the printer about your letterhead paper; they might be able to provide a paper with less powder. Otherwise, maintain a fairly rigorous cleaning schedule, say, once a month.

Maintenance

Your printer is the most abused piece of equipment you have. Everyone has a tendency to ignore their printers until they are hungry and wanting toner, ribbons, or paper. It is only when they start to act up that we pay any attention to them.

You should set up a maintenance program for cleaning your printer. If you have a laser printer, have someone come in regularly and clean it. Whenever you change the cartridge, follow the instructions that come with it and perform a minicleaning of your printer.

The ImageWriter is not as difficult to take care of. Pick up a head cleaner and use it regularly. Keep all large paper particles out of it, and take it in for a professional cleaning once a year. With a little maintenance, your printer will serve you better and longer.

Troubleshooting Your Network

Finding out what is wrong with a network can drive you crazy. You can have problems with System software, cabling, network software, or just clogged traffic patterns. Finding out what is wrong with your network can be an all-day task.

If you are going to seriously troubleshoot networks, have some network tools that will make your job easier. In addition to the tools, have a plan of action worked out as well. To help you on the way, this section will first look at strategy and then some of the tools that might be useful.

Your Strategy

The strategy you use for troubleshooting depends on your network's configuration. If you are using a daisy-chain configuration, your entire network will probably go down if you have a break in a cable connection. This is especially true with an EtherNet network using coax (Cheapernet) cabling.

When the entire network goes down, start by segmenting the network, breaking it in half to see if either half operates independently. If you can isolate the section where the problem exists, you can fix the problem by a process of elimination; this whole process is one of dismantling and rebuilding the network. While you are doing this, it helps to have a cable tester that will check the integrity of your cables, and a utility, such as NetCheck, to see which machines are actually on the network. If you are troubleshooting a PhoneNet system, check the individual cables. If one of them got pulled, the stress could cause the connection in an RJ-11 jack to become loose. LocalTalk cables have the nasty habit of coming apart where a connector is used to join two lengths of cable.

The following are general guidelines to follow when tracking down a network problem:

- First, always to check your cabling; make sure all connectors and terminators have tight fits. Also, check how close your cabling is to any other electrical equipment. Closeness to power lines, outlets, and other electrical devices can interfere with the network. Always use shielded wire on all your networks.
- Next, see which machines use see the networked laser printer or file server. If none of your Macs can access these from the Chooser, check the termination at each end of the daisy chain.
- Start breaking the network apart. Try splitting it in half and then quarters until you find the section that has the problem.
- If you are having problems transferring files, but all networked devices can be accessed, you probably have a System problem. Try to isolate the Macintosh that is having the problem, and reinstall its System. Do not forget that the server could be the machine that is messing up.

Troubleshooting a hub configuration is usually easier than a daisy chain, because hubs can be controlled with ports being turned on and off. By turning ports on and off, you can determine where the problem and correct it.

Tools

Before you start out on any network troubleshooting endeavor, you should have a network map. If you know how the cables are laid out and which cable is connected to which Mac, you will be many steps ahead of the process.

You should also have a line tester for whatever type of network you are using. AESP makes an inexpensive but good cable tester for phone line with RJ-11 plugs and for LocalTalk cable. Using this, you can quickly tell if you have a bad or improperly made cable. EtherNet cable testers are more expensive, especially for coax cable.

If you do not have a cable tester, you can always use a voltmeter with a continuity checker, which is good for testing all twisted-pair cabling. A continuity checker sends a small electric current down one of the wires. If it makes it to the other end, the volt meter will beep, letting you know the wire is good. By checking each wire, you can tell if your cable is good.

A software tool that will make life easier is a utility, such as NetCheck (there are other, similar tools that will also work). By using a software utility that will show you the name every Mac or other device on the network, you can quickly see which Macs are not showing up, this could save you hours of searching.

If your intent is to optimize your network, you will need a utility that can analyze your network's traffic flow. If you have two machines at opposite ends of the network (in a daisy chain) that keep exchanging lots of data, they will slow the network functions for every device in between. If you determine that this is the case, you can reconfigure the network so that these two machines are more directly connected, and thereby break up the bottleneck.

Installing an EtherNet backbone can also work wonders on slow networks, but optimization is almost more experimentation than anything else. You will need a history of the network's traffic to identify where the problems are occurring. Once you know where the problems are, you can fix them. Otherwise, you will be proceding by guesswork, which will take a lot of time and luck.

Special Considerations (or Odds and Ends)

There are a few odds and ends of which you should be aware. Since the foregoing primarily covers the CPU, hard drives, and the SCSI bus, miscellaneous problems with monitors and other special problems will be covered here.

Monitors and Displays

If your monitor should suddenly fail to display, examine the cables and connectors. If, after checking the power and cables, your monitor still does not work, turn off the power and let it cool down. After an hour or so, turn it back on. If it works, your monitor's power supply or logic board has a loose component, which must be repaired by a dealer. If your monitor does not come back to life, the same solution applies.

With a color monitor, if you lose one of your colors, there are only two things likely to cause the problem: One is that a cable has broken and needs to be replaced; the other would be a malfunctioning color gun in the picture tube. The cable is easy to replace; a malfunctioning gun will require more professional care.

PowerBook Nicad Batteries

Most Macintosh PowerBooks are powered by nickel cadmium batteries, which keep it running and rechargeable. The problem with nicad batteries is that they can suffer from what is called a *memoring* effect.

The memoring effect happens when you consistently use your PowerBook for an hour and then recharge the battery. After this has happened enough times, your battery will operate only for an hour before it needs to be recharged, even though it should last for two to three hours.

To prevent this from happening, use your PowerBook until the battery is dead, then recharge it. If you do this on a consistent basis, you will avoid the memoring effect of the nicad battery. There is also a recharger sold by Lind Electronic Design that will perform a deep discharge on your PowerBook batteries prior to recharging them. This is really a necessity if you rely on your PowerBook and its full battery life, but don't use the full capacity of the battery on a regular basis.

If you have a PowerBook 100, you will have the same problem, but there is no recharger to take care of this problem for you. You will have to be careful and perform your own battery maintenance.

If you have extra batteries for your PowerBook, package them carefully when you travel. If you accidentally short the battery across the positive and negative leads, you could cause a fire. To prevent this, there is a plastic carrying case for these batteries. If you need one, contact your Apple dealer.

Dead Batteries

Every Macintosh has a battery, which keeps the settings you select in Apple's control panels in the Macintosh's Parameter RAM. If the battery goes dead, any of the parameter RAM settings you have adjusted revert to their default factory setting. The best way to determine if your battery is dead is to check the internal clock on your Mac. If it does not keep time after you set it, turn off your Mac, and then turn it on again, then your battery is dead and needs to be replaced. On all Macs except the Macintosh Plus, the battery is inside the machine. On the Plus, it is behind a little panel on the back of the Mac.

The Macintosh II and any Mac that is started by pressing the power on switch on the keyboard, can do so only if the battery is working. If your Mac worked one day and won't start the next, you could very easily have a dead battery; but check the power cord first. The batteries in all Macs since the SE are long-life batteries that should last from five to seven years, but they do not always last that long.

To get a new battery, you will have to purchase one from your dealer and install it yourself, or have your dealer install it. In several of the first models of the Mac II, the battery was soldered in place. If yours is soldered in place, have your dealer put in a battery socket so that the battery can be easily replaced. All Macintoshes that use the power switch have a battery holder, so replacing the battery is not as much of a problem. If you are squeamish about opening your Mac even to replace a battery, let your dealer do it.

Fixing It Yourself

Fixing your hardware problem yourself can be a challenge. Unless you are comfortable with opening up your hard-drive case or your Macintosh, do not try to fix a

hardware problem on your own. And if you do decide to poke around inside your computer, observe these cautions:

- If you are unsure of what you are doing, stop.
- Discharge any static electricity you may be carrying by touching something metal before putting your hands into the computer.
- Never force anything when you are installing or removing a component.
- Do not leave any metal, such as screws or tools, on the logic board when you finish.
- If you turn on the Mac while it is open, be very careful not to short out something.
- If opening a compact Mac, be careful of the CRT, it is easy to break the nipple and ruin your monitor. Also, do not discharge the CRT unless you know what your are doing and why. The CRT stores enough power to destroy your Mac and cause you serious harm, so be attentive.
- If your computer is under warranty, opening it will void the warranty and you will have to pay for any repairs.

Hopefully, these cautions will be enough to keep you out of your machine; if you decide to open it you have been warned.

Fire and Smoke

If your Macintosh suddenly takes up the bad habit of smoking, it will need serious surgery. Should it ever make a loud buzzing sound, emit smoke, or catch on fire, turn it off and take it to the repair shop. Your problems are beyond the purview of this book.

Summary

Hopefully, you won't have to use this part of the book much. But if you do, you now have the information you need. There are many problems that haven't been covered in this chapter—troubleshooting could easily be a book of its own; be aware that there are other problems you could face. However, from the information in this chapter and this part of *Macintosh Revelations*, you should be learning how to deal with even some unexpected and unexplained problems.



CHAPTER 17

System and Application Troubleshooting

Troubleshooting your Mac is work, and when it comes to troubleshooting your System or an application, it is a lot of work. However, this chapter will take some of the tedium and out of troubleshooting your System. System troubleshooting is more difficult than applications troubleshooting. As such, this chapter contains more information about System troubleshooting. However, if you pay attention to the techniques used for System troubleshooting and apply them to applications troubleshooting, you'll have all of the knowledge you need to correct most problems you'll encounter.

The topics for this chapter are:

- First Principles (Troubleshooting Theory)
- Troubleshooting Techniques
- Bootup Problems (When Bits Collide)
- Using a StartUp Manager
- System Troubleshooting
- Applications Troubleshooting

First Principles (Troubleshooting Theory)

If you watch someone who has lots of experience with Macs, the process they go through when troubleshooting a problem can appear to be mystical. Often, you need only to describe your problem to them and they will know what is wrong and how to fix it; don't let this scare you. Everyone starts in the same place with the same knowledge—little to none. It is only through experience and patience that the Mac experts learn their craft. If you have the patience and take the time, you, too, can become expert enough to solve your own problems.

In addition to patience and experience, a Macintosh expert also has an arsenal of software tools that make his or her job easier. You should have some basic tools that will remove some of the guesswork involved in the task at hand. With these tools, you will be able to find and correct common problems while eliminating other possible problems. (These tools were discussed in Chapter 14, "Avoiding Problems." There is a method for checking out a Mac to find and isolate a problem. You will develop your own technique for finding your difficulties and there is no *correct* method, only methods that work. In developing your own technique, remember one basic principle: If you tried it once and it didn't work, don't try it again—you'll get the same result. Remember, you are working on a *dumb* computer.

Finally, you will want to know why your computer malfunctioned; everyone asks why this or that problem occured. There is an answer to this question, but you would have to ask a programmer and/or systems engineer to answer it, and, even then, you may not get one. Quite often, your satisfaction will come from fixing the problem without knowing what caused it.

Remembering Where You Have Been

When troubleshooting your System, especially if you are new to the process, make a map detailing what you have tried so that you don't repeat yourself. It is just like getting lost in the woods; you need to take precautions to ensure that you are always going in a specific direction. If you do not use a checklist (like the one shown in Figure 17.1) or some other method to make sure you're not going in circles trying to find your Macintosh problem, the process will be more frustrating and, of course, will take more time—time which you do not have, because the problem probably occurred at the worst possible time, anyway.

Try It Once

If you know that you have tried something to solve a problem (for example, your drive won't start) that didn't work (such as switching a SCSI cable), why do it again? There is a natural and human tendency to assume that *X* must be the problem, and, as a result, you will keep trying the same thing over and over again. Resist this temptation.

If whatever you try does not work the first time, the only reason for trying it again is to ensure that you performed the procedure properly the first time. If you tried it once and you know that you did it properly, try something else. This will also help prevent you form going in circles.

Troubleshooting Techniques

This section sets forth the actual steps for troubleshooting your system. First of all, you should know the following about your system.

Your troubleshooting starts with the following steps, in the order presented:

1. Which System version you are using. There are different troubleshooting techniques for System 7 and System 6.0.X, so you need to know what system is installed on your hard drive.

Troubleshooting Checklist Equipment Configuration	Description	Serial Number
Type of Macintosh		
Amount of Memory		
SCSI Device ID #0		
SCSI Device ID #1		
SCSI Device ID #2		
SCSI Device ID #3		
SCSI Device ID #4		
SCSI Device ID #5		
SCSI Device ID #6		
Type of Printer		
Type of Network		
Additional Equipment		

Enviroment

System Verision		
Problem Program Version		

Problem Description (include all error codes)

Actions Taken (Can You/Have You...)	Y/N	Add any additional steps you try
Backed up your data?		
Duplicate the problem?		
Checked for viruses?		
Reconnected Cables?		
Boot from clean floppy?		
Run program from a clean system?		
Turned off or removed extesions?		
Turned off or removed Cdevs?		
Reinstalled system?		
Replaced your system?		
Isolate the problem hardware device?		
Attempted a data recovery?		
Checked the recovered data?		

Figure 17.1 Troubleshooting checklist.

2. All cables and connections have been checked and reattached. Only when you are sure that your cables and connections are secure should you attempt to troubleshoot your system. If you skip this step, you might spend hours looking for your problem only to realize that you have wasted your time chasing phantoms.
3. Your System is virus-free. Only if your system is virus-free can you proceed with any troubleshooting. If your problems are caused by a virus, it can be very hard to detect the problem and fix it. The problems caused by viruses can be too erratic, and there are enough viruses in the Mac world so that they add extra and unnecessary confusion to the process.
4. Your hard drive's directory is uncorrupted. The only way to know for sure that your directory is OK is to check it. If you have a bad directory on your hard drive, use a disk drive utility and fix it before proceeding. After fixing your directory, back up your drive, reformat it, restore the data, and see if your problem persists.
5. You have your clean System disk ready to use. The first step in finding a system software problem will be to use your clean System disk. Without one, it will be impossible to isolate a System problem.

Isolating the Problem

The hunt for your problems must follow some form of logic. Begin with the symptom and work your way back to the cure. As stated above, you may not always know what caused the problem, you may only be able to fix it. After you are sure about the items listed above, and they have been eliminated as potential problems, you need to ask if your Mac is doing any of the following:

- ❖ Does it start?
- ❖ Does it completely boot up?
- ❖ Does it crash after startup?
- ❖ Does it crash when an application is started?
- ❖ Does it have random system errors?

Of all of these, the random system errors are often the most frustrating and difficult to deal with. If, after you go through the Maintenance section at the end of this chapter, your random system errors still persist, follow the steps in troubleshooting your applications.

If you are having trouble with your Mac, it means that processing gets interrupted at some point. Your troubleshooting begins at the point where the error occurs. If the Mac fails to start, then that is where you have to begin. If it crashes as you launch an application, that is your beginning. Chapter 15, "Common Macintosh Problems," details the troubleshooting process.

Bootup Problems (When Bits Collide)

Bootup troubleshooting is actually part of System troubleshooting, but it will be easier to discuss as a separate section. Here, you will learn how to determine what is interrupting the startup process and how to fix the problem. So, if you are having trouble starting your Mac, this is the section you want to read. It is also assumed that you are *not* having a problem with either your hard drives or your hardware, and that your System is virus-free.

The problems presented here are software-related only, and concentrate on conflicts in System software, a damaged System, and damaged System components. When your Mac crashes on bootup, it is because two extensions or a Cdev and an extension are competing for the same location in memory, or one of them is trying to use a memory location needed by the System. When the bits collide, they shut down the Mac. As your Mac loads the Inits and Cdevs that get installed into memory, most of them are displayed by icon across the bottom of your screen, in the order in which they are loaded into the System heap. So, if one particular icon appears and immediately afterward your Mac crashes, the problem is with the extension or Cdev that loads after the one whose icon was last visible.

To correct this, you have to disable the piece of software that caused the crash. To accomplish this, you can boot with your clean startup disk and remove the offending software from the Extensions or Control Panels folder, placing it in a folder other than the System folder. Or, you can reboot while holding the Shift key down, which will disable all extensions and memory-dependent Cdevs if you are using System 7.X, with System 6.0.X, you have to use your clean startup disk.

Understanding the Startup Process

This section describes the procedures your Mac completes when it starts up. This information is important for troubleshooting because you can use it to diagnose a problem as your Mac is starting. This checklist is very technical and the language won't be explained. By now, you should know enough about the Mac to make some sense of this list. All we're looking at, at this point, is the sequence of events.

When you start your Mac, it performs a series of diagnostic checks called *initialization procedures* and it goes through the following internal checklist:

- Test of critical hardware, including the SCSI chip and other hardware components critical to how the Mac operates. When your Mac completes this procedure, you hear the familiar startup *boing*.
- Two stages of testing RAM. These stages depend on whether you are performing a software restart (choosing Restart from the Special menu) or a cold start (turning on the Mac). Your Mac tests all of its installed RAM during a cold start, but it tests only 1K during a software restart.
- Determination of the type and speed of the CPU.

- Initialization of Global Variables. This process sets aside memory for use by the computer and system during the entire computing session.
- Setting up of the System heap, which is a section of reserved memory (RAM) that is used for system functions and all memory-resident control panels and extensions (Inits in System 6.0.X).
- Initialization of ROM resources. During this step, the Mac prepares the different Toolbox managers necessary for the computer to run.
- Initialization of the Apple Desktop bus. This step makes your keyboard and mouse available.
- Initialization of your video card. The Mac scans the NuBus and PDS slots looking for the primary video card, unless your use built-in video.
- Initialization of the SCSI, Disk, and Sound Managers. The Mac prepares to begin looking for your hard drive.

