

# MAXIMIZING YOUR MAC

## THE ULTIMATE MAC GURU'S GUIDE

- Understand the mysteries of the Macintosh operating system
  - Organize, maintain and troubleshoot your system for maximum productivity and pleasure
- Enhance your Mac with power user system additions, keyboard shortcuts and macros
- Win friends and influence people with cool, fun tricks, sounds, and hidden Mac features



# **MAXIMIZING YOUR MAC**



**AMY LASKIN**



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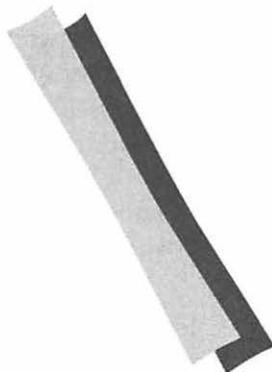
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## INTRODUCTION

"393 • Learn how to operate a  
Macintosh computer."

—*From Life's Little Instruction Book—511  
Suggestions, observations, and reminders on  
how to live a happy and rewarding life,*  
by H. Jackson Brown, Jr.



I must admit from the very start that I am biased. And what's more, I'm assuming you are too. I am strictly a Macintosh user. I don't do DOS. Macs are my "preferred" computer for anything I can think of. While I know there are perfectly rational arguments why other operating systems are superior for certain applications, I won't listen. If I can't do it on my Mac, let someone else do it. This rationale has worked for me, because I have yet to find anything I want to do that can't be done on my Mac—where it's usually easier and more fun, too.

I learned to use the Mac the way so many users do: by doing. I started with a little word processing and a game or two, and then I discovered PageMaker. I haven't (voluntarily) touched a DOS machine since. As time went on, I found myself making the Macintosh my profession. I learned more and more applications, and with each one it became easier to learn the next. The friendly interface and software compatibil-

ity made it possible to try all kinds of applications, often with only a cursory glance at the manuals.

After a while, though, I wanted to know more. Why did my system crash so much? What was all that junk in the System Folder? How did this thing work, anyway? What made it do all the stuff it did? What the heck is an INIT? I didn't want to be a technical expert or a programmer. I just wanted to know the basics of how my Mac worked and how to make it work better.

I asked a lot of questions. I read a lot of magazines. I did a lot of experimenting. And eventually, I got the information I wanted. I've put that information into this book.

## Who This Book Is For

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This is not an introduction to the Mac, nor is it an expert's guide full of technical wizardry. It's a guide for the Mac user who wants to know how the Macintosh works, and how to make it work a little better.

Your Mac is a machine, like a car. How long have you been driving your car? Years, probably. You know how to operate all of its different devices, from the ignition and gear-shift to the windshield wipers and headlights. In fact, most of those operations are second-nature to you by now. But do you know how the car really works? What happens when you turn the key? What about when you change gears? What exactly does gasoline have to do with running the car? And spark plugs? You might know how to change the oil, but do you know why you have to? What about water, windshield-wiper fluid, antifreeze? Is that funny noise you hear something to worry about, or is it nothing? The brakes feel funny—do you need new brake pads, or new brakes? Should you be worried?

If you know some basic auto mechanics, you can save yourself a lot of time and money. Instead of taking your car to the shop for every little thing, you can do some of the work yourself. You can diagnose some of your own problems, and

possibly even fix them yourself. Why pay a mechanic eighty bucks to change an eight-dollar belt?

It's the same way with your Mac. You know how to use it; you don't even have to think about it. But if you know a little bit about how it works, you can make it run smoother, faster, and more easily. You can diagnose and repair small problems without having to call an expert. You can even soup it up a little bit to get more power and fun out of it. And you don't have to be a certified programmer to do it.

## What This Book Assumes

---

This book assumes that you are an experienced Mac user who is familiar with the basics of operating the Mac. For starters, you should know

- How to use the mouse and menus, as well as keyboard commands
- How to use the Apple menu, including the Chooser, control panels, and Find File
- How to install and use desk accessories
- Basic Finder operations, such as moving, changing, copying, and deleting files and folders
- How to use the Open/Save dialogs and navigate through your hard disk
- How to use buttons, checkboxes, and pop-up menus in dialog boxes.

## Conventions Used in this Book

---

I use the terms **System 6** and **System 7** to refer to the various versions of the Macintosh operating system. System 6 and System 7 refer to all versions of those systems. If I am referring

to a specific version, I will use its exact name (such as "System 6.0.7"). A familiar product may be referred to by a shorter version of its name, such as "Word" instead of "Microsoft Word." The complete names for any product mentioned can be found in the "Product Guide" in Appendix C.

## **Here's Where I Cover My Ass**

---

With all the possible combinations of software and hardware available to the Mac user today, there is no way to cover all eventualities. I have tried to consider a variety of configurations in all contexts, but I cannot guarantee that everything herein will work for your system exactly as described.

## **About the Product Recommendations**

---

Throughout the book I recommend hardware and software products. I freely admit to personal bias. My recommendations are based on my own experience, reviews from the trade journals, recommendations of my friends and colleagues, and totally arbitrary preferences. Battles will always rage when user preferences come into play. Put any QuarkXpress lover together with a PageMaker maniac and watch the sparks fly. It is always worthwhile to research competitive products when you are planning a major purchase, and the recommendations herein should be considered part of that research. However—there are some products I simply love. I think every power user should have them. I have indicated these with the "POWER ADD-ON" Treasure Chest icon. In some cases, the products I describe have competitors with very similar features.

Certain other products have terrific capabilities that are available with other products, too. Wherever you see the

Treasure Chest icon, it means I recommend that you get a product that has the capabilities of this one, if not necessarily the exact program itself. For example, I think all power users need a powerful macro program. Personally, I prefer QuicKeys, but there are many excellent, competitive macro programs out there that might suit you just as well. Therefore, I have indicated QuicKeys as a “POWER ADD-ON.”

You’ll also notice the bulging bicep of the “Power Move” icon. I have used this icon to indicate especially hot tips or little-known facts.

## **“What’s In It For Me?”**

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This book can help you get to know your hardware and software better. The better you know it, the easier (and more fun) it is to use, and the better use you can make of it. In short, *Maximizing your Mac* can make you a “power user”.

## CHAPTER 1

## THE OPERATING SYSTEM

In this chapter you will get to know your operating system. Topics include:

Defining the operating system ◊

The ROM-based operating system ◊

The disk-based operating system ◊

The System Folder ◊

The System file ◊

The Finder ◊

Installing the operating system ◊

Boot blocks ◊

The volume information block ◊

The volume bit map ◊

B-tree directories ◊



# T

The one great thing about the Mac that got us all converted in the first place was the **interface**. That friendly, easy-to-comprehend desktop metaphor was an alluring departure from DOS line commands. No need to preach to the converted here—we all know why we love our Macs.

While the Mac's interface made worlds open up, it also closed one off: the world of the operating system. As end users, we are removed from the root of the operations and left only with the result. This is fine as long as everything goes smoothly. But after enough unexplainable crashes or software failures, one can start tearing one's hair out, asking oneself, *Why?!* And more importantly, *How can I make this stop?!*

Knowing the basics of how your Mac runs and how it handles its files makes it easier to prevent and solve problems. And once you understand the workings of your operating system, you can modify parts of it to suit your needs and whims.

Before launching into areas like troubleshooting or customization, we need some basic information about how the Mac works.

## The Operating System

---

When you start up your Mac, before you launch any applications, you are working with what is known as the **operating system**. The operating system is a program or group of programs that provide the basic tools for running your computer. The operating system controls the “ground level” work of your Mac: the basic operations that are part of everything you do on your computer. These operations include managing memory, processing input and output, executing applications (“launching” them), and managing files and programs. The operating system is what provides the interface that defines how you interact with the Mac.

The operating system falls into two parts: the ROM-based operating system, and the disk-based operating system (Table 1.1). The ROM-based operating system is the part that resides in the actual hardware of your Mac, as part of the ROM (Read-Only Memory) chips. The rest of the operating system is disk-based, meaning it resides on your hard disk (or floppy disk). This is what the System Folder holds.

**Table 1.1**  
The  
Operating  
System

	<i>ROM-Based (Hardware)</i>	<i>Disk-Based (Software)</i>
	Startup Routines	File Organization
	System Diagnostics	Memory Management
	System Managers	Interface

## The Rom-Based Operating System

The ROM contains routines for starting up your Mac, running diagnostics to make sure everything is in working order, and managing the system. It also is home to a number of **managers**. Managers are programs that contain the code responsible for “low-level” operations—some of the basic functions of the system. Some of the responsibilities of the managers are probably familiar to you:

- The Control Manager provides the resources for check boxes, buttons, and scroll bars.
- The Desk Manager handles desk accessories.
- The Dialog Manager provides resources for dialog boxes and alerts and transmits the responses you make in them back to the application.
- The File Manager executes the Open, Save, and Save As... commands (known as the Standard File Package).
- The Menu Manager handles the menus in menu bars and identifies the menu selections that you make.
- The Scrap Manager provides the clipboard for copying and pasting.
- TextEdit provides the editing capabilities for copying and pasting.
- The Window Manager creates, controls, and manipulates windows. Resizing, closing, overlapping, and redrawing windows are all handled by the Window Manager.

## The Disk-Based Operating System

The disk-based operating system is all the junk in the System Folder. Or it should be—though almost every System Folder has stuff in it that doesn’t need to be there. The System Folder software handles your Mac’s ongoing activities, such as file storage and memory management, and it provides the graphical user interface (GUI).

Applications work with the disk-based operating system. Applications and the hardware make everything happen. For example, suppose you want to open a Microsoft Word file. Word will request a file from the File Manager (in the ROM hardware). The File Manager consults the disk-based operating system for the file location (it looks it up in the directory). Then, when the operating system has provided the information, the File Manager transmits the location to the SCSI controller (part of the Mac's hardware), which then gets the file and loads it into RAM. Voila! It is ready and waiting for the application (Word), which can then access it.

## The System Folder

---

You are probably familiar with at least a few of the residents of your System Folder. The two most important ones are the System and the Finder, but you will also find a number of other files that are part of the disk-based operating system. These files include routines released by Apple as upgrades or changes to the ROM chips. They are known as "patches" (isn't that reassuring?). The System Folder is also where extensions to the system reside such as fonts, sounds, desk accessories, scrapbook data, and files used by the Chooser and control panels. In System 7, fonts and sounds are right inside the System file itself and there are new folders to handle Startup Items, Apple Menu Items, Extensions, and Control Panels. Chapter Two—*System 6 versus System 7* covers the changes accompanying System 7 in greater detail.

It is those two noble system folder residents, the System and the Finder, with which you need to be most concerned. They provide the basics of Mac operations and the interface we know and love—the familiar onscreen items like the desktop, trash, folders, etc.

# The System File

The System file holds the bulk of the operating system. Part of the System file is the boot code, which starts up (boots) the Mac. It is all the information the Mac looks for at startup. We'll talk a little more about boot code later in this chapter.

## Resources

Also residing within the System file are **resources**, which are bits of code that provide aspects of the interface. All applications have their own resources that contribute to that program's individual look and feature set, but the System has the "basics" for all applications to share. These shared resources include fonts, menus, sounds, scroll bars, and so on. Resources can be edited with a resource editor, the most well-known of which is ResEdit. This means that you can change what your menus display, as well as alter the look of your scroll bars. Resource editing is a tricky business, but it is the key to ultimate customization of your Mac. If you are interested in learning more about resource editing, see Appendix C for references.

Resources reside in one of the two **forks** that make up a file. The other fork is the **data fork**. The data fork contains the sequential data within a file: text in a word processing file, for example, or numbers in a spreadsheet. Therefore, a data file (such as a word processing file or spreadsheet) would have a large data fork, and a small resource fork (or none at all). After all, you don't have sounds residing in your spreadsheets (well, not usually, anyway). When you open the file, it is the application that gives the file its appearance (and the *application* borrows some of those resources from the System file). A System file, on the other hand, would have a very large resource fork, and a small data fork (Figure 1.1).

