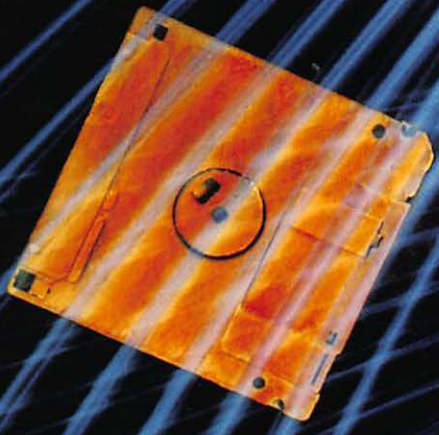
MAC SCREAMER

THE ULTIMATE MACINTOSH® SUPERCHARGING KIT



- Pump Up the Speed on Your Compact, LC, PowerBook, Quadras, and Newer-Model Macs
- Get the Lowdown on "No-Cost" Upgrade Ideas, and Do Your Own Speed Testing
- Make Your Mac Run the Way You Want It To
- $80 Value On Upgrade to Award-Winning Stuffit Deluxe

INCLUDES 1.4 MB MAC SCREAMER PERFORMANCE DISK!

JAN L. HARRINGTON

RANDOM HOUSE
ELECTRONIC PUBLISHING

3½" Disk Included


75072
0 90129 03500 7

Mac Screamer

The Ultimate Macintosh® Supercharging Kit

Jan L. Harrington

RANDOM HOUSE
ELECTRONIC PUBLISHING

Mac Screamer: The Ultimate Macintosh® Supercharging Kit

Published in the United States by Random House, Inc., New York, and simultaneously in Canada by Random House of Canada Limited.

Manufactured in the United States of America

First Edition

0 9 8 7 6 5 4 3 2 1

ISBN: 0-679-75072-X

New York Toronto London Sydney Auckland

Contents

Preface

Speed—speed—speed! Gimme more speed! Just about every Mac user wants his or her computer to do its work as fast as possible. Given today's technology, there are many things you can do to eke out the maximum performance from any Macintosh model. Some performance enhancements require adding hardware to your computer; other performance enhancements can be achieved through software alone. Hardware enhancements are usually costly and sometimes difficult to install. Software enhancements, on the other hand, are usually more affordable and as easy to install as dragging a file from a floppy to a hard disk and then restarting your Macintosh.

This book looks at software techniques that you can use to speed up and optimize your Macintosh. It also looks at software that measures just how fast your Mac is performing. You'll read about optimizing and speeding up disk access, getting more disk space without adding another disk drive, getting more main memory without adding more RAM, accelerating application software performance, and speeding up the Desktop. In addition, you'll find a chapter for PowerBook users and another that deals with accelerating the use of application software packages.

These upgrades and enhancements work in one of two ways. Some actually enhance the performance of a piece of hardware, such as speeding up access to the data on a CD-ROM. Others don't actually speed up hardware, but speed up you, the user. This latter group of enhancements ranges from ways in which you can speed up access to application programs to software that makes typing faster and easier.

In some cases, all the software in the world can't bring you enough speed. You will therefore find sections throughout this book labeled "When Software Isn't Enough ..." that provide an overview of hardware upgrade alternatives that can give you even more speed than software alone. For the most part, hardware upgrades cost more and are harder to install than software, but may be a viable solution if you can't get the speed you need from software alone.

It's an unfortunate fact that something you do to optimize one aspect of your Macintosh's performance may cause a slowdown in some

other aspect. For example, if you use background printing so you won't have to wait for printing to finish before continuing work, you'll find that printing (and perhaps your application program) slows down. Computing is full of trade-offs of this type. Throughout this book you'll learn what those trade-offs are so you can make choices that make sense for your specific needs.

The Software

Throughout this book you'll read about many software packages (see the Product List at the end of the book for complete product information.) Some are commercial products, others are shareware or freeware. All have been tested to ensure that they run under System 7.1; most are also compatible with System 7 Pro. Although all of those that install as system extensions run on at least one of my systems, there is no way to ensure that any given extension won't conflict with something you have installed on your system. For information on diagnosing and handling extension conflicts, see Chapter 1.

My primary test system was a Macintosh II with a DayStar 33 MHz 68040 accelerator and 128 K instruction cache, the Mac IIx ROMs and SuperDrive, and 20 Mb RAM. Many of the programs discussed in this book were also tested on a PowerBook 180c with 14 Mb RAM. The Mac II was running System 7 Pro; the PowerBook was running System 7.1.

What You Need to Know Before You Begin

Before reading this book, you should be familiar with typical Macintosh operations, including the following:

- Working with the Macintosh operating system to manage files (moving, copying, deleting), make choices from menus, and manipulate windows.
- Launching application software.
- Working with basic application software such as a word processor or spreadsheet.
- Opening, closing, saving, and printing documents.

This book assumes that you are working with some version of System 7. If you are using System 6, much of the software about which you will read in this book will still be of use. However, before purchasing you should contact the software manufacturer to make sure that the soft-

ware is compatible with System 6. (Some of the products are actually dependent on System 7.)

Acknowledgments

A book of this type takes the efforts of lots of people: the writer, the publisher's staff, and software developers who provide products and information. I'd like to thank the cast of thousands who were a part of this effort.

First, there are the people at Random House Electronic Publishing:

- Tracy Smith, editor
- Elizabeth LaManna, production editor/Mia McCroskey, managing editor

Next, there are the people and companies who provided products and information:

- Debbie Degutis at Connectix for Maxima and RAMDoubler
- Jane Evans at Kiwi Software for KiwiENVELOPES!
- Philip Green at ALSoft, Inc. for Power Utilities
- David Johnson at Working Software Inc. for Toner Tuner
- Robin Jones at Charles River Analytics Inc. for Open Sesame!
- Suzanne Kimball at Dayna for ProFiles
- Mike Mickeletti at FWB, Inc. for CD-ROM ToolKit
- Sue Nail at PrairieSoft for DiskTop
- Brian Salmon at Jump Development for OptiMem
- Roby Sherman of Interealm for PowerLaunch II
- Michael Sherwood at Now Software for Now Compress
- The folks at Aladdin Systems for StuffIt Deluxe

—JLH

Photo Credits

Figure 1.2	Apple Computer Inc.
Figure 1.3	Black Gryphon Ltd.
Figure 1.6	DayStar Digital, Inc.
Figure 1.7	Apple Computer Inc.
Figure 1.8	Apple Computer Inc.
Figure 1.9	Apple Computer Inc.
Figure 1.10	Apple Computer Inc.
Figure 1.11	Apple Computer Inc. (John Greenleigh, photographer)
Figure 1.12	Apple Computer Inc.
Figure 1.13	Apple Computer Inc. (John Greenleigh, photographer)
Figure 1.14	Apple Computer Inc.
Figure 1.15	Apple Computer Inc.
Figure 1.16	Apple Computer Inc.
Figure 1.17	Apple Computer Inc.
Figure 1.18	Apple Computer Inc. (John Greenleigh, photographer)
Figure 1.19	Apple Computer Inc.
Figure 1.20	Apple Computer Inc. (John Greenleigh, photographer)
Figure 1.21	Apple Computer Inc. (John Greenleigh, photographer)
Figure 1.22	Apple Computer Inc.
Figure 1.23	Apple Computer Inc. (John Greenleigh, photographer)
Figure 5.28	Peripheral Land Inc. (PLI)
Figure 5.29	FWB, Inc.
Figure 7.5	Black Gryphon Ltd.
Figure 8.11	Apple Computer Inc.
Figure 8.12	Apple Computer Inc.
Figure 8.13	Apple Computer Inc.
Figure 9.3	Kensington Inc.
Figure 9.4	Wacom Technology
Figure 9.17	Apple Computer Inc.
Figure 9.18	Apple Computer Inc.
Figure 9.20	Apple Computer Inc.
Figure 9.21	Apple Computer Inc.
Figure 11.19	Battery Technology, Inc.
Figure 11.20	Technöggin

1

The Performance Conundrum

Using software to accelerate and optimize a Macintosh presents several challenges. The first challenge is understanding exactly which parts of the Macintosh can be affected by software upgrades. The second (and often the most frustrating) is choosing a group of software upgrades that will work together. Making it all a bit more difficult is the irony that accelerating and optimizing one part of your system can actually slow down another part.

This chapter begins your exploration of software upgrades for your Mac by looking at the parts of a Macintosh system that are common targets for upgrading. You'll read about just what you can help with software and what you can't, as well as about problems with software upgrade compatibility. The chapter ends by looking at what upgrades you might want to consider if software doesn't provide all the speed you want. (You'll find more about the trade-offs between different types of upgrades throughout this book.)

Optimization Targets

A Macintosh is more than just a box that sits on your desk. It's made up of a collection of hardware and software components, each of which has its own impact on the computer's overall performance. This section looks at the parts of the Macintosh that affect performance and whether you can realistically expect to optimize or enhance that performance using software techniques.

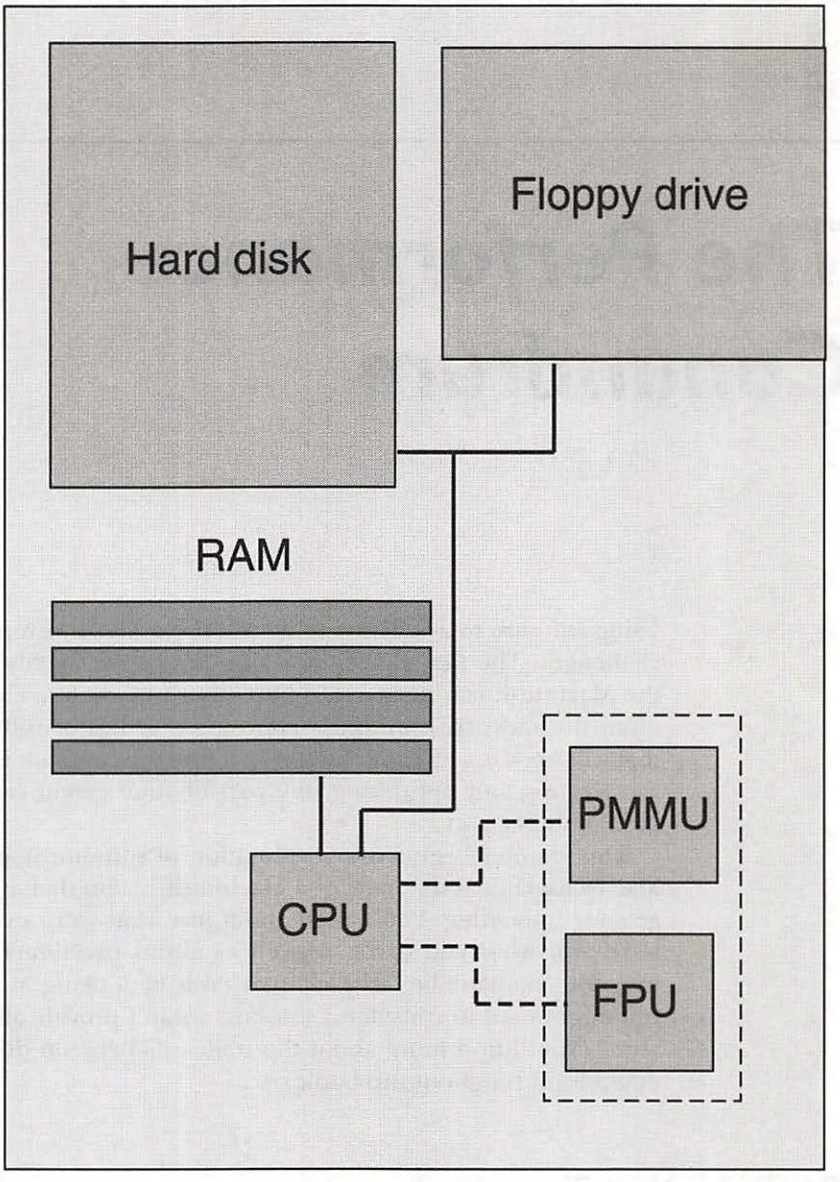


Figure 1.1 The major components inside a Macintosh system unit

Many of the hardware components that affect performance are located within the Macintosh *system unit* (the box in which the computer actually resides). For example, in Figure 1.1, you can see that a typical system unit contains a hard disk drive, a floppy disk drive, some main memory, and a CPU. (As you will read later in this book, the compo-

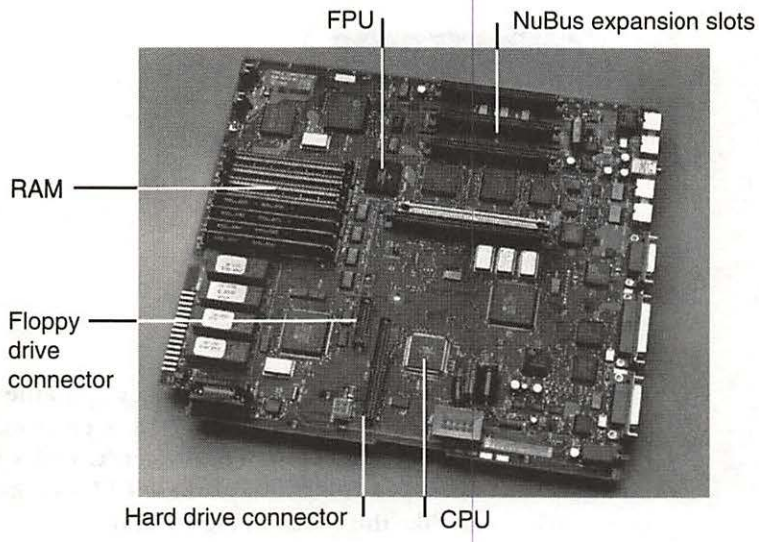


Figure 1.2 The IIci motherboard

nents labeled FPU (Floating Point Unit) and PMMU (Paged Memory Management Unit) may be part of the CPU (Central Processing Unit), may be separate components, or may not be present at all.)

Many of the components in Figure 1.1 are typically located on a single circuit board that lays across the bottom of the computer, known either as the *motherboard* or the *logic board.* In Figure 1.2, the motherboard from a Macintosh IIci, you can see the CPU, the circuit boards on which main memory is installed, and the FPU. The motherboard also has connectors for plugging in a floppy disk and a hard disk.

By the Way

The PowerBooks have a second main circuit board known as a *daughterboard.* Older Macintoshes such as the Plus also have a second main circuit board—the *analog board.*

CPU

A Macintosh's *central processing unit* (CPU)—its *microprocessor*—is the heart of the computer. It performs all the arithmetic and logical operations needed to run programs. All Macintosh CPUs are made by the Motorola Corp. Those used in Macintoshes prior to the introduction of the PowerPC in 1994 are numbered 68000 (all Macintoshes up to the Plus, the SE, the Classic, and the Portable), 68020 (the Macintosh II

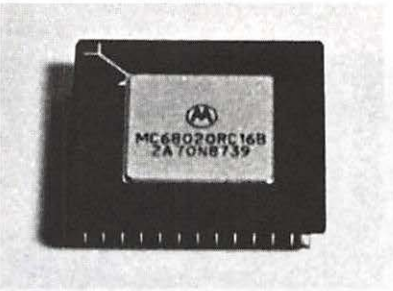


Figure 1.3 A 68020 CPU

and LC only), 68030 (most other Macintoshes up to the introduction of the Centris and Quadra lines), and 68040 (Centrises, Quadras, and recent members of the LC line). The PowerPC CPUs have three-digit numbers, such as 601 and 603. All of these CPUs look about the same (a 1.5-inch square like the 68020 in Figure 1.3).

680x0 Versus PowerPC Microprocessors

There is a fundamental difference between the 680*x*0 line of microprocessors and the PowerPC microprocessors. The 680*x*0 microprocessors are what is known as *complex instruction set computers* (CISC); the PowerPC microprocessors are *reduced instruction set computers* (RISC). To understand this difference you need to know that every CPU has a fixed and predetermined number of things that it knows how to do (its *instruction set*). A computer program is therefore nothing more than a sequence of operations expressed in the CPU's instruction set.

The difference between CISC and RISC microprocessors lies in the way their instructions sets are handled. A CISC microprocessor has its entire instruction set in hardware, as part of the CPU itself. In contrast, a RISC microprocessor has only a portion of its instruction set in hardware; the rest is in software. This might make you think that a CISC microprocessor would be faster than a RISC—generally anything implemented in hardware is faster than something implemented in software—but the reverse is actually true. The internal design of a RISC microprocessor is such that it can execute instructions much faster than a CISC microprocessor, even though it is using software to emulate many of the instructions that a CISC microprocessor has in hardware.

CPUs and Computer Speed

Regardless of whether your Macintosh has one of the 680x0 line of microprocessors or one of the new PowerPC microprocessors, the speed of the CPU is one of the most important factors in determining

how fast software runs on your machine. Microprocessor speed is typically expressed in megahertz (abbreviated MHz), a representation of the number of times the CPU's internal clock pulses every second. The higher the number, the faster the CPU.

By the Way

A CPU's internal clock is very different from the clock that keeps track of the date and time. The CPU clock is used to coordinate and synchronize the actions of all the components of the computer; it plays no role in date and time determinations.

The speed of a CPU does not rest solely on the speed of its clock; the internal design of the CPU also affects its speed. Comparing raw CPU speed ratings is therefore valid only within the same type of microprocessor. For example, a 50-Mhz 68030 is faster than a 33-MHz 68030, but a 33-MHz 68040 is actually faster than the 50-MHz 68030. Because the MHz rating can be a bit misleading when trying to compare different types of microprocessors, microprocessor speeds are starting to be measured in *million instructions per second* (MIPS), a more accurate reflection of just how many program instructions the CPU can process in a given time.

By the Way

MIPS has been used for many years to measure the speed of minicomputer and mainframe CPUs. However, it is only now beginning to be used to express microprocessor speeds because previously microprocessors were too slow for MIPS to be a valid measure.

The extent to which the CPU affects overall application performance depends on the type of program you're running. The speed of programs that spend most of their time manipulating data in main memory (for example, graphics programs, spreadsheets, and data analysis programs) relates directly to the speed of the CPU. On the other hand, programs that read and write a lot of data to and from disk (for example, data management programs) are more dependent on the speed of disk transfers than the raw speed of the CPU. In general, the lower the percentage of time an application spends in input and output operations, the more its execution speed relies directly on the speed of the CPU.

Fortunately or unfortunately (depending on how you look at it), a CPU is a piece of hardware. Its processing speed can't be affected by software enhancements. This means that when you look to speeding up

and optimizing your Macintosh's performance through software, you need to look at other components of the computer.

By the same token, the CPU is the fastest part of the computer. You can therefore usually obtain noticeable performance gains without spending money on a faster CPU by speeding up slower operations, especially input and output operations.

The Macintosh 680*x*0 family of CPUs have some important differences that affect not only how fast they execute, but what types of software they can run. These differences include the presence or absence of two additional processors: a *floating point unit* (FPU) and a *paged memory management unit* (PMMU). An FPU relieves the CPU of having to process floating point arithmetic operations; a PMMU handles memory management for virtual memory. You will learn about which Macintoshes have or can use an FPU in Chapter 2; PMMUs are discussed in Chapter 7.

RAM

Random access memory (RAM), often called *main memory*, provides temporary storage for programs and data while your computer is turned on. The CPU reads program instructions from main memory as a program executes; in most cases, data are transferred between main memory and external devices such as printers and disk drives.

By the Way

To be completely accurate, main memory consists of more than RAM—it also includes *read only memory* (ROM). The Macintosh ROM holds enough of the operating system to begin the system startup process: It's a program in ROM that tells the Macintosh to look on a disk for a System folder. The ROM also holds programs that the operating system and application programs use to manage portions of the Macintosh user interface, such as windows and menus.

The contents of ROM can be read many times, but cannot be changed by other programs. This is where it gets its name of "read only."

RAM speed is measured in *nanoseconds* (10^{-9} seconds, abbreviated ns). The lower the speed of the RAM, the less time it takes to transfer read and write data. Older Macintoshes, such as the Macintosh Plus, can handle RAM as slow as 120 ns. However, newer Macintoshes typically require RAM of 80 ns or faster. A Macintosh can use RAM that is faster than its maximum allowable RAM speed; it cannot use RAM that is slower.

Like the speed of the CPU, the speed at which data enter and leave RAM is a property of the hardware itself; you can't affect that transfer speed with software. However, you *can* speed up some programs if you have enough RAM to store an entire document in main memory, eliminating the need for slower disk reads and writes.

One way to increase your RAM is to add more physical RAM. However, there are also software utilities that can optimize the way your Macintosh uses its RAM so that you can fit more into the same space. Some software utilities compress the contents of RAM so that your Macintosh actually thinks it has more physical RAM than it does. As well as increasing the amount of available RAM, such utilities can also make it practical to use System 7 on Macintoshes with limited RAM capabilities, such as the 68000 Macs (Plus, SE, Classic). You will read about RAM optimization and compression utilities in Chapter 7.

The System Bus

The components inside the system unit are connected by an electronic pathway known as a *bus*. A bus is made up of many electronic circuits running side by side. Some of the circuits carry data; others carry the location of data or program instructions in main memory (*addresses*). A third type of circuit carries signals from the CPU to other components to tell them what to do.

The number of circuits used to carry addresses (the *address bus*) is of vital importance to a Macintosh user because it determines the maximum amount of main memory the computer can access. If your Macintosh has a 68000 CPU, then it uses 24 circuits to carry addresses (*24-bit addressing*), proving a total of 16 Mb of main memory addresses. Unfortunately, not all of that 16 Mb can be used for physical RAM; 8 Mb is reserved for the operating system, leaving 8 Mb available for RAM. The 68000 Macs, however, have room for only 4 Mb of RAM.

Other Macintosh models use 32 circuits to carry addresses (*32-bit addressing*). This provides 4 Gb (*gigabytes*, or billion bytes) of addresses, up to 1 Gb of which can be used for RAM. A problem with the ROM in some older Macintoshes (those prior to the LC and IIsi generation), however, prevents those models from taking advantage of the 32-bit address bus. Such ROMs are said to be *32-bit dirty*. Without software to compensate for the 32-bit dirty ROMs, the computer is limited to 24-bit addressing and 8 Mb of installed RAM. Fortunately, there are two solutions: an Apple system extension that comes with the Hardware System Update package and Mode32. Although Mode32 is a commercial product, it has been licensed by Apple for free distribution.

By the Way You must also be using System 7 to take advantage of 32-bit addressing.

Assuming that your Macintosh has 32-bit clean ROM or a system extension that compensates for 32-bit dirty ROM, you still can't install 1 Gb of RAM. Total RAM is limited by the size of the circuit boards that hold RAM chips (*single in-line memory modules* or *SIMMs*). The maximum RAM that any Macintosh model has been able to hold is 256 Mb (for example, the Quadra 900 and 950).

Disks

One of the slowest parts of a computer system are transfers of data to and from disk drives. As with CPU speed and RAM access, the underlying speed at which a disk drive transfers data is a characteristic of the hardware itself. However, a disk drive's published transfer rate is actually a maximum. Over time—as files are created, modified, and deleted—the data transfer rate goes down because files and pieces of files are scattered all over the disk's surfaces, rather than stored contiguously. Known as *fragmentation,* you can take care of this condition using software disk optimization utilities. You will learn more about hard disk optimization and the problems it cures in Chapter 5. Optimizing and speeding up other types of disks (floppy disks, CD-ROM, and RAM disks) are covered in Chapter 6.

Along with optimizing disk access speed, you may want to increase your hard disk space without purchasing another disk drive. Chapter 5 therefore also looks at disk and file compression, software techniques that can increase the amount you can store on a hard disk.

Printing

Printing is even slower than disk transfers. The speed at which printing occurs depends on many factors, including the speed of the printer and the speed of the medium over which data are transferred to the printer (either a network or serial cable). If you are using a printer shared by users over a network, printing speed may also be affected by how many other people's print requests are ahead of yours in the print queue.

There is relatively little you can do to affect the speed at which your printer can print or the speed at which data travel to the printer from your computer. However, you don't have to wait for the printer to finish before you go on to other tasks. Chapter 8 looks at optimizing the

printing process so that you spend the least amount of time possible waiting for a printer.

System Software

Without the Macintosh operating system, your Macintosh can't run application software or manage the myriad hardware devices you connect to it. The Finder, the operating system program that manages the Macintosh Desktop, shows you the contents of your disks, lets you maintain the files and folders on your disks, and provides access to application software and documents.

There are many things you can do to speed up the operation of the Finder. You can, for example, speed up copying operations, speed up deleting and emptying the trash, and speed up the display of the contents of a disk. All of these speedups can be obtained through software, sometimes by manipulating the operating system configuration, sometimes by adding utility programs. You will find out more about accelerating the Finder in Chapter 4.

Application Software

The final piece in the Macintosh jigsaw puzzle is application software, the software that does useful work for you. Under System 7, more than one application can be running at the same time. This does not mean, however, that all of these programs are actually executing simultaneously. A CPU can only execute one program at a time. When you have multiple programs running, they are actually taking turns accessing the CPU.

Application software can run in the *foreground* or in the *background.* At any given time, there is only one foreground application, the active application with which you are currently interacting (also known simply as the *current application*). Background applications are those that automatically run when the foreground application isn't using the CPU. Typical background activities include printing and transferring data over a network.

There are many factors that affect how fast application software executes:

- The speed of the Macintosh's CPU
- The amount of disk I/O required by the program
- The level of background activity
- The efficiency with which the application program has been written

You can't do much about the speed of your CPU (short of purchasing another computer, upgrading your logic board, or installing a CPU accelerator board). By the same token, you don't have any control over how well a program has been written. You can, however, control background activity and have some control over disk I/O. The general strategy is to keep as much activity in main memory as possible. You will learn about application software speedup techniques in Chapters 3 and 6.

In addition to general application software optimization techniques, you can speed up specific software packages. Doing so is discussed in Chapter 3.

To INIT or Not to INIT

Many of the software upgrades you will encounter throughout this book take the form of INITs, software that is loaded into main memory when you start up your computer. One of the unfortunate facts of INITs is that not all of them can coexist in the same Mac at the same time. In fact, INIT conflicts are one of the most common software problems encountered by Macintosh users.

INITs come in several forms:

- ***Control panels:*** Control panels load at system startup and are accessible when your system is running to configure the behavior of the INIT. Control panels are stored in the Control Panels folder inside the System Folder. An alias for the folder is stored in the Apple Menu Items folder. That means you can access the Control Panels window by choosing its name from the menu.
- ***Extensions:*** System extensions (stored in the Extensions folder within the System Folder) add function to the operating system. Once they are loaded at system startup, they operate without user intervention.
- ***Enablers:*** System enablers are special extensions that Apple has written to tailor the operating system to new models of the Macintosh. Like other extensions, enablers load at system startup and work without user intervention.

How do you know that you have an INIT conflict? There are two major symptoms that should lead you to suspect that INITs may be a problem:

- Your computer hangs during the startup process. The last INIT whose icon appeared on the bottom of the startup monitor's screen is most likely at fault, although you should also suspect those INITs whose icons don't show up on the screen.

- Software crashes with a bomb box containing an error message such as "bus error" or "F-line exception." This type of crash can be caused by other problems (in particular, bugs within application programs), but you should at least suspect an INIT conflict when such a crash occurs.

The only way to be certain that you are dealing with an INIT conflict is to boot without INITs. To do so, hold down the Shift key when turning on or restarting your Mac. The "Welcome to Macintosh" box will then display a second line: "Extensions off." No INITs except system enablers will be loaded. If your system boots successfully, repeat whatever you were doing when your problem surfaced. If the problem recurs, then you're more likely to be dealing with a software bug than with an INIT conflict. If the problem doesn't recur, then you can suspect one or more of your INITs.

By the Way

In some cases, you may not be able to boot your Macintosh without at least some of your INITs. This may occur, for example, if you are using an older Macintosh with 32-bit dirty ROMs and running System 7.1 or System 7 Pro. Your computer may not boot unless you install an INIT to compensate for the dirty ROMs (either Mode32 or the Apple system extension that is part of the Hardware System Update). If you find that you must include one or more INITs simply to get your computer to boot, then you will need to follow the procedures outlined below to identify an INIT conflict.

There is no magic formula for discovering which INITs will conflict with other INITs prior to actually installing them and seeing what happens when you operate your Mac. Conflicts depend on the application programs you run, the specific mix of INITs loaded, how the INITs operate, where they are loaded into RAM, and sometimes even on the versions of the INITs. The best you can do is choose your INITs carefully, load those you want, and keep your fingers crossed.

If you do suspect an INIT conflict, you need to identify which INIT is causing the problem. The general strategy is as follows:

1. Remove all INITs not supplied by Apple from the System Folder. You don't have to delete them; just move them to the top level of the disk window.
2. Reboot the Macintosh.
3. Repeat whatever you were doing when the problem occurred. If the problem doesn't recur, then one of the removed INITs is at

fault and you should proceed with identifying the specific problem INIT. If the problem does show up, then you need to look elsewhere for the source of the problem.

4. Move one INIT back into the System Folder, placing it in its original location (either the Control Panels or Extensions folder).
5. Reboot the Macintosh.
6. Repeat whatever you were doing when the problem occurred. If the problem doesn't recur, then the INIT you just replaced in the System Folder isn't the source of the problem. If the problem does recur, then you've identified the culprit.
7. Repeat steps 4 through 6 until the offending INIT is found.

The problem with the procedure you've just seen is that it is very tedious. If you happen to use a lot of INITs, it can take a significant amount of time and effort to identify a problem INIT. There are, however, some utility programs that can make the process easier.

Startup Manager, part of the Now Utilities package, makes it easy to indicate which INITs should be loaded and which shouldn't be. As you can see in Figure 1.4, you place a check mark next to each INIT you want to load. You remove the check to disable an INIT, preventing it from loading the next time you boot or restart the computer.

Startup Manager is also useful if something should go wrong during the boot process. If your Mac hangs while trying to load an INIT, press the reset button (or the sequence of keys that resets your Mac). When you restart, you'll find that Startup Manager has disabled the INIT that was in the process of loading when the reset occurred. You will be given the option of reenabling the INIT or leaving it disabled. This means

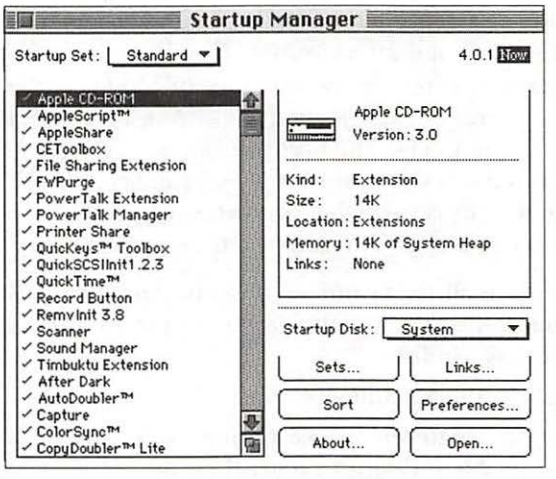


Figure 1.4 Using Startup Manager to determine which INITs should be loaded

Figure 1.5 Using Conflict Catcher to manage INITs

that you can often get a Mac to boot from the hard disk even if an INIT that hangs during startup is present.

Conflict Catcher (Figure 1.5) provides another method for identifying problem INITs. The Conflict Test button disables half your INITs. If the problem doesn't recur after rebooting, then the problem INIT is in the half of the INITs that were disabled; if the problem does recur, then the problem INIT is in the enabled INITs. Conflict Catcher then disables half the INITs in the half where the problem must lie. The process is repeated until the problem INIT is uncovered. This type of searching, eliminating half the INITs each time, is very efficient. It can significantly cut down on the time of times you need to reboot your Mac to find a problem INIT.

Once you've identified a problem INIT, you have several choices:

- Simply live without the INIT (the most common solution).
- Disable the INIT temporarily whenever you want to use the application with which it conflicts.
- Contact the developer of the INIT to see if there is an updated version available that solves the problem.

When Software Isn't Enough...

If you try the software speedup techniques discussed throughout this book and still feel that your Macintosh isn't fast enough, then you may want to consider a faster CPU. You can add a new CPU (often called an *accelerator board* or *CPU accelerator*, such as the DayStar Turbo 040 in

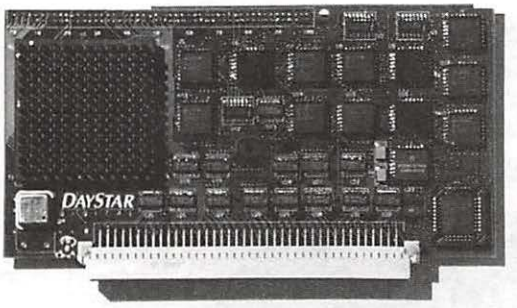


Figure 1.6 A CPU accelerator board (the DayStar Turbo 040)

Figure 1.6), replace the motherboard, or replace your computer with a newer model. Which option makes most sense depends on the model of your Mac.

Macintosh 128K and 512K

The two earliest Macintoshes cannot be upgraded with a CPU accelerator unless they have been upgraded with an 800K disk drive and the accompanying ROM upgrade. Unfortunately, Apple hasn't manufactured the upgrade for years, making it impractical to consider upgrading these machines. If your Macintosh 128K or 512K no longer meets your needs, the only realistic option is to replace the computer.

Macintosh 512Ke

The Macintosh 512Ke can be upgraded with a 68030 CPU accelerator, costing between $300 and $750. Such accelerator boards usually accept up to 16 Mb RAM and have room for an FPU. Many also have circuitry to support an external black-and-white monitor. (The Macintosh 512Ke cannot generate color or grayscale images, even with a 68030 CPU and an external monitor.)

Adding a CPU upgrade to the 512Ke requires opening the computer's case and removing the motherboard. You must then either remove the existing CPU and solder the upgrade in place or clip the upgrade around the existing CPU. (The installation method varies from one vendor's products to another.) The upgrade should therefore usually be performed by a service technician.

Although you can upgrade the 512Ke, it is usually not cost effective to do so. By the time you add extra RAM to the accelerator board and

purchase an external monitor, the cost is more than that of a new, color-capable machine. In addition, the 512Ke can't accept a 1.4-Mb SuperDrive. The bottom line is that it is usually better to replace a 512Ke that no longer meets your needs rather than to try to upgrade it.

Macintosh Plus, SE, and Classic

The Macintosh Plus (Figure 1.7), SE (Figure 1.8), and Classic (Figure 1.9) all have 68000 CPUs. Like the 512Ke, they can be upgraded with CPU accelerator boards that use the 68030 microprocessor. Most of these accelerator boards accept up to 16 Mb RAM and many have circuitry for a black-and-white external monitor. (Color is not available, even with the 68030 CPU.) The boards typically cost between $300 and $750 (without RAM).

The Plus and Classic have no expansion slots. That means that adding a CPU accelerator board requires opening the case, removing

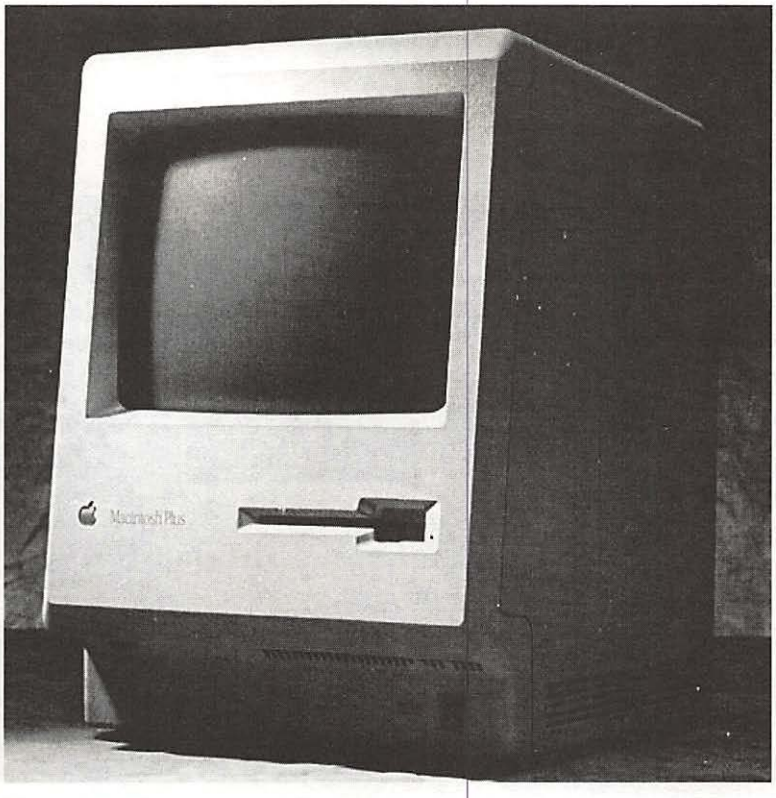


Figure 1.7 The Macintosh Plus

Figure 1.8 The Macintosh SE

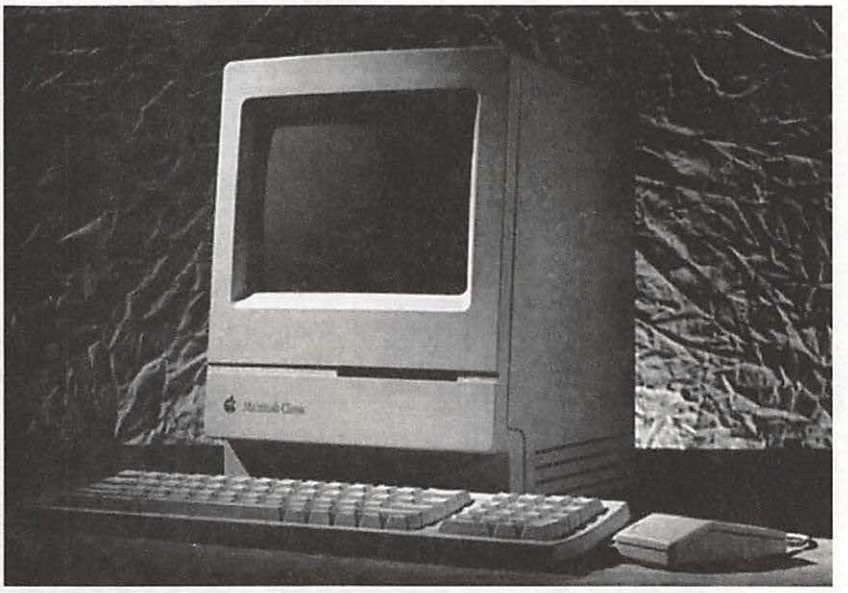


Figure 1.9 The Macintosh Classic

the motherboard, and either soldering or clipping the new CPU onto the motherboard, a procedure that is usually best left to a service technician. The SE, however, has an expansion slot. An accelerator board can therefore be added by opening the SE's case and plugging the board into the expansion slot. An SE owner with a steady hand can usually perform the upgrade.

Should you upgrade these machines? If you need raw processing power and don't need a lot of RAM, color, or an external monitor, then upgrading a Plus, SE, or Classic can be economical. For example, an upgraded Plus, SE, or Classic can make a good machine for a student or clerical worker whose use is limited to word processing, or can serve as an electronic mail server on a network. However, if you need a lot of RAM, color support, or an external monitor, then it will be more cost effective to purchase a new machine.

Macintosh Classic II and Performa 200

The Classic II (and its mass-market twin, the Performa 200) has a 68030 CPU. The machine has no expansion slots; the design of its CPU makes it impossible to clip a CPU accelerator onto the motherboard. There are, therefore, no CPU accelerators available for this model. If the current CPU isn't fast enough for your needs, your only alternative is to replace it with a new computer.

Macintosh SE/30

The SE/30 (Figure 1.10) has a 68030 CPU and one expansion slot. Both faster 68030 CPUs and 68040 CPUs are available, ranging in price from $750 to $1,500. Although adding an accelerator board requires opening the case, an owner with a steady hand can plug an accelerator board into the SE/30's slot.

Whether you should upgrade an SE/30 depends on your specific needs. The SE/30 still has a lot to recommend it: It can accept up to 128 K RAM and can display color on an external monitor. Because its video circuitry is on the motherboard, it has the fastest black-and-white display of any of the compact Macintoshes. However, when you add up the cost of the CPU accelerator board, circuitry for an external monitor, and the cost of the monitor itself, purchasing a new Macintosh (for example, a member of the LC family) becomes more cost effective. On the other hand, an upgraded SE/30 that is equipped with a large hard disk can make an excellent network file or electronic mail server. It is also excellent for student use or for clerical use where a large monitor or color isn't required.

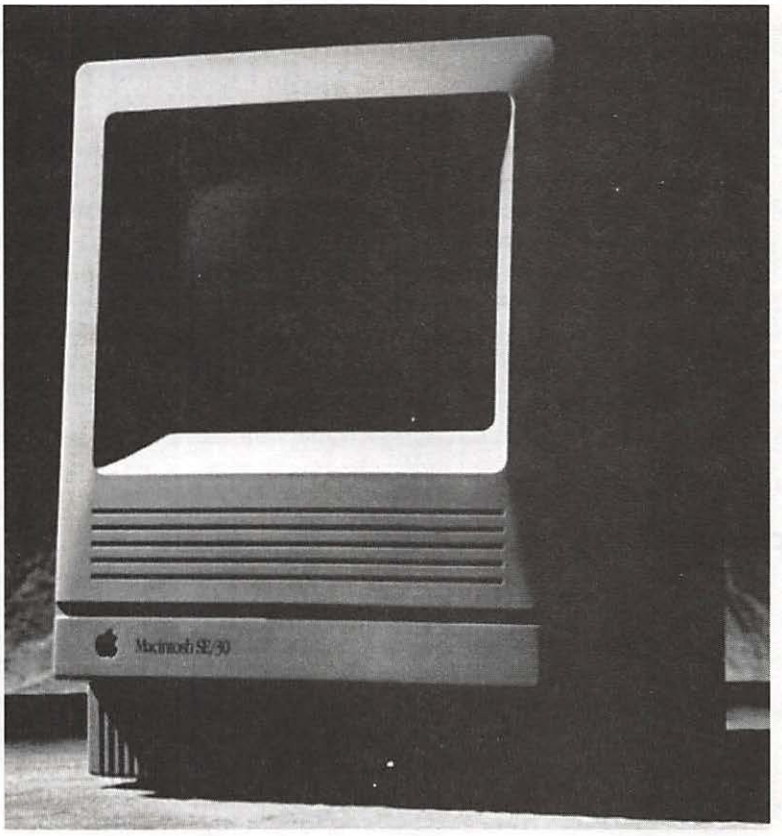


Figure 1.10 The Macintosh SE/30

By the Way

To access more than 8 Mb RAM, the SE/30 requires System 7 and a system extension that compensates for a problem with the SE/30's ROM. This problem, known as having *32-bit dirty* ROM, is shared by all Macintoshes prior to the original LC. You will read more about it later in this book.

Macintosh Color Classic

The Color Classic (Figure 1.11) is the only compact Macintosh that can be upgraded without opening its case—it has a door in the back that provides access to the motherboard, which simply slips out of the case. Nonetheless, there are no CPU accelerators available for this model. If

Figure 1.11 The Color Classic

the Color Classic's 68030 isn't fast enough for your needs, then you have no alternative but to replace the computer with a new Macintosh.

The Macintosh LC

The Macintosh LC (Figure 1.12) is one of only two Macintoshes to use the 68020 microprocessor. (The other is the original Mac II.) The LC has one expansion slot that is easily accessible by simply removing the computer's lid.

There are two ways to get a new CPU for your LC. You can install a CPU expansion board containing a faster 68030 ($500 to $1,000) or a 68040 ($1,000 to $1,500), or you can replace the computer's motherboard with that of the LC II or LC III. The LC II motherboard replacement (about $750), however, costs more than the LC III motherboard (about $500) and provides a slower CPU. In most cases, the most cost-effective way to get more processing power out of an LC is to have a service technician perform the LC III motherboard upgrade. The drawback to the motherboard swap is that you will need to purchase new RAM, since the LC III uses a different type of RAM circuit board. On the other hand, the LC III can accept up to 36 Mb RAM, while the LC is limited to 10.

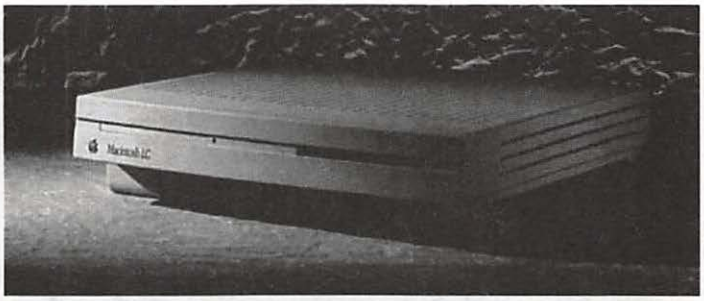


Figure 1.12 The Macintosh LC

Should you upgrade your LC? If you don't need more than 10 Mb of RAM and the speed of a 68030 is enough for your needs, then adding an accelerator board makes good economic sense. If you need more processing power and RAM and the speed of a 68030 is enough for your needs, then the LC III logic board upgrade makes sense. However, if you want the speed that a 68040 brings, then investigate the cost of a Macintosh such as the LC/Performa 475. The cost of an entire new system is not much more than the cost of a 68040 accelerator and brings with it the support for more RAM along with better video support on the motherboard.

Macintosh LC II and Performa 400, 405, and 430

The CPU upgrade situation for the LC II (and the Performa models based on its motherboard) is very similar to that of the LC. You can swap the motherboard for an LC III motherboard for around $500, install a faster 68030 on an accelerator board for between $500 and $1,000, or install a 68040 accelerator board for between $1,000 and $1,500.

Because the LC II is limited to 10 Mb RAM, you should seriously consider the logic board upgrade if you need 68030 speed and access to more RAM. However, if you need 68040, a new LC/Performa 475 system may be more cost effective. It provides support for more RAM as well as the faster CPU at only slightly more than the cost of a 68040 accelerator.

Macintosh LC III and Remaining 68030-Based Performas

The LC III (Figure 1.13) and the wide variety of Performas that have been based on its motherboard (for example, the 450 and 550) have a moderately fast 68030 CPU and can support up to 36 Mb RAM. Sharing the characteristics of this group of Macintoshes are also the recent all-in-one Macintoshes, such as the LC 520 (Figure 1.14). The all-in-one

Figure 1.13 The Macintosh LC III

LCs are designed for low- to mid-range multimedia work. They include a built-in CD-ROM player, an integrated monitor, and integrated stereo speakers.

Should the CPU of a Macintosh based on the LC III logic board not be fast enough, you can install a faster 68030 accelerator board ($750 to $1,000) or a 68040 accelerator ($1,000 to $1,500) into the computer's single expansion slot. If you need more horsepower for an LC than an accelerator board can provide, you will need to look into replacing the machine. A viable alternative, especially for multimedia work, is one of the AV Quadras (the 660AV or 840AV) or a PowerPC-based Macintosh. If you happen to have an LC 475, a Performa 475/476, or one of the all-in-one members of the LC line (the 520, 550, 575, and Performa 550), consider taking advantage of the availability of a PowerPC logic board upgrade. You will not only gain the speed of the PowerPC CPU, but will also benefit from the PowerPC's enhanced I/O circuitry.

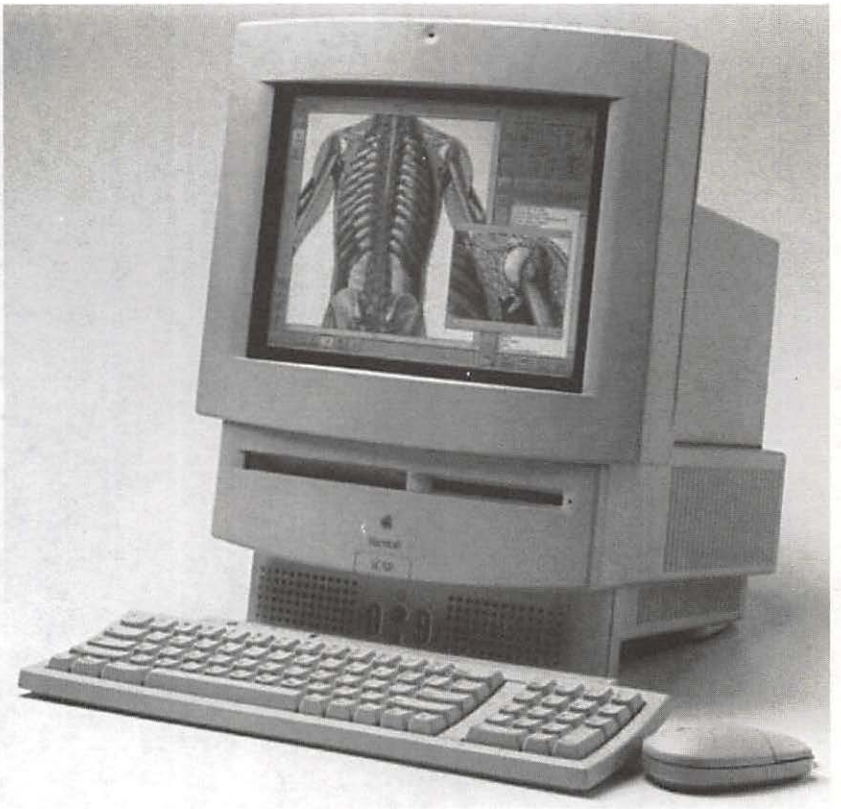


Figure 1.14 The Macintosh LC 520

The Macintosh II Family

With the exception of the Macintosh II, with its 68020 microprocessor, the Macintosh II family uses the 68030 microprocessor. CPU accelerator boards with faster 68030s ($500 to $1,000) are available for most models; 68040 CPUs ($1,000 to $1,500) are also available. In addition, by the time you read this book, some manufacturers will have released PowerPC upgrade boards. Whether it pays to add an accelerator depends largely on the model.

The Macintosh II, IIx, and IIfx (Figure 1.15) are highly expandable machines. They have six expansion slots, have room for two internal floppy drives as well as an internal hard disk, and can accept up to 128 Mb RAM (assuming you compensate for the 32-bit dirty ROMs with the appropriate system extension). CPU expansion boards either can replace the original CPU on the motherboard (difficult installation but the most speed) or can be installed into an expansion slot (easy installation but slightly less speed). These machines, unfortunately, have slower

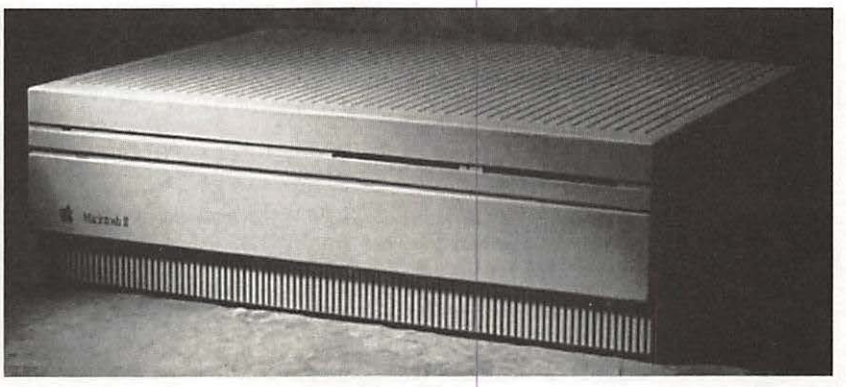


Figure 1.15 The Macintosh II, IIx, and IIfx

input and output circuitry and buses than more recent Macintoshes. Adding a PowerPC CPU to a II, IIx, or IIfx, for example, may initially appear to be cost effective, especially if you have a large investment in RAM and other equipment for the machine. However, the benefit of the PowerPC CPU is decreased by the remainder of the circuitry if the computer can't provide enough speed to support the PowerPC's full range of capabilities. On the other hand, adding a 68040 accelerator to a II, IIx, or IIfx can be a cost-effective way to extend the life of a very useful machine.

The remaining members of the Macintosh II family have fewer expansion slots than the II, IIx, and IIfx. For example, the IIcx in Figure 1.16 is similar to the IIx but has only three expansion slots; the IIsi in Figure 1.17 has only one. Others members of the Macintosh II family such as the IIvx (Figure 1.18) have room for an internal CD-ROM drive as well as between one and three expansion slots.

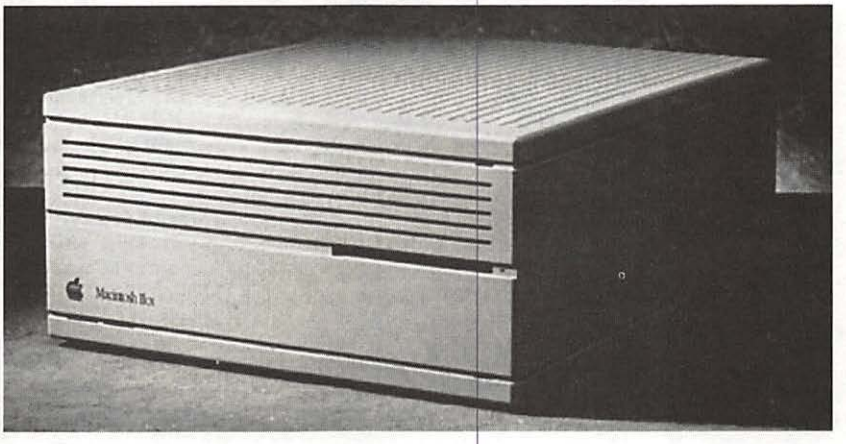


Figure 1.16 The Macintosh IIcx

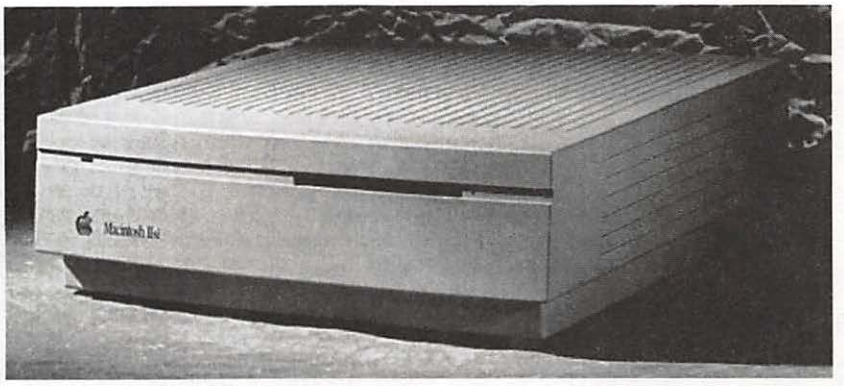


Figure 1.17 The Macintosh IIsi

Both faster 68030 and 68040 expansion boards are available for the remaining members of the Macintosh II family. Apple is also selling replacement PowerPC logic boards for the IIvx, IIvi, and Performa 600. In addition, some PowerPC accelerator boards are available from vendors other than Apple.

The decision as to whether to add a CPU accelerator is a bit more complicated with these machines because they have less RAM capacity and less space for other upgrades. They are also handicapped by the same older input and output circuitry and buses as the II, IIx, and IIfx.

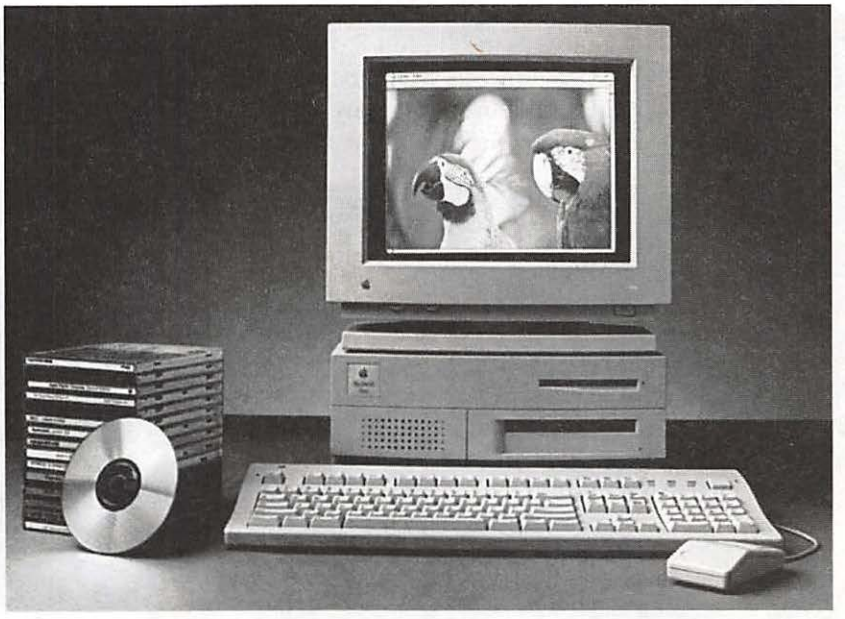


Figure 1.18 The Macintosh IIvx

If you want to extend the life of a Mac II family computer and need only raw processing speed, a 68040 CPU upgrade can be cost effective. However, if you are working with multimedia or other applications that require faster input and output, consider moving to one of the AV Quadras (the 660AV or 840AV) or a PowerPC Macintosh.

The multimedia-capable IIvx, IIvi, and Performa 600 can benefit enormously from the PowerPC logic board upgrade, which not only gives them a new CPU, but includes enhanced I/O circuitry as well. Keep in mind, however, that the new motherboard requires new RAM; you won't be able to transfer any existing main memory.

The Quadra Family

The Quadra family (including those machines originally labeled "Centris") have some version of the 68040 CPU. Some, such as the 605 and the 610 (Figure 1.19) have the 68LC040, which can't accept an FPU. The rest have the complete 68040.

Quadras either come in a desktop case like that of the Quadra 610, a desktop case with room for an internal CD-ROM drive like the Quadra 650 (Figure 1.20), or in an upright case like the Quadra 800 in Figure 1.21. The 610's case is shared by the 660AV, the 800's case by the 840AV. The AV Macintoshes include PlainTalk (speaker-independent

Figure 1.19 The Quadra (Centris) 610

Figure 1.20 The Quadra (Centris) 650

voice recognition) and are intended for intensive multimedia use. The Quadra 840AV has the fastest 68040 of the entire 680*x*0 line.

If you have a Quadra with a 68LC040 and you need an FPU, you have several alternatives. You can replace the 68LC040 with a 68040, or you can also replace the motherboard with either a 660AV motherboard or a PowerPC motherboard.

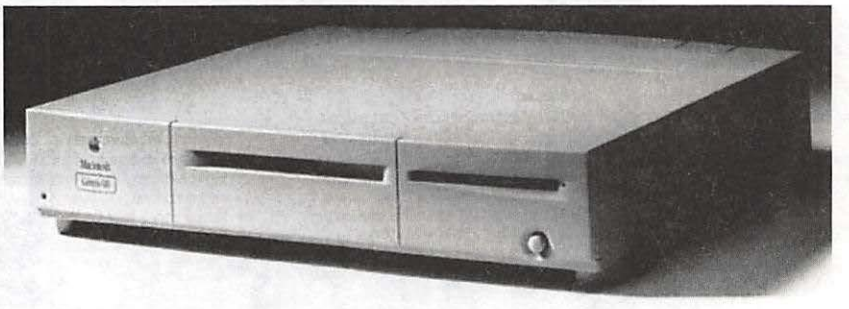


Figure 1.21 The Quadra 800

If your Quadra has the 68040, you can upgrade it with a faster 68040 by installing a CPU accelerator board from a vendor other than Apple. You can also upgrade to a PowerPC CPU by installing an expansion board or, for recent models, replace the motherboard with a PowerPC motherboard.

By the Way

Apple has indicated that it is committed to providing PowerPC logic board upgrades for all current Macintosh models. That includes the Quadra 605, 610, 650, 660AV, 800, and 840AV.

The Macintosh Portable

The Macintosh Portable (Figure 1.22) is a heavy, transportable Macintosh with a 68000 CPU. Although you can add more memory and a larger hard disk, there are no CPU accelerators available. If you happen to have a Portable and its CPU is too slow, the only alternative is to replace it with a new computer, probably a PowerBook.