When the computer is finished running these tests, the pointer appears on-screen. The preceding list represents the first half of the entire startup sequence. If the screen displays a blinking Mac with a question mark or a Smiling Mac, the computer has successfully passed its internal diagnostics. After the hardware initialization, the Mac performs the following system startup procedures:

The Start Manager controls the functions in this list.

- The Mac obtains the SCSI ID number for the startup drive, which is stored in its parameter RAM (PRAM). After it finds the drive, the Mac waits 15 to 31 seconds for the drive to power up.
- The Mac then scans for a startup disk. It first scans floppy drives 1 through 3, the two internal and then the external floppy drives. If any of your floppy drives has a System disk inserted, the Mac will use the floppy disk to boot; otherwise, it looks for the hard drive found in the last step. During this step, the Mac also ejects any floppy disk that is not a startup disk.
- If the Mac does not find a default startup disk, it will try to start from the installed internal hard drive. Then, it scans the SCSI bus looking for a bootable hard drive starting with SCSI ID number 6 and working backward to SCSI ID 0. Because you cannot set a default drive on a Mac Plus, your computer scans only the SCSI bus, starting with ID number 6.
- After the Mac selects the startup disk, either a floppy or a hard disk, it checks the SCSI bus for additional hard drives. As the Mac finds the driver for each drive, it reads the driver into memory.
- The Mac reads the startup information off the disk and finishes its startup procedure.

The remainder of the startup process starts at this point with the System Startup. The following is the sequence of events that the Mac goes through to completely start:

- The Mac gets the SCSI ID number of the startup drive from the Parameter RAM (PRAM).

- The Mac waits for 15 to 31 seconds to allow the SCSI device to start up.
- The StartUp Manager searches for a startup device. A startup device will be the first appropriate disk with a System that the Mac finds. The Mac starts its search with the internal floppy drive. If you have two internal floppy drives, as with the SE or the II, it looks at the bottom drive first in an SE, the far right drive first in a II.
- Next, your Mac checks for an external floppy drive, after which it continues its search for a SCSI drive with the ID stored in the PRAM as the Startup device. Should that drive be missing or not defined in the PRAM, your Mac will look at all of the SCSI drives attached, starting with the internal drive. Then, it checks all other drives starting with ID 6 and going backward to 0. As the Mac looks at each hard drive, it loads its driver into memory.
- In the case of any Mac with a NuBus slot, it will check the NuBus slot for a startup device before checking the drives. If there is a device, such as an accelerator that starts the Mac, the startup procedure gets transferred to the NuBus device.
- After the Mac has found a startup device and reads the drivers for all hard drives into memory, it begins the final stage of the booting process by reading the startup information contained in the boot blocks of the disk selected to boot the Mac. Your Mac will always boot from a floppy disk if the floppy has a System and Finder.
- At this point, your Mac will display the Smiling Mac as it boots, which means that it has found a disk that has valid startup information in its boot blocks. This does not mean that the System is intact, or even present, on the disk.
- From the information in the boot blocks, the Mac gets the location of the System file, which then initializes the Resource Manager, the System Error Handler and the Font Manager. If an error should occur prior to the System Error Handler being initialized, you will get a Sad Mac error code rather than a System error. If you get a System error or a Bomb dialog box, then your Mac was successful in booting past this point.
- Then, the Welcome to Macintosh or StartUp screen is displayed and your Mac loads its debugger if you are using one. (A debugger is a programmer's tool for finding problems in programs.) After this, it makes any adjustments for the ROM by installing software patches.
- At this point, the ADB bus is activated and your mouse will begin to track.
- If your Mac has slots that are being used, their drivers are read into memory and initialized.
- The RAM cache is initialized and the System heap is installed.
- Your Mac then loads all of its extensions, Cdevs, and Chooser devices into memory.
- Finally, the Mac loads the Finder, and you are off and running.

Finding the Source of Your Misery

This section details how to find an extension or control-panel conflict manually. Although System 7.5 comes with the Extension Manager control panel that can help and expedite this process, you really should know how to do it by hand.

When your Mac fails to boot, the problem is almost always a control-panel or extension conflict. If you do not know what control panel or extension caused the crash, you may have to do a bit of detective work to find it. Otherwise, if you know which file is the culprit, identify it by its icon or name and move it out. After it is removed, reboot your Mac. If it still hangs up, remove the last visible extension and control panel that appeared on your screen as your Mac booted.

After you have removed a couple of these devices, if you are still having problems on booting, remove all of the extensions and control panels, then restart your Mac. If you're using System 7.X, you can depress the Shift key as soon as you hear the startup chime. You can release the Shift key when you see the words "Extensions Off" under the Welcome to Macintosh greeting. At this point your Mac should boot without a problem. If it still crashes, your System file or Finder is broken and needs to be replaced (see the following section on Replacing Your System).

If, after you've replaced your System, you're still having problems, you'll still have to find the cause of your misery. Remove all of your system extensions and control panels (except the standard Apple ones) and place them in a folder that is easy to access. Now, you have to put them back into the System methodically. The number of extensions and Cdevs you have will determine how you go about this process. If you have just a few, it is a simple task to put one or two at a time into the System folder, reboot, and see what happens. When your Mac crashes on bootup, you will know that one of the last two devices installed caused it; just remove one of them and try it again.

However, it is possible to have 100 or more of these devices installed. Now, the task is more like looking for a needle in a haystack. Restoring them to the System folder two at a time would be very tedious. A better method is to work on your extensions and then your Cdevs; of course, you can do it the other way around if you wish. For our example, let's start with the extensions first.

Open the folder with your extensions, set the view to View By Name, and select about half of the extensions and put them back into the System. Viewing them by name will make it easier to know which group you just installed. Now, restart your Mac. If it boots without a problem, repeat the process with another group of your extensions and continue until all the extensions are installed. If you haven't crashed yet, do the same thing with your control panel devices.

At some point, your Mac will crash. When this happens, reboot while holding down the Shift key to disable the Extensions and Cdevs that require System memory. Open either the extensions or Control Panel folder and remove half of the last group of devices you just installed. Then, reboot again. Repeat this process, each time removing half of the remaining devices from the last group installed. You should only have to reboot about three or four times before your Mac starts without crashing. Once it starts without crashing, you will know that the offending device is in the last group removed from your System. At this point, select half of the last group

removed, put them into the System, and repeat the drill. If it crashes, you know it is one of the devices you just installed; remove half of the group you just installed and try again. (See, it really is a tedious process.) By now, you should be able to identify a couple of suspects. Keep repeating this process until you have identified the source of your misery.

Remove the offending device and reboot. If everything starts, replace the rest of your Extensions or Cdevs, using the 50-percent method just in case you had more than one problem. Once you have all of your devices back in your System, you will be ready to get back to work. However, if during this process, you had lots of System errors, you should reinstall your System software just in case all of the crashes caused a problem.

The preceding method will work for any type of System troubleshooting, including fonts, sounds, Fkeys, and Cdevs. If you install all of your System elements and you are still having problems, remember that a font or Fkey could also be causing a problem; but it is more likely that these would not show up until after you have completely started up.

Is It the One You Found?

By now, you should have found the problem System element. Now, your problem is to determine whether it is the culprit or the victim. If the element is a shareware or freeware product, it could be that the device is just buggy and not working as intended. To find out, try using it by itself to see if it crashes your Mac without help from another Cdev or extension. Chances are, however, that the device causing the crash did so only because it conflicted with another device and that the two together are a toxic combination. The other possibility is that the element that caused the crash did so only because of the loading order, and, if it is loaded earlier or later in the startup process, it will not crash your Mac.

This is where the process of troubleshooting gets more sophisticated. It is the usefulness of the offending System element that will determine whether you want to spend another hour or so trying to get it to work. If you want to continue from this point, use a StartUp manager. Without one, you will have difficulty setting the order of your extensions and Cdevs during startup. To do this type of troubleshooting, do the following:

- Determine if the extension or Cdev works by itself.
- See if changing its loading order by changing its name has an effect. (Some extensions and cdevs will not work if you change their names.)
- The Mac always loads from the Extensions folder first. If you have a Cdev that conflicts with an extension, you can fix only the loading order with a StartUp manager.
- Search out the conflicting device by leaving the device that apparently caused the crash in the System. Then, repeat the process previously described in the section, "Finding the Source of Your Misery," until you find the other extension or control panel with which it conflicts.

- After all of this is done, you may have to choose between two different devices and use only one of them, or use your StartUp manager to create two startup sets, allowing you to use the device you need during different operating sessions.

Other Techniques

Rearranging the loading order of your extensions or control panels by changing their locations or names is one troubleshooting technique you can use. Reordering how these System components load is a two-edged sword. You might solve a problem, or you might create one. If an extension or control panel needs to load at a specific time, before or after another System element, changing the loading order or location will make your Mac crash. This type of troubleshooting should be done as a last resort and very carefully.

Using an Init or StartUp Manager

The tedium of the foregoing should convince you that an Extensions Manager is a necessity. Both Init Manager by Baseline Publishing and StartUp Manager, a part of Now Utilities by Now Software, will make your troubleshooting efforts easier. With either of these products, you can turn on or off your extensions or Cdevs at will and at startup. Each of these will disable an element that interrupted (crashed) the startup process; this feature alone could save you a couple of hours.

You can perform the same process just described without removing your Cdevs or extensions. It will take having to find a crashing Cdev or extension only once before you will want to get one of these managers. Not to mention the other useful features they have, such as startup sets that will allow you to have customized startup sets, where you define sets of extensions and control panels for different purposes and for memory conservation.

Replacing the System

If your System file is corrupted, it needs to be replaced. It is possible to reinstall a new System over the old one, but, usually, by the time you get to this point, a reinstall will not correct the problem. So, to avoid extra heartache, just install a new System.

If you have to reinstall your System, before you search out your problem, use all of the steps in this section and then return to the previous section, "Finding the Source of Your Misery."

There are a couple of things you should do first. One, open your System folder and see if there are any sounds, fonts (if you're using System 6.0.X, 7.0, or 7.0.1), or Fkeys you want to save. If there are, open your System file by double-clicking on it, select the fonts and sounds you want to keep, and copy them to a floppy or a folder on your hard drive.

Second, perform a Find on the word *Sys* to search your hard drive for extra System files. Although it is possible to keep two System files on your hard disk, it is not recommended. Unless you know why you have two Systems and what you are doing with them, trash any extra Systems you find; they will only cause you grief.

You do not need to copy the standard System fonts or sounds, since they are going to be reinstalled with the System. (A list of the standard fonts and sounds can be found in Chapter 7, "Getting the Most from Your System.") Just copy any non-standard fonts, sounds, or Fkeys that you have installed and want to save. After you have copied the items, reboot your Mac from your clean startup disk and follow these steps:

- After your Mac has booted, put your System file and Finder into the Trash and empty it.
- Rename your System folder to something other than "System Folder." If you do not, the Installer will put the new System into the old folder. Anything in the old System or Finder that was causing problems will still be there, so you will not be any closer to discovering your problem. If you have already solved your problem, skip this step and reinstall your System into your existing System folder. However, be warned: If your Mac crashes after you reinstall your System, you will have to repeat the process for finding the conflicting extension or control panel.
- Shut down your Mac using the Shutdown command from the Special menu.
- Insert your System 7.X Install 1 or Install Me First disk and restart your Mac.

Install your System using the instructions provided in Chapter 6, "Installing Your System and Software."

When you are finished installing your new System, restart your Mac, but do not put any of your extensions or control panel devices back in. If your Mac boots without a problem, then you can begin the process of finding the offending extension or control panel—if there is one. If the problem was with your System rather than any of your Cdevs or extensions, you can restore all of them to their appropriate folders. (Do not replace any of the Apple Cdevs or control panels during this process). After restoring everything, reboot and see if you still crash; if you do not, everything is fine.

The foregoing procedures also work for System 6.0.X, except that you will have to use the Font/DA mover to get any of your Fonts and DAs prior to trashing your System. The instructions for using Font/DA Mover can be found in Chapter 9, "Customizing Your System." If, when using the Font/DA Mover program, your Mac crashes, the System is beyond help and your fonts and DAs are lost. You will not be able to get them back; just trash your System and reinstall it.

System Troubleshooting

This section will cover the problems that can occur once your System has booted up and you are in the Finder. At this point, it becomes more difficult to determine

where the difficulty lies because anything from a bad hard drive driver to a software incompatibility problem could be causing the problem. To limit the search, there are a couple of prerequisites for this section:

- Your Mac can boot without a problem to the point that you are in the Finder and have some functionality. This means that you can move your mouse, select menus, open drives, and so on.
- You have checked all of your cables, power sources, and so on, and determined to the best of your ability that you are not experiencing a hardware problem.
- Your System is virus-free.
- Intermittent problems are often impossible to fix; sometimes, you just have to live with them. If you have a random problem that is intolerable, the process of fixing it could take several days to several weeks.

Any operating problem could be caused by the problems just described. Therefore, the steps covered there will not be repeated in this section.

Determining Your System Problems

How do you know if you have a System problem? Basically, if your Mac can find its way to the Finder you are not having a hardware problem unless it is a hard-disk directory problem. But, if once in the Finder, your mouse freezes, you crash while selecting a menu, your fonts do not display properly, or you experience any other operating anomaly, you have a System problem. In this case, the troubleshooting procedures include one additional step. As a part of the deduction process, you may have to draw a conclusion-like Sherlock Holmes. After exhausting all the likely possibilities whatever is left is your problem, regardless of how unlikely it may seem.

The order of events should be dictated by what is going wrong and a logical process of eliminating possibilities. Start with the manifestation of the problem: What is your Mac doing? Does the error have any connection with some piece of hardware, such as a trackball or alternative pointing device, a printer, or SCSI device?

Try the following steps to see if the problem goes away:

1. Boot from your clean startup disk.
2. If it seems to be peripheral-related, disconnect or replace the peripheral.
3. Zap your PRAM.
4. Rebuild your Desktop.
5. Replace your Preference files.
6. Replace your System.
7. Troubleshoot your Inits and Cdevs.
8. Reinstall your hard disk driver.
9. Reformat your hard drive.

None of these steps are cast in stone, nor do they have to be done in the order listed. As you gain experience in troubleshooting your System, you will learn what

steps to skip or reorder. But, to begin with, you should start at the beginning and work through each step.

Booting with a Clean System

You should always do this first; it will tell you if everything is working properly from a hardware level. If you boot from your clean System and your trackball is still acting up, you will have a good idea of where the problem might be. Likewise, if you boot from a clean System and everything works as it should, you will have eliminated any obvious hardware problem.

Zapping the PRAM (Restoring All Default Parameters)

From time to time, your parameter RAM will get confused and your Mac will not boot from the disk you specify, or your mouse will start acting up, or your Desktop pattern could change. Anything that is set by your General Controls from the control panel or your standard Apple control panels will be stored in your parameter RAM. When the PRAM gets corrupted, you can reset it to the default setting and clean it by Zapping the PRAM. There are two ways to zap your PRAM with System 7:

- Hold down the Command+Option+P+R keys as you turn on the power and reboot.
- Use a freeware utility called zapParam by Devon Hubbard of Reach Software Corp.

If you use the command key sequence, your Mac will start to boot, *boing*, and reboot. If you continue to hold down the keys, it will continue to cycle through the zapping process. Once is enough.

With zapParam, open the program, press the Zap-It button, and reboot. After you zap the PRAM and reboot, see if the problems persist before you reset your parameter settings. If the problem goes away, great. Otherwise, you will have to continue the troubleshooting process.

Rebuilding the Desktop

The next step will be to rebuild your Desktop file. Although this will probably not solve your problem, you should not skip this step. It is primarily a general maintenance step. If your problem was the result of a corrupted Desktop file, this step will correct it.

To rebuild the Desktop hold down the Command+Option keys while your Mac boots. As the Mac finishes the booting process, it will ask if you really want to rebuild the Desktop (see Figure 17.2). After you select OK, your Mac will rebuild your Desktop file; it is not re-created. Rebuilding the Desktop will relink all of your data files with their applications, remove any icons that no longer have files associated with them, and erase all of your Finder's Get Info comments. If you have com-

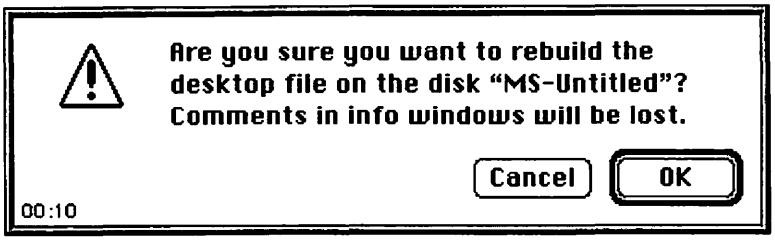


Figure 17.2 Request to rebuild the Desktop.

ments there that you want to preserve, use a utility, such as C.E. Software's DiskTop. With DiskTop, you can put your comments into a section called CE Info that will not be deleted when the Desktop file is rebuilt (see Figure 17.3).
There are times when the your Desktop file is so badly damaged that rebuiding it doesn't work. Your Mac will go through the steps of rebuilding the Desktop but your icons will not be linked to their applications, or you're still experiencing some other problem. To get brand-new Desktop files, you have to remove the old ones and then reboot your Mac.