**Figure 1.1**

A typical data file has a large data fork and nothing in its resource fork, while a System file has a very large resource fork and a small data fork.

Data File		System File	
Data Fork	Resource Fork	Data Fork	Resource Fork
Large gray area	White area	White area	Large gray area

## The Finder File

The Finder is a big part of what makes a Mac a Mac. It is the translator between you, the operating system, and your applications. If you have worked with DOS (the IBM operating system), you know that you must learn a number of line commands in order to execute various operations on your computer. The operating system provides a **prompt** (something that looks like this: C>) and you type in a string of code that means something to the computer. To make a new directory (the equivalent of a Mac folder) named “stuff” and copy the contents of a floppy disk to it, you would type:

```
C>MD stuff
C>CD\stuff
C>stuff>A:
A:copy *.* C:\stuff\*.*
```

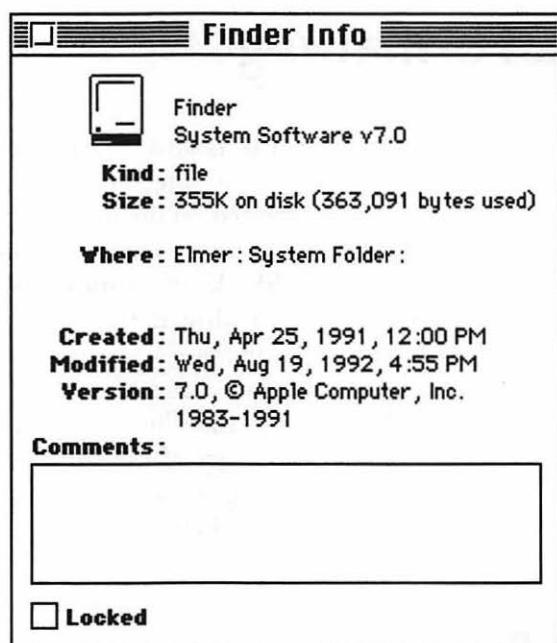
What fun! And so easy to remember! With a Mac, you just drag the icon of the floppy to the icon of your hard drive, and the Finder handles everything: It makes a folder named after the floppy and copies the contents of the floppy to that folder.

The Finder also translates in the other direction: from the computer to you. The operating system has a very sophisticated (and complicated) organizational structure for keeping

track of everything on a disk. You'll read more about the Mac's filing system later in this chapter. The Finder translates that structure into something we can understand: a system of files and folders on a familiar and logical desktop.

The Get Info command, which lets you see general information about your files, is provided by the Finder. If you highlight an icon and choose Get Info from the File menu in the Finder, you will see a window containing basic information about that file. You can add comments of your own into this window (Figure 1.2). (See Chapter 2, *System 6 versus System 7* and Chapter 10, *Hard Disk Management* for more information about the Get Info window.)

**Figure 1.2**  
The Get Info  
window of the  
Finder itself.



## The Desktop File

When you format a disk, the Finder creates a file called the **Desktop** file. The Desktop file contains an applications list

that uses a file's "type" and "creator" information to access the correct application when you double-click on a file. This file is responsible for the appearance of your desktop. For example, the Desktop remembers the locations of all the icons and windows on a disk, so that each time you return to the Finder everything will be as you left it. It keeps track of the viewing preferences you have set for each window, such as whether the files are listed by date or by name. The Desktop remembers icons for files and the files' applications, even if the application for a given file is not on the disk.

Under System 7, there is a new Manager called the Desktop Manager, which handles these desktop functions.

## Disk Formatting

---

Formatting a disk is also called **initialization**. Initializing a disk sets up the five directory areas that keep track of where everything is located on the disk and provides the information for startup. These areas are the **boot blocks**, the **volume information block**, the **volume bit map**, the **extents B-tree**, and the **catalog B-tree**. Now, before your eyes glaze over and you skip the rest of this chapter, think of this: If you have no idea of how the Mac keeps track of files, what will you do when you can't find one? Knowing the basic organization and terminology of file structures will be tremendously helpful when things go awry. And running a diagnostics program is much more helpful if you know the terminology.

### Boot Blocks

The first part of initialization is laying down the boot blocks. At startup, the Startup Manager looks for the boot blocks to begin the startup process. Boot blocks are the part of the oper-

ating system that informs the Startup Manager that the disk is a bootable disk. They mark the beginning of the operating system, set up memory, and point to the System file.

The boot blocks of the system start on your disk at absolute sector 0, which means that they are the first things read off the disk. If you think of your disk as akin to a vinyl record (remember those?), the boot blocks are the beginning of the first song. (If you want to know more about how a hard drive works, see Chapter 5, *Data Storage*.) The information is represented on the disk using the hexadecimal system, or **hex**. (Hexadecimal is the mathematical system of base-16 where the decimal system would be base-10.) Each byte (8 bits) of data is represented by two hexadecimal digits.

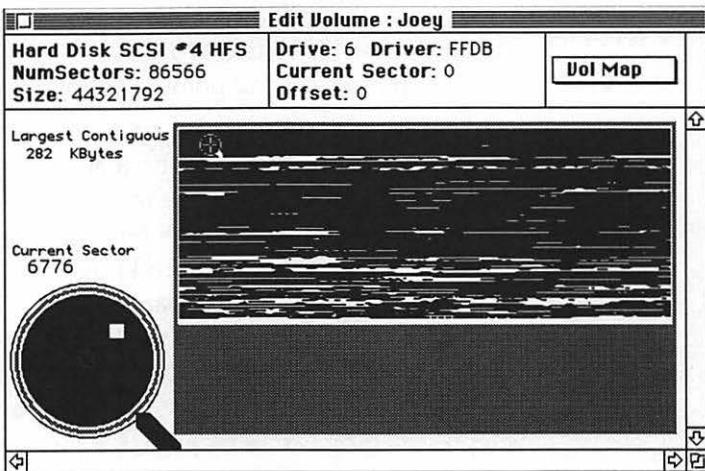
## Volume Information Block

The volume information block lies immediately after the boot blocks on the physical disk. It continues defining the disk to the Startup Manager by telling the manager the folder number in which the System file resides. This is not a number you assign, but a number assigned by the system's directory. The System Folder that it points to is called the **blessed folder**. The volume information block tells the system what kind of volume the disk is (what filing system it uses) and defines its allocation block size (the size of the blocks in which that data is written).

## Volume Bit Map

The volume bit map is a map of your disk that tells the File Manager which areas of the disk are free and which parts are in use. Figure 1.3 is a graphic representation of the volume bit map as you see it using SUM II's Tools. (See Chapter 13, *Software Troubleshooting*, for more about the amazing things you can do with these and other tools.)

**Figure 1.3**  
 SUM Tools' view of the volume bit map, showing which parts of the disk are in use and which parts are free.



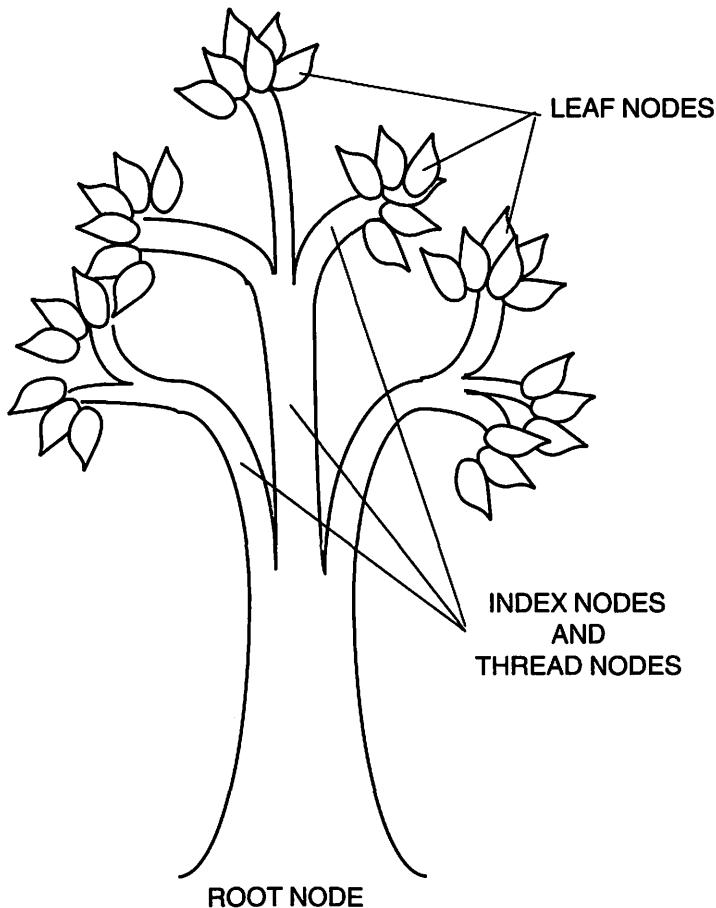
## Directories

The Mac's internal filing system is quite complex. Since each new file could be written to any location (depending on which sectors are free), there has to be some kind of directory that keeps track of it all. This system is called the **Hierarchical File System**, or HFS. The major components of HFS are the two B-trees (balanced trees), the extents B-tree, and the catalog B-tree. The name "tree" is apt, because the data structure is organized somewhat like a tree. Each directory has nodes that point to other nodes or to the location of the file, just as branches lead to other branches and ultimately to leaves. There are three kinds of nodes. **Index nodes** locate information based on system-assigned folder numbers and file names. **Thread nodes** are navigational aides that point to other nodes. **Leaf nodes** store actual file data, such as the location of the file's data on the disk, and the location of the icon on the desktop. The general structure of the directories is illustrated in Figure 1.4.

The **extents B-tree** keeps track of fragmentation. When a file is written to disk, it may be broken into pieces to fit into the available disk space. The extents B-tree keeps track of where all the pieces are so that they can be reassembled when you want to use the file. The **catalog B-tree** has nodes to

keep track of a file's physical position on disk and its relative location on the desktop. The operating system uses both directories to find and manipulate files. As you can imagine, damage to these directories can mean big trouble. Then it's time for troubleshooting, covered in Chapter 13.

**Figure 1.4**  
The operating system's directories, the B-Trees, and file information in a treelike hierarchy.



## Questions and Answers

**Q:** What is the Macintosh operating system?

**A:** A program or group of programs that provide the basic tools for running your Macintosh.

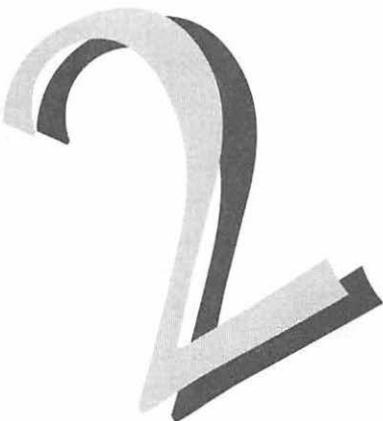
- Q:** What part of the operating system is built into the ROM?
- A:** Startup routines, diagnostics, and system management (including the Managers).
- Q:** What functions does the disk-based operating system handle?
- A:** File storage, memory management, and the interface.
- Q:** What are a few of the most important residents of the System Folder?
- A:** The System file, the Finder file, patches to the ROM, and extensions to the system.
- Q:** What's in the System file?
- A:** The bulk of the operating system, including boot code and shared resources.
- Q:** What does the Finder do?
- A:** It works as a translator between you and the operating system, provides the filing system, and creates the Desktop file.
- Q:** What is installed when you format, or initialize, a disk?
- A:** The boot blocks, the volume information block, the volume bit map, the extents B-tree, and the catalog B-tree.
- Q:** What do the boot blocks do?
- A:** They inform the startup manager that the disk is a bootable disk and begin the startup process.
- Q:** What does the volume information block do?
- A:** It finds the blessed System Folder and provides information about the type of volume the disk is.
- Q:** What is the volume bit map?
- A:** It is a map of the disk that indicates which parts of the disk are free and which parts are in use.
- Q:** What are directories?
- A:** The directories are the catalog B-tree and the extents B-tree. They are the filing system the Mac uses to identify files' locations on the disk.