Figure 1.22 The Macintosh Portable

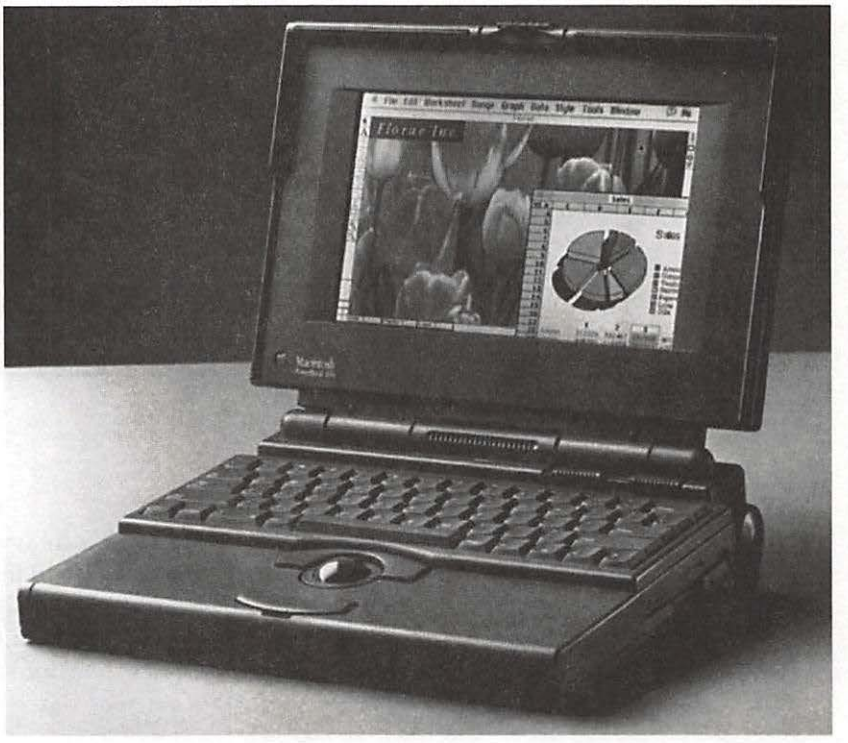


Figure 1.23 A Macintosh PowerBook

The PowerBooks

The PowerBooks (for example, Figure 1.23) range from the 100 (a 68000 CPU) to high-end models with a 68030 CPU. At the time this book was written, only one company—Digital Eclipse Software Inc.—was making CPU upgrades for PowerBooks. One upgrade transforms a PowerBook 140 or 145 into a 170. The company ships you a replacement "daughterboard" for your machine; a $200 deposit is refunded when you return the PowerBook's original daughterboard. Digital Eclipse also offers an upgrade to transform a PowerBook 160 into a 180. Installation requires sending the computer to the upgrade manufacturer so that the computer's motherboard can be modified. No CPU upgrades are available for other PowerBook models.

2

Measuring Your Mac

Throughout this book you will read about many things you can do to optimize the performance of your Macintosh. However, how are you going to know if a particular technique really gives you a performance boost? You can certainly judge subjectively, just by seeing how your Mac looks and feels. (In some cases, that may be the only option you have.) On the other hand, you can use software that measures a Macintosh's performance in some way.

This chapter looks at a variety of software—commercial and shareware—that can be used to measure a Macintosh. You will read about the tests that the software packages perform and learn exactly what those tests tell you. You will then be able to decide which tests are appropriate for measuring the effectiveness of the upgrades you make to your Mac.

Standard Computer Benchmarks

A benchmark is a number that represents some aspect of a computer's performance. Many benchmarks are generated by programs that use well-known processes so that it's possible to compare the same benchmark between many computers. The rest of this section looks at some of the common benchmarks you are likely to encounter with performance measuring software.

Whetstones

The Whetstones benchmark is a measure of how fast your computer can perform calculations. It is therefore a measure the speed of the computer's CPU, its floating point unit (FPU), and the software used to perform floating point operations.

The Whetstones program reports its results in terms of the number of times it can repeat its calculations (number of *iterations*) per second, usually expressed as thousands of iterations per second. To use the benchmark, you compare the number generated by your computer *before* an upgrade to the number generated *after* an upgrade. You can also use a Whetstones benchmark to compare performance between two computers.

By the Way

When looking at Whetstones results, keep in mind that not all Macintoshes have (or can have) an FPU. The 68000 microprocessor cannot use an FPU. The 68020 and 68030 can accept a separate FPU chip. An FPU was included with most older 68030 Macintoshes (for example, the SE/30) and is still included with most newer high-end 68030 Macintoshes (for example, the PowerBook 180c).

If your Macintosh has a 68040 microprocessor, then the FPU is integrated into the CPU. However, some Macintoshes (for example, the Centris/Quadra 610) have a special low-cost version of the '040 (the 68LC040) that cannot accept an FPU.

If you don't want to add an FPU to your 68020 or 68030 Macintosh, you can simulate the presence of an FPU with a shareware program called SoftwareFPU. This will let you run software that requires an FPU. It will also work on 68LC040 Macintoshes, although a bug in that CPU prevents SoftwareFPU from working properly with some programs that require an FPU. Unfortunately, SoftwareFPU will not work a 68000 Mac.

Although SoftwareFPU may seem to be a low-cost alternative to a hardware FPU, keep in mind that any time you simulate the functions of a hardware component in software, performance will be significantly less than what can be achieved with hardware. SoftwareFPU *will* let you run software that requires an FPU on 68020 or higher Macs without the presence of a hardware FPU. Nonetheless, performance will be considerably slower than it would be if the hardware were present.

A Whetstones result can be affected by software upgrades to your Macintosh. Although CPU and FPU speeds are hardware characteris-

tics, the Macintosh's floating point routines are part of the Standard Apple Numerics Environment (SANE), which is software. At least two companies provide replacements for the SANE routines (Radius and DayStar). Unfortunately, neither of the sets of replacements are available for sale as stand-alone software products; they are instead bundled with hardware upgrades. If you happen to have a DayStar accelerator board, a Radius accelerator board, or a Radius monitor, then you probably received new math routines with your purchase. Installing these routines can produce a significant increase in floating point calculation performance, which will have an impact on the Whetstones benchmark.

By the Way

Don't despair if you don't have replacement SANE routines. Floating point operations aren't important to many applications, including word processing, desktop publishing, and graphics. Floating point does become important for working with spreadsheets, performing data analysis, and in some cases, data management.

Dhrystones

The Dhrystones benchmark is also a measure of computational speed, specifically the speed with which the computer can move data between main memory and the CPU. Like the Whetstones benchmark, its results are expressed in terms of the number of calculations per second (generally thousands of iterations per second). Because no system software is involved in the transfer of data between main memory and the CPU, this benchmark is affected primarily by the speed of the CPU and the speed of the computer's memory.

Sieve of Eratosthenes

The Sieve of Eratosthenes is a program that generates the prime numbers up to 8,190. Because it works only with integer arithmetic (no floating point), it tests the raw computational power of a CPU. In particular, it focuses on integer arithmetic routines, which are typically implemented as part of the CPU.

Towers of Hanoi

The Towers of Hanoi is a problem involving the child's game of moving rings of various sizes among three posts. Only one ring can be moved at a time. The goal is to rearrange the rings so that the largest ring is on the bottom of each post and the smallest ring on the top. It, too, is a test of the raw computational power of a computer's CPU.

The Bottom Line

As you have been reading this discussion of standard benchmarks, you may have wondered what good these benchmarks are if they only test hardware performance. The purpose of standard benchmarks is to let computer manufacturers and purchasers compare performance between various computer models. Such comparisons don't do you much good when your goal is to compare the performance of a single computer after upgrades (and, in particular, software upgrades) have been made.

The developers of benchmarking software for the Macintosh are very sensitive to this issue. Although the software that you will read about shortly does compute some of the standard benchmarks, it also computes a variety of unique measures that reflect aspects of the computer's performance other than just the CPU, RAM, and floating point routines.

Each software package finishes its suite of benchmarks by providing a single, composite performance rating. Because each rating is unique to the software that computes it, the rating can't be compared to other computers. However, because it measures overall system performance, it can be compared to itself over time (to search for system problems) or to itself after the computer has been upgraded. For the Macintosh user, a composite benchmark that rates overall system performance can be more valuable than a standard performance benchmark.

Software for Measuring Your Mac

There are several programs that can help you measure the performance of your Macintosh. These programs fall into two major categories: those that monitor changes in system performance over time and those that compare the performance of your Macintosh to other Macintosh models. All of these products measure the performance of many aspects of the Macintosh, including the CPU, disk drives, and video. They can help you identify the parts of your Macintosh that are responsible for performance bottlenecks as well as alert you when something changes in your computer's environment.

MacEKG

MacEKG is designed for long-term monitoring of a Macintosh's performance. It is usually installed so that it runs each time you start up or shut down your Mac. MacEKG keeps track of performance measure-

ments from one run to another. As you can see in Figure 2.1, the result of a MacEKG run is a number called an MPR (Macintosh Performance Rating) as well as a histogram of up to the last 30 MPRs. The MPR is a composite rating generated by MacEKG after it tests various parts of your Macintosh, including components on the motherboard (the computer's main logic board), RAM, disk media, and video circuits and monitors (for example, see Figure 2.2).

By the Way

MacEKG tests only the startup monitor and hard disks connected to the native SCSI bus. If you happen to have more than one monitor and/or a SCSI accelerator card that provides a second or alternate SCSI bus, then those components will not be tested.

A single MPR by itself doesn't tell you much. However, if the MRP drops over time or if a single run produces an MPR significantly lower

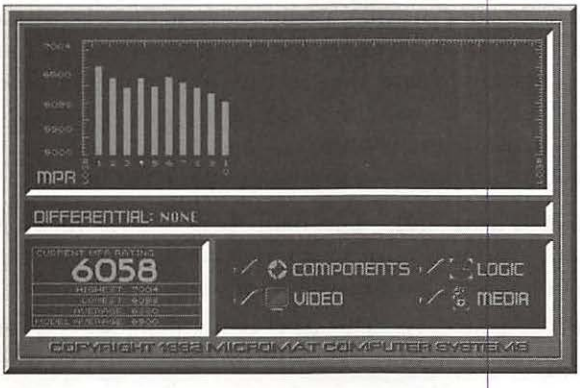


Figure 2.2 MacEKG's video tests

Figure 2.3 A MacEKG warning

than the average, that is a signal that something is interfering with your Macintosh's performance.

Whenever possible, MacEKG identifies the part of a Macintosh that is responsible for a dip in the MRP. For example, in Figure 2.3, MacEKG has detected a problem with the VIA 1 chip on the motherboard. This particular circuit is involved in input and output operations, and problems with it can affect such things as reading from and writing to floppy disks. More commonly, however, fluctuations in the MPR are due to changes in hard disk access speed: Because disk I/O is so much slower than the other components of the Macintosh, degradation in disk performance has a more noticeable effect on the MPR than the same performance degradation would have in some other component.

Snooper

Snooper is primarily intended to perform hardware diagnostics. However, it does provide a suite of benchmarks whose values can be compared against averages for various Macintosh models. Although there is no way to save the benchmarks generated, there is no reason you can't chart the benchmarks yourself in a spreadsheet and watch for changes in averages over time.

Snooper computes the following benchmarks:

- ***Math (Figure 2.4):*** The math benchmarks measure integer arithmetic (a function of hardware only) and floating point arithmetic (a function of hardware and software).
- ***CPU (Figure 2.5):*** The CPU benchmark sorts a series of numbers and then computes a ratio of the tested Mac's performance against

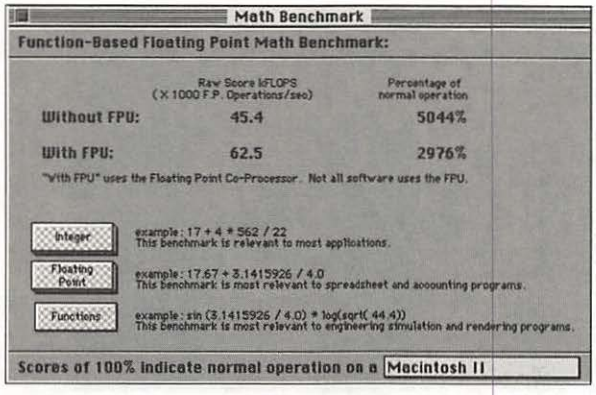


Figure 2.4 Snooper's math benchmarks

the Macintosh model selected from the popup menu at the top right of the dialog box. This benchmark measures only hardware.

- ***RAM (Figure 2.6):*** The RAM benchmark measures the time it takes to move data to and from RAM. This, too, is a measure of hardware only. However, the value generated by this benchmark can help you know if your RAM speed is a performance bottleneck. (It should be at least 100 percent when compared to your Macintosh model.)
- ***Hard Drive (Figure 2.7):*** Snooper's hard disk benchmarks are affected by both the disk hardware and by the layout of files on the disk. If the values generated by these tests begin to degrade over time, you need to seriously consider defragmenting and optimizing your disk. (For in-depth information about getting the best performance possible out of a hard disk, see Chapter 5.) Note that Snooper can perform Read and Write tests on all SCSI hard disks, even those

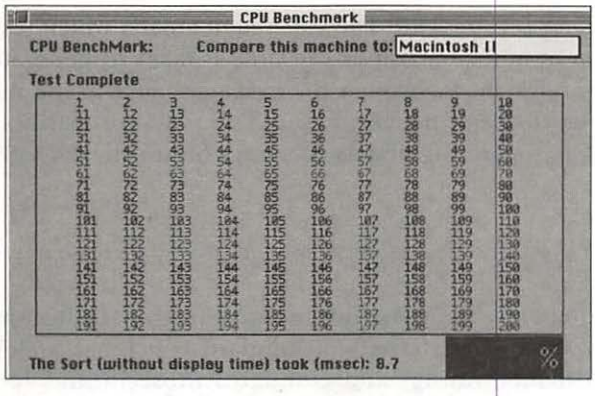


Figure 2.5 Snooper's CPU benchmark

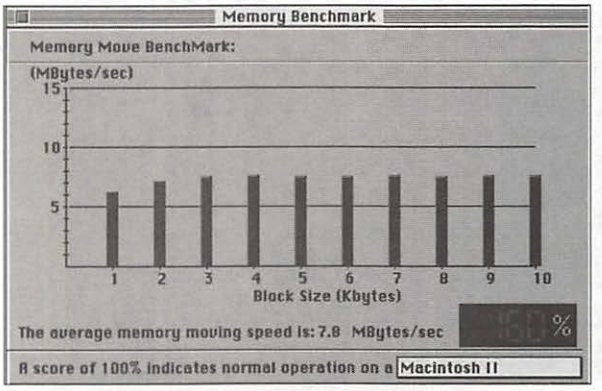


Figure 2.6 Snooper's RAM benchmark

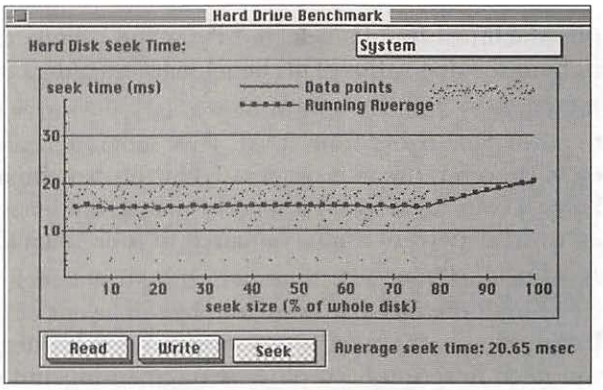


Figure 2.7 Snooper's hard disk benchmarks

attached to SCSI accelerator boards. However, Seek tests can only be performed on disks attached to the native SCSI bus.

- *Video (Figure 2.8):* The video benchmark, which tests only the start-up monitor, measures the time it takes to generate video images, transfer them through the video circuitry to the monitor, and display them for the user to see. This is also primarily a hardware function, something that usually can't be affected by software changes.

Speedometer

Speedometer, the shareware entrant in the Macintosh benchmarking arena, computes a variety of standard benchmarks along with its own performance ratings and compares those ratings to those of other Macintoshes. (Speedometer is included on the disk that comes with this

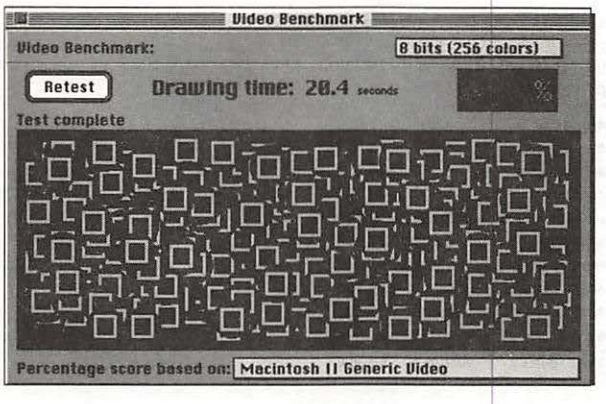


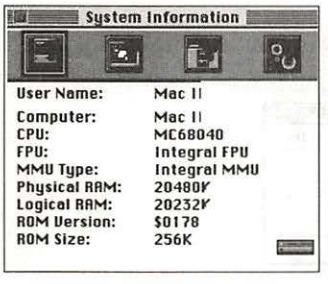
Figure 2.8 Snooper's video benchmark

book. You must register the shareware to get the complete set of machine records for other Macintosh models.)

When you launch the Speedometer application, you are presented with a summary of your Macintosh's hardware configuration. For example, in Figure 2.9, you can see the system information for the upgraded Mac II that was used to test most of the software discussed in this book. Notice that the System Information window can help you find out exactly what type of CPU is in your Macintosh and whether an FPU and/or PMMU is available.

Speedometer computes a wide range of standard benchmarks (for example, Figure 2.10). Notice that the performance ratings are given two ways: absolute measures (iterations per second) and relative measures. The relative measures are based on a Mac Classic, the most recent desktop Macintosh to use the 68000 CPU.

Speedometer provides some specialized tests for Macintoshes that support color and/or have an FPU. For those Macintoshes that support color, Speedometer computes a set of color benchmarks that rate video performance. Notice in Figure 2.11 that the relative ratings are based on performance of an unmodified Mac II, the first Macintosh to sup-



Benchmark Mix

Test	Abs.	Rat.*	Itr.
KWhetstones/sec	1538.461	210.748	1
Dhrystones/sec	26086.956	26.773	1
Towers (sec)	0.400	26.000	1
Quick Sort (sec)	0.367	23.409	1
Bubble Sort (sec)	0.533	25.312	1
Queens (sec)	0.317	24.105	1
Puzzle (sec)	0.733	30.114	1
Permutations (sec)	0.667	27.850	1
Fast Fourier (sec)	1.250	156.547	1
F.P. Matrix (sec)	0.667	162.175	1
Int. Matrix (sec)	0.433	32.577	1
Sieve (sec)	1.117	27.896	1
*Mac Classic equals 1.0	Average:	64.458	

Figure 2.10 Speedometer's standard benchmarks

Color Benchmarks

Test	Abs.	Rat.*	Itr.
Monochrome (sec)	8.217	3.970	1
Two Bit (sec)	11.183	3.483	1
Four Bit (sec)	17.267	2.659	1
Eight bit (sec)	27.450	2.062	1
*Mac II equals 1.0.	Average:	3.043	

Figure 2.11 Speedometer's color benchmarks

port color. If your Macintosh has an FPU, you can test its performance with Speedometer's FPU benchmarks (Figure 2.12). These measures include the standard Whetstones benchmark as well as a matrix multiplication and fast Fourier analysis.

Speedometer coalesces all its benchmarks into a single, overall performance rating that includes CPU tests, video display tests, disk I/O tests, and math performance tests (see Figure 2.13). All the measures computed to arrive at the overall performance rating constitute a "machine record," which can be saved in a file. You can then compare the saved record to a machine record computed at a later date—an easy way to watch for changes in the performance of a single Macintosh over time.

Machine comparisons are made in graphic format, as in Figure 2.14

FPU Benchmarks

Test	Abs.	Rat.*	Itr.
KWhetstones/sec	5000.000	7.000	1
Matrix Mult.(sec)	0.483	14.828	1
Fast Fourier (sec)	0.183	14.636	1
*A Mac II should be 1.0	Average:	12.154	

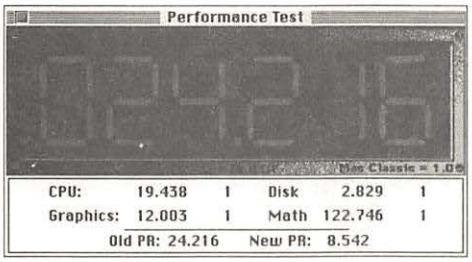


Figure 2.13 Speedometer's overall performance rating

(a comparison between the upgraded Mac II from Figure 2.9 and a generic Quadra 800). In this particular example, the upgraded Mac II performs as well as the Quadra 800 with the exception of its video display. (This isn't surprising, when you consider that the Mac II's video comes from a NuBus card while the Quadra 800's video circuitry is on the computer's logic board.) You can display any two machine records in the graph (two records collected from the same machine or two records from different machines).

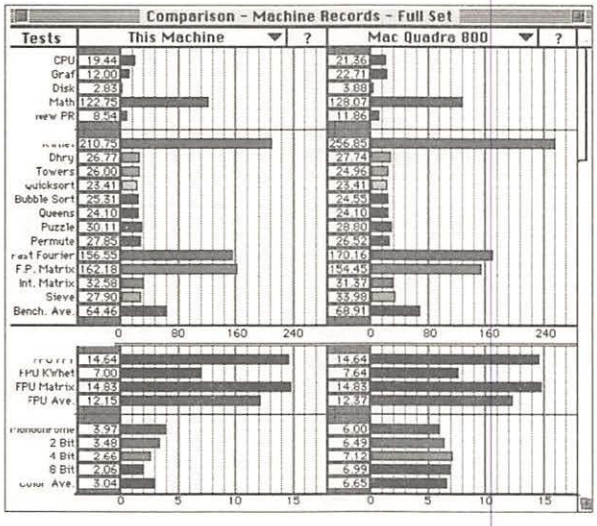


Figure 2.14 Speedometer's machine record comparison graph

3

Enhancing Application Software Performance

The speed with which application software executes is largely a function of the speed of your CPU, the speed at which your disk drive can transfer data, and how well the program was written. This means that in most cases, there is little you can do with add-on programs to affect a program's raw processing speed. However, there are some techniques you can use to maximize an application's performance. This chapter reviews some of those techniques for generally speeding up application program performance and examines some add-on programs that speed up program launching.

Speed Up Strategies

There are many simple things you can do to generally speed up the performance of application programs and your access to them. This section describes a variety of techniques you can use without spending a single penny.

RAM and Application Programs

One of the most important things you can do to speed up your application programs is to allocate enough RAM to them. As you know, disk read and write operations are considerably slower than data transfers between RAM and the CPU. Therefore, the more of a program and the

document on which you are working can be kept in RAM, the more you cut down on disk I/O.

When you launch a Macintosh application, the operating system allocates a block of RAM for that application. In most cases, there must be enough contiguous memory (memory lying physically in a single, uninterrupted block) to contain the program. Under System 7.0, the minimum memory partition is set by the programmer. If enough memory isn't available, the program simply won't launch.

Under System 7.1 and later, however, the programmer sets a suggested memory size. The application also has a minimum memory size. If the suggested memory size isn't available but there is more memory than the minimum memory size, the operating system launches the program in as much memory as it can get. However, it will not launch the program in less than the minimum memory partition.

Under any version of System 7, you can increase the size of the preferred memory partition using the application's Get Info dialog box. For example, in Figure 3.1, the programmer has suggested that the program run in 2 Mb of RAM (the suggested size); however, it can exist in 1 Mb (the minimum size). The user nonetheless prefers to run the program in a 4-Mb partition (the preferred size). Notice that the minimum and preferred size can be changed; the suggested size cannot.

How much memory should you allocate to a given application? That depends on the application. The first place to look for suggestions is in the manual that came with the software. You will generally find memory partition guidelines. There are also some general guidelines you can follow, based on the type of program:

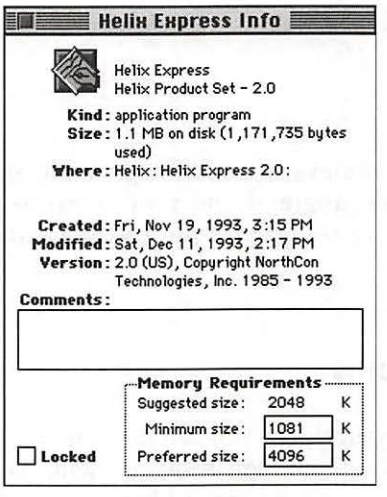


Figure 3.1 An application program's Get Info dialog box

- ***Word processors:*** Word processors perform best if they can keep an entire document in memory at one time. You may therefore want to increase a word processor's preferred size so that it includes room for the largest document with which you typically work. Because word processors differ so much in the amount of memory they require, it is difficult to specify here what an appropriate partition size might be.
- ***Desktop publishing software:*** Desktop publishing software also performs best if it can keep an entire document in main memory. In most cases, you will need between 2 and 4 Mb of RAM. Keep in mind, however, that if graphics are linked rather than copied into a document, performance will slow down whenever a graphic image has to be read into memory, regardless of how much memory the program and the rest of the document are occupying.
- ***Spreadsheets:*** Spreadsheet performance benefits if an entire document can be kept in memory. Most spreadsheets will require between 1 and 4 Mb of memory to operate at maximum efficiency.
- ***Data management:*** File managers and database management systems can benefit from increased memory, but they are typically not designed to operate with an entire "document" in memory. In some cases, you will discover that there is a point beyond which increasing memory brings little performance increase. You will usually find this limit mentioned in software documentation. If the maximum effective memory size isn't documented, you will need to experiment to find out how much memory is useful.
- ***Graphics and imaging:*** Most graphics and imaging programs perform best when an entire document is in main memory. Black and white graphics programs can often do well in 1 Mb of RAM. However, because color and grayscale images takes up a great deal of memory, you will probably want at least 4 Mb of RAM for color and/or grayscale work. If you are modifying photographs with imaging software such as Adobe Photoshop, you may need considerably more RAM: A 20-Mb-RAM partition would not be unusual for working with a full-color photo.

What can you do if you don't have enough memory to keep an entire document in main memory? Assuming you have at least the minimum memory available, you can run the program in what memory you do have. Although performance won't be optimum, the program will run. Alternatively, you can do something to optimize your memory. For more details on using software to fit more into existing physical RAM, see Chapter 7.

Eliminating the Competition

As you read in Chapter 1, programs can execute in the foreground or background. Theoretically, a background application is supposed to take advantage of the CPU's idle time, without affecting the performance of the foreground application. This is not, however, exactly the case. The presence of background programs generally slows down the operation of the foreground application. To understand why this is so, you need to know a little about what happens when applications trade off control of the CPU.

Whenever an application gives up control of the CPU, letting another application run in its place, all of the following actions take place:

1. The operating system freezes the application that will be vacating the CPU by taking a picture of the program's current state. This makes it possible to resume the program exactly where it left off the next time the program has a turn in the CPU.
2. The operating system loads the entering application into the CPU. If the program is being launched, the CPU is initialized and execution begins. If the program has been running for a while, the CPU copies the picture of the program's state that it made the last time the program gave up the CPU.
3. Execution of the entering application begins.

All of this activity takes time; a switch in the program using the CPU isn't instantaneous, especially if parts of the program entering the CPU need to be read in from a disk. The presence of multiple background applications can also add to the slowdown because those applications are competing for CPU access during idle periods.

Although the foreground application always has priority in the CPU, the presence of background applications can significantly slow down its performance. You can therefore avoid the slowdown by avoiding running programs in the background.

By the Way

You can have many programs running at the same time without a performance slowdown. It's only those programs that run in the background that cause problems. If you aren't certain whether a specific program runs in the background, consult the users guide that came with the program. This type of information is almost always well documented.

Avoiding the I/O Slowdown with the Disk Cache

As you work with an application program, you may notice that your Macintosh occasionally accesses a disk, even when you haven't given a command to open or save a file. This occurs because the program has been written so that the entire program isn't loaded into main memory from disk when the program is launched and/or because a portion of a large document is kept on disk and loaded into main memory only when needed.

Next to printing, disk I/O is just about the slowest operation a computer can perform. An application can slow down noticeably when it has to wait for something to be read from disk into RAM. There is a way, however, that you can avoid these slowdowns to some extent—use the disk cache.

In a generic sense, a cache is a safe holding area. Computers use caches as holding areas for data and program instructions. A disk cache is a portion of main memory set aside to hold the most recent data or program instructions read from disk. How does this help avoid disk I/O? The theory is that the data or instructions that an application is most likely to need next are the data or instructions that it needed most recently. (There is a great deal of research that indicates that this theory is actually correct.) Therefore, because reading from RAM is much faster than reading from disk, reading from the disk cache can avoid the disk I/O slowdown.

Under System 7, the disk cache is always on. Its size is set from the memory control panel. As you can see in Figure 3.2, the default size is 32 K. A larger size is set by clicking either the up or down arrow. How big should the disk cache be? Unless the documentation of an applica-

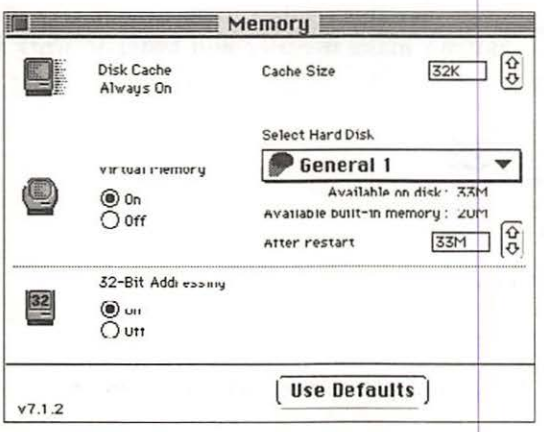


Figure 3.2 Using the Memory control panel to set the disk cache size

tion program suggests otherwise, keep the disk cache around 128 K or 256 K. Larger sizes eat into the RAM you have available for running applications and don't bring much additional performance benefits.

Hiding Things

As long as at least a portion of a window can be seen on the Desktop, the Macintosh will update that window each time a change is made in either that window or a window that overlays it. The more windows you have open, the longer it will take to update the display. Although some updating does take place in the background, you will often have to wait for display redraws before you can continue working. The delay can be especially noticeable if windows containing grayscale or color graphics are open.

There is a simple way to avoid the redraw delay: Hide all windows except those for the application with which you are working. Use the Hide Others command in the application menu to hide all windows except those of the current application (see Figure 3.3). To make all windows reappear, choose Show All. Alternatively, choose the name of a single application from the application menu to display its windows and make it the current application. The windows of the application with which you were working previously remain on the screen.

Optimizing Application and Document Access

The Macintosh operating system provides many ways to access and launch applications. This section looks at a variety of techniques and programs that can make it easier and faster to work with application programs.

Figure 3.3 Using the application menu to hide windows

Figure 3.4 Configuring Bail to abort program launches

Stopping a Launch

How many times have you accidentally double-clicked on the wrong application program or document file, only to have to wait while the Finder finished loading the application before you could quit and start over? If it's a large program or document, you may have to wait quite a while. The Macintosh operating system has no way to abort a launch. However, a shareware INIT called Bail can help.

Bail enables the key combination ⌘-. or a press of the mouse button as a signal to abort an application program launch. As you can see in Figure 3.4, Bail lets you designate applications whose launch can never be aborted. These are generally background applications whose operations might accidentally be aborted by a click of the mouse button that was actually intended for the foreground application.

Aliases and Application Access

An alias is a small file that contains the location of the file or folder that it represents. As you can see in Figure 3.5, an alias has the same icon as the original file or folder. However, the alias's name is in italics. When

Figure 3.5 An alias icon

you double-click on an alias, the Macintosh operating system acts on the original, opening the folder or file. There are several ways you can use aliases to speed up application access.

Aliases and the Menu

Under System 7, any file/folder or file/folder alias that is stored in the Apple Menu Items folder appears in the Finder's menu. Such items are more accessible than they would be if they were buried in multiple nested folders. Although you can put original files and folders in the Apple Menu Items folder, doing so can take up a lot of space on your startup partition. Each alias, however, uses only 2 K. You can therefore gain the benefit of easier and faster access to frequently used items and avoid the problem of wasting space on your startup drive by using placing aliases in your menu.

Aliases and Startup Items

Files placed in the Startup Items folder are opened whenever the Macintosh is booted, speeding access to those applications or documents. This can be particularly handy if there are activities that you perform regularly every morning. For example, if you check your electronic mail the first thing each day, you might want to set up the electronic mail application as a startup item.

As with the Apple Menu Items folder, you can place original files or aliases in the Startup Items folder. Because the Startup Items folder is nested within the System 7 System folder, using aliases saves considerable space on your startup disk.

There is one problem with placing items in the Startup Items menu: If you happen to reboot your Macintosh during the day (for example, after a crash), items that you want to only run first thing in the day will run again. To prevent that from happening use Once Daily (Figure 3.6), a freeware control panel that looks for files whose names end with "daily." Those files will be opened only once a day.

Recent Application Menus

You can also speed access to frequently used files and folders by adding a utility program that places recently used items in a special menu. For example, the menu in Figure 3.7 is produced by NowMenus (a part of the Now Utilities package). It appears when you press the mouse button with the mouse pointer just to the left of the menu. The theory behind such a menu is that recently used items are the items most likely to be used again in the near future.

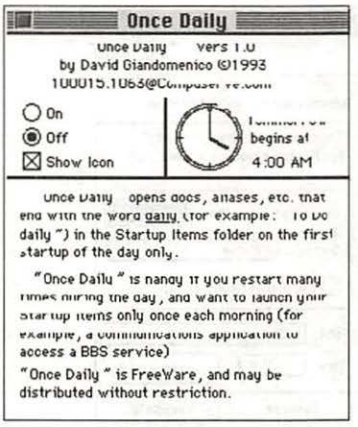


Figure 3.6 Making sure that startup items run only once a day with Once Daily

The types of items that appear in the recently used items menu are determined by settings in the NowMenus control panel (Figure 3.8). Notice that currently running items appear at the top of the menu and a user-determined number of recently used items appear below them.

Figure 3.7 NowMenus Left Side menu of recently used items

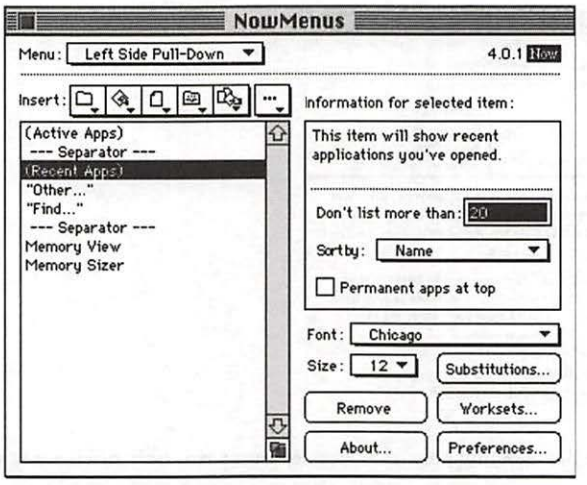


Figure 3.8 The NowMenus control panel

As configured, the menu also provides access to a file finding utility, an Open File dialog box for opening "other" files, and two memory configuration utilities.

Saving a Mouse Click When Switching Applications

One way to switch between running applications is to click on any open window of the application that you want to make the foreground application. When you do this, the application doesn't process the first click. Instead, it interprets it as a wakeup call. Your actual work with the application begins with the second mouse click.

You can, however, modify applications so that they actually process the first click you make in application window with FirstClick!, a shareware application. Keep in mind that this is a permanent modification. You should therefore make a copy of an application program for safe keeping, just in case you don't like the way the application behaves after it is modified.

Speeding Up Application Switching

The typical means of switching between applications is either to choose the application's name from the Application menu (or a recent applications menu, if you have such a utility installed) or to click on one of the application's open windows. However, there are utilities that can make

Figure 3.9 A Malph palette of running applications

switching even simpler and faster. One is a freeware program called Malph.

Malph is an application that creates a floating palette with icons for running applications. For example, at the time the screen shot in Figure 3.9 was taken, five programs (including Malph) were running. To switch to an application, you make Malph the current application and click on the icon of the application you want to use.

It may seem a bit of a contradiction to need to switch to Malph before switching to another application. If you can't see the Malph palette, how can you switch to it without using a menu? The answer is a "hot spot." As you can see in Figure 3.10, the hot spot can be any corner of your startup monitor. To bring the Malph window to the front, all you need to do is move the mouse point to the hot spot.

Malph makes good use of balloon help. With balloon help turned on, moving the mouse pointer over an application's icon in the Malph palette displays system information about the application (Figure 3.11). Notice that the balloon shows the amount of memory used by the application (Size) and how much of that memory is unused (Free). It also

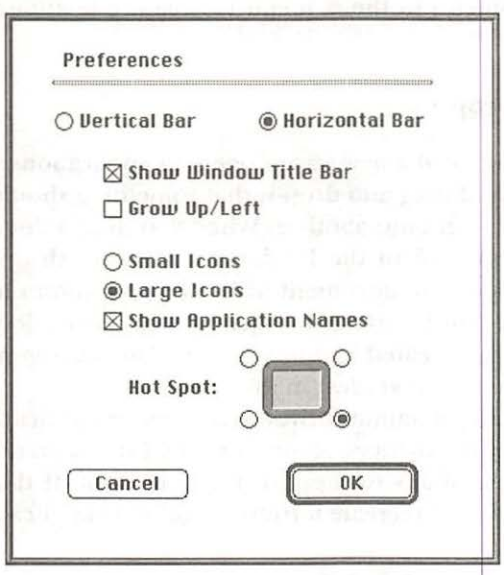


Figure 3.10 Setting preferences for Malph, including the hot spot that brings the palette to the front

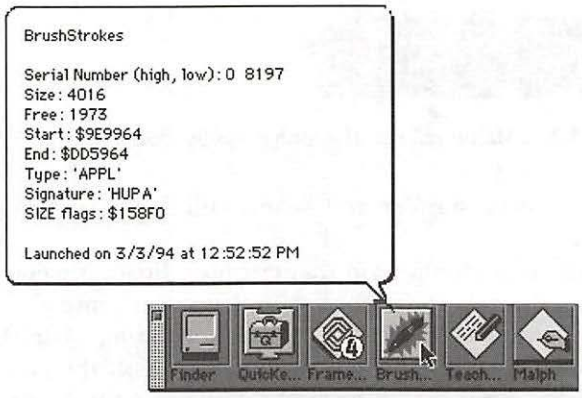


Figure 3.11 Malph's balloon help

shows the application's starting and ending locations in main memory as well as its file type.

Speeding Up Launching

Beyond placing aliases for frequently used items in the Apple Menu Items folder, a number of software utilities can make it easier and faster to gain access to applications or documents you want to open. Such application-launching programs take a variety of strategies, from adding a submenu to the menu to creating floating palettes of buttons.

Drag and Drop

System 7 introduced a new way of opening applications: drag and drop. The idea behind drag and drop is that something should happen when you drag one icon onto another. When you drag a document file onto an application icon in the Finder, the Macintosh operating system attempts to open the document with the application onto which it was dropped. Not only is this a convenient way to open a document with the application that created it, but you can also open generic document types (for example, text files) in this way.

You can drag document files to aliases of applications. However, under some circumstances, aliases for applications on different disk volumes lose their ability to support drag and drop. If this should occur, delete the alias and recreate it from the original application file.

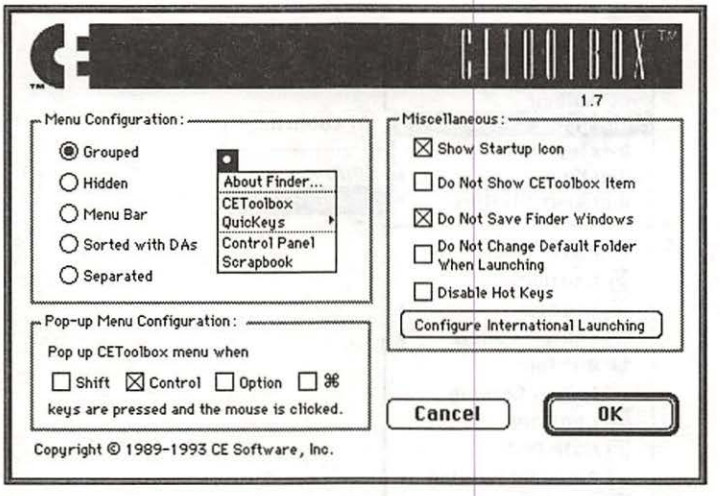


Figure 3.12 The CEToolbox

By the Way

Other elements of the Macintosh operating system support drag and drop. For example, if you are using PowerTalk, you can use drag and drop to mail a document.

DT Launch

DT Launch is a file and document-launching utility that ships as part of the DiskTop file management package. It runs in conjunction with the CEToolbox, which places DT Launch in the menu. As you can see in Figure 3.12, CEToolBox provides choices as to where DT Launch appears (for example, at the top of the menu or sorted in with the Apple Menu Items). It also provides for a popup menu, such as the one in Figure 3.13, that can appear anywhere on the screen. When configured as in Figure 3.12, the menu in Figure 3.13 appear when you hold down the Control key and press the mouse button. This means that you don't need to return to the menu to gain access to anything managed by DT Launch.

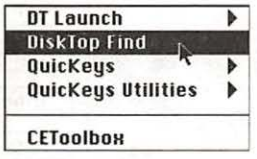


Figure 3.13 A CEToolbox popup menu that can appear anywhere on the screen

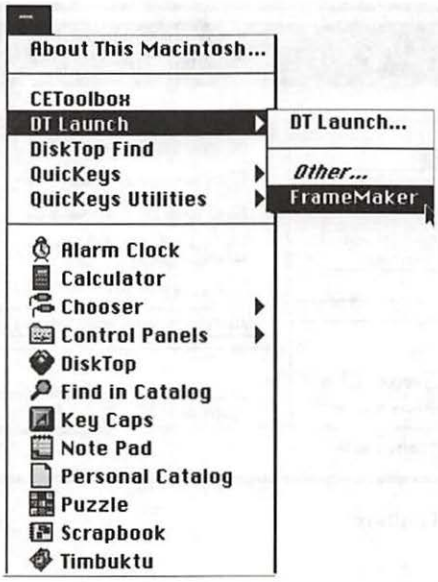


Figure 3.14 The DT Launch submenu

DT Launch creates a submenu of applications and documents that appears when you display the CEToolbox menu and run the mouse button to the side of the DT Launch item (for example, Figure 3.14). Choosing an item from the submenu opens that item. If the item is a document and the document's creator isn't running, DT Launch launches the application and then opens the document.

Items are added to the DT Launch submenu with the DT Launch window (Figure 3.15). The major restriction to adding items is that a

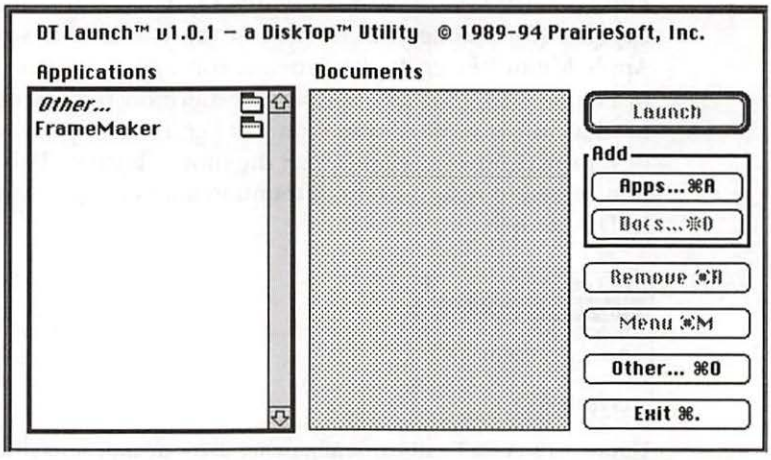
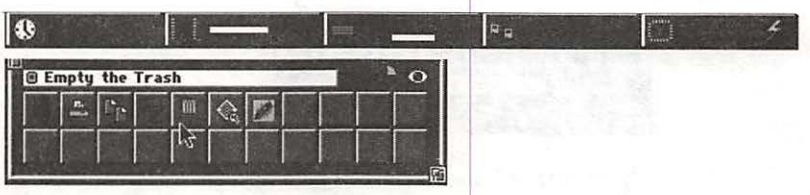


Figure 3.15 Adding items to the DT Launch submenu



document cannot be added unless the application that created the document or an application that can open the document is already part of the submenu.

PowerBar

PowerBar is one of several shareware utilities that places a palette of buttons on the Desktop. Clicking a button launches an application or opens a document. In the case of PowerBar, buttons can also correspond to a variety of Finder actions. For example, in Figure 3.16, the first five buttons represent Finder actions; the two left-hand buttons represent application programs.

Notice in Figure 3.16 that PowerBar also places additional buttons above the palette. In this example, PowerBar was running on a PowerBook. From left to right, the buttons display the date and time, show the power voltage being used, the amount of hard disk space in use, the currently selected printer driver, and the speed at which the CPU is operating. The printer driver button makes it possible to change printer drivers without opening the chooser. The hard disk button provides a popup menu of all mounted volumes.

PowerBar installs as a control panel. After the Macintosh is restarted, a PowerBar menu appears in the menu bar to the right of the Finder's Special menu (Figure 3.17). The Special Commands option lets you

Figure 3.17 The PowerBar menu

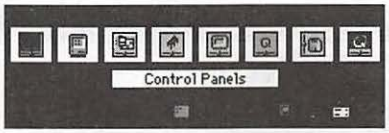


Figure 3.18 A PowerLaunch II palette

add Finder actions to a palette. A file, however, can be added simply by dragging its icon to an empty button.

PowerLaunch II

PowerLaunch II is a commercial application that creates floating palettes containing any double-clickable item. Palettes are grouped together into "sets." Although only one set of palettes is available at any given time, a set can contain up to ten palettes, each of which can contain up to eight items. In Figure 3.18, for example, the Control Panels palette (from the "General" set that ships with the application) has buttons for control panels that a user wants to access frequently.

When an item is added to a PowerLaunch II palette, you have the opportunity to configure the working environment for the launch of the application or document. As you can see in Figure 3.19, settings include the number of colors or shades of gray to be displayed on the startup monitor and the level of sound to come from the Macintosh's speaker. In addition, files can be set to launch automatically on specific days and times.

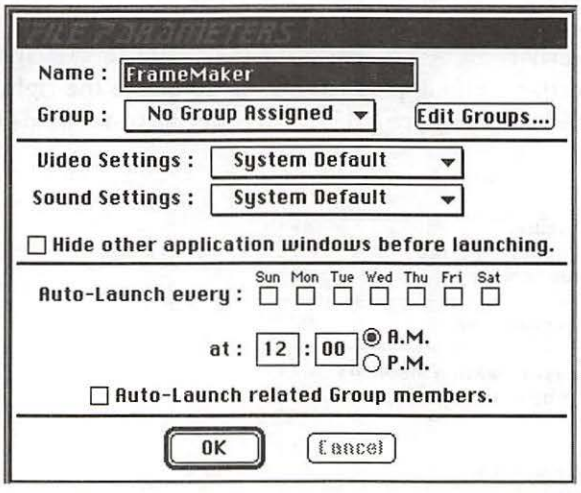


Figure 3.19 Setting launch parameters for a file in a PowerLaunch II palette

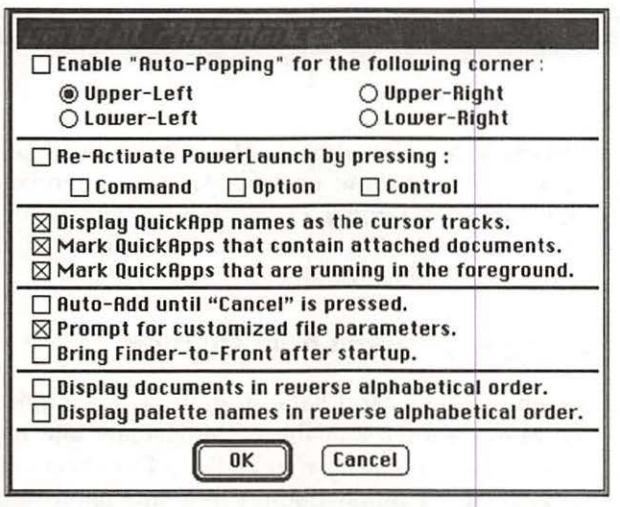


Figure 3.20 Configuring PowerLaunch II for popup of palettes

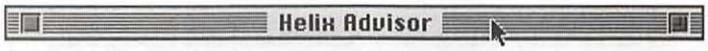
Each button on a PowerLaunch II palette may be assigned to a "group" of items rather than to a single item. In that case, clicking the button launches all items in the group. This can be particularly handy if, for example, you regularly open multiple documents at the same time.

PowerLaunch II is an application, not an INIT. It is therefore most effective if an alias of its icon is placed in the Startup Items folder so that the program is launched when you boot your Mac. You can then display palettes as needed or use predetermined key combinations to pop up the palettes (handled by the Preferences dialog box in Figure 3.20).

PowerLaunch II ships with a number of extensions that can be added to palettes. These include actions such as emptying the trash, playing sound files, restarting the computer, and executing QuicKeys macros. (QuicKeys is discussed in depth in Chapter 10.) In addition, a drag-and-drop extension lets you add items to a palette by dragging icons to a special PowerAdd icon.

Keeping an Application Running

Most Mac users have experienced the message "The application X has unexpectedly quit." The Macintosh hasn't crashed, but an application has stopped running. This can be a significant problem for Macintoshes that are expected to have applications such as database servers, electronic mail servers, or remote access communications software running



at all times. It can also affect a Macintosh that is performing background operations without minute-by-minute attendance by a person. Although there isn't any iron-clad way to make sure an application never quits when you don't want it to, there are a couple of things you can do to provide some insurance.

Preventing Applications from Quitting

The System 7 Finder has a habit of quitting any applications that have no open windows when available RAM becomes low. If you have closed application windows to keep your Desktop from becoming too cluttered or if an application simply doesn't have any open windows at a given time, you may discover that suddenly the application is no longer running. The solution is to keep a window open for all running applications. However, when you do that, you either have a very messy Desktop or many hidden windows.

To get around the problem, try using the shareware control panel WindowShade. WindowShade lets you shrink an open window to just its title bar, as in Figure 3.21. As long as that title bar is present, the Macintosh operating system realizes that the application has an open window and doesn't attempt to quit the application.

The keystrokes that shrink and expand windows are handled in the control panel's window (Figure 3.22). Notice that you can configure WindowShade so that you only need to click on a title bar or, to make sure you don't accidentally shrink a window, to require pressing a modifier key along with the clicks of the mouse button.

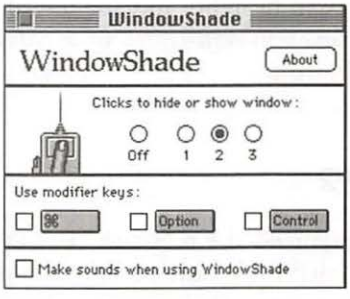


Figure 3.22 The WindowShade control panel

Automatic Relaunching

If you happen to have an application that must be kept running, try using Keep It Up, a shareware program that attempts to relaunch an application that has "unexpectedly quit." Keep It Up runs as an application. When running, it displays a tiny window (Figure 3.23) that needs to remain open so that the Finder will not terminate it when memory begins to run low.

The first time Keep It Up is run, it creates a folder named Keep It Up Items in the Preferences folder. You place an alias for each application you want Keep It Up to monitor in that folder. The way in which Keep It Up acts on the applications whose aliases appear in the folder is determined by its Preferences settings. As you can see in Figure 3.24, settings include the amount of time to wait before relaunching and instructions for restarting the computer if repeated errors occur.

Using Stationary Files

If you have a document format that you use repeatedly, you can save the time needed to format that document by saving a template of that

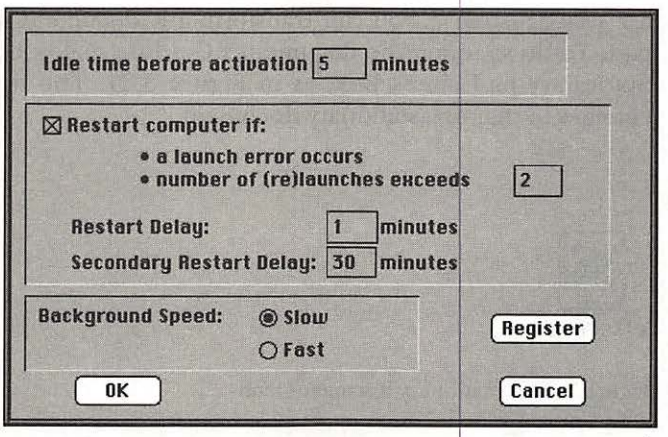


Figure 3.24 Keep It Up Preferences

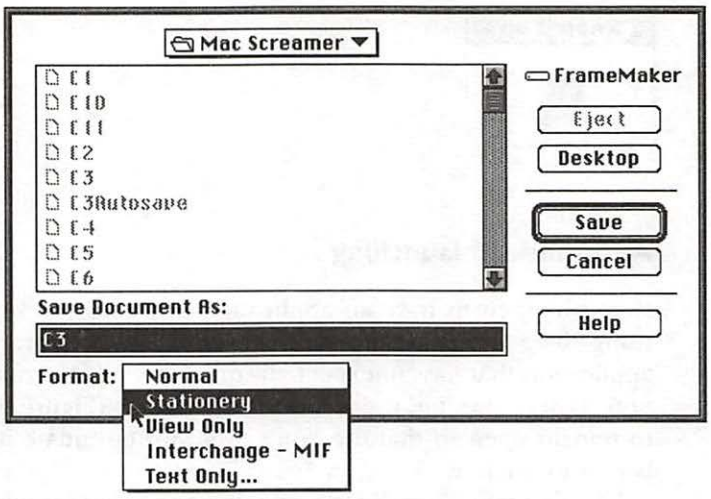


Figure 3.25 Saving a document as stationary

document as stationary. When you open a stationary document, the application program creates an untitled copy of the stationary document, leaving the stationary document unmodified. You then work with the untitled copy.

To create a stationary document, format a document and enter any text you want to appear each time you work with a new copy of the document (for example, letterhead information). Then, choose Save As from the File menu. When the Save File dialog box appears, use the file type/format popup menu to select Stationary, as in Figure 3.25. The document takes on an icon that looks like a pad of paper (Figure 3.26).

Not every application can save stationary documents. However, if you are using System 7, you can transform any document into a stationary pad. To do so, open the document's Get Info dialog box and click the Stationary pad check box, as in Figure 3.27. The document's icon changes to that of a stationary document.

Figure 3.26 A stationary document icon

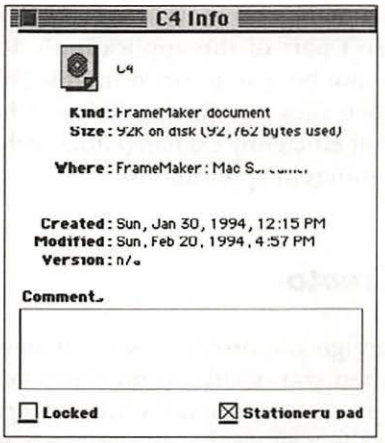


Figure 3.27 Using the Get Info dialog box to create a stationary pad

Adapting Foreign Files

If you happen to enjoy exploring shareware, you may have discovered that the documentation is often distributed in text files that none of your software can access. Although most word processors can theoretically open plain text files, these files simply don't show up in an Open File dialog box listing, and double-clicking on the files brings the message in Figure 3.28. What's going on here?

Every Macintosh file has two four-character strings attached to it. One, its creator, identifies the application that created the document. When you double-click on a document, the Macintosh operating system looks for a program that matches the creator string. The message in Figure 3.28 appears whenever it can't find a matching application.

The second four-character string, a file's type, indicates the type of file. A word processor, for example, usually recognizes files that it created plus files of type TEXT. There's nothing magic about the file types an application can open; it is programmed to recognize specific types.

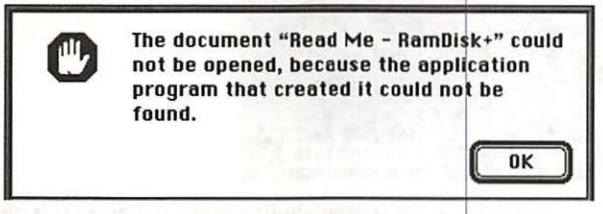


Figure 3.28 A dialog box indicating that the Macintosh operating system can't find an application to open a document

Therefore, even if a document's contents are readable by a program, if the document's type isn't part of the application's acceptable list of types, you will probably not be able to open the file. What can you do then, if you want to open files for which you don't have a matching application? How can you efficiently exchange files with friends and co-workers when you have different applications?

Changing a File's Type and Creator

One solution to the foreign file problem is to change the file's type. However, be careful when you decide to do this; many files, such as those created by word processors, contain formatting codes along with text and graphics. Such files will display properly only with the applications that created them; they'll look like garbage if opened as text. Nonetheless, if you are certain that a file contains just text (and no formatting codes), you can change its type using something like the shareware program Finder Info Changer.

As you can see in Figure 3.29, the documentation for the program RamDisk+ has a creator of "ttxt." This particular creator string has been allocated to TeachText (that ubiquitous text editor that seems to get installed with most Macintosh applications and then appear in multiple copies all over your hard disk). A read-only TeachText document has a type of "ttro"; TeachText documents that can be modified have a type of "TEXT."

To change the type so that any word processor can open it, you simply replace the "ttro" with "TEXT," as in Figure 3.30. The next time you

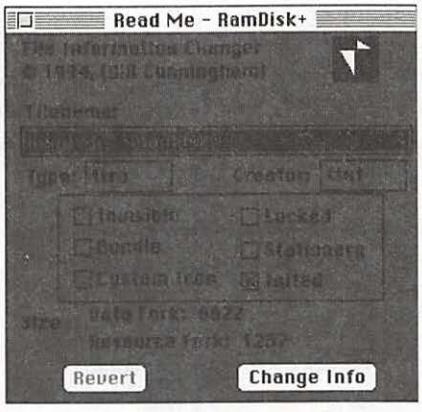


Figure 3.29 Finder information about a text file before it is changed

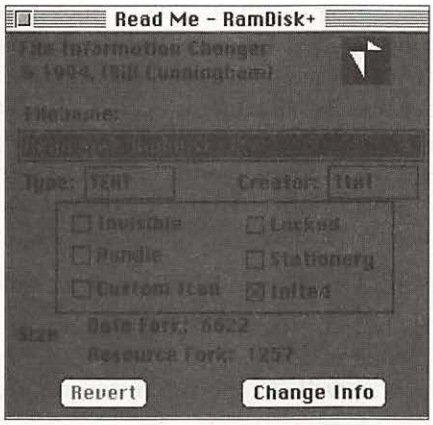


Figure 3.30 Finder information about a text file after it is changed

By the Way

There isn't anything magical about figuring out types and creators. When a software developer writes a new application, he or she must register the application's creator string and the type string its documents use with Apple Computer. This is to ensure that no two applications use the same type and creator strings. (The exception is generic document types such as TEXT, PICT, and PTNG.)

How do you find out what type and creator strings your documents have? If you don't find them in printed documentation somewhere, run a program like Finder Info Changer to look at a file in which you are interested. You can then make a note of the types and creators with which you will be working.

try to open this file with your word processor, it will appear in the list of readable files. There is, however, one major drawback to making this change: Any graphics that are in the file will not be included in the text file.

By the Way

Type and creator strings are case sensitive (uppercase and lowercase letters are different). That means, for example, that "TEXT" is not the same type as "text."

There may also be times that you want to change a file's creator. For example, assume that someone sends you a MacDraw file. Files created

by QuickDraw graphics programs typically save files with a type of PICT, a file type that can be opened by most Macintosh graphics programs. However, you don't have MacDraw; you have Canvas. That means you can't open the file by double-clicking on its icon; the Macintosh operating system will be looking for MacDraw. Since you'll be using Canvas to modify the file, you'd like to open it with Canvas rather than MacDraw. The solution, of course, is to change the file's creator string. The process you might use is as follows:

1. Open Canvas with Finder Info Changer or a similar program that lets you change a file's type and creator.
2. Note Canvas's creator string. This will become the creator string of the document as well. (Application programs generally have a type of APPL.)
3. Close Canvas without making any changes.
4. Open the document whose creator you want to change.
5. Change the creator string. Leave the type string alone.
6. Save the change.

Linking File Types and Creators

The technique you have just seen creates a permanent change of a file's type and creator. However, if you often receive files for which you don't have the application that created them, then explicitly changing the type and/or creator can be very time consuming. Instead, you may want to link specific file types and creators to applications that you do have.

There are many programs that can set up document and application linking. The shareware INIT SpeedyFinder 7, for example, lets you link any type of document to any application that you have on your system (see Figure 3.31). The shareware control panel AppChooser (Figure 3.32) provides similar features. Keep in mind that regardless of the program you use for document/application linking, it's up to you to determine which type strings will be linked to which creator strings.

Managing Running Applications

So you're running short of memory; you can't possible run another application. Which application should you quit to make room for another? Which application is hogging a lot of memory? You can get some basic information about memory use from the Finder's About This Macintosh dialog box. For example, in Figure 3.33 three programs

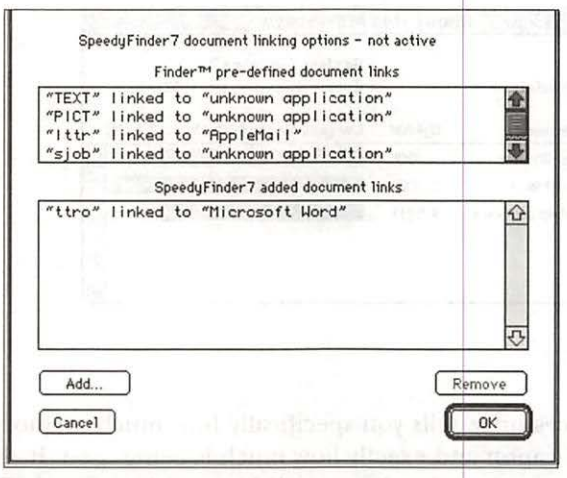
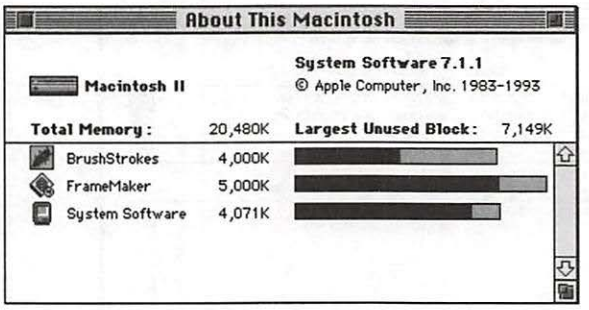


Figure 3.31 Using SpeedyFinder 7 to link document types to applications

are consuming memory. BrushStrokes (a graphics program) is running in a 4-Mb partition. The bar to the right of the partition size indicates that the program is currently using only about half the partition. (The dark portion of the bar represents memory actually in use.) FrameMaker and the operating system, however, are using most of their memory partitions. Unfortunately, you can't do anything with this information once you have it.