There are two problems you will encounter if you want to remove the Desktop files: First, the Desktop files are invisible—you can't see them unless you use a utility, such as DiskTop. Second, if you use a utility to make the Desktop files visible, you can't throw them into the Trash. The Desktop files are used by the Mac all of the time, and the Mac prohibits you from trashing files that are *in use.*

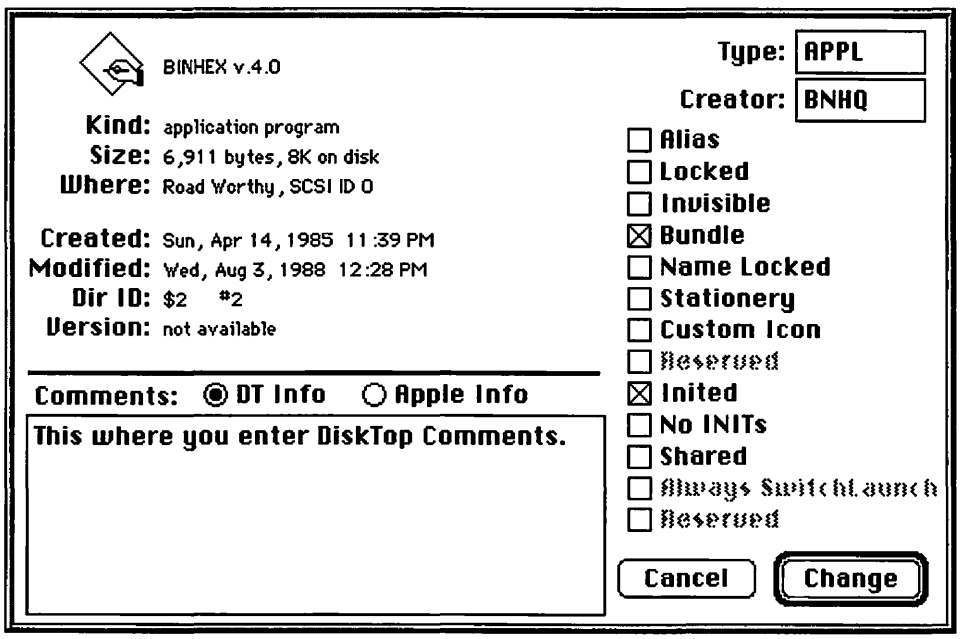


Figure 17.3 DiskTop's CE Info window.



Disk Utilities on the CD-ROM

The CD-ROM included with this book has some file utilities that will let you make invisible files visible. Spend some time exploring the CD-ROM; you will find several utilities that can make troubleshooting and file management tasks easier.

The way around these difficulties requires a utility that will delete your Desktop files, or you can perform the following steps:

1. Make the Desktop files visible.
2. Make a folder and move the Desktop files into the new folder.
3. Restart your Mac.
4. When your Mac boots, it will automatically create new Desktop files.
5. After your Mac boots, trash the folder containing the old Desktop files.

The only danger you face when replacing your Desktop files is if your hard disk has directory damage and cannot re-create the Desktop files. If the Desktop files cannot be re-created, you will have to recover the data on your drive as described in Chapter 18, "Disk Crashes and Data Recovery," and then reformat your hard drive.

If this should happen to you, the only consolation that can be offered is that your data recovery should be easy and that your drive would have crashed anyway. You just forced the issue to a head and are probably better off discovering the problem, rather than having a more serious situation latter.

Replace Your Preferences

Inside the System folder, you will find a Preferences folder. Inside are all of your program and System settings not held in the PRAM. If one of your Preferences files is corrupted, your Mac could act in an erratic manner. If you can isolate the problem to a specific function and delete the function's preferences file, you may just solve your problem. For example, if File Sharing was not working, you could trash the File Sharing Preferences file.

It is safe to delete Preferences files, because all of your programs that require Preferences files are supposed to store their files in the Preferences folder and recreate them if the file is missing. But, you don't want to trash the Preferences folder because there are some programs that don't work properly and will not re-create their preferences.

The best thing to do is remove the Preferences folder from your System folder and rename it. After doing this, reboot your Mac. It will re-create a new Preferences folder

on bootup. After doing this, re-create your File Sharing Users and Groups. Some of your extensions and control panels will also want to re-create their Preferences. Such things as startup managers, QuickKeys, DiskTop, and other utilities will no longer have the settings you selected, either. But, if a corrupted Preferences file was causing your problem, the problem should go away. Each program and utility you use is supposed to re-create its Preferences file if it is missing when the program or utility is used. But, if one of your programs doesn't re-create its Prefer-ences file, you still have the old one and won't have go hunting for its master disk.

This is a quick way to eliminate a potential problem source without replacing your entire System. If you want to skip this step, fine—but it could save you some time.

Replace Your System

To save time and eliminate the possibility of a corrupt System file, you should replace the System as previously described. Although it may seem a bit like shooting a fly with an elephant gun, this is the only way to be sure your problem is not with the System. Besides, it is almost as easy to replace your System as it is to reinstall it, and replacing it will ensure that you have a clean System. Replace it.

Extension and Control-Panel Conflicts

Just as these wonderful and useful utilities can be a source of grief by interrupting the startup of your Mac, they can also cause problems in general. Although, once your System has started, control panel devices are more likely to be a problem than extensions. However, either can become corrupted.

Corrupted Cdevs or extensions are a real problem when they are only partially broken, meaning that they will not interrupt the startup process. They generally work properly except for some small dysfunctions. One example might be that the driver for your fax software goes through the process of printing your fax, but all you get is a blank page. And, because you trust that it's working correctly, you send a bunch of blank faxes without knowing it. The driver is broken, but you don't find out until one of your fax recipients calls you.

In this case, it is fairly easy to figure out what is wrong. It's not so simple if your System keeps crashing after you perform a few Finder functions, such as opening a window or getting information on a file. Follow the procedure in Bootup Troubleshooting, or install a new System and replace your additional extensions and Cdevs one at a time.

System Problems and Your Hard Drive

If you have followed all of the procedures previously listed and your Macintosh continues to crash, then your problem is at a level below the System. This is especially

true if you can boot from your clean startup floppy without trouble, yet, even after you have installed a clean System, you continue to crash. It is possible to have a problem with your hard drive that the best disk utilities cannot find. (The utilities' manufacturers would deny this, but it's true.) If you have such symptoms, you should reinstall your hard drive driver.

Reinstalling your driver can result in the loss of your data, so be sure to back it up before doing the reinstall. Follow the instructions in your hard drive manual. Afterward, if your Mac is still acting up, you will have to reformat your disk. You can at least take heart in having backed up your data. After you have reformatted your drive, be sure to install a clean System. If, at this point, your Mac is still not working properly, take it to your dealer or call in a service professional.

Applications Troubleshooting

Usually, when a specific application starts giving you trouble, it is because the program itself has suffered a mishap, a Preferences file is corrupted, or you have been fortunate enough to find a minor bug. Also, if you have installed a new utility, extension, or Cdev, the new arrival could have a problem with the application.

Application troubleshooting is not as complex as System troubleshooting, but it can be frustrating nevertheless. In principle, the steps are the same except that you start with the application and work backward. Use the following steps as a guide for correcting the problem; try to duplicate the problem in between each step:

- Remove the application's Preferences file from the Preferences folder.
- Check the application's folder for other subsidiary files that could be causing the problem, and replace all subsidiary files.
- Replace the application.

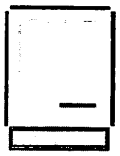
Should these steps fail, then work backward. But, first, boot from your clean startup disk to see if the program runs properly. When you use your clean startup disk, make sure your Mac will not switch launch to the System on your hard disk. After you have started your Mac, run your application. Hopefully, it will work without a problem. If it does, you know that the application is okay, and that your problem is related to the System on your hard disk.

At this point, you should replace your System. If the problem is particularly sticky, go through the procedures outlined in the System Troubleshooting section. Remember that very intermittent problems, although frustrating, may not be curable. Also, try starting with your extensions disabled before you get too far into the process. This can quickly answer whether your problem is due to one of your extensions or Cdevs. If one of them does turn out to be a problem, call the technical-support department for the software manufacturer, to see if they know what is causing your problem. However, if your luck is as good as mine, you will have discovered something with which they are completely unfamiliar, and they will be of little help.

Summary

Does your head hurt? Well, sometimes headaches are part of troubleshooting. Hopefully, your headache is not too bad—and just think about what you've gained.

You now know how to troubleshoot your Mac. You can fix System problems, reinstall your System, and isolate hardware problems—you can be Mac self-sufficient. If you practice these techniques, you'll have the skills when you need them. Remember, your Mac may act up when you're in a time crunch. You might not have time to read this chapter to learn how to fix the problem. So, learn it now and you'll have what you need when....



CHAPTER 18

Disk Crashes and Data Recovery

In Chapters 10 and 11 disk drives are covered in detail, and most of the evils that can afflict your drive are mentioned there. The evils that were missed in those chapters are covered in Chapter 16, "Macintosh Hardware Problems." This chapter is about recovering from those demons. The cause of a hard disk problem is secondary to getting your data back. Therefore, this chapter contains procedures for recovering deleted files, mounting drives, and recovering crashed drives.

Before you read this chapter you need to have read:

- Chapter 10 Macintosh Disk Drives
- Chapter 11 Essential File, Disk, and Data Information
- All of the preceding chapters in Part V.

If you haven't read these chapters, your success with this chapter will be limited unless you already have extensive knowledge about your Mac. In a sense, this entire book has been building up to this chapter, because dealing with disk problems is one of the most complicated and difficult things you can do with your Mac, and the procedures assume that you have most of this knowledge. Not only that, but if you do not properly recover a disk or if you make a mistake, you can lose all of your data.

Data recovery is not a substitute for backing up your hard drive; it is what you do as a last resort. Disk drive problems are the most nerve racking problem you can have. So, if you have to use the information in this chapter, you'll already be at a disadvantage because you're scared and nervous to begin with. Both of these conditions make it easier for you to make a mistake. So, read this chapter before you have to. Make backups of your data so that you know it is safe. Be familiar with your hard disk utility, and, if you're at all unsure about what you're doing and your data is important, hire a professional to recover your data or fix your hard drive.

The best way to learn to troubleshoot your Mac is to think about what your Mac is doing or trying to do. Everything your Mac does follows a specific logic. It has to perform specific steps to accomplish any task, and, if you understand what it is supposed to be doing, when it doesn't work you can figure out how to fix it.

Read This Before You Touch Your Drive

Anytime you have a hard-drive problem, keep in mind all of the other things that could be wrong. Your best indication of trouble will be if you are experiencing errors reading or writing data, or, worse yet, your hard drive might be asking to be initialized. Regardless of what error you are experiencing, start with the first principles mentioned in Chapter 14, "Avoiding Problems." Check your cables and review the section on SCSI bus troubleshooting in Chapter 17 before continuing.

Any symptom that your Macintosh may manifest that appears to be a hard-drive problem can have other causes. Although the other causes may be hard drive-related, they may not be a problem with the drive itself. Problems with SCSI cables, improper termination, and System software can all appear to be hard-drive problems. Even read and write errors could have other causes.

At the other end of the spectrum, your entire system can be functioning properly with the exception of a pesky, totally random yet consistent System error that can actually be a hard-disk problem. Your disk utilities that check the drive reveal no anomalies, but you've checked everything and nothing other than your drive could be the problem. Then, it probably is a hard-drive problem. You know something is wrong, but you don't know what. The process of troubleshooting hard-disk problems ends up being a combination of factual knowledge and intuition. The hardest part is trusting your intuition but, sometimes, that is all you'll have to go on.

Hopefully, you're beginning to see the magnitude of the issue. If you go off half-cocked you stand the danger of losing your data at one extreme, or, at the other extreme, doing a lot of work for no reason, because your drive was not damaged.

The final warning is that the author, publisher, or anyone else associated with this book is not responsible if you lose your data by following the steps, procedures, or recommendations in this book. If you try to recover your drive and lose all of your data, none of us can be held responsible. Data recovery is a *perform at your own risk* venture.

Determining the Problem

When you have Macintosh problems, it can difficult to determine their cause. Ninety percent of the time, your problem will be hard-drive-related. This does not mean that your physical hard drive is broken, only that the problem is one with your hard drive or the data it contains.

Before you can determine what the problem is, you have to know what problems you could possibly have. Unfortunately, this list is quite long and determining the problem can be one of trial and error. Yet, the solution may be obvious even though you don't know the exact problem.

This section provides some basic steps for determining the problem, and, failing that, what steps to follow, given a specific set of symptoms. When you suspect that you have a hard-drive problem there is a specific series of steps that you can follow to help you determine the problem, and/or which procedures you should use to correct the problem and save your data.

This section describes the most common hard drive problems you may encounter. Knowing the problem before you begin can greatly expedite the troubleshooting

process. After the descriptions, you will find a series of steps that you can perform to help you determine the problem and your next step. The sections are:

- Hard-Disk Hardware Problems
- Disk-Drive Software Problems
- Figuring It Out

Hard-Disk Hardware Problems

Hard drives are complex electromechanical devices that can and do malfunction. When a hard drive malfunctions, the result can be equated to a heart attack—a hard-disk hardware problem will stop your computer cold. This section will look at the most common hard-disk hardware problems you might encounter.

When a hard drive has a hardware problem, there is little that you can do. Recovering data from a malfunctioning hard drive is sometimes possible, but even the attempt is very expensive and there are no guarantees. You will have to ship your drive to a drive recovery specialist, and the attempt will take several days. You can easily spend several hundred dollars and not get your data back.

The hard drive problems you could have are:

- Crashes
- Stiction
- A Dead Drive



Drives Fail

When manufacturers test hard drives, they create a number for mean time between failures (MTBF), which represents how long your drive can run before it will fail. The number they use is based on a drive being left on for 20,000, 50,000, or 100,000+ hours. Manufacturers continue increasing this number, although the number couldn't *really* have been tested—50,000 hours equals 5.71 years. No manufacturer has tested a drive for 5.71 years before releasing it for sale. Don't be fooled by the MTBF rating; it is an extrapolated number using statistical averages and has a nominal bearing on reality.

What does this number have to do with dead drives? It is an admission by disk-drive manufactures that drives fail. Because a drive is an electromechanical device, it is more susceptible to problems than any other component of your system, with the possible exception of the printer.

Sometimes, when a drive fails, you will have a difficult time determining whether the drive is dead or just suffering from a software crash. The section about crashes makes a very important distinction between a software and a hardware crash, a distinction that you should understand.

Crashes

Two types of hard-drive crashes occur on the Macintosh:

- A *software crash*, where your program has a bug or a conflict with your system software; a software crash is indicated by an on-screen bomb. These crashes are distressing, although they are more inconvenient than detrimental. Sometimes, they can cause damage of a software nature, but they are almost never the cause of a hardware problem.
- A *hardware crash* can affect your hard drive. Remember, your drive's heads float on a cushion of air above the platters, not touching the platters while they are spinning. Abrupt jarring, sudden movement, or a power loss to the drive while it is reading or writing data can cause the heads to come in contact with the media. When this happens, you have experienced a hardware crash.

The damage caused by a hardware crash can be minor—lost data—or fairly extensive—media damage that requires you to reformat or replace the drive. If the heads *are* damaged along with the media, the problem can be serious. As long as your drive can map out the bad sectors, all will be fine. If the media has a great deal of damaged sectors or damaged heads, your drive becomes an expensive paper weight. If your drive is under warranty, you may be able to get the drive replaced.

Head crashes are rare. The drives that are manufactured today have high tolerances, and, generally, crashes are caused only by serious mishaps. Do not be careless with your hard disk drive—should a crash occur, you will inevitably lose data that is not backed up. To stay on the safe side, follow a regular backup routine so that you will not lose data in a crash.

Stiction

Another problem that is more common than it should be is *stiction*. Your drive has a stiction problem when the platters in the hard drive do not spin and your drive does not power up. When your drive has a stiction problem, the platters inside the drive will not spin. If you have an external drive, the power light will come on but your drive will not boot, and you will not be able to access it with your formatter. So, if one day you do not hear your drive's platters spinning, you may be experiencing a stiction problem. Also, a failure of your drive's logic board can have the same symptoms. When you have a drive with a stiction problem, it is usable if you get it running again, as long as you never turn it off. A drive with a stiction problem is not dependable (you never know when it will freeze for good).

When a drive first starts to have a stiction problem, the problem is usually intermittent. The drive will start one time and not start the next. If you turn on your Mac

and the disk that was fine yesterday doesn't start today, try turning the power on and off a couple times. If the drive finally starts after a few tries, it is suffering from a stiction problem. Like most progressive diseases, the stiction problem will get increasingly worse. One day, the hard drive simply will not start no matter how many times you turn on and off the power. To extend the life of a drive that you know has a stiction problem, leave the drive or your Macintosh turned on all the time.

When a hard drive has a stiction problem, a dealer will say that the drives are no good. You also may be told that you cannot recover data from one of these drives after they begin to fail. The former assertion—that the drive needs to be replaced—is true. The latter—that the data cannot be recovered from the driver—is false. If you need to recover the data, call different repair shops and consultants to find a technician who can start your drive. Usually, a drive with a stiction problem can be started and its data recovered. If the drive cannot be started, it no longer has a stiction problem—it is dead.

A Dead Drive

A dead drive is one that no longer functions. Pronouncing a drive dead is a very delicate process, because there are many problems that appear to be a drive problem when they are not. A dead drive can refuse to power up, run but not format, or cause your Mac to exhibit the Sad Mac. Usually, you can determine that a drive is definitely dead only after an extensive troubleshooting process, which is described in the upcoming section "Figuring It Out."

This section discusses some of the symptoms that could indicated a dead hard drive:

- Not holding a format—One type of failure is when a drive will run, format, work for a week, and then suddenly fail, telling you that it needs to be initialized. This failure is due to the drive not holding a format; a drive that will not hold a format is useless and cannot be fixed except by sending the drive to its manufacturer to be rebuilt.

  When this problem first occurs, your drive will appear to have suffered a software crash. It will ask to be initialized, and only after you've recovered your data, reformatted the drive, restored the data, and run it for a few day to a week will you know that this is a problem—because the drive will ask to be initialized *again*.