## CHAPTER 2

## SYSTEM 6 VERSUS SYSTEM 7

This chapter will describe the differences between System 6 and System 7. You will learn about:

- Balloon Help ◊
- The Applications menu ◊
- Views changes ◊
- Labels changes ◊
- Aliases ◊
- Apple menu changes ◊
- Changes to Open/Save dialog ◊
- Changes to Finder windows ◊
- Emptying the Trash ◊
- The Startup Items folder ◊
- The Apple Menu Items folder ◊
- The Control Panels folder ◊
- The Extensions folder ◊
- Installing fonts, DAs, and sounds ◊
  - Background printing ◊
  - Stationery ◊
  - TrueType ◊
  - File sharing ◊
- Publish and Subscribe ◊
- Changes to Find command ◊
- Memory management ◊
- Hardware requirements ◊



I

n 1991 Apple introduced its long-awaited new version of the Macintosh operating system: System 7. The resulting arguments about whether the new system is a fantastic improvement or a major disappointment have raged at a level comparable to the Mac-versus-DOS debates.

## **System 6 or System 7?**

How do you know which system is right for you? To make the decision, it is important to know the major differences between System 6 and System 7. Look closely at each feature of System 7 to determine whether it is a feature you really could use. Think about how you use your system, and how you might use it in the future. Many critics have accused

System 7 of being little more than a souped-up Finder for the small-scale user who doesn't share data and doesn't need all the technological wizardry of features like Publish and Subscribe and File Sharing. However, those Finder changes alone could be enough to merit the switch if they can substantially increase your productivity and ease of use. And any user who regularly uses more than one application should look into whether Publish and Subscribe is available for those applications.

As more and more software developers write System 7 "savvy" applications (Apple's term for applications that take advantage of all of System 7's capabilities), it will become more difficult to resist the change. Many will hold out until the bitter end, waiting for the change to be completely irresistible. Those who feel the need to have the latest thing right away have been using System 7 since it was just a beta. Although it may sound like a cop-out, the fact is that only you can decide whether System 7 is right for you.

This chapter outlines the new features and changes that come with System 7. This is not an in-depth description of how to use these features; there are numerous good books on the subject of System 7 and how to use it. I merely outline what changes you can expect if you upgrade.

## **Finder Differences**

The most immediately obvious differences in System 7 are apparent in the Finder. Some are merely cosmetic, others are changes in Finder performance.

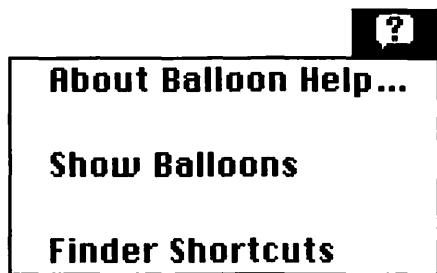
### **Balloon Help**

Easily the cutest Mac invention to come along since the bomb icon, Balloon Help is certainly more welcome. Balloon Help is invoked from a new Finder menu of its own, on the right side of the menu bar, and it is available in both the Finder and

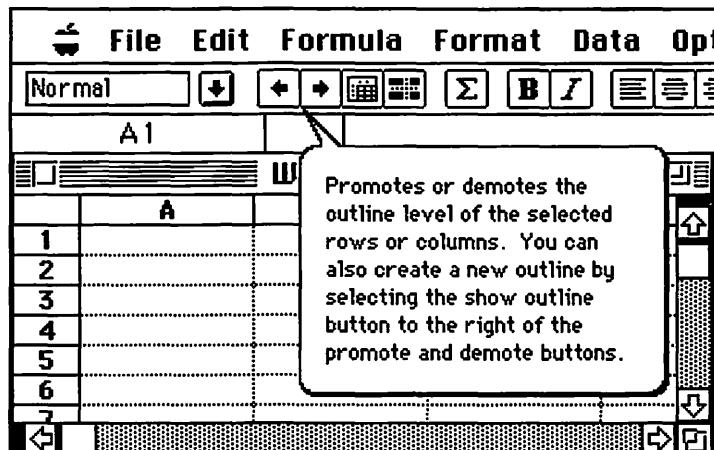
many recent third-party software releases. An application needs Balloon Help to achieve "savvy" status.

Balloon Help is toggled on and off from the menu bar (Figure 2.1). It is available in the finder and in any application that takes advantage of this System 7 feature. When you position the pointer over an object on the screen, small help windows appear in the form of cartoonlike balloons (Figure 2.2). The "tails" of the balloons point to the items the help screens refer to. The balloons provide instantaneous context-sensitive help. Their value as help depends on how well the help is written; the implementation of Balloon Help across different applications varies greatly in quality. The Finder's own help is pretty basic, but it can be helpful to the beginner.

**Figure 2.1**  
The Balloon Help menu.



**Figure 2.2**  
A help balloon describing a button in Microsoft Excel, one of many applications featuring Balloon Help.



## Application Menu

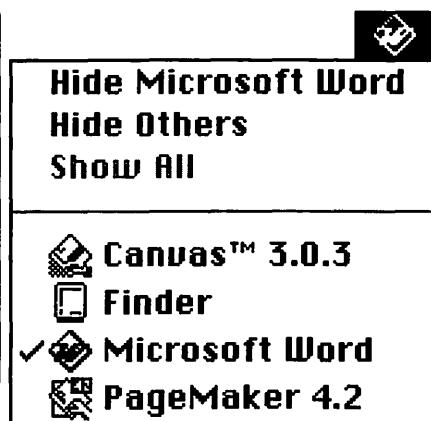
Under System 7 you can run more than one application at a time, and the Finder is available at all times. With several applications open at once, you can switch back and forth between them easily. It is similar to working under MultiFinder in System 6. System 7, however, has the added feature of the Application menu. All open applications are listed under the Application menu, including the Finder. The active application's icon is displayed in the menu bar, and its name is checked in the menu (Figure 2.3). The Application menu offers a couple of nifty advantages. First, selecting an application from the menu is much easier than clicking around through multiple windows or clicking repeatedly on the application icon in MultiFinder until the correct one shows up. Second, you can control which open windows will be visible on the desktop. The first choice under the Application menu is a command to hide the foremost application. Hide Others hides all windows except those in the active application (Figure 2.4). Hidden applications are visible in the Application menu with dimmed icons to indicate their hidden status.

Being able to hide applications is advantageous because you can leave several windows open without cluttering the desktop, and without having to open and close windows repeatedly. The windows aren't closed; as soon as you make an application active again, its windows reappear.

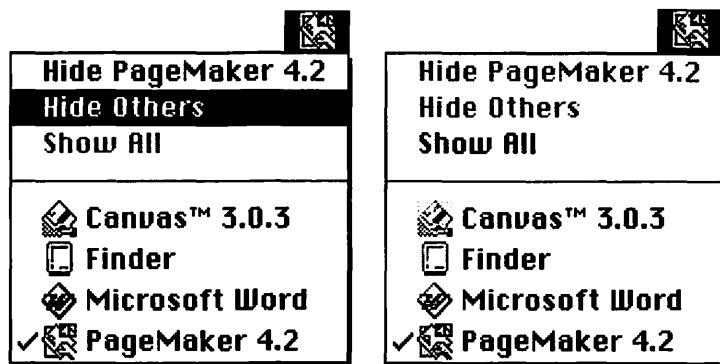
**Figure 2.3**

The Application menu lists all open applications.

The active application (the foremost window) is checked.



**Figure 2.4**  
 Choosing Hide Others from the Application menu (left) hides all the open windows except those in the active application, PageMaker (right).



## Views

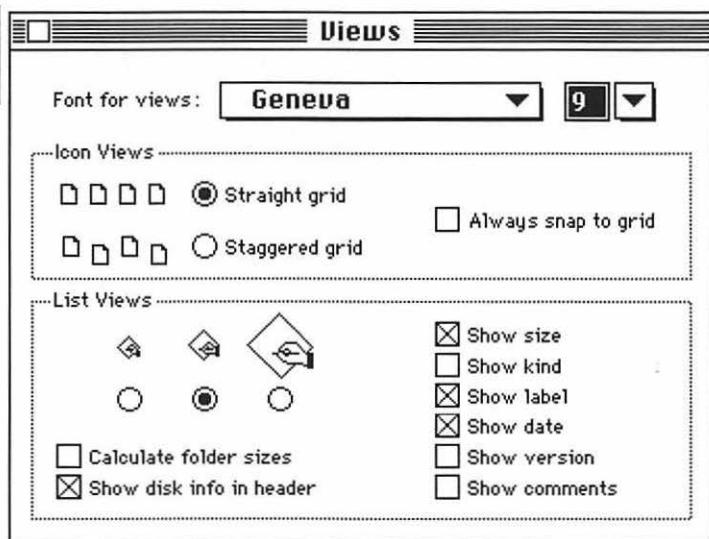
A new control panel, Views, lets you customize how files appear in the Finder (Figure 2.5). At long last, you can change from tired old 9-point Geneva in your windows to the font and size of your choice (although you still can't change the font in the window title bars or menus). You can change the default layout of icons on the desktop to straight alignment or staggered. You can choose to always align to the grid, so when you move an icon it will snap to the grid you have selected. The List Views options allow you to specify the size of icons and the various categories of information you wish to be displayed. In addition to the familiar date, kind, and size, you can also choose to see the label, version, comments, disk info, and folder size. (See Chapter 10, *Hard-Disk Management*, for tips on taking advantage of the Views control panel.) And, just as important, you can choose *not* to see them. For example, unchecking Calculate folder sizes can save a lot of time when opening and closing windows.

A couple of gripes here (you didn't think I was only going to rave, did you?). Users of the popular shareware program Layout (by Mike O'Connor) will be familiar with the customizability of previous versions of the Finder. Unfortunately, System 7 eliminated the LAYO resource that made Layout pos-

sible. The Views control panel allows only two grid choices rather than a fully customizable grid. In addition to allowing the toggling of list view categories, it *should* be possible to choose the order in which they appear in the window and the width of the columns. While we're at it, why not make the lists configurable within the window with a click-and-drag operation?

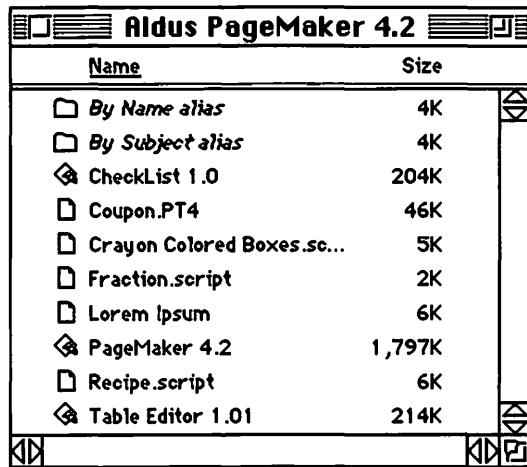
Furthermore, the three icon sizes offered for the list views leave something to be desired. The first is the standard list view icon, a tiny generic document, application, or folder icon. This choice allows the largest number of files to be displayed at once, but with no differentiation between them (Figure 2.6). The second is a miniature full-blown icon (Figure 2.7), and the third is a full-size icon like the ones in the Icon view (Figure 2.8). I find the mini-icon a bit too small and the full-size icon *way* too large. It would be nice if there were a size between the medium and large icons. And as long as I'm dreaming, how about different views for different windows?