If you want more specific information about where applications are in main memory and more control over those applications, consider using the freeware program Processorize. As you can see in Figure 3.34,

Figure 3.32 Using AppChooser to link file types and applications



Processorize tells you specifically how much memory is allocated to an application and exactly how much is being used. It also tells you how long the process has been running and how much CPU time it has used. (This can also be very handy for identifying applications that are CPU hogs!)

By the Way

Processorize gets its name from the operating system word for an running program: a process. That is why the buttons in its dialog box read "Bring Process to Front," and so on.

Processorize has three buttons in its lower-left corner:

- "Bring Process to Front" makes the highlighted application the foreground application.

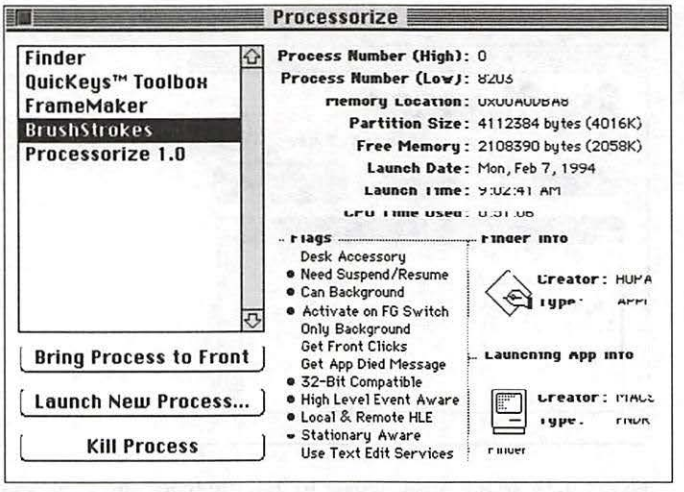


Figure 3.34 Processorize information about a running application

- "Launch New Process" runs an application that currently isn't running
- "Kill Process" stops an application from running. This will stop the application without asking you to save any unsaved changes in a document.

When Software Isn't Enough...

The performance of most application programs responds to the general hardware speedup solutions of adding a faster CPU, more RAM, a faster hard disk, and so on. (You will find more about these hardware solutions throughout this book.) However, some applications also can be speeded up by adding hardware designed specifically for them. In particular, these include high-end graphic imaging software such as Adobe Photoshop, Fractal Design Painter, and Adobe Premier.

Image-processing accelerator boards contain specialized processors known as digital signal processors (DSPs) which are designed to handle specific functions within the program being accelerated. In particular, they can speed up the compression and decompression of images as much as 20 times. They can also speed up use of image filtering software ("plug-ins") that have been provided by third-party developers to extend the enhance the performance of the image-processing application.

4

Accelerating and Optimizing the Desktop

With the introduction of System 7, the Macintosh Finder gained a wealth of Desktop display and formatting options. Using some of these options can actually slow down the Macintosh's performance. Other options can be replaced with add-on software that is both more capable and faster than that available with System 7.

This chapter looks at techniques and software for speeding up your interactions with the Finder. You will read about Finder settings that can slow down performance, settings that can give you the best possible performance, software for enhancing how you work with windows, and software for replacing Finder functions such as finding, copying, and deleting files.

Faster System Startup

The Macintosh operating system performs a number of activities when you start up your computer. Some of these activities can significantly extend the time it takes for the operating system to finish its work and turn the computer over to you. To get around the delay, you can turn off various system features that you don't use regularly, including the following:

- ***File sharing:*** If file sharing is enabled, it is started up on every time your computer is booted or restarted. Starting up file sharing requires access to every disk volume for which file sharing has been allowed, a process that can be very time consuming for Macintoshes

that have multiple disk volumes, most of which can be shared. If you don't use file sharing regularly, turn it off and keep it off except for when you actually need to transfer files over a network.

- ***PowerTalk:*** Loading PowerTalk, the electronic mail facility that made its debut with System 7 Pro, can significantly slow down system startup. During the startup process, PowerTalk checks all catalogs, including network catalogs, and looks for mail in the MailBox. If you aren't using PowerTalk's electronic mail capabilities, you can avoid the startup delay by not loading PowerTalk. To do so, remove the PowerTalk Extension and the PowerTalk Manager from the Extensions folder and the PowerTalk Setup control panel from the Control Panels folder.

Setting System 7 for Fast Finder Window Display

Some of System 7's Finder window display options can have a major impact on your Macintosh's performance. You can optimize the performance of your Desktop by simply not using those capabilities that slow down the display of the contents of a disk.

Finder display options are configured with the Views control panel (Figure 4.1). The "Straight grid" and "Staggered grid" radio buttons affect the placement of icons in Icon view whenever icons are aligned with a Finder window's invisible grid. Snapping to the grid and the type of grid has no impact on performance.

The icon sizes in the List Views portion of the control panel also have no impact on window display performance, although they do affect how much can be seen in a window at one time. (Of course, the larger the icon, the fewer files or folders that can be displayed in a win-

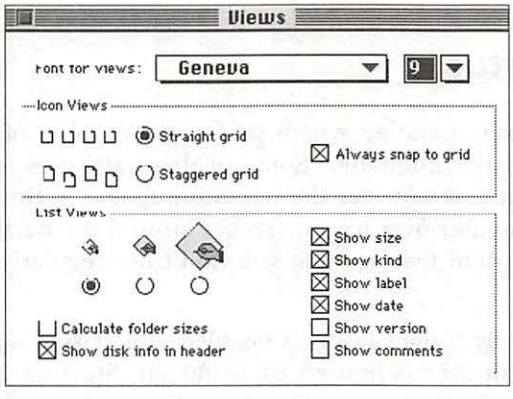


Figure 4.1 The Views control panel

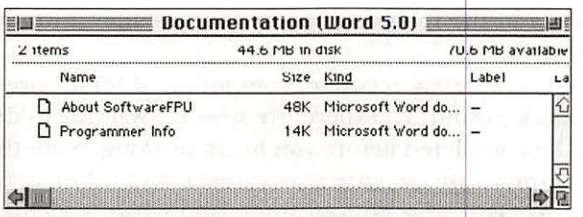


Figure 4.2 A Finder window showing disk information in the header

dow.) The "Show disk info in header" check box places data below the window name describing free space on the disk. For example, in Figure 4.2 the disk information shows how many items are in the current window, the total size of the files and folders stored on the disk, and the amount of space available on the disk. This option, which does not slow down the Macintosh, alleviates to some extent the problem with System 6 list views, which couldn't tell you how much disk space was available.

Unfortunately, "Show disk info in header" doesn't tell you the size of a folder whose contents you are viewing. To get this information, you might choose to use the "Calculate folder sizes" option. When this check box is checked, Finder windows not only show the sizes of files, but folders as well, as in Figure 4.3. The Finder begins calculating folder sizes as soon as you check the "Calculate folder sizes" check box in the Views control panel. It doesn't even wait for you to close the control panel's window! Folder sizes are calculated for every open window. Each time you open a window, the Finder recalculates folder sizes; each time you start up your computer, the Finder recalculates folder sizes for every open window. Because folder sizes aren't stored anywhere, but computed on the fly when windows are opened, there can be a signifi-

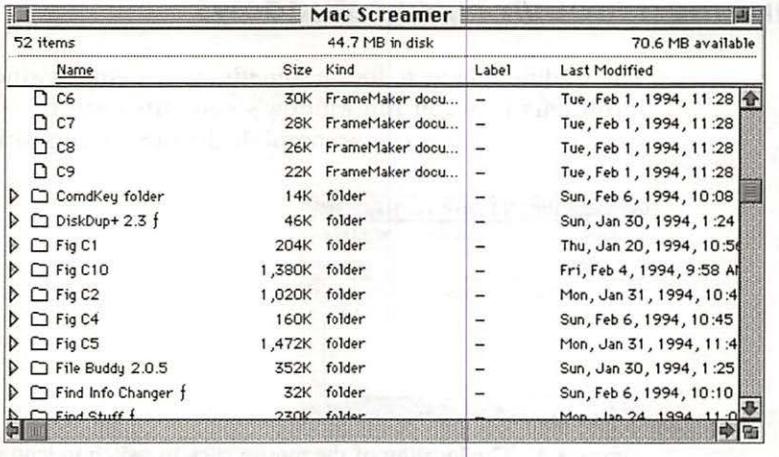


Figure 4.3 A Finder window showing folder sizes

cant delay in the folder size computations after a window is opened or at system startup.

To be completely accurate, computing of folder sizes actually occurs in the background. You therefore needn't wait for folder size computation to be completed before you begin working. Nonetheless, the folder size computation activity slows down any other actions you might choose to take. The bottom line? Don't use "Calculate folder sizes." Feel free to use any other of the Finder's window display options; they don't affect Finder and/or system performance.

Faster List to Icon View Switching

If you look again at the list view in Figure 4.3, you'll notice that the column heading "Name" is underlined, indicating that the window is currently in "View by Name" order. Clicking on any other column heading sorts the window's contents by the clicked heading. However, if you want to go to an icon view (either large icons or small icons), you must go to the View menu and select that option.

For faster switching to either icon view, you can install a shareware system extension called WithAView7. Once the extension is installed in the System folder and the Macintosh restarted, you can switch to the big icon view by clicking in the top left corner of the window, just below the title bar, as in Figure 4.4. If you hold down the Option key while clicking, the window switches to small icon view. To return to a list view, click on the work "items" in the window header.

Whizzing Through Finder Windows

The traditional way to locate something in a Finder window is to use the scroll bars to scroll the window's contents until the item comes into view. However, you can accomplish the same thing without ever taking

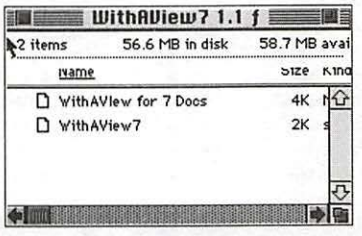


Figure 4.4 The location of the mouse click to switch to icon view when WithAView7 is installed

your hands from the keyboard and reach a file or folder name much faster, especially if the window in which you are working happens to contain many items.

To use the keyboard to reach a file or folder, you must know at least the first letter of the name of the item for which you are searching. Assuming that you do, the process is as follows:

1. Make the window you plan to search the current window by clicking in its header. (The window can be in an icon view or a list view; this technique works with both.)
2. Type the first letter of the file or folder you want to find. The Macintosh operating system scrolls to and highlights the first item whose name starts with the letter you typed. (If no item in the window starts with the letter you typed, the operating system highlights the alphabetically closest item.)
3. Press the Tab key to move to the next item that starts with the letter you typed. Press the ↓ key to move to the next item; press the ↑ key to move to the previous item.
4. Repeat step 3 until you reach the item you want.

By the Way

If you happen to have an extended keyboard (one with the Page up and Page down keys on it), then you can take advantage of the extra keys to scroll Finder windows. The Home key has the same effect as dragging the scroll box all the way to the top of the vertical scroll bar; the End key has the same effect as dragging the scroll box all the way to the bottom of the vertical scroll bar. Pressing the Page up key acts as if you had clicked in the vertical scroll bar above the scroll box; pressing the Page down key acts as if you had clicked in the vertical scroll bar below the scroll box.

Faster Folder Expansion

To quickly expand all the folders in a Finder window, displaying the entire nested folder hierarchy, try the following:

1. Press ⌘-A to select everything in the window.
2. Press ⌘-Option-→ to expand the entire hierarchy.

To collapse the entire hierarchy, press ⌘-Option-←. These key sequences work to expand and collapse any folders that are highlighted in a Finder window.

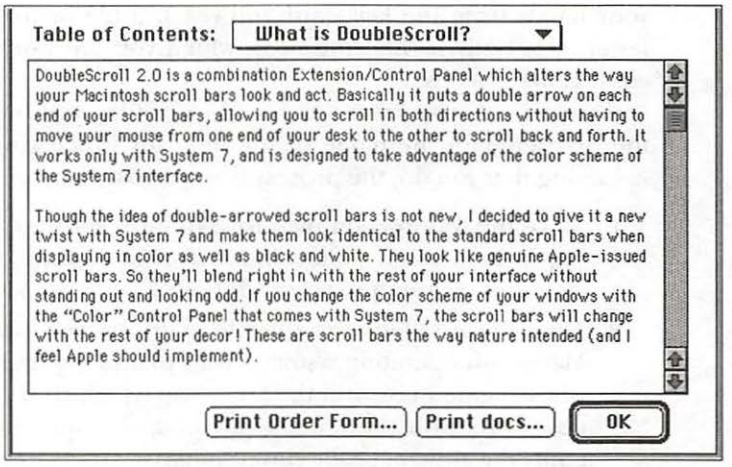


Figure 4.5 A window with double arrows installed by DoubleScroll

Optimizing Scrolling

Imagine that you have a document that fills your entire monitor screen. You scroll down one line by clicking on the down arrow. Then, you realize that you need to see what scrolled off the bottom again. You move the mouse pointer all the way to the top of the window and click the up arrow. If you happen to have a large monitor, then these movements represent a lot of mousing around. It certainly would be faster and more convenient if you had double arrows at each end of the scroll bar, as in Figure 4.5.

The double arrows are provided by a shareware system extension called DoubleScroll. Although it is not necessarily compatible with all

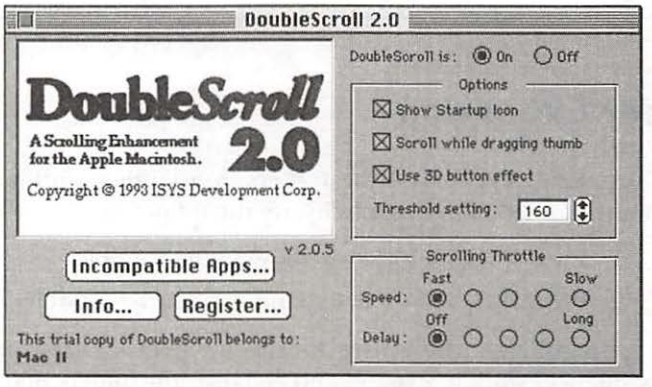


Figure 4.6 The DoubleScroll control panel

Figure 4.7 A file with its name highlighted and boxed for editing

applications, it can make working with large documents on a large monitor much faster and easier. The control panel (Figure 4.6) lets you set up a list of incompatible applications, as well as setting scrolling speed.

Speeding Up File and Folder Renaming

One of the most annoying "features" to make its debut with System 7 was the delay between highlighting a file or folder's name and the appearance of the box around the name indicating that editing of that name was possible (Figure 4.7). There are several ways to deal with the delay. The first, of course, is to live with it (annoying but not fatal). The second is to use ResEdit, the program that lets you tweak the internals of a file's resources, to remove the delay (effective but dangerous if you don't know exactly what you're doing).

There are two safer ways to get rid of the delay. The first is to move the mouse pointer immediately after highlighting the name of the file or folder (effective but a bit of a pain). The second is to use a shareware INIT called SpeedyFinder 7 (easy and effective). If you are running System 7 Pro, be sure you get at least version 1.5.9; earlier versions aren't compatible.

SpeedyFinder 7 provides a useful collection of System 7 enhancements, including elimination of the renaming delay. As you can see in

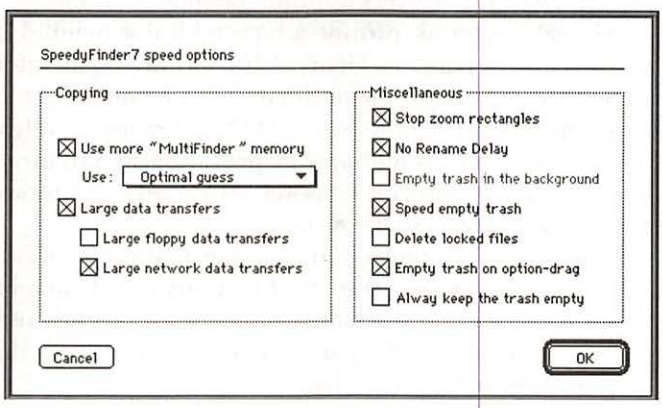


Figure 4.8 SpeedyFinder 7 speed options

Figure 4.8, the "No Rename Delay" check box does the trick. Notice that SpeedyFinder 7 also can be used to speed up copying items and working with the trash.

Simplifying Access to the Menu

Some of the items that appear in the menu don't actually launch applications or open documents. Instead, they open windows with which you must then work. The most frustrating of these is the Control Panels item. Selecting Control Panels from the menu simply makes the Control Panels window open. You still must find the control panel with which you want to work and then double-click on its icon.

A faster, simpler, and more efficient way of working would be to have the individual control panels available directly from the menu, without having to open the Control Panels window. The solution comes in the form of a utility that adds hierarchical capabilities to the menu. As you can see in Figure 4.9, those menu items that have other items nested within them, such as the Control Panels folder, appear with a right-pointing arrow at the right of the item name. In this particular example, the contents of the Control Panels folder appear in a second-level hierarchical menu. Making a choice from the submenu opens the control panel directly.

Notice that the Monitors control panel and the After Dark Files folder also have arrows indicating that they have submenus (a third menu level). The Monitors submenu lets you change the number of colors or shades of gray displayed on the startup monitor without opening the Monitors control panel. The After Dark Files submenu lets you change the module the screen saver After Dark uses without opening the After Dark control panel. The Chooser also has a submenu that you can use to change printer drivers without opening the Chooser.

Several programs provide a hierarchical menu. HAM (configured by the control panel in Figure 4.10) was originally intended to be part of System 7. When Apple decided not to include the hierarchical menu capabilities as part of System 7, HAM's developers released it as a commercial product. In addition to providing hierarchical menus for the control panels and the Chooser, HAM adds a hierarchical menu of recently used items to the menu.

NowMenus, introduced in Chapter 3, also provides a hierarchical menu. Its hierarchical menu functions exactly like HAM's, although NowMenus does not include a submenu of recently used items. This is because it maintains a separate menu of recently used items at the left or right edge of the menu bar.

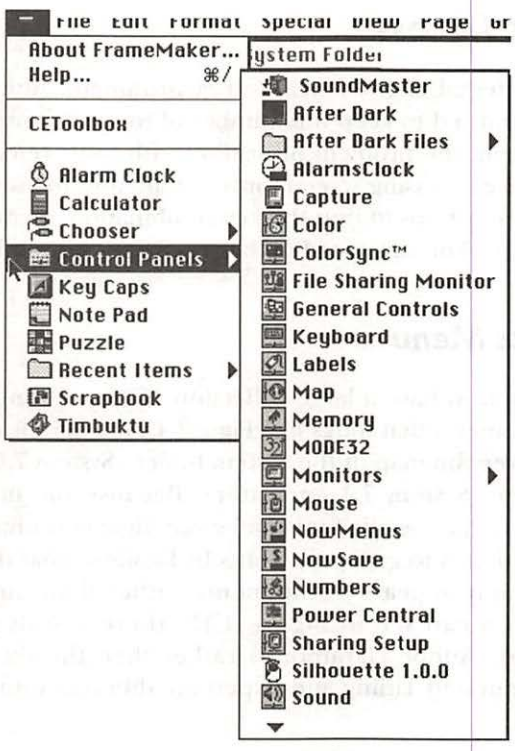


Figure 4.9 A hierarchical menu

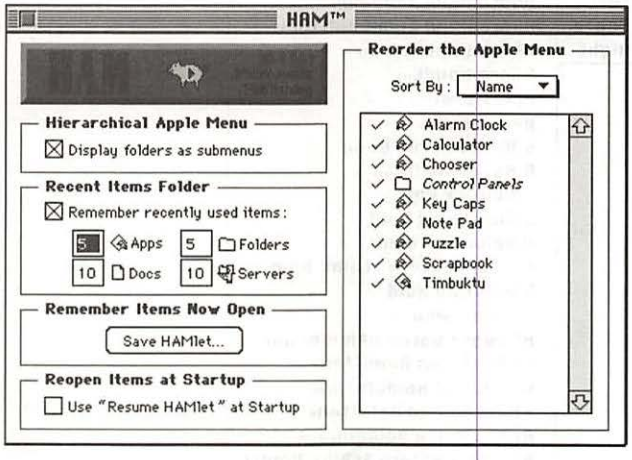


Figure 4.10 Configuring HAM to provide a hierarchical menu

Speeding Up Font Access

Fonts are integral to the Macintosh environment. Although most Mac users have learned to keep the number of fonts they use in a document to a minimum, the problem of dealing with fonts remains. Two major slowdowns are accessing screen fonts in long font menus and the time it takes to use Key Caps to find the key combination needed to access special characters. You can speed up both activities with utility programs.

Optimizing the Fonts Menu

If you happen to have a large collection of screen fonts, then you may have a Font menu that looks like Figure 4.11. There is one entry in the menu for every bit-map in the System folder (System 7.0 and earlier) or Fonts folder (System 7.1 and later). Because the menu is so long, scrolling to find a specific font can be very time consuming.

The solution is to group the fonts by family so that only the name of the font family appears in the menu, rather than the individual bit-maps. As you can see in Figure 4.12, there is only one listing for AGaramond (Adobe Garamond) rather than the six in Figure 4.11. (Adobe Garamond Titling and Expert are different font families.)

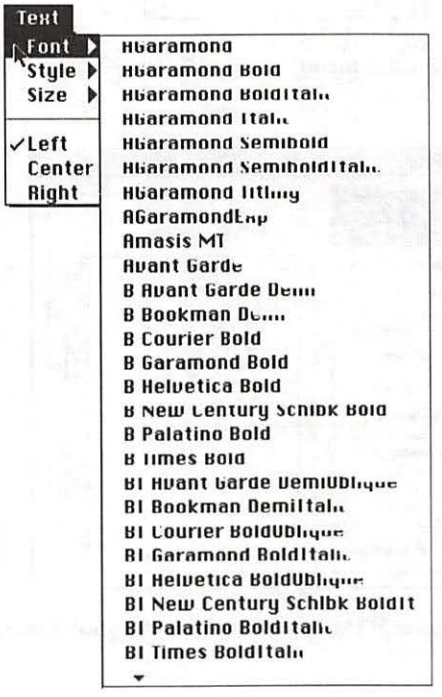


Figure 4.11 An unaligned Font menu

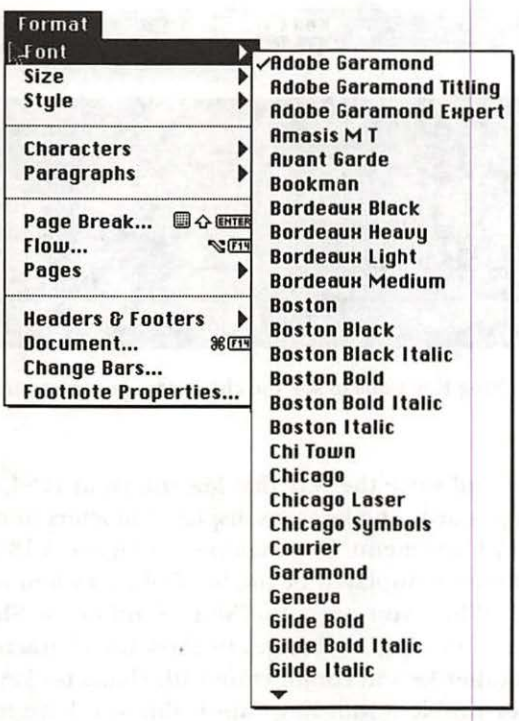


Figure 4.12 An aligned Font menu

Some application programs—particularly desktop publishing programs—perform their own type alignment. You can also add a utility such as Adobe Type Align or Font Harmony. Keep in mind, however, that font alignment utilities can run into problems if you have older font bit-maps on your Macintosh. The way in which fonts are numbered has changed over the history of the Macintosh; it is therefore not uncommon to have different fonts whose numbers are the same or to encounter other font incompatibilities that a font alignment utility can't resolve.

Speeding Access to Special Characters

One of the characteristics that made the Macintosh special from the beginning was its ability to display special characters, including foreign language letters and mathematical symbols. The special characters don't appear on the keyboard; you need to use combinations of keys to generate them.

The typical way of finding out which key combination generates which character is to select Key Caps from the menu. Key Caps, which

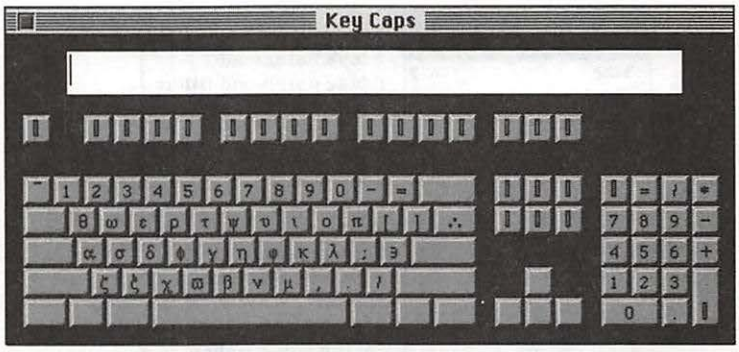


Figure 4.13 Using Key Caps to see the characters generated by specific key presses

has been around since the very first Macintosh in 1984, displays a drawing of the keyboard. The key tops display characters in the font selected from the Key Caps menu. For example, in Figure 4.13 you can see the characters that are displayed by the Symbol font when no modifier keys are pressed. When you press the Shift, Option, or Shift and Option keys, the Key Caps display changes to show the characters produced by pressing modifier keys in conjunction with character keys.

The major problem with Key Caps is that you have to remember the key combination that generates a character when you return to your application. It also can't show you how to generate characters that require a sequence of keypresses (for example, accented characters such as é). To simplify and speed up access to special characters, try using PopChar, a shareware utility that displays a palette of characters from which you can choose.

PopChar installs as a control panel. After you restart your Mac, it places a tiny icon in a corner of the menu bar, as in Figure 4.14. The location of this "hot spot" is handled by the PopChar control panel (Figure 4.15). If you are using System 7 and choose the spot to the left of the Application menu icon, the tiny "P" is replaced with a "P" icon the size of the Application menu icon.

To activate PopChar, you move the mouse pointer to the hot spot and press the mouse buttons. A palette such as the one in Figure 4.16 appears, displaying the characters available in the current font. PopChar identifies the current font without your intervention, relieving you from having to use a menu to select the font. The More spot at the

Figure 4.14 The PopChar hot spot

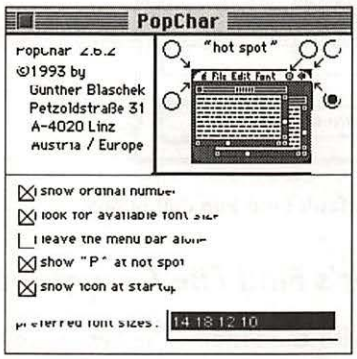


Figure 4.15 The PopChar control panel

upper right of the palette enlarges it to include the accented characters that require two key presses. To insert a character into a document, you simply select it from the palette by moving the mouse pointer over the character with the mouse button pressed. When you release the mouse button, the character is copied into your document. The beauty of this, of course, is that you don't have to remember any arcane key presses.

Faster and More Flexible Finding

As your hard disk stores more and more items, it becomes harder to remember where you put things. Files can be scattered throughout multiple hard disk partitions and nested many folders deep. To help, the Macintosh operating system provides a way to find files and folders. As you will see in this section, the Finder's Find command is somewhat limited in the search criteria it supports. It can also be clumsy to use. You will therefore be introduced to shareware and commercial alternatives that make finding and working with the items you find much easier and efficient.

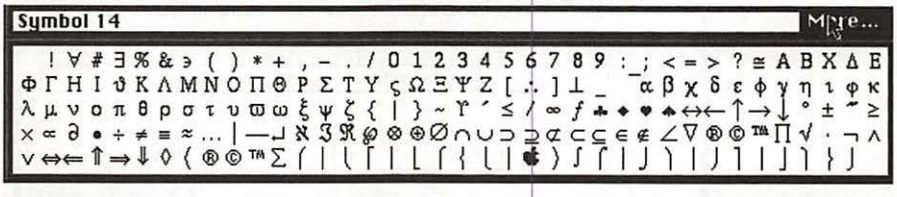


Figure 4.16 A PopChar palette

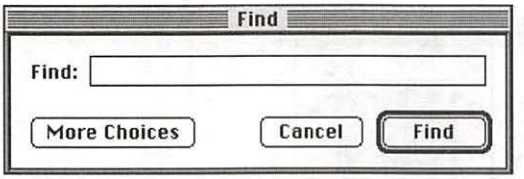


Figure 4.17 The Finder's default Find File dialog box

The Starting Point: The Finder's Find File Command

When you are working with the Finder, the keystroke combination ⌘-F displays the dialog box in Figure 4.17. You type the name of a file or folder you want to find and click the Find button. The Macintosh operating system locates the first item with the name you typed, opening the window in which it is contained if necessary. Then, it stops. To find the next matching item, you press ⌘-G.

If simply searching for a file or folder name that matches isn't flexible enough for you, click the More Choices button. The dialog box expands to that in Figure 4.18. Using the left hand popup menu, you can search for a file or folder by name, type (kind), size, label, lock (files that are locked so they can't be changed or deleted), modification date, or creation date. The middle popup menu varies depending on what is selected to its left. For example, if you are searching by name, you can look for names that match, start with, or contain a value typed in the rectangle at the right. For creation or modification dates, you can search for dates that are equal to, before, or after the date typed in the rectangle at the right.

The Search popup in the middle of the dialog box lets you choose where to search. If you happen to have many disks with many files, you can speed up the search process by restricting the search to a disk where you know an item is located.

By default, the Find File command locates one matching item at a time. However, if you click the "all at once" checkbox, it highlights all matching items, opening windows to display them as necessary. At this

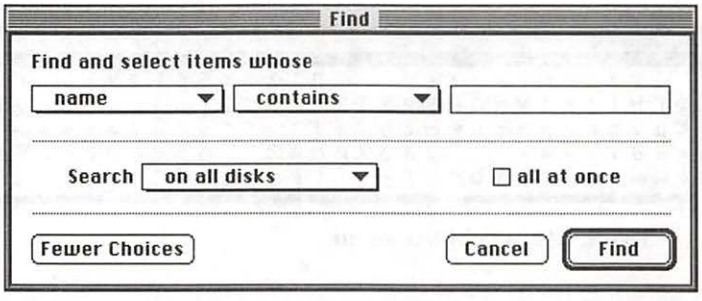


Figure 4.18 The Finder's expanded Find File dialog box

point, you might want to add another search criteria. To do so, leave the found items highlighted. Then, set the Search pop-up to "the selected items." Enter the new search criteria at the top of the dialog box and click the Find button. You can repeat this process as many times as needed to locate the precise items you want.

There are several problems with using the Find Command in this way. First, when files are found, the Finder opens their windows. If a search happens to locate a large number of items, your Desktop can become littered with many open windows, some of which may overlay each other, hiding found items from view. Second, searching on multiple criteria is slow and clumsy. In essence, you must perform a separate search for each criteria, narrowing the found items each time. In addition, notice that all the Find File's search criteria are in the positive (for example, "starts with" or "before"). There's no way to frame search criteria in the negative (for example, "doesn't start with" or "not equal to"). Finally, there's no way to save search criteria. If you have a search that you do repeatedly, you'll have to recreate the search in the Find File dialog box each time you look for the needed items. The solution is to look for an add-on product that enhances file and folder finding, and in particular, makes it easier to search using multiple criteria.

Finding with File Buddy

File Buddy is a shareware file management utility (an application, not an INIT) that, among other things, provides file finding that is more flexible than that provided by the Finder. (File Buddy is included on the disk that comes with this book. Please register the shareware if you intend to use it beyond a trial period.)

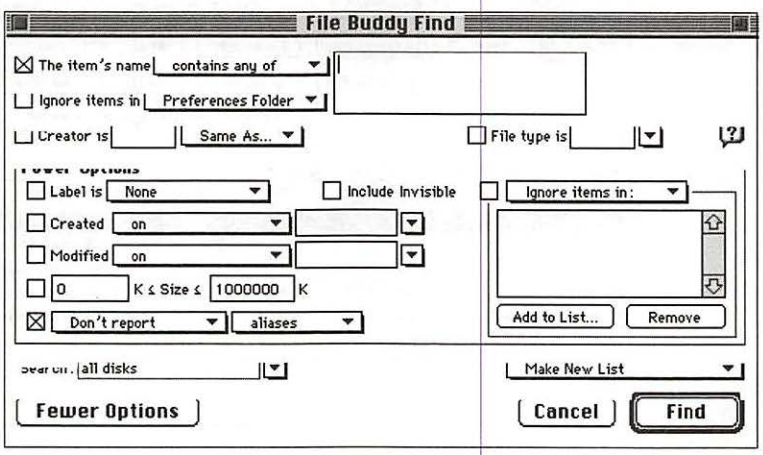


Figure 4.19 File Buddy's file finding capabilities

Figure 4.20 File Buddy search operators

As you can see in Figure 4.19, File Buddy supports multiple types of criteria in the same search request. You can, for example, search by name, label, and creation date all at the same time. File Buddy also can exclude specific folders or files from a search. Its search criteria include negatives such as those in Figure 4.20. It also allows you to save search criteria so they can be used again.

The items that File Buddy finds are listed in a File Buddy window, as in Figure 4.21. The windows in which the items are located are not opened automatically. To get to a file or folder's location, you highlight the item and click the Show button. From the File Buddy window you can also create an alias for an item, copy an item, move it to the Desktop, or throw it in the trash. File Buddy will also open an item's Get Info dialog box (the Finder Info button) or display a special File Buddy Info window. As you can see in Figure 4.22, this dialog box not only provides file information, but lets you modify characteristics of the file such as its type, creator, creation date, and last modification date.

File Buddy has some System 7 drag-and-drop capabilities. By default,

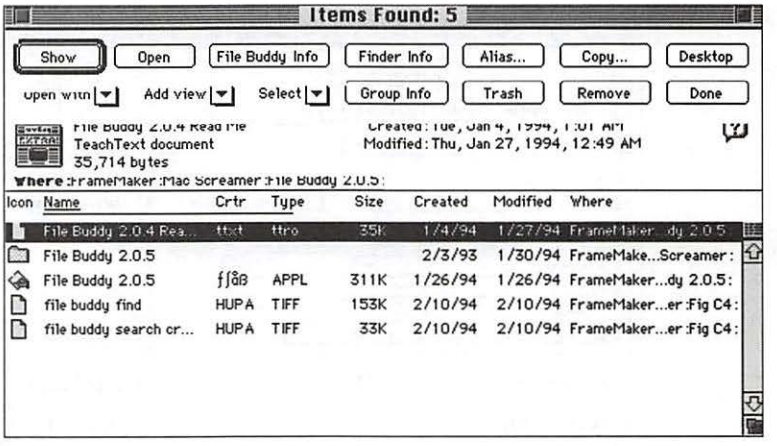


Figure 4.21 The result of a File Buddy search

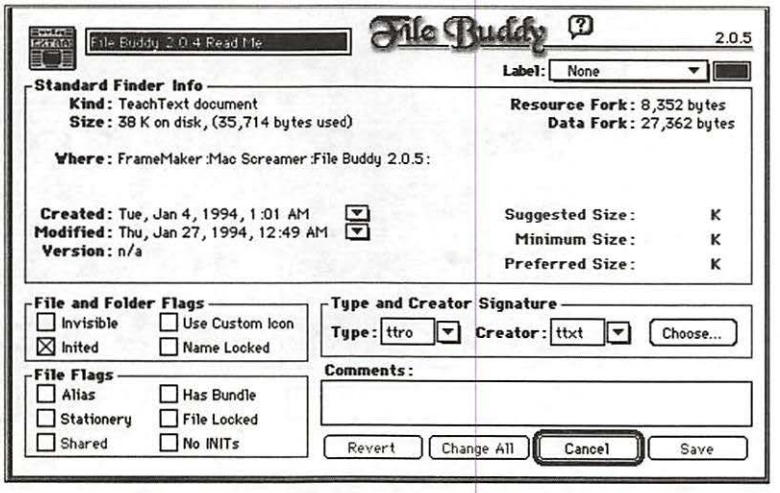


Figure 4.22 The File Buddy Info dialog box

if you drag an item onto the File Buddy application icon, File Buddy opens the item's File Buddy Information dialog box. By combining modifier keys (shift, control, option, command) with the drag-and-drop operation, File Buddy will perform a variety of operations automatically.

The one limitation to File Buddy's file finding is that search criteria can have only one criteria of each kind. For example, you can apply only one condition to the name of a file and one condition to the size of a file within the same search criteria. However, this restriction is present in all the find utilities discussed.

Finding with UltraFind

UltraFind, another shareware application, also provides multiple types of criteria in a single search. (Like File Buddy, there can be only one condition of a given type in any search.) As you can see in Figure 4.23, the search criteria don't actually appear on the UltraFind screen. Instead, a selected criteria is highlighted in the lower right corner of its button. The criteria themselves are entered in individual dialog boxes. Search criteria can be saved for later use.

In addition to searching for file characteristics, UltraFind can search *inside* a file. That means it can search through the contents of a document, looking for text that matches up to three phrases (see Figure 4.24). This type of search is not necessarily very fast, but it can help you, for example, locate all the memos in which you discussed a particular project.

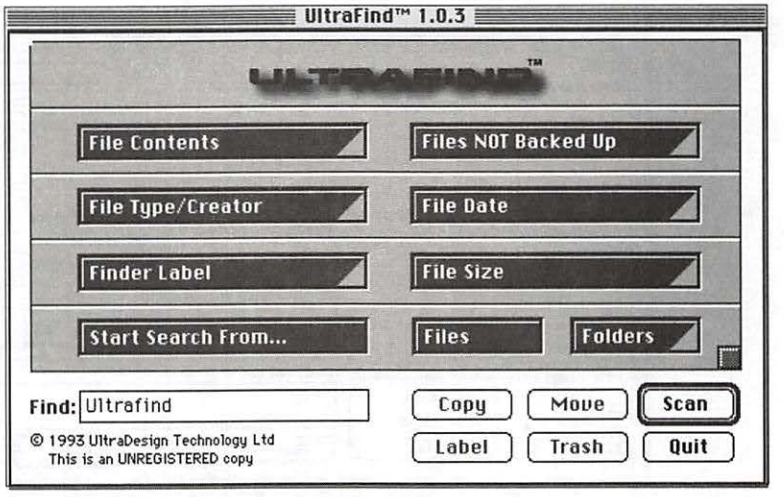


Figure 4.23 UltraFind's file searching

UltraFind places the result of a search in a listing window (for example, Figure 4.25). Once a file is highlighted in the list, you can copy it, move it, label it, or trash it. You can also take advantage of UltraFind's Copyright-It feature. This allows you to place copyright information in an item's Get Info dialog box (see Figure 4.26).

Finding with ProFiles

ProFiles is a commercial product that provides more flexibility in assembling search criteria than either of the shareware programs about which you have just read. It also provides file compression using StuffIt and

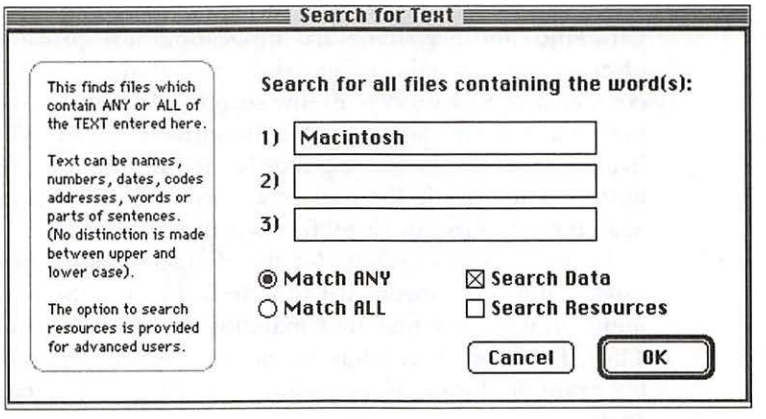


Figure 4.24 Using UltraFind to search for text inside a file

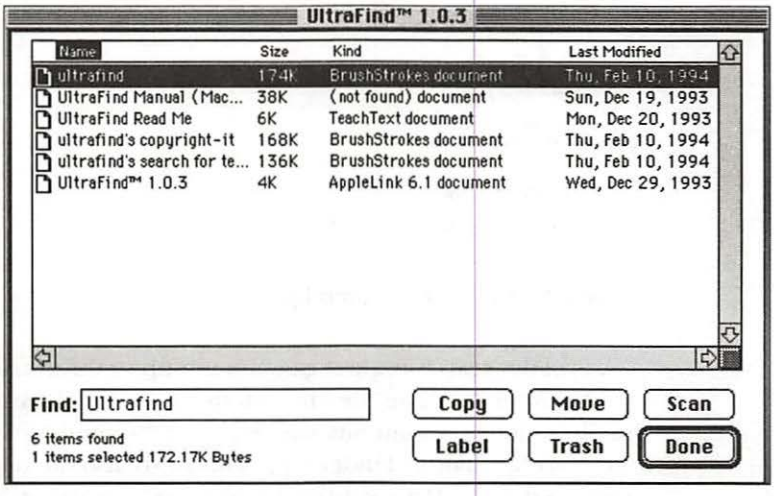


Figure 4.25 The result of an UltraFind search

can trigger compression using AutoDoubler or DiskDoubler, should you have either program installed on your system. In addition, ProFiles isn't restricted to disks mounted on your Macintosh; it can search network disk volumes as well.

ProFiles installs as both a control panel and an application. The control panel (Figure 4.27) contains two radio buttons that determine whether a press of ⌘-F launches the Finder's Find File command or ProFiles. The bulk of ProFiles's capabilities are handled by the application.

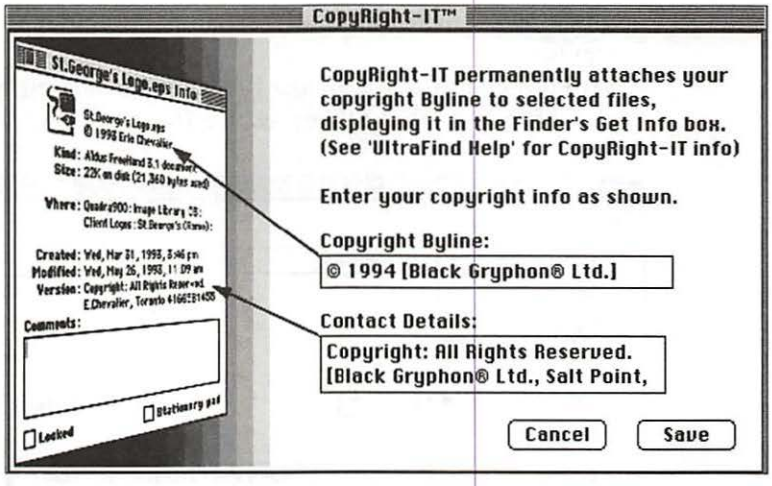


Figure 4.26 Using UltraFind to attach a copyright notice to a file or folder's Get Info dialog box

Figure 4.27 The ProFiles control panel

A ProFiles search request can contain up to three criteria of any type (see Figure 4.28). The file characteristics on which you search include the file's name, its contents (see Figure 4.29), and kind. A file's kind is a bit broader than its Finder type. File kinds also include things such as orphaned files (those for which a creator can't be found) and orphaned aliases (those for which the original file or folder can't be found). Search criteria can be saved for reuse.

Like the two shareware programs you have seen, ProFiles displays the result of a search in a window (for example, Figure 4.30). The buttons across the top of the window control operations that can be performed on files, including copying, moving, creating aliases, and trashing files. Files can also be compressed, decompressed, and printed. Should you choose, you can explicitly add items to the file list. When the list is complete, you can save it for reuse. (This saves the list of files, not the files themselves.)

The ProFiles list window works much like a Finder window. Double-clicking on an item in the list opens the item; clicking on the right-pointing arrow next to a folder expands the folder so you can see its contents.

ProFiles can also *synchronize* files. Synchronizing means updating copies of files so that all copies are the most recent. For example,

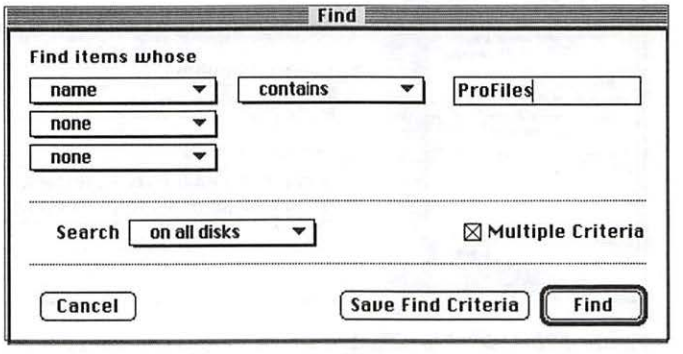


Figure 4.28 Creating a ProFiles find request

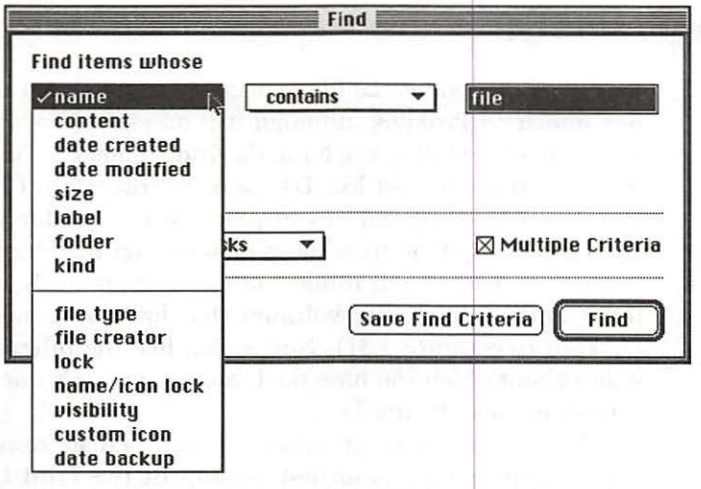


Figure 4.29 File characteristics for a ProFiles search

assume that you have copied a document from a network server to your Macintosh and modified that document. Synchronizing will update the version on the server so that it matches your newer version. By the same token, should another user modify the document on the server, synchronizing will update your local copy so that it matches the more recent server version.

If you are running System 7 Pro, you can choose to install an INIT that enables ProFiles's drag-and-drop capabilities. With drag and drop enabled, you can move and copy files by dragging them from the file list window to their new location.

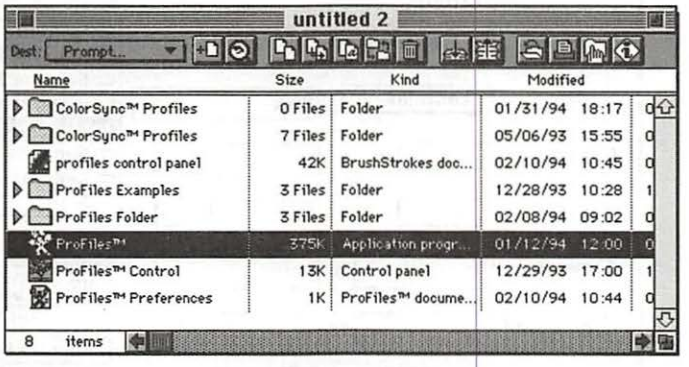


Figure 4.30 The result of a ProFiles search

Finding with DiskTop

DiskTop is a commercial file management utility that provides capabilities similar to ProFiles, although it is accessed in a different manner. Rather than replacing the Finder's Find command, DiskTop is reached from the menu, just like DT Launch, covered in Chapter 3. To use DiskTop's find capabilities in place of the Finder's, you therefore choose DiskTop Find from the menu rather than using ⌘-F.

DiskTop can search using multiple criteria on both local disk volumes and network disk volumes that have been mounted on your Desktop (see Figure 4.31). Notice that like the other file finding programs about which you have read, you can use only one search value for each of the search criteria.

While a search is in progress, the intermediate results of a DiskTop search appear in a modified version of the Find Criteria window (Figure 4.32). The partially filled circle at the right of the window (underneath the list of disks being searched) indicates how much of the search has been completed. The search can be stopped at any time by pressing a key and clicking the mouse button. You can then examine items already found, continue the search, or cancel the search.

By the Way

Although DiskTop itself cannot search inside a file, the product does ship with a companion utility, GOfer, that provides flexible searching of the contents of files.

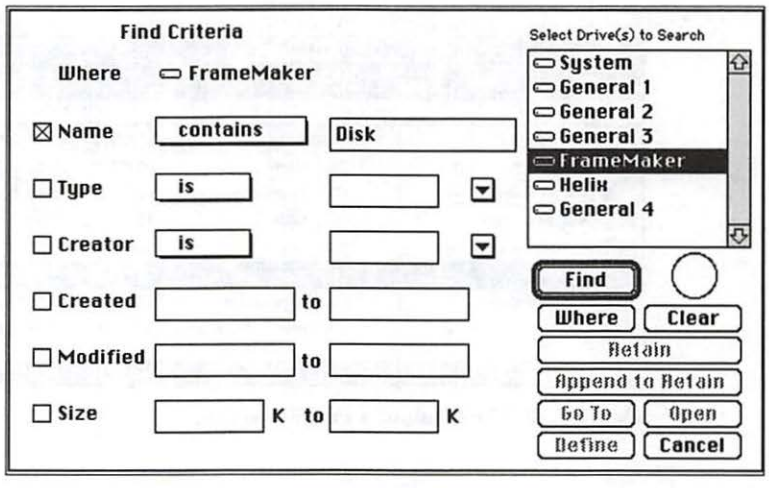


Figure 4.31 Specifying search criteria for a DiskTop search

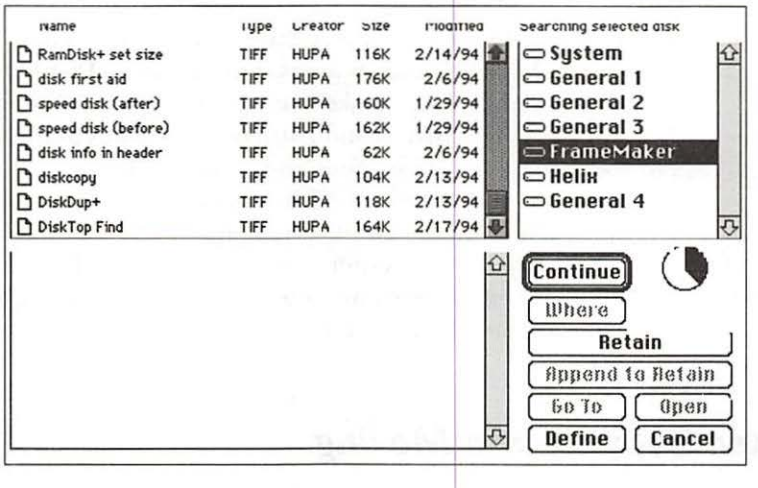


Figure 4.32 A DiskTop search in progress

The items in a completed search are transferred to a file list window (for example, Figure 4.33). By default, the window displays information similar to what you see in a Finder list view. However, you can choose to see a more technical view of the items found (including item types and creators) as well as create custom views that include just the data you want to see. Items in the file list can be opened by double-clicking on

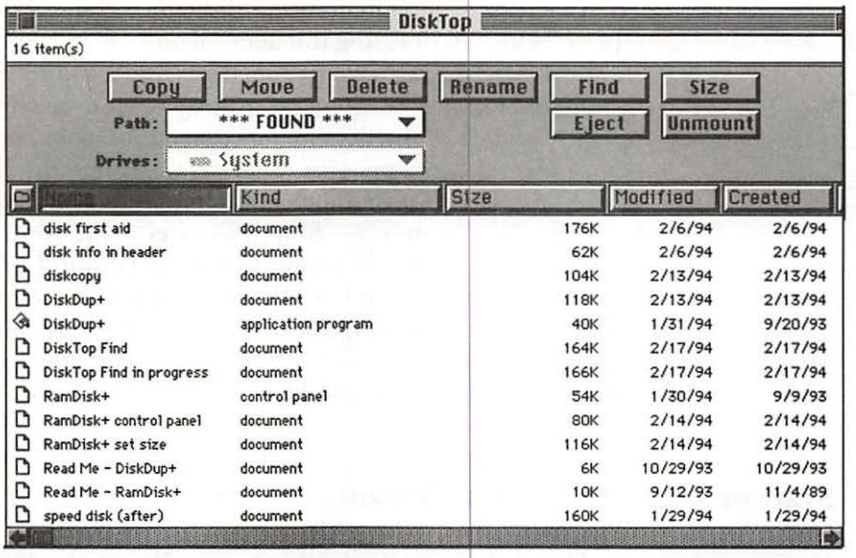


Figure 4.33 A DiskTop file list

the item's icon, copied, moved, renamed, and deleted. The eject and unmount operations affect disks only. DiskTop also adds its own Get Info dialog box, which is accessible only while DiskTop is running.

DiskTop can also make it easier to navigate through a complex file hierarchy. The Drives: and Path: popup menus in the file list window let you choose a disk volume and folder within that disk volume whose contents you want to view. This avoids the need to open and close multiple Finder windows while threading through nested folders.

DiskTop's search criteria cannot be saved. However, the contents of a file list can be saved as a text file for modification by any application that can read plain text files.

Faster Copying and Moving

Two of the most common Finder operations are copying and moving files and folders. Although superficially intuitive, what happens when you drag a file or folder icon from one place to another depends on whether the source and the destination are on the same disk volume. To copy an item from one disk volume to another, you drag the item's icon to the location where you want the copy to appear; to move an item from one disk volume to another, you must first copy the item and then delete the original. However, if you drag an item from one location to another within the same volume, the item is moved, not copied. To make a copy of an item within the same volume, you hold down the Option key when dragging the item's icon.

There are several ways to speed up and simplify file copying and moving operations. The general strategy behind speeding up copying is to read as much of the item being copied into main memory as possible before writing the copy. This minimizes the time the disk drive spends looking for data. (Further details about minimizing disk access time can be found in Chapter 5.) Simplifying copying and moving usually involves such things as copying in the background, copying only files that have been modified, and moving between volumes in one step. These speedup and simplification techniques are supplied by utility programs. There is also software that can speed copying the entire contents of one floppy onto another.

System 7's Background Copying

Wouldn't it be nice if you could copy files in the background rather than having to wait for the Finder to complete a lengthy copy operation? If you set things up properly, you can get System 7 to copy in the

background. The problem you need to get around, is that once copying starts, there's no way to gain access to the Desktop to launch another application.

The trick to System 7 background copying is to launch the application with which you want to work *before* you begin copying. You must also be sure that a window from that application will be visible once copying starts. Begin copying. Then click on a window from the application to switch to it.

Faster and Easier Copying: CopyDoubler

CopyDoubler is a control panel (Figure 4.34) that is available as a standalone product or as part of the AutoDoubler package. (You can find details about AutoDoubler's disk compression capabilities in Chapter 5.) In some cases, CopyDoubler can literally double copying speed. In addition, it supports a "Fast Replace option" (Figure 4.35) that lets you copy only those files or folders that have changed. This is a particularly useful feature when you're backing up to disk media (for example, to a floppy disk or removable hard disk cartridge).

Faster Copying: SpeedyFinder 7

If you look back at Figure 4.8, you can see that half of SpeedyFinder 7's speed options relate to copying files. Checking the "Use more MultiFinder memory" check box instructs SpeedyFinder 7 to use as much memory as it can when copying. The Large Data Transfers check boxes instruct SpeedyFinder 7 to read and write data in blocks that are as large as possible.

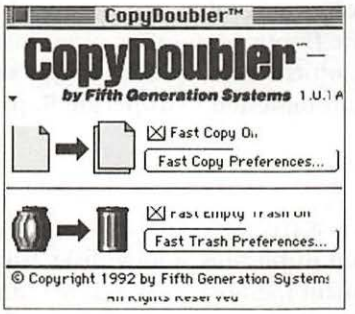


Figure 4.34 The CopyDoubler control panel

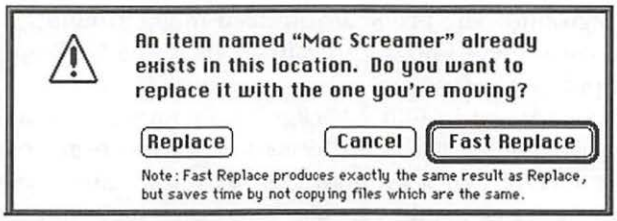


Figure 4.35 CopyDoubler's Fast Replace

Easier Copying and Moving: File Finding Utilities

When looking for utilities to make copying and moving items easier, consider the same programs used to make file finding easier. File Buddy can copy any item it finds; UltraFind both copies and moves items. To do either, you highlight the item to be moved/copied and click the appropriate button. You then use a Save File dialog box to indicate where you want the item placed. The advantage to this approach is that you don't have to thread your way through nested folders to locate the source icon and the destination window. You also avoid having to manipulate windows so that both the source and the destination are visible. If you happen to have more than one monitor, you can also avoid a long, awkward drag operation.

ProFiles also supports moving and copying items from its file lists. You can use the same button click/Save File dialog box technique as that required by File Buddy or UltraFind. However, as mentioned earlier, if you are running System 7 Pro, you can drag icons from a ProFiles file list to copy or move the items. Whether an item is copied or moved when its icon is dragged from a ProFiles window depends on which modifier key is held down during the drag.

Faster Floppy Copying

Most of today's Macintoshes have only one floppy disk drive. Copying the entire contents of one floppy to another often means many annoying disk swaps, a process which is also excruciatingly slow. The solution is to use a utility specifically designed to duplicate floppy disks.

DiskCopy

DiskCopy (Figure 4.36) is a freeware application distributed by Apple Computer. It formats and duplicates floppy disks from an image of a master floppy stored in main memory. Disk images can be saved as disk files so that you can use them at a later date to create floppies.

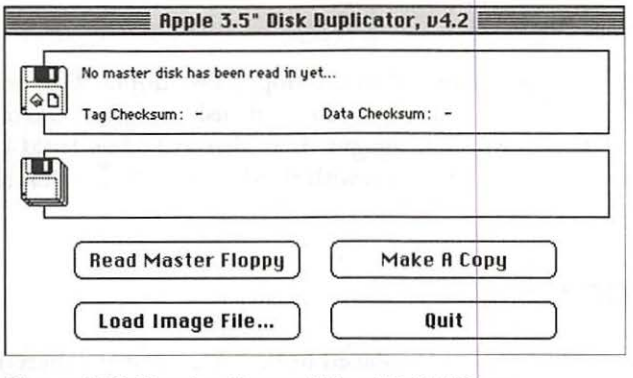


Figure 4.36 Copying floppy disks with DiskCopy

DiskCopy is very fast. However, it is incompatible with some hardware upgrades, including some CPU accelerators (replacement CPUs). If you find that DiskCopy doesn't work on your Macintosh, consider a commercial or shareware alternative.

Floppier

Floppier (Figure 4.37) is a commercial floppy disk duplication utility sold as part of the Norton Utilities package. Like DiskCopy, it formats and duplicates floppy disks from a master disk image stored in main memory. Floppier disk images can also be stored on disk for later use. Although Floppier is considerably slower than DiskCopy, it is compatible with most hardware upgrades.

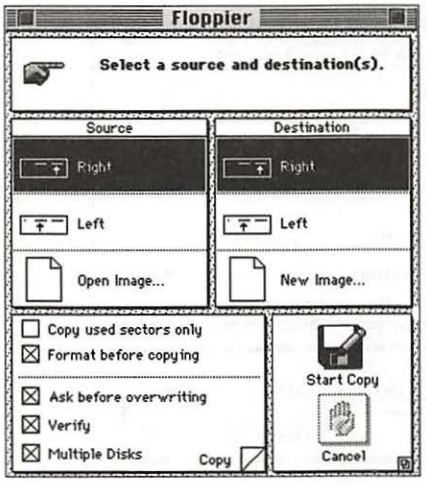


Figure 4.37 Copying a floppy disk with Floppier

DiskDup+

The shareware entrant in the floppy disk duplication arena is DiskDup+ (Figure 4.38). DiskDup+ can read disk images created by DiskCopy as well as its own disk images. It is also as fast as DiskCopy and doesn't appear to have problems with third-party CPU accelerators.

Faster Deleting

Under System 7, files placed in the Trash remain there until you explicitly empty the Trash. Each time you choose Empty Trash from the Special menu, the operating system asks you if you really want to delete the files (Figure 4.39). The process of choosing a menu option and then responding to a dialog box can become very tedious when all you want to do is get rid of something! There are, however, several utilities that can make deleting files and folders easier and faster.