  When a drive loses the ability to hold a format, the drive's condition will deteriorate. It will get to the point where you format the drive and either it will not format, or it will work only for a few minutes to a few hours before wanting to be initialized. If you suspect this is the problem, run the drive with a plain system, install your system, and don't add any non-Apple extentions or control panels while you're troubleshooting it.
- Hard disk controller failures—Every hard drive has a logic board called a *controller*. Sometimes, a component on the controller will fail. When this happens, the hard drive will not format or, if it formats, it will not initialize. And, in some cases, it will be impossible to see the drive with your formatting software; it will be as if the drive just disappeared.

- Noises made by the drive—Some drives, over time, get noisier and noisier. A noisy drive does not mean that your drive is dead or dying. However, the noise can be a warning sign. If, all of a sudden, your drive starts making noises, you should immediately back it up.

  Usually, a drive will not die suddenly. A drive's total failure often occurs over a period of time. Grinding, shrieking, or other odd noises coming from your drive are warning signs; if you ignore them, you will try to start your Mac one day and the drive will be gone.
- Sudden Failures—Every once in awhile, a hard drive will be fine one day and will not work the next. There will be no warning signs or indicators of any type. Basically, the drive is here today and gone tomorrow. The protection you have against this type of failure is a backup of your data.

Disk-Drive Software Problems

The most common disk-drive problems, in addition to the Desktop problem described in Chapter 15, "Common Macintosh Problems," are listed in the following. Each has its own symptoms and different cures. If you have a disk-repair and recovery utility, such as Norton Utilities for The Macintosh, you will be able to correct most of these conditions.

In-Use Sectors

In-use sectors occur when you have trashed a file and the Mac fails to make all of the freed space available. The sectors are still marked as being used. Sometimes, there can be just a few in-use sectors and you will not notice any loss of space. And, at other times, you can have thousands of sectors marked as being in use, with you being deprived of a lot of hard disk space as a result. This is not a serious problem; you will probably run across it in the course of performing a maintenance check or while correcting some other problem. Unless you notice that a lot of disk space is missing, as in Figure 18.1, where over half of the space on the floppy disk, is missing you should not really be concerned about this as a problem.

To correct this problem, yuse Norton Utilities for the Macintosh by Symantec, 1st Aid HFS by Datawatch, or Central Point Software's MacTools Deluxe. Any of these packages will be more than adequate for freeing your in-use sectors and making them available for use again. The actual steps for freeing your in-use sectors will depend on the utility you're using, so check your utility's manual before attempting this procedure.

Bad Sectors

Bad sectors are areas on your hard disk that have deteriorated or been damaged so that they can no longer hold data. All hard drives develop bad sectors over time (if

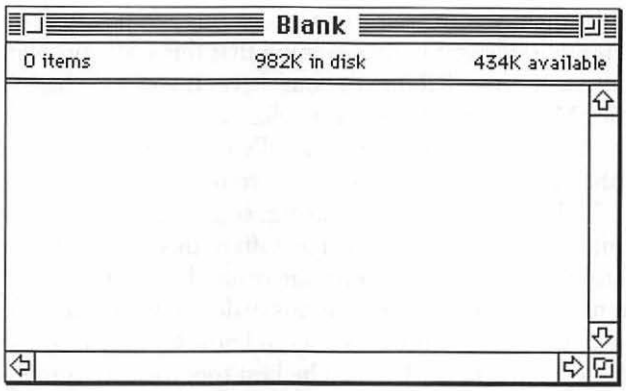


Figure 18.1 *A floppy disk with missing space.*

yours does not, consider yourself blessed). When sectors go bad, you can have problems with either reading or writing data to your disks. Most often, you will get a dialog box like the one shown in Figure 18.2.

Sometimes, this error is just a glitch in the reading and writing process, and recopying the file will correct it. But, if you start having this problem consistently, your hard drive will need to be reformatted or you will have to use a utility, such as Norton Utilities for the Macintosh or Datawatch's 1st Aid HFS. These are the only utilities available that will map out a bad sector without requiring you to reformat your hard drive. All other programs that check for bad sectors will just notify you of the problem.

Both Norton and Disk First Aid fix the problem by creating an invisible file that occupies the bad sector(s). By doing this, they prevent data from being written to the sector that has died. If you get more than a few bad sectors, the safest course of action is to reformat your drive.

A Corrupted Directory

Because the hard disk's directory contains all of the information about where your files are stored, a corrupted directory is the most serious problem you can have with your hard drive. And, of course, it is the most difficult to detect. If you are having

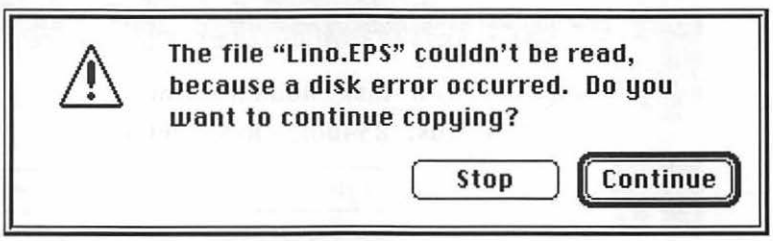


Figure 18.2 *Error message while writing or reading disk.*

any difficulty with your drive, check this as a possibility. There is no specific set of rules to guide you in determining that this is the problem, other than general difficulty with the reliability of your drive. If you have had a series of system errors, or your Mac crashes while it is reading or writing to the hard drive, check for directory damage. A system error will usually not cause damage, but, if it does, it will corrupt either a file or your hard drive directory.

Problems involving the saving, copying, moving, or deleting of files can all be indicators of directory damage. Often, this type of damage is not discovered until it is too late, when you receive the dialog box that says "This disk is damaged. Do you want to initialize?" But even this dialog box can occur for reasons other than a damaged directory, so the only way to know for sure is to check your drive with one of the tools previously listed. The best tool for determining whether your directory is damaged is Datawatch's 1st Aid HFS or Norton Utilities. 1st Aid HFS, however, does not have the overall capabilities of Norton Utilities for the Macintosh. Ideally, you should have both utilities.

Using both 1st Aid HFS and Norton Utilities is a straightforward process. Figures 18.3 and 18.4 show the progress of 1st Aid HFS as it does a Quick Cure to check a hard disk directory. If you want to check for bad sectors as well as the directory, you need to perform a full evaluation.

As you can see from Figure 18.5, Norton checks more than just the directory. If Norton finds directory damage, it will offer to fix it. Figures 18.6 and 18.7 show the process of Norton Utilities as it checks your drive.

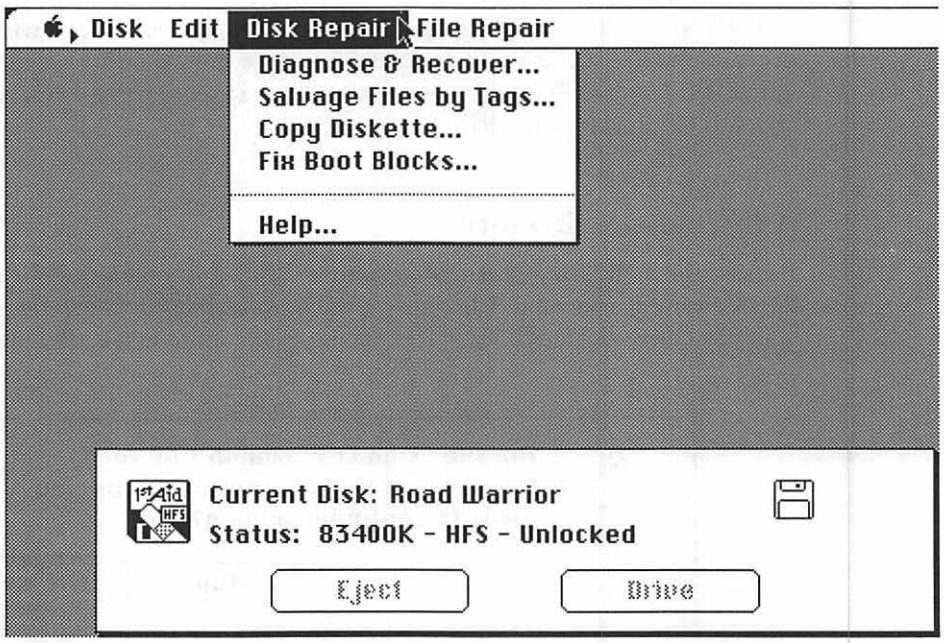
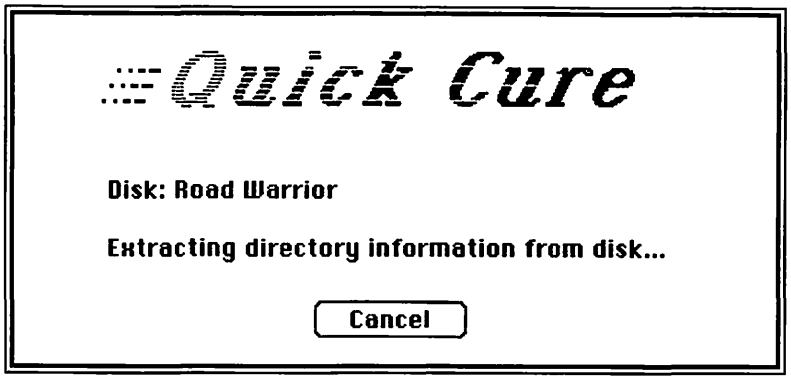


Figure 18.3 *Selecting 1st Aid HFS options.*



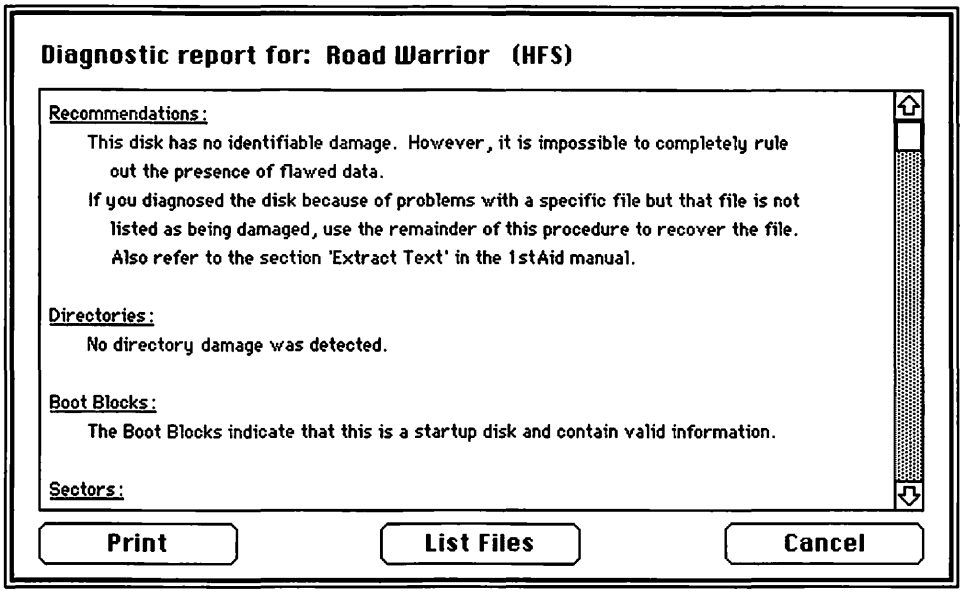


Figure 18.4 *1st Aid HFS progress and report.*

If your directory is damaged and you repair it using any of the utilities previously listed above, immediately back up your data and reformat your drive. The directory structure of a Macintosh hard drive is complicated, and there is no utility that can guarantee it is fixed. The only way to be sure is by formatting the drive; any other action is courting disaster. If you use a utility to fix your directory, think of it as a temporary repair for the purpose of retrieving your data.

Insufficient Disk Space

It is very easy to run out of disk space. Even when the finder tells you that you have disk space available, you still may not have enough. Many programs write temporary

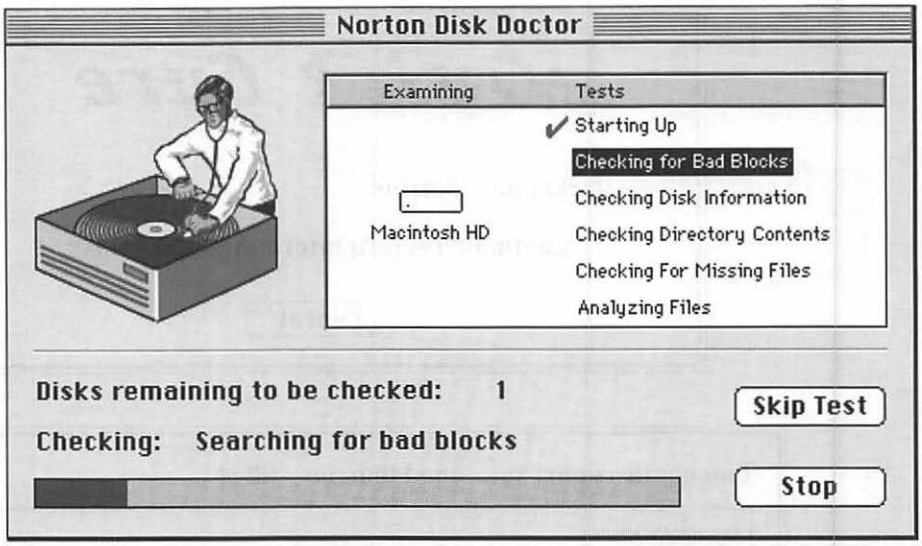


Figure 18.5 *Display of Norton's Disk Doctor startup.*

files to the disk while they are running, which means you really need more space than you might think. A good rule of thumb is to keep five megabytes or ten percent of your hard drive free. This will ensure that you have enough disk space for temporary files and that your Desktop file has room to grow.

Letting your drive get too full and then writing a file when there is not enough room can also result in directory damage. The Macintosh is very good about not letting this

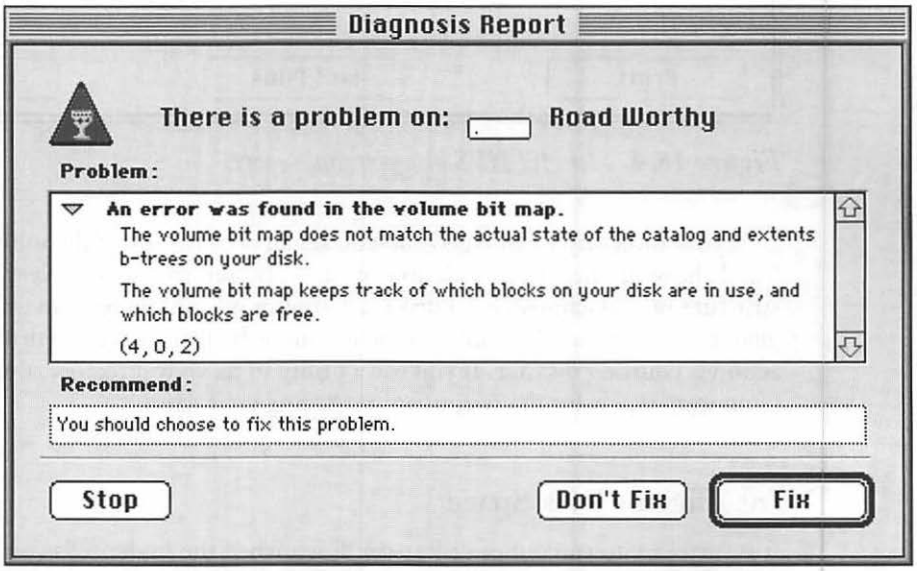


Figure 18.6 *Norton's offer to repair directory damage.*

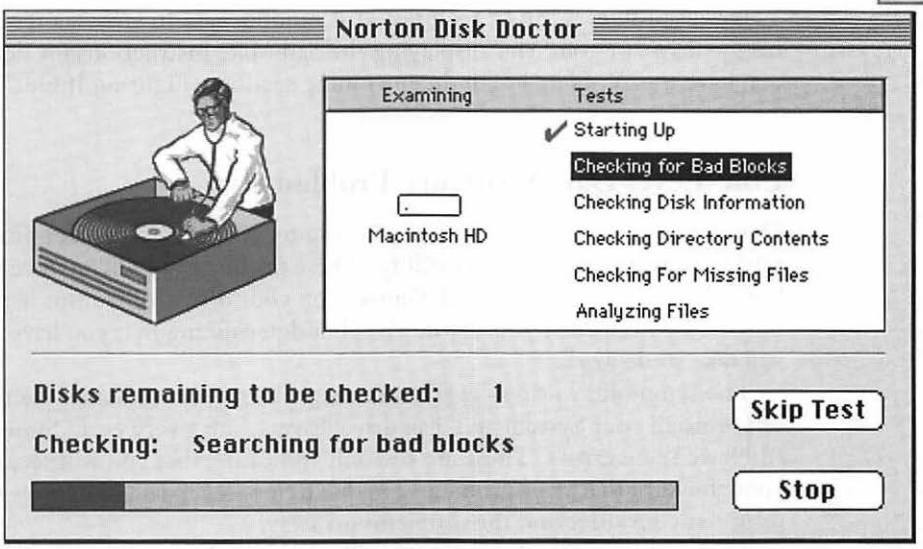


Figure 18.7 Display of Norton's progress while checking the drive.

happen, but sometimes a program may not be well-behaved and will try to write the file, anyway. If this should happen, your directory will probably get damaged.

Mounting Problems

If your drive is refusing to mount as you boot, especially a second hard drive, you can have a bad driver, connection, or cable, or corrupted boot blocks. To force mount the drive, you will need either your formatter if it has a mounting feature; a utility such as SCSIProbe, HDT Prober from FWB's Hard Disk ToolKit; or an Fkey utility called Mount-Em.