**Figure 2.5**  
The Views  
control panel.



Corresponding to the Views control panel is a new addition in the Views menu. In addition to the familiar by Icon, by

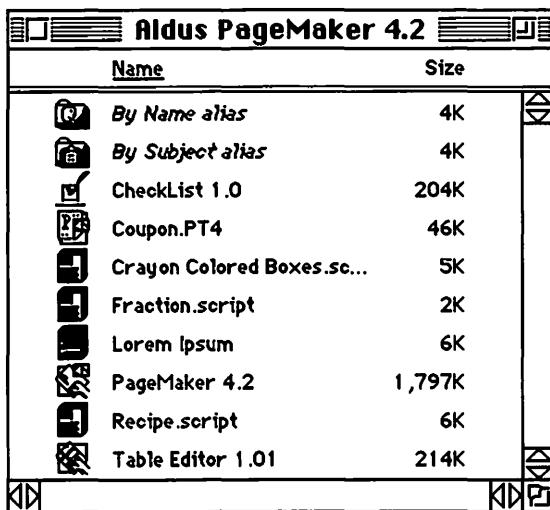
**Figure 2.6**  
A window with the smallest icon chosen for list views.



A screenshot of the Aldus PageMaker 4.2 application window. The title bar reads "Aldus PageMaker 4.2". The main area is a list view showing the following files:

Name	Size
By Name alias	4K
By Subject alias	4K
CheckList 1.0	204K
Coupon.PT4	46K
Crayon Colored Boxes.sc...	5K
Fraction.script	2K
Lorem Ipsum	6K
PageMaker 4.2	1,797K
Recipe.script	6K
Table Editor 1.01	214K

**Figure 2.7**  
A window with the intermediate size icon chosen for list views.



A screenshot of the Aldus PageMaker 4.2 application window, similar to Figure 2.6 but with intermediate size icons. The title bar reads "Aldus PageMaker 4.2". The main area is a list view showing the same files as Figure 2.6, but with larger, more detailed icons next to each file name.

Name	Size
By Name alias	4K
By Subject alias	4K
CheckList 1.0	204K
Coupon.PT4	46K
Crayon Colored Boxes.sc...	5K
Fraction.script	2K
Lorem Ipsum	6K
PageMaker 4.2	1,797K
Recipe.script	6K
Table Editor 1.01	214K

Small Icon, by Name, by Size, by Kind, and by Date, there are two new options: by Comments and by Label. Comments typed into the Get Info window can be viewed in any List view window in the Finder, and files can be sorted by these comments alphabetically. (For more on how take advantage of this feature, see Chapter 10, *Hard Disk Management*.) Sorting files by label lets you group them into categories based on the labels you have chosen in the Labels control panel.

**Figure 2.8**  
A window  
with the  
largest icon  
size chosen  
for list views.

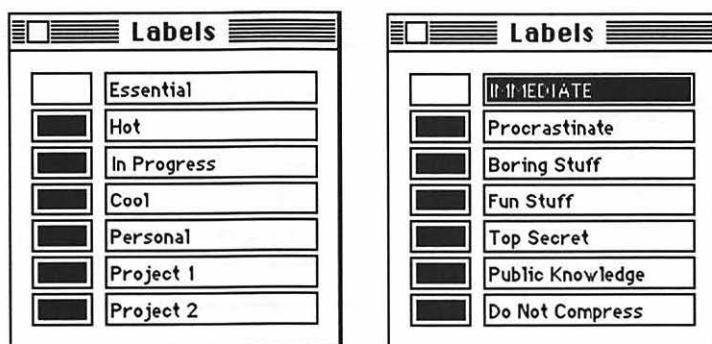
Name	Size
 By Name alias	4K
 By Subject alias	4K
 CheckList 1.0	204K
 Coupon.PT4	46K
 Crayon Colored Boxes.sc...	5K
 Fraction.script	2K
 Lorem Ipsum	6K
 PageMaker 4.2	1,797K
 Recipe.script	6K
 Table Editor 1.01	214K

## Labels

You can customize the names of icon labels with the Labels control panel. If you have a color monitor, you can also customize the colors corresponding to the labels. Your new choices will appear in the Labels menu (Figure 2.9).

When you apply a label to a file, the name will appear in the window if you have chosen to show labels in the Views control panel (Figure 2.10).

**Figure 2.9**  
The Labels control panel with default names...and user-selected names.



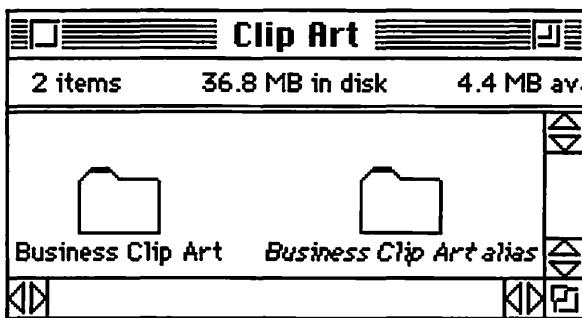
**Figure 2.10**  
A window sorted by label.

Name	Size	Label
Multimedia Presentation	-	Immediate
Urgent Matters	-	Immediate
Brainstorm/Ideas	-	Procrast...
Career Adjustment Ltr	5K	Procrast...
Paint files	-	Fun Stuff
Party files	-	Fun Stuff
Christmas Card list	5K	Top Secret
Classified	3K	Top Secret
Correspondence	-	Top Secret
Employee Bios	-	Top Secret
Accounting	3K	Public Kn...
Mortimer Industries	-	Public Kn...

## Aliases

If you've heard anything about System 7, you've heard about **aliases**. Aliases are basically pointers to files, folders, and applications. They take only 2K of disk space, but they work just as if they were the real thing. To make an alias, you select an application, file, or folder, and choose Make Alias from the File menu. An alias will be created with the same icon as the original but with the name in italics and the word "alias" at the end of the name (Figure 2.11).

**Figure 2.11**  
A folder and  
its alias.



You can then move the alias to any location and, if desired, rename it. When you double-click on the alias, it opens the original file, folder, or application.

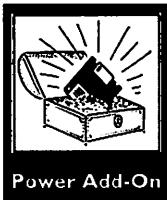
The people at Apple deserve a round of applause for coming up with aliases. Aliases have revolutionized hard-disk management. You can put an alias of current projects in one folder and keep the original files in separate folders. You can put aliases of your most commonly used applications in the Apple Menu Items folder (see below for more on the Apple menu). You can put aliases of your top five or ten applications right on the desktop. You can put an alias of a folder from your hard disk on the desktop of someone else's networked Mac.

I keep an alias of each shared disk from my network right on my desktop. If I want to connect to the disk, double-clicking on the alias will automatically connect me. All applications are aliased in the Apple menu, as are commonly accessed folders. I keep a folder called "current projects" in the Apple menu and keep aliases of any work-in-progress in it. All files for a given project are kept in folders named for the project, and I cross-reference them by placing aliases of the files in folders named for the clients. Chapter 10, *Hard-Disk Management*, has more tips on how to take advantage of aliases.

## Apple Menu Differences

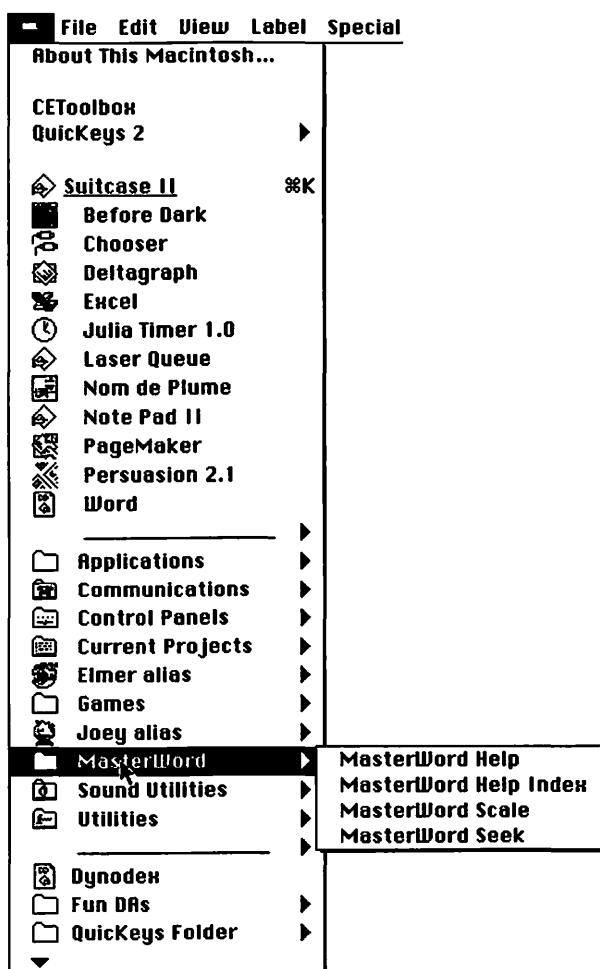
One of the most dramatic and most useful changes made in System 7 is the new Apple menu. Essentially, you can now

make *anything* appear in the Apple menu—desk accessories, applications, individual files, folders, or aliases. To add any item to the Apple menu, drag it to the Apple Menu Items folder, which is in the System Folder. It's a simple, fast, and very handy procedure. By customizing your Apple menu, you can have everything you need available with one menu choice. Add a hierarchical menu utility (such as HAM, Hand Off II, Menu Choice, On Cue, or BeHierarchic) and you can get to anything on your hard disk with one menu click! (Figure 2.12) More on this in Chapter 10, *Hard Disk Management*.



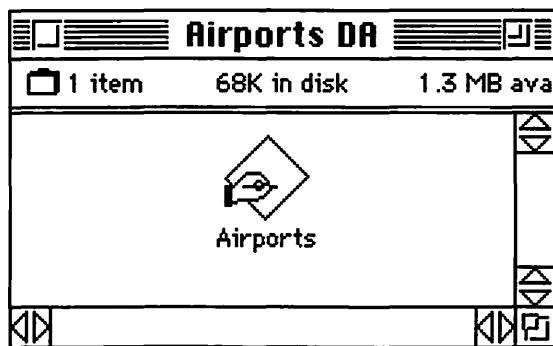
Power Add-On

**Figure 2.12**  
A highly customized Apple menu, featuring frequently used applications, current projects, favorite DAs, and dividers. BeHierarchic adds the hierarchical menus. Here, the contents of the MasterWord folder are displayed.



Desk accessories under System 7 are really nothing more than little applications. A desk accessory's suitcase, when double-clicked, opens up into a window, from which you can drag the small application icons (Figure 2.13).

**Figure 2.13**  
An open  
suitcase  
window,  
revealing the  
left-handed  
icon of a desk  
accessory.



Note that they are “left-handed” to differentiate them from regular application icons. Once removed from the suitcases, desk accessories work as standard, double-clickable applications. If you so desire, however, you can treat them like old-fashioned desk accessories by putting them in the Apple Menu Items folder to make them appear in the Apple menu.

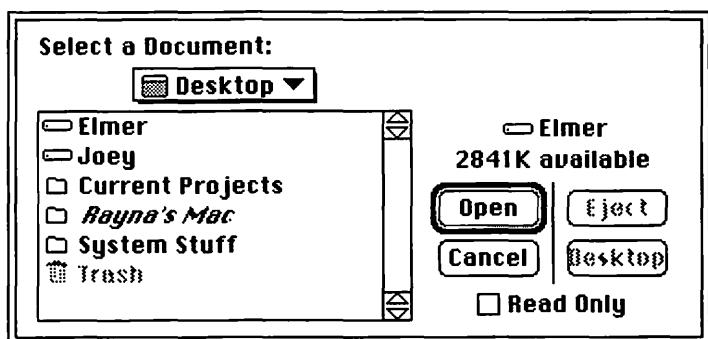
## Open and Save

The Open and Save dialog, unfortunately, hasn't changed much. You still get the too-small, slow, modal dialog box (a **modal dialog box** is one that doesn't have a title bar, can't be moved, and cannot be left open to switch to another window). This Standard File (SF) dialog is much-loathed by users who feel that it is an anachronism in an improved system. It is so confusing to new users that many close a window or even quit an application to return to the Finder to select another file and open it. These users are unaware that there is another way. And who among us has not, at least in our beginner days,

saved a file to the wrong folder inadvertently, unable to navigate the convoluted pop-down-to-move-up/click-Open-to-move-down nonsense in the SF dialog? I'll be the first to admit it: I regularly used to save files to the wrong folder, close or quit, go to the Finder, and physically drag the file to the right folder.