Getting Rid of the Empty Trash Warning

The first thing you might want to do is get rid of that dialog box that asks you to confirm every delete operation. To do so, select the Trash icon and open its Get Info dialog box (Figure 4.40). Remove the check from the "Warn before emptying" check box and close the dialog box. The operating system will then empty the trash immediately after you choose Empty Trash from the Special menu.

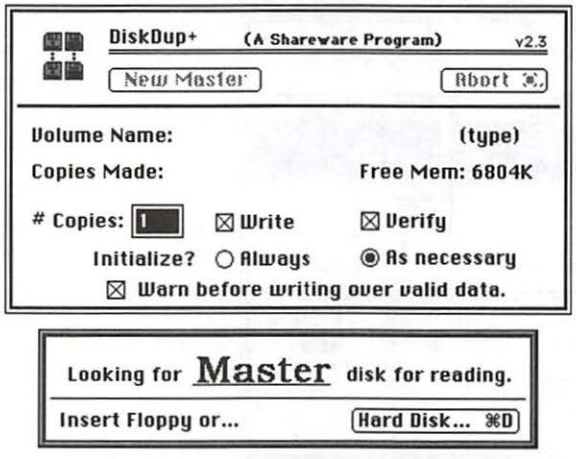


Figure 4.38 Copying a floppy disk with DiskDup+

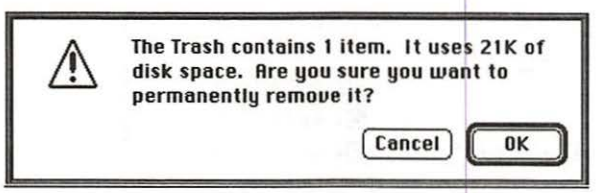


Figure 4.39 The Finder's default Empty Trash warning

Avoiding the Empty Trash Menu Choice

The second thing you might want to do to speed up working with the Trash is to find a way to avoid having to choose Empty Trash from the Special menu. There are several ways to do so:

- ***Use SpeedyFinder 7:*** SpeedyFinder 7's speed options (Figure 4.8) can enable automatic emptying of the Trash when the Option key is held down while an item is dragged to the Trash. SpeedyFinder 7 will also install ⌘-T as a command key equivalent for the Empty Trash menu option (see Figure 4.41).
- ***Use one of the file finding utilities discussed earlier in this chapter:*** File Buddy, UltraFind, and ProFiles will all move items to the Trash. File Buddy and ProFiles can also empty the trash.

Easier File Saving and Opening: Enlarging the Save File and Open File Dialog Boxes

Although the Macintosh lets you create file and folder names up to 31 characters long, the file/folder list in the standard Save File and Open File dialog boxes isn't wide enough to show all of a long name. If you happen to have two or more files/folders that have similar names, you

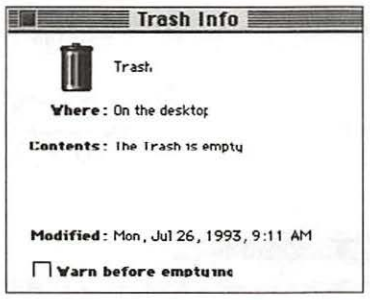


Figure 4.40 The Trash's Get Info dialog box

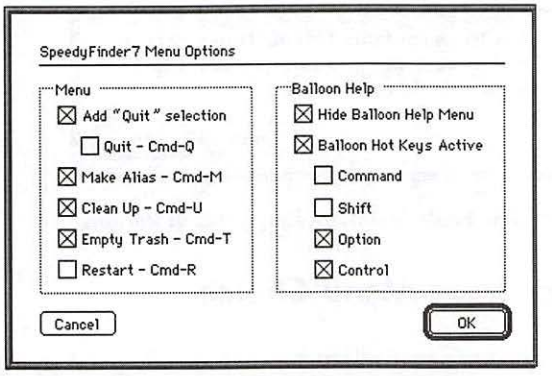


Figure 4.41 SpeedyFinder 7's menu options

may not be able to tell them apart. The solution is to use a utility, such as Open-wide, that makes the dialog boxes wider. As you can see in Figure 4.42, the wider dialog box has space to display an entire file or folder name.

Open-wide gives you control over exactly how wide the Save File and Open File dialog boxes become (see Figure 4.43). Both the size of the file/folder list and the size of the dialog box can be set by entering dimensions in pixels or by dragging a rectangle on the screen after clicking the "Drag" buttons in the dialog box in Figure 4.43.

Faster File Saving: Rebuilding the Desktop Files

The Desktop Files (Desktop DB and Desktop DF) are invisible files that, among other things, keep track of file icons and the comments you

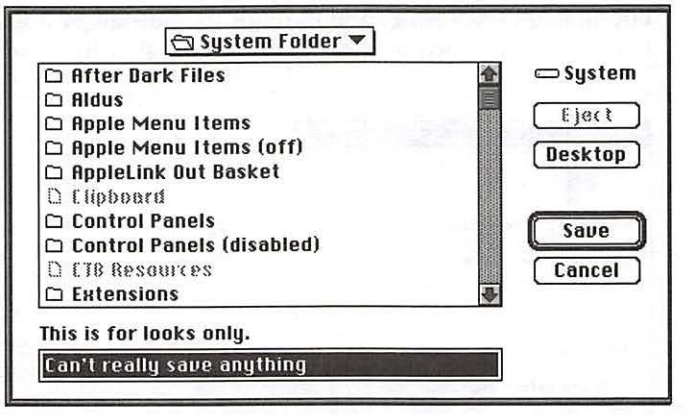


Figure 4.42 A Save File dialog that has been made wider with Open-wide

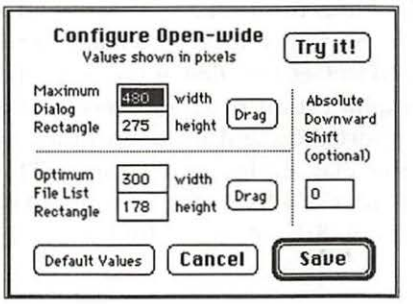


Figure 4.43 Determining the size of Save File and Open File dialog boxes

enter in Get Info dialog boxes. As you save and delete files, the Desktop files can become large, increasing the amount of time it takes to save files. You may also find that you lose custom icons (applications and documents appear with the plain, default icons).

The solution is to rebuild the desktop file. The Macintosh operating system provides two ways to do so:

- Hold down the ⌘ and Option keys when starting or restarting your Macintosh.
- Under System 7, make the Finder the current application and press 1-Option-Esc. This is a forced quit (forcing an application to quit). The dialog box in Figure 4.44 appears. Click the Force Quit button and hold down the ⌘ and Option keys while the Finder reloads.

You will be asked to confirm rebuilding the Desktop for each mounted disk volume. The more files stored on a disk, the longer rebuilding can take, so be patient.

In most cases, you should rebuild the Desktop approximately once a month. If using the key sequences discussed earlier makes you a bit nervous, consider using a utility program that simplifies the process. File Buddy, for example, has a menu option for rebuilding the Desktop. Open Sesame!, about which you will read in Chapter 10, can automate rebuilding so that it happens at some interval without your needing to remember.

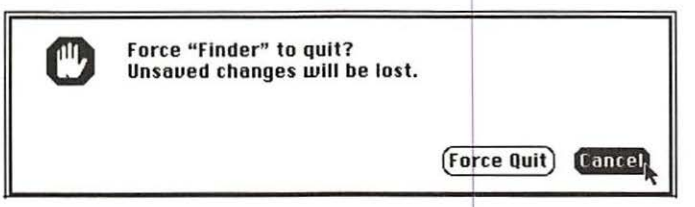


Figure 4.44 The Force Quit dialog box

Before you go rebuilding the Desktop, you should know that there are a couple of problems when you do so. First, you will lose any comments you have entered in Get Info dialog boxes. Perhaps more importantly, an alias to an application program stored on another volume loses its ability to support drag and drop. In other words, when you drag a file on top of the alias, nothing will happen. This is apparently a bug in the System 7 Finder. To fix it, you can use Alias Dragon, a freeware program that scans a disk volume or folder and fixes any problem aliases it finds.

5

Optimizing Hard Disks

A hard disk's rated transfer speed is really an optimal speed. As files are created, modified, and deleted over time, performance degrades, primarily because of the layout of the files on the disk. This chapter looks at why hard disk transfer performance degrades and what you can do about it. Although you can't change the physical parameters that govern how fast your disk and its cable can push data to and from the computer, you can use software to ensure that you get every possible bit of speed that your drive can give you.

Disk Fragmentation

To understand what happens to a hard disk as files are modified, you need to know something about how files are organized on a disk surface. Inside most of today's hard disks is a stack of metal disks, each of which is called a *platter*. Data are usually written to both the top and bottom of every platter, providing two surfaces for storing data. (In some disk drives, the top surface of the top platter and the bottom surface of the bottom platter are not used.)

Each surface on which data are written is divided into a set of concentric circles, called *tracks* (see Figure 5.1). The same track on all platters in a disk drive is known as a *cylinder*. Data are written to and read from a disk surface by a *read/write head*, which moves from track to track as needed; there is one read/write head for each surface on which data are stored. Because moving the read/write head assembly is a mechani-

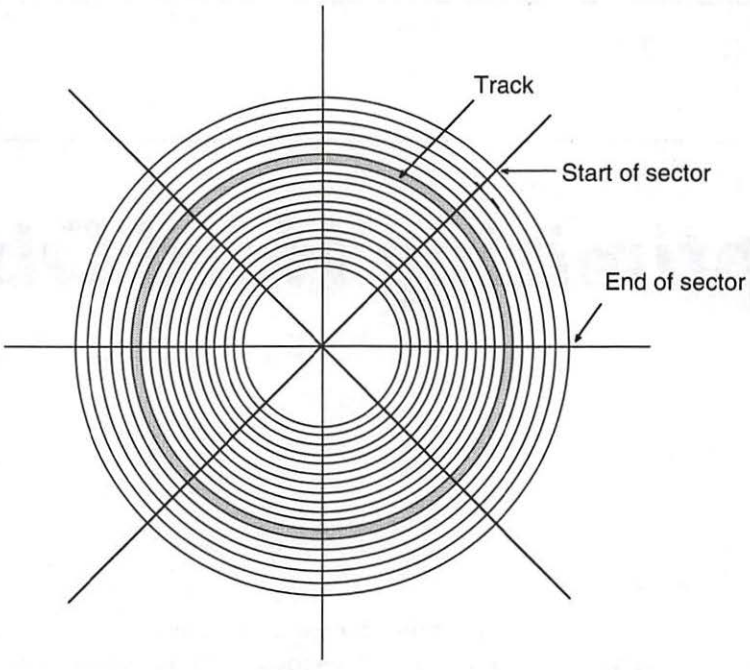


Figure 5.1 The organization of a disk platter

cal movement, it is the slowest part of transferring data between a disk drive and a computer. It is therefore faster to write data to tracks in the same cylinder rather than to multiple tracks on the same surface. If a file is too big to fit on one track, the remainder of the file is likely to be written on the same track on another surface, rather than in another track on the same surface. A file spills into the next cylinder only when there aren't enough sectors in a cylinder to contain the entire file.

By the Way

Many computer literacy textbooks draw an analogy between the tracks on a disk and the track on a vinyl record. The idea is to emphasize the difference between a tape, which is accessed sequentially, and a disk, which can be accessed randomly. However, a vinyl record has one spiral track, while computer disks have many concentric tracks, nested one within the other.

In addition to being divided into tracks, the surface of a disk is divided into pie-shaped *sectors*. Although a real disk has many more tracks and sectors, Figure 5.1 shows the general organization of a single disk surface.

Each sector is divided into units called blocks. A block can be as large as a sector, or it may be smaller. (Block size is set when a disk is formatted and depends on the size of a given disk partition.) When a file is created, data are written starting at the beginning of a block in a single track. If the file doesn't fit in one block, a new block is allocated to the file. Whenever possible, a file is written to contiguous blocks (blocks next to one another). This helps to speed access to the file by reducing the amount of movement of both the read/write head assembly and the disk platter assembly needed to reach all the data in a file.

By the Way

A disk block is also known as an *extent*.

Eventually, after files have been created, modified, and deleted, there is no longer space to write a file to contiguous sectors on the same track and/or cylinder. In fact, the blocks that make up a file can end up scattered all over the disk drive. Opening or saving a file then takes more time because the read/write head assembly must make many movements to reach each part of the file. This condition is known as *disk fragmentation*.

The solution to disk fragmentation is to rewrite the files on a disk so that as many as possible occupy contiguous blocks. You will be introduced to a number of software packages that can defragment a hard disk later in this chapter.

Disk Defragmentation Versus Disk Optimization

Defragmenting a disk can help speed up access to the contents of a disk. However, you can gain additional speed improvements and cut down on the amount of fragmentation that occurs by *optimizing* a disk. Disk optimizing is based on the idea that there are certain types of files that are rarely modified, in particular, system software and application programs. These files are placed together on the inner cylinders of the disk (the cylinders nearest to the center hole). In most cases, system software is placed on the innermost cylinders, followed by application programs.

Files that are often modified (for example, document files and the Desktop files) are placed toward the outer cylinders of the disk. Because system software and application programs are stored in contiguous sectors, access to them is as fast as possible. What fragmentation does occur occurs in the free space and space occupied by frequently

modified files. Therefore, even if document files and the Desktop files are spread over more than one cylinder, the sectors are contained in a smaller area, reducing the amount of read/write head movement needed to access those file.

Free space can be gathered at the very outside of a disk or it can be gathered in the middle cylinders. Regardless of which type of placement is used, coalescing all the free space into one contiguous block helps reduce new fragmentation because most new files can be written to contiguous blocks.

As you will see shortly, disk defragmentation is a different operation from disk optimization. You can defragment a disk containing open files (for example, your startup partition); however, you can't optimize a disk with open files. This presents a bit of problem if you want to optimize your startup partition. The solution is to prepare a special floppy disk from which you can boot your computer and perform the optimization.

Preparing a Floppy Startup Disk for System Disk Optimization

Because the files that make up the disk-based portion of the Macintosh operating system have grown so large, booting a Macintosh from a floppy disk isn't as easy to do as it was prior to System 6. You must therefore pay special attention to the contents of a bootable floppy if the files you need are going to fit.

If you don't have a SuperDrive (the 1.44-Mb disk drives that read high-density disks), then your bootable floppy must use System 6. (There's simply no way to make a System 7 installation fit on an 800K disk.) Place the following files on the 800-K disk:

- System 6.0.7. (You may be able to use an earlier version, but be sure to check the disk optimization software you are using for compatibility.)
- Finder 6.0.7. (This file, along with System 6.0.7, can be found on the System Tools disk.)
- Your disk optimization application.

If you do have a SuperDrive, then you may be able to use System 7 on your bootable floppy. (If your disk optimization program takes up too much room, you'll need to go back to System 6.0.7.) Place the following files on a 1.44- Mb floppy:

- The entire contents of the System Folder from the Disk Tools disk. (This takes up 1.1 Mb of space, more than 800 K of which is consumed by the System file.)

- Your disk optimization application. (Your program will need to be less than 300 K in size. Fortunately, most disk optimizers are very small.)

Disk Defragmentation and Optimization Software

There are many programs that can defragment and/or optimize your hard disk, including Norton Speed Disk (part of the Norton Utilities package) and Disk Express II (sold individually or as part of the Power Utilities package). This section introduces you to both packages.

By the Way

When shopping, be sure to remember that disk defragmentation and optimization are different operations and that not all packages provide both.

Norton Speed Disk

Norton Speed Disk is a stand-alone application program that provides both disk defragmentation and optimization. The advantage to its being a stand-alone application is that it doesn't add to INIT conflict problems. On the other hand, it is up to you to remember to check your disks to determine whether they need defragmenting and/or optimization.

The first step in defragmenting and/or optimization is to check the disk to determine the amount of existing fragmentation. In Figure 5.2, for example, you can see a disk map produced by the "Check Drive" option. In this particular case, the system files, represented by the dark band at the top of the disk map, are already stored on the innermost cylinders. The white space represents unused disk space. Applications and document files are scattered throughout the rest of the disk volume; the Desktop files (the thin black line at the very bottom left of the disk map) are already on the outermost cylinders.

By the Way

Norton Speed Disk is only 151 K in size. It will therefore fit on a 1.44-Mb floppy disk along with a bare bones System 7 System Folder.

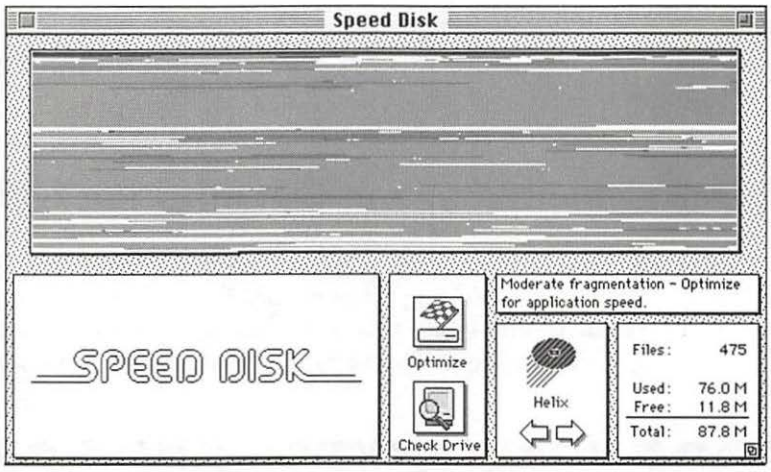


Figure 5.2 A map of a moderately fragmented disk partition

Speed Disk can defragment any hard disk volume. However, as mentioned earlier, it cannot optimize a volume with open files. If you click the Optimize button in an attempt to do so, Speed Disk offers to defragment (see Figure 5.3).

Optimizing a disk volume can take a bit of time because most of the files need to be rewritten. (The greater the amount of files stored on the disk and the greater the degree of fragmentation, the longer the process will take.)

After optimizing, the disk map reflects the new location of the files. As you can see in Figure 5.4, application files (represented by the moderately dark band at the top of the disk map) are all together, followed by document files (the large gray block below the application files). All the white space appears at the bottom of the disk map, indicating that unused space is all at the outer cylinders of the disk.

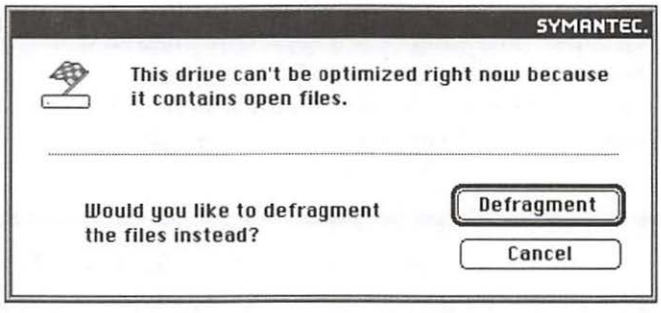


Figure 5.3 A warning that a disk volume with open files can't be optimized

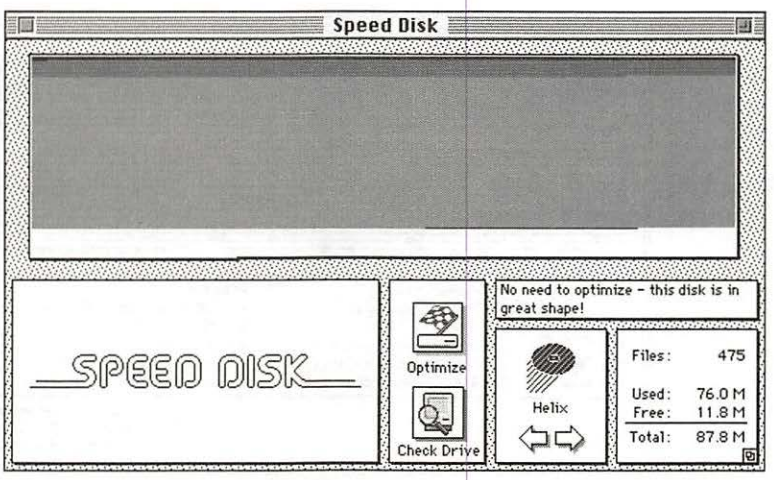


Figure 5.4 A disk map after optimization

Disk Express II

Like speed Disk, Disk Express II both defragments and optimizes disks. However, Disk Express II installs as an INIT. The advantage to this approach is that Disk Express II can be configured to optimize in the background. On the other hand, the INIT does take up a small amount of RAM and you are also faced with the possibility of an INIT conflict.

Disk Express II provides two types of disk maps, one showing fragmentation (Figure 5.5) and one showing file activity (Figure 5.6).

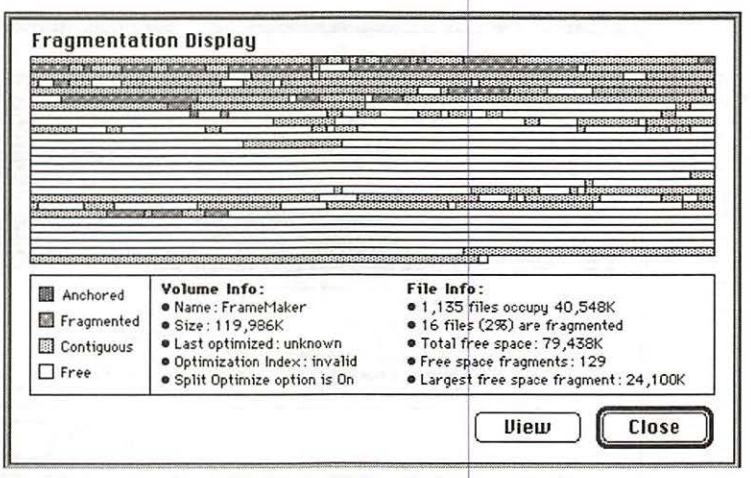


Figure 5.5 A Disk Express II fragmentation disk map before the disk is defragmented and optimized

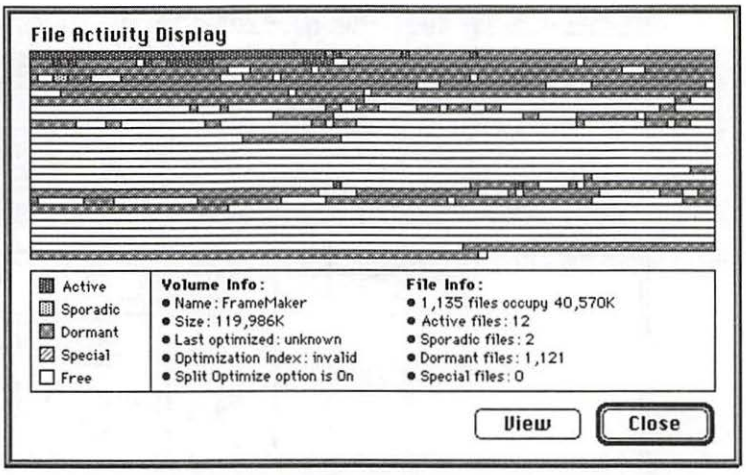


Figure 5.6 A Disk Express II activity disk map before the disk is defragmented and optimized

Notice in the fragmentation display that there are actually four types of files. Anchored files are files such as virtual memory swap files that can't be moved when the disk is defragmented and/or optimized. The display also indicates the space occupied the fragmented files, files stored in contiguous blocks, and unused blocks.

Disk Express II provides two types of disk optimization. Packed optimization is the same as that provided by Speed Disk: All files are packed toward the inside of the disk, with free space coalesced at the outside. Infrequently used files, such as system software and applications, are

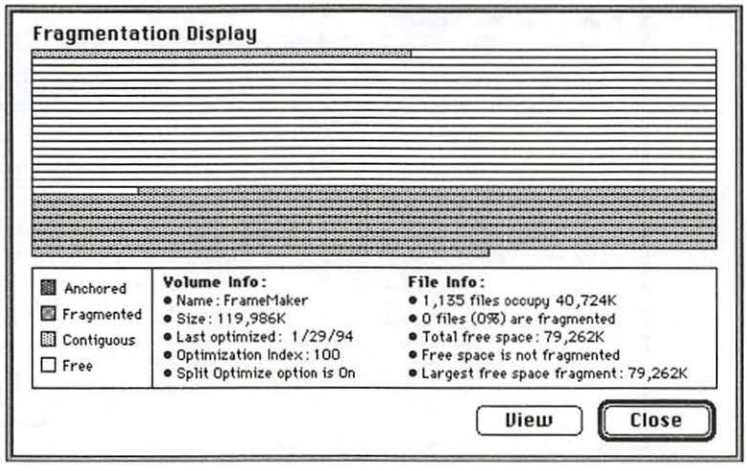


Figure 5.7 A Disk Express II fragmentation disk map after defragmenting and optimizing using split optimization

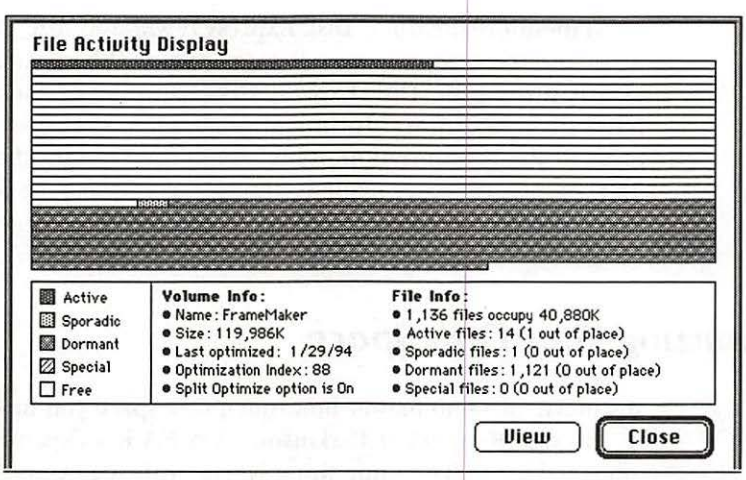


Figure 5.8 A Disk Express II activity map after defragmenting and optimizing using split optimization

placed toward the center; active files (those that change frequently) are placed closest to the free space.

Split optimization places active used files toward the center of the disk, followed by the free space, followed by infrequently used files on the outside of the disk. The affect of split optimization can be seen in Figure 5.7 (a fragmentation disk map after split optimization) and Figure 5.8 (an activity disk map after split optimization). Notice that all fragmentation has been removed and that active files are separated from less frequently used files by free space.

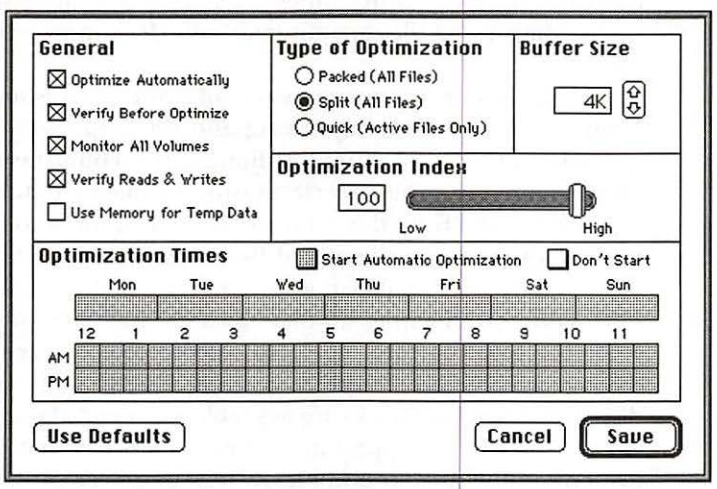


Figure 5.9 Setting Disk Express II options

As mentioned earlier, Disk Express II will optimize disks automatically, in the background, as well as manually. When automatic optimization is turned on, Disk Express II keeps a log of file activity on each hard disk partition. Optimization begins whenever fragmentation exceeds the "optimization index" set in the Options dialog box (Figure 5.9). Notice that automatic optimization can also be set to happen at specific days and times.

Maximizing Your Disk Space

It's inevitable—no matter how much disk space you have, you are going to run out. Remember Parkinson's Law? A job expands to fill the time allocated for it. The same thing is true with regard to disk storage: The size of the files you need to store expands to fill available storage. Back in 1985 we thought that 20 Mb was a *huge* amount of disk space; today a computer with less than 100 Mb is considered to be short on space.

You have two alternatives when you run out of disk space: Purchase a new (or additional) hard disk or make better use of the space you have. File and disk compression software can help you with the latter. *File compression* shrinks a file or group of files so that they occupy less space. In most cases, you must run file compression software manually to shrink and expand files; it is rarely an automatic process. File compression is therefore most useful when you want to shrink a few specific files or when you want to send files over data communications lines.

On the other hand, *disk compression* shrinks entire disk volumes. Disk compression software usually works automatically in the background, compressing files during times when the Macintosh sits idle. In most cases, compressed files are automatically decompressed when you open them.

File and disk compression is one of those areas where there is a performance trade-off. Compressing and decompressing individual files can take considerable time. Although disk compression works in the background and rarely interferes with normal computing, decompressing a file to open it adds a bit to the time it takes to open the file. In most cases, however, the added time to decompress a file to open is so small you may only notice it when you are working with large files.

In addition to eating up disk space by simply having lots of files on your disk, you may also lose space if the disk's directory files become damaged. These directory files keep track of what files are stored on the disk as well as what blocks are available for use. A damaged disk directory can result in the appearance of much less free space than is actually present on the disk. You will learn how to detect and repair this type of damage to reclaim free space at the very end of the chapter.

File Compression Software

File compression is most useful when you have a few files you want to compress and leave compressed for some time. For example, if you have finished working on a project and no longer need access to the project's documents, you can compress those files using file compression software. The files are still present on your hard disk and available for decompression any time you might need them.

The file compression arena is dominated by two products, StuffIt Deluxe (commercial) and Compact Pro (shareware). Both are used by major information services such as CompuServe and American Online to compress files that travel over data communications lines. The remainder of this section introduces you to both these programs.

StuffIt Deluxe

StuffIt Deluxe began life as shareware, but is now a full-featured commercial file and disk compression package. StuffIt works in two ways: You can work with archive files using the StuffIt Deluxe application or you can compress and decompress individual files and folders from the Finder using StuffIt SpaceSaver, a program that also provides automatic disk compression.

By the Way

UnStuffIt, a utility that can extract files from StuffIt archives, is available as freeware. Although it can't create archives, it can let you read StuffIt archives that someone sends to you.

A StuffIt Deluxe archive (Figure 5.10) provides a window that lists the files and/or folders in the archives, their expanded and stuffed sizes, and how much space has been saved by compression. StuffIt Deluxe also provides a floating palette of tools for manipulating the items in the archive. Notice in Figure 5.10 that the functions provided by this palette include those often more closely associated with file management programs, including renaming, moving, launching, and deleting files. Archives can be made self-extracting, embedding the unstuffing application into the archive so that if someone who doesn't have StuffIt or UnStuffIt receives the archive, he or she can nonetheless gain access to its contents.

Compression directly from the Finder requires SpaceSaver and Magic Menu (Figure 5.11). Assuming that both the SpaceSaver and Magic Menu control panels are installed, you can stuff and unstuff items selected in a Finder window. SpaceSaver is fairly smart when it

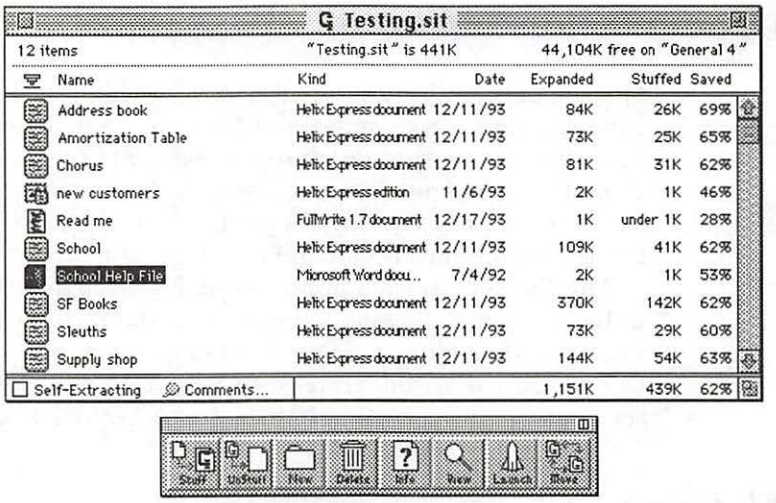


Figure 5.10 Working with a StuffIt Deluxe archive

comes to stuffing things. If you append ".sit" as a file or folder name's extension, SpaceSaver creates a standard StuffIt archive. However, if you append ".sea" as the extension, SpaceSaver creates a self-extraction archive.

StuffIt Deluxe can decompress archives created by a wide variety of file compression programs; it can also create archives in many of those formats (those formats with an arrowhead to the right of their names in the Translate menu in Figure 5.12). Those a Macintosh user is likely to encounter frequently include:

- ***BinHex4:*** A text format used to send binary files over networks such as the Internet. (You will read more about the Internet in Chapter 12.)
- ***CPT:*** Archives created by Compact Pro, about which you will read shortly.
- ***DD:*** Compressed files created by Disk Doubler, the compression engine behind Auto Doubler, one of the disk compression packages discussed later in this chapter.

Figure 5.11 StuffIt's MagicMenu

Figure 5.12 Archive formats that StuffIt Deluxe can translate

Arc, Pack, and Zip are formats used primarily by MS-DOS computers. UUCode and tar, along with Unix Compress, are compression formats used by computers running the UNIX operating system.

Compact Pro

Compact Pro is part of that small group of commercial-quality shareware that has achieved wide use and distribution throughout the Macintosh community. Its sole function is to compress files as much as possible, in some cases squeezing files to less than 40 percent of their original size. (Some graphics, especially TIFF graphics, may shrink to less than 10 percent of their original size!)

A Compact Pro archive consists of any group of files and folders that you want to compress. Compression actually takes place after you have added all the files you want to the archive. After you issue a Save command, Compact Pro saves a compressed *copy* of the files in the archive.

When you save a Compact Pro archive, you have one very important choice to make (other than the location of the archive). As you can see in Figure 5.13, a Compact Pro archive can be self-extracting. Checking the self-extract box means that the part of the program needed to expand files is embedded into the archive, making it possible for someone without Compact Pro to gain access to the files. Although self-extracting archives take up a bit more space than those without the extraction code, they are very useful for files sent over data communications lines; they are of very little benefit if you are simply compressing files to save storage on your local hard disk.

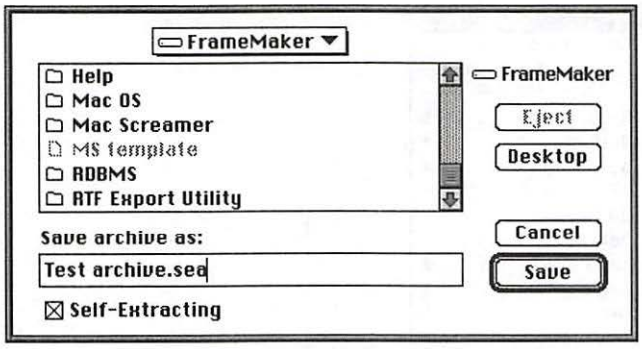
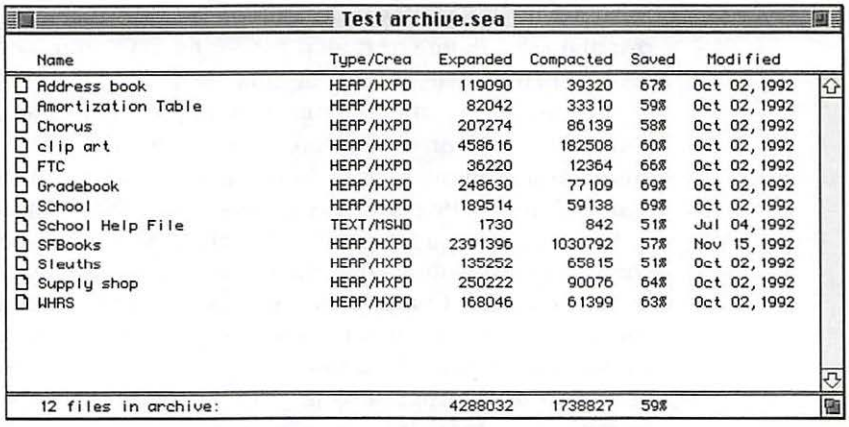


Figure 5.13 Saving a Compact Pro archive

Once a Compact Pro archive has been saved, Compact Pro shows you the amount of space it has been able to squeeze out of the files. For example, in Figure 5.14, a group of files more than 4.2 Mb in size have been compressed to about 1.7 Mb, a savings of 59 percent.

Compact Pro can split an archive between multiple floppy disks. If you save the archive to a floppy rather than a hard disk, Compact Pro will ask you to switch disks whenever it fills a disk. This is particularly handy for disks that you are planning to send to someone. Keep in mind that you should have enough new or empty disks to hold the archive before you begin. Although Compact Pro will pause to format an unreadable or new floppy, it can't delete existing files from a formatted floppy in the middle of the archiving process.



Name	Type/Crea	Expanded	Compacted	Saved	Modified
Address book	HEAP/HXPD	119090	39320	67%	Oct 02, 1992
Amortization Table	HEAP/HXPD	82042	33310	59%	Oct 02, 1992
Chorus	HEAP/HXPD	207274	86139	58%	Oct 02, 1992
clip art	HEAP/HXPD	458616	182508	60%	Oct 02, 1992
FTC	HEAP/HXPD	36220	12364	66%	Oct 02, 1992
Gradebook	HEAP/HXPD	248630	77109	69%	Oct 02, 1992
School	HEAP/HXPD	189514	59138	69%	Oct 02, 1992
School Help File	TEXT/MSWD	1730	842	51%	Jul 04, 1992
SFBooks	HEAP/HXPD	2391396	1030792	57%	Nov 15, 1992
Sleuths	HEAP/HXPD	135252	65815	51%	Oct 02, 1992
Supply shop	HEAP/HXPD	250222	90076	64%	Oct 02, 1992
WHRS	HEAP/HXPD	168046	61399	63%	Oct 02, 1992
12 files in archive:		4288032	1738827	59%	

Figure 5.14 A saved Compact Pro archive

Disk Compression Software

There are several programs that perform automatic disk compression and decompression. In this section you will read about three of them: AutoDoubler, Now Compress, and SpaceSaver. The way in which they work is typical of this type of software.

There are two caveats that you should consider before embarking on disk compression. First, once your files have been compressed and you add more files in the space made available by the compression, you will no longer have enough disk space to decompress all your files at the same time. You should therefore consider carefully exactly how many of your files you might need to decompress at the same time.

Second, many application programs will not operate properly if the resource files they use are compressed. It is therefore often safer not to compress frequently used application programs and their supporting files. Instead, compress document files and infrequently used applications. Before using a compressed application, consider explicitly decompressing it.

AutoDoubler

AutoDoubler performs its automatic disk compression after your Macintosh has been sitting idle for some specified period of time (for example, two minutes). Although technically a background program, AutoDoubler doesn'tinterfere with normal processing in the same way background operations such as printing do. Compression stops immediately if you perform any action, such as moving the mouse pointer or pressing a key.

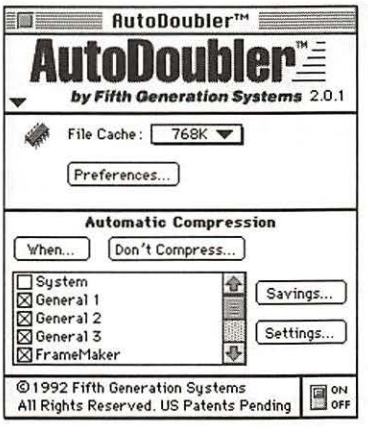


Figure 5.15 The AutoDoubler control panel

Figure 5.16 Creating a "Do not compress" label

Disk volumes that are to be compressed are identified in the AutoDoubler control panel. For example, in Figure 5.15 the volume name System will not be compressed, while General 1, General 2, General 3, and FrameMaker will be.

Once you have indicated that the contents of a volume should be compressed, you can exclude specific files and folders from compression. Probably the easiest way to do so is to create a Label, such as the "Do not compress" label in Figure 5.16, that can be used to identify files or folders that should be excluded. Once the label exists, you can instruct AutoDoubler to ignore any file or folder to which the label is applied (for example, see Figure 5.17). Notice also in Figure 5.17 that you can also exclude items by size and by name.

AutoDoubler also gives you control over when compression occurs. As you can see in Figure 5.18, you can determine the length of the idle time that must elapse before compression begins as well as where you can place the mouse pointer to either begin compression immediately or prevent compression from occurring.

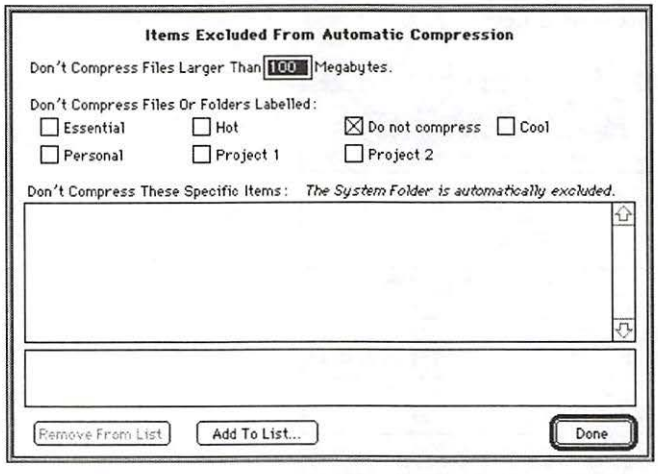


Figure 5.17 Excluding items from compression

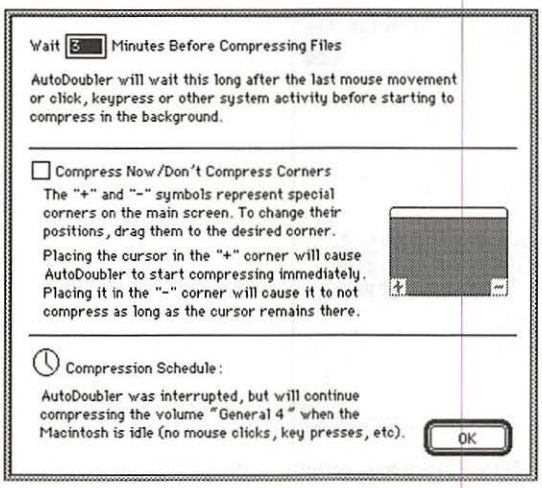


Figure 5.18 Controlling when AutoDoubler compresses

Now Compress

Like AutoDoubler, Now Compress performs automatic compression disk compression during idle periods. The product's installer copies both a system extension and a control panel to the System folder. Upon system restart you will find a new menu to the left of the Finder's Special menu that provides access to all Now Compress's functions (Figure 5.19).

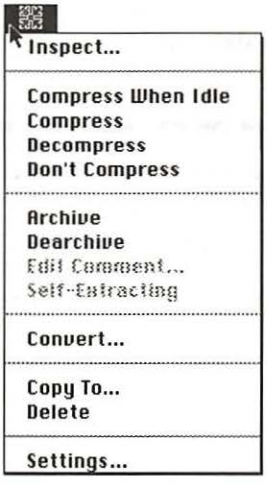


Figure 5.19 The Now Compress menu that appears in the Finder's menu bar

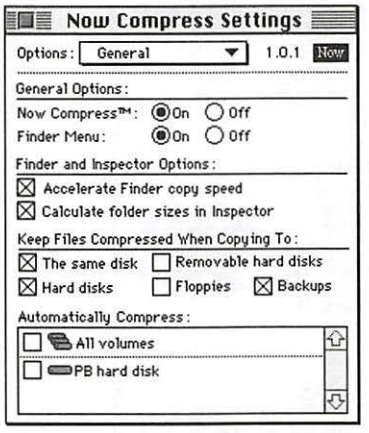


Figure 5.20 Now Compress general settings

Settings such as which items are to be compressed and when compression should occur are handled by the four panels of the Now Compress control panel. The "general" settings panel (Figure 5.20), for example, takes care of identifying disk volumes to be compressed and how compressed files should be handled when copied. Specific files or folders to be excluded from compression are identified individually on the "don't compress" panel (Figure 5.21); the "compress" panel (Figure 5.22) determines when compression will occur.

The status of files and folders (compressed or not compressed) and the amount of disk space saved through compression appears in the Inspector window (for example, Figure 5.23). (In most cases, compression at least halves the amount of disk space occupied by an item.) The Inspector window's buttons also provide access to all of Now Compress's functions, including copying and deleting files and folders.

By the Way

Now Compress can also create compressed file archives, just like Compact Pro and StuffIt Deluxe. Although its archives aren't compatible with any other archiving program, Now Compress does include a freeware extraction utility that you can distribute to anyone with whom you share archives. You can also create self-extracting archives.

SpaceSaver Disk Compression

SpaceSaver, the disk compression segment of the StuffIt Deluxe package, will perform automatic background compression when configured

Figure 5.21 Excluding files and folders from compression by Now Compress

to do so in its control panel (Figure 5.24). As with AutoDoubler and Now Compress, you can specify exactly which files and/or folders will be compressed. Notice in Figure 5.25 that items can be excluded by label or by location. In addition, items can be excluded from compression by beginning or ending their file names with "big"; items whose names begin or end in "small" will always be compressed.

The timing of background compression is handled by the idle time settings in Figure 5.26. These settings determine which volumes will be compressed and the amount of idle time that must elapse before compression begins. You can also choose to exclude from compression those items that have been modified recently. This is often a good strat-

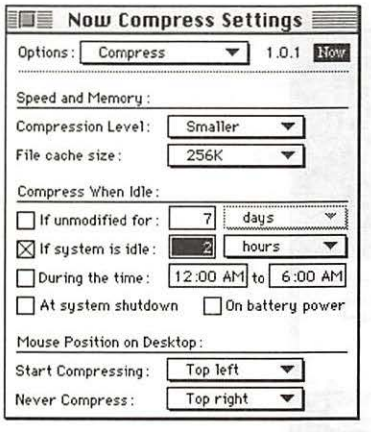
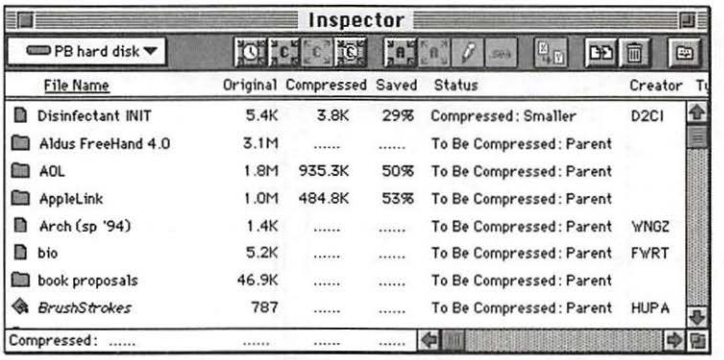


Figure 5.22 Choosing when Now Compress will compress files and folders



egy for maximizing both performance and disk space—items used recently are items most likely to be used again in the near future.

Recovering Disk Space by Repairing Disk Directory Problems

As you have read, the Macintosh operating system maintains special blocks on disk that keep track of which disk blocks are in use and which are available. Sometimes these directory blocks become inaccurate. In that case, you may end up with orphaned extents—disk blocks that are no longer part of any file but that haven't been returned to the list of available blocks—that cannot be reused. Orphaned extents are disk space that should be available, but isn't.

Figure 5.24 The StuffIt SpaceSaver control panel

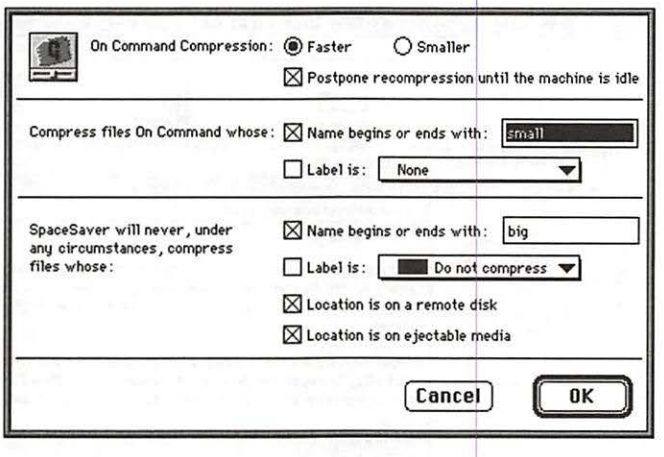


Figure 5.25 SpaceSaver compression settings

How do you know that you have orphaned extents? The first symptom is usually files that won't go away. In other words, you drag something to the trash and then empty the trash. However, the files still appear in the trash window. Sometimes they disappear after you empty the trash but reappear in the trash when you open the folder in which they were contained. Another symptom is unreclaimed disk space. You empty the trash, but the disk header information doesn't indicate that you regained the space occupied by the deleted items. To confirm the orphaned extents, run a disk optimization program such as Disk Express II, which reports on orphaned extents when it scans a disk to determine the amount of fragmentation.

The solution is to repair the disk directory damage. The easiest way to do so is to use Disk First Aid, a program that comes on the Macintosh

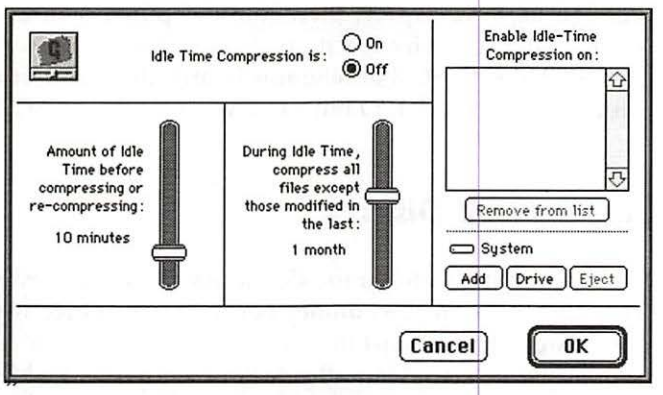


Figure 5.26 SpaceSaver idle time settings

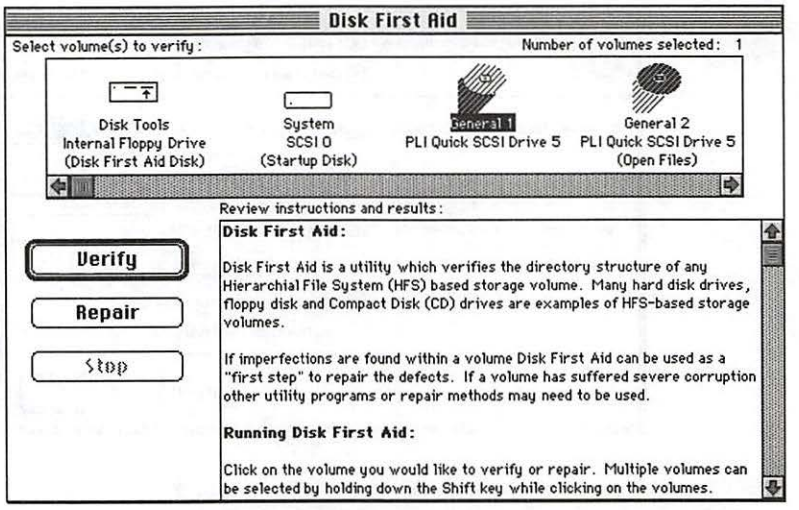


Figure 5.27 Using Disk First Aid to repair disk directory damage

operating system's System Tools disk. Disk First Aid (Figure 5.27) can verify and repair most directory damage. Keep in mind, however, that it cannot repair disks with open files. You will therefore need to boot your Macintosh from the System Tools disk to make repairs on your startup volume.

When Software Isn't Enough...

If optimizing and defragmenting your hard drive doesn't provide fast enough data transfer speed, then it's time to consider adding a faster drive, a faster SCSI controller, or both. If compression doesn't provide enough hard disk space, then consider purchasing a larger hard drive or investing in high-capacity removable media. Faster hard drives can be coupled with SCSI accelerator boards that can not only provide significantly faster disk I/O but can give you a second SCSI chain as well.

Faster and Larger Hard Disks

The continuing trend in the development of hard disks is toward faster, larger disks costing less money per megabyte. Once you decide to shop for a larger, faster hard disk, the most effective strategy is to purchase the largest disk you can afford. For example, a 20-Mb hard disk costs around $150, but a 200-Mb hard disk costs around $400 (ten times the

Figure 5.28 A PLI SyQuest drive and cartridge

space for only 2.66 times the cost). If you can afford to spend just over $600, you can get 500 Mb; $1,000 buys a 1-Gb (1,000-Mb) drive.

High-Density Removable Media

Sometimes a larger hard disk doesn't make sense, especially if you find that your needs for hard disk space grow continually. For example, if you work with large graphics files or produce multimedia presentations, then you are probably dealing with individual files several megabytes in size. In that case, it may not be cost effective to repeatedly purchase larger or additional hard disks; some type of high-capacity removable media can be a better solution. High-capacity removable media is also very practical if you need to transfer files that take up a lot of space to someone.

SyQuest Drives

The most widely used type of high-capacity removable media is a cartridge hard drive whose mechanism is made by SyQuest. SyQuest sells the drive mechanisms to many manufacturers (for example, the PLI SyQuest drive in Figure 5.28), who put the mechanisms in a case, add software, and resell the drives. (Other manufacturers do make cartridge hard drives, but SyQuest drives are so commonly used that they have become a de facto standard throughout the computing industry.)

SyQuest drives come in three densities. The popularity of the 44-Mb mechanism ($300–$400, with cartridges costing around $65–$70) is fading, although the large number of these drives in use means that the format will be viable for some time. The 88-Mb mechanism ($450–$650, with cartridges costing around $80) can read the 44-Mb disks; the 88c mechanism can also write to 44-Mb but cannot format them. A more cost-effective alternative is the 105-Mb or 270-Mb mechanism, costing $450–$750, with cartridges costing $65–$75. The only drawback to the two higher-capacity drives is that because they are relatively new to the market, few people have them. If you need to exchange files with someone, then at least for the near future you should stick to the 44- or 88-Mb formats, which others are more likely to have. If the SyQuest drive is for your own use, then the higher-capacity formats are more economical.

Optical Drives

An *optical drive* stores data on optical disc using a magnetic field, just like floppy disks, hard disks, and SyQuest drives. The drive uses a laser to heat small portions of the disk. When the surface is heated, the write head first passes over the surface to align all particles in the magnetic field in one direction. The write head then makes a second pass to set the direction of the particles to represent the data being stored. A low-powered laser, which doesn't heat the disc surface as much as that used when writing to the disc, is used in read operations. Because these drives combine both laser and magnetic storage technologies, they are formally known as *magneto-optical drives.*

Optical drives come in three storage capacities:

- 128 Mb (about $800 for the drive, $35 per cartridge)
- 650 Mb (about $1,700 for the drive, $89 per cartridge)
- 1.3 Gb (about $2,800 for the drive, $115 per cartridge)

As with SyQuest and hard drives, the cost of optical storage goes down per megabyte as the total storage capacity of the media goes up.

SCSI Accelerators

SCSI, which stands for *small computer systems interface,* is a standard that Apple has adopted for the transfer of data between an external device such as a disk drive or scanner and the computer. The transfer is managed by a *SCSI controller.* The speed of that controller pays a major role in how fast data can move to and from a disk drive.

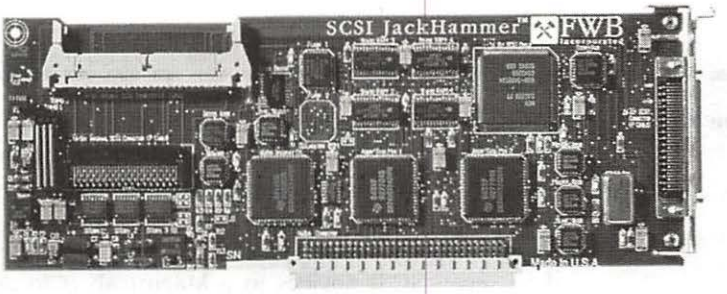


Figure 5.29 The FWB SCSI JackHammer card

To be completely accurate, there are actually two sets of SCSI standards. The *SCSI-1* standard is what has been implemented in the 680*x*0 Macintoshes. However, the more recent *SCSI-2* standard supports two faster ways of data transfer: *fast SCSI* and *wide SCSI*. The fastest hard disks available today adhere to at least part of the SCSI-2 standard. To attach one to your Macintosh, you must have a SCSI-2 controller that is compatible with the drive; you can also use a SCSI-2 controller with most SCSI-1 drives to speed up their data transfer as well.

SCSI-2 controllers are available on expansion boards (for example, the FWB SCSI JackHammer card in Figure 5.29). They vary in price from about $350 for a board that supports a portion of the SCSI-2 standard for speeding up SCSI-1 drives to around $800 for a board that supports the entire SCSI-2 standard, including both fast and wide SCSI.

By the Way

Although you can attach a SCSI-1 drive to a SCSI-2 card, you won't get the full benefit of the card unless you use a SCSI-2 drive. Currently, fast SCSI-2 drives are available; wide SCSI-2 drives should be available soon.

A SCSI expansion board can bring one extra bonus to your Macintosh: Some of them can give you a second SCSI chain. In other

words, with the SCSI-2 card installed, you can have up to seven devices connected to the Macintosh's internal SCSI controller and up to another seven devices connected to the SCSI-2 card. Because not all SCSI-2 cards provide this capability, check with the manufacturer before you buy.

By the Way

Some Macintoshes, such as the Quadra 900 and 950, appear to have two SCSI controllers because they have two SCSI connectors, one for internal devices and one for external devices. However, the Macintosh sees the combination of the two as a single SCSI chain, with a limit of seven devices. The only way to attach more than seven SCSI devices to a Macintosh is to add a second SCSI controller on an expansion board.

6

Optimizing Floppy, CD-ROM, and RAM Disks

A hard disk may be your primary storage medium, but a Macintosh system uses other types of disks as well. Floppy disks have always been a staple of Macintosh configurations; CD-ROMs are newer but becoming increasingly important. RAM disks aren't exactly physical media, but in some cases can significantly speed up a computer's performance.

Optimizing Floppy Drive Performance

Although we typically don't use floppy drives anymore for day-to-day data storage, they are nonetheless an important part of any Macintosh system. Without floppy disks, you can't install software on your Macintosh (only a small proportion of application software is being shipped on CD-ROM). Floppies also play an important part in transferring software from one computer to another, since they can be easily carried or mailed.

By the Way

If you hear someone refer to "sneaker net," he or she is talking about placing a file on a floppy and walking it from one Macintosh to another, rather than using some sort of electronic file transfer.

To make sure that your floppy drive can read the floppy disks you receive and that other Macintosh users can read the floppies you make

for them, your floppy drive needs to be in good condition. That includes making sure it is clean and that the heads are properly aligned over the tracks on the disk. A software kit from MicroMat—DriveTech—can help tune up your floppy drive(s) and diagnose problems. (There is no software that can affect the actual speed at which your floppy drive transfers data.)

DriveTech comes in two parts. One is a floppy drive cleaning disk with cleaning fluid. A clean disk drive will read and write disks more accurately. It will also make it more likely that you will be able to read disks of marginal quality.

The second is software that tests floppy drives to make sure that they are working properly. The tests are controlled from the DriveTech application (Figure 6.1), which displays an animated drawing of the internals of a floppy drive as it works.

One of the most valuable things DriveTech can do is identify misaligned drives. The read/write heads in a misaligned floppy drive don't center over a track. As a result, you won't be able to read floppy disks made on other computers (including commercial software) and the floppy drives in other Macintoshes won't be able to read the disks that you write. Note that if DriveTech identifies a misaligned drive, you will need to have it repaired; realignment requires special equipment and techniques that most computer users don't have.

When Software Isn't Enough...

Proper maintenance and file compression may still not give you enough speed or space on a floppy disk. In that case, you have a few options, depending on the capacity of the floppy disk currently in your Macintosh.

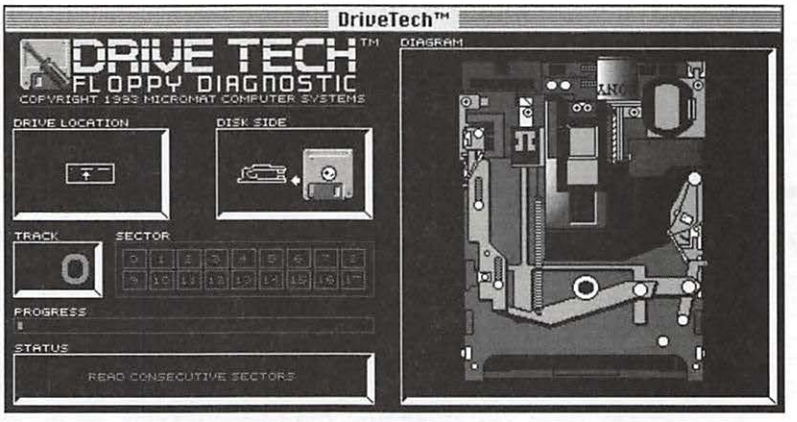


Figure 6.1 Performing floppy drive analysis with DriveTech

New Floppy Drives for Macintoshes with 800-K Drives

Macintoshes such as the Plus, SE, and II have 800-K floppy drives. Relying on an 800-K drive is becoming more and more of a problem because software manufacturers are beginning to ship only high-density floppies. What can you do? Add a 1.44-Mb SuperDrive.