Because the drive is normally loaded at the time the Mac boots, when it does not get loaded, your can crash you Mac by forcing it to load. If the driver is well-behaved (meaning, written according to Apples specifications), the disk should mount without a problem; but not all drivers are well-behaved. If your drive will not mount or crashes on mounting, reinstall the driver.

The worst possible result of trying to mount your drive is when it mounts and immediately asks to be initialized. If this happens, check your cables again, try a new SCSI cable, and restart your Mac. If this does not correct the problem, go to the later section on disk recovery.

Corrupted Drivers

In Chapter 10, "Macintosh Disk Drives," there was a brief section about corrupted drivers. Every once in awhile, the driver on your hard drive can become corrupted; when this happens, your Mac can exhibit a wide range of symptoms.

Driver problems can be manifested as random system errors, a request to reinitialize the drive, or your Mac displaying the Sad Mac. Instructions for determining if you have this problem are in the upcoming section, "Figuring It Out."

Low-Level Data Structure Problems

One of the worst situations you can encounter is one that involves problems that are not detected by any hard-disk utility. These problems usually involve your directory, boot blocks, or other low-level elements on your drive. When this has occurred, the only fix is to reformat your hard drive; but determining that you have this problem will take some work.

The symptoms for low-level structure problems are random system errors. You can reinstall your System and disk drive drivers, run a very clean System folder, and still have these errors. These are the only indicators that you will see, and you won't know for sure that your problems are due to low-level data structures until you reformat your drive and the problems go away.

This problem is the last one you will suspect and you will not get to this point until you've performed every troubleshooting technique in this book. After you fix the problem, you'll wonder why you waited so long to reformat your drive.

Figuring It Out

Before you can determine if your hard drive is your problem, you have to perform all of the troubleshooting techniques for System troubleshooting in Chapter 17, "System and Application Troubleshooting." Once you've determined that your Mac is not suffering from System software problems, follow the steps for driver troubleshooting and then move on to the section about determining if your drive is dead.

Driver Troubleshooting

If your Mac will not work when booting from your clean startup disk, even when forcing it to ignore the SCSI bus, you have a serious problem.

To determine if you have a bad driver, try the following:

1. Turn off the power and any equipment connected to your Mac.
2. Find your Macintosh System Tools disk (System 6.0.X) or the Macintosh Disk Tools disk (System 7.0.X).
3. If you do not have an internal hard disk drive, disconnect all external drives and boot from the System Tools or the Disk Tools disk. If your Mac starts without the Sad Mac, reinstall your hard disk driver.

If your Mac has an internal hard drive, follow the remaining steps:

4. Disconnect any SCSI devices attached to your Mac and try to boot the computer. If it starts properly, check all cable connections and reattach your

hard drives one at a time until you find the one that is causing problems. When your Mac presents you with the Sad Mac, you will have found the offending device.

5. If your internal drive is causing the problem, turn off the power and insert the System Tools (System 6.0.X) or Disk Tools (System 7.0.X) disk. Press and hold down the Command, Option, Shift, and Delete keys as you turn on the Mac.

   Forcing the Mac to boot while ignoring the internal drive may require several attempts. It is difficult to start the Mac and press the proper keys. The only way to know for sure whether you're not starting the Mac properly or that there is some other hardware problem is to disconnect all of your hard drives, including the internal drive, and start your Mac from a floppy. If you get the Sad Mac with all hard disks disconnected, you have a hardware problem that is not related to your hard drive. If you get the Sad Mac icon, you have a hardware problem. If your Mac starts from the floppy, you need to reinstall the hard disk drive drivers. The instructions for reinstalling your hard disk's driver are in Chapter 10, "Macintosh Disk Drives."

There is a danger involved with reinstalling your hard disk's driver. The driver may install improperly or the installation may not take. If there is a problem with the driver installation, your disk will ask to be initialized and you'll have to reformat your drive. Do not attempt to reinstall your driver more than once. Repeated attempts to reinstall a driver will result in your drive needing to be formatted. If the driver reinstallation is successful, back up your data and reformat your drive. If it is unsuccessful, you will have to recover your data and then reformat your drive.

Another way to determine if a drive's driver is corrupted is to follow these steps, which will work only on a drive that is not internally terminated:

1. Turn off the drive.
2. Start your Mac.
3. After the drive has started, turn on the hard drive.
4. Use a disk mounting utility to mount the drive. If your Mac crashes when you try to mount the drive, it's driver is probably corrupted.

Determining if Your Drive Is Dead

Before deciding whether to announce the death of your drive, use the following guidelines:

- ❖ Always check the cabling and power connections in case they have become loose. Also, make sure the SCSI ID has not been inadvertently changed.
- ❖ Whenever possible, test the suspect drive on another Mac.
- ❖ If more than one drive is attached to your system, remove the other drives and test the suspect drive by itself. A SCSI ID conflict, improper termination, or a bad cable can make any drive seem defective.



Service Technicians

Take your drive only to someone you trust. Too many times, an Apple dealer will tell you that your drive is dead and the data is unretrievable. As a rule, they do not keep the best people as technicians because they can't pay them enough; the training Apple gives is basically how to swap parts. Therefore, an Apple dealer technician is more apt to want to swap a part than try to find the problem and really fix it.

- Make sure your drive is getting power, then turn it on. If your drive does not power up, you could be experiencing a stiction problem. Find a hard disk drive expert who understands stiction problems and can recover your data.
- The drive will format but, after a short period of time, it crashes. This symptom could indicate a software problem. Run the drive with a clean system for the same length of time as the drive ran before crashing, or longer. If the drive fails again with a clean system, test the drive on a different Macintosh. The problem could be with the Mac, not with the drive. If the results are the same on another Mac, the problem is probably in the drive.
- Try formatting the drive with the best formatting software you can find. Your current formatting software might be incompatible with System 7, or might be doing a poor job of formatting combined with a lousy driver.

Now that My Disk Has Crashed...

There is nothing more distressing than having your drive display the message shown in Figure 18.8.

"What do I do now?" is first question you will ask after crying "Oh, my God!" Of course, you will want your data back, so you will want to perform a recovery. The cause of your crash could be any number of things, but the real concern is to get your data back. Before you try to recover your drive's data, make sure the request to initialize your disk is the result of a drive problem, not a bad SCSI connection. For this reason, double-check your cables and all connections after you dismiss the request to initialize. Once you're sure your drive has crashed, you can perform your data recovery.

In general, your drive will probably have one of the following problems:

- A corrupted directory
- An invalid bitmap partition
- Corrupted volume information
- A corrupted hard disk driver

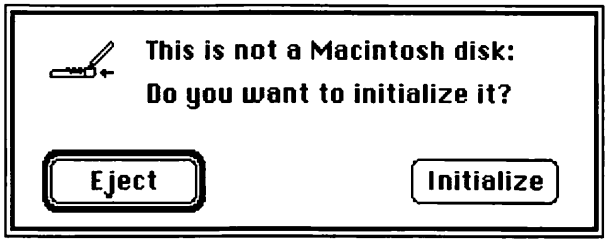


Figure 18.8 A hard disk requesting to be initialized.

- The drive was initialized from the Finder or other utility

In the case of an initialized disk, your directory is completely rewritten so that it displays a blank disk. Of the listed problems, the most serious problems are an initialized disk and an invalid bitmap partition. The other problems can easily be repaired on the file by a utility, such as Norton or MacTools.

There are two types of disk recoveries: One is an easy recovery, and the other, a hard recovery. With an easy recovery, when your disk crashes, all you have to do is run your utility package and it will automatically repair your disk's damage, giving you access to all of your data. Doing an easy recovery makes modifications directly to the disk that has crashed. It will work on the file allocation table, the directories, and the files themselves. So, if the recovery does not work—they are not always successful—the chances of using the hard recovery procedures and being successful are greatly diminished. You will probably not get any more than you got with the easy recovery.

If it appears that the damage to your disk is serious, do a hard recovery. The hard recovery will allow you to recover the crashed disk to another drive, leaving the crashed disk drive untouched. You will know it is serious when your drive does not mount or asks to be initialized. With serious damage, your bitmap partition is usually corrupted and the disk is seen as being unformatted. With serious damage it is likely that your disk did not mount, and using a mounting utility did not work, either. Yet, because your drive is displayed by the SCSI utilities and you hear it spinning, you'll know it is available, just like the SyQuest disk at SCSI ID 6 shown in Figure 18.9.

The following sections demonstrate how to recover deleted files and your disk using Norton Utilities for The Macintosh. Norton is not the only utility available, but it is one of the best.

The Basic Disk Recovery Process (an Easy Recovery)

A basic disk recovery should be used either after you've done an advanced recovery (if you think your drive has serious trouble) or if you're willing to live with a partial recovery. The easy recovery steps are what you should do as a periodic maintenance procedure before your drive crashes, not just to recover lost data. These steps pose potential dangers because Norton's Disk Doctor makes modifications to a drive's directory, allocation blocks, and B-trees when it is run. If you modify these structures with Norton Utilities or any other recovery program, and don't get your data back, it is ten times harder to get your data back, if you get it back.

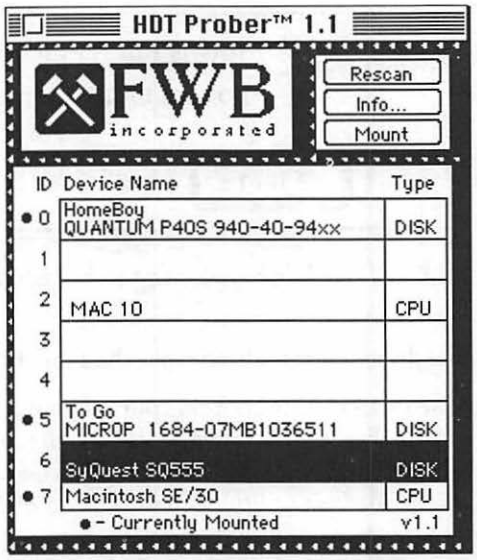


Figure 18.9 A nonmounting disk.

Always try these preliminary steps before doing a recovery; it just might be possible to get your drive back without doing a recovery:

1. Check all cables and go through the SCSI Bus troubleshooting procedures previously shown.
2. Run Apple's Disk First Aid.



Norton and Disk Recovery Utilities

The instructions in this chapter for recovering a disk are for Norton Utilities 2.0. Norton has recently released version 3.1, but version 2.0 has been sold for over two years and there are thousands of copies floating around so that you stand a better chance of having version 2.0 than you do 3.0. Also, version 3.0 works much like 2.0 except it is easier to use. So, I've decided to use the 2.0 version for the examples. Differences between the two versions will be noted where they are significant.

There are two major disk utility programs on the market: Norton and Central Point's MacTools. These programs are similar in both their features and how they work. If you are using MacTools and don't have Norton, read your manual and then follow the steps given in the next section. The procedures are basically the same regardless of which package or version you're using.

3. If the drive is not mounting, try to mount it using a mounting utility. If your Mac crashes when mounting the disk, try reinstalling the driver.

Once you've done the preliminary steps, go on with these steps for an easy recovery:

1. Run Norton Utilities and select Norton Disk Doctor (Figure 18.10).
2. Select the crashed drive from the disk selection window (Figure 18.11). If the drive is not visible, choose the More... option rather than the Scan SCSI Bus option; this can hang if you have SCSI devices other than hard drives attached to your Mac. If you have to use the More... option, go to the Advanced Disk Recovery section. Norton 3.1's More... option is a Disk menu item: Show Missing Disks.
3. If you have to use the More... option, you will be presented with a window like the one shown in Figure 18.12 and the recovery process will be more difficult. In this instance, the disk at SCSI ID 6 is the crashed drive. In this window, you will see that the disk has "No Volume Info Block."
4. In selecting the More... option, you have a couple of additional choices: One is to use a Volume Information File (VIF) that you have previously made; another choice is to have Norton scan for the VIF and find an existing one on your drive. Version 3.0 automatically scans for the Volume Information File.
5. Press the start button after selecting your disk (Figures 18.13 and 18.14).

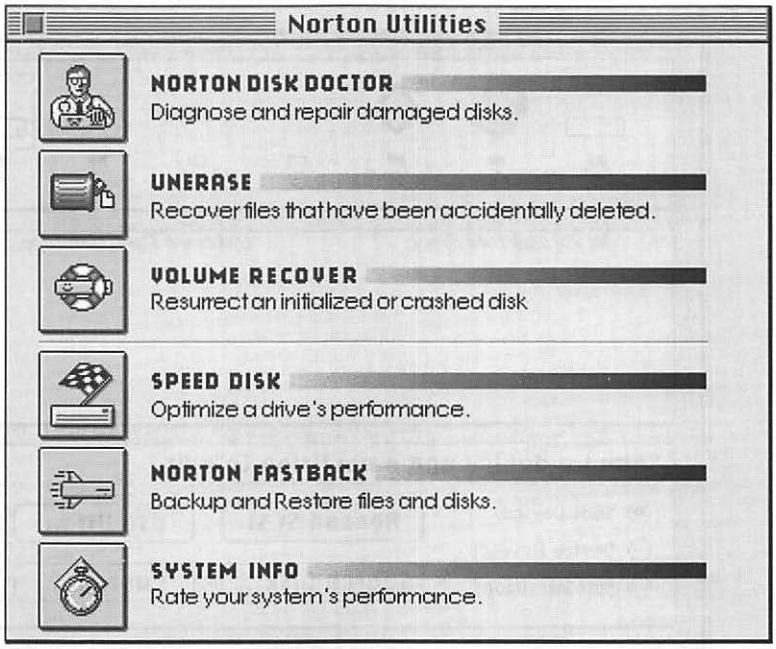


Figure 18.10 *Norton's opening window.*

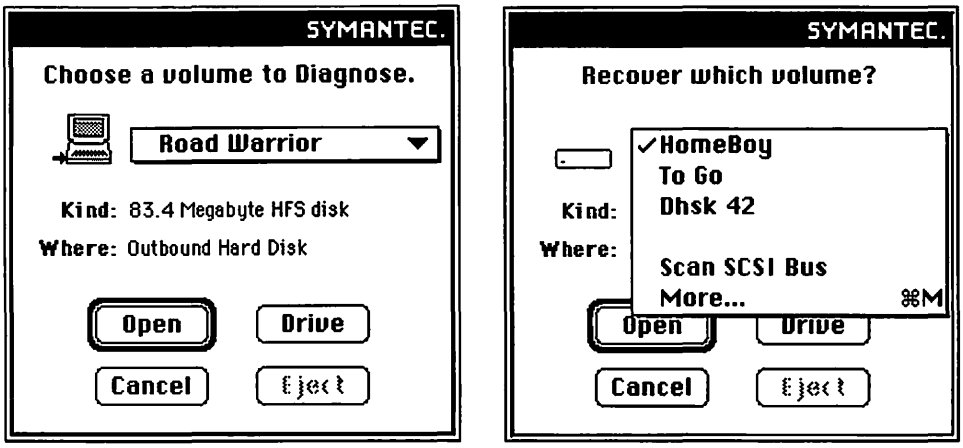


Figure 18.11 *Norton's selection window.*

6. Your Mac will start scanning the disk to look for problems. The first problem with the disk in the example is shown in Figure 18.15. As Norton scans your disk, it will pop up various messages asking if it should correct the problem. Unless you have a reason for not fixing a specific problem, answer "Yes" to all of the correction requests.

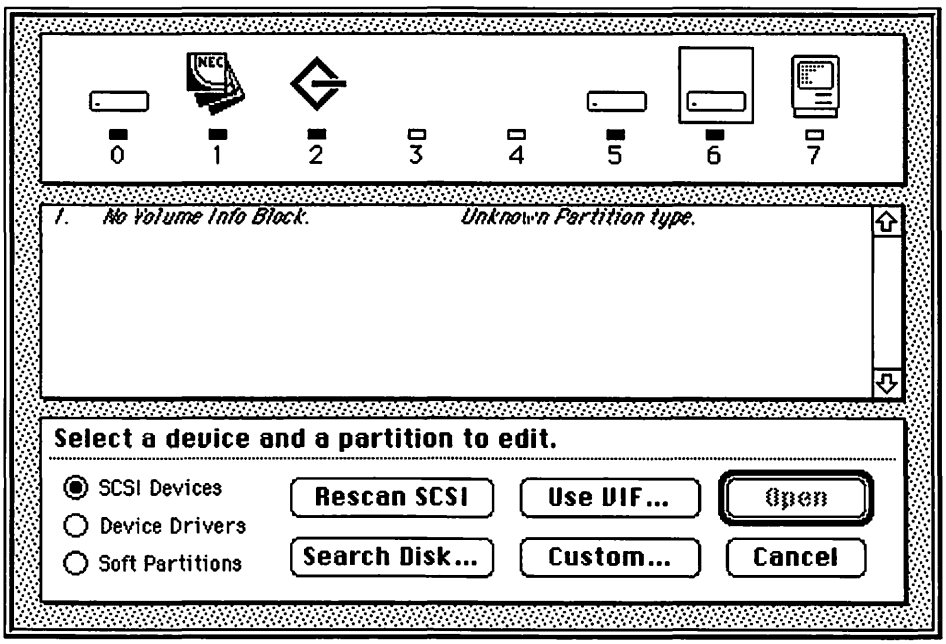


Figure 18.12 *No Volume Info Block (disk needs to be recovered).*

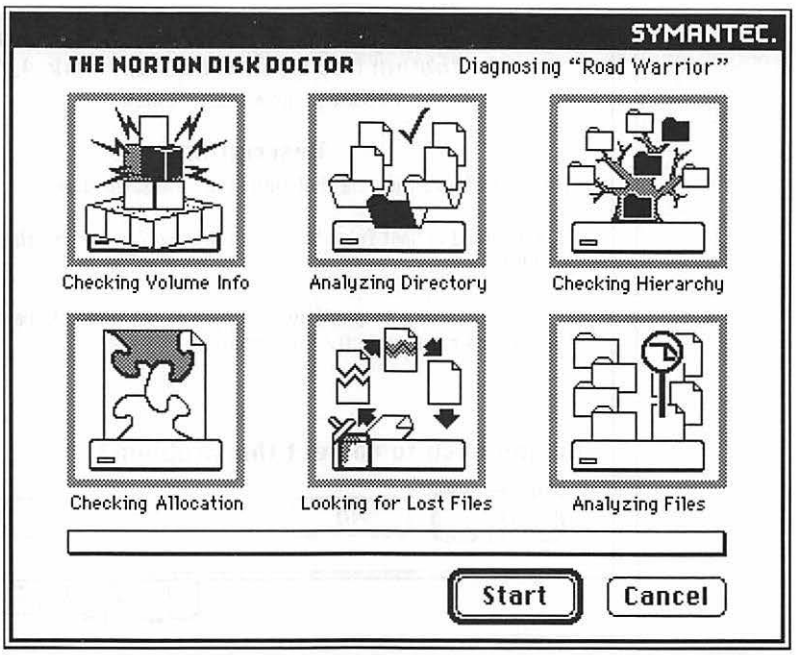


Figure 18.13 *Starting the Norton recovery process.*

7. During the repair process, if you see *link* or *leaf* errors, you should fix them (Figure 18.16). However, the disk should be reformatted after you have restored it and copied from it any data you want. The disk will probably not be reliable, and you should assume it is broken.