There is one minor change to the Open and Save dialog that is of some virtue. There is a Desktop button where the Drive button used to be. Instead of clicking on the Drive button until the correct drive shows up, you now click on the Desktop button to view all mounted volumes and anything else on your desktop, such as folders you've placed there, as well as the trash (Figure 2.14). This is basically an improvement, both because it allows quick access to any mounted disk and because it makes it easy to save to the desktop itself or any folder on it. Some "single" Mac users (meaning those who use an unnetworked Mac, not those who are unmarried) gripe that this *adds* an extra step for them, since clicking on the Drive button would allow them to switch between their hard disk and floppy drive with only one click, and having the Desktop button instead means two clicks. (People get very testy about extra clicks.) But for anyone with more than the two drives (those with external drives, networked servers, dual floppies, and so forth) it is a boon.

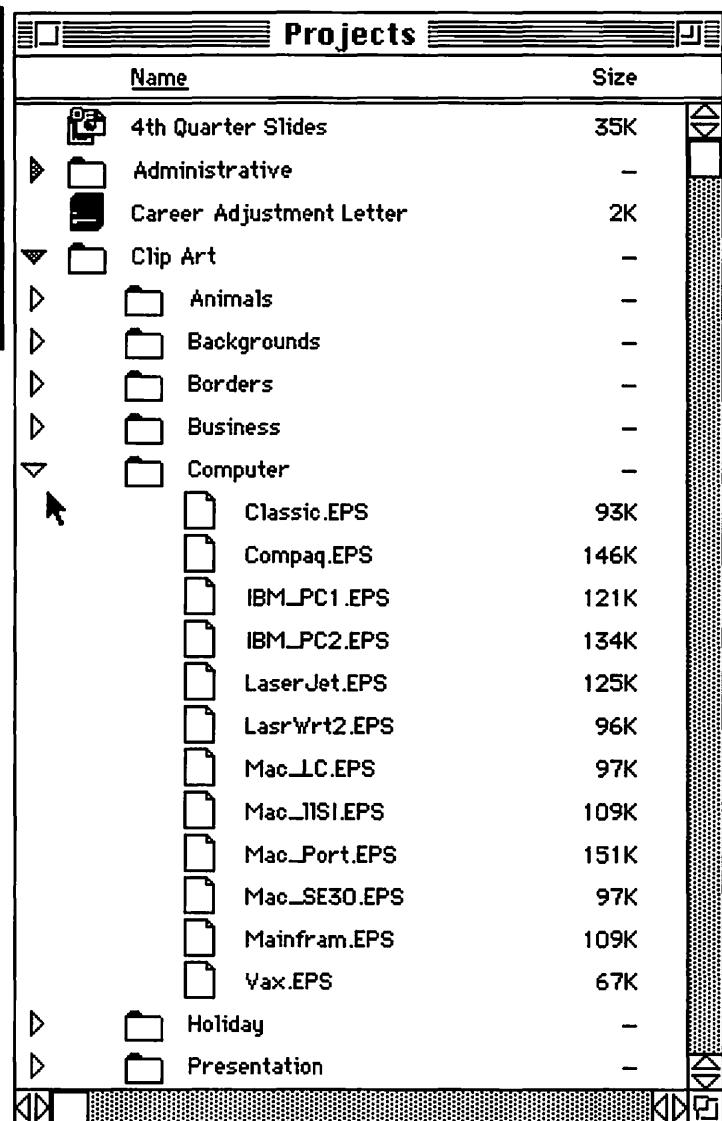
**Figure 2.14**  
The Open and Save dialog box now displays the desktop itself.



## Windows

The improvements to the Finder's windows themselves are long overdue. Most are navigation and manipulation aids.

**Figure 2.15**  
Clicking the triangle at the left of the folder name reveals the contents of the folder in an indented list.



## Outline Views

The most immediately apparent change to the windows is the addition of outline views. Whenever a window is in any of the list views (Name, Size, Kind, Date, or Label), a triangle appears next to folder names. Clicking on the triangle reveals the contents of the folder, indented under the folder name. It is possible to see the contents of several levels of folders within a single window (Figure 2.15). Any item visible in the window can be selected, no matter how many levels it is indented. You can also select items from different folders simultaneously. Clicking on the triangle again hides the folder's contents.

With System 6, I always used to debate between the organizational advantages of multitudinous folders versus the tediousness of digging through them. Outline views are a great help to the compulsive folder-maker.

## Pop-Up Paths

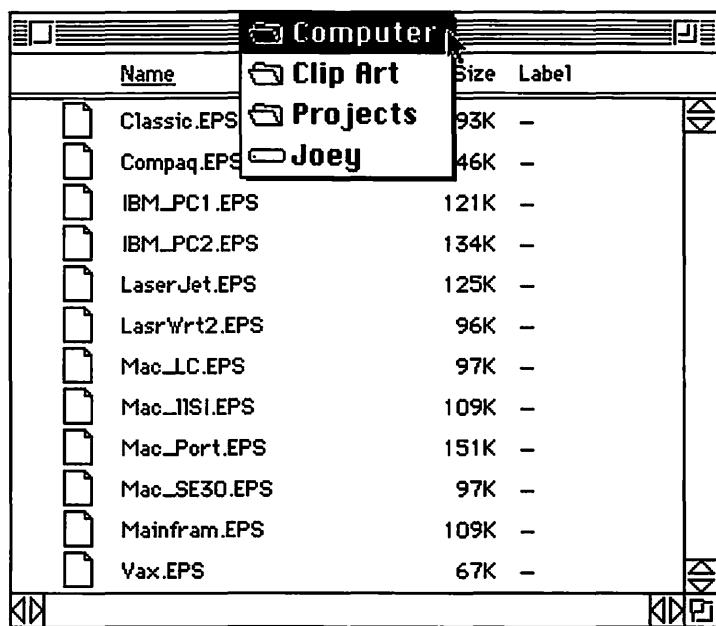
Another great navigation aid is the addition of pop-up paths. If you hold down the Command key as you click on the title of a Finder window, a menu will pop up indicating the path of that folder (that is, the folders and disk in which that folder resides) (Figure 2.16). Not only is this handy for reference, but it is great for navigating your way back through the folders. As you open a new folder, you can close its parent folder, secure in the knowledge that it is available with a quick pop-up.

## Drag Open

When you drag a file's icon over a compatible application's icon, that application will open the file. If you want to open a file in an application other than the one in which the file was created, you can simply drag the icon over. Not sure whether the application will open the file? Try dragging anyway—if the application's icon becomes highlighted, you can use it. I keep aliases of my most common applications on the edge of my desktop. When I use a document created in a different word

**Figure 2.16**

Holding down the Command key as you click on a Finder window's title to reveal a pop-up menu indicating the folder's path.



processor, I just drag it to the Word icon. I have my favorite paint program available for opening any new paint files I acquire, no matter what their origin.

## Changing Names in Finder Windows

One change that takes a bit of getting used to is to the way you select and edit item names. When you click on the icon itself, nothing happens. If you've ever accidentally hit the keyboard and renamed a selected file "nn," you understand why this is a good thing. Now, when you click on the *name* of an item, there is a moment's pause before it becomes highlighted for editing. If you find the pause too long (many do), just move the mouse slightly off the file name just after clicking on it. The highlight will appear immediately. Or you can press Return after clicking on a file for the same result. There are also shareware fixes available that will let you adjust the speed; one is aptly named Rename Delay Editor.



Power Move

## Sorting in Finder Windows

In any of the list views, you can change the sorting order by clicking the name of the category in the title bar (Figure 2.17). This saves you a trip to the menu bar and lets you switch back and forth easily.

**Figure 2.17**  
Clicking on the name of a category resorts the window according to that category.

Name	Size	Kind	Label	Version	Comments
Mac_Port.EPS	151K	document	Fun Stuff	-	Color EPS
Compaq.EPS	146K	document	Fun Stuff	-	Color EPS
IBM_PC2.EPS	134K	document	Fun Stuff	-	Color EPS
LaserJet.EPS	125K	document	Fun Stuff	-	Color EPS
IBM_PC1.EPS	121K	document	Fun Stuff	-	Color EPS
Mac_ISI.EPS	109K	document	Fun Stuff	-	Color EPS
Mainfram.EPS	109K	document	Fun Stuff	-	Color EPS

## Keyboard Navigation

To move around from file to file in Finder windows, you can use the keyboard instead of the mouse. In fact, there's a handy little reference guide built into the Help menu. You can use the arrow keys to move around the files on your desktop, and with the arrow and modifier keys (Command and Option) you can essentially navigate your way through an entire window—up, down, and sideways. It takes some getting used to, though. I thought I was the keyboard whiz—I even knew a whole bunch of key commands in Word. (Microsoft Word 4.0 is a program notorious for the most un-intuitive key combinations of any software product for the Mac—to select All, for example, you hit Command-Shift-m.) But I, for one, had a hard time getting used to the Finder combinations. It's worth taking the time to master it, though—it really does speed things up, and it makes life a bit easier on your mouse hand. There are also keyboard shortcuts for other Finder activities, like menu commands, dialog boxes, as well as various other functions.

## Smart Zoom

The improvement to window zoom sizing is one of those things that makes you think, “Yeah, it *should* be like that.” When you click on the Zoom box in the upper-right corner of a Finder window, the window will zoom to a size just big enough to show everything in the window. Clicking the Zoom box in System 6 produces huge desktop-sized windows.

## Selecting in Windows

You have always been able to select groups of icons in the icon view windows. With System 7 you can select groups in list views as well. Just click and drag the pointer as you would in icon view windows.

Another nice feature is automatic scrolling. If a window is not big enough to display both a document and the folder you want to drag it to, you can drag the document to the top or bottom edge of the window and it will automatically scroll to reveal the folder. (This works only within a single window, not when you drag from one window to another.)

## Get Info Windows

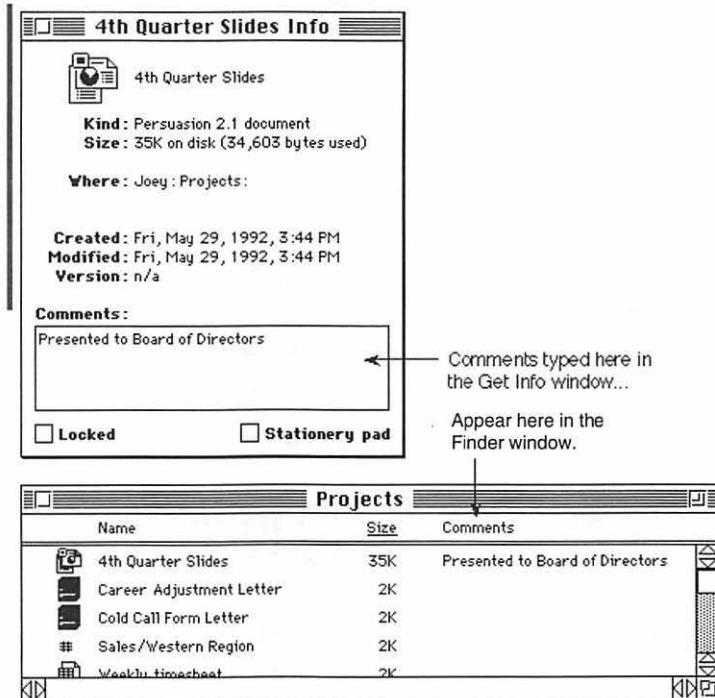
The Get Info command, available in the Finder under the File menu, has a pair of new features that will make it a more useful tool.