To add a SuperDrive to a Plus and SE, you will need to look for an external drive: The ROMs in these machines can't support an internal SuperDrive. External SuperDrives cost around $300 and usually are SCSI devices. Although SCSI floppy drives are slower than internal SuperDrives, they do give an older Macintosh that can only support an 800-K drive access to high-density disks.

If you have a Mac II, you can certainly add an external SuperDrive. However, Apple is still making an upgrade that includes new ROMs for the Mac II (the ROMs from the IIx) and an internal SuperDrive, all for under $400. Anyone planning to keep and upgrade a Mac II should install this upgrade soon, before Apple decides to discontinue it.

Removable Media When 1.44 Mb Isn't Enough

Although floppy disk designers have been flirting with higher-density floppy drives for some time, at this point it doesn't appear that those formats will have a major impact in the Macintosh world. Therefore, if you need higher-capacity removable storage, then consider a cartridge hard drive or an optical drive. (For details, see the end of Chapter 5.)

Optimizing Performance with a RAM Disk

A *RAM disk* is a portion of RAM set aside to function as a disk drive. Because access to RAM is significantly faster than access to a disk, input and output operations to the RAM disk are faster than those to a hard or floppy disk. Access to RAM also requires less power than access to a hard or floppy disk. RAM disks are therefore also very useful for PowerBook users as a technique for extending battery life.

The Advantages and Disadvantages of RAM Disks

When you use software that manages a RAM disk, the Macintosh operating system isolates a portion of RAM from the rest of main memory. An icon for the RAM disk appears on the Desktop so that you can interact with the RAM disk just as you would with any other type of disk.

When you copy a file to a RAM disk, the file is actually copied to RAM. When you use an application program's Save command to save a

file to a RAM disk, the document is written to RAM; when you use a program's Open command to read a file from a RAM disk, the document is read from RAM. These types of operations form the basis of a RAM disk's speed enhancements because the data transfer to RAM are so much faster than data transfers to disk.

A RAM disk has one major drawback: Because it stores files in RAM, its contents are lost when power is removed from the Macintosh. You must therefore be certain that you save the contents of a RAM disk to a hard or floppy disk before you shut down or restart your Macintosh. There is also a risk that unsaved changes made to a RAM disk will be lost if power is lost accidentally or if software crashes and you must reboot the Macintosh.

As you will read shortly, some RAM disk software can be configured to automatically save the contents of the RAM disk to a hard disk on system shutdown. Some software is also able preserve the contents of a RAM disk during a restart or a system reset using the programmer's switch; however, no RAM disk software can recover from an accidental power loss or from a shutdown prior to which the RAM disk wasn't saved on a physical disk.

The risk of losing the contents of a RAM disk is much less when the RAM disk is used on a PowerBook than if it is used on a desktop Macintosh. This is because the PowerBooks continuously run off battery power. As long as the PowerBook is put to sleep rather than shut down, the contents of a RAM disk will endure as long as there is battery or AC power.

The second drawback to a RAM disk is that it eats up RAM that could otherwise be used to run more application programs. It is therefore generally impractical to use a RAM disk if you have less than 8 Mb of RAM.

Using a RAM Disk Effectively

Like many things in a computing environment, a RAM disk can't help everything you do. It is most effective in speeding up operations that perform a lot of disk reads and writes. This includes access to the System Folder as well as application software such as data management. Software such as word processors and spreadsheets, which tend to keep as much of a document as possible in RAM, don't benefit as much from being placed on a RAM disk.

In most cases, you can see a noticeable performance enhancement if you place your System folder on a RAM disk. You can also see some performance enhancement if you save the document on which you are working to a RAM disk. Unless an application program makes frequent

accesses to support files, placing an application program on a RAM disk rarely provides major performance gains. Therefore, you can usually get the most benefit out of a RAM disk by making it just large enough to contain your System folder and the documents on which you are currently working.

RAM Disk Software

If you have a PowerBook, then RAM disk capabilities are available through System 7. However, if you have a desktop Mac, then you'll need to get your RAM disk software from a third-party software manufacturer or as shareware.

System 7's RAM Disk

On a PowerBook, the Memory control panel has an extra section to configure a RAM disk (see Figure 6.2). To set up a RAM disk, you click the "On" radio button, use the slider to set the percent of physical RAM that should be allocated to the RAM disk, close the control panel, and then restart the Macintosh. After restart, the RAM disk appears on the Desktop with a floppy disk icon, as in Figure 6.3.

Although the RAM disk isn't permanent storage, while on the Desktop it behaves just like a floppy or hard disk, you open, save, copy, and delete files in exactly the same way. The System 7 RAM disk, however, is vulnera-

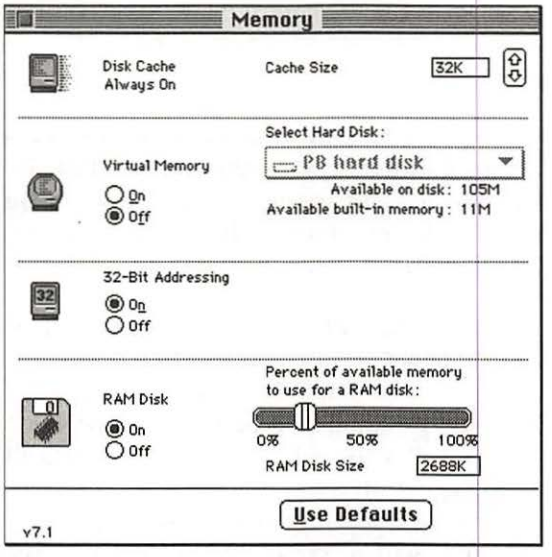


Figure 6.2 The Memory control panel on a PowerBook

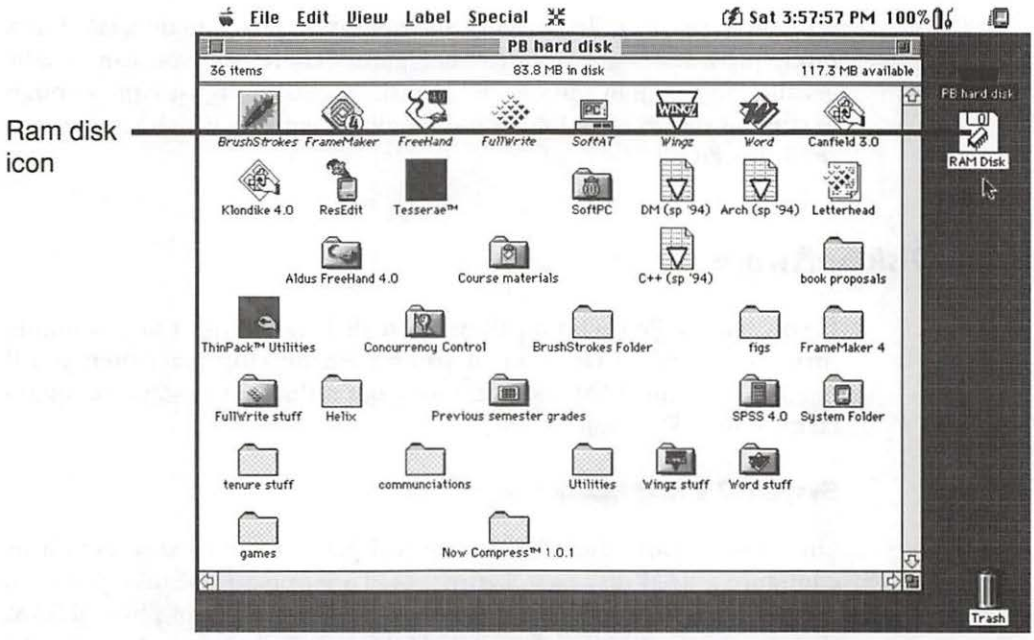


Figure 6.3 A PowerBook Desktop with a System 7 RAM disk

ble to anything that disrupts the contents of memory. In other words, you will lose the contents of the RAM disk whenever you shut down your Macintosh or restart it for any reason. If you have placed critical documents on the RAM disk, you must be sure to back them up to a hard disk frequently while you are working and before you shut down the machine.

Maxima

Maxima is commercial RAM disk software. It works on any 68030 or 68040 Macintosh as well as a 68020 with a PMMU installed. Once the RAM disk is installed and configured, it places an icon on the Desktop, as if the RAM disk were another hard disk (Figure 6.4). Just like the System 7 RAM disk, you work with Maxima's RAM disk as if it were a physical disk.

The size and behavior of the Maxima RAM disk are handled with the Maxima control panel (Figure 6.5). In addition to setting the size of the RAM disk, the control panel determines whether the contents of the RAM disk should be saved to a hard disk when the Macintosh is shut down and which files should be loaded automatically onto the RAM disk when the Macintosh is started up.

The Maxima RAM disk can also be configured so that its contents survive a system restart or crash. As long as power isn't turned off, the

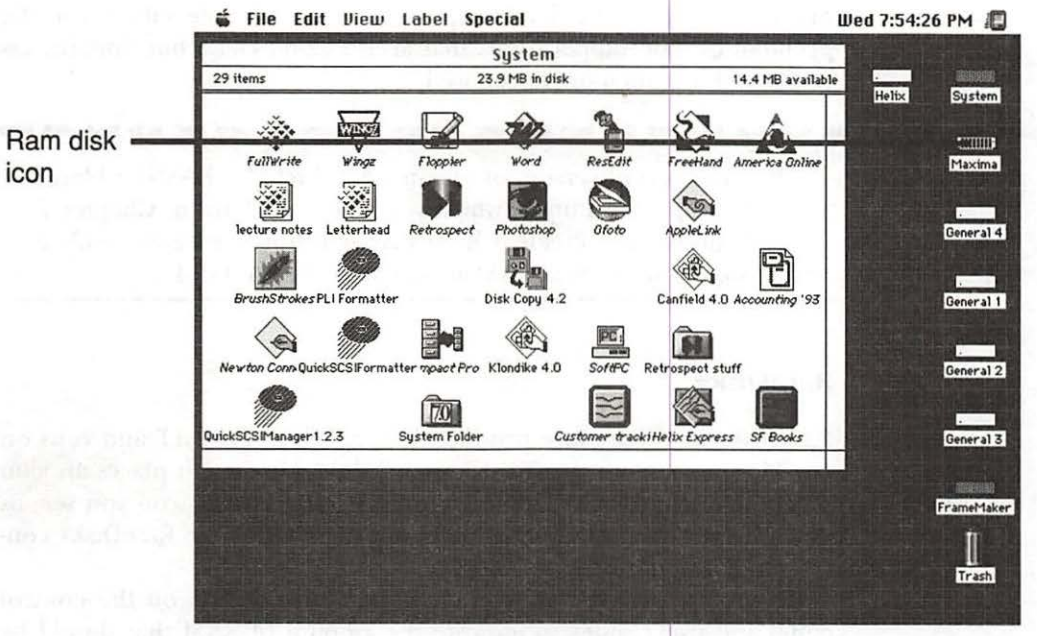


Figure 6.4 A Maxima RAM disk icon on the Desktop

Maxima RAM disk will retain its contents whether you use the Special menu's Restart command, click the Restart button in a bomb box, or press the Restart button on the programmer's switch.

In addition to providing the RAM disk, Maxima can make 14 Mb of RAM available to Macintoshes that have 32-bit dirty ROMs. In other words, you can access 14 Mb rather than 8 Mb of RAM when running

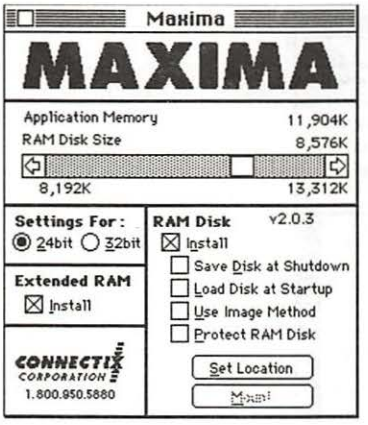


Figure 6.5 The Maxima control panel

programs in 24-bit mode. This provides an acceptable solution to the problem of older applications that aren't 32-bit clean but nonetheless require a lot of memory to run well.

By the Way

The most recent version of Maxima also includes RAMDoubler, a RAM compression utility which you will read about in Chapter 7. RAMDoubler can create a RAM disk that holds twice as much as the size of the physical RAM allocated to the RAM disk.

RamDisk+

RamDisk+ is a shareware product that installs as an INIT and runs on any Macintosh from the 512 K onward. Like Maxima, it places an icon on the Desktop that represents the RAM disk. Which icon you see, as well as other configuration options, are handled by the RamDisk+ control panel (Figure 6.6).

To set up a RAM disk, you click the Setup button on the control panel and use a slider to indicate the amount of RAM that should be allocated to the RAM disk (Figure 6.7). Once the size is set, you can return to the control panel and configure other options, including which files should be copied to the RAM disk during system startup and which files should be copied back to a physical disk when modified.

RamDisk+ can help a Macintosh that isn't using 32-bit addressing (a Mac with a 68000 CPU or with 32-bit dirty ROMs) take advantage of RAM above 8 Mb. The extra RAM is set aside as a RAM disk. Although it can't provide extra memory for running applications, it can speed up the performance of applications that *will* fit in existing physical RAM.

Figure 6.6 The RamDisk+ control panel

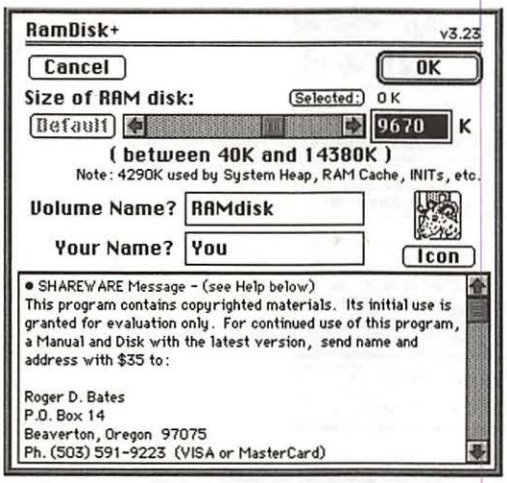


Figure 6.7 Setting the size of a RamDisk+ RAM disk

Speeding Up a CD-ROM Drive

CD-ROM drives are notoriously slow. Even today's double-speed drives transfer data considerably more slowly than hard disks. However, there is a way to speed up access to data on a CD-ROM, providing you have 1.5 to 5 Mb of hard disk space to spare.

CD-ROM ToolKit from FWB supports CD-ROM drives from the manufacturers listed below.

Apple
CD Technology
Chinon
MetroCD
NEC
PLI
Trantor
Toshiba

The software uses a caching scheme to keep a small portion of the data on a CD-ROM in RAM and a larger portion on hard disk. In most cases, the disk file holds the CD-ROM's directory and the "next" data likely to be read. The "next" data likely to be read are assumed to be data that are adjacent to the data most recently retrieved from the CD-ROM.

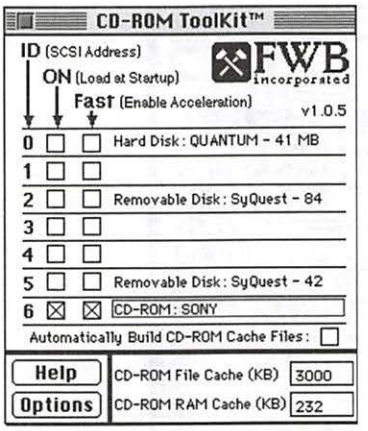


Figure 6.8 The CD-ROM ToolKit control panel

The way in which the CD-ROM ToolKit caches data is configured through its control panel (Figure 6.8) and its caching options dialog box (Figure 6.9). Entries in the control panel determine the size of the disk and RAM caches. The caching options indicate whether the "next" data to be read will be cached and the size of the blocks of that data.

The CD-ROM ToolKit replaces the device driver that acts as an interface between the CD-ROM player and the Macintosh. Like the Apple CD-ROM driver, it also provides a remote control desk application that allows CD-ROM players that have speakers or are connected to external amplified speakers to play audio CDs.

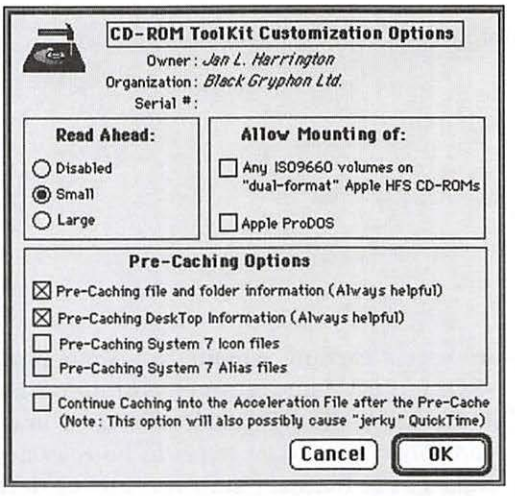


Figure 6.9 CD-ROM ToolKit caching options

When Software Isn't Enough...

The access speed of a CD-ROM drive is measured in milliseconds (ms). The lower the number, the faster the drive. The original single-speed drives have access speeds of more the 350 ms. For example, the AppleCD Plus is rated at 380 ms.

Unfortunately, many of today's CD-ROMs require access rates of less than 300 ms. If you have an older drive, you can to some extent mitigate the speed problem by using the CD-ROM ToolKit and allocating plenty of RAM to the application you are running. However, that often isn't enough.

If you find that you simply can't run the CD-ROMs that you need with a single-speed CD-ROM player, then the only alternative is to replace the drive. Double-speed drives ($300–$500), the most common type available today, have access speeds of 300 ms or less. You can also purchase a triple-speed drive (access speed of 200 ms or less, costing $500–$750) or quadruple-speed drive (access speed of 100 ms or less, costing $600 and up). However, before you invest in a triple- or quadruple-speed drive, keep in mind that currently there is very little software that can take advantage of the faster drives.

Simplifying Access to Tape Drives

Tape drives have long been the mainstay of microcomputer backup schemes. The drives and tape media are cheaper per megabyte than disk media. Tapes are also easier to store. However, tape drives are notoriously the slowest storage media, both for reading and writing.

Tapes are slow because they can't be accessed randomly like a disk. Instead, a tape drive needs to fast-forward or rewind to reach the beginning of a file on the tape. Access is also difficult because in most cases the contents of a tape can't be mounted on the Desktop like a disk; you need to run software specifically designed to control the tape drive.

Although you can't affect the speed of your tape drive with software, in some cases you can simplify access to a tape's contents. DeskTape, a commercial tape management utility from Optima Technology, works with some tape drive mechanisms to keep a directory of tape contents on disk. Supported tape mechanisms include digital audio tape mechanisms manufactured by Hewlett-Packard, Sony, WangDAT, Wangtek, and Archice. DeskTape also handles tape drives containing 150- and 600-Mb Teac cassette mechanisms, Exabyte 8-mm tape drives, and a few other SCSI-2 tape drives.

DeskTape reads through a tape and creates a file on your hard disk that contains a catalog of the contents of the tape. The catalog mounts

on the Desktop like a disk volume. You can then use the tape's Finder window to manipulate the files on the tape. Keep in mind, however, that when you double-click on a file of tape to open it or drag a file to copy it, the tape must still be fast-forwarded or rewound to reach the start of the file on the tape. DeskTape makes it easier for you to manipulate what's on the tape, but it can't change the essential nature of the tape drive.

When Software Isn't Enough...

Like disk drives, the technology tends toward faster, higher-capacity, and cheaper drives. If your older tape drive is too slow, your only alternative is to replace it with one of today's newer digital audio tape (DAT) drives. A DAT that stores up to 2 Gb per tape costs between $800 and $1,200; a DAT that uses compression to store 8 Gb or more on a tape costs between $1,200 and $1,500. Tapes run between $12 and $35, depending on capacity.

Should you replace your older tape drive? Consider the availability of replacement mechanisms as well as the speed and capacity of the drive. For example, if your existing tape drive were to be destroyed in a fire, could you find a replacement drive that could read your backup tapes? (This is assuming that you store backup copies off-site or in a fire-proof filing cabinet!) If you happen to have a very old drive (for example, a 60-Mb Teac mechanism), then the answer is "probably not." In that case, a replacement drive is in order. Tape drives with newer mechanisms should be replaced if they are either too slow or if they don't have sufficient capacity.

7

Optimizing RAM

One of the best things you can do for your Macintosh is to give it lots of RAM. In general, the Macintosh performs better when an entire document fits in main memory. This is because transfers of data to and from RAM are much faster than transfers to and from disk. If you can't or don't want to add more physical RAM, there are nonetheless some things you can do with software to get the most use out of your existing RAM: You can waste as little RAM as possible and you can add a variety of utilities to stretch existing RAM.

There are three different strategies for stretching RAM capacity. The first is to optimize the use of RAM so that the minimum amount of space is wasted, the strategy taken by OptiMem. The second strategy is to compress the contents of RAM so that more data and programs can fit in existing space. This strategy is used by RAM Doubler. You will read about both of these programs in this chapter. Finally, you might choose to use virtual memory. Virtual memory, available as part of System 7 or as a third-party add-on product, is a mixed blessing. Although it can give you theoretically unlimited RAM (up to your available hard disk space), it can slow down performance considerably. Virtual memory is discussed at the end of this chapter, along with techniques for getting it to perform as well as possible.

In addition to the three strategies described above, this chapter looks at making sure that you can gain access to the maximum amount of RAM your Macintosh can support (being "32-bit clean"). You will also find an introduction to the art of adding more physical RAM to your Mac.

Avoiding RAM Waste

System 7 is a RAM-hungry operating system: It isn't unusual for system software to use between 4 and 5 Mb or RAM. If you happen to have a Macintosh with 8 Mb or less of RAM, then operating system overhead represents a significant chunk of your available space. One way to get the most use out of your installed RAM is to cut back on the amount of RAM the operating system uses.

Just what exactly is loaded into all that system memory? Along with the Finder, the system software memory partition includes system extensions, fonts, and sounds. To cut the amount of memory allocated to system software, you need to control the number of extensions, fonts, and sounds that are loaded into RAM when the system is started up.

Controlling system extension memory use is rather straightforward: Simply be judicious in the number of extensions you install. If you aren't using an extension, turn it off using one of the INIT managers discussed in Chapter 1 or remove it from the System folder. You can replace it later when you actually need it.

To control the amount of space used by fonts and sounds, you can certainly remove unneeded fonts and sounds from your System folder. (Sounds are actually inside the System file; fonts are inside the System file under System 7.0, but in a Fonts folder under later versions of the operating system.) However, if you happen to have a large font collection and need most of those fonts available most of the time, then removing and installing the fonts, restarting each time you make a change, is an annoying waste of time.

The alternative is to use a font management program that lets you maintain font and sound collections outside the System folder. Such utilities only load fonts and sounds into memory as they are needed, rather than at system startup. One of the most widely used is Suitcase.

By the Way

Suitcase will also manage DAs and FKeys. However, desk accessories have more or less ceased to exist under System 7; they work like any other program. A few FKeys, such as the ⌘-Shift-3 FKey that takes a screen shot, are still in use. Nonetheless, most have been superceded by keyboard macro packages such as QuicKeys (see Chapter 10 for details); most are also quite old and not compatible with System 7.

Using Suitcase to Manage Fonts and Sounds

Suitcase is one of the utilities that many Macintosh users consider indispensable. It allows you to group fonts and sounds into "sets" that can be opened when needed. A "permanent set" includes those fonts and sounds that you want available at all times. Typically, the permanent set includes those fonts used by the operating system (Geneva and Monaco) and perhaps some of the most widely used fonts, such as Times, Helvetica, and Courier. You can define other sets specific to given applications (Figure 7.1). For example, if Adobe Garamond is the text font you use most frequently with your desktop publishing software, but not with other types of software, then you can define a set for the desktop publishing program that includes Adobe Garamond. You might also define a set that contains the fonts used in a special project so that they are available in both your word processor and graphics program.

When the Macintosh is booted, Suitcase loads the permanent set into main memory. However, other fonts and sounds aren't loaded, freeing memory that a large font and/or sound collection would otherwise occupy. When you launch an application for which a set has been defined, the fonts and/or sounds in that set are opened. The opened items remain in main memory only as long as the application for which the set has been defined is in use. Quitting the application frees the memory occupied by the fonts and/or sounds.

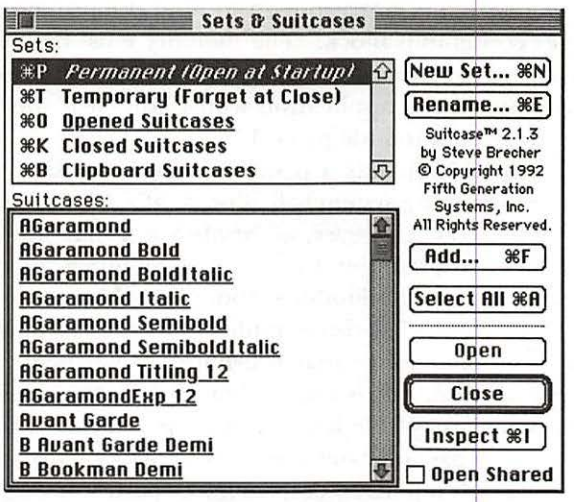


Figure 7.1 Defining sets of fonts with Suitcase

By the Way

Suitcase also lets you store fonts and sounds outside the System folder. This means you can get a large collection of fonts off your startup partition, freeing up disk space for things like print spooling.

Using OptiMem to Optimize Memory

OptiMem helps you run more programs in the same amount of RAM by changing the way in which RAM is allocated to applications. It will run on just about any Macintosh, even those such as the Plus, SE, Classic, and PowerBook 100 that have no memory management hardware. To understand how OptiMem works, you first need to know something about how the Macintosh operating system manages memory when OptiMem isn't present.

Macintosh Memory Allocation

As you know, the amount of memory to be allocated to an application is set in that application's Get Info dialog box. When you launch an application, the Macintosh operating system looks for a contiguous block of free memory that is large enough to hold the program. The key words here are "contiguous block." The memory must be located in a single, unbroken block. Even if the total available memory is enough to run the application, the application won't launch if the memory is fragmented (broken into little pieces).

Each application has a preferred memory size. If possible, the Macintosh operating system will allocate a block of memory of that size to an application. However, an application may not always need the entire block. You can get a gauge of how much allocated memory is lying unused from the Finder's About This Macintosh dialog box. For example, in Figure 7.2 three applications are running along with the operating system. Notice that BrushStrokes has been allocated a 4-Mb memory partition, but is currently using about a third of that space. (The dark portion of the bar indicates space actually in use; the lighter portion of the bar indicates unused but allocated space.) FrameMaker is also using only a portion of its memory partition.

Under the Macintosh operating system, unused portions of an application's memory partition simply sit unused. The Macintosh, which

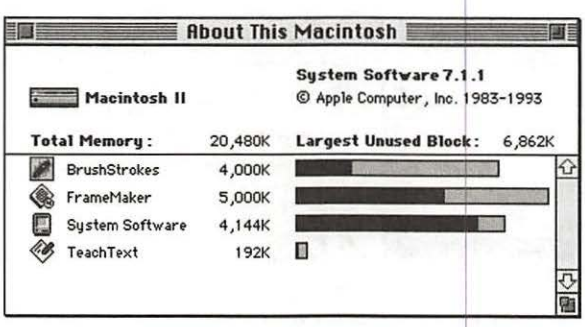


Figure 7.2 Viewing memory use in the Finder's About This Macintosh dialog box

always launches an application into a contiguous fixed-size block, has no way to dynamically allocate memory to an application as needed.

OptiMem Memory Allocation

OptiMem changes the way in which memory is allocated when an application is launched and when it is running. First, it launches an application in a block of memory that is just large enough to hold the application. Then, it dynamically allocates more memory to the application as needed. The extra memory added to an application's partition does not need to be contiguous with the application's original memory partition. OptiMem also frees memory that an application no longer needs. As a result, OptiMem gives you access to RAM that would otherwise be wasted; more applications can fit in main memory at the same time.

Not all applications benefit from OptiMem's memory optimization. The product comes with a database of known applications, indicating whether OptiMem should be used. However, many applications are unknown to it. You can therefore try OptiMem with your applications and indicate individually which should be optimized. The OptiMem control panel (Figure 7.3) not only provides an interface for turning OptiMem on and off for individual applications, but determines how unknown applications should be handled and when OptiMem should give low-memory warnings.

When first used with a new application, OptiMem may cause a slowdown in performance. However, OptiMem monitors the way an application behaves and learns its memory-use patterns. Performance degradation typically disappears after an application is launched two or three times. (That's all it takes for OptiMem to learn the application's memory-use behavior). Those applications that don't benefit from OptiMem can be excluded by turning OptiMem off with the control panel.

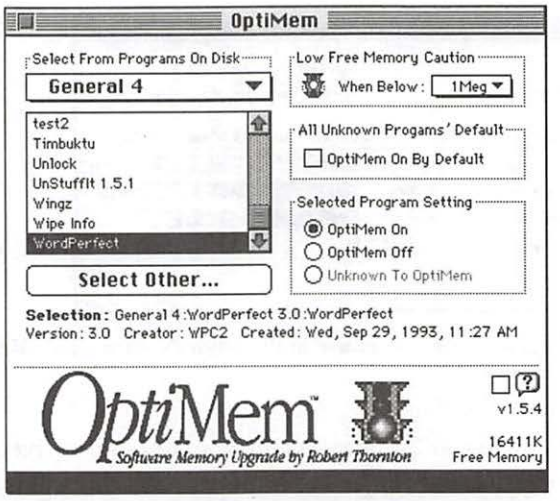


Figure 7.3 Using the OptiMem control panel to indicate applications for which memory use is to be optimized

Using RAMDoubler to Compress Memory

RAMDoubler is a commercial RAM utility that makes your Macintosh seem like it has twice as much RAM as is physically installed. For example, the PowerBook 180c in Figure 7.4 has 14 Mb of installed RAM. However, with RAMDoubler installed, the memory available to run programs is twice that (28 Mb).

RAMDoubler uses the memory management hardware built into the 68030 and 68040 CPUs; it can also run on a 68020 if a memory management chip is added. (See the discussion of virtual memory in the next section for more information on memory management hardware for a 68020 Mac.) This means that it cannot be used on Macintoshes with a 68000 CPU or the original LC, which uses a 68020 but has no place to install memory management hardware. On the other hand, RAMDoubler does not need lists of applications to be excluded from RAM optimization; it will work with all applications.

By the Way

RAMDoubler will not run if a SCSI-2 accelerator card is installed. The presence of boards such as the FWB JackHammer and the PLI QuickSCSI will cause the Finder to crash before ever reaching the Desktop. On the other hand, it's happy as can be in a PowerBook!

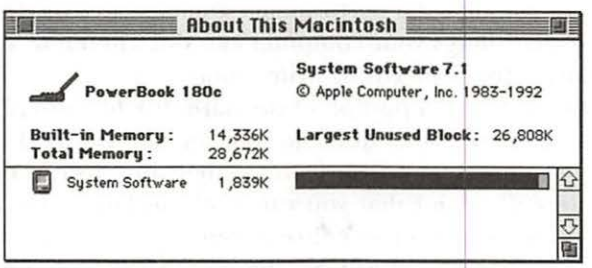


Figure 7.4 Memory available on a RAMDoubled Mac

RAMDoubler uses a combination of dynamic RAM allocation (similar to the technique used by OptiMem) and RAM compression to achieve the doubled RAM. It first uses dynamic RAM allocation because this technique causes no performance slowdown. If dynamic RAM allocation doesn't provide doubled RAM, it then compresses the contents of RAM to make more space. RAMDoubler tries to compress parts of RAM that are occupied by program code that is used only once (for example, when a program is loaded). Because compressing and decompressing RAM takes a bit of time, the idea is to avoid compressing anything that will be used frequently. As a last resort, RAMDoubler may write some of the compressed RAM to disk to create more uncompressed space in which to run applications. (This rarely occurs, especially if your Macintosh has 8 Mb or more of physical RAM.) The presence of all three RAM expansion methods means that RAMDoubler can guarantee twice the installed physical RAM all the time.

Virtual Memory

Virtual memory is a technique in which space on a hard disk is used to simulate more RAM than is physically installed in the computer. (In computereeze, virtual means simulated.) Macintosh virtual memory requires enough hard disk space to store a file (the *virtual memory swap file*) as large as all the RAM being simulated and the physical RAM installed in the computer. For example, if you have 5 Mb of physical RAM and decide that you want 15 Mb of RAM, you will need a file 15 Mb in size.

In the example just presented, there are 5 Mb of physical RAM but 15 Mb of virtual RAM. That means that only one-third of the contents of virtual RAM can actually fit in the physical RAM at any given time. Because a program must be in physical RAM to execute, virtual memory software must swap the contents of physical RAM to and from the virtual memory disk file as it needs to bring additional parts of the virtual memory into physical memory.

Here is where the performance trade-off occurs. Disk I/O is one of the slowest things your computer can do. Therefore, every time virtual memory software needs to write a portion of physical RAM to the hard disk file and copy a portion of the hard disk file into physical RAM, program execution slows down to wait for the disk I/O to finish. On the other hand, virtual memory means that you can run more programs at the same time and that you can work on larger documents with programs that insist than an entire document fit in main memory.

In most cases, you will get the most satisfactory results from virtual memory if you have enough physical RAM to hold your largest program and the largest document on which you are working. There will then be no need to perform disk I/O while you are working on a single document; disk I/O will occur when you are changing applications (in other words, switching to another running application) or documents.

By the Way

RAMDoubler cannot be used with virtual memory. If you think back to the previous section, you'll remember that RAMDoubler's trick of last resort is to write small portions of RAM to disk, the technique used by virtual memory.

Virtual Memory Hardware Requirements

Although virtual memory software support is present in System 7 and can be added to System 6 with the program named Virtual, not every Macintosh can use virtual memory. Whether you can depends on the type of CPU in your Macintosh:

- ***68000:*** A Macintosh with a 68000 CPU (for example, Plus, Classic, or Classic II) cannot use virtual memory, regardless of what version of the operating system you are using or what software you add onto the computer.
- ***68020:*** The 68020 was used in only two Macintoshes—the Macintosh II and the Macintosh LC. The Macintosh II can use virtual memory with addition of a chip called a *paged memory management unit* (PMMU), such as that in Figure 7.5. Motorola is no longer manufacturing PMMUs. However, they can be purchased for the Mac II from most mail order vendors that sell Macintosh memory. On the other hand, PMMUs are not available for the LC, which means that the LC cannot use virtual memory.
- ***68030:*** The circuitry that is part of a PMMU is built into the 68030. Therefore, if you have a Macintosh with a 68030, you will be able to use virtual memory.

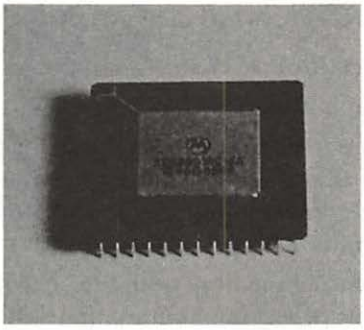


Figure 7.5 A PMMU chip for use in a Macintosh II

- *68040:* PMMU circuitry is also built into the 68040. All 68040 Macintoshes support virtual memory.
- *PowerPC:* PMMU circuitry is part of the PowerPC CPUs. A PowerPC Macintosh can therefore use virtual memory.

Using System 7's Virtual Memory

System 7's virtual memory is controlled by the Memory control panel. If your Macintosh is capable of supporting virtual memory, then the Memory control panel will contain a section labeled "Virtual Memory." As you can see in Figure 7.6, the Virtual Memory control panel contains a switch to turn virtual memory on and off, a popup menu for choosing the volume that will hold the virtual memory swap file, and up and down arrows for adjusting the size of the virtual memory swap file.

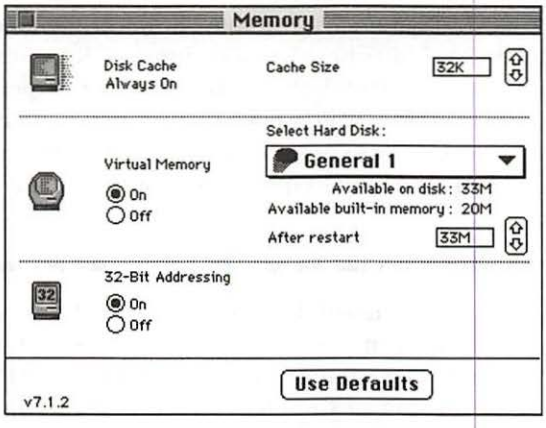


Figure 7.6 Using the Memory control panel to set up virtual memory

To set up your Macintosh for virtual memory, do the following:

1. Open the Memory control panel.
2. Click the "On" radio button.
3. Use the popup menu to choose a disk volume for the virtual memory swap file. Note that the selected disk volume must have free space equal to or greater than the amount of physical RAM installed in the computer.
4. Set the size of the virtual memory swap file. The size of this file is equal to the amount of virtual memory that will be available for use.
5. Close the Memory control panel.
6. Restart your Macintosh.

Once virtual memory is enabled, you can interact with your Macintosh just as you would as if virtual memory were not in use.

To turn off virtual memory, return to the Memory control panel and click the "Off" radio button. The change will take effect when you restart your Macintosh. Keep in mind, however, that the virtual memory swap file will not be deleted when you turn off virtual memory. If you want to reclaim the disk space it is using, trash it.

On Being 32-bit Clean

If you happen to have a 68020 or 68030 Macintosh produced prior to the Macintosh LC, then your computer has 32-bit dirty ROM. That means that regardless of how much physical memory you have installed or how much RAM optimization software you use, you will be limited to 8 Mb RAM under System 7. (You may, however, be able to use up to a total of 16 Mb RAM of either virtual memory or RAM disk.)

This problem is particularly annoying with computers such as the SE/30, II, IIx, and IIfx, which have eight slots for memory expansion. Given that the memory expansion boards that fit those machines hold as much as 16 Mb each, the eight slots provide a theoretical maximum of 128 Mb.

By the Way

Because of a problem with its ROM, the Mac II can only recognize 20 Mb of RAM, even if software to compensate for 32-bit dirty ROM is in use. The solution is to install the SuperDrive upgrade discussed at the end of Chapter 6. That upgrade includes the IIx ROMs, which permit access to as much RAM as you can stuff into the RAM expansion slots.

Two system extensions can compensate for the presence of 32-bit dirty ROMs, making your older Macintosh 32-bit clean. The first is Mode32, a product of Connectix that has been licensed by Apple for free distribution. It can be downloaded from information services such as America Online, CompuServe, and AppleLink; it is also available directly from Apple. The second extension is part of the System 7 Hardware System Update, available from Apple and information services.

By the Way

A 68000 Macintosh is limited to 4 Mb of RAM (16 Mb with a 68030 accelerator board) because of its internal design. The issue of 32-bit dirty or clean ROMs is irrelevant. Nothing you can do to a 68000 Mac can extend its address space beyond 16 Mb.

When Software Isn't Enough...

Probably the most cost-effective present you can give your Macintosh is to add more RAM. Plenty of RAM means that you can run more applications at the same time, have a larger RAM disk, and/or allocate more memory to specific applications. RAM is added to a desktop Macintosh by installing a *single in-line memory module*, or *SIMM*, into a special SIMM expansion slot on the computer's motherboard. PowerBook RAM comes on special RAM expansion boards.

There isn't a simple answer to the question of how much RAM you actually can add to a given Macintosh. The total RAM your Mac can use depends on the specific Macintosh model (the amount of RAM soldered to the motherboard and the number of SIMM slots) and sometimes the type of ROM. The picture is further complicated because there is more than one type of SIMM used in various Macintosh models and because various models can accept SIMMs with only specific capacities.

The 68000 Compact Macs

The compact Macintoshes that have a 68000 microprocessor (128K, 512K, 512Ke, Plus, Classic, and SE) are limited to 4 Mb of RAM. The SIMM type and capacities of these models can be found in Table 7.1.

If you install a 68030 CPU accelerator board in one of the 68000 compact Macs, you can install up to 16 Mb of RAM on the board.

Table 7.1 RAM capacities of 68000 compact Macs

Model	RAM Capacity	Type of SIMM	SIMM Sizes
128K	4 Mb	30-pin	256 K, 1 Mb
512K	4 Mb	30-pin	256 K, 1 Mb
512Ke	4 Mb	30-pin	256 K, 1 Mb
Plus	4 Mb	30-pin	256 K, 1 Mb
SE	4 Mb	30-pin	256 K, 1 Mb
Classic	4 Mb	30-pin	256 K, 1 Mb

However, RAM above 8 Mb is handled as if it were virtual memory. (The design of these machines means that they are limited to 8 Mb of program memory, regardless of the type of CPU that might be installed.) Performance is nonetheless better than disk-based virtual memory because the swapping is occurring between blocks of physical RAM rather than between physical RAM and a hard disk.

The Mac II, IIx, IIfx, IIci, IIcx, and SE/30

If equipped with a system extension that compensates for 32-bit dirty ROMs, the Mac IIx, IIfx, IIci, IIcx, and SE/30 can handle up to 128 Mb of RAM. The Mac II can also handle up to 128 Mb RAM if it has been upgraded with the IIx ROMs; without the ROM upgrade, the Mac II is limited to 68 Mb RAM. Without the system extension that corrects for the ROM problem, all six machines are limited to 8 Mb RAM. A summary of SIMM types and RAM capacities appears in Table 7.2.

Table 7.2 RAM capacities of the Mac II, IIx, IIfx, IIci, IIcx, and SE/30

Model	RAM Capacity	Type of SIMM	SIMM Sizes
II	68 Mb/128 Mb*	30-pin	256 K, 1 Mb, 4 Mb, 16 Mb
IIx	128K Mb	30-pin	256 K, 1 Mb, 4 Mb, 16 Mb
IIfx	128K Mb	30-pin	256 K, 1 Mb, 4 Mb, 16 Mb
IIci	128K Mb	30-pin	256 K, 1 Mb, 4 Mb, 16 Mb
IIcx	128K Mb	30-pin	256 K, 1 Mb, 4 Mb, 16 Mb
SE/30	128K Mb	30-pin	256 K, 1 Mb, 4 Mb, 16 Mb

* The 128 Mb capacity require upgrading with IIx ROMs.

Table 7.3 RAM capacities of the Classic II, Color Classic, LC, and LC II

Model	RAM Capacity	Type of SIMM	SIMM Sizes
Performa 200, Classic II	10 Mb	30-pin	1 Mb, 2 Mb, 4 Mb
Color Classic	10 Mb	30-pin	1 Mb, 2 Mb, 4 Mb
LC	10 Mb	30-pin	1 Mb, 2 Mb, 4 Mb
Performa 400, Performa 405, Performa 430, LC II	10 Mb	30-pin	1 Mb, 2 Mb, 4 Mb

The Classic II, Color Classic, LC, and LC II

The Classic II (including the Performa 200), the Color Classic, the LC, and the LC II (including the Performa 400, 405, and 430) are limited to 10 Mb RAM. All of the models have 32-bit clean ROMs and therefore don't need the system extension to fix 32-bit dirty ROMs. RAM capacities are summarized in Table 7.3.

The LC III, LC 475, IIvi, IIvx, and Performas

The newer models in the LC line bring additional RAM capacity to the low end of the Macintosh modular line. The LC III, the Performas based on its motherboard design (the 450 and 550), the LC 475, and the Performa 475, as well as the multimedia-capable IIvi, IIvx, and Performa 600, can accept up to 36 Mb RAM. Because these computers have 32-bit clean ROM, no special software is needed to access more than 8 Mb RAM. RAM capacities are summarized in Table 7.4.

The IIsi

In terms of its motherboard design and RAM capacity, the IIsi is unlike any other model in the Macintosh line. This model can handle up to 65 Mb RAM. Released at the same time as the original LC, it has 32-bit clean ROMs. It requires 30-pin SIMMs in 1-, 2-, 4-, or 16-Mb capacities.

Table 7.4 RAM configurations for the LC III, LC 475, IIvi, IIvx, and Performas based on their motherboards

Model	RAM Capacity	Type of SIMM	SIMM Sizes
Performa 450, Performa 550, LC III	36 Mb	72-pin	1 Mb, 2 Mb, 4 Mb, 8 Mb, 16 Mb, 32 Mb
Performa 475, LC 475	36 Mb	72-pin	1 Mb, 2 Mb, 4 Mb, 8 Mb, 16 Mb, 32 Mb
IIvi	36 Mb	72-pin	1 Mb, 2 Mb, 4 Mb, 8 Mb, 16 Mb, 32 Mb
Performa 600, IIvx	36 Mb	72-pin	1 Mb, 2 Mb, 4 Mb, 8 Mb, 16 Mb, 32 Mb

The Low-End Quadra/Centris Models

The low-end Quadras, including those that were originally named Centris, vary a great deal in the amount of RAM they can handle. The Quadra 605 accepts up to 36 Mb, the 610 can handle up to 68 Mb RAM, but the 650 and 660AV have room for 132 Mb. All have 32-bit clean ROM. A summary of RAM capacities for these models can be found in Table 7.5.

Table 7.5 RAM capacities of low-end Quadra/Centris Models

Model	RAM Capacity	Type of SIMM	SIMM Sizes
Quadra 605	36 Mb	72-pin	1 Mb, 2 Mb, 4 Mb, 8 Mb, 16 Mb, 32 Mb
Quadra 610	68 Mb	72-pin	4 Mb, 8 Mb, 16 Mb, 32 Mb
Quadra 650	132 Mb	72-pin	4 Mb, 8 Mb, 16 Mb, 32 Mb
Quadra 660AV	132 Mb	72-pin	4 Mb, 8 Mb, 16 Mb, 32 Mb

The High-End Quadras

Like the low-end models in the Quadra line, the high-end models vary considerably in how much RAM they can hold (see Table 7.6). The original low-end Quadra, the Quadra 700, has room for only 68 Mb

Table 7.6 RAM capacities of high-end Quadras

Model	RAM Capacity	Type of SIMM	SIMM Sizes
Quadra 700	68 Mb	30-pin	1 Mb, 4 Mb, 16 Mb
Quadra 800	136 Mb	72-pin	1 Mb, 2 Mb, 4 Mb, 8 Mb, 16 Mb, 32 Mb
Quadra 840AV	136 Mb	72-pin	1 Mb, 2 Mb, 4 Mb, 8 Mb, 16 Mb, 32 Mb
Quadra 900	256 Mb	30-pin	1 Mb, 4 Mb, 16 Mb
Quadra 950	256 Mb	30-pin	1 Mb, 4 Mb, 16 Mb

RAM. The 800 and 840 AV accept up to 136 Mb RAM. However, the Quadra 900 and 950 can handle up to 256 Mb RAM! As you might expect, all of these models have 32-bit clean ROM.

The Macintosh Portable

The original Portable, with its 68000 CPU, can accept 9 Mb RAM in the model without screen backlighting. The model with screen backlighting can accept only 8 Mb RAM. The 68000 CPU means that the issue of 32-bit clean or dirty ROM is moot for these models.

The PowerBooks

PowerBook RAM is added on an expansion board that plugs into a single RAM expansion slot. As you would expect, the capacity of that RAM expansion board varies from one model to another. Details appear in Table 7.7.

Table 7.7 PowerBook RAM capacities

Model	RAM Capacity	RAM Model	Capacity
100	8 Mb	180	14 Mb
140	8 Mb	180C	14 Mb
145	8 Mb	Duo 210	24 Mb
160	14 Mb	Duo 230	24 Mb
160c	14 Mb	Duo 270c	32 Mb
170	8 Mb		

How Much Does It Cost?

RAM prices are among the most volatile in the entire computing industry. For example, over the past ten years, they have fluctuated between $22 and $450 for 1-Mb SIMMs. Events such as tariffs to prevent dumping of RAM chips on the U.S. market and a fire in a plant that makes resins used in assembling RAM at times have caused SIMM prices to skyrocket. (In the late 1980s, when RAM prices were at an all-time high, men in dark suits could be found skulking around in corners at Macworld Expos, flashing briefcases full of SIMMs offered for sale at exorbitant prices.)

At the time this book was written, 1-Mb SIMMs were selling for about $39, 4-Mb SIMMs for $135, and 8-Mb SIMMs for $270. Larger SIMMs were more expensive per megabyte ($610 for 16 Mb, $1,200 for 32 Mb). Keep in mind, however, that SIMMs prices change frequently. Before purchasing any RAM, consult a publication such as *MacWEEK, Macworld,* or *MacUser* to get the toll-free numbers of several companies that sell SIMMs. Then call for the current price.

8

Optimizing Printing

Printing is the slowest thing your Macintosh can do. In most cases, the computer can generate the data the printer needs to create a page much faster than that data can travel down a cable to the printer and actually be printed. If you have to wait for the computer to finish printing a long document, you lose time when you could be doing other productive work. The solution is to somehow free up your computer so that you can continue to work while printing is occurring. You will read about a solution to this problem and its pluses and minuses in the first portion of this chapter.

This second portion of this chapter deals with more mundane issues: controlling the use of consumables by your printer. You will see how to control the amount of toner used by a laser printer and how to monitor the use of StyleWriter ink cartridges.

Eliminating the Wait: Background Printing

The technique that can free you from having to wait for a document to be printed completely is known as *background printing*. Programs that execute in the background take advantage of the fact that the CPU isn't busy all the time. Even when you are actively typing, drawing, or calculating there are short periods when you aren't doing anything. Background programs, such as those that manage background printing, run in that idle time.

When background printing is turned on, issuing the Print command doesn't immediately send a document to the printer. Instead, it creates

a temporary disk file (a *spool file* or *print file*) that holds instructions for the printer on how to create the pages in the printed document. Once the spool file is created, control of the program from which the Print was issued is returned to the user. At that point, you can perform any actions you choose. Printing is managed by a program that runs in the background, taking the contents of the spool files, one at a time, and sending them to the printer. Spool files are deleted once printing finishes.

Unfortunately, background printing isn't as seamless as it sounds. When the program managing background printing takes control of the CPU so that it can execute, the current program with which you were working must vacate the CPU. When you begin to work with the current program again, the background printing program must vacate. These swaps take time, often resulting in a general slowdown of the Macintosh.

In general, background printing frees you from having to wait for the printer, but extracts a price in overall system performance while background printing is in progress. Nonetheless, most users choose to turn on background printing because in the long run it increases the amount of work that can be done with the Macintosh in a given period of time.

Laser Printer and StyleWriter Background Printing

Background printing is provided by the Macintosh operating system for laser printers and the StyleWriter printer through an application called PrintMonitor. PrintMonitor is stored in the System folder and launched automatically when a print file is spooled to the PrintMonitor Documents folder in the System folder.

Background printing is enabled and disabled using the Chooser. Whenever you select a printer driver for which background printing is available, such as the LaserWriter in Figure 8.1, the "On" and "Off" buttons to the right of "Background Printing" appear. Choose the "On" button to make background printing available immediately. (It isn't necessary to restart the Macintosh.)

Printing a document is done in the same way, regardless of whether background printing is enabled. However, when background printing is turned on, the PostScript generated by the printing process is directed to a disk file rather than directly to the printer. If it isn't running already, PrintMonitor is launched when the disk file is complete.

Once PrintMonitor is running, you can use its window to manage the *print queue* (the list of items waiting to be printed). In Figure 8.2, for example, three files are in the print queue: C2 (currently being printed) and C5 and C1 (waiting to be printed).

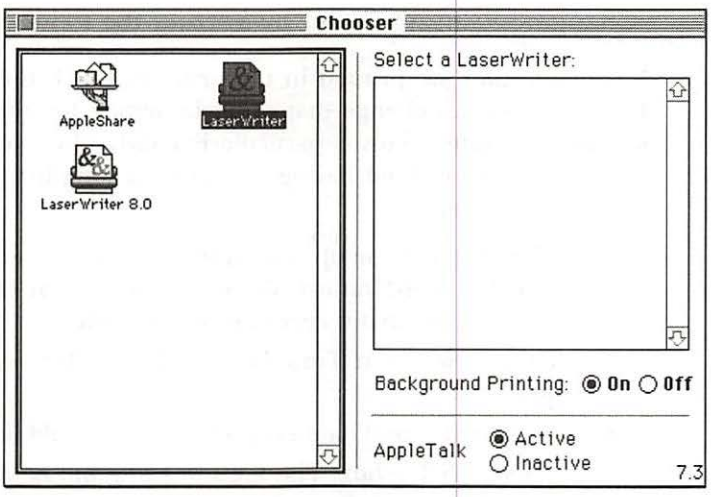


Figure 8.1 Using the Chooser to enable or disable background printing

By the Way

Try to avoid keeping the PrintMonitor window open. When the window is open, the Macintosh operating system continually checks the PrintMonitor Documents folder to see if new spool files have been created that should be added to the list of files in the PrintMonitor window. This activity slows down printing as well as any other programs that may be running.

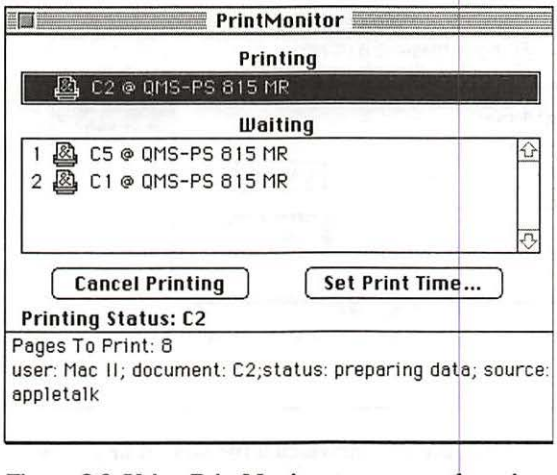


Figure 8.2 Using PrintMonitor to manage the print queue

Changing Printing Order by Setting the Print Time

By default, files are printed in the order in which they were spooled. However, you can change that order by setting the time at which files should be printed. This is particularly handy when you want to print some small files without having to wait for a long file to print first. To set the print time:

1. Highlight the name of a file in the scrolling list of files in the center of the PrintMonitor window. (You cannot change the print time of the file that is currently being printed.)
2. Click the Set Print Time button. The dialog box in Figure 8.3 appears.
3. Enter the time and date at which the file should be printed.
4. Close the dialog box. The file's printing will be delayed until the specified date and time.

There are some things to keep in mind about setting print times for spooled files. First, your Macintosh and the printer must be up and running at the time set for printing. If the hardware isn't available at the scheduled time, PrintMonitor will report an error.

You can use the "Postpone Indefinitely" radio button to leave a spool file in the PrintMonitor Documents folder without attempting to print it. When you are ready to print the file, set the print time to the current date and time. There is one major catch to this, however. If no files are currently waiting to be printed, PrintMonitor won't be running, making it impossible to get to the postponed print files. The trick is to go into

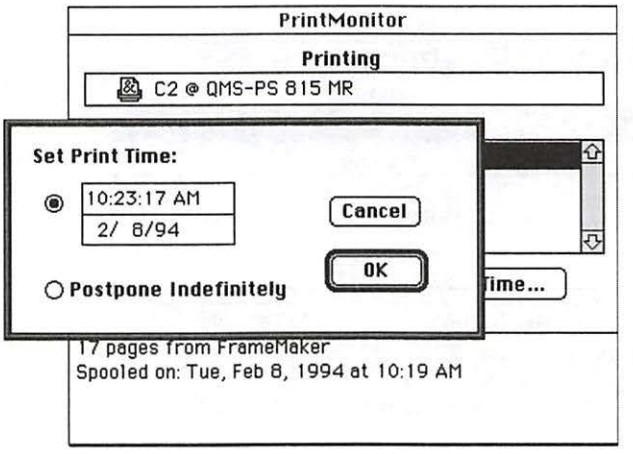


Figure 8.3 Setting the time at which a file should be printed

the Extensions folder and double-click on the PrintMonitor file. It will launch like any other application, giving you access to the files whose print time you want to reschedule.

Removing Files from the Print Queue

You can use the PrintMonitor window to cancel the file currently being printed and to remove files from the print queue. To cancel the file currently being printed:

1. Highlight the name of the file currently being printed at the top of the PrintMonitor window.
2. Click the Cancel Printing button.

Printing is canceled, although any pages that have already been sent to the print will be printed. The spool file is removed from the PrintMonitor Documents folder and the next file in the print queue begins printing.

To remove a file from the print queue:

1. Highlight the name of the print file to be removed in the scrolling list in the middle of the PrintMonitor window. Notice that the Cancel Printing button changes to Remove from List.
2. Click Remove From List.

The print file is removed from the print queue and deleted from the PrintMonitor Documents folder.

PrintMonitor Preferences

You can tailor PrintMonitor's behavior under certain circumstances to your needs by setting a few preferences. The Preferences dialog box (Figure 8.4) determines whether the PrintMonitor window is visible at all times when printing, what PrintMonitor does to signal a printing problem, and how PrintMonitor should handle manual feed printing. In most cases, you will want to leave the default settings in Figure 8.4. However, if you are working with an envelope printing utility (for example, KiwiENVELOPES!, which is discussed later in this chapter), it is much easier to turn off the notification of manual feed printing jobs.

PrintMonitor Memory Problems

PrintMonitor has one very annoying habit: It always launches in its minimum memory partition (80 K), regardless of how much memory you set as its preferred memory size. As a result, it often doesn't have enough memory to print. When this occurs, PrintMonitor displays the dialog box in Figure 8.5.

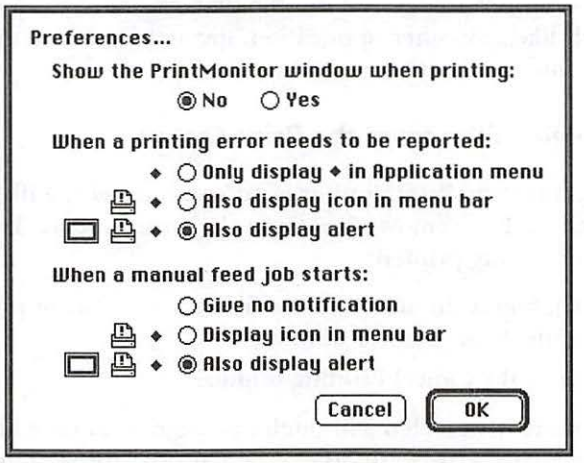


Figure 8.4 PrintMonitor preferences

You have two choices. You can cancel printing or you can ask PrintMonitor to launch itself in a large partition and try again (the Adjust Memory Size button). If you do elect to have PrintMonitor try again, keep in mind that the new memory partition will be only 10 K bigger than the previous memory partition. There's no guarantee that it will be enough memory to print the file in question. Secondly, PrintMonitor will begin reprinting the file from the beginning, regardless of where it was in the document when it ran out of memory. If you are printing a long document, you are probably better off canceling printing and then respooling the document, beginning with the next page to be printed. This takes more time and effort than simply letting PrintMonitor try again, but it does avoid wasting time and supplies on printing some pages more than once.

A word of caution about letting PrintMonitor launch itself in a larger partition is in order at this point. If you choose to let PrintMonitor quit

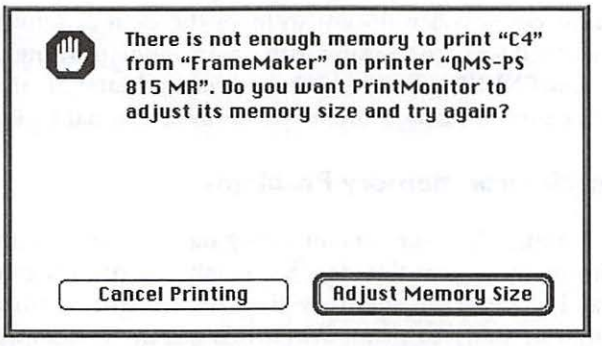


Figure 8.5 A PrintMonitor out of memory message

and relaunch, don't attempt to launch another application or open a document until PrintMonitor is running again. Doing so could cause one or both of the programs to crash. You can, however, continue to work with any open documents.

Background Printing for Other Printers

Owners of printers other than a laser printer or StyleWriter (or any printer that uses the StyleWriter printer driver) have only limited options for background printing. A program called SuperLaserSpool (originally from 5th Generation Systems, but now owned by Symantec), which provides print spooling for virtually any Macintosh printer, has been discontinued. However, you may be able to find some copies still available from mail-order software suppliers.

Some printer manufacturers provide their own background printing software. For example, the Citizen Notebook Printer II (a portable printer designed to carry around with your PowerBook) is accompanied by a background printing program. When making the decision whether to purchase a printer that isn't a laser printer or StyleWriter, check with the manufacturer to determine if background printing is supported.

PostScript for a Non-PostScript Printer

What can you do if you don't have a PostScript printer but need to print a document that *requires* a PostScript printer? You don't need to run out and buy new hardware. Instead, you might want to use Freedom of Press, an application that translates PostScript page descriptions into something a wide variety of other printers can handle. The program supports most Apple, GCC, and Hewlett-Packard printers, as well as printers that use the PCL4 printer control language.

By the Way

Freedom of Press also provides print spooling for all the printers it handles.