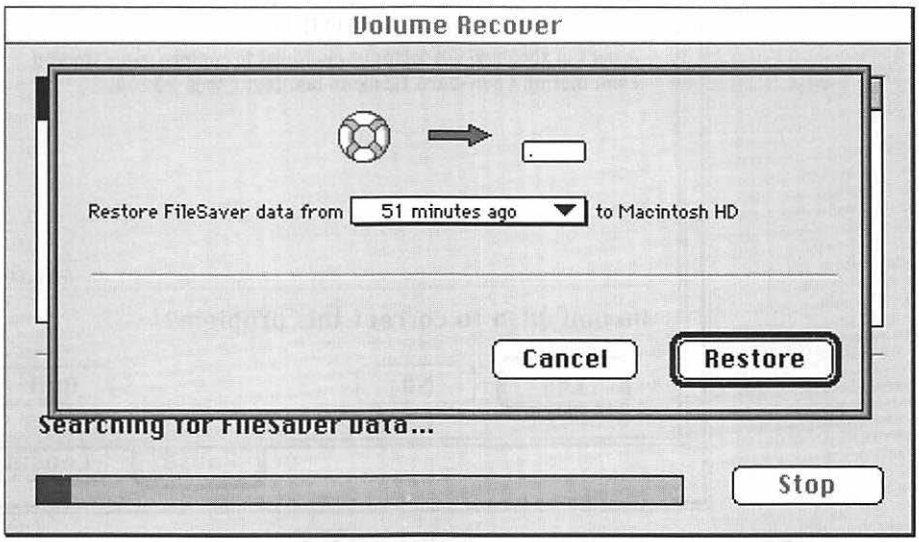


Figure 18.14 *Starting the Norton 3.1 recovery process.*

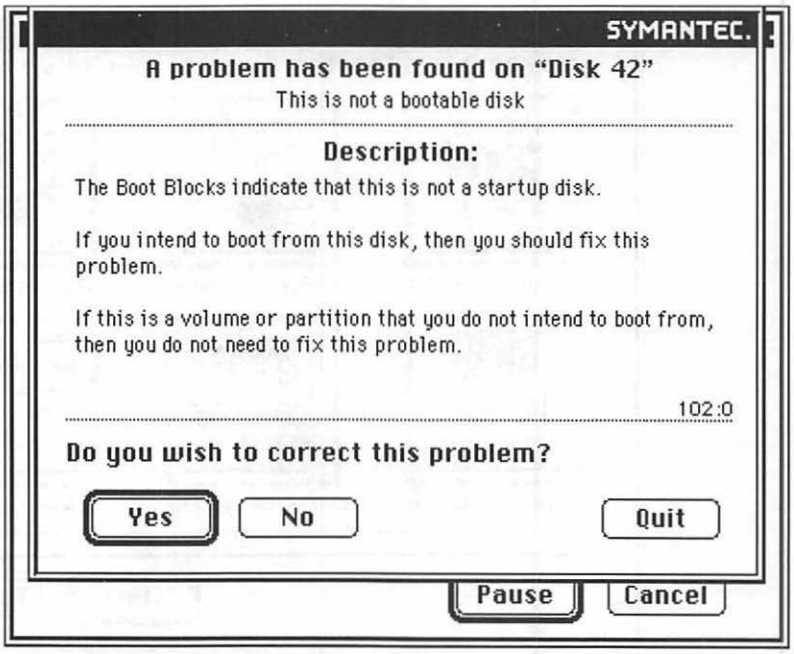


Figure 18.15 *Request to fix a directory error.*

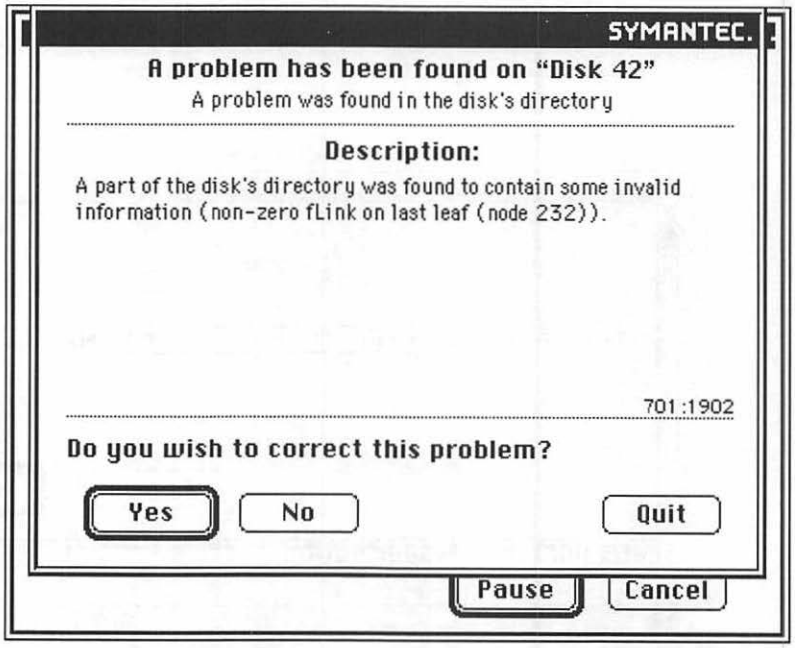


Figure 18.16 *Request to fix leaf and link errors.*

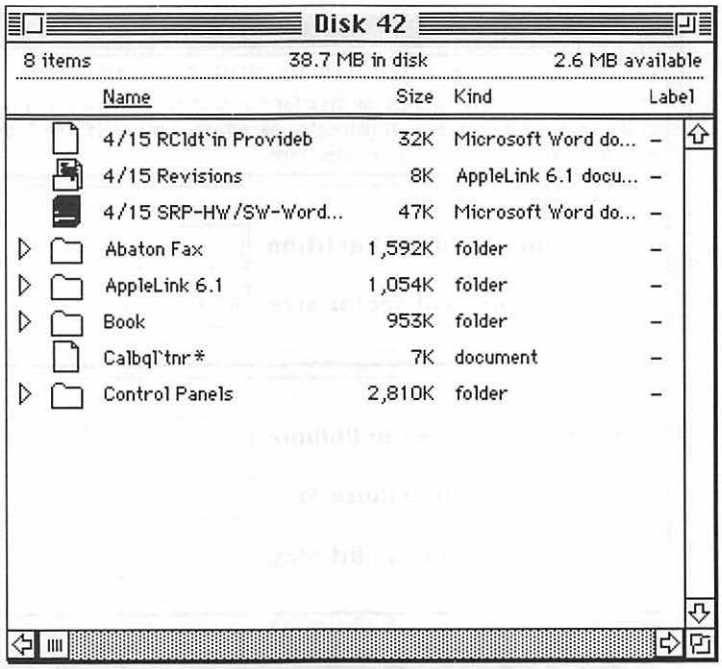


Figure 18.17 *Disk window after recovery.*

8. After the recovery is completed, your disk will appear on the Desktop. In the case of the example, it was not really a successful recovery; a hard recovery should have been performed instead, because the disk was not easily available and the More... option was needed to find it. As you can see in Figure 18.17, some of the filenames are garbled; it says that there are 38 megabytes used, but the totals of the displayed files do not equal 38 megabytes. The next step will be to see what it is possible to get with a hard recovery.

An Advanced Disk Recovery Process (a Hard Recovery)

The first steps for doing a hard recovery are the same as for the easy recovery: Check your cables, the SCSI troubleshooting, and so on. Where they change is in the option you select. Rather than using the Norton Disk Doctor, use the Volume Recover program, as seen in Figure 18.18. The drive selection process is also the same. There is one possible exception: Using the Custom... button from the drive selection window when using the More... option. Figure 18.18 shows the window you get when you select the Custom... button. In the different fields, enter the specific drive parameters for your drive. If you're using Norton 3.1, the Custom... button has been replaced by an Add Custom Disks... menu item in the Disk menu.

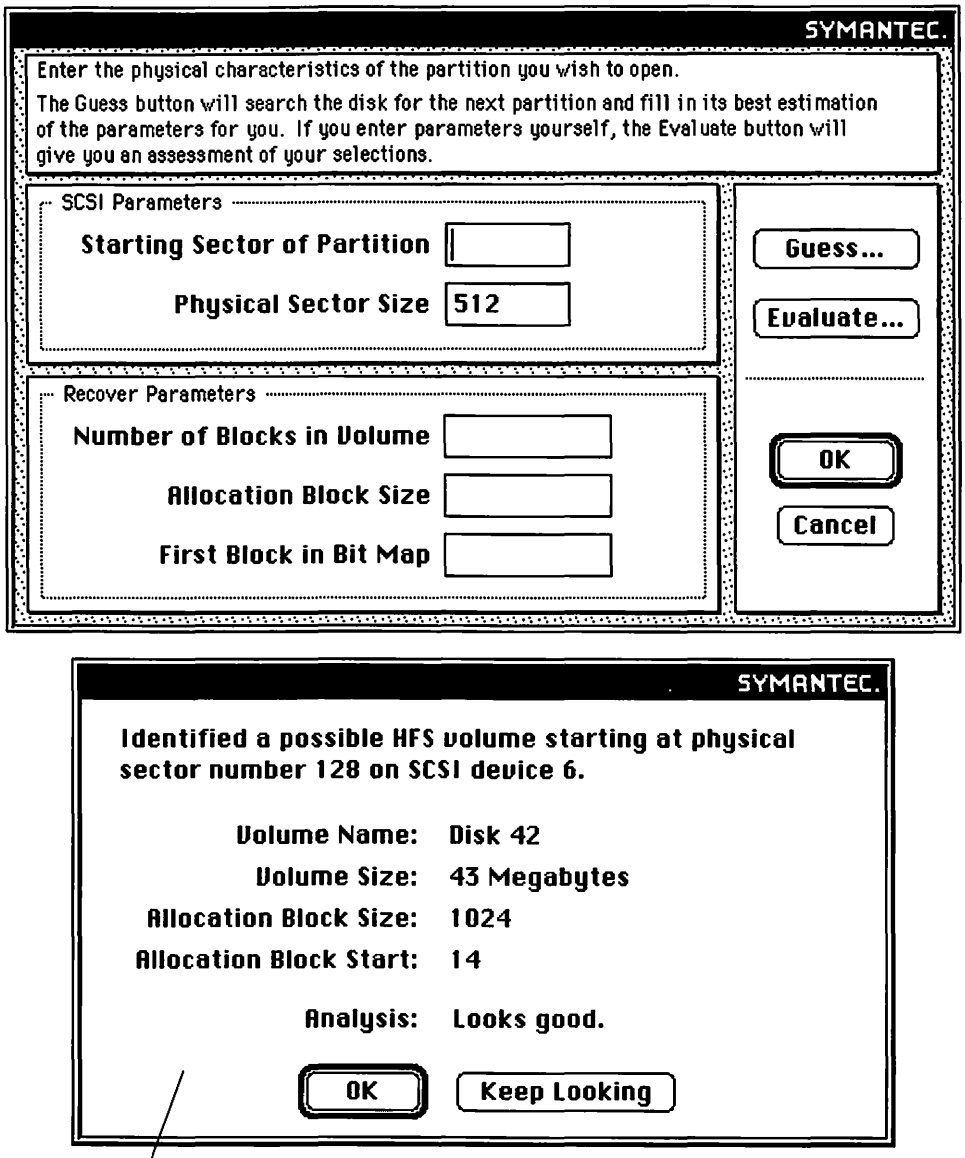


Figure 18.18 *Using Norton's custom options.*

One way to get these parameters is to use HDT Prober, or see if you can get the information from your formatter. Unfortunately, you need to get this information before your drive crashes. You can have Norton guess, but that is not always successful. When it guesses, it scans your disk for bitmap volumes, ignoring the volume information stored on the disk. Use this option if your directory and/or your volume information blocks are damaged.

The best way to get this information after the fact is to find a disk of the same type as the one that crashed, format it with the same formatter, and use Norton to make a VIF file. Then, use this VIF file with Norton on your drive. Guessing at the values can sometimes work—but not always—and you may have to scan your disk several times, using different parameters until you get the correct ones. If you guess and are partially correct, and Norton detects what it believes to be the correct parameters, it will ask to change them.

After you select the drive to open, you will go through the following steps:

1. Figure 18.19 shows a Norton window asking what method to use. This is specific to Norton's special file that preserves your disks information in a backup directory. If you were not using this within Norton, you will need to select "Other methods," which is what is needed for this example.
2. Selecting "Other methods" will give you three options. You can do a Directory Scan, a Volume Scan, or a Floppy Recovery. If you know that the directory is good but want to use this option so that you could recover to another volume, go for it. However, if you are at this point, then you probably should do the Volume Scan, which will scan the entire drive looking for files, as when undeleting files.
3. After selecting the scan, you will prompted for the types of files you want to look for. Select All File Types and the Options... button, where you will make sure that it searches the entire disk while specifying how thorough the search should be (see Figure 18.20). You might select the "Recover unknown file fragments" because they could contain data you need, or even the "Exhaustive search through sectors." Since Norton does not know about every file format for every Mac program, you should select this option. If you choose the exhaustive search, expect your Mac to be tied up for several hours, depending on the size of your hard disk.

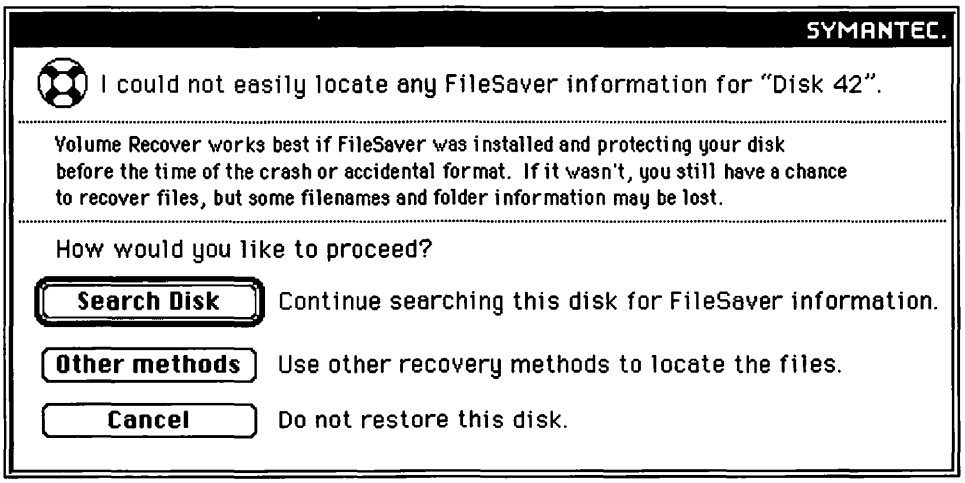


Figure 18.19 Choosing the recovery method.