### Get Info Comments

At the bottom of the Get Info window is a box for comments (Figure 2.18). Technically, this can't really be called a new feature; it *was* available under System 6. However, the comments are more useful under System 7. The comments you type in the Get Info box can appear in the list view windows in the Finder (if you choose the option in the Views control panel). Chapter 10, *Hard Disk Management*, has more on how to take advantage of the Get Info comments.

**Figure 2.18**

Comments typed into the Get Info box comments window can appear in Finder windows.



**Big-Foul-Up Alert:** The programmers of System 7 neglected to fix a problem from System 6. When you rebuild your desktop (a necessary maintenance task covered in Chapter 13, *Software Troubleshooting*), the Get Info comments disappear. Fortunately, there are shareware and commercial software fixes—like CommentKeeper, by Maurice Volaski—that will save the comments for you.



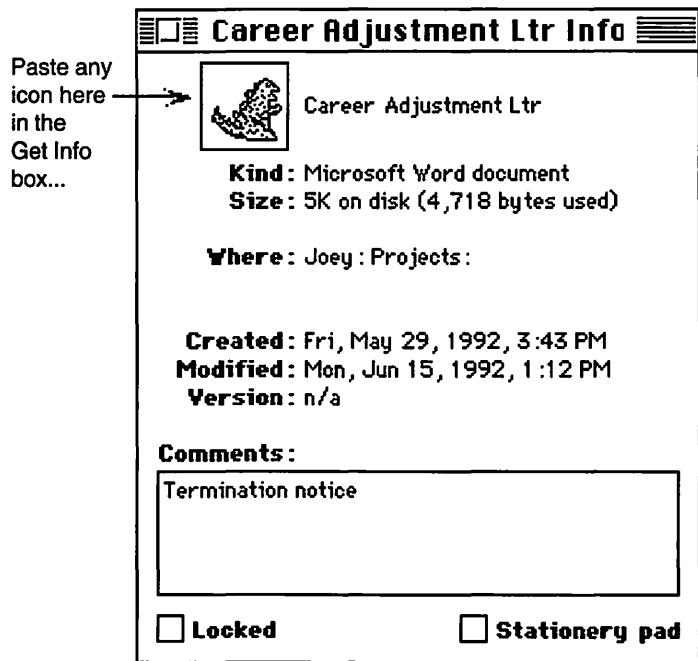
## Custom Icons

You can easily customize any icon in the Get Info window. First, create a picture in a graphics program. Then copy the picture to the clipboard. Select the icon you want to change and choose Get Info. Click on the icon in the Get Info window and paste. Then the new icon will be displayed (Figure 2.19). If the picture you choose is larger than the standard icon size

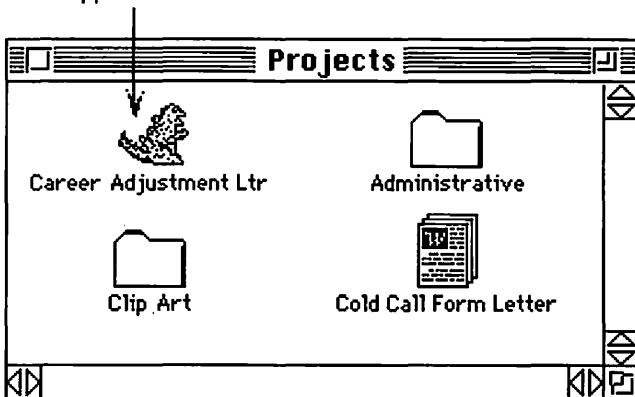
(32 pixels by 32 pixels), it will shrink to fit. You can also copy an icon from one Get Info window to another. If you decide you want to go back to the original icon, just select the customized icon in the Get Info window and choose Cut.

**Figure 2.19**

A customized icon copied and pasted into a file's Get Info window gives the file a new icon in the Finder window.



It will appear in the Finder window.



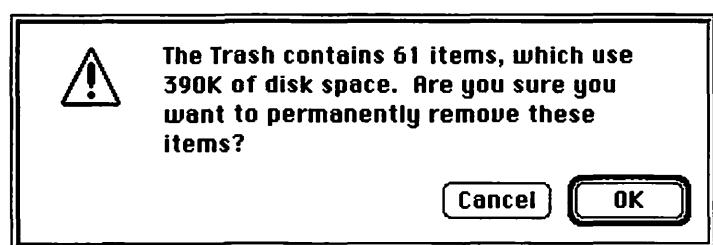
Icons can be scrounged from anywhere—copy icons you like, modify existing icons with Resedit, or create your own. Icon artists make collections of beautiful icons with three dimensions and glorious colors; you can download them from bulletin boards.

Some files have icons that cannot be changed (system files, for example). You will not be able to paste a new icon into the Get Info windows for these files. The Paste command will appear dimmed in the Edit menu.

## Trash

The Trash has been made more foolproof in System 7. The Trash no longer automatically empties when you launch a program, eject a disk, restart, or shut down. In fact, it *never* empties automatically; you have to choose Empty Trash from the Special menu to delete the files in the Trash can. The disadvantage of this is that you no longer have an excuse for bemoaning a trashed file, since you must make a willful decision to delete it in the first place. In fact, there is now a built-in warning that comes up every time you empty the Trash (Figure 2.20). While it does build in a lot of idiot-proofing, it gets very old very fast. There are two ways to disable it: If you just want to avoid the warning once, hold down the Option key as you empty the trash; if you want to turn it off permanently, you can choose Get Info from the File menu and uncheck the Warn before emptying box.

**Figure 2.20**  
The warning dialog box that appears when you empty the Trash.



## System Folder Differences

The System Folder has become a little more organized and intuitive in System 7. There are four new folders within the System Folder: Startup Items, Apple Menu Items, Extensions, and Control Panels. Installing fonts and sounds is at long last an easy, drag-install process, and the horrible Font/DA Mover is at long last obsolete. The System Folder is still a mess, but it's getting better.

### Startup Items Folder

The Startup Items folder resides within the System Folder. Any application or document dragged into the folder will launch on startup. If you decide you don't want something launched, just drag it back out of the folder. Aliases can be used to advantage here: You can leave documents or applications organized as they should be, and drop aliases of them in the Startup Items folder when you need them.

### Apple Menu Items Folder

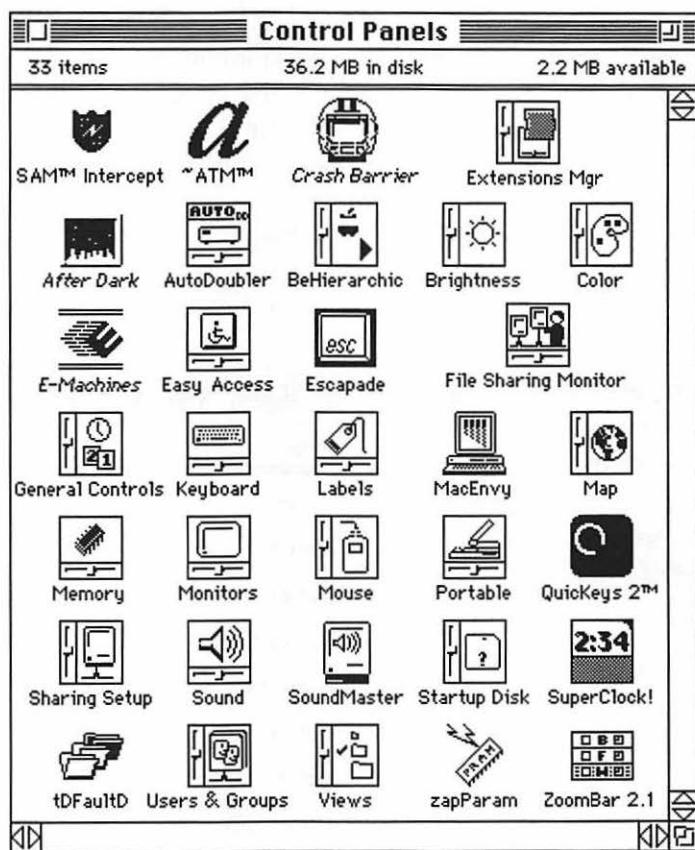
The Apple Menu Items folder is a great invention. Anything you put in this folder within the System Folder will show up in your Apple menu. *Anything*—applications, documents, folders, and, of course, desk accessories. See more on Apple menu differences earlier in this chapter.

### Control Panels Folder

The Control Panels folder is not much more than a convenient location for control panels, because control panels now stand alone like little applications. You will find that all your old familiar friends already reside there when you install the system: Mouse, Keyboard, General, and so on. To install a Control Panel in System 7, you just drag it to the System Folder. The system recognizes it as a control panel and will

ask whether you want it moved to the Control Panels folder. Just click yes, and it's installed. An alias of the Control Panels folder is automatically available in the Apple menu, so you can access control panels as you always have. However, when you open it, the Control Panels folder opens like any other window, a change from System 6 (Figure 2.21).

**Figure 2.21**  
The Control  
Panels  
window is  
displayed as a  
regular Finder  
window, with  
each control  
panel  
available as a  
separate,  
double-  
clickable  
application.



## Extensions Folder

The Extensions Folder is the home for what used to be called INITs. When you drag an extension (INIT) to the System Folder, a dialog box will appear and ask whether you want it

to go into the Extensions folder. Click yes. When you restart, the extension will be installed. Dragging the item out of the Extensions folder will deinstall it. Chapter 8, *System Software Enhancements*, covers the use and abuse of extensions at length.

## Installing Fonts, DAs, and Sounds

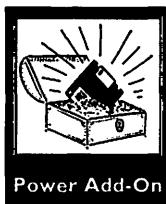
Font/DA Mover, the unintuitive, confusing installer of previous system versions, is at long last obsolete. To install fonts in System 7, you drag the font's suitcase over the System file itself. The System will copy the font from the suitcase to your System file. The System file can be opened as a window to show which fonts and sounds are currently installed (Figure 2.22). If you prefer, you can still use a font utility such as Suitcase II or MasterJuggler.

**Figure 2.22**  
The open-system file displaying installed fonts and sounds.

	Name	Size
□	Chicago	44K
□	Courier	58K
□	Courier 9	5K
□	Courier (bold)	56K
□	Courier 10	5K
□	Courier 12	6K
□	Courier 14	6K
□	Courier 18	7K
□	Courier 24	10K
□	Droplet	2K
□	Geneva	54K
□	Geneva (italic) 9	3K
□	Geneva 10	3K

DAs, once dragged out of their suitcase, work as stand-alone double-clickable applications and do not need to be installed at all. They can be dropped into the Apple Menu Items folder if you want them available as they were with previous system versions.

Sounds can be dragged into the System file if you want to install them as system beep choices available in the Sound control panel. Otherwise, System 7-compatible sounds can be heard with a double-mouse-click. You can recognize a System 7-compatible sound by its speaker icon (Figure 2.23). Old sounds can be converted with a variety of conversion applications; try the excellent \$5.00 shareware program Sound Extractor, by Alberto Ricci.



Power Add-On

**Figure 2.23**  
A System 7  
double-  
clickable  
sound file.



Makin' Copies Sound

## Technology Differences

In addition to the cosmetic and ease-of-use differences in System 7, there are a number of technological differences that change the way the system operates.