Freedom of Press installs as two applications. The "Freedom of Press" application lets you indicate which printer you are using (see Figure 8.6), as well as print files manually. The second program—FP Spooler—takes a LaserWriter spool file and translates it into instructions that a

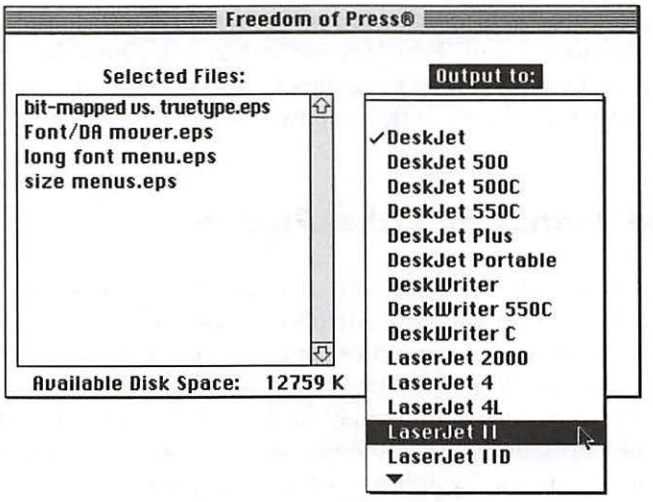


Figure 8.6 Choosing a printer for use with Freedom of Press

non-PostScript printer can understand. FP Spooler is used for automatic printing: You can print exactly as you would if you were printing without Freedom of Press.

Controlling How Much Toner or Ink Is Applied

The cost of printing doesn't end with the money you put down for the printer—you are continually purchasing supplies for that printer. Money spent on toner and ink cartridges for laser and ink jet printers can mount up very quickly. There is, however, software that lets you control how much laser printer toner or ink jet ink is applied when you print.

Toner Tuner is a shareware system extension that adds a slider to laser printer and ink jet printer Print dialog boxes. As you can see in Figure 8.7, the slider determines the percentage of normal toner or ink coverage that will be applied. You can therefore save considerable amounts of toner or ink by printing draft copies (especially those that include gray-scale or color graphics) with less toner or ink coverage.

Toner Tuner is compatible with most laser and ink jet printers as well as most application programs. However, some programs (for example, Aldus Freehand and Adobe Photoshop) bypass the normal print routines. Although the Toner Tuner slider will appear in their dialog boxes, using it won't have any affect on printing.

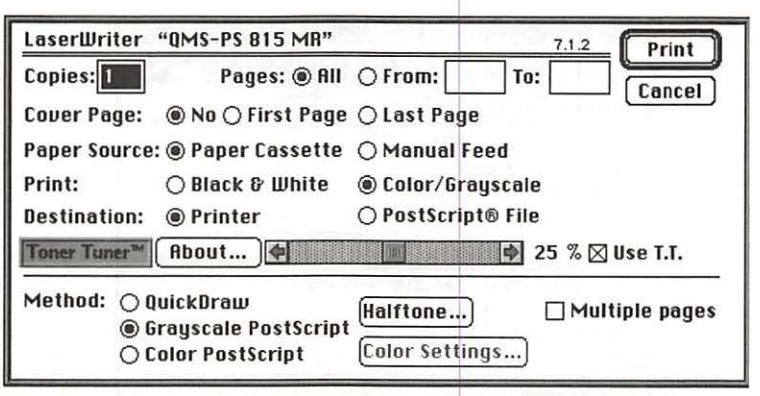


Figure 8.7 A Print dialog box with Toner Tuner installed

Avoiding the Print Dialog Box

Are you tired of having to deal with the Print dialog box when you just want to print a single copy? You can avoid the Print dialog box, saving the time it takes to display and dismiss the dialog box, with a freeware system extension called Print One. Print One adds an option named "Print One" to the File menu of most applications. Selecting that option prints a single copy of an entire document without displaying the Print dialog box.

Avoiding Envelope Frustration

One of the greatest time wasters is trying to use a word processor to lay out an envelope for printing. Although the Page Setup dialog box does provide envelope-sized pages (for example, as in Figure 8.8), there is no way to indicate exactly what size envelope is being used. In addition, you need to manually place the address and return address on the enve-

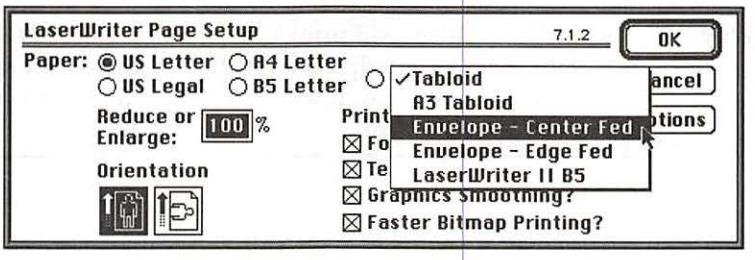


Figure 8.8 Using the Page Setup dialog box to choose an envelope as paper

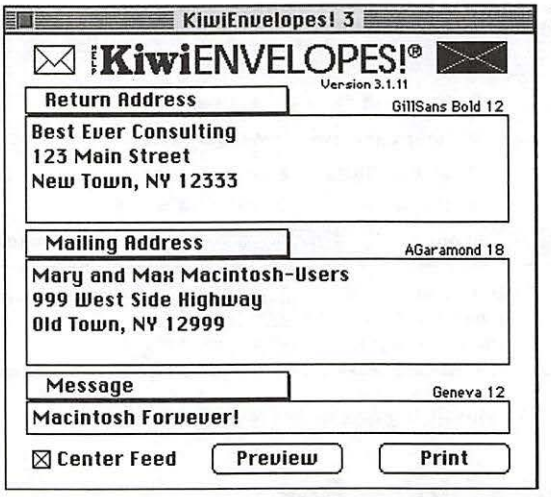


Figure 8.9 Quick envelope printing with KiwiENVELOPES!

lope. After a half dozen tries and wasted envelopes, people are often ready to give up on printing envelopes with a computer and turn back to the typewriter!

The solution is to use an envelope printing utility such as KiwiENVELOPES! KiwiENVELOPES! is a small application (94 K) that is most conveniently placed in the Apple Menu Items folder. Paste or type the address and return address into the KiwiENVELOPES! window (Figure 8.9).

For legibility on the screen, the addresses don't appear in the fonts you choose for them, but you can use the print preview to see what the envelope will look like when it is printed (for example, see Figure 8.10). Notice that KiwiENVELOPES! can also print a message in the lower left-hand corner of the envelope. The placement of all elements on the envelope is automatic, based on whether you have selected a letter- or business-sized envelope.

By the Way

KiwiENVELOPES! will print U.S. post office bar codes for addresses with a nine-digit zip code. Although this won't speed up your computing in any way, it will speed up your letter's travel through the U.S. postal system!

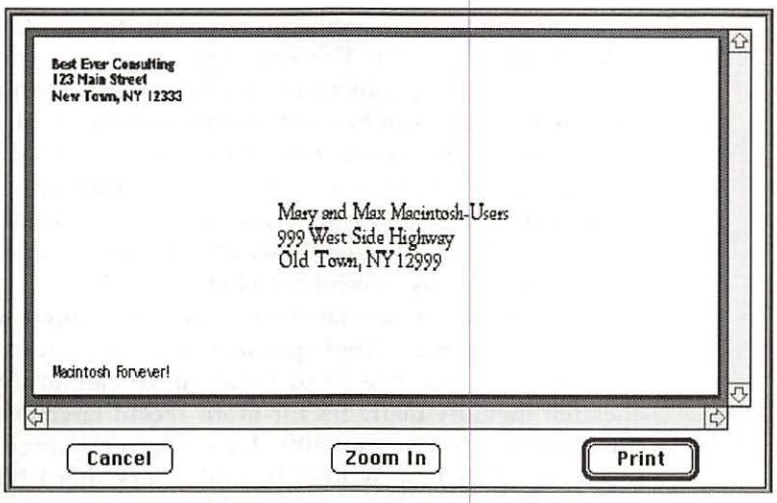


Figure 8.10 Previewing a KiwiENVELOPES! envelope design

When Software Isn't Enough...

Printing is one of the slowest things your computer can do. Although background printing can give you control of your computer before the print job is finished, your entire computer does slow down while background printing is occurring. If you just can't stand the slowdown and want to get those pages printed faster, the most common solution is to purchase a new printer. However, in some cases, you may be able to speed up and enhance a laser printer by upgrading its hardware.

Upgrading a Laser Printer

A laser printer is really a special purpose computer. It has its own CPU (generally either a 680*x*0 or a RISC microprocessor) and its own RAM. It may also have a hard disk attached on which fonts are stored. Because a laser printer contains all the elements of a computer, it sometimes can be upgraded like a computer.

Logic board replacements are available for some Apple laser printers, providing faster CPUs and therefore faster printing. For example, the LaserWriter Pro 600 can be upgraded to a LaserWriter Pro 650; a LaserWriter IINTX can be upgraded to a LaserWriter IINTXJ. In addition, the Xante corporation provides upgrade boards for many Apple laser printers (beginning with the original LaserWriter). Such upgrades provide faster printing, more memory for creating page images, and higher resolution.

A laser printer must be able to create the image of an entire page in RAM before it prints it. The size of the page that can be printed, the complexity of the graphics that can be printed, the number of downloadable fonts that can be used, and the number of shades of gray that can be printed are directly related to how much RAM is available. The original LaserWriter and LaserWriter Plus, with only 1.5 Mb of RAM available for imaging a page, occasionally cannot print documents created with today's software, especially if they include large grayscale graphics and/or large downloadable fonts.

RAM upgrades are available for many laser printers. If you happen to have one of the older Apple printers, you will need to invest in one of the Xante upgrade boards to install more memory. However, Apple does sell memory upgrades for more recent laser printers, including the LaserWriter Select 300, LaserWriter Select 310, Personal LaserWriter 320, LaserWriter 810, and LaserWriter IINTX. For memory upgrades for laser printers not made by Apple, consult the printer manufacturer.

Choosing a New, Faster Printer

In the 1980s, choosing a printer for a Macintosh was relatively easy. You purchased an ImageWriter or a LaserWriter. Although there were device drives and cables for attaching Hewlett-Packard printers and some letter-quality printers (printers that operate like typewriters), the output wasn't very satisfactory. Choosing a new printer today is considerably more complicated. Most printer manufacturers are making printers that are designed to work well with the Macintosh as well as with other types of computers.

To help you make a decision on a new printer, this section looks at the three printing technologies typically used by Macintosh printers and compares them as to price and speed. The ImageWriter and ImageWriter II (Figure 8.11) are *impact printers;* you will often hear them called *dot-matrix printers.* However, to be completely accurate, every Macintosh printer is a dot-matrix printer because it creates the image on the page by applying a pattern of dots. The ImageWriter and ImageWriter II apply ink to paper by striking the paper through a ribbon, thus the term *impact.* Technically, they should be called "dot-matrix impact" printers.

The quality of a dot-matrix printer's image depends on how closely the dots are placed together. The more dots per inch, the harder it is for the human eye to discern the individual dots and the more solid the image appears. To get excellent quality output from an ImageWriter or

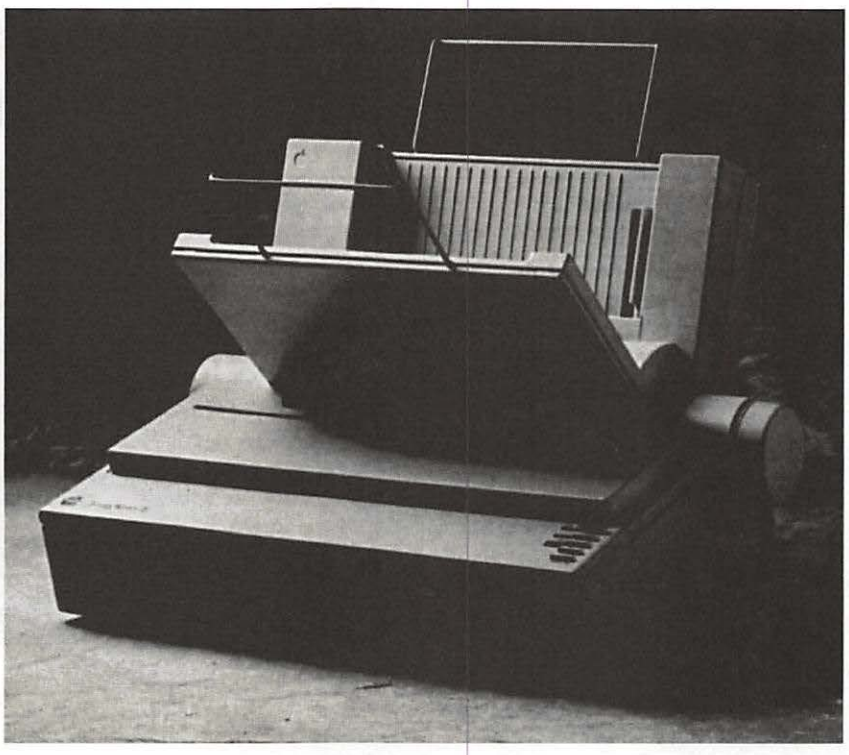


Figure 8.11 The Apple ImageWriter II with optional cut-sheet feeder

ImageWriter II, you need to use the "Best" setting in the Print dialog box. The "Best" setting, however, slows printing considerably and takes a significant toll of the life of a ribbon. The irony of this is that although the ImageWriter II is the slowest of all Macintosh printers, it is also relatively expensive, retailing for just under $400.

The most economical printer today is an ink-jet printer. Retailing between $300 and $400, ink-jet printers from Apple and Hewlett-Packard create images by spraying a pattern of dots onto paper. The original Apple StyleWriter was very slow, but the performance of the more recent StyleWriter II (Figure 8.12) and the Hewlett-Packard series of DeskJet and DeskWriters print faster than the ImageWriter II. They also produce considerably better output. If you have an ImageWriter or ImageWriter II and are looking for a low-cost upgrade, then an ink-jet printer is a good alternative.

The best output from a Macintosh comes from a laser printer. Macintosh-compatible laser printers are produced by a wide variety of manufacturers, including Apple (for example, Figure 8.13), Hewlett-

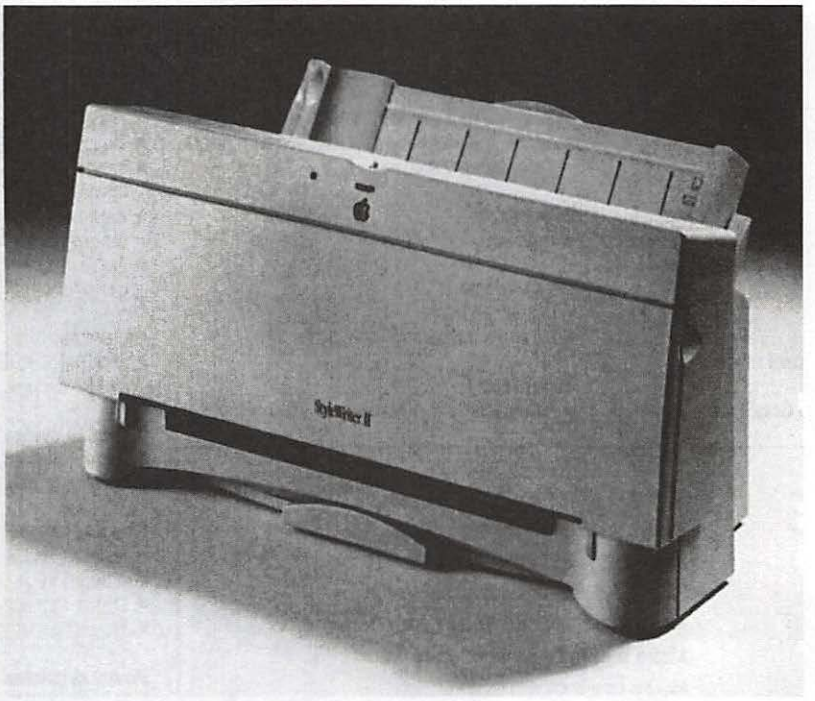


Figure 8.12 The Apple StyleWriter I

Packard, GPP, and QMS. Within each manufacturer's line, there is a variety of output qualities and speeds.

Laser printers can be divided into two major groups: QuickDraw and PostScript. QuickDraw laser printers use the QuickDraw routines in the Macintosh ROM to form an image on the printed page. They also aren't designed for sharing over a network. Instead, they connect directly to the printer port of a single Macintosh with a serial cable.

PostScript printers accept commands in the PostScript page description language to determine what should be printed. A PostScript printer typically is designed for sharing over a network and although it can be connected with a serial cable to a single computer's printer port, it is more commonly connected with network cabling. PostScript printers also generally provide better output than QuickDraw printers; they are also more costly. For example, a low-end QuickDraw laser printer can be found for under $1,000, but a low-end PostScript laser printer costs around $1,500.

The quality of a laser printer's output is also determined by the density with which it can place the dots on the page. The original LaserWriter

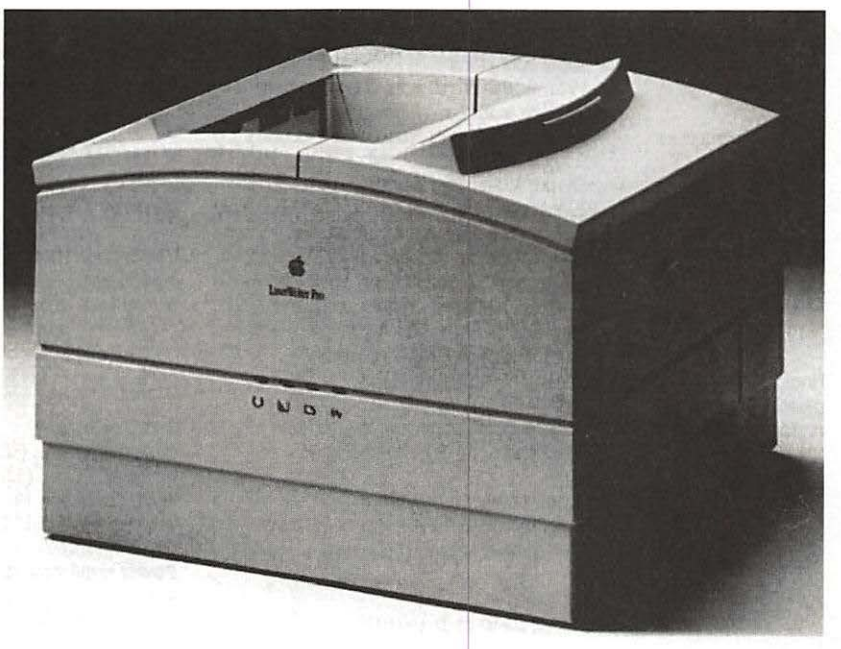


Figure 8.13 The Apple LaserWriter Pro 600

and most of today's low-cost laser printers produce 300 dots per inch (dpi). However, 600-dpi printers, which provide higher-quality output, are common.

The speed of a laser printer is measured in the number of pages it can print per minute (ppm). The ppm speed rating of a laser printer usually refers to the number of text pages (pages without graphics). Because much Macintosh printing involves graphics, the best use of such ratings is to compare various printers. It isn't necessarily an indication of how fast the printer will perform for you. That depends on the amount and type of graphics you're printing.

Color Printing Notes

There are a number of technologies used to create color output. In general, keep in mind the maxim "color costs." Whenever you move away from black-and-white/grayscale printing, you are going to pay more. However, color ink-jet printers such as the Hewlett-Packard 550c can provide acceptable color output for proofing of color graphics and for overhead transparencies at a cost of between $500 and $600. Unfortunately, the quality of color ink-jet output isn't high enough for many publishing applications.

Higher-quality color printers include laser printers, thermal-wax printers (wax from colored ribbons is melted onto paper), and dye-sublimation (colored ink is applied to paper). PostScript color, as you might expect, is more costly than QuickDraw color. A low-end PostScript thermal-wax color printer costs nearly $5,000; high-end PostScript laser and dye-sublimation color printers designed for accurate color matching can cost more than $10,000. In general, high-quality color printers are priced for business, rather than home, use.

9

Optimizing I/O

In previous chapters, you read about optimizing disks and printing. Input and output, however, consists of more than just those two activities. This chapter looks at a variety of I/O issues, including using software to speed up your mouse and extend the area that you can see on your monitor.

Optimizing Mouse Actions

There are two general strategies for speeding up mouse actions. The first is to actually make the mouse move faster. The second is to avoid unnecessary mouse movement. In this section you will read about software that can do both.

Getting a Faster Mouse

The speed with which the mouse travels across the screen can affect both your productivity and your ability to select objects on the screen. If the mouse travels too slowly, you waste time; if the mouse travels too fast, you may be unable to perform the manipulations needed to select objects.

The Macintosh operating system provides some control over mouse speed through the Mouse control panel (Figure 9.1). The slowest set-

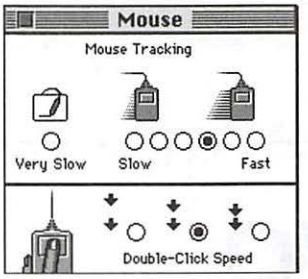


Figure 9.1 The Mouse control panel

ting is intended for graphics tablets, the remaining for mice and trackballs. In general, the larger your Desktop, the faster you want your mouse to travel.

If the Mouse control panel's fastest setting isn't fast enough, try installing the shareware utility Speedy Mouse, which doubles the speed at which the mouse travels. When Speedy Mouse is installed, you can return to normal mouse speed by holding down the Shift key when moving the mouse.

Avoiding Unnecessary Mouse Movements

What happens when your mouse runs up against an edge of the Desktop? It stops dead. If you happen to need access to something on the other edge of the Desktop, you need to move the mouse across the entire screen. However, if you install WrapScreen, a shareware utility, then the mouse pointer will move off one edge of the Desktop and appear immediately on the opposite edge. For example, if you run the mouse pointer off the left edge, it will wrap around to the right edge.

By the Way

The edge of the Desktop isn't necessarily the same as the edge of a monitor. When more than one monitor is attached to a Macintosh, the mouse normally moves from one monitor to another, stopping only at the edge of the Desktop as determined.

The way in which wrapping occurs is handled by the WrapScreen control panel (Figure 9.2). Notice that wrapping can occur both horizontally and vertically. You may also want to avoid wrapping in screen corners, since placing the mouse pointer in a corner is used by other programs, such as screen savers and disk compression utilities, to either prevent or invoke program actions.

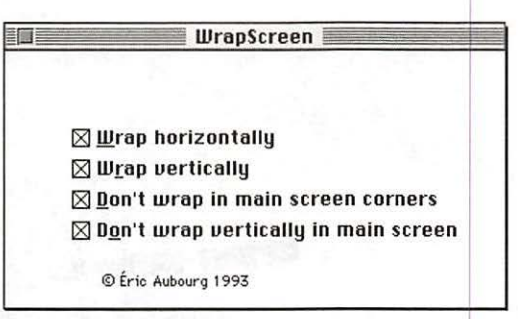


Figure 9.2 The WrapScreen control panel

When Software Isn't Enough...

Every Macintosh comes with a mouse. However, sometimes a mouse isn't the best input device for moving the mouse pointer. For example, if you have a large monitor or more than one monitor, using a mouse can be very awkward because you don't have as much table space as you do screen space. A mouse is also not particularly well suited to making the precise, small movements needed for drawing. The solution is to invest in an alternative input device.

Trackballs

Conceptually, a trackball is a mouse turned upside down. In other words, a mouse works by rolling a small ball against a hard surface. A trackball has the ball on the top so that you can move the ball with your

Figure 9.3 A trackball (the Kensington TurboMouse)

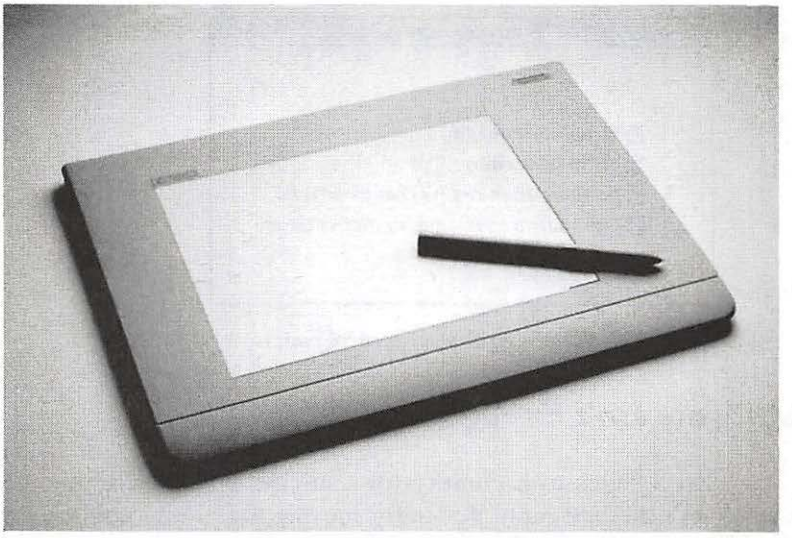


Figure 9.4 A Wacom graphics tablet

fingers (for example, Figure 9.3); the base in which the ball fits stays in one place. Instead of lifting and repositioning the mouse when you run out of desk real estate, with a trackball you simply make a small movement with your fingers, without ever moving your hand, much less the base of the trackball. A trackball is therefore a good alternative if you have a large monitor or limited desk space.

Graphics Tablets

A graphics table, such as that in Figure 9.4, is an input device that causes the mouse pointer to react to the movements of a stylus on a pressure-sensitive tablet. The tablet lies flat on a desk; to use the tablet, you hold the stylus as you would a pen and draw with it in the same way. A graphics tablet is commonly used by artists who want to be able to make precise, fine movements with the mouse pointer. (It generally isn't used for everyday mousing around.)

Optimizing Keyboard Use

In 1994, Articulate Systems delivered the first voice dictation system for the Macintosh. Anyone who can afford the more than $3,000 price can enter the contents of a text document by speaking into a microphone.

Unfortunately, the steep price tag on the product makes it impractical for most Macintosh users. That means that the keyboard remains the primary input device for text. That being the case, you can significantly speed up working with documents if you can speed up your typing. (The suggestions that follow are in addition to working with a typing program if you don't already know how to touch type!)

Quick Access to Special Characters

Macintosh fonts provide a variety of special characters that can make a document look more professional. These include curly quotes (for example, " and "), ligatures (for example, fl or æ), and en and em dashes (– and —). You can access the special characters by pressing key combinations including the Shift and Option keys. However, the key combinations are often awkward to type and hard to remember.

To make it easier to type special characters, use SmartKeys, a freeware utility. SmartKeys works with most applications to provide the following:

- ***Space:*** The space SmartKey makes sure that you don't type more than one space in a row. (Using two spaces to separate sentences is a technique used with typewriters that shouldn't be used in word processed documents.)
- ***Dash:*** The dash SmartKey turns two hyphens (- -) into an en (–) or em dash (—). The specific dash that appears is handled by settings in the SmartKeys control panel.
- ***Quotes:*** Professionally typeset documents use curly quotes (" " and ' '). When Smart Quotes is turned on, typing quotes produces the correct curly quotes instead of the normal straight quotes.
- ***Ligature:*** The ligature SmartKey replaces the two characters that form a ligature with the ligature itself. In most Macintosh fonts, the ligatures are fi, fl, æ, Æ, œ, Œ, and ß.
- ***Kill Doubled Capitals:*** If you accidentally type two capital letters at the beginning of a word, followed by a lowercase letter, the Kill Doubled Capitals SmartKey changes the second capital into a lowercase letter. For example, if you happen to type ANd, it will be changed to And.
- ***Shifted Punctuation:*** On occasion, you may want to hold down the Shift key while you type letters and punctuation marks. However, unlike the Cap Locks key, the Shift key shifts every character, making it impossible to type characters such as a period or comma. The Shifted Punctuation SmartKey makes the Shift key work like the

Figure 9.5 The SmartKeys control panel

Caps Lock key so that you can type punctuation marks and letters while the Shift key is down.

Some applications such as word processors and desktop publishing programs have already implemented Smart Spaces and Smart Quotes; some special characters (in particular, ligatures) may not be available with all fonts. In addition, some programs such as games may require repeated presses of the space bar. You can therefore use the SmartKeys control panel (Figure 9.5) to turn off SmartKeys for specific applications.

Typing Shortcuts

Throughout the day, there are many phrases that you type repeatedly, such as your name, the name of your company, the current date, and phrases like "Yours sincerely." You can ease typing of such phrases by using TypeIt4Me, a system extension that looks for short abbreviations as you type and replaces them with text that you have associated with the abbreviation.

After installation, TypeIt4Me places a menu to the left of the menu (Figure 9.6). You then use the Add Entry and Edit Entry options to place abbreviations and the text that should be substituted for the abbreviations into a TypeIt4Me dictionary, as in Figure 9.7. The abbreviation is usually a combination of a few characters that aren't likely to appear in a document. For example, "ys" makes a good abbreviation for "Yours sincerely," and "@dt" makes a good abbreviation for the current system date.

The TypeIt4Me editor provides a significant amount of space to enter the text that will be substituted for an abbreviation. Notice in Figure 9.8 that the text of only one abbreviation appears at a time; the

Figure 9.6 The TypeIt4Me menu

text entry window will scroll if necessary. This means that TypeIt4Me can be used to insert paragraphs of boilerplate into a document.

Optimizing Keyboard Access to Dialog Boxes

You can get away from using the mouse to move around dialog boxes using a combination of System 7 features and shareware software. Using the keyboard rather than the mouse can significantly speed up opening and saving files because you don't have to move your hand from the keyboard to the mouse in those commonly used Open File and Save File dialog boxes.

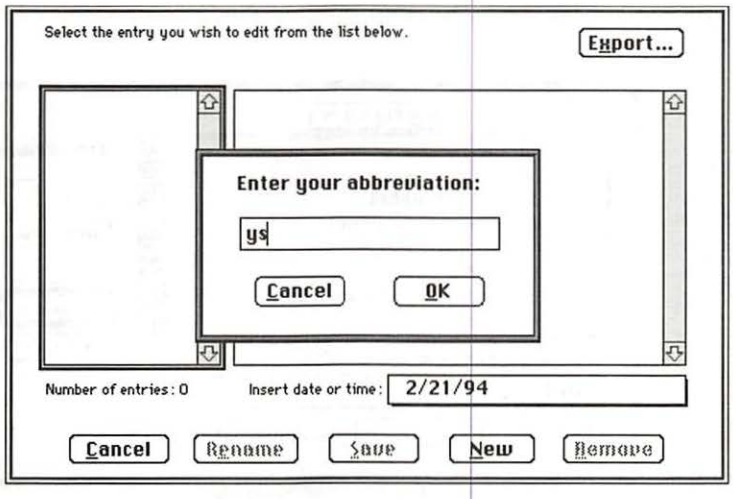


Figure 9.7 Entering a TypeIt4Me abbreviation

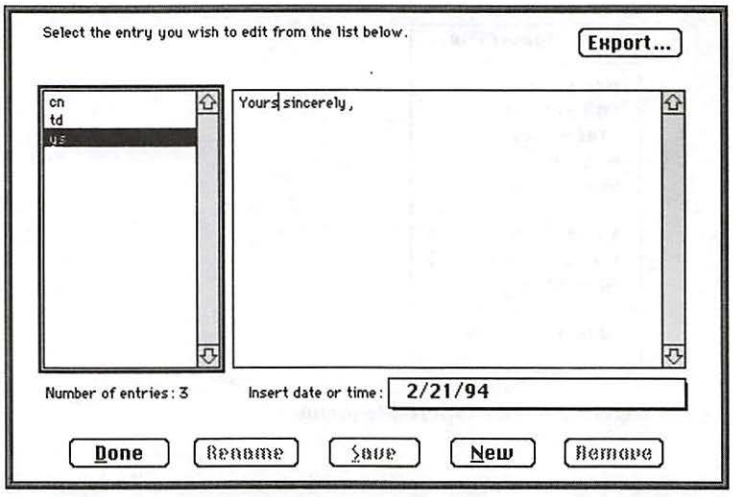


Figure 9.8 The TypeIt4Me window with an abbreviation and its associated text

Keyboarding Around a Dialog Box

Under System 7, the elements of a dialog box are accessible in round-robin fashion by using the Tab key. For example, in the Save File dialog box in Figure 9.9, pressing the Tab key moves between the scrolling file list and the rectangle for entering the name of the file being saved. The file list in Figure 9.9 has a dark border around it to indicate that it is the active element in the dialog box. Pressing Tab moves the highlight to the file name rectangle; pressing Tab once more returns to the file list.

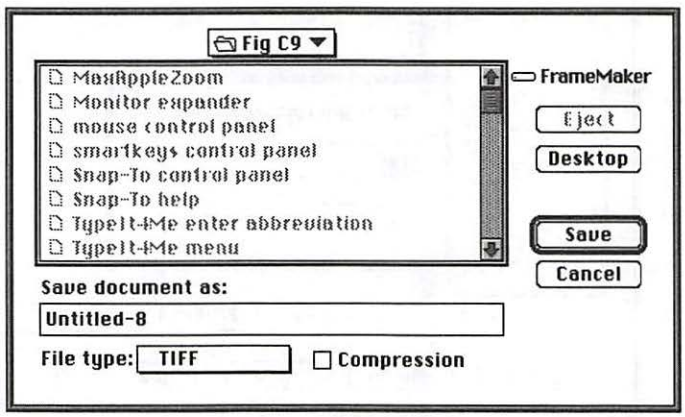


Figure 9.9 Using the Tab key to highlight the file list in a Save File dialog box

You can also use the keyboard to make selections in a dialog box file list:

- Use the ↓ key to move the highlight down the file list.
- Use the ↑ key to move the highlight up the file list.
- If you have an extended keyboard, use the Home key to scroll to the top of the file list; use the End key to scroll to the end of the file list.
- If you have an extended keyboard, use the Page up key as a substitute for clicking in the scroll bar above the scroll box; use the Page down key as a substitute for clicking in the scroll bar below the scroll box.
- Use the Enter key to open a highlighted folder or to select a highlighted file.

Moving the Cursor to the Default Button

Snap-To, a shareware control panel (Figure 9.10), makes it easier to work with dialog boxes that have default buttons, even if the default buttons aren't outlined by the application that displays them. Snap-To automatically moves the cursor to the default button so that you don't have to spend time moving the mouse pointer to the dialog box (particularly useful for large monitors). You can then use the Enter key to select the default button. In fact, if the default button is the button you need, you needn't touch the mouse at all.

As you can see from the help screen in Figure 9.11, Snap-To can add outlining to default buttons that aren't outlined by their applications, disable or enable cursor moving in Open File and Save File dialog

Figure 9.10 The Snap-To control panel

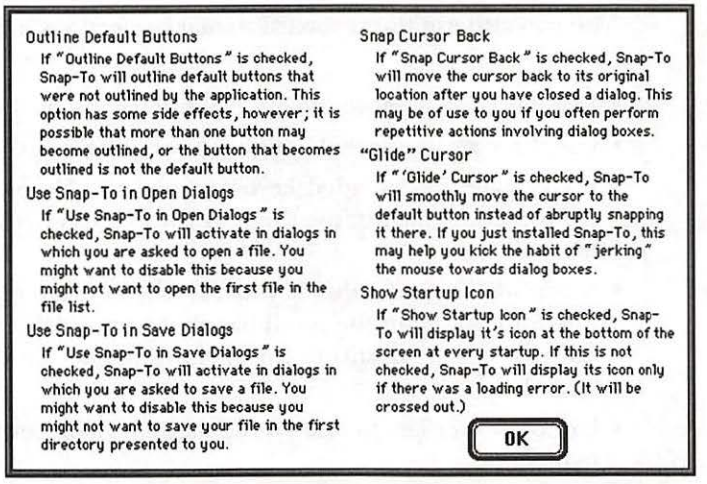


Figure 9.11 The Snap-To Help screen

boxes, and move the cursor back to its original location when the dialog box is dismissed. By default, Snap-To moves the cursor with a jerk; however, you can change the "snap" into a "glide" if you prefer a more gentle movement.

Alternative Keyboard Layouts

The symbols that appear on the top of keys in a keyboard are nothing more than labels for the convenience of users. The character that appears when you press a key is determined by a system resource which is completely unrelated to the way in which the keyboard is labeled. This situation is both good and bad (but mostly good). The good part is that you can change the mapping of keys to characters by installing a new keyboard resource into your System file. The bad part is that when you use a keyboard layout that doesn't correspond to the labels on your key caps, you may find it difficult to remember which character is generated by which key.

Alternate keyboard layouts, however, can be very useful. There are several versions, for example, of Dvorak keyboard layouts. Many people find that the layout of the keys promotes faster typing than the standard QWERTY keyboard, which was actually designed to slow down touch typists during the era of mechanical typewriters. As you can see in Figure 9.12 (the unshifted Dvorak layout) and Figure 9.13 (the shifted Dvorak layout), the vowels have been moved to the "home" row of the keyboard (the row where the fingers normally rest). Other commonly used keys are either in the home row or in the center of the keyboard where they are easily reached with little hand movement.

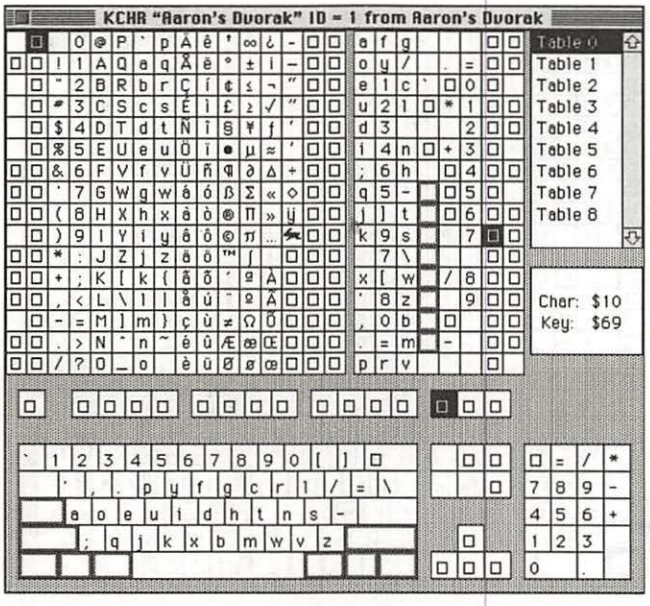


Figure 9.12 The unshifted Dvorak keyboard layout

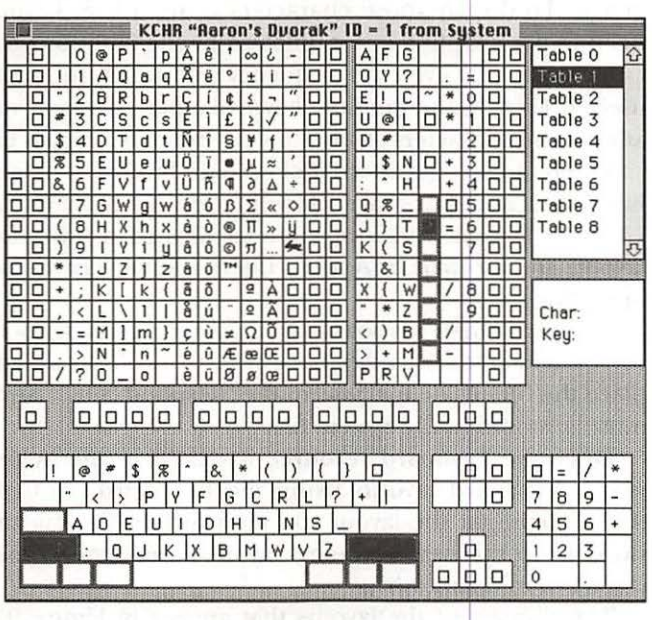


Figure 9.13 The shifted Dvorak keyboard layout

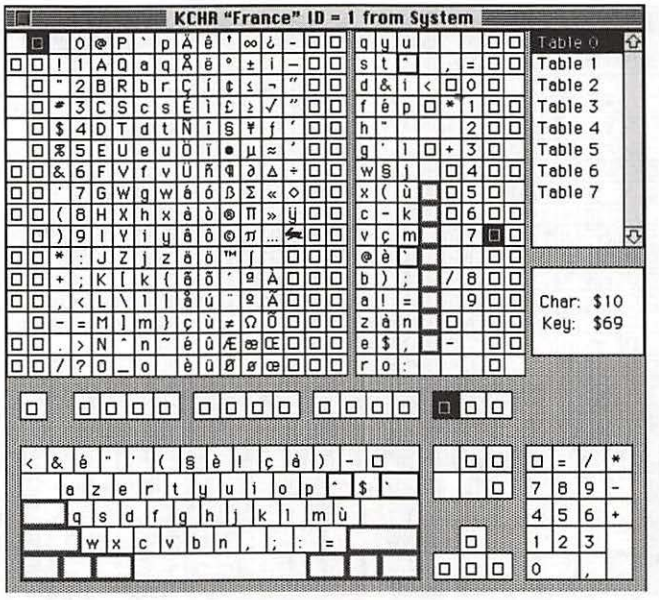


Figure 9.14 The unshifted French keyboard layout

A wide variety of international keyboard layouts are also available. For example, the French keyboard layout in Figure 9.14 provides easy access to the accented vowels that are used frequently in the French language. To display those characters using a U.S. keyboard layout, you need to press Option-letter followed by the letter to which you want the accent applied. Given the frequency with which the accented vowels are used in French, the multiple keystroke per character method of generating those characters would slow down French typists unnecessarily.

Where do you get alternate keyboard layouts? The examples that you have seen are shareware, downloaded from an information service (Aaron's Dvorak and International Keyboard Layouts). International layouts are also part of Apple's international versions of the Macintosh operating system.

To install a new keyboard layout, you drag the keyboard layout file to the System folder. Under System 7, you will be asked if you want to place the file inside the System file. Respond "OK": Keyboard resources must be stored in the System file.

Once the keyboard resource is stored in the System file, you can switch keyboard layouts using the Keyboard control panel (Figure 9.15). Highlight the layout you want to use. Closing the control panel switches to the new keyboard layout immediately; you don't need to restart your Macintosh.

The displays of the layouts that appear in Figure 9.12, Figure 9.13, and Figure 9.14 are accessible by using a program called ResEdit.

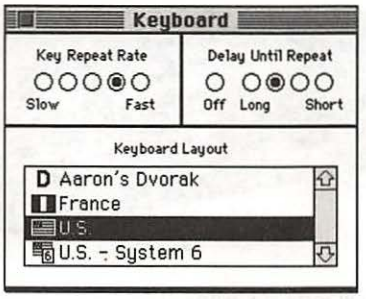


Figure 9.15 The Keyboard control panel showing multiple keyboard layouts

ResEdit is a freeware application developed by Apple for use by programmers to create and manipulate resources. It is available for downloading from most information services.

Knowledgable users can also benefit from ResEdit. Keep in mind, however, that because ResEdit can actually modify resources, you should always work on a copy of a file rather than the original.

To see the key mappings provided by a system layout:

1. Make a copy of the file into which you are going to look. This can be the file containing the keyboard layout or a System file into which a keyboard layout has been installed.
2. Launch ResEdit and click on the splash screen to make it disappear.
3. Use the Open File dialog box to select the file you want.
4. A screen showing an icon for each type of resource in the file appears.
5. Double-click on the icon for the KCHR resource.
6. A listing of the individual resources appears, as in Figure 9.16.

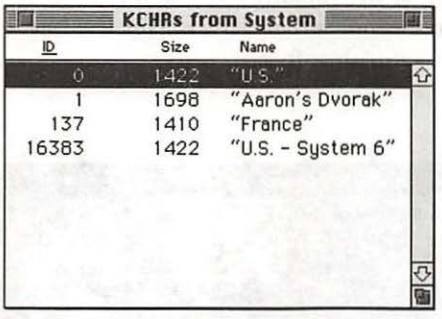


Figure 9.16 The keyboard resources stored in a file

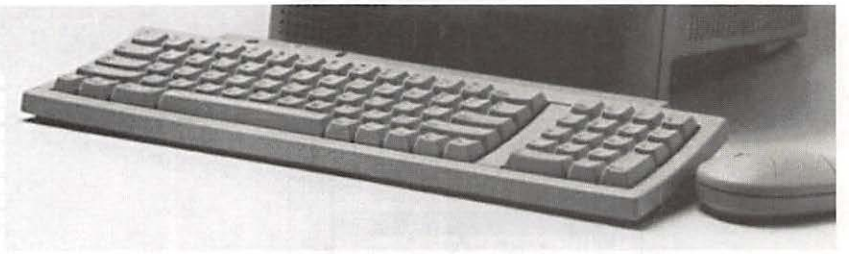


Figure 9.17 The Macintosh standard keyboard

7. Double-click on the keyboard layout you want to see. The keyboard layout will appear.
8. Press modifier keys (Shift and/or Option) to see the characters that will be displayed when modifier keys are pressed.

Adding Extended Keyboard Keys to a Standard Keyboard

Many of today's Macintoshes are sold with a standard keyboard such as that in Figure 9.17. It has a numeric keypad, but lacks some of the keys found on the extended keyboard (Figure 9.18), including function keys, Page up, Page down, Home, End, Del, and Help/Ins. You needn't replace your keyboard, however, to have these keys. Instead, you can install a software extension that lets you substitute a key combination for each of the missing keys.

Keyboard PLUS, for example, is a shareware control panel that handles assigning key combinations to the missing keys. In Figure 9.19, the key combination Control-1 has been assigned as a substitute for the key F1. (The character ^ is often used to represent the Control key.) Although there is no restriction as to which key combinations can be chosen for any one of the missing extended keyboard keys, the Control key along with some other key usually makes the best choice because it is rarely used by Macintosh software.

Figure 9.18 The Macintosh extended keyboard

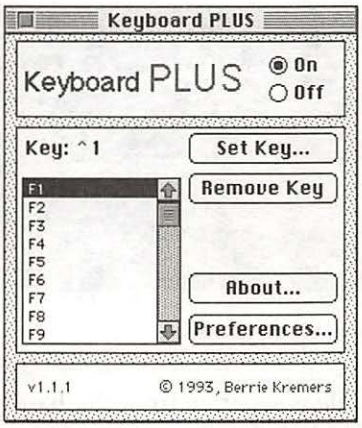


Figure 9.19 The Keyboard PLUS control panel

When Software Isn't Enough...

Software alone can't make you a faster typist, although as you have seen, it can make typing more convenient. A new keyboard also won't necessarily make you a faster typist, although a more responsive keyboard (one that needs only a light touch to activate a key) can help. Speed, however, isn't the major concern many users have about keyboards. In fact, much of the focus on keyboards and keyboard design is concerned with avoiding hand, wrist, and arm problems that can occur from continuous use of a keyboard where the hand and wrist position doesn't vary for long periods of time. These injuries are known collectively as repetitive motion disorders, the most widely known of which is carpal tunnel syndrome.

There are several ways to avoid repetitive motion disorders. (Repetitive motion disorders are very painful and treatment isn't always successful; it is better to avoid them if at all possible.) The easiest solution is to make sure that you vary your hand and wrist position as you work, taking frequent breaks if necessary.

Another solution is to purchase a type of keyboard that is less likely to produce problems. Adjustable keyboards—keyboards that split in the middle and allow you to place the keyboard comfortably on the desk—can help avoid repetitive stress disorders. The Apple Adjustable Keyboard, for example (Figure 9.20), not only splits in the middle, but provides wrist rests that keep the arm, wrist, and hand at the same angle, another technique known to help avoid injury. Although the basic Adjustable Keyboard doesn't have all the keys of the extended keyboard, you can add a separate numeric keypad module (Figure 9.21) that contains not only the numeric keypad but function keys as well.

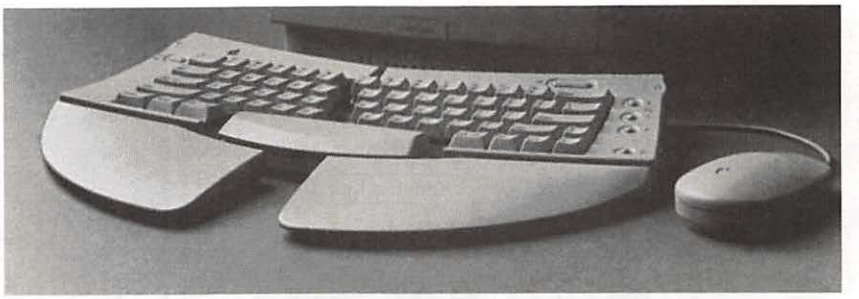


Figure 9.20 The Apple Adjustable Keyboard

Because the keypad module is separate from the basic keyboard, it can be placed anywhere on the desk that is comfortable for the user.

Extending the Screen

For many applications, a larger monitor is certainly better. Short of purchasing a new monitor, there may be something you can do with software to enlarge the viewing area of a monitor. Keep in mind, however, that monitor extension software is usually very restrictive in terms of which hardware it supports.

Most monitors display a black border around the edges. There are some shareware INITs that can convert at least a portion of that black border into Desktop, increasing the total number of pixels visible on the monitor. Some can also create a virtual, or simulated, Desktop that is larger than the physical display surface. These products support one or more Apple-brand video cards; they do not work with Macintoshes that rely on video circuitry on the motherboard.

MaxAppleZoom

MaxAppleZoom (Figure 9.22) works with the Apple Toby Frame Buffer Card, the Macintosh II High-Resolution Video Card, the Apple Display

Figure 9.21 The Apple Adjustable Keyboard with optional keypad module

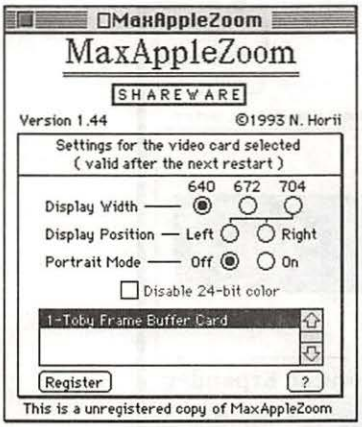


Figure 9.22 Setting monitor resolution with MaxAppleZoom

Card 4/8, and the Apple Display Card 8/24. It can increase the display width from 640 pixels to 704 pixels. If you happen to have more than one compatible video card, you can configure separate resolutions for each card.

Monitor Expander

Monitor Expander works only with the Toby Frame Buffer video card. (This card was generally sold in the late 80s for the Mac II, IIx, and IIfx.) It can use some of the black border space around a monitor but can also create a virtual Desktop.

To use Monitor Expander, you drag its control panel to the System folder and then restart. Then, you open the Monitors control panel and click the Options button. Monitor Expander provides the display configuration options in Figure 9.23. The "Desktop size" list determines the size of the virtual Desktop; the "Viewing area" list determines how many pixels are visible at one time. If the size of the virtual Desktop is larger than the physical Desktop, you can cause the viewing area to scroll by dragging the mouse pointer to the edge of the screen.

By the Way

Because larger Desktops require more video memory, using a larger Desktop may cut down on the maximum colors or shades of gray that you can use.

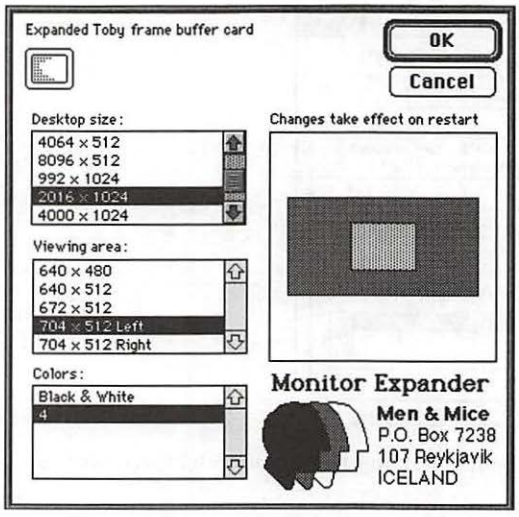


Figure 9.23 Monitor Expander options

Speeding Up Screen Displays

The speed at which the Macintosh can draw an image on a monitor is largely a function of the video hardware in use. Video hardware built onto the computer's motherboard is generally faster than video hardware on an expansion board. However, you can also affect the speed of redraws by the number of colors or shades of gray you choose to display.

As you know, the number of colors and shades of gray is determined by settings in the Monitors control panel (Figure 9.24). Although some

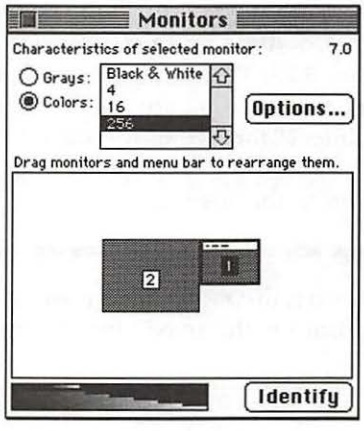


Figure 9.24 The Monitors control panel

graphics and game programs require a specific number of colors or shades of gray, in most cases the display depth is up to you. You will get faster screen redraws if you display fewer colors and shades of gray; black-and-white displays are the fastest. If you are working with full-color graphics or photographic images, the difference in display redraw speed between 256 colors/shades of gray and black and white is dramatic; the difference between thousands of colors and black and white is even more significant.

By the Way

The slowdown in displaying grayscale or full-color images can be so significant that most page layout and document processing programs provide a setting that turns off the display of graphics altogether. Although the space allocated to the graphics appears, the computer doesn't spend time attempting to draw the pictures. If screen redraw speed is a problem for you, check your desktop publishing software for such an option.

Faster Color Depth Switching

Once you have decided to adjust the color depth of your monitor(s) to speed up screen redraws, you are faced with the prospect of opening the Monitors control panel every time you want to make a change. There are, however, some shareware products that can make the switch much easier. The first one described in the following section (ColorSwitch) is typical of INITs that change a monitor's color depth at your command. The second (DepthMaster) links color depths to specific applications and changes the number of colors/shades of gray when you launch or quit specific programs.

Color Switching with ColorSwitch

ColorSwitch installs as a control panel. Under System 7, it places a menu just to the left of the Balloon Help menu in the menu bar (Figure 9.25). This menu makes changes to the startup monitor. It also lets you adjust the volume of the Macintosh's speaker (the Volume option at the top of the menu).

The ColorSwitch menu can also pop up anywhere on the screen of any monitor attached to the Macintosh. The modifier keys that must be pressed in conjunction with the mouse button to make the menu appear are controlled by ColorSwitch's settings. Assuming that the settings are configured as in Figure 9.26, pressing the Shift and Control

Figure 9.25 The ColorSwitch menu

keys along with pressing the mouse button displays the menu. The option you choose from the menu affects the monitor on which the menu is displayed, making it easy to change the settings of a single monitor on a Macintosh with multiple monitors.

Linking Color Depths to Applications with DepthMaster

DepthMaster takes a slightly different approach to switching color depth. Although it does provide a popup menu that can be used to change color depths and sound levels, its greatest strength is in allowing you to build a database that links monitor and sound settings to specific applications. After installing the control panel, you configure the program through a specially tailored Open File dialog box (see Figure 9.27).

Figure 9.26 ColorSwitch menu settings

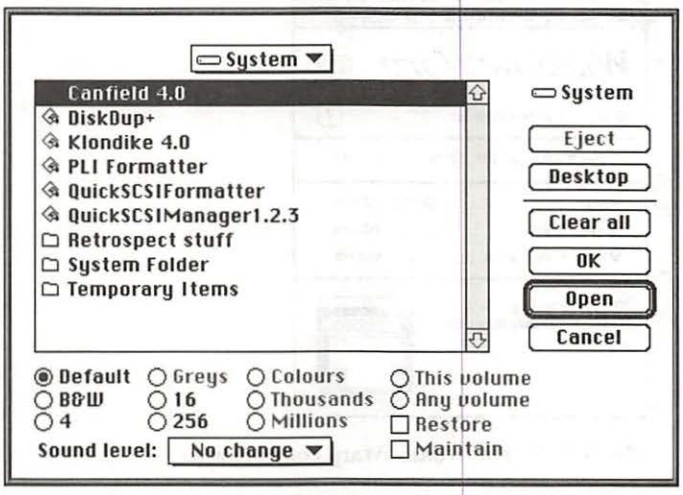


Figure 9.27 Linking an application to color depth and sound level

For each application whose color depth you want to control, you choose a radio button that corresponds to the color depth. You can also use the "Sound level" popup menu to change speaker volume without opening the Sound control panel. Settings can be retained from one application to another or reset when an application is no longer the current application. Keep in mind that the settings enforced by DepthMaster don't affect the settings in the monitor's control panel. Your Macintosh will return to those settings the next time you restart.

Optimizing Zooming Across Multiple Monitors

Although most Macintosh software is compatible with multiple monitors, when it comes to zooming windows on multiple monitors, some software isn't very smart. Clicking the zoom box at the upper right corner should zoom the window to fill the entire screen of the monitor on which the window is currently displayed. Nonetheless, sometimes clicking the zoom button moves a window back to the startup monitor, even if it was originally on another monitor.

To gain control of the behavior of the zoom box, install the shareware utility WindowWarp (Figure 9.28). By combining a click on the zoom box with modifier keys, WindowWarp can either force a window to zoom to fill the screen of the largest monitor available or zoom to fill the screen of the monitor on which the window is currently displayed.

Figure 9.28 The WindowWarp control panel

When Software Isn't Enough...

Software techniques sometimes aren't enough to speed up video display. For example, setting the display to black-and-white isn't a viable alternative if you are working with color graphics or grayscale images. In that case, you may need to look to hardware speedup and upgrade solutions.

The Macintosh stores the image displayed on each monitor attached to a Macintosh in RAM. However, with the exception of Macintoshes with an internal black-and-white display (for example, the 68000 Macintoshes and the SE/30), the RAM is special video RAM rather than the system RAM used to run applications. The number of colors/shades of gray that you can display on a monitor is partially determined by the amount of available video RAM. The other major factor is the number of individual dots (pixels) on the monitor's screen. The more pixels on a screen and the more colors/shades of gray displayed, the more RAM is needed to store the image. For example, if you have 256 K of video RAM, you can display thousands of colors on a 12-inch monitor but only 256 colors on monitors between 13 and 16 inches. Upgrade the video RAM to 768 K and you will be able to display thousands of colors on 13- and 14-inch monitors. At the high end, 2 Mb of video RAM can produce millions of colors on monitors of up to 16 inches. However, monitors between 16 and 21 inches can display only thousands of colors.

One way you can upgrade your video is to add more video RAM. Some Macintoshes have expansion slots for video RAM on their motherboard; others can accept additional video RAM that is installed on a video expansion board. When purchasing video expansion hardware,

By the Way

To be completely accurate, the LC can function without any video RAM, although its default configuration has video RAM. If you try to use application RAM for video RAM on an LC, you will be limited to a 12-inch black-and-white display.

check both the size of the monitors supported by your Macintosh after the upgrade coupled with the number of colors/shades of gray that can be displayed.

Adding video RAM necessarily doesn't do anything about the speed with which images are displayed. However, if you are working with full-color (thousands or millions of colors) or 256 grayscale images, you may be able to speed up video display by installing a video accelerator board. Video accelerators work by replacing the routines in the Macintosh ROM (QuickDraw) that software typically uses to draw on the screen. The graphics routines on the video accelerator board execute more quickly than those in ROM, providing the video display speedup. However, actual video benchmarks indicate that the actual speedup provided by these boards is not as dramatic as you might expect: If you get a 10 to 20 percent increase you are doing well.

By the Way

A review of a large collection of video accelerator boards can be found in the April 1994 issue of *Macworld* ("Fast Track to 24-Bit Color").

10

Streamlining Through Customization

Many of the common procedures you perform every day with your Macintosh are repetitive and tedious. For example, it can be very annoying to have to choose Empty Trash from the Special menu every time you want to delete something. It would be much easier to simply press a keyboard equivalent (⌘-something-or-other) or even to have the trash emptied automatically whenever you put something in it, should that be your choice.

There are three general strategies for customizing your Macintosh to simplify and speed up routine tasks. The first that you will read about in this chapter involves creating *keyboard macros,* sequences of actions that are invoked when you press a previously specified key combination. The second strategy is to employ an *intelligent agent* that watches how you use your Macintosh and makes suggestions as to how those procedures can be automated. Finally, for the ultimate in flexibility, you might choose to write *scripts* (small programs that interact with the operating system and some application programs) to automate very specific, custom activities. The final portion of this chapter therefore looks at AppleScript, the scripting language that made its debut with System 7 Pro.

Keyboard Macros

Originally, a *macro* was a small block of code in a program that was assigned a name. Whenever the programmer wanted to use that block of code, he or she used the name as a placeholder. The name of the

macro was replaced by the actual code that made up the macro when the program was translated into executable form. Spreadsheet developers latched on to the idea of having a group of actions initiated by a name associated with those actions, thus creating the first keyboard macros as a means of automating spreadsheet interactions. The concept of a keyboard macro has been extended so that you can associate a keystroke or keystroke plus modifier key with any group of actions, regardless of whether you are interacting with an application program or with the operating system.

Although there are several keyboard macro programs available for the Macintosh, the most widely used is QuicKeys. QuicKeys can fill in all sorts of gaps in the Finder and in application programs. For example, you might use QuicKeys to define ⌘-T for the Special menu's Empty Trash command. QuicKeys can also be used to add support for the function keys and cursor control keys on the extended keyboard to applications that otherwise don't support those keys.