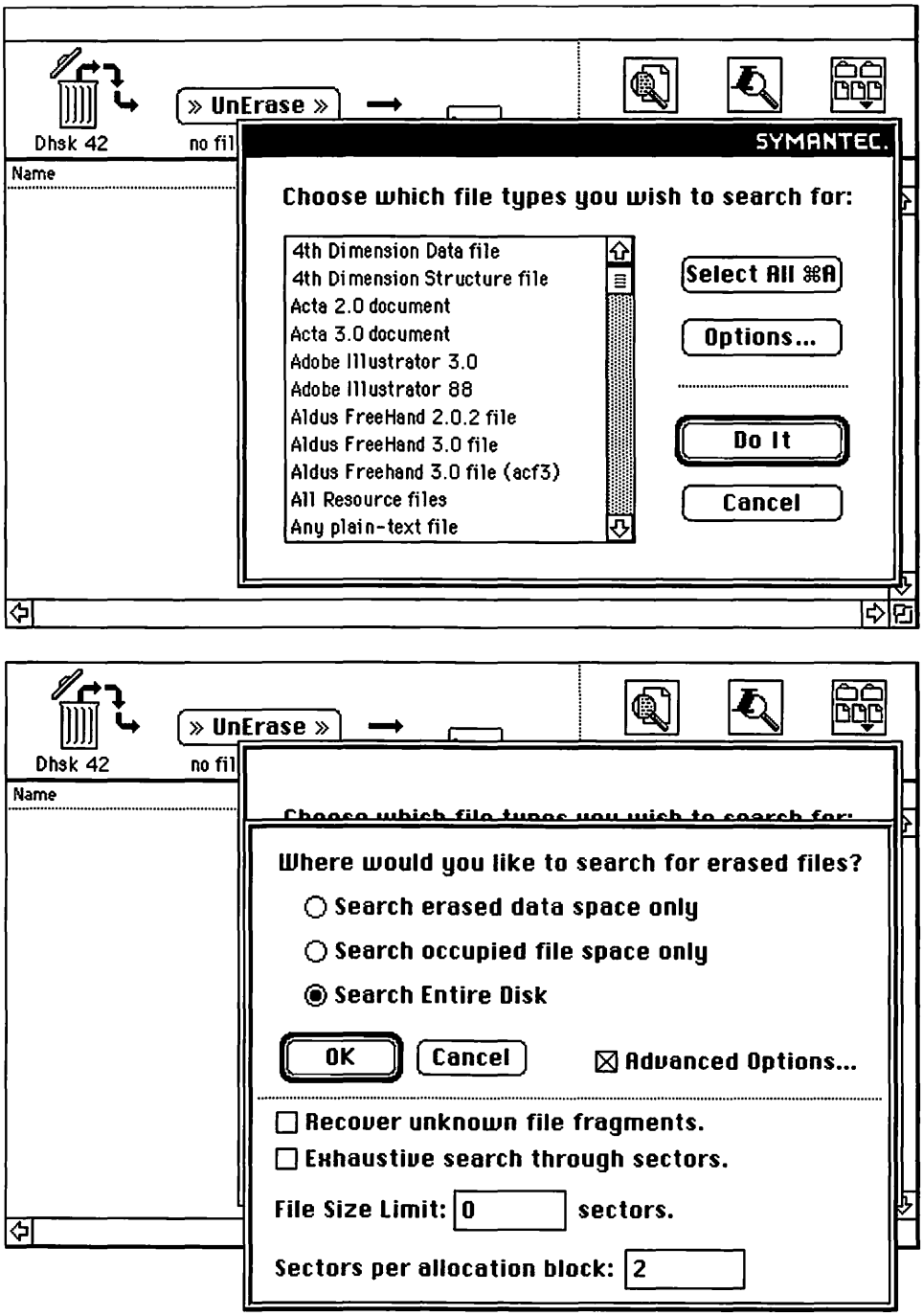
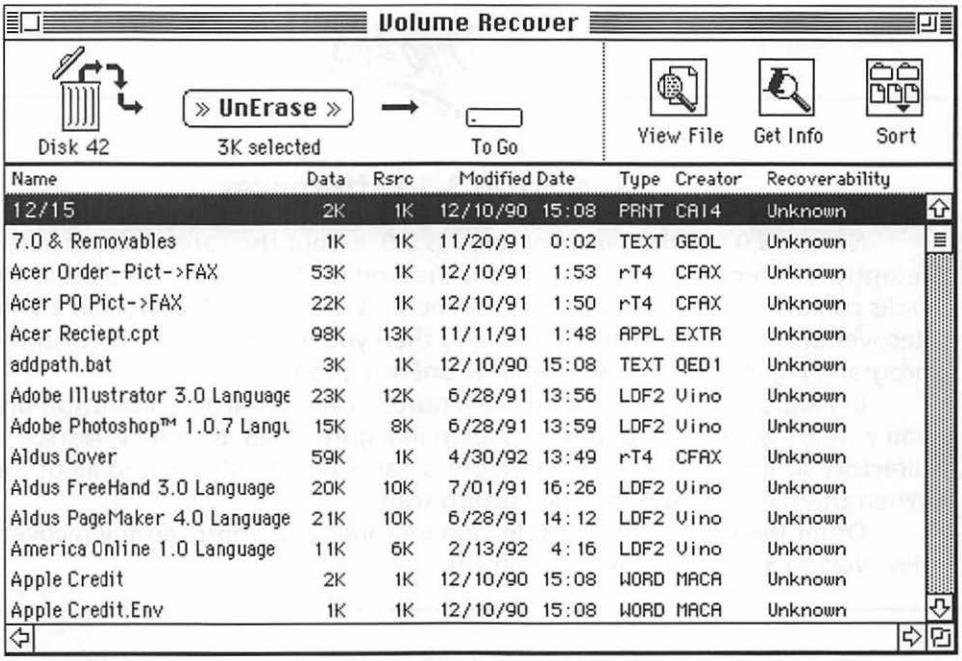


Figure 18.20 *Additional recovery options.*



Name	Data	Rsrc	Modified Date	Type	Creator	Recoverability
12/15	2K	1K	12/10/90 15:08	PRNT	CAI4	Unknown
7.0 & Removables	1K	1K	11/20/91 0:02	TEXT	GEOL	Unknown
Acer Order-Pict->FAX	53K	1K	12/10/91 1:53	rT4	CFAX	Unknown
Acer PO Pict->FAX	22K	1K	12/10/91 1:50	rT4	CFAX	Unknown
Acer Reciept.cpt	98K	13K	11/11/91 1:48	APPL	EXTR	Unknown
addpath.bat	3K	1K	12/10/90 15:08	TEXT	QED1	Unknown
Adobe Illustrator 3.0 Language	23K	12K	6/28/91 13:56	LDF2	Vino	Unknown
Adobe Photoshop™ 1.0.7 Langu	15K	8K	6/28/91 13:59	LDF2	Vino	Unknown
Aldus Cover	59K	1K	4/30/92 13:49	rT4	CFAX	Unknown
Aldus FreeHand 3.0 Language	20K	10K	7/01/91 16:26	LDF2	Vino	Unknown
Aldus PageMaker 4.0 Language	21K	10K	6/28/91 14:12	LDF2	Vino	Unknown
America Online 1.0 Language	11K	6K	2/13/92 4:16	LDF2	Vino	Unknown
Apple Credit	2K	1K	12/10/90 15:08	WORD	MACA	Unknown
Apple Credit.Env	1K	1K	12/10/90 15:08	WORD	MACA	Unknown

Figure 18.21 *Recovery window with found files.*

4. As soon as you have selected your search criteria, it will search your drive. This process can take awhile, probably about twice as long as the undelete scan (figure 15 to 20 minutes per 50 megabytes).
5. After it has finished scanning your drive, you will see a list of files. You can see in Figure 18.21 that it found 27.2 megabytes of the 38 that were reported as used in Figure 18.17.
6. From this window, you select the drive to recover to and the specific files you want to recover. You do not need to recover the entire drive, just the files you want. From this point, select the files you need and press UnErase; Norton will take the files and place them onto the destination volume.

After the Recovery

Whenever you recover data, regardless of the method, you should verify it's integrity. The very fact that you have had to recover your data indicates that you had a crisis. There is no sense in compounding the problem by performing a recovery only to discover, after you have reformatted the disk, that the recovery was no good.

Whenever you recover or undelete a file, check it out. Often, your recovered data will have icons that can lull you into a false security; the icon means only that the Finder recognized it as a file associated with a specific program. Open the file(s) with

Notes

Norton 3.1 Differences

Norton 3.0 has the same features as 2.0, except they are accessed a little bit differently. As mentioned in this section, the Add Custom Disks... and Show Missing Disks commands are found in the Disk menu. When you select Norton's Volume Recover program, it selects the disk and then you'll find yourself in Norton's UnErase program. Figure 18.22 shows the new UnErase program.

In Figure 18.23, you'll again see a button called Search. This button presents you with other search options, as shown in Figure 18.23. Normally, Norton tries a directory scan first, but, if the directory is damaged, it will not find all of the files. When this happens, use the File Pattern scan.

Other than different disk selection methods and improved file recovery abilities, Norton 3.1 is much like version 2.0.

the program that created it, double-click on the icons, and check every piece of critical data. At the very least, perform a thorough random sampling of your files.

After your data is recovered and before you format your hard drive, back up your data. Back up your data. Back up your data. Once you format your hard drive, all of its data is gone—*no one can get data from a formatted hard drive.*

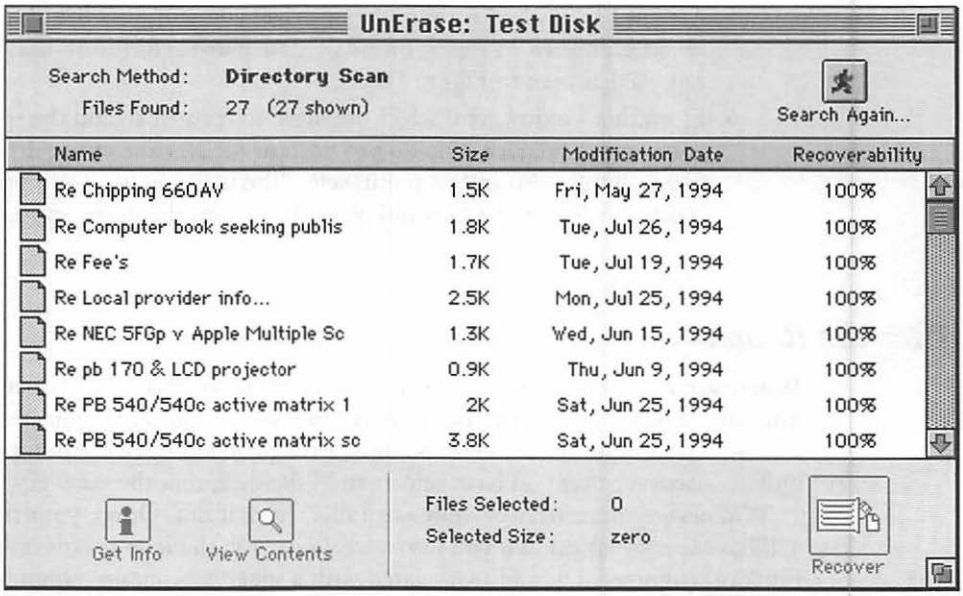


Figure 18.22 *Norton 3.1's UnErase program.*

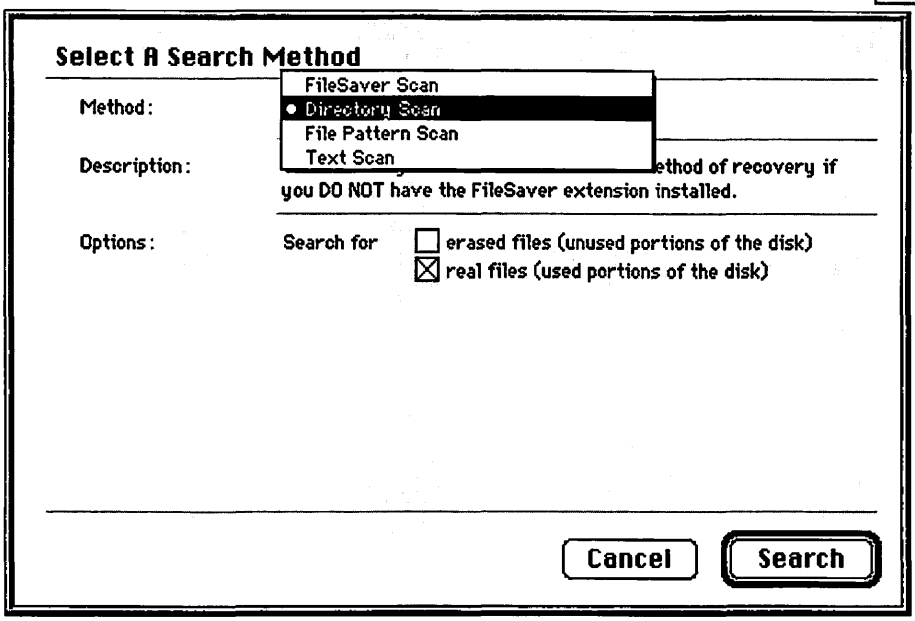


Figure 18.23 Searching options in Norton 3.1.

Recovering Deleted Files

It will happen: Some day, you will place a file into the Trash and empty it. When this happens, you will either wail and gnash your teeth, or rejoice because you have a utility installed that will let you dig in the Trash and get back your file. If you don't have such a utility, do not despair; your chances of recovering the file are still 90 percent.

When a file is deleted, it is not erased from your hard drive; initially, it is just removed from your directory. If you do not write anything to your disk after the file is trashed, it is still there. If, however, you copy files onto your disk or save new documents, you stand a chance of overwriting the file. And, if you optimize your drive, the file will be overwritten and gone forever. So, as soon as you know that you have deleted a file, you should not run any programs, copy any files, or use your Mac until you have gotten back the file.

The reason for not running any programs is that many programs create temporary files while they run. So, just running some programs will cause data to be written to your drive. And, if your drive is almost full, the temporary file will be written wherever there is space, including the space freed by your deleted file.

Undeleting Made Easy (Using an Installed Disk Utility)

When you have an installed utility, recovering a deleted file is easier than turning your wastepaper over to find the memo you just used as a basketball. These utilities

keep a record of your deleted files and whether they have been overwritten. So, when you try to undelete one, you will know if it is available in its entirety or only in part.

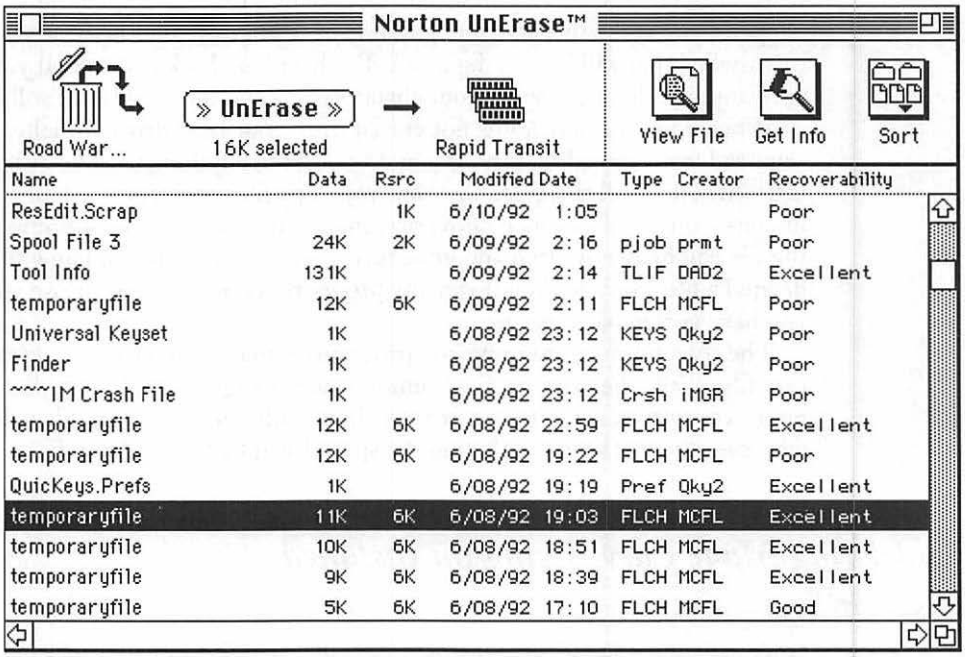
Figure 18.24 shows the results of the Norton Utilities quick UnErase option. It lists the files by date, and displays how much of a file is recoverable. All of the other utilities have similar capabilities.

Datawatch, in its SuperSet Utilities, has a very nice undelete utility that is a Cdev that does not require running a separate application to recover the file. It will also undelete the file to its original location on the drive (see Figure 18.25).

Regardless of which application you use, it can be a lifesaver when you accidentally trash the quarterly report or some other important document; you will be able to recover it in minutes. Seriously consider using one of them. When you get your recovery utility read the manual and make sure it is installed properly. Then, practice by deleting a couple of files and recovering them so that you will be prepared if and when a crisis occurs.

Oh, No, I Haven't Installed My Disk Utilities!