### Background Printing

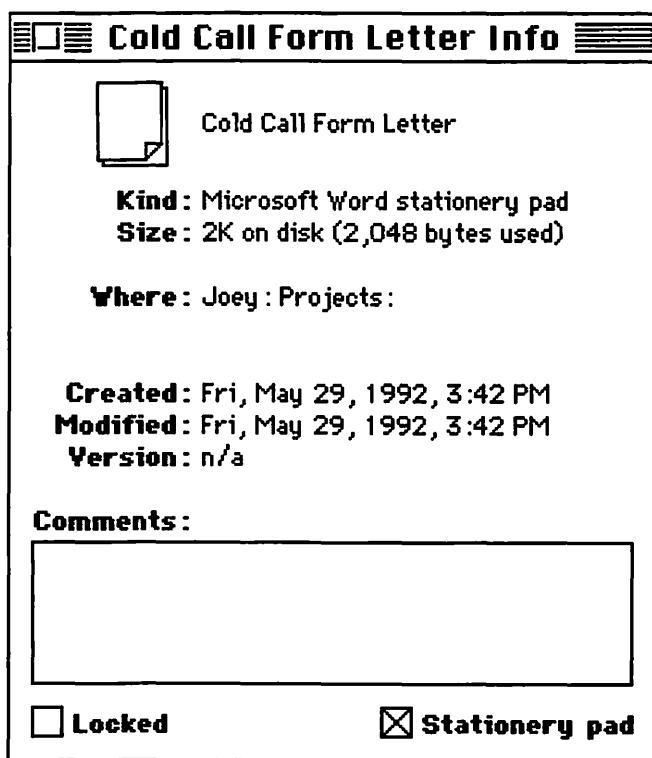
The Finder can now print your documents in the background with most printers, allowing you to move on to other tasks. You can access background printing through the Chooser. Background printing does not work with dot matrix printers like Apple's ImageWriter.

### Stationery

Some applications have the ability to create templates or stationery files. System 7 lets you create stationery for any appli-

cation. A stationery pad is a file that has your preferred setup, usage preferences, and, if you desire, common elements. When you double-click on a stationery file, it opens an untitled document with all the attributes you have selected. You can create a stationery pad in the Save As... dialog box in some applications, but if the application doesn't offer the option, you can make any document a stationery pad by opening its Get Info box in the Finder and clicking on the Stationery pad box (Figure 2.24). You can recognize your new stationery pad as the icon that looks like a notepad with a corner of the top page turned up (Figure 2.25).

**Figure 2.24**  
Clicking on  
the Stationery  
pad box in the  
Get Info  
window  
makes a file  
into a  
stationery  
pad.



**Figure 2.25**  
The icon for a plain Word file (left), and after it has been made into a stationery pad (right).



## TrueType Fonts

System 7 comes with a new font technology called TrueType. The Mac scales TrueType fonts to whatever size you need, so you need only install one size into your system. TrueType uses the same file to display the font as to print, so you don't need separate bitmapped files to display the font. It will appear smooth onscreen and in print at any size.

There is much debate about the relative superiority of TrueType versus Type 1 fonts. If you have a vast supply of Type 1 fonts (like the Adobe fonts), you can certainly still use them under System 7, and there is probably no point in switching. If you are buying new fonts, TrueType is worth looking into. It is possible to work with both font types simultaneously, and there are even programs available to convert fonts from one technology to the other (for example, Metamorphosis Professional, from Altsys, or FontMonger, from Ares Software).

## File Sharing

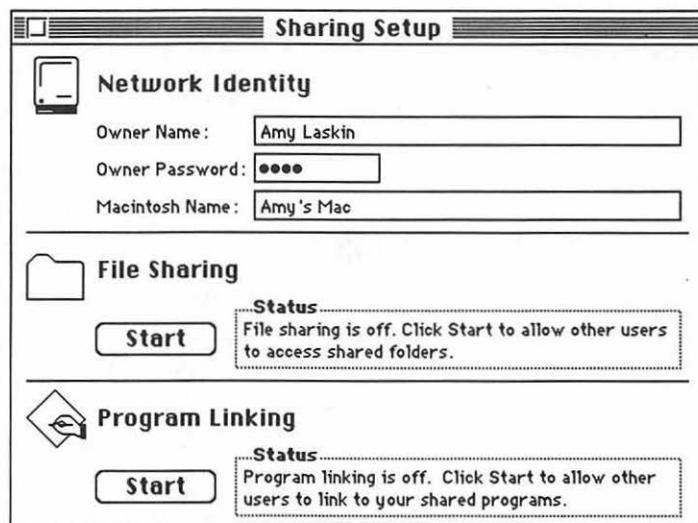
File sharing is a powerful new capability of System 7. It allows you to have access to the hard disks and CD-ROM drives of any networked Mac. What previously required third-party networking software like Tops is now built into the system.

File sharing works as AppleShare did under previous system versions, with the major difference that any Mac used as a regular workstation can also be used as a small-scale server.

This means that any Mac can share with any other Mac. Other Macs' hard drives can be mounted from your Mac as if they were peripherals to your own system. You can work on files that reside on another drive as if they were your own. Or, if you prefer, access can be limited to certain files or folders. Similarly, you can make your own files available to other Macs.

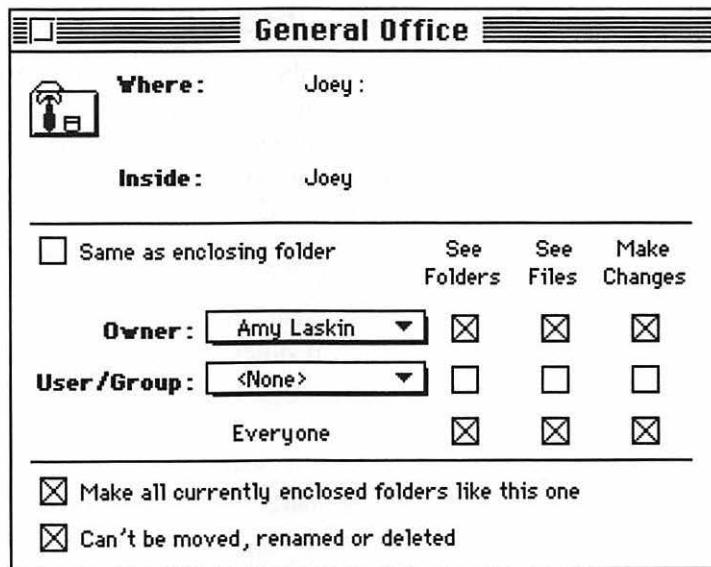
Although file sharing is set up through a convoluted bunch of control panels and extensions, it is quite easy to use. To turn on file sharing and make your Mac appear on the network as a server, you use the Sharing Setup control panel (Figure 2.26). You can make available to other users anything from a single folder to your entire hard disk, including applications. To make a folder or disk available to the network, you choose Sharing from the File menu (Figure 2.27). The user privileges are fully customizable, so any other user or group of users on your network can have specific access to your drive. You can set up privileges through the Users & Groups control panel (Figure 2.28). Between the Users & Groups control panel and the Sharing dialog box, you can get pretty specific about who can do what to which things on your drive. If you want to make it possible for everyone except your archrival to use your budget files, you can do it.

**Figure 2.26**  
The Sharing Setup control panel lets you identify your Mac to the network and turn on file sharing and program linking.

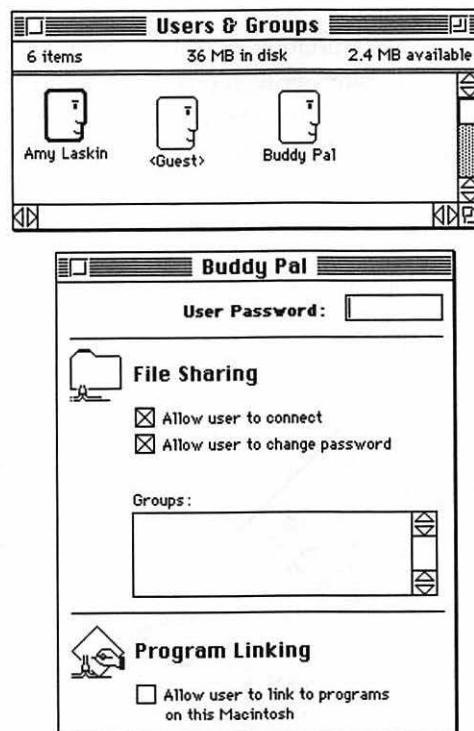


**Figure 2.27**

The Sharing dialog box lets you specify whether or not a folder is to be shared, and with whom.

**Figure 2.28**

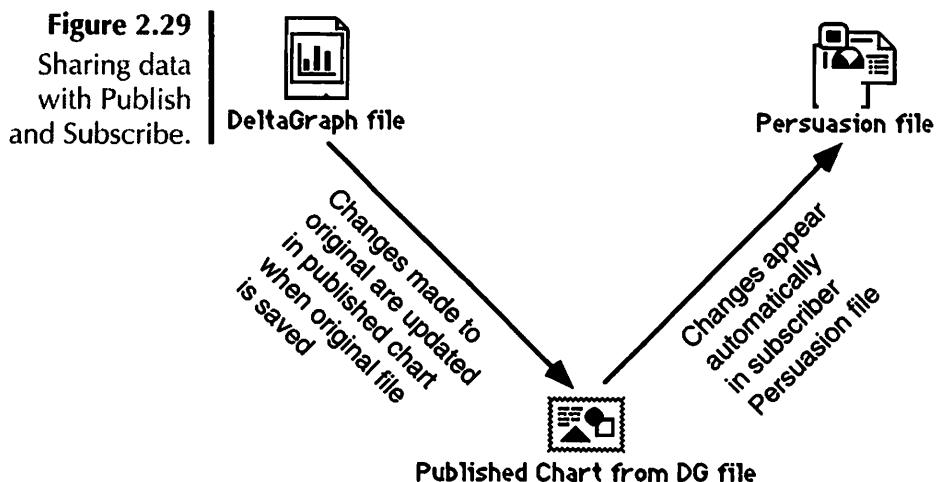
The Users & Groups control panel shows the users and groups on your network for whom you have set up sharing privileges (top). Double-clicking on one of the "people" shows his or her privileges (bottom).



## Publish and Subscribe

Publish and Subscribe is one of the greatest features System 7 has to offer, though software developers have started to take advantage of it only recently. You might be familiar with file linking from some of the software you already use. Publish and Subscribe is a way of linking data from one program to another so that it will update automatically. It is a “live” link that will pass information from one document to one or more others. If you “publish” material from one document, you can “subscribe” to it in other documents. When you change the “publisher,” your changes will automatically appear in any of the “subscriber” files.

Let me clarify this with an example. You are working on a project involving charts brought into a page-layout program. If you have published a chart and subscribed to it in your layout program, it will be displayed in your layout. Then, when you edit the original chart file, any changes you make will appear the next time you open the page layout file (Figure 2.29). Wow! Instant updates! No more copy-switch applications—delete old version-paste-reposition every time a file changes. On heavily edited documents, this can really save some time and repetitive, tedious labor.



When System 7 first came out, most software did not take advantage of this feature, so it was not much to get excited about. Now that many developers have upgraded their software to System 7 "savvy" status, it is possible to use Publish and Subscribe in many major applications. As I said in the beginning of this chapter, this feature alone may make the switch worthwhile. If you share information between documents often, you should research the Publish and Subscribe capabilities of your software to see whether you can take advantage of this feature.

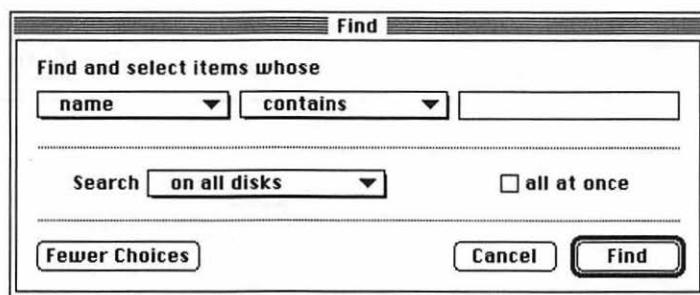
## Find

The Find command, formerly a desk accessory, is now a command that appears in the Finder's File menu. The old Find File DA would bring up a list of files whose names contained the text you typed into the dialog box. You then had to quit Find File and go hunting for the file. Now, the Find command will take you directly to an item with the text in its name and display it. If you want to see another, you can choose Find Again from the File menu.