QuicKeys groups macros into "sets." All applications and the Finder have access to macros in the Universal set. As you can see in Figure 10.1, the Universal set adds support for the extended keyboard as well as provides key sequences for access to the QuicKeys program. You can also create sets that are specific to a given application. For example, ⌘-T is very useful with the Finder as a quick way to empty the trash. That same key sequence, however, is used by a number of word processing and desktop publishing problems to invoke a "go to page" dialog box. Therefore, the ⌘-T macro should be placed in a special set for the Finder rather than in the Universal set.

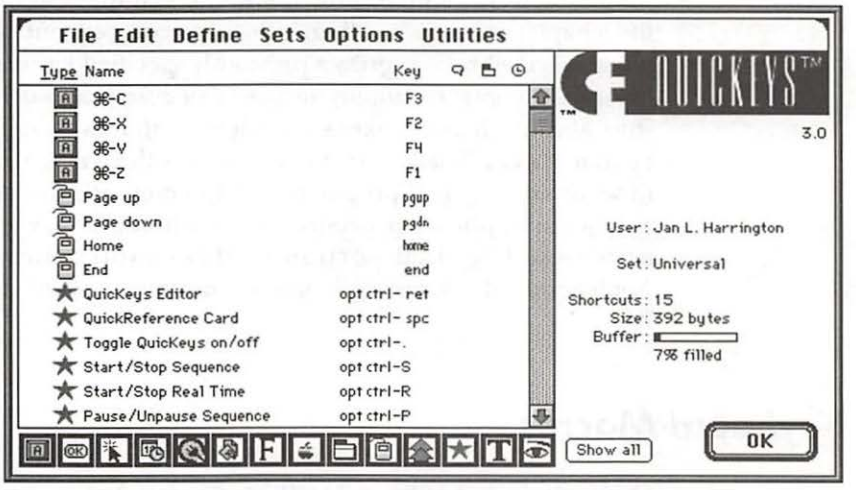


Figure 10.1 The QuicKeys ShortCut Editor displaying a portion of the Universal set

QuicKeys can handle macros for many different events in the Macintosh environment. There are three ways to create macros: the ShortCut Editor (the easiest but least flexible way), recording actions (more flexible than the ShortCut Editor but a bit more difficult), and programming the macro sequence (the hardest but most flexible way). As you can see in Figure 10.2, macros defined using the QuicKeys Shortcut Editor can do any of the following:

- Act as aliases for any keystroke
- Select buttons
- Perform a mouse click or drag anywhere on the screen
- Insert a date or time in one of a variety of display formats
- Turn system extensions on and off
- Gain access to FKeys (macros such as ⌘-Shift-3 that are installed in the System file)
- Make menu selections
- Adjust windows ("Mousies")
- Invoke the sequence editor (for editing and writing macro sequences from scratch)
- Add bits of text to a document
- Replay actions in the same amount of time you used when you initially performed them

To add a shortcut to a set, you first run the application for which you want to define the ShortCut. Then, open the QuicKeys dialog box,

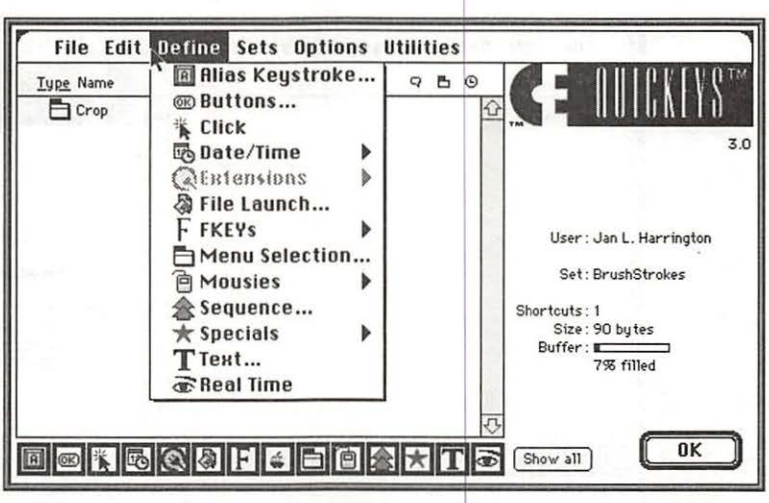


Figure 10.2 QuicKeys Shortcut Editor macro types

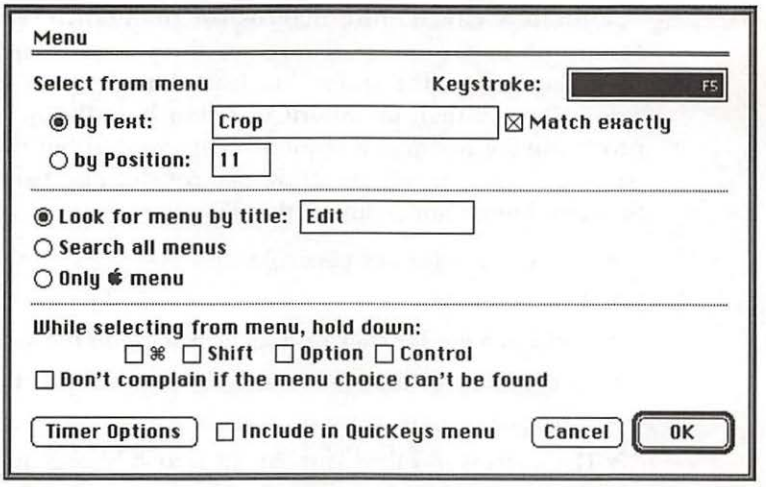


Figure 10.3 Configuring a QuicKeys shortcut

choose the set to which you want to add the shortcut, and choose the type of shortcut from the Define menu that appears in Figure 10.2. The Shortcut Editor then asks you to press the key sequence or perform the actions that are to be performed by the shortcut. Although the QuicKeys dialog box is open, the actions you take are interpreted in terms of the application program with which you were working most recently.

QuicKeys then lets you look at the proposed shortcut. In Figure 10.3, for example, the shortcut is a menu selection (choosing Crop from the

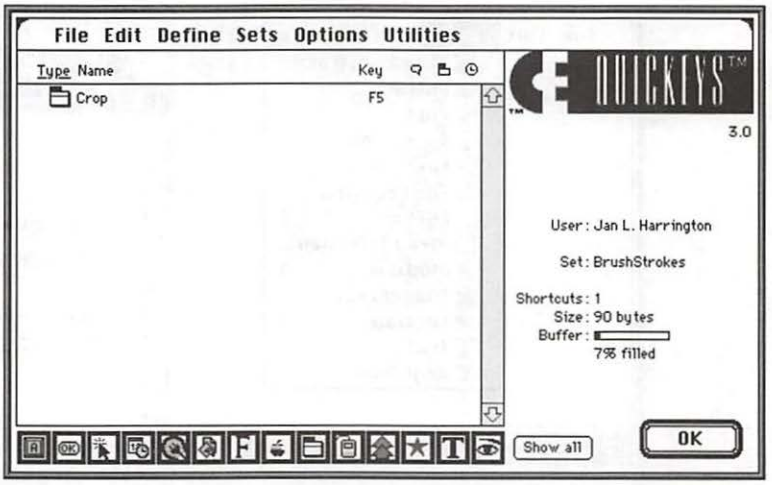


Figure 10.4 The first macro in a new QuicKeys set

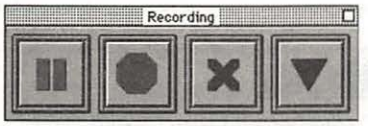


Figure 10.5 The QuicKeys Recording palette

Edit menu of a graphics program). In most cases, all you will need to do at this point is enter the keystroke that you want to associate with the shortcut. Once you close the configuration window, the new keyboard macro appears in the chosen set. The Crop menu item selection is the first macro in an application-specific set (see Figure 10.4).

Recording a macro means that QuicKeys keeps track of every action you perform once recording is turned on. These actions become a part of a QuicKeys script, which you can then associate with a keystroke combination. Recording is controlled from the Recording palette (Figure 10.5). Notice that the palette looks much like the controls on a video or audio tape recorder.

Once you have completed the actions that you want to be part of the sequence, QuicKeys opens the Shortcut Editor and then the Sequence Editor. As you can see in Figure 10.6, the Sequence Editor shows you the actions you have performed and allows you to view and/or modify them before saving the sequence. The Sequence Editor also lets you name the newly recorded sequence and assign the keystroke that will invoke it.

The recorded sequence in Figure 10.6 might look a bit imprecise because the last three actions are all mouse clicks. However, each

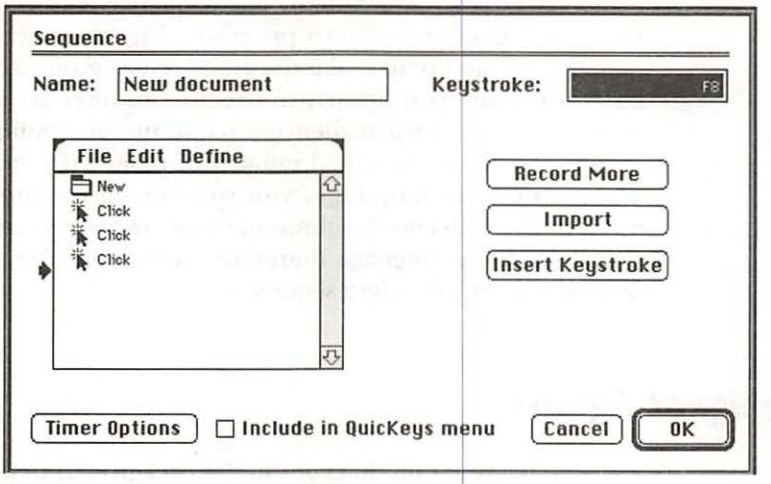


Figure 10.6 A QuicKeys recorded sequence

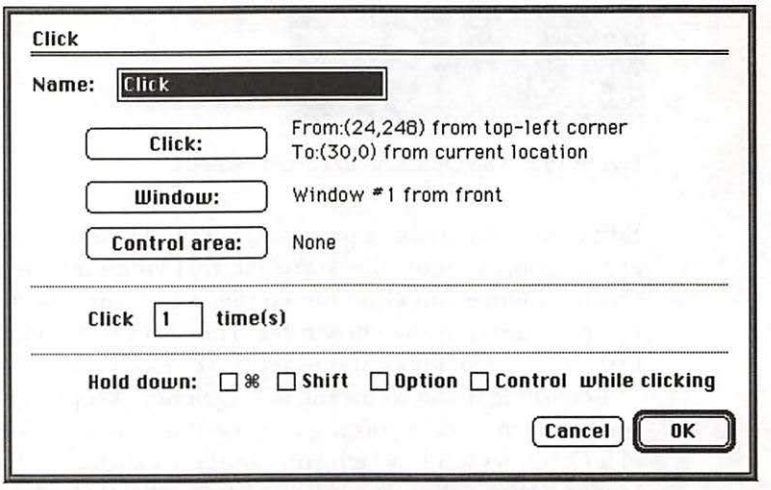


Figure 10.7 Editing a mouse click action

mouse click action is associated with the specific location on the screen where the click occurred (see Figure 10.7). In this particular sequence, the first action opens a new document by choosing New from the File menu. The first mouse click (the second action) sets the foreground color to white; the second mouse click sets the line color to white. The final mouse click selects a rectangle tool from a palette of graphics tools. (This sequence is very handy for configuring a bit-mapped graphics program so that it can be used to clean up screen shots. However, it works only as long as the floating tools palette isn't moved!)

As you have seen, recording a sequence gives you access to the Sequence Editor (Figure 10.6). The Sequence Editor provides access to the entire QuicKeys macro programming language. This language includes the ability to make decisions (choose one action or another based on some condition), to execute another sequence and then return to the original sequence to continue processing, and to repeat groups of actions a specified number of times. [If you are familiar with a programming language, you will recognize these elements as if/then/else (selection), subroutine calls, and looping (iteration).] The QuicKeys macro language therefore provides flexible control over the actions that are taken by a sequence.

Intelligent Agents

An *agent* is a program that runs in the background to handle the specific tasks for which it has been programmed. An *intelligent agent* is an

agent that learns by watching how you interact with your Macintosh. One of the first products to make use of intelligent agent technology is Open Sesame!, a program designed to identify and automate things you do with the Macintosh operating system.

By the Way

Open Sesame!'s learning capabilities are based on an artificial intelligence technique known as *neural networks.* A neural network attempts to simulate the learning processes of the neurons in the human brain.

Open Sesame! observers two kinds of behavior: event-based and time-based. An event-based behavior is a pattern of repeated actions that always occur together, but not necessarily at any given time. For example, if you empty the trash immediately after putting something in it, Open Sesame! detects that behavior as event-based. On the other hand, behavior that generally occurs at the same time every day is considered time-based. If you happen to check your electronic mail at 2:00 p.m. every day, Open Sesame! will notice that behavior and, if you give the program permission, will automatically run your e-mail program at 2:00 p.m.

The Preferences dialog box (Figure 10.8) determines which behaviors Open Sesame! will monitor and learn. Notice that it looks for files, folders, and applications that you open or close as well as behaviors such as hiding and showing windows. It also looks for items that you access frequently and that might benefit you by being placed in the Apple Menu Items folder, in the Startup Items folder, or on the

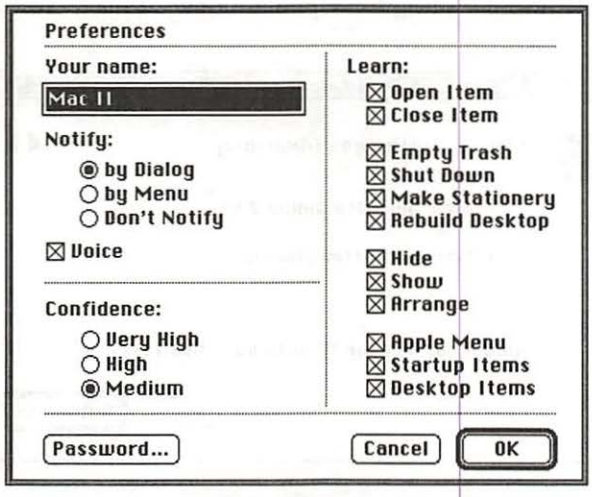


Figure 10.8 The Open Sesame! Preferences dialog box

Desktop.

Open Sesame! installs as a combination of an INIT and an application program. The installer places an alias for the application in the Startup Items folder; Open Sesame! can monitor behavior only if the application is running in the background. The application requires between 500 and 600 K of RAM. If your Macintosh has limited RAM, you may want to quit the Open Sesame! application when working with a large application program.

Open Sesame! doesn't necessarily wait until it's positive about a behavior before asking you if the behavior should be automated; it can tolerate some fuzziness in its conclusions. However, you can control how confident Open Sesame! will be before it makes a suggestion to you with the Confidence radio buttons.

Once it is confident enough to make an observation, Open Sesame! notifies you in a pleasant female voice that it has noticed a pattern. For example, in Figure 10.9 Open Sesame! noticed that the Mac II's user ran a particular program eight minutes after starting up the machine. (This, of course, is a time-based behavior.) If the user should choose to automate this behavior, then Open Sesame! will cause it to occur eight minutes after every system startup.

If an Open Sesame! observation is close, but not exactly what you want, you can edit the behavior associated with the observation. Notice in Figure 10.10, for example, that you can change when the behavior occurs, whether Open Sesame! asks for confirmation before performing the behavior, and whether the instructions represented by this behavior are turned on or off. (Instructions that have been turned off remain available, but are not executed until they are turned on again.) The dialog box in Figure 10.10 can also be used to create new instructions, without waiting for Open Sesame! to make an observation based

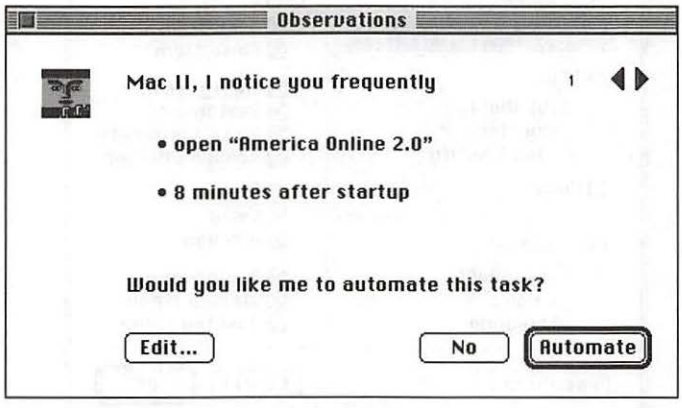


Figure 10.9 An Open Sesame! observation

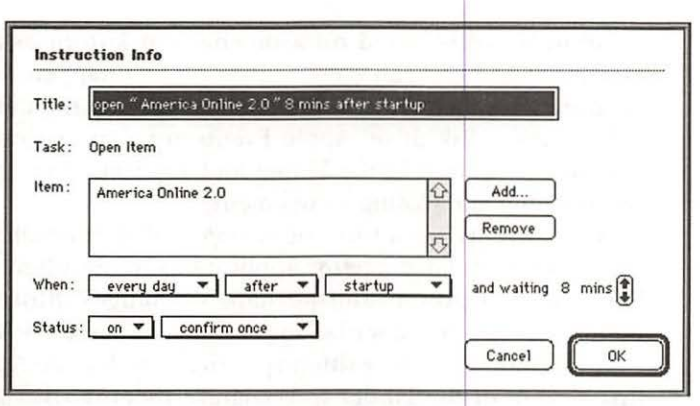


Figure 10.10 Editing an Open Sesame! instruction

on your behavior.

Just how smart is Open Sesame!? When it comes to interacting with the Desktop, it's very smart. It notices when you do things, what things you do (including files that you tend to open at the same time), and where you tend to put things. If you respond "no" twice to an observation, Open Sesame! keeps track of that fact and doesn't ask you again. On the other hand, Open Sesame! can't monitor actions while you're working with an application program. If you want to customize and/or automate behaviors inside an application program, you will need to look at scripting (which can be combined with Open Sesame! instructions for complex behaviors) or at keyboard macros.

Scripting

The release of System 7 Pro marked the official debut of *AppleScript,* a programming language that can be used to customize a wide variety of actions in the Macintosh environment. You might, for example, want to write an AppleScript program that opens an electronic mail program, retrieves your mail, sorts it by type, and then opens with a word processor each piece of mail that meets some predefined criteria. AppleScript is designed to automate such types of complex actions, especially where the actions involve more than one application.

AppleScript programs, known as *scripts,* are typically executed like any other application program. In other words, you run the program (an *applet*) by double-clicking on its icon. Some specially written scripts (*droplets*), however, can be launched by dragging a file or folder icon onto the script's icon. If you obtain commercial or shareware scripts, you will need to consult the script's documentation to determine which type you have.

AppleScript is based on a mechanism known as *Apple Events*. In Macintosh parlance, an *event* is anything that happens in the Macintosh environment, including such actions as moving the mouse or inserting a disk into a disk drive. Apple Events are a special category of events that are recognized by the Finder and application programs (for example, opening and closing a document).

Apple Events are a form of *interapplication communication*. They provide a common language for applications to use when a script switches between applications and perhaps exchanges information between them. Publish and subscribe, for example, is based on Apple Events.

A program must be written specifically to handle Apple Events. The first version of the Finder to recognize them is 7.1.3 (the version that shipped with the first release of System 7 Pro). Currently, only a few application programs support the full range of Apple Events required for the application to be controllable with an AppleScript script, although most major applications are becoming scriptable as they are upgraded.

There are three ways to obtain scripts for your Macintosh:

- Purchase commercial scripts or obtain shareware scripts from an online information service, bulletin board service, or user group.
- Record your own scripts, much as you would record a keyboard macro.
- Write your own scripts, using the AppleScript language.

Given the infancy in which support for AppleScript currently finds itself, none of these options are particularly ideal. There are only few commercial scripts available, although the number of shareware scripts is growing rapidly. Recording a script is as easy as recording a keyboard macro, but very few applications are "recordable." [An application that recognizes Apple Events (a "scriptable" application) and is therefore able to be controlled by a script still is not necessarily recordable.] Writing your own script means that you need to learn to program in the AppleScript language, something that not everyone is willing to do.

By the Way

Many of the commercial scripts that are beginning to appear are involved with automating data communications tasks, particularly involving PowerTalk, the electronic mail software that is part of System 7 Pro. These scripts function as agents to route and process incoming documents.

AppleScript loads as a system extension. It takes up RAM that might otherwise be allocated to application programs. Should you install

AppleScript? The answer is definitely "maybe." If you have scriptable or recordable applications and have access to useful scripts or are writing your own scripts, then AppleScript can help speed up routine tasks as well as make them easier and more efficient. AppleScript's programming language is more flexible than that available with a keyboard macro program such as QuicKeys. It also provides more flexibility in how scripts are executed. (Keyboard macros are invoked only by keystrokes; scripts are actual application programs.)

However, if you don't have scriptable or recordable applications, don't have access to scripts, and don't know how to program and don't care to learn, then you probably shouldn't bother with AppleScript. Stick to add-ons such as QuicKeys that can record most actions without resorting to programming or requiring Apple Event support, or choose an intelligent agent such as Open Sesame! that learns the way you work with minimal user intervention.

Creating Scripts

When you choose to install AppleScript, several files are copied to your startup disk, including the AppleScript extension and the Script Editor. The Script Editor (Figure 10.11) is an application that can be used to write, record, and run scripts. If you happen to have another scripting system or macro package installed (for example, QuicKeys or UserLand Frontier), you can also use the Script Editor to write scripts for that scripting system. For example, in Figure 10.11 the Script Editor recognizes the presence of QuicKeys.

Recording a script is very much like recording a QuicKeys macro. With a Script Editor document open, you click the Record button and

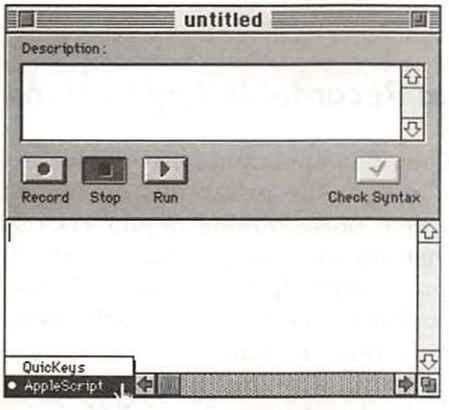


Figure 10.11 The AppleScript Script Editor

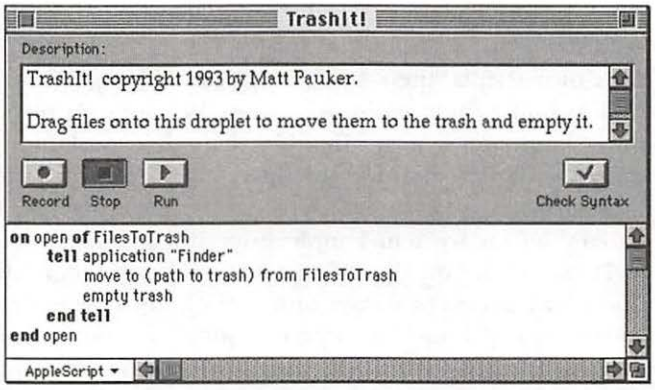


Figure 10.12 A simple AppleScript script to send a file to the Trash and then empty the Trash

then perform the actions you want to record. The actions show up in the Script Editor window as AppleScript statements. When you have finished recording, you click the Stop button. (Switches between the application or applications from which you are recording and the Script Editor are not recorded.)

The Script Editor's window also functions as a text editor that can be used to key in the contents of a script that you are writing. For example, consider the simple script in Figure 10.12. It is written as a droplet. (Any script that begins with "on open" is a droplet.) When you drag an item to the script's icon, the item is sent to the trash; the trash is then emptied immediately. This type of script is a good alternative for someone who doesn't *always* want to empty the trash immediately but instead wants to do so easily from time to time. Because the Finder is scriptable but not recordable, the TrashIt! script was written in the Script Editor by typing in the program statements.

Identifying Scriptable and Recordable Applications

How do you find out if an application is scriptable or recordable? The easiest way is to look at the program's documentation. Because AppleScript is so new, most software developers that support Apple Events advertise that support quite prominently. If you still aren't sure, there is one foolproof way to find out if an application is scriptable; a bit of trial and error can then tell you if an application is recordable.

The Apple Events that an application recognizes are kept in the application's "dictionary." If an application has a dictionary, then it is scriptable. To see if an application has a dictionary, open the Script

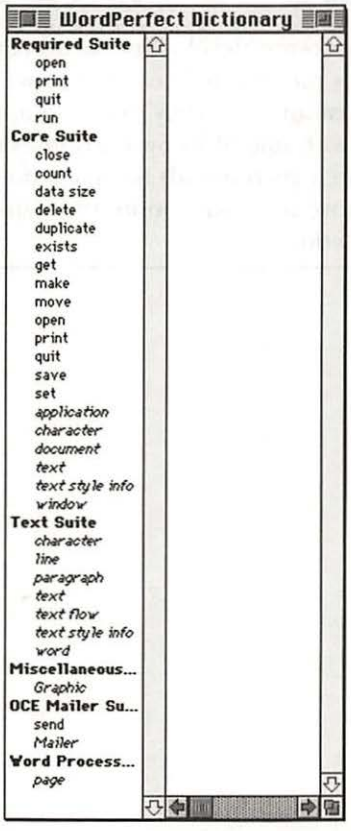


Figure 10.13 The Apple Events recognized by WordPerfect

Editor. Then, choose Open Dictionary from the File menu. If the application in question appears in the listing in the Open File dialog box, then a dictionary exists. You can then open the dictionary to see which program actions are mapped to Apple Events. For example, the Apple Events in WordPerfect's dictionary (Figure 10.13) include most of the word processor's common actions, such as opening, closing, and printing documents, as well as setting font styles and document formatting.

An application that is recordable must be scriptable, although, as you have read, the reverse is not necessarily true. Once you have verified that an application is scriptable by locating its dictionary, the only way to know if the application is recordable is to attempt to record a script. If lines of AppleScript code appear in the Script Editor during recording, then you've uncovered a recordable application. If no lines of code appear, then the application isn't recordable.

By the Way

To this point, many software developers have been reluctant to make their applications recordable because it slows down the performance of the application. Not only does the application have to process each event with one of its own actions, but it must also send an Apple Event that corresponds to that action to the Script Editor. You will therefore find many more scriptable applications than recordable applications.

11

PowerBook Optimization

PowerBooks can be optimized and speeded up in many of the ways discussed throughout this book. However, there are two issues that are unique to PowerBooks. The first is the crucial issue of battery life. For many PowerBook users, the computer's internal battery just doesn't last long enough. In this chapter, you'll read about system configurations and other techniques that help you extend battery life.

The second PowerBook concern is its keyboard. If you are used to the function and cursor movement keys available on the extended keyboard, then a PowerBook keyboard can be a real frustration. Fortunately, there is software that will let you use a modifier key in combination with keys that are present on the PowerBook keyboard to simulate a numeric keypad as well as those keys found only on an extended keyboard. Such software also gives you keyboard access to elements of a dialog box, freeing you from unnecessary movements of the trackball.

Optimizing Battery Life

When you are on the road, your PowerBook is only good as long as its battery power lasts. Unfortunately, as the capabilities of a PowerBook go up, its battery life goes down. The original Macintosh Portable could go six to eight hours on a single battery; today's color PowerBooks are lucky to run two. Later in this chapter you will read about hardware fixes that can provide more on-the-go work time. However, there are some things you can do to extend battery life without spending any money at all. If you want to spend just a little, you can look into soft-

ware that monitors and fine-tunes settings that promote long battery life.

Factors That Affect Battery Life

There are a number of factors that affect how long the battery in your PowerBook will last, including the following:

- ***The speed of the CPU:*** The faster the speed of a PowerBook's CPU, the more battery power the computer consumes.
- ***Access to a disk drive:*** Reading from or writing to a disk (either hard or floppy) consumes a great deal of power. Keeping the hard disk spinning also consumes power, but not as much as actual drive access.
- ***AppleTalk:*** When AppleTalk is turned on, the PowerBook checks the port to which AppleTalk is connected every few minutes, looking for network traffic. This activity consumes unnecessary power if you aren't printing or communicating with another computer over a network.
- ***The brightness of the screen:*** The brighter the screen backlighting is set, the more power is used. In fact, the screen can be the highest drain on the battery.
- ***The type of screen:*** Screens that display color draw more power than screens that display in grayscale only; grayscale screens draw more power than black-and-white screens. Active matrix screens (those that send current to every pixel on the screen at once) draw considerably more power than passive matrix screens (those that send current to one pixel at a time). Therefore, the active-matrix color screen on the PowerBook 180c draws the most power of any PowerBook screen. Once you've purchased your PowerBook, there is, of course, nothing you can do about the power requirements of your type of screen!

Strategies for prolonging battery life are based on reducing the amount of power used by any of the preceding activities. Most can be implemented through software; the screen brightness can also be controlled with a hardware setting.

Strategies for Extending Battery Life

The strategies you can use to make sure you get the most out of your PowerBook batteries are directly related to those factors about which you just read. To maximize battery life, you can do any of the following:

- ***Turn down the brightness of the screen.*** You can do this by using the slider on the PowerBook or through add-on software.
- ***Use software that dims the backlighting of the screen.*** This not only saves battery power, but also helps to prevent images from burning into the screen.
- ***Use a RAM disk.*** When you start up your PowerBook, make sure that the System folder is copied to the RAM disk. Also place any applications and files you are using on the RAM disk. This will significantly cut down on disk access.
- ***Use software that "rests" the CPU.*** For example, a 33-MHz CPU can be slowed down to 16 MHz to save power by running at the slower speed.
- ***Allow the PowerBook to sleep after a specified period of inactivity.*** This conserves battery power and also keeps images from burning into the screen.
- ***Use software that powers down the hard drive after a specified period of inactivity.*** Keep in mind, however, that powering down the hard drive is effective only if you don't need access to the hard drive very often. Powering up the drive after it has spun down uses a lot of power. Coupling a drive power down with a RAM disk, however, can be a very effective power saver.
- ***Turn AppleTalk off.*** If you aren't using AppleTalk, go to the Chooser and turn it off. This saves power that would ordinarily be used to check for network activity.

The other major trick to extending battery life is making sure that you get a full charge each time you charge the PowerBook's internal battery. Doing so can require more than simply leaving the computer plugged in overnight. The Nickel Cadmium (NiCad) batteries used in the PowerBook 140, 145, 160, 165, 165c, 170, 180, and 180c suffer from what is known as the memory effect. If they aren't discharged completely, they won't charge completely, but instead charge only partially. The memory effect can be erased—allowing a NiCad battery to take a full charge—by periodically completely discharging the battery. (Many people suggest that you do this once a month.) You will see several ways to completely discharge the battery throughout this chapter.

By the Way

The PowerBook 100 uses Lead Acid batteries; the PowerBook Duo 21, 230, 270, and 270c use Nickel Metal Hydride batteries. Complete discharging and recharging isn't recommended for these batteries.

There is one thing you need to keep in mind when trying to conserve battery power. Many of the activities that conserve battery power also slow the computer's performance. For example, resting the CPU to conserve power causes it to process program instructions more slowly.

Battery Management Software

Because battery life is so important to the usefulness of a laptop computer, utilities designed to enhance the PowerBook focus much of their capabilities on battery management. Some utilities provide battery monitoring; others can configure the PowerBook for more efficient battery use; still others can provide some degree of complete NiCad discharging.

Before looking at battery monitoring software, you should know something about how the PowerBook reacts to the charge state of its battery. The amount of charge in a battery is measured in volts (abbreviated V). A fully charged PowerBook NiCad should hold close to 7.5 V; a full discharge should drain the battery down to below 5.65 V (5.5 V is great if you can get it!). As battery power gets low, the PowerBook issues a series of three warnings. The first, at about 5.8 V, warns you that power is low and that the screen will be dimmed to conserve power. The second, at about 5.7 V, is another warning that power is low. At 5.65 V, the final warning appears, telling you that the PowerBook will go to sleep in 10 seconds to preserve the contents of memory. You won't be able to wake up the PowerBook until you plug it in to charge the battery.

If you discharge the battery below 5.65 V, the PowerBook eventually doesn't have the power to maintain the contents of RAM, even if asleep. In that case, it shuts itself down. The contents of RAM are lost. Restarting requires pressing the Restart button at the back of the machine.

Software to Monitor Battery Use

The Macintosh operating system provides a very basic battery monitoring control panel. As you can see in Figure 11.1, in its expanded mode it displays an approximate bar graph of the percentage of charge

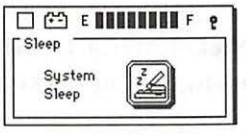


Figure 11.1 The Battery control panel

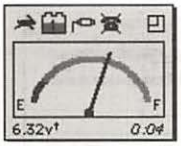


Figure 11.2 The MyBattery display

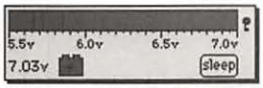


Figure 11.3 The Threshold display

remaining in the battery. (The battery in Figure 11.1 is fully charged.) The System Sleep button at the bottom of the control panel's window provides a quick way to put the PowerBook to sleep.

If you want more information about battery reserves, then you need to look to an add-on utility. Two shareware applications (for example, MyBattery in Figure 11.2 and Threshold in Figure 11.3) monitor remaining battery power. The first few times you use MyBattery, the lower-right corner of its display shows you elapsed time since MyBattery was launched. Eventually, as MyBattery learns how your PowerBook uses battery power, the elapsed time display is replaced by an estimate of how much battery power remains. Threshold's bar graph not only displays the current battery voltage, but also includes indicators for where the three low battery warnings will occur (the vertical lines in Figure 11.3). Note that both the MyBattery and Threshold windows can be shrunk to about half their original size so they take up less room on the screen.

If you prefer a battery power display in the menu bar, consider installing CPU (Connectix PowerBook Utilities) or PBTools, commercial utility packages that add considerable functionality to the PowerBook. The CPU menu bar display is handled by the control panel settings in Figure 11.4. The settings in Figure 11.4 change the right side of the menu bar so that it appears as in Figure 11.5. The amount of battery power appears as a percentage, along with a graphic indicator of much power remains. The plug to the right of the battery icon indicates that the PowerBook was plugged in at the time the screen shot was taken. Notice that if you so choose, you can also configure CPU to display an estimate of the amount of battery time remaining. Like MyBattery, CPU gets better with its remaining time estimates the longer you use it.

The PBTools menu bar display consists of a single battery icon that supplies several pieces of information (Figure 11.6). The lightning bolt through the battery indicates that the PowerBook is plugged in and charging. The two small dots at the top left and right indicate that

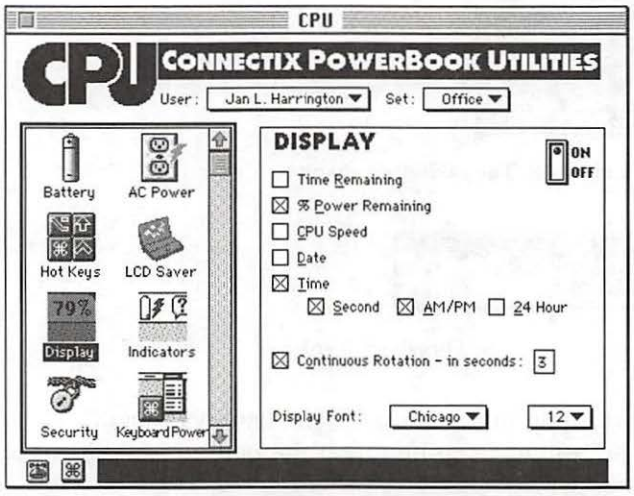


Figure 11.4 CPU menu bar display settings

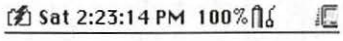


Figure 11.5 The menu bar display produced by the settings in Figure 11.4

Figure 11.6 The PBTools menu bar display

AppleTalk is turned on. In addition, the line above the icon indicates that the hard drive is spinning.

The PBTools control panel provides more extensive battery use information. As you can see in Figure 11.7, the PowerWatch panel displays a graph of power use over time. (This type of graph is particularly useful for testing power consumption under various settings such as levels of backlighting.) Notice that you can keep records for up to four different internal batteries.

Software to Configure the PowerBook for Efficient Battery Use

You can use software that is a part of the Macintosh operating system to configure your PowerBook to make more efficient use of its battery. Alternatively, you can add a third-party utility to gain even more control over battery-consuming activities.

The Macintosh operating system has two control panels whose settings affect PowerBook battery use. The first, PowerBook in Figure 11.8,

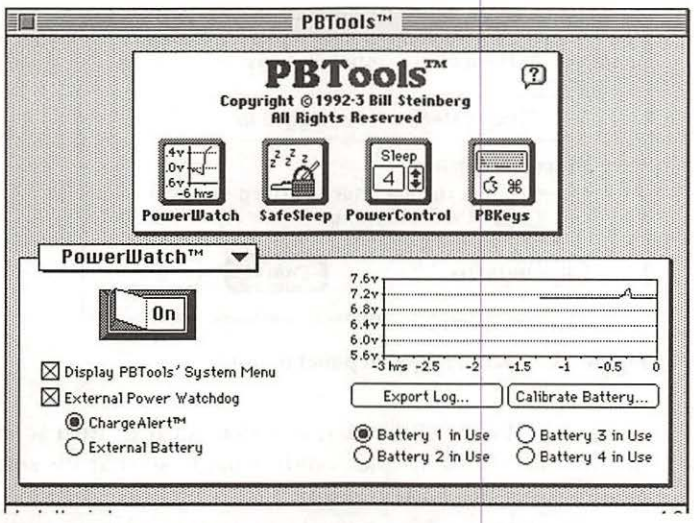


Figure 11.7 The PBTools PowerWatch panel

sets the idle time interval until the PowerBook puts itself to sleep and powers down the hard disk. Notice that you can't actually specify the time interval. The leftmost setting (Maximum Performance) sets both the sleep and disk power down delay to 15 minutes; the rightmost setting (Maximum Conservation) sets the sleep delay to one minute and the disk power down delay to 30 seconds.

You can gain a bit more control over the PowerBook's behavior if you open the Options dialog box (Figure 11.9). In particular, notice that the default setting is processor cycling, which slows down the processor during idle times to save power. If you find that some applications are performing too slowly, you might want to turn processor cycling off.

The Macintosh operating system provides some control over the PowerBook's screen with the PowerBook display control panel (Figure 11.10). The slider at the top of the control panel determines the idle time delay before the screen is dimmed to conserve power. Note that the settings in this control panel may conflict with settings you apply using a third-party PowerBook utility. If you are using such a utility (for

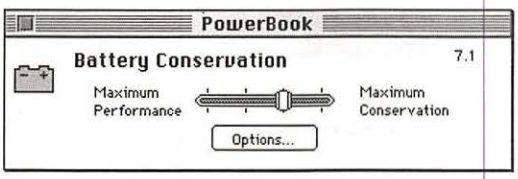


Figure 11.8 The PowerBook control panel

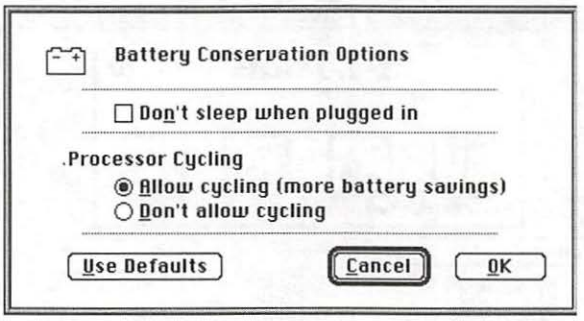


Figure 11.9 Battery control panel options

example, CPU or PBTools), you may want to turn screen dimming off in the PowerBook Display control panel so that it's settings don't override those of the add-on utility.

Third-party utilities provide finer control over battery conservation settings than what is available through the Macintosh operating system. For example, CPU's battery settings (Figure 11.11) provide separate sliders for the timing of processor cycling, spinning down the hard drive, dimming screen backlighting, and putting the machine to sleep. Each slider provides time settings accurate to the second.

PBTools also provides accurate settings for sleep and screen dimming timing. The PowerControl panel (Figure 11.12) takes care of system sleep, hard disk powerdown, and backlight dimming. Notice that you can configure separate settings for running off the battery or off AC power.

Software to Provide Deep Battery Discharge

Software that provides a deep discharge can quickly take the voltage in a PowerBook's NiCad battery down to about 5.65 V, and occasionally even lower. CPU, for example, provides a Quick Discharge setting which keeps the processor at top speed, the disk spinning, the screen backlighting at maximum, and the screen at maximum brightness. Using Quick Discharge, you can drain the battery to about 5.65 V, the

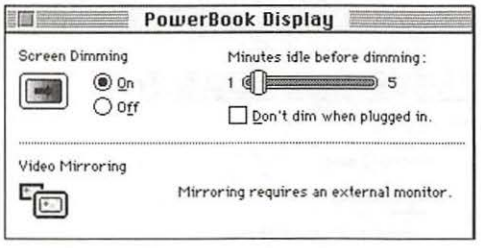


Figure 11.10 The PowerBook Display control panel

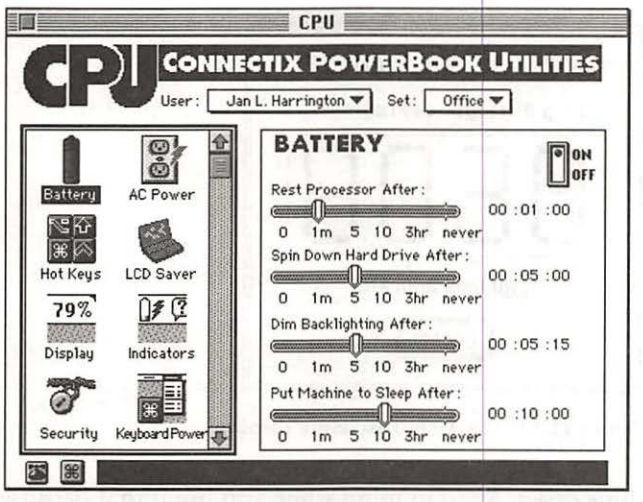


Figure 11.11 CPU battery configuration settings

point at which the PowerBook puts itself to sleep. PBTools can also discharge an internal NiCad battery. The Recondition Battery button in Figure 11.12 starts the process, taking the battery down to just under 5.7 V before the PowerBook shuts down.

To drain the battery below 5.65 V (to the point where the PowerBook shuts down), use the shareware utility DeepDischarge. DeepDischarge (Figure 11.13) overrides the operating system's three sleep warnings and allows discharging to continue until the PowerBook

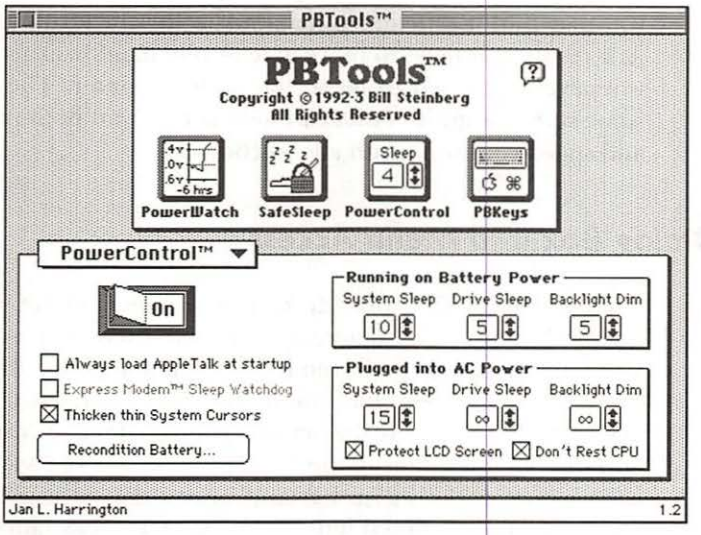


Figure 11.12 The PBTools PowerControl panel

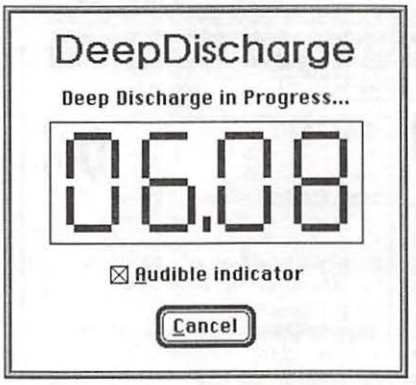


Figure 11.13 The DeepDischarge display

shuts down. Keep in mind when you use it that because the PowerBook actually shuts down rather than just going to sleep, you will lose the contents of any unsaved documents that happen to be open when the shutdown occurs. The best strategy, of course, it to quit all applications before beginning to discharge the battery.

Keyboard Management

Although the PowerBook has received numerous awards for its design, its keyboard still doesn't have a numeric keypad, function keys, or cursor movement keys (for example, Page up and Page down.) In addition, you may find it difficult to manipulate the trackball with your thumbs. As a result, you need to move at least one hand back from the keyboard whenever you need to move the mouse pointer. There are, however, some software utilities that can help get around both of these problems and speed your work with a PowerBook.

Easing Dialog Box and Menu Access

Utilities such as CPU provide keyboard access to both dialog boxes and menus. When keyboard access is enabled, each item in a dialog box has an underlined letter in its name. For example, in Figure 11.14 each button and popup menu has one underlined letter. (You can use the Tab key to toggle between the scrolling list of items in the current folder and the box for entering the filename.) As you can see in Figure 11.15, each menu in the menu bar and most items in a pulled down menu also have an underlined letter. (The menu is assigned the letter "a.") Once the menu is pulled-down, you can choose items with the arrow keys or with the keyboard.

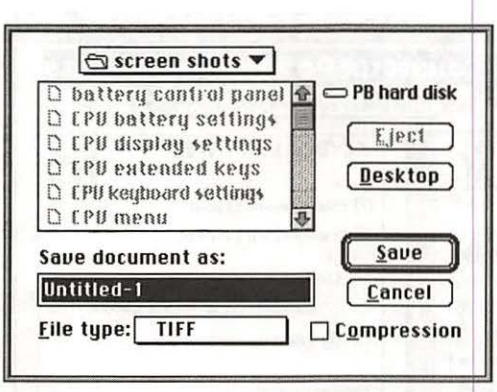


Figure 11.14 A dialog box with underlined letters for keyboard access

The key combination used to invoke keyboard access to dialog boxes and menus is controlled through the CPU control panel (Figure 11.16). To avoid conflict with keyboard equivalents used by application software and the Finder, keyboard choices from dialog boxes or menus are triggered by the Control key along with an optional modifier. (The default is Control and Shift.)

Simulating the Keys on the Extended Keyboard

There are several utilities that let you use key combinations to simulate the presence of keys from the extended keyboard that aren't part of the

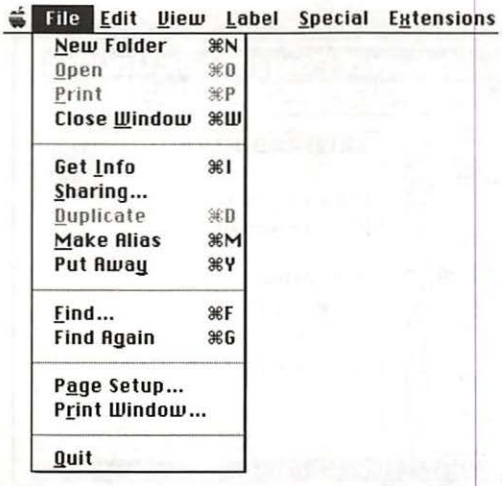


Figure 11.15 The menu bar and a menu with underlined letters for keyboard access

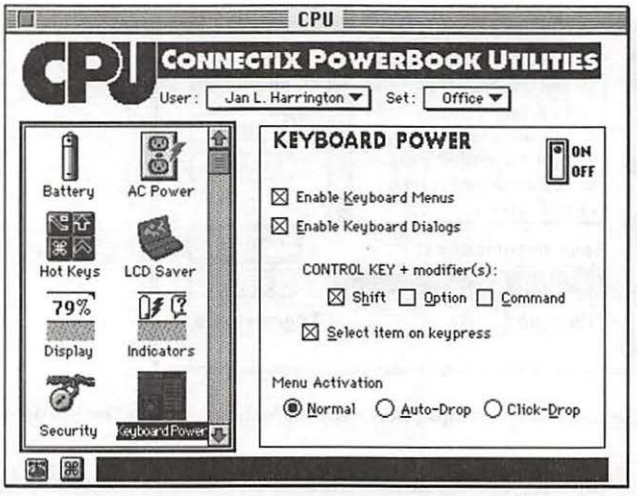


Figure 11.16 CPU keyboard settings

PowerBook keyboard. For example, Keyboard Plus, to which you were introduced in Chapter 9, works well on the PowerBook.

Utilities tailored specifically to the PowerBook provide similar capabilities. As you can see in Figure 11.17, CPU can enable both cursor movement keys (Home, End, and so on) and function keys. When you press the Control key with a number key, the PowerBook recognizes a function key. Pressing Control and Delete acts as the Del key, deleting the character to the right of the cursor. Notice that this control panel also can take care of the problem with PowerBook's caps lock key: It's

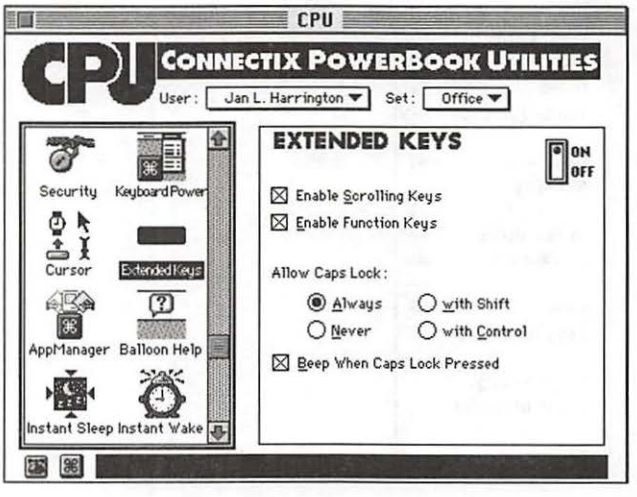


Figure 11.17 CPU settings to emulate keys from the extended keyboard

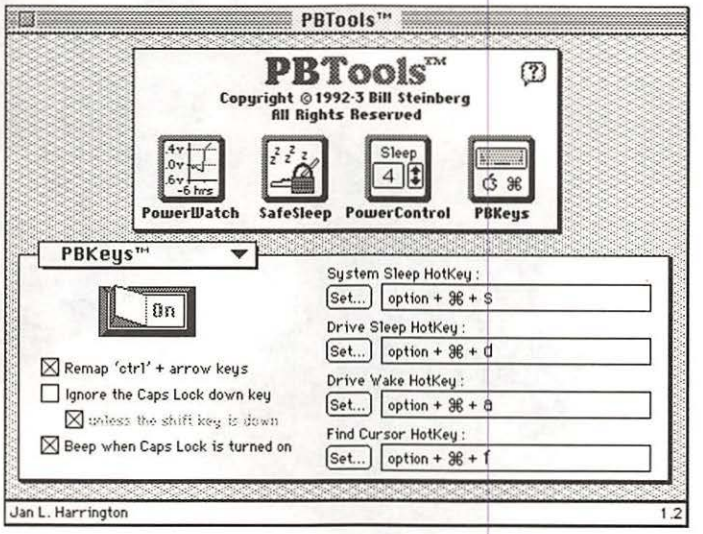


Figure 11.18 The PBTools keyboard panel

easy to accidentally engage the caps lock key. The solution is to require that a modifier key be pressed along with caps lock.

PBTools also enables cursor movement keys. As you can see in Figure 11.18, pressing Control with the arrow keys simulates Home, End, Page up, and Page down. The PBKeys panel also enables key sequences that put the PowerBook to sleep, put the hard drive to sleep, spin up the hard drive, and locate the mouse pointer.

When Software Isn't Enough...

Software settings and utilities can help you get the longest life possible from your PowerBook's internal battery. However, even the best software can't discharge a NiCad battery completely. In addition, if you happen to be taking a cross-country trip, there's nothing you can do to make a single internal battery last the entire trip. To get the most charge from a NiCad, you need to look to an external battery conditioner and charger. To get more battery life, you need either more than one internal battery or an external battery.

Battery Conditioners and Chargers

A battery conditioner is a stand-alone device such as the BTI PowerCharger PLUS in Figure 11.19 that can completely drain and

Figure 11.19 An external battery conditioner (the BTI PowerCharger PLUS)

recharge a PowerBook battery. External conditioners can not only extend battery life, but also charge the battery faster than it charges when installed in the PowerBook. Expect to pay between $50 and $150 for a battery conditioner/charge. An extra internal battery, which can be charging in the conditioner while you are using the PowerBook, runs about $60.

Figure 11.20 Technöggin PowerPlates

External Batteries

Should you want a battery that lasts longer than the PowerBook's internal battery, you need to look at an external battery. The longest lasting external batteries aren't NiCads, but planar batteries, such as the PowerPlates in Figure 11.20. Notice that the batteries are very thin and sized to fit under the PowerBook; their weight is between 1 and 2 pounds. Planar batteries don't suffer from the memory effect of NiCads and charge much faster. They can provide up to five times the battery life of an internal NiCad battery. Depending on their capacity, planar batteries cost between $150 and $400.

12

Extending Your Reach: Data Communications

For the first few years of their existence, microcomputers were truly stand-alone devices. Today, however, most microcomputers are connected in some way to other computers. In a business, computers are most likely connected to a local area network (a network confined to a small area such as a single office, a floor of a building, or an entire building).

By the Way

Local area networks, or LANs, can also exist in the home. If your Macintosh is connected to a printer using LocalTalk or PhoneNet cabling, then you have a LAN.

In addition, many Macintoshes communicate with other computers over standard telephone lines. If you currently aren't plugged into a data communications network, then adding the software and hardware that lets you communicate with other computers is one of the best upgrades you can give your Macintosh. Data communications not only opens you up to the world of freeware/shareware software, but puts you in touch with people all over the world who have similar interests. If you do communicate with other computers, then now is the time to take a hard look at your equipment and decide whether an upgrade is in order.

This chapter focuses on communicating with other computers over standard telephone lines. In it you will read about communications services as well as the hardware and software that give you access to those

services. You will also be introduced to the issue of virus protection, which becomes a concern whenever you copy software from another computer.

By the Way

Data communications is a very complex topic, far more than can be discussed in a brief introduction. The purpose of this chapter is to provide enough of an introduction to the topic so that if you choose, you can gain access to the communications services that maintain libraries of freeware and shareware software.

Choosing Communications Services

There are many things you can do when you communicate with other computers. The most common include:

- Exchanging messages in open forums with people who share common interests. Topics range from computers, to gardening, to running a business, to raising children
- Sending and receiving private electronic mail
- Downloading (transferring from a remote computer to your computer) freeware and shareware software
- Shopping
- Business activities such as checking stock prices and making airline reservations
- Research using reference materials such as encyclopedias
- Taking college courses
- Playing games in real-time with other computer users

By the Way

Playing games over the telephone lines with other computer users is particularly appealing to young people. Most services that provide such games automatically bill charges to a credit card. Occasionally a parent gets caught in an embarrassing situation when trying to use the credit card, only to discover that Junior has run the card up to its credit limit!

The remainder of this section looks at the sources for communications services. As you will see, they vary considerably in terms of what they offer and how much they charge.

Bulletin Board Services

A *Bulletin Board Service*, or BBS, is a communications service typically provided by a user group, a corporation, or an individual. A BBS usually has a relatively narrow range of features. For example, most user group BBSs provide message exchange and freeware/shareware software libraries. A corporate BBS is usually designed to provide support for a company's products. Individuals who run BBSs commonly focus on one specific area of interest, such as aviation or gardening.

Access to a BBS is generally free or low in cost. However, you must pay any telephone charges that you incur when dialing the BBS's computer. (Regular toll and long distance rates apply.) In addition, many BBSs have special conditions that qualify a person for access. For example, many corporate BBSs require that you have registered a product with the company prior to gaining access to the BBS. Many user group BBSs limit the functions available to non members; only members have access to the entire BBS.

Where do you find out about BBSs? If you belong to a Macintosh user group, the group probably has its own BBS and also a list of the telephone numbers of other user group BBSs. Corporate BBS numbers are often included in product documentation; you may also be given the number when you call the company for technical support. The telephone numbers of BBSs run by individuals come from many sources, including word of mouth, publications dedicated to the topic supported by the BBS, and organized groups interested in the topic.

Information Services

An *information service* is a commercial communications service that provides all of the services listed earlier in this chapter. Because the corporation that runs an information service is in business to make money, there is a charge for the time you are connected to the information service's computer system. You can either have the fees billed automatically to a credit card or deducted from your checking account.

Use of information services has grown enormously in the past year. The two services most heavily used by Macintosh users—CompuServe and America Online—have subscribers that number in the millions. At any time, as many as 10,000 people might be connected to the same information service. Because information service use has grown so rapidly, it has also become more competitive. As a result, the services provided have expanded and the cost has gone down.

One of the benefits of using an information service is that, for most people, no long distance telephone charges are involved. Typically you

place a local call to a local node, which then connects you to the information service's network. The only telephone charges involved are those you ordinarily pay for a local call.

By the Way

Most major information services maintain local nodes in most major cities and in many smaller municipalities throughout North America. However, people who live in rural areas or very small towns may find that there is no toll-free local node. In that case, there will be telephone charges to reach whichever node you choose to call. Given the way telephone charges are structured, it may be cheaper to call a node outside your area code rather than a node that is a toll call within your area code.

CompuServe

CompuServe is an international information service that has been available for many years to users of all types of computers. Among other things, users can exchange private electronic mail, post messages to public forums, download software, check stock quotes, go shopping, check airline schedules, and communicate with product manufacturers. CompuServe can also send and receive mail over the Internet. (You will read more about the Internet shortly.)

Many users like CompuServe not only because it provides such a wide range of services, but because international users can gain access to it without paying international long distance charges. CompuServe maintains its own telephone network, with local nodes throughout the world. As long as you are using CompuServe's network to access CompuServe, there are no additional surcharges for network use.

By the Way

Some large BBSs can be reached via the CompuServe network. In that case, you do pay for the time you are using the network. However, it is typically much less than regular telephone long distance charges.

CompuServe charges a flat fee of $8.95 each month for unlimited time to read mail and gain access to some technical support forums. The $8.95 also includes an allotment for sending mail based on the number of characters sent. (You can send about 600 K of data before you begin to incur surcharges.) Access to other features, such as public message forums, are charged at an hourly rate. The specific rate, which has been decreasing recently, depends on the speed with which you are communicating with CompuServe.

America Online

America Online (AOL) began as a Macintosh and Apple II-only service in October 1989, but has grown to include MS-DOS and Windows users throughout North America. It provides all the services listed at the beginning of this section and also includes full access to the Internet.

AOL does not maintain its own telephone network, but makes use of two existing data communications networks: SprintNet and TymNet. There is no telephone surcharge when using either of those networks to reach America Online; only charges to the local node apply. The major drawback to America Online is that is doesn't provide international access. Although you can use the Internet to send electronic mail around the world, international users have no way to log on to the service to use its other features.

America Online charges a base fee of $9.95 a month. This provides up to five hours of time using any of AOL's services, regardless of the speed at which you are communicating. After the first five hours, you are charged $3.50 per hour, calculated to the minute.

The Internet

The Internet is a worldwide data communications network that has no simple definition! No one owns it, no one manages it, although there is a committee that sets general policies. The Internet works because thousands of organizations that have computers choose to participate and cooperate in its operation. Each organization bears the brunt of the costs for its own participation.

The Internet began in the United States as a network of Defense Department and research universities known as ARPANET. Large universities continue to form the backbone of the Internet, although the Defense Department role has largely disappeared. Today, educational institutions, government agencies, corporations (both profit and nonprofit), and individuals are connected to the Internet. It is the largest data communications network in the world, both in terms of users and number of connected computers.

The Internet's services include electronic mail, public message forums (newsgroups), and file transfer. Advanced users can also use the Internet to log on to remote computers on which they have accounts.

How much Internet access costs depends on how you reach a computer connected to the Internet. If you employer is connected, then your employer pays telephone charges for transferring messages and your individual costs are probably nothing. If you reach the Internet through an information service such as CompuServe or America Online, then you pay charges to the information service. Alternatively,

you can pay for a personal account on an Internet computer. For example, the Well in California charges $15 per month for Internet access; you pay the telephone charges to reach the Well.

The Internet is so very popular for several reasons. First, almost every person who has access to data communications of some sort has access to the Internet. Second, its costs are very low. Third, it provides easy access to people throughout the world. The Internet's major limitation is that it doesn't provide the range of services users have come to expect from an information service, such as shopping and up-to-the-minute stock quotations and sports scores.

By the Way

Because the Internet isn't controlled or managed by a central authority, the subject matter and language used in some of the newsgroups may be offensive to some readers. In addition to dealing with typical information service topics such as computers and entertainment and hobbies, newsgroups also explore areas such as alternative life styles and racism. In most cases, administrators of computers on the Internet refrain from censoring the newsgroups, leaving it up to the individual computer user to decide which newsgroups he or she will read.

Choosing or Upgrading Communications Equipment

Communicating with another computer requires three pieces of equipment in addition to your computer: a telephone line, a cable, and a *modem.* The telephone line is connected to the modem with a standard telephone cord, which in turn is connected to the computer with the appropriate cable, as in Figure 12.1. Many modems look like nothing more than a box. However, they are required for resolving a basic incompatibility between the type of signal sent by a computer and the type of signal carried by a standard telephone line.