This is what you say when you trash that file before you purchased or installed your undelete utility. If you will remember from Chapter 11, where Macintosh files are described, files can be quite complicated, containing many different attributes or other files even though they appear on the Desktop as a single file. Because of this,



Name	Data	Rsrc	Modified Date	Type Creator	Recoverability
ResEdit.Scrap		1K	6/10/92 1:05		Poor
Spool File 3	24K	2K	6/09/92 2:16	pjob prmt	Poor
Tool Info	131K		6/09/92 2:14	TLIF DAD2	Excellent
temporaryfile	12K	6K	6/09/92 2:11	FLCH MCFL	Poor
Universal Keyset	1K		6/08/92 23:12	KEYS Qky2	Poor
Finder	1K		6/08/92 23:12	KEYS Qky2	Poor
~~IM Crash File	1K		6/08/92 23:12	Crsh iMGR	Poor
temporaryfile	12K	6K	6/08/92 22:59	FLCH MCFL	Excellent
temporaryfile	12K	6K	6/08/92 19:22	FLCH MCFL	Poor
QuicKeys.Prefs	1K		6/08/92 19:19	Pref Qky2	Excellent
temporaryfile	11K	6K	6/08/92 19:03	FLCH MCFL	Excellent
temporaryfile	10K	6K	6/08/92 18:51	FLCH MCFL	Excellent
temporaryfile	9K	6K	6/08/92 18:39	FLCH MCFL	Excellent
temporaryfile	5K	6K	6/08/92 17:10	FLCH MCFL	Good

Figure 18.24 *Norton's UnErase window with files.*

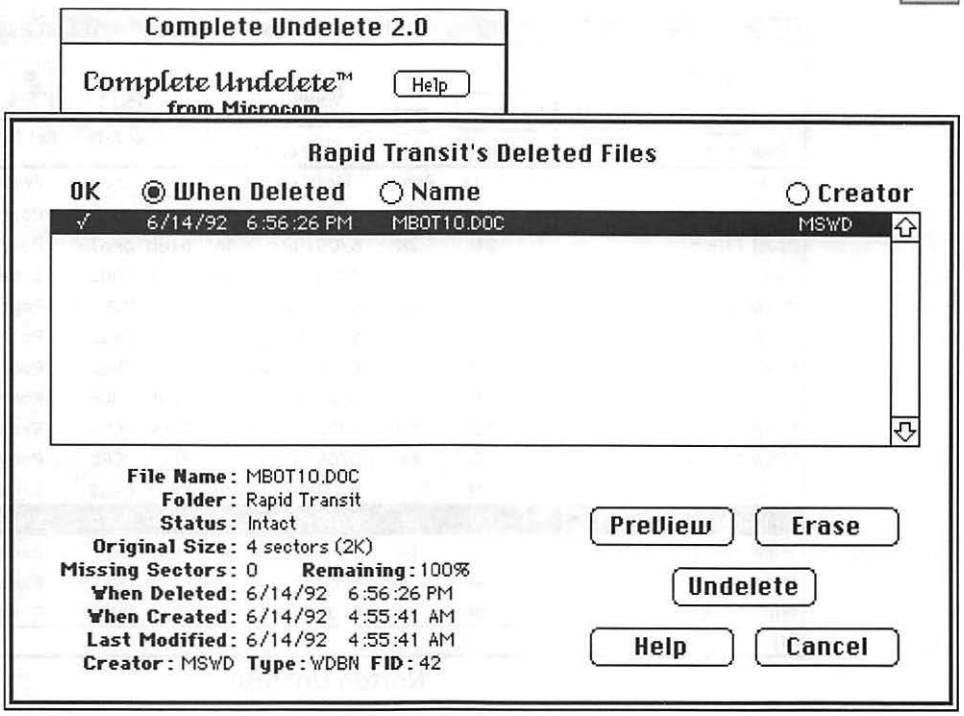


Figure 18.25 *Complete UnDelete Cdev window.*

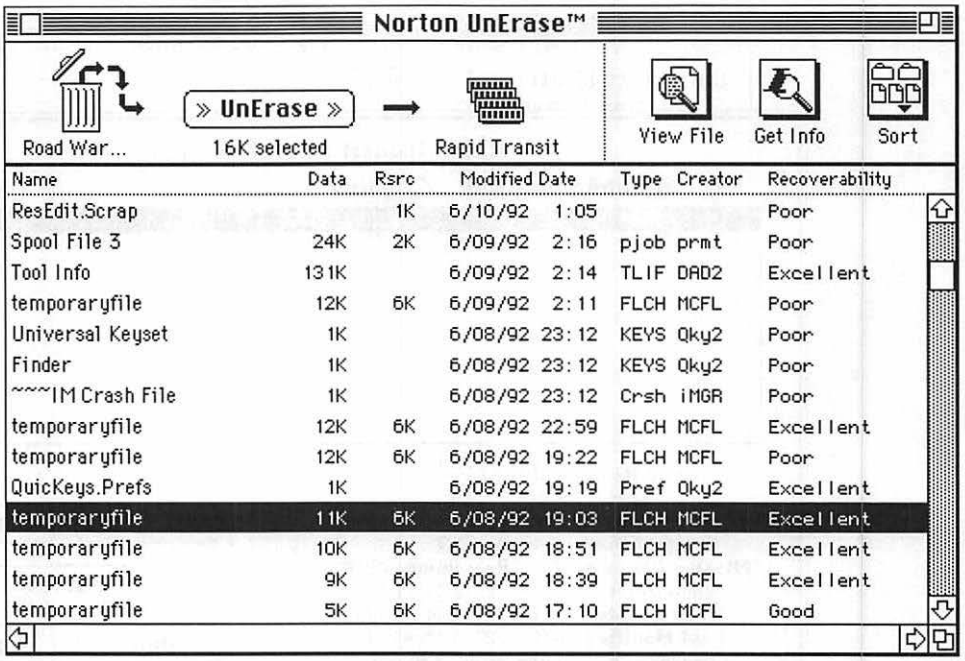
more complicated files are harder to recover (for example, files made by QuarkXPress, Excel, and PageMaker).

To recover any file that has been deleted or one that has no directory reference (one of those unfortunate times when your directory gets damaged), use a disk utility that scans your hard drive for files and file fragments. Both MacTools by Central Point Software and Norton Utilities' For the Mac by Symantec will scan your hard drive for deleted files (see Figure 18.26). Also, each of these packages has templates for different file types so that when it finds a file, if its structure is similar to a template, the package knows how to look for and recover the file intact. However, if the template is similar but the application's manufacturer made some type of change so that the file and the template do not exactly match, you could have difficulty recovering the file.

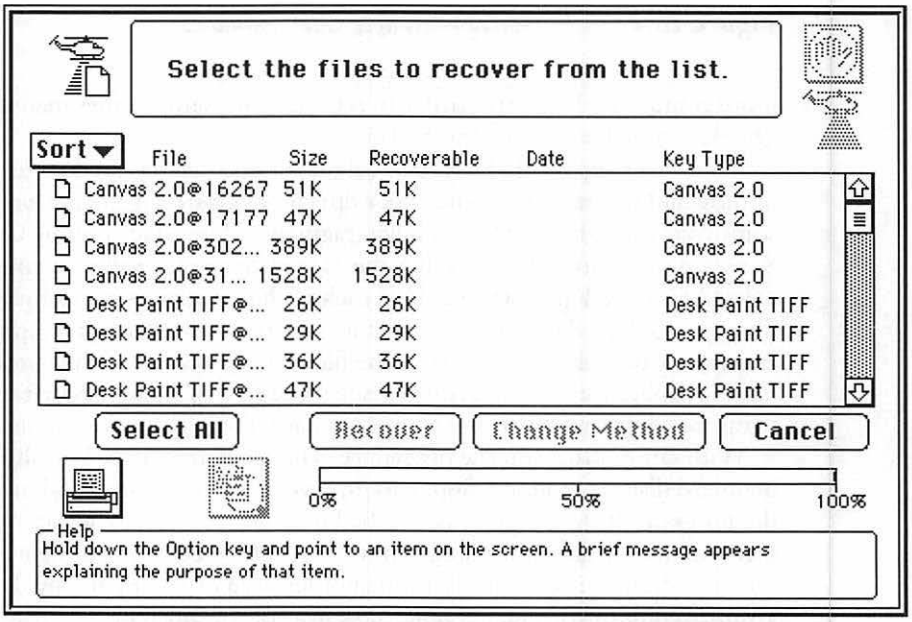
With either program, the procedure is basically the same. You should have a second hard disk, or at least a floppy to hold your recovered data and, if possible, to run the program. If the program is installed on your hard disk, you can run it off of your drive (do not install either program if you want to recover your deleted files). Otherwise, run the disk utility from another hard drive or a floppy disk. Norton Utilities comes with an emergency disk just for this purpose.

To run either program, you hardly need a manual:

1. Start the program.
2. Select UnErase or Undelete.



Norton UnErase



Central Point's Undelete Window

Figure 18.26 *Norton's and Central Point's Undelete windows.*

3. Select the disk from which to recover data.
4. Follow the program's prompts.

Whenever you go after a deleted file, you have to determine whether the time to recover it is worth as much as the file. Sometimes, you could spend more time trying to recover a file than it would take to re-create it. If you have to scan a large drive, it will take about 10 to 15 minutes for every 50 megabytes. And, to perform the operation, you will have to scan the entire drive, so a 500M drive could take an hour to scan.

Disk Utility Packages

In this chapter, several disk utilities were mentioned. Each utility has different features, and ideally, you should have at least two different packages: Microcom's 911 utilities and Norton Utilities. But, if you have to choose one then it probably should be Norton Utilities.

Norton Utilities

Norton Utilities is published by Symantec and delivers more for your money than any other package. It has a complete set of recovery tools, plus a series of disk maintenance utilities that will make your life easier. The extra utilities include back up, disk copy, encryption, and a security disk eraser.

Datawatch SuperSet Utilities

Datawatch has also put together an impressive set of utilities, all of which are sold separately or in a bundle. One utility is ScreenLink, which with the increase in portable Macs, is almost a must because it allows you to take control of a remote Mac and make speedy file transfers when two machines are connected directly together. It also includes Disk 1st Aid, a file recovery program that will also check for bad sectors and map them out so that you do not have to reformat your drive.

And the list goes on. Complete Undelete is a control panel that lets you recover your erased files without running another program, and it will restore the file to its original location as well. And, to top it all off, their virus-checking program, Virex, is included. As a complete package, it is probably your best value, but the file recovery tools are not as complete as Norton's and they don't provide a disk optimizer.

At the time this was written, Datawatch was still selling its SuperSet Utilities, but the utility set is not being produced. Datawatch is trying to decide what to do with the utilities. Virex and ScreenLink are available as separate utilities.

MacTools

Central Point software has a lot of experience in making disk recovery tools—they have been doing it for years. As a suite of utilities, the package is almost identical to Symantec's. They have recovery tools, an undelete utility, an encryption program, plus a backup package; and let's not forget the optimizer. Because they are always running promotions, it is possible to get their software at a good price. Even though their tools are not quite as efficient as Norton's, it is still a perfectly adequate package.

Other Utilities

Do not forget to use Apple's Disk 1st Aid. It does not do a whole lot, but it can save your disk and repair minor directory damage. In addition, there are the antivirus utilities made by Mainstay (Anti Toxin), Symantec (Anti-Virus Utilities for the Mac), and Microcom (Virex). You should have one of them installed and running.

Summary

Well, that's it. You now have the basic information you need to recover your drive and diagnose almost any other Macintosh problem. To get the most from this chapter, you need to read your utility's manual. The intent of this chapter is to provide you with information about what has gone wrong, not necessarily to walk you through every procedure. If you learn what has happened and the principles for fixing a problem, you can use any utility on the market to recover your data.

One final word of warning: Disk drive problems are complex. I can't emphasize enough how *many* different problems are possible. Most problems you'll encounter are discussed in this chapter, but I, of course, cannot describe every one of them. You should, however, have a good foundation with the information in this book, to figure out any unusual problems.



APPENDIX A

BMUG's *Macintosh Revelations* CD-ROM

Included with this book is the BMUG *Macintosh Revelations* CD-ROM. The CD-ROM contains over 600M of software. All of the software is either shareware, freeware, or demonstration software.

There are 12 categories of software on the BMUG CD-ROM:

AfterDark—A collection of modules to be used with Berkeley Systems' AfterDark screen saver.

Business—A collection of utilities, templates, and programs that are related to business or personal activities. Some of the items you'll find are information managers, spreadsheets, and calendar programs as well as templates and macros for Microsoft Excel and Claris' FileMaker Pro.

Education—Don't think that this is a category for teachers only. It contains the works of Shakespeare, programs that demonstrate computer artificial intel-



What's Shareware?

Shareware is software that is distributed through BBSs, user groups, and other public distribution methods so that you can try it before you buy. The concept behind shareware is honor-based. If you try the software and like it and use it, then you are bound by honor to pay the prescribed fee to the software's author. Each of the shareware programs will have a notice that specifies the software's cost and how to make payment.

ligence, and aids for teachers and students. There's lots of information about a wide variety of subjects.

Entertainment—Games, games, and more games. In this category, you'll find strategy, adventure, and card and word games just to name a few. There are enough games here to keep you from ever getting any work done. Be careful, some of them are addictive.

Fonts—Do you need a special font for that flyer you're putting together? Here, you have more than 42M of fonts and font utilities that you can use with your publications. The collection of fonts includes both Type 1 PostScript and TrueType fonts.

Graphics—This is a collection of graphics programs and utilities. You'll find banner makers, paint programs, and graphic converters. Check here before you buy another graphics program or utility; you might find what you're looking for.

Pictures—There's almost 90M of pictures here: EPS, PICT, and TIFF pictures of people, computers, animals, and many more subjects. If you're looking for something to spruce up your newsletter, you might find it here.

PowerPC—So, you just bought a Power Macintosh. This folder contains programs and utilities that will take full advantage of the new RISC processor in your Macintosh.

Programming—If you want to tame your Macintosh, you might want to start with this collection of programming utilities and languages. You may be the programmer of the next killer application.

Sound—Do you want your Mac to talk to you? Here, you'll find sounds and sound utilities that you can use to customize how your Mac sounds. Who knows what your Mac can tell you when it speaks?

Telecom—Connect your Mac to the world. In the Telecom folder, you'll find terminal programs, Internet utilities, and file conversion and compression tools. Everything you need for telecommunication is here.

Utilities—There are more utilities here than you can use. It will take you months to explore all of them to decide which ones you're going to use; there is a utility for every purpose. If you want extensions or control panels to enhance and streamline the way you work, you'll find them here. Do you need to change a file's type or creator code, want a different text editor, or some drag-and-drop utilities? They're all here just waiting to be used.

It would take a book the size of this one to describe everything on the CD, so you'll just have to explore the disk. But there is an extra benefit with the CD: It provides you with an opportunity to really learn your Mac. As you experiment and use the software on the CD, you'll learn how to use different programs, fonts, and other utilities. The CD has already saved you some money—you'd pay more for the CD by itself than you did for the book and the CD. Enjoy.



APPENDIX B

Finder Shortcuts

The following lists all of the keyboard shortcuts for performing finder actions and special startup procedures:

Actions	Shortcut
Opening an icon	Double-click on the icon, press ⌘+Down Arrow, or highlight the icon and press ⌘+O.
Copying an icon into another folder	Hold down the Option key and drag the icon.
Cleaning up selected icons	Hold down the Shift key and select Clean Up from the Special menu.
Cleaning up and sorting icons	Hold down the Option key and select Clean Up from the Special menu.
Selecting an icon by name	Start typing the name.
Selecting the next icon in alphabetical order	Press the Tab key.
Selecting the previous icon in alphabetical order	Hold down the Shift key and press Tab.
Selecting an icon to the left or right in icon views	Press the Left Arrow or Right Arrow.
Selecting an icon above or below in icon views	Press the Up Arrow or Down Arrow.

Actions	Shortcut
Selecting more than one icon	Hold down the Shift key and click on the icons, or drag to enclose them with the marquee.
Making the Desktop active	Hold down the ⌘+Shift keys while pressing the Up Arrow.
Closing all windows	Hold down the Option and select Close from the File menu, click the Close box, or press ⌘+W.
Moving a window without making it active	Hold down the ⌘ key and drag the window by the titlebar.
Displaying a pop-up menu of the enclosing folders and disk	Hold down the ⌘ key and click on the window title.
Opening the window that encloses the active window	Hold down the ⌘ key and press the Up Arrow.
Closing a window after opening one of its icons	Hold down the Option key while selecting Open from the file menu, double-click the icon, or press ⌘+W.
Zooming a window to the full size of the screen	Hold down the Option key and click the zoom box.
Changing the view	Click a view title in the window header, such as Size or Date.
Expanding the outline of the selected folder	Hold down the ⌘ key and press the Right Arrow.
Collapsing the outline of the selected folder	Hold down the ⌘ key and press the Left Arrow.
Expanding the entire outline of the selected folder	Hold down the ⌘ and Option keys while pressing the Right Arrow.
Collapsing the entire outline of the selected folder	Hold down the ⌘ and Option keys while pressing the Left Arrow.
Taking a snapshot of the screen	Press the ⌘, Shift, and 3 keys simultaneously.
Deleting locked files	Hold down the Option key while selecting Empty Trash from the Special menu..
Avoid seeing a warning message	Hold down the Option key while selecting Empty Trash from the Special menu, or Get Info on the Trash and turn off the warning.

Actions	Shortcut
Reversing the current setting of "Always snap to grid" while moving an icon	Hold down the ⌘ key and drag the icon.
Rebuilding the Desktop file	Hold down the ⌘ and option keys during startup.
Turning off all system extensions when starting up	Hold down Shift during startup.
Zapping the PRAM (Parameter RAM)	On startup, before you see the Smiling Mac, hold down the ⌘, Option, P, and R keys simultaneously. When your Mac restarts, release the keys.
Creating a new folder	Press ⌘+N.
Batch-print selected documents	Press ⌘+P.
Eject a floppy disk from Drive 1	Press the ⌘, Shift, and 1 keys simultaneously, or select disk icon and select Eject from the Special Menu, or press the ⌘ and E keys.
Eject a floppy disk from Drive 2	Press the ⌘, Shift, and 2 keys simultaneously, or select disk icon and select Eject from the Special Menu, or press the ⌘ and E keys.
Get Info on a selected item	Select Get Info from the File menu, or press ⌘+I.
Make a copy of a file or folder	Select Duplicate from the File menu, or press ⌘+D.
Make an alias	Select Make Alias from the File menu, or press ⌘+M.
Put away a file folder, or unmount a disk that is on the Desktop	Select Put Away from the File menu, or press ⌘+Y.
Find a file or folder by name	Select Find from the File menu, or press ⌘+F.
Search again with the same criteria used with the last find	Select Find Again from the File menu, or press ⌘+G.
Closing an open window	Select Close from the File menu, or press ⌘+W.

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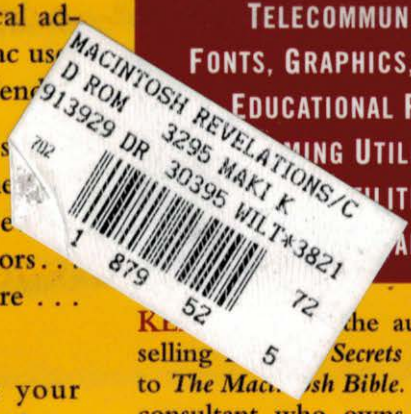
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