Modems: Why They're Needed and How They Work

When Alexander Graham Bell invented the telephone, computers were the last thing on his mind. The type of signal carried by telephone wires over 100 years ago is the same as that carried by today's telephone wires, and it is fundamentally different from the type of signal computers must send.

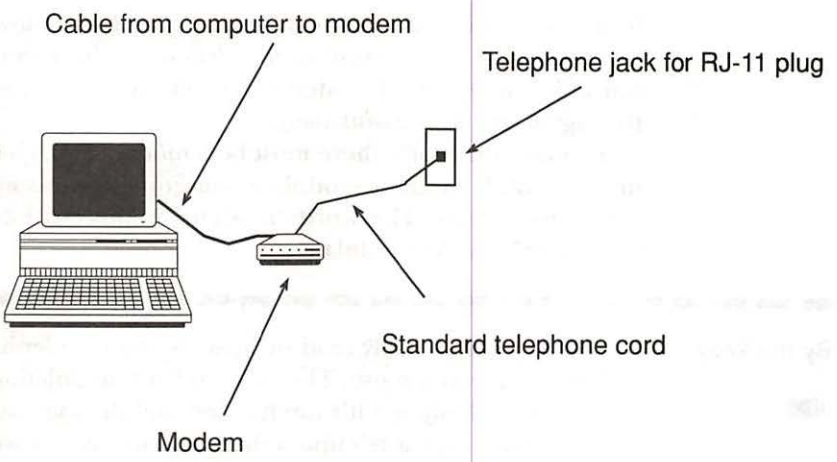


Figure 12.1 Hardware required for Macintosh data communications

Telephone signals are *analog*, consisting of a waveform that varies continuously between its high and low point, such as the one at the top of Figure 12.2. However, the signals that a computer sends are *digital*, made up of a discrete sequence of highs and lows (for example, the bottom of Figure 12.2). The problem with sending computer signals over a telephone line is therefore something like trying to fit a square peg into a round hole. How do you place a digital signal on an analog transmission medium?

The answer to is use a modem to superimpose the digital signal onto an analog signal. A modem sends out an analog signal of a constant frequency (*a carrier tone*). To send a high digital signal, it then raises the

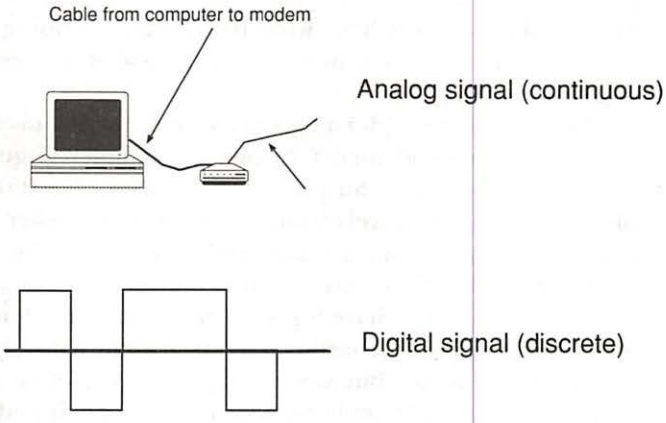


Figure 12.2 Analog versus digital signals

frequency of the carrier tone; to send a low signal, it lowers the frequency. This process is known as *modulation*. At the receiving end of the transmission, a second modem strips off the carrier tone, reassembling the digital signal (*demodulation*).

To make this work, there must be a modem at each end of the transmission. Each modem modulates outgoing signals and demodulates incoming signals. The word "modem" is therefore a contraction of "modulate" and "demodulate."

By the Way

You may occasionally read or hear the term "telephone modem." That term is nonsense. The modem isn't modulating and demodulating a telephone; it's modulating and demodulating the signal that travels over a telephone line. In fact, as you will see shortly, most modems are telephones in their own right.

Inside a Modem

A typical modem contains circuitry to do the following:

- Dial a telephone number (either using tones or pulses)
- Answer incoming calls
- Perform modulation
- Perform demodulation
- Receive data from a computer for transmission
- Transmit received data back to the computer

To be able to dial and answer calls, a modem must have most of the parts of a telephone. That includes the dialer and usually a speaker. The speaker lets you hear what the modem is doing throughout the process of making a connection; most speakers cut out once the connection is established.

There are some older modems, called *acoustic couplers*, that do not contain telephone elements. An acoustic coupler (Figure 12.3) has rubber cups into which you place the handset of a standard desk telephone. The signal travels from the modem's speaker to the handset's microphone and from the handset's speaker to the modem's microphone. Because of the extra speaker and microphone, an acoustic coupler is more likely to have a poor signal than a modem that contains a telephone within it. Acoustic couplers are not typically used with desktop machines today, but some people still prefer to travel with them because some hotel telephone systems aren't equipped to handle a jack from a self-contained modem's telephone cable.

Figure 123 An acoustic coupler

Modem Speeds

The speed at which a modem can transmit and receive data is measured in *bits per second* (bps). The easiest way to interpret this figure is to know that it takes 8 bits to transmit a character. (A bit is a binary digit, a zero or a one used as part of the codes that describe everything inside a computer.) Therefore, divide the bits per second by 8 to get a feeling for how many characters you can shove down the telephone line in a second.

By the Way

You may hear the term *baud* used to describe modem speeds. However, baud is not the same as bits per second. Baud refers to the number of times per second the modem changes the frequency of the carrier tome. The more frequencies a modem uses, the more bits it can transmit with a single frequency change. For example, most 9600-bps modems use 16 frequencies and send 4 bits with each frequency change. The 9600-bps speed corresponds to a baud rate of 2400 because the frequency changes only 2400 times per second. Therefore, for most of today's modems the baud rate is lower than the bps rate. This is actually a good thing. The less often the frequency changes, the more time the modem at the receiving end has to interpret the incoming signal, providing more reliable transmissions.

Like everything else in computing, modems continually get faster and cheaper. In 1975, a fast modem transmitted at 300 bps. Today, however, a minimally acceptable speed is 2400 bps; 9600 bps is becoming the most common speed. Modem speeds of 14,400 bps (abbreviated 14.4 K) are also available for use with desktop and laptop computers. Although faster modems are available, the quality of telephone lines makes it difficult to get good transmissions with low error rates at higher speeds.

Choosing a Modem

Choosing a modem means making choices from among the following alternatives:

- ***Maximum speed of 2400 bps (under $150), 9600 bps (under $200), or 14.4 K bps (between $200 and $450)***: Most information services now provide 9600-bps access; few provide 14.4 K bps access. Therefore, 9600 bps is the slowest speed modem that makes sense today. (A 9600-bps modem can also transmit at slower speeds, such as 2400 bps.) Although modem price is tied to modem speed, the difference in cost between 2400 bps and 9600 bps is minimal.
- ***Fax capabilities or no fax capabilities:*** Many modems include circuitry to send and receive faxes. Documents are converted to a format that the fax hardware can transmit by special software. Received faxes are stored on disk as graphics. The advantage to a fax modem is that you don't have to print documents to fax them; you also don't have to waste paper printing every fax you receive. The major disadvantage is that your computer has to be turned on to receive faxes. In addition, fax hardware adds about 25 percent to the cost of a modem.
- ***All-in-one modem or accoustic coupler:*** Unless you travel frequently and stay in hotel rooms where there are no standard RJ-11 telephone jacks, then purchase an all-in-one modem. Although accoustic couplers are a bit cheaper than all-in-one modems, the problems with the quality of the communication they provide isn't worth saving a few extra dollars.
- ***For a PowerBook, internal or external:*** If you have a PowerBook, you can choose to purchase a modem on an expansion board that installs inside the PowerBook. The advantage is that you don't need to haul an external modem and cable with you; all you do is plug a telephone cord into the back of the PowerBook. On the other hand, internal modems cost a bit more than external modems.

If you have a slower modem—for example, 1200 bps or 2400 bps—should you replace it? (Modems can't be upgraded; the only way to get faster transmission speeds is to buy a new one.) Most information services will continue to support slower transmissions for some time to come. If you can live with the slower speeds and don't want to spend money on a faster modem, you can continue just as you have been. However, if you are becoming frustrated with the slowness of communications, then a 9600-bps modem is a good value.

There is one other issue you should consider when purchasing a modem. To send configuration settings to a modem, software must express commands in a language the modem understands. Although

there is no single standard modem communication language, the language used to communicate with modems made by the Hayes Corp. has been adopted by many modem manufacturers. Any modem that is labeled as "Hayes-compatible" will understand those commands and is likely to be compatible with most communications software. Selecting a Hayes-compatible modem can avoid potential problems when setting up a communications session.

The Role of Communications Software

A modem won't do anything until it receives commands from communications software. The software takes care configuring the modem, including setting up the characteristics of the communication session (communications parameters). Software also instructs an all-in-one modem regarding which number to dial, in some cases makes a remote computer think it is talking to a computer terminal rather than a microcomputer, and takes care of sending data to and receiving data from the modem. In this section you will be introduced to communication parameters and terminal emulation, as well as see an overview of the different types of data communications software.

Communication Parameters

If a data communications session is to work properly, the two computers that are communicating must agree on the characteristics of the conversation. If you are using general communications software, it will be up to you to find out what parameters are required by the computer you are calling and to set your software accordingly. Specialized communications software, such as that used by major commercial information services, will set some of the parameters for you.

Communications parameters generally include the following:

- ***Communications speed:*** Both computers must transmit and receive data at the same speed.
- ***Number of data bits:*** The scheme that the Macintosh uses to encode characters requires 8 bits to describe a character. However, some of the computers with which you might be communicating use only 7 bits. You must therefore set the communications parameters to account for the difference in coding.
- ***Type of parity:*** Parity is an error-checking scheme used in data communications. Systems may use no parity, even parity, odd parity, or mark parity.

- ***Number of stop bits:*** When you are transmitting files over data communications lines, the receiving computer needs to know where blocks of data start and stop. A stop bit is a special signal that a block of data has ended. You will find computers that use no stop bits or that use 1 or 2 stop bits.
- ***Type of handshaking:*** *Handshaking* is the procedure used by two communicating computers to signal the start and end of each computer's transmissions. The term also can refer to the procedure two computers use to agree upon communications parameters.

Terminal Emulation

Large computers, such as the mainframes used by commercial information services, aren't designed to communicate with microcomputers. Instead, they are designed to communicate with stand-alone terminals. One of the features of communications software is therefore to translate the keypresses from a microcomputer keyboard into those of a terminal type the remote computer recognizes. This is known as terminal emulation.

Most computers with which you will communicate recognize at least two types of terminal emulation: TTY and VT100. (The exception is some information services that use special-purpose communications software to provide a Macintosh interface.) A TTY is a very old terminal that works on only one line at a time. Once you press Return or Enter to transmit a line, you can't go back and edit it. In fact, the only editing capability you have is the Backspace key. TTY recognizes only keyboard character input; use of the mouse or even arrow keys isn't supported.

The VT100 was a terminal made by Digital Equipment Corp that has become a data communications standard. It has long since been discontinued, but its characteristics are still supported by many large computers. The VT100 supports function keys and cursor movements with arrow keys. However, it does not support mouse movements.

General-Purpose Communications Software

Most BBSs and some information services (for example, CompuServe) support access with general-purpose communications software. Such software gives you the most flexibility to configure your communications session. However, it also means that you must set up the session yourself, deciding on the type of terminal emulation and the communications parameters.

General-purpose communications software can be purchased as a stand-alone product (for example, MicroPhone II or White Knight). It is also available as part of most integrated software packages such as ClarisWorks or Microsoft Works. The stand-alone products tend to have features beyond the basics needed to conduct a communications session. For example, both MicroPhone II and White Knight provide scripting capabilities that let you automate the process of logging onto a remote computer.

Regardless of where you get your communications software, you will find that it has some way of setting communications parameters. ClarisWorks, for example, uses the screen in Figure 12.4 to set parameters such as the transmission speed (notice that the speed is incorrectly labeled "baud rate"), as well as parity, number of data bits, number of stop bits, and the type of handshaking. The settings in Figure 12.4 (no parity, 8 data bits, and 1 stop bit) are typical of most communications sessions. If you don't know the communications parameters of a computer you need to call, these are a good place to start.

The ClarisWorks communications module, like most general-purpose communications software, provides TTY emulation along with some variation of the VT100 terminal (in this case, VT102). Notice in Figure 12.5 that all you really need to do is choose the type of terminal emulation. The rest is handled by the software.

One of the problems with terminal emulation is that some Macintosh keyboards may not have some of the keys on the keyboard of the terminal being emulated. In particular, the standard keyboard does not have function keys. General-purpose communications software therefore typically provides a palette of keys that you can click to send

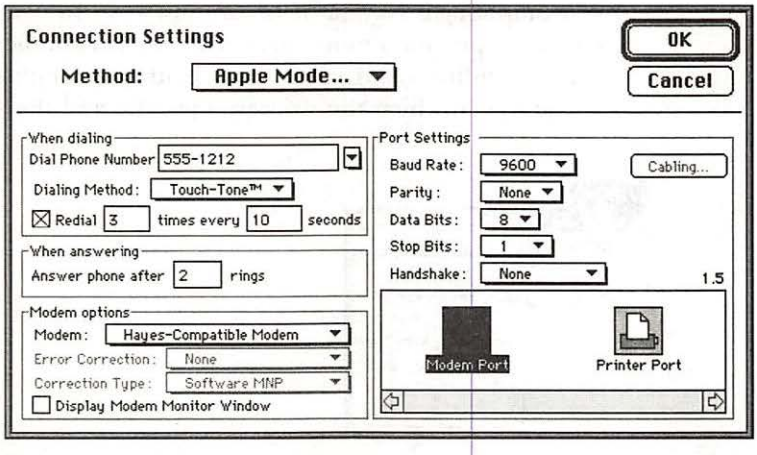


Figure 12.4 Using the ClarisWorks communications module to set communications parameters

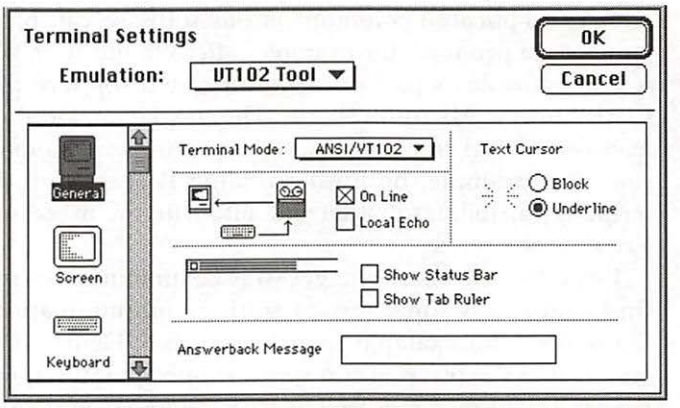


Figure 12.5 Using the ClarisWorks communications module to choose a type of terminal emulation

the keypress that the terminal would send had you actually pressed the key. For example, the palette in Figure 12.6 represents the numeric keypad found on the VT100 terminal, providing access to four function keys as well as the keypad's number keys.

Specialized Communications Software

To make communications more "Macintosh friendly," some information services have designed their own software that supports the Macintosh interface. For example, although you can use general-purpose communications software to interact with CompuServe, it is much easier to use either CompuServe Navigator or CompuServe Information Manager, both of which provide a more Macintosh-like environment.

America Online (AOL) is only accessible through specialized software. The way in which the software operates and the functions it pro-

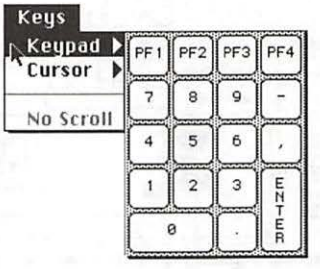


Figure 12.6 A keypad palette that provides access to keys on the VT100 key board that may not be present on a Macintosh keyboard

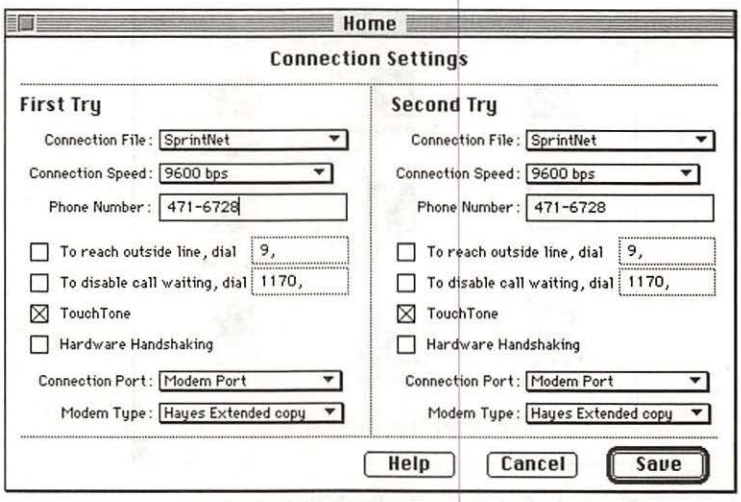


Figure 12.7 America Online communication settings

vides are typical of specialized communications software. As you can see in Figure 12.7, the only communications parameter is the transmission speed. The only other technical piece of information you need to supply is the type of modem (in this case, a Hayes-compatible modem). The remainder of the parameters are built into the software. Because the software is designed to communicate with only a single communications system, the user is not required to enter things such as parity, data bits, or stop bits.

AOL's software, which is available free, instructs the modem to place a call to the local access number you have entered on the settings

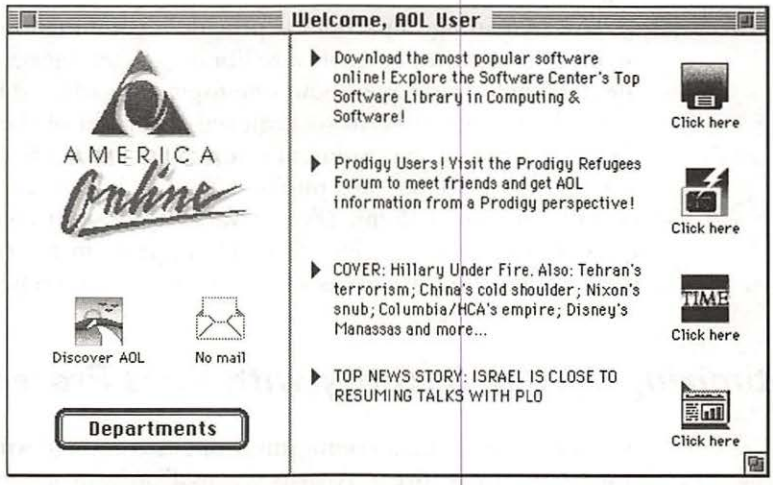


Figure 12.8 The America Online opening screen

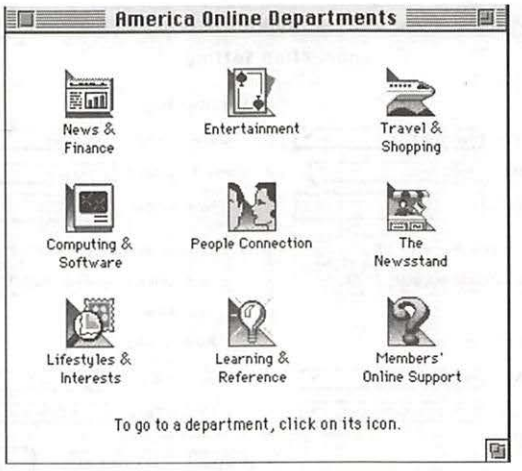


Figure 12.9 America Online's departments

screen. It then completes the process by logging you onto the system. Once logged on, you are notified if you have electronic mail, and have access to announcements and current news headlines (Figure 12.8).

Each of the icons at the right of the screen is a button that opens a Macintosh-style text window. The "Departments" button at the lower left provides access to the broad groupings of software libraries and public message forums (Figure 12.9). The People Connection is an area where people can join in a real-time conversation on any topic of interest with other users. Travel & Shopping provides airline schedules and catalogs of items you can purchase while online. Members' Online Support is a free area where users can get help with using the information service.

The remaining departments provide a combination of articles, public message forums, and software libraries. Each message occupies a single document; messages about one topic are gathered into a folder. For example, in Figure 12.10 you can see a portion of the folders that discuss the database management system Helix Express. Because the messages in these folders are public, anyone who has an America Online account can read them. (For privacy, users send electronic mail.) A message (for example, Figure 12.11) appears in a scrolling Macintosh window that you can save as a text file for later reference.

Optimizing System Security with Virus Protection

No discussion of data communications is complete without some mention of the virus threat. A virus is a malicious program that gets into a

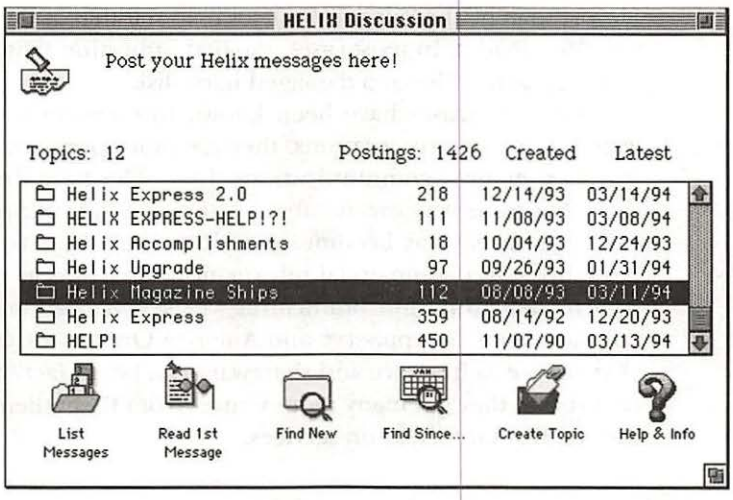


Figure 12.10 The contents of a public message form

computer system and interrupts normal processing and/or destroys data. A virus might display a dialog box on your screen at an unexpected time or it might actually destroy the files on your hard disk. Regardless of what it does, a virus is a program with no reason for existing except to cause problems for people.

Viruses attach themselves to other files. They are propagated when you transfer an infected file from one computer to another.

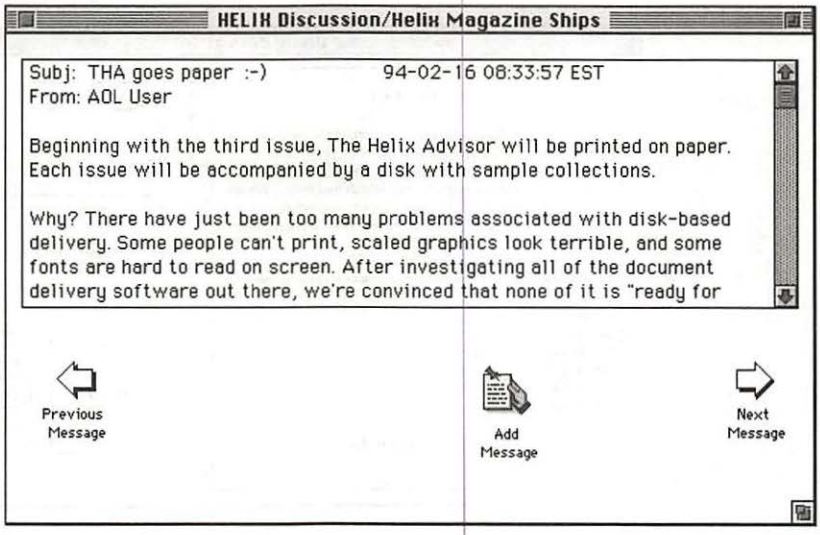


Figure 12.11 An America Online message

Unfortunately, there is rarely any way to tell that a file is infected when you download it. In most cases, the first indication that a virus is present is disappearing files or a damaged hard disk.

Although viruses have been known to creep into commercial software on one or two occasions, they are more prevalent in software that travels over data communications lines. The best virus prevention is therefore to be very careful about where you get your software. Because the virus threat has become so serious over the past few years, most large BBSs and commercial information services now pay special attention to detecting and eradicating viruses in their software libraries. Software from CompuServe and America Online, for example, is about as virus-free as freeware and shareware can be. In fact, many consultants report that they get many more viruses from their clients' software than they do from information services.

Virus Detection and Eradication Software

Virus detection software is designed to scan disks for known viruses and, if one of those viruses is found, remove it from all infected files. For example, the freeware program Disinfectant searches the entire contents of a disk and reports infected files (Figure 12.12). Clicking the "Disinfect" button instructs Disinfectant to cure damaged files.

To be especially safe, many users place an alias of their virus detection software in the Apple Menu Items folder, ensuring that the software runs every time the Macintosh is started up. However, even if you

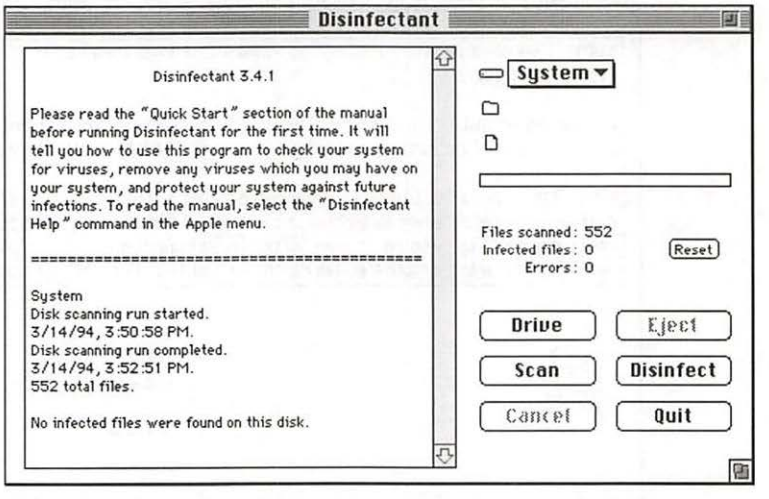


Figure 12.12 Using Disinfectant to scan for viruses

run virus detection software consistently, there is one major loophole: Virus detection software only recognizes viruses it has been programmed to detect. If someone creates a new virus that is currently unknown to your software, the software won't detect or remove it.

This loophole has, in some cases, produced an endless cycle of virus creation and detection. As soon as a new virus is recognized, producers of virus detection software rush out to modify their programs to detect and remove the virus. The virus programmers, who see virus detection software as a challenge, in turn modify their viruses so they can no longer be detected. Although the developer of Disinfectant and a few commercial antiviral programs (for example, SAM from Symantec) remain available, some antiviral program developers have pulled their software from the market, believing that the presence of virus detection software actually makes the virus problem worse.

Practicing Safe Software Downloading

Given that virus detection software isn't foolproof, what can you do to protect yourself from viruses? First, be careful about where you get your software. Whenever possible, only download software from BBSs and information services that indicate that files have been scanned with virus detection software. Nonetheless, there is no way to be absolutely certain that you don't have a virus. There is, however, a procedure you can use to protect yourself from the damage a virus can cause.

When you receive software from a suspect source (perhaps a client, colleague, or BBS that doesn't indicate that files have been scanned for viruses), do the following when you open a file or launch an application:

1. Before saving the suspect file on your system, make a backup of your entire hard disk. If worse comes to worse, you can restore the entire system from this clean backup.
2. Create an emergency restart floppy. As you read in Chapter 5, this disk should have a System folder along with any device drivers you need to reach the disk or tape drive on which your backup was made. In this particular case, also include the software you use when making backups.
3. Save the new file or application on a floppy disk whose contents you can afford to lose.
4. Open the file or launch the application.
5. Check your hard disk carefully. Look for files that have disappeared or unrelated files that were modified at the same time you opened the file or launched the application. These are both indi-

cations of a virus at work. In the case of the worst viruses, your hard disk may actually become inaccessible.

If you don't see any changes to your hard disk, then your can be relatively certain that the new file is free of viruses. (There are some viruses that are programmed to trigger on a specific date or time; it's very difficult to test for those that can't be identified by virus detection software.) On the other hand, if your hard disk appears modified in some unintended way, then the file probably is infected. Throw it out and report the virus to the source of the file.

Glossary

A

Accelerator board: An expansion board that contains a replacement CPU for a Macintosh. The term "accelerator" is used because replacement CPUs are typically faster than the computer's original CPU.

Address: A label placed on a location in main memory that is used by programs to access that specific location.

Address bus: An electronic pathway used to carry addresses from one component in the computer to another; a portion of the system bus.

Agent: A program that runs in the background, observing and responding to events in the Macintosh environment without user intervention.

Alias: A file that holds the path to a Macintosh file or folder.

Analog board: One of the main circuit boards in older compact Macintoshes (for example, the 128K, 512K, 512Ke, and Plus).

Analog signal: A continuous waveform signal such as the signal that travels over standard telephone lines.

Apple Events: Events in the Macintosh environment that are designed for sharing actions and messages between applications.

AppleScript: A programming language that responds to Apple Events.

Applet: An AppleScript program that acts as a stand-alone application. It can be launched by double-clicking on its icon.

B

Background program: A program that runs during periods when the CPU isn't busy running the application with which the user is currently interacting.

Background printing: Printing that takes place in the background, using CPU idle time.

Battery conditioner: A stand-alone device that discharges completely and then recharges completely an internal PowerBook battery.

Baud: The rate at which the frequency of a modem's carrier signal changes.

BBS: The abbreviation for *Bulletin Board Service.*

Benchmark: A measure of the speed of some aspect of a computer's performance.

Bit: A binary digit; a zero or a one.

Bits-per-second: The unit used to measure the speed at which a modem can transmit data over a data communications network.

Block: The unit of space on a disk that is allocated to a file whenever the file needs more space.

bps: The abbreviation for *bits per second.*

Bulletin Board Service: A communications service usually run by a user group, corporation, or individual to provide specialized services.

Bus: An electronic pathway in a computer that connects the computer's components.

C

Carpal tunnel syndrome: A repetitive motion disorder affecting the hand, wrist, and arm caused by poor hand, wrist, and arm placement during long-term keyboard use.

Carrier tone: An analog signal sent over a telephone line by a modem onto which a digital signal is superimposed so that the digital signal can travel through the analog medium.

Central processing unit: A computer's main processor which executes programs and, in most Macintoshes, handles input and output operations.

CISC: The abbreviation for *Complex instruction set computer.*

Communications parameters: The characteristics of a data communications session—including transmission speed and parity—on which both computers engaging in the communications session must agree.

Complex instruction set computer: A microprocessor that has circuitry to process all of its instructions as part of the CPU's hardware.

Control panel: A Macintosh system extension that is configured by an application that is accessible while the Macintosh is running.

CPU: The abbreviation for *Central processing unit.*

CPU accelerator: See *Accelerator board.*

Creator: A four-character string attached to a Macintosh file that identifies the program that created the file.

Current application: The application running in the foreground; the application with which a user is currently interacting. There can be only one foregound application at a time.

Cylinder: A unit of a multi-platter disk made up of the same track through all platters in the disk drive.

D

DAT: The abbreviation for *Digital audio tape.*

Daughterboard: A secondary circuit board that is attached to a computer's motherboard. Daughterboards are found in PowerBooks.

Demodulation: Removing the carrier tone from an analog signal to reassemble the digital signal that has been superimposed upon it.

Digital audio tape: Magnetic tape that stores data in digital form, used in the computer field primarily for backing up large hard disks.

Digital signal: A signal made up of discrete highs and lows; the type of communications signal generated by a computer.

Digital signal processor: A special processor used to handle the display and processing of multimedia signals.

Disk cache: An area of main memory set aside to hold the "next" data to be read from disk, speeding up access to data and programs.

Disk compression: A technique for obtaining more space on a hard disk by compressing files so they take up less space.

Disk fragmentation: A condition that arises when the blocks occupied by files are no longer contiguous, increasing the time it takes to access the contents of a file.

Disk optimization: The processes of reorganizing the files on a disk so that files that aren't modified frequently are placed together in one section of the disk, separate from files that are modified frequently.

Download: Transfer software from a remote computer to a local computer over data communications lines.

Dot-matrix printer: Technically, any printer that forms its image by placing a pattern of dots on paper. In common use, a dot-matrix printer is an impact printer that applies its dots by striking the printer through a ribbon.

Drag and drop: A technique for working with files in which a source file icon is dragged onto a destination file icon, causing the destination file to take some action with the source file. For example, under System 7, you can open a document by dragging its icon to the application with which you want to open it.

Droplet: An AppleScript program that is executed by dragging a file onto its icon.

DSP: The abbreviation for *Digital signal processor.*

E

Enabler: A system extension that tailors the Macintosh operating system to a specific Macintosh model.

Event: Anything that happens in the Macintosh environment, such as clicking the mouse button or inserting a floppy disk.

Extension: Software that adds functionality to the Macintosh operating system.

Extent: The amount of disk space allocated to a file when the file needs additional space.

Fast SCSI: A portion of the SCSI-2 standard the provides faster data transfers to SCSI-2 disk drives than is available with SCSI-1 drives.

F

File compression: A technique for saving disk space by compressing and combining a selection of files into an archive.

Finder: The Macintosh operating system program that takes care of managing the Desktop.

Floating point unit: A special-purpose processor that handles floating point arithmetic operations to speed up applications such as spreadsheets.

Forced quit: An action (pressing ⌘-Option-Esc) that forces an application to quit immediately and return to the Finder, bypassing the dialog box that warns you of unsaved changes to open documents.

Foreground application: The program with which the user is currently interacting; the application that has first priority in terms of access to the CPU.

H

Handshaking: The procedure used by two communicating computers to signal the start and end of each computer's transmissions. The term also can refer to the procedure two computers use to agree upon communications parameters.

I

Impact printer: A printer that forms its image by striking a paper through a ribbon.

Information service: A commercial communications service that provides electronic mail, message forums, software libraries, shopping, business services, and other features to users who pay a fee for the time they are connected to the service.

INIT: A system extension that adds functionality to the Macintosh operating system.

Ink-jet printer: A printer that forms its image by spraying ink in a pattern of dots.

Instruction set: The actions that a CPU can execute. A computer program is a sequence of steps expressed in the CPU's instruction set.

Intelligent agent: An agent that learns from the way a user interacts with his or her computer.

Interapplication communication: The exchange of information between applications running at the same time.

Iteration: The repetition of some action. In computing benchmarks, this term refers to the number of times the program that computes the benchmark is executed.

K

Keyboard macro: A sequence of actions triggered by pressing a combination of keys.

L

LAN: The abbreviation for *Local area network.*

Local area network: A computer network limited to a small area, such as a single office, a floor of a building, or an entire building.

Local node: A connection into an information service's telephone network that typically is a local call.

Logic board: The computer's main circuit board, containing the CPU and main memory. It generally lays across the bottom of the system box.

M

Megahertz: Million cycles per second; the units used to measure the rate at which a CPU's internal clock pulses; a measure of the speed of a CPU.

Magneto-optical drive: A disk drive that uses lasers to heat portions of an optical disc so that a read/write head can manipulate the direction of the magnetic field on the disk.

Memory effect: A property of NiCad batteries that prevents them from being completely recharged when they aren't completely discharged.

MHz: The abbreviation for *Megahertz.*

Microprocessor: A complete CPU on a single chip; the type of CPU used in a microcomputer.

Million instructions per second: A measure of the speed of a CPU.

MIPS: The abbreviation for *Million instructions per second.*

Modem: A piece of equipment that makes it possible to transmit a digital computer signal over an analog telephone line.

Modulation: Raising and lowering the frequency of a carrier tone to transmit a digital signal over an analog telephone line.

Motherboard: The computer's main circuit board, containing the CPU and main memory. It generally lays across the bottom of the system box.

N

Nanosecond: The unit used to measure the speed of main memory; 10^{-9} seconds.

Neural network: A type of artificial intelligence that learns by simulating the way that the neurons in a human brain learn.

O

Optical drive: A disk drive that uses lasers to heat portions of an optical disc so that a read/write head can manipulate the direction of the magnetic field on the disk.

P

Paged memory management unit: A processor that handles memory management. It may be a separate chip (the 68020) or may be integrated into the CPU (the 68030 and 68040).

Parity: An error-checking scheme used in data communications.

Pixel: One dot on a computer screen.

Planar battery: A battery technology used in external PowerBook batteries. Planar batteries have longer life spans than NiCad batteries and do not suffer from the memory effect.

Platter: One disk in a disk drive on which data are written.

PMMU: The abbreviation for *Paged memory management unit.*

Print file: A file of commands that describe a printed page waiting on disk to be printed.

Process: A running application.

Processor cycling: Slowing the speed of a CPU to save battery power in a PowerBook.

R

RAM: The abbreviation for *Random access memory.*

RAM disk: A portion of RAM set aside to function as a high-speed disk drive.

Random access memory: Main memory that can be read from and written to. The contents of RAM are lost when electrical power is removed.

Read only memory: Main memory that can be read from but not written to. The contents of ROM aren't lost when electrical power is removed.

Read/write head: The part of a disk drive that reads and writes data.

Reduced instruction set computer: CPU that has only a small portion of its instruction set built into the CPU. The remaining instructions are simulated through software.

Repetitive motion disorder: An injury that occurs to a computer user after he or she repeats the same movements over a long period of time.

RISC: The abbreviation for *Reduced instruction set computer.*

ROM: The abbreviation for *Read only memory.*

S

Script: A program written in the AppleScript programming language.

SCSI: The abbreviation for *Small computer systems interface.*

SCSI controller: A processor that is in charge of transferring data between the Macintosh and SCSI devices.

SCSI-1: The original SCSI standard, implementated in Macintoshes.

SCSI-2: The second version of the SCSI standard that provides faster performance than the SCSI-1 standard. Adding SCSI-2 to a Macintosh requires an expansion board.

Sector: A wedge-shaped section of a disk drive.

SIMM: The abbreviation for *Single in-line memory module.*

Single in-line memory module: A small circuit board containing RAM chips that is used to expand a computer's main memory.

Small computer systems interface: A standard for the transfer of data between a computer and external devices such as disk drives, tape drives, and scanners.

Spool file: A file of commands that describe a printed page waiting on disk to be printed.

Stationery document: A document used as a template. Opening a stationery document causes the application to create an untitled copy of the document, leaving the original untouched.

Stop bit: During the transfer of a file over data communications lines, a bit that signals that a complete block of data has been transmitted.

Synchronize (files): Copy files between two or more computers so that each has the most recent version of common files.

SyQuest drive: A mechanism for a removable cartridge hard drive manufactured by the SyQuest Corp.

System unit: The box in which the major components of a microcomputer (motherboard, internal disk drives, and so on) are housed.

T

Terminal emulation: Using software to translate keypresses from a microcomputer into those of a terminal that is recognized by a remote computer with which the microcomputer is communicating.

32-bit addressing: A method of addressing Macintosh memory that limits the maximum address space to 4 Gb and the maximum physical RAM to 1 Gb.

32-bit clean: Macintosh ROMs that are capable of supporting 32-bit addressing.

32-bit dirty: Macintosh ROMs that are not capable of supporting 32-bit addressing. Without the addition of a system extension that compensates for the 32-bit dirty ROMs, Macintoshes with those ROMs are limited to 24-bit addressing.

Track: A circular subsection of a disk. Each disk is divided into many concentric tracks.

Type (of a file): A four-character string attached to a Macintosh file that identifies the type of file.

24-bit addressing: A method of addressing Macintosh memory that limits the maximum address space to 16 Mb and the maximum physical RAM to 8 Mb.

V

Virtual: In the computer field, something that is simulated.

Virtual memory: A technique for extending the amount of RAM available to a computer by simulating added RAM with a disk file.

Virtual memory swap file: The disk file used to hold the portion of simulated RAM that currently won't fit in the computer's physical RAM.

Virus: A malicious computer program that invades a computer system and interrupts normal data processing and/or destroys data.

W

Wide SCSI: A portion of the SCSI-2 standard that provides the fastest SCSI data transfer. Although Wide SCSI expansion boards are available, Wide SCSI disk drives are not available at this time.

Product List

Aaron's Dvorak
(Shareware)
Matthew Lasater
Voice: (713) 782-1808

Adobe Type Reunion
(Commercial)
Adobe Systems Inc.
1585 Charleston Road
P.O. Box 7900
Mountain View, CA 94039-7900
Voice: (800) 833-6687

Alias Dragon
(Freeware)
James W. Walker
CompuServe: 76367,2271
America Online: JWWalker
Internet: JWWalker@AOL.com

America Online
Voice: (800) 827-3338

AppChooser
(Shareware)
John L. Hayes
175B N. Magnolia
Anaheim, CA 92801

AutoDoubler
(Commercial)
Fifth Generation Systems, Inc.
10049 N. Reiger Road
Baton Rouge, LA 70809-4562
Voice: (800) 225-2775
Fax: (415) 295-3268

Bail
Christopher Evans
Natural Intelligence, Inc.
2067 Massachusetts Ave.
Cambridge, MA 02140
Voice: (617) 876-4876
Internet: evans @natural.com

CD-ROM ToolKit
(Commercial)
FWB Software, Inc.
2040 Polk Street
Suite 215
San Francisco, CA 94109

CEToolbox
(*see* DiskTop)

ColorSwitch
(Shareware)
Ambrosia Software, Inc.
P.O. Box 23140
Rochester, NY 14692
Voice: (716) 427-2577
Fax: (716) 475-9289
CompuServe: 73424,1226
AppleLink: Ambrosia.SQ
America Online: AmbrosiaSW
Internet: AmbrosiaSW@AOL.com

Compact Pro
(Shareware)
Cyclos Software
P.O. Box 31417
San Francisco, CA 94131
Voice: (415) 821-1448
($25 shareware fee)

CompuServe Information Service
5000 Arlington Centre Blvd.
P.O. Box 20212
Columbus, OH 43220
Voice: (800) 848-8990

CompuServe Information Manager
(Commercial)
see CompuServe

CompuServe Navigator
(Commercial)
see CompuServe

Conflict Catcher
(Commercial)
Casady & Greene, Inc.
22734 Portola Drive
Salinas, CA 93908-1119
Voice: (408) 484-9228

CopyDoubler
(Commercial)
Fifth Generation Systems, Inc.
10049 N. Reiger Road
Baton Rouge, LA 70809-4562
Voice: (800) 225-2775
Fax: (415) 295-3268

CPU
(Commercial)
Connectix
2655 Campus Drive
San Mateo, CA 94403
Voice: (800) 950-5880
Fax: (415) 571-5195

DeepDischarge
(Shareware)
Jeremy Kezer
143 Songbird Lane
Farmington, CT 06032-3433
America Online: JBKezer
Internet: jbkezer@aol.com

DepthMaster
(Shareware)
Victor Tan
42 Waratah Ave.
Randwick, NSW, 2031
AUSTRALIA

DeskTape
(Commercial)
Optima Technology
17526 Von Karman
Irvine, CA 92714
Voice: (714) 476-0515
Fax: (714) 476-0613
AppleLink: OPTIMA

Disinfectant
(Freeware)
John Norstad
Academic Computing and Network Service
Northwestern University
2129 North Campus Drive
Evanston, IL 60208
Internet: j-norstad@nwu.edu

DiskCopy
(Freeware)
Apple Computer Inc.
20525 Mariani Ave.
Cupertino, CA 95014
Voice: (800) SOS-APPL

DiskDup+
(Shareware)
Roger D. Bates
P.O. Box 14
Beaverton, OR 97075
Voice: (503) 591-9223

Disk Express II
(*see* Power Utilities)

Disk First Aid
(Commercial)
Apple Computer Inc.
20525 Mariani Ave.
Cupertino, CA 95014
Voice: (800) SOS-APPL

DiskTop
(Commercial)
PrairieSoft, Inc.
1650 Fuller Rd.
P.O. Box 65820
West Des Moines, IA 50265
Voice: (515) 225-3720
Fax: (515) 225-2492

DoubleScroll
(Shareware)
Edward Voas
ISYS Development Corp.
81 Dean Ave.
Smithfield, RI 02917-3628
CompuServe: 71141,3477
America Online: ISYSDev

Drive Tech
(Commercial)
Micromat Computer Systems
7075 Redwood Blvd.
Novato, CA 94945
Voice: (415) 898-6227
Fax: (415) 897-3901

DT Launch
(*see* DiskTop)

File Buddy
(Shareware)
Laurence Harris
1100 W. NC Highway 54 BYP #29-J
Chapel Hill, NC 27516-2826
Voice: (919) 933-9595
CompuServe: 76150,1027
America Online: LHarris
Internet: 76150.1027@compuserve.com

Finder Info Changer
(Shareware)
Bill Cunningham
P.O. Box 14531
Reno, NV 89507
America Online: BillC36613

FirstClick!
(Shareware)
Millenium Software Company
5956 Encore Drive
Dallas, TX 75240
CompuServe: 71370,3004
AppleLink: TAILORCOMMCO
America Online: MSC1KEVIN
Internet: MSC1KEVIN@AOL.com

Floppier
(*see* Nortion Utilities)

Font Harmony
(Commercial)
Fifth Generation Systems
10049 N. Reiger Road
Baton Rouge, LA 70809
Voice: (800) 873-4384
Fax: (504) 295-3268

Freedom of Press
(Commercial)
ColorAge Inc.
900 Technology Park Drive
Billerica, MA 01821
Voice: (508) 667-8585
Fax: (508) 667-8821

GOfer
(*see* DiskTop)

HAM
(Commercial)
Inline Design
308 Main Street
Lakeview, CT 06039-1204
Voice: (800) 453-7671

International Keyboard Layouts
(Freeware)
Tom Zeller
America Online: Zelmo
Internet: Zelmo@aol.com

Keep It Up
(Shareware)
Karl Pottie
Orkaanstraat 21
8800 Rumbeke-Roselaire
BELGIUM
Internet: karl@uz.kuleuven.ac.be

Keyboard PLUS
(Shareware)
Berrie Kremers
Prof. Cobbenhagenlaan 464
5037 DJ Tilburg
THE NETHERLANDS
Internet: berrie@kub.nl

KiwiENVELOPES!
(Commercial)
Kiwi Software
6546 Pardall Road
Santa Barbara, CA 93117-4842
Voice: (805) 685-4031
Ffax: (805) 968-1932
CompuServe: 73207,1275
AppleLink: D0862
America Online: KiwiSoft

MacEKG
(Commercial)
Micromat Computer Systems
7075 Redwood Blvd.
Novato, CA 94945
Voice: (415) 898-6227
Fax: (415) 897-3901

Malph
(Freeware)
Nitin Ganatra
AppleLink: GANATRA
Internet: ganatra@apple.com

MaxAppleZoom
(Shareware)
Naoto Horii
B.P. 1415
B-1000 Brussels
BELGIUM

Maxima
(Commercial)
Connectix
2655 Campus Drive
San Mateo, CA 94403-2520
Voice: (800) 950-5880
Fax: (415) 571-5195

Mode32
(Freeware)
Connectix
2655 Campus Drive
San Mateo, CA 94403-2520
Voice: (800) 950-5880
Fax: (415) 571-5195

Monitor Expander
(Shareware)
Men & Mice
P.O. Box 7238
107 Reykjavik
ICELAND
Voice: +354-169-4596
Fax: +354-169-4991
Internet: me-registrations@rhi.hi.is

MyBattery
(Shareware)
Jeremy Kezer
143 Songbird Lane
Farmington, CT 06032-3433
America Online: JBKezer
Internet: jbkezer@aol.com

Norton Utilities
(Commercial)
Symantec Corp.
10201 Torre Ave.
Cupertino, CA 95014-9854
Voice: (800) 441-7234
Fax: (408) 255-3344

Now Compress
(Commercial)
Now Software
319 N.W. Washington Street
Portland, OR 97204
Voice: (800) 237-3611

NowMenus
(*see* Now Utilities)

Now Utilities
(Commercial)
Now Software
319 N.W. Washington Street
Portland, OR 97204
Voice: (800) 237-3611

Once Daily
(Freeware)
David Giandomenico
4 Waverly Drive
Camberley, Surrey GU15-2DL
ENGLAND
CompuServe: 100016,1053
Internet: 100016,1053@compuserve.com

Open Sesame!
(Commercial)
Charles River Analytics Inc.
55 Wheeler Street
Cambridge, MA 02138
Voice: (617) 491-3474
Fax: (617) 868-0780
AppleLink: OPENSESAME

Open-wide
(Freeware)
James W. Walker
3200 Heyward St.
Columbia, SC 29205
CompuServe: 76367,2271
America Online: JWWalker
Internet: JWWalker@aol.com

OptiMem
(Commercial)
Jump Development Group
1228 Malvern Avenue
Pittsburgh, PA 15217
Voice: (412) 681-2692
Fax: (412) 681-2163
CompuServe: 71321,1527
AppleLink: RTHORNTON
America Online: JUMPDEVGRP
Internet: JUMPDEVGRP@AOL.com

PBTools
(Commercial)
VST Power systems, Inc.
1620 Sudbury Rd.
Suite #3
Concord, MA 01742-5810
Voice: (508) 287-4600
Fax: (508) 287-4068

PopChar
(Freeware)
Günther Blaschek
Petzoldstr. 31
A-4020 Linz
AUSTRIA
Internet: gue@soft.uni-linz.ac.at

PowerBar
(Shareware)
Scott A. Johnson

PowerLaunch II
(Commercial)
Interealm
P.O. Box 110177
Aurora, CO 80042
Voice: (303) 366-8327
Fax: (303) 360-9118

Power Utilties
(Commercial)
ALSoft
22557 Aldine Westfield
Suite 122
Spring, TX 77373
Voice: (800) 257-6381
Fax: (713) 353-9868

Print One
(Freeware)
CRA Z Software
P.O. Box 6379
Haverhill, MA 01831
Voice: (508) 521-5262
CompuServe: 74007,2303
AppleLink: CRA.Z
America Online: CRA Z

Processorize
(Shareware)
Carl W. Haynes III
Haynes Consulting Services
P.O. Box 2715
W. Lafayette, IN 47906
America Online: CWH3
Internet: haynes@mace.cc.perdue.edu

ProFiles
(Commercial)
Dayna Communications, Inc.
Sorenson Research Park
849 West Levoy Drive
Salt Lake City, UT 84123
Voice: (801) 269-7200

QuicKeys
(Commercial)
CE Software
P.O. Box 65580
West Des Moines, IA 50265
Voice: (515) 221-1801

RamDisk+
(Shareware)
Roger D. Bates
P.O. Box 14
Beaverton, OR 97075
Voice: (503) 591-9223

RAMDoubler
(Commercial)
Connectix
2655 Campus Drive
San Mateo, CA 94403-2520
Voice: (800) 950-5880
Fax: (415) 571-5195

ResEdit
(Freeware)
Apple Computer Inc.
20525 Mariani Ave.
Cupertino, CA 95014
Voice: (800) SOS-APPL

SmartKeys
(Freeware)
Maurice Volaski
173 Princeton Ave.
Apt. #2
Amherst, NY 14226-5006
Internet: volaski@contra.med.buffalo.edu

Snooper
(Commercial)
Maxa Corp.
116 Maryland Ave.
Suite 100
Glendale, CA 91206
Voice: (800) 788-6292

SoftwareFPU
(Shareware)
John Neil
P.O. Box 160699
Cupertino, CA 95016-0699
CompuServe: 70421,730
America Online: John Neil
Internet: johnneil@netcom.com

Speed Disk
(*see* Norton Utilities)

Speedometer
(Shareware)
Scott Berfield
26043 Gushue St.
Hayward, CA 94544
CompuServe: 72627,564
AppleLink: BERFIELD
America Online: SBerfield
Internet: SBerfield@cup.portal.com

SpeedyFinder 7
(Shareware)
Victor Tan
42 Waratah Avenue
Randwick, NSW, 2031
AUSTRALIA

Speedy Mouse
(Freeware)
Mark Pilgrim
1130 Padnor Hill Road
Wayne, PA 19087-2203
Internet: f8dy@netaxs.com

Startup Manager
(Commercial)
Now Software
319 N.W. Washington Street
Portland, OR 97204
Voice: (800) 237-3611

Stuffit Deluxe
(Commercial)
Aladdin Systems
165 Westridge Drive
Watsonville, CA 95076
Voice: (408) 761-6200
Fax: (408) 761-6206

Suitcase
(Commercial)
Fifth Generation Systems, Inc.
10049 N. Reiger Road
Baton Rouge, LA 70809-4562
Voice: (800) 225-2775
Fax: (415) 295-3268

Threshold
(Shareware)
Jeremy Kezer
143 Songbird Lane
Farmington, CT 06032-3433
America Online: JBKezer
Internet: jbkezer@aol.com

Toner Tuner
(Commercial)
Working Software, Inc.
740 Front Street
Suite 318A
Santa Cruz, CA 95060
Voice: (408) 423-5696
Fax: (408) 423-5699
CompuServe: 76004,2072
AppleLink: D0140
America Online: WORKINGSW

TypeIt4Me
(Shareware)
Riccardo Ettore

UltraFind
(Shareware)
UltraDesign Technology Ltd.
69 St. George's Square
London SW1V 3QN
ENGLAND
Voice: (+44) 071 931 0010
Fax: (+44) 071 630 9105
AppleLink: ULTRA.TEC.UK
Internet: ultra.tec.uk@applelink.apple.com

Virtual
(Commercial)
Connextix Corp.
2655 Campus Drive
San Mateo, CA 94403-2520
Voice: (800) 950-5880
Fax: (415) 571-5195

WindowShade
(Shareware)
Rob Johnston
1720 N.W. River Trail
Stuart, FL 34994-9449
Voice: (407) 692-9199

WindowWarp
(Shareware)
Jan Bruyndonckx
Salvialei, 23
B-2540 Hove
BELGIUM
AppleLink: WAVE.BEL
Internet: wave.bel@applelink.apple.com

WithAView7
(Freeware)
David P. Sumner

WrapScreen
(Shareware)
Eric Aubourg
1742 Spruce Street #24
Berkeley, CA 94709
Internet: aubourg@physics.berkeley.edu

Index

StuffIt Deluxe™ 3.0

Special Upgrade Offer!

SAVE $80

As a user of ***Mac Screamer: The Ultimate Macintosh Supercharging Kit,*** you've seen the benefits of Stuffing files. We would like to extend a special offer on trading up from StuffIt Lite to StuffIt Deluxe™ 3.0. This award-winning product retails for $120.00. With this special offer, **you'll pay only $40.00.***

Why trade up?

1. Ease of use
Just "Stuff" from a menu in the Finder to make an archive. Drop boxes let you Stuff in one step on the Desktop.

2. Includes StuffIt SpaceSaver FREE (a $59.00 value)
SpaceSaver compresses files on-command or while your Mac is idle. Once files are compressed with SpaceSaver, you can work with them just like uncompressed files —except they take up much less space on your hard drive.

3. Also access files compressed on PCs and Unix systems with foreign file translators

4. View or print Text and PICT files
—while they're still compressed in StuffIt archives.

5. Launch compressed files directly from the Deluxe application

6. Get built-in scripting language for automating common tasks

7. Includes extensions for QuicKeys, Hypercard, and MPW support (for even more automation)

8. Comprehensive User's Guide. PLUS MUCH MORE!

MACWORLD MW ★★★★

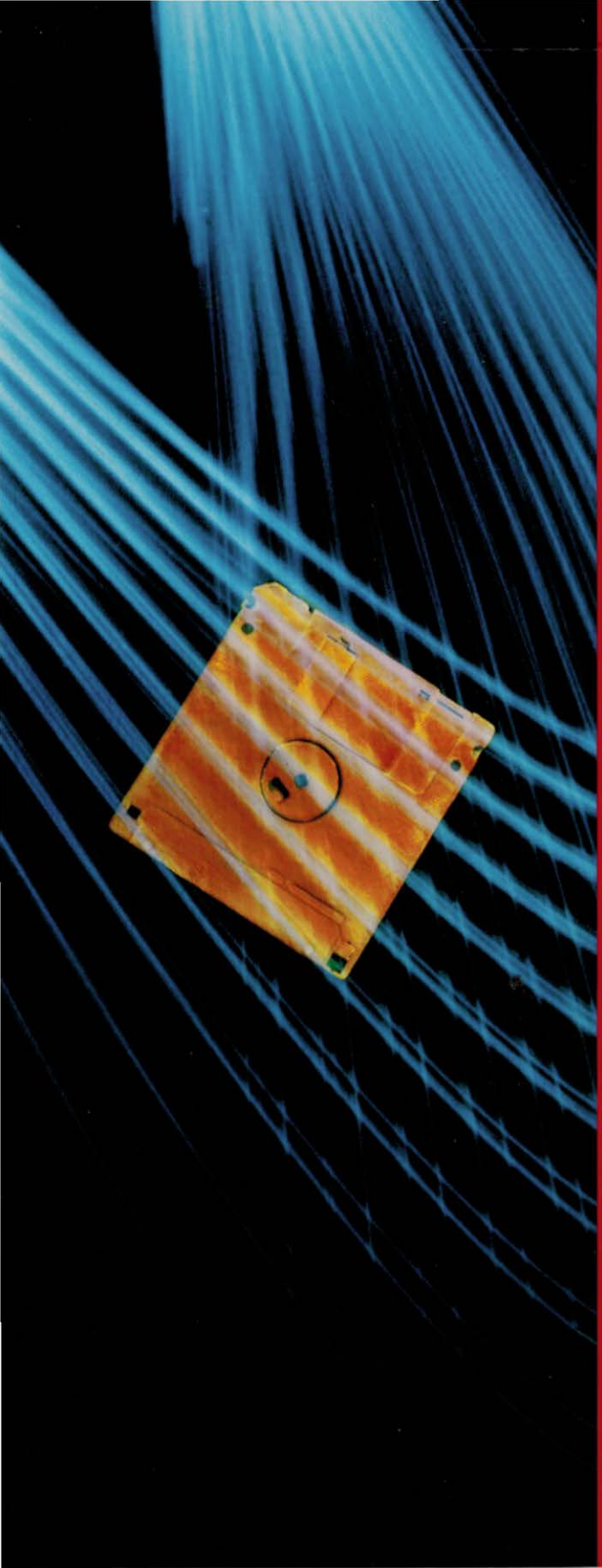
★★★★½

Call ***Aladdin Systems*** *direct and trade up to* ***StuffIt Deluxe™ 3.0*** *today!*

1-408-761-6200
or fax 1-408-761-6206
or contact us online:
America Online: Aladdin
Applelink: Aladdin
CompuServe: 75300,1666

Aladdin Systems

**Plus shipping and handling (CA residents add 8.25% sales tax).*
Offer expires June 1995



On your 1.4 MB Mac Screamer High-Performance disk, you'll find these tools to help you speed up routine Macintosh operations and customize your system to work more efficiently.

BAIL Lets you bail out of an application or program launch.

DISINFECTANT An antivirus program that keeps your system clean.

DISK DUP+ Disk duplication software that copies floppies fast.

DOUBLESCROLL Modifies windows to make scrolling easier.

FILEBUDDY File management software.

KEYBOARD PLUS Lets you customize your keyboard.

MALPH An application switcher that enables you to move between applications quickly.

ONCE DAILY Makes sure startup programs run only once each day.

OPEN WIDE Makes Open File and Save File dialog boxes wider for easy viewing.

POP CHAR Replaces keycaps and allows you to insert special characters in your documents.

RAMDISK Creates a RAM disk.

STUFFITLITE File compression software.

WRAP SCREEN Wraps the cursor from one edge of the screen to the other.

SPEED UP YOUR MAC
WITHOUT BREAKING THE BANK

Is fast not fast enough anymore? But you can't afford to spend big bucks on software upgrades or more hardware? Then *Mac Screamer: The Ultimate Macintosh Supercharging Kit* is for you. This book emphasizes simple hardware adjustments and software solutions for speeding up your Mac and the way you work, and it comes with a disk that includes the best of shareware to diagnose and speed up system performance.

Author Jan L. Harrington shares her secrets for pumping up the processing performance of all major Mac models from the classic compacts to the newer models. The book will help you decide what you need, why you need it, and then describe what to do.

INTERMEDIATE/ADVANCED
MACINTOSH
GENERAL

Get the scoop on:

- Software techniques to speed up and optimize your Mac
- Software that measures how fast your Mac is performing
- How to optimize and speed up disk access
- How to accelerate application software performance
- How to get more application memory without adding more RAM

WHETHER IT'S YOUR HARDWARE THAT NEEDS A BOOST, YOUR SOFTWARE THAT DESERVES A SECOND LOOK, OR YOU WANT TO LEARN NEW SHORTCUTS FOR USING YOUR SYSTEM MORE EFFICIENTLY, THIS BOOK COVERS IT ALL. YOU'LL LEARN:

- **When simple hardware and software techniques are enough**
- **What performance numbers and measurements mean**
- **When you're up against the wall and your only solution is a hardware upgrade**

Jan L. Harrington, author of more than 15 books, has been working with and writing about the Macintosh since 1984. Her previous data management books include *Riding the Helix Express*, *Making Database Management Work*, and *Relational Database Management for Microcomputers*. Dr. Harrington is also a full-time college professor who has been teaching computer-related topics to graduate and undergraduate students for nearly 15 years. She lives in upstate New York.

ISBN 0-679-75072-X

53500

9 780679 750727

RANDOM HOUSE
ELECTRONIC PUBLISHING

0-679-75072-X
U.S. $35.00
CAN. $47.00
U.K. £32.99 Net
(incl. VAT)