Alternatively, you can click on the More Choices button in the Find dialog box. This lets you specify the search criteria according to name, creation date, modification date, label, kind, comments, or lock (Figure 2.30). You can also choose to

**Figure 2.30**

The Find dialog box with More Choices selected has pop-up menus for criteria of the search and disks to search.

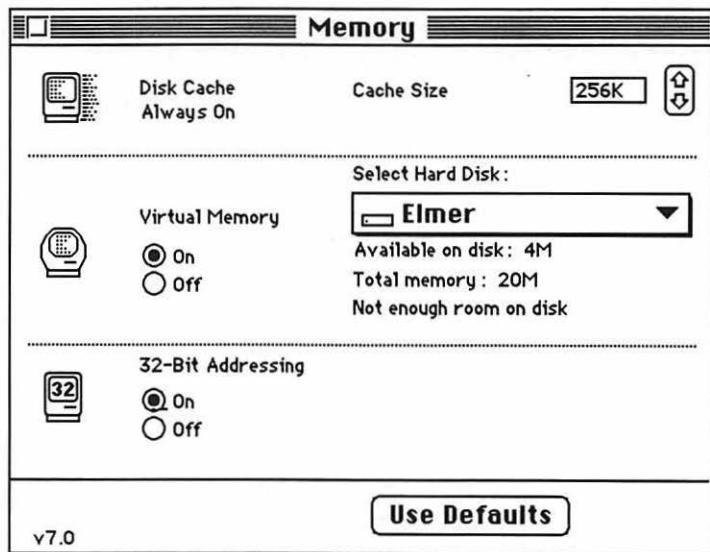


have the files appear sequentially or all at once. Choosing to see the files all at once will bring up a Finder window in a list view with all matching files highlighted.

## Memory Management

The Disk Cache (formerly called RAM Cache), once an option, is now a permanent feature of System 7. It lets you set aside a portion of your RAM for frequently accessed system data. Since the data does not have to be read from disk, it speeds up operation. Adjusting the cache is done through the new Memory control panel (Figure 2.31). (Cache used to be set in

**Figure 2.31**  
The Memory control panel lets you adjust the Disk Cache, virtual memory, and 32-bit addressing.



the General control panel.) You still need to do a delicate balancing act between the amount of memory you set aside for the cache and the amount you leave available for applications. See Chapter 1, *The Operating System*, and Chapter 13, *Software Troubleshooting*, for more information on the Disk Cache.

Virtual memory is a way of using your unused hard-disk space as RAM. It takes a lot of hardware to take advantage of virtual memory: You need a 68030-based Mac, or a 68020 with an added PMMU (Paged Memory Management Unit) chip, and at least 4 megabytes of real RAM (it will run on two megs, but that would be too slow to be of any use). You also need to have a fair amount of free contiguous hard-disk space. If you don't know whether you have what it takes, you can find out when you open the Memory control panel—it will only have options for virtual memory if you can use it (Figure 2.31). Virtual memory is incompatible with some programs. And there is a limit to how much you can have. If you use more virtual memory than you have RAM, for example, your Mac will slow down as if oiled with molasses. However, if you've got everything you need, you can set virtual memory to twice your installed RAM. Since most recent software hogs memory in multi-megabyte chunks, this can come in handy, especially if you are running a few memory hogs simultaneously. You probably don't want to run with virtual memory on all the time, since the slow-down can be noticeable.

32-bit addressing also has a major hardware requirement list: a Mac IIci or newer Mac based on the 68030 or 68040 chips. If you really need it, you can access up to 128 megs of RAM with the right hardware and 32-bit addressing turned on in the Memory control panel (Figure 2.31). Since you have to buy and install the RAM that you want to access, 32-bit addressing is advantageous only if you need gobs of memory and have the bucks to get a high-end Mac and lots of RAM. But, like most of the expensive, high-end advantages, it's great if you can afford it. With a Mac IIfx and 128 megs of RAM, you'll never see an out-of-memory bomb again—at least not until they start writing software that hogs two-digit numbers of megs of memory, which could happen in a couple of years. After all, it was only a few short years ago that Macs were shipped with 512k of memory—and that seemed like enough!

## Hardware Requirements

The fact is, the bigger the Mac, the better the results with System 7. By bigger I mean more powerful and fast. A few basic considerations:

- It takes a *minimum* of two megabytes of RAM to run System 7, four or more if you want it to actually run well. Although the people at Apple tell you that System 7 requires only two megabytes of RAM, they seem to be ignoring the probability that you will want to run *applications* on your Mac. If you have two megs, and your system software is using 1500-2000K, what exactly is going to run on your Mac? If you want to use System 7, you will need at least four megs of RAM.
- You cannot run System 7 on a Mac 128K, 512K, 512Ke, or any Mac with insufficient RAM or no hard disk.
- System 7 will degrade speed performance on the low-end Macs, like the Plus. You will have to decide whether the trade-off of the other features of System 7 is worth the slowdown.
- You will also want some generous hard-disk space available. System 7 takes up at least three megabytes, and more when you start souping it up.
- The best performance from System 7 is on the high-end members of the Mac II family (including the II itself, with a PMMU chip installed) and Quadras. It also does fine on an SE/30.
- If you don't have the most recent version of your various applications, you might find they are incompatible with System 7. You should consider possible upgrade costs when making your decision, since many upgrades to System 7 compatible software are *not* free. Contact the software manufacturer if you are not sure whether your version is compatible or if you want to know how much an upgrade will cost.

If you have the necessary hardware or can afford to buy it, you should seriously consider System 7. You *can* keep both

System 6 and System 7 installed at the same time, and switch between them with a utility such as System Picker. That way, you can still run anything that's not compatible with System 7 or change back and forth for any reason you choose. With System 7 *and* System 6, you have the best of both worlds. Any application that doesn't run under one system, you can try under the other.

## Questions and Answers

**Q:** What is Balloon Help?

**A:** A new feature that displays small help screens as you move the pointer over parts of a window.

**Q:** What is the Application menu?

**A:** A menu in System 7 that lists all open applications, indicates the active application, and hides an open application's window.

**Q:** What's new with Views in System 7?

**A:** Window views in the Finder are customizable through a control panel and include two new view choices: by Comments and by Label.

**Q:** What's new with Labels?

**A:** Label names and colors can be customized, and, they appear in Finder windows.

**Q:** What are aliases?

**A:** Assumed names used by criminals; also icons representing files, folders, or applications that can go in any location and are linked to the original file.

**Q:** How is System 7's Apple menu different from the Apple menu in System 6?

**A:** You can put anything in System 7's Apple menu: applications, files, folders, aliases, and desk accessories.

**Q:** How has the Open and Save dialog changed?

**A:** You can now choose the desktop itself and the files and folders residing there.

**Q:** How have the Finder windows changed?

**A:** Some major changes to Finder windows are:

- Outline views that show folders' contents in an indented list
- Pop-up lists that show the paths of a Finder window
- A new way to open files: dragging them over an application's icon
- Icon selection, so that you now must select the actual name to change it
- Windows that can be resorted by clicking on category names in the title bar
- Navigating Finder windows from the keyboard
- Improved zooming
- The ability to select a group of files in list view windows
- Windows that scroll automatically
- Get Info comments that appear in Finder windows
- Icons that can be customized.

**Q:** How has the Trash changed?

**A:** It no longer empties automatically. You must choose the Empty Trash command from the menu.

**Q:** What goes into the Startup Items folder?

**A:** Anything you want to open at startup.

**Q:** What goes in the Apple Menu Items folder?

**A:** Anything you want to appear in the Apple Menu.

**Q:** What goes in the Control Panels folder?

**A:** Control Panel Devices, which are now individual double-clickable applications.

**Q:** What goes in the Extensions folder?

**A:** System Extensions that customize the system—formerly called INITs.

**Q:** How are fonts and sounds installed under System 7?

**A:** By dragging them over the System file.

**Q:** What is background printing?

**A:** When the system prints your document while you perform other tasks.

**Q:** What is Stationery?

**A:** Pink paper for writing thank-you notes. Also a file that serves as a template for preferences and common elements.

**Q:** What is TrueType?

**A:** The new font technology that scales a single font file to any size for onscreen viewing and for printing.

**Q:** What is File Sharing?

**A:** File Sharing allows you to share files with other users on a network without a file server.

**Q:** What is Publish and Subscribe?

**A:** A live link between files. When you update a published file, all subscribers show the changes automatically.

**Q:** How is the Find command improved?

**A:** It has a variety of choices for search criteria.

**Q:** What's new with memory management?

**A:** Virtual memory, which allows you to use disk space as RAM, and 32-bit addressing, which allows high-end Macs to access large quantities of installed RAM.

**Q:** What do I need to run System 7?

**A:** Four megabytes of RAM, a hard drive with space available, and up-to-date versions of your software packages.

## CHAPTER 3 ◊ MEMORY

This chapter is about...ummm...  
uhh...oh, yeah! Memory. Topics  
include:

The various types of memory ◊

How the Mac uses RAM ◊

How to determine the amount of  
memory the system or an application  
is using

What factors you should consider to ◊  
determine how much memory  
you need

Who should do RAM upgrades ◊

Who can help with upgrading ◊

What should be considered ◊  
when shopping for RAM

The RAM cache ◊

System 7 memory enhancements ◊

RAM disks ◊

# 3



emory is a common area of confusion for computer users. There's ROM, RAM, PRAM, disk memory, and, with System 7, virtual memory. To make it clear from the beginning, here's a brief explanation of the differences.

**ROM**, as we've discussed, is memory built into the hardware of your Mac. ROM stands for Read-Only Memory, because it can only be "read" or accessed—it can never be changed, erased, or altered in any way. As far as you are concerned, ROM just hangs out quietly in the background, so you needn't be too concerned about it.

**RAM** is the memory the Mac uses to store information temporarily, as needed. Unlike ROM, this memory is constantly changing. Anything in RAM (like information copied to the clipboard, or a document's unsaved changes) disappears when you shut down or restart. Older Macs, like the Plus and SE, came with 1Mb (megabyte) of RAM. (One megabyte is

1024 kilobytes, or K. When you calculate from Kilobytes to megabytes, divide Kilobytes by a thousand for a quick mental conversion. Thus, a file that is 1492K is about 1.5 megs.) More recent Mac models come with at least 2Mb of RAM, often more. You can add more RAM to your Mac—to a maximum of 128Mb—depending on which model you own. In a moment we'll look at how much RAM you should have.

**PRAM**, or Parameter-RAM, is a portion of RAM set aside and maintained by your computer's battery. It does *not* empty out when you shut down, because your battery keeps going even when the Mac is off. However, the information in PRAM can change. It holds the settings for things like your serial port configurations (modem and printers) and the clock for your Mac.

**Disk memory** is read/write storage space. When you save a file, it saves to the disk memory, where it will stay indefinitely until you decide to change it or throw it away. (Or until it becomes corrupted or your disk fails—but we'll save that for the troubleshooting section in Chapter 13.)

Finally, **virtual memory** is disk memory used as RAM. You can trick your Mac into thinking available hard-disk space is more RAM, and it will use it the same way it uses RAM.

## How the Mac Uses RAM

---

RAM is fast. By loading information into RAM, your Mac can access it much more quickly than it could if your information was on the disk. Suppose you were going to bake a cake—you would get out the ingredients, measuring cups and spoons, baking pans, and so on, set them all out where you could use them, and then wash and put them away when you were done. The Mac works the same way by loading everything it needs into RAM. Otherwise, it would be as if you washed and put away each measuring cup or spoon as you finished using it, only to take it out again five minutes later. As you can imagine, it would take you a lot longer to make a cake that way.

When you start up your Mac, parts of the operating system and Finder are loaded into RAM, and they stay there until you shut down or restart. If you have INITs and Control Panels installed, they load into RAM, too. Every time you launch an application, the Finder copies it into RAM so it can do its business. The actual program does not run from disk, but from RAM, where it can perform much faster.

So the system takes a chunk, extensions take a chunk, each successive application takes a chunk. Sooner or later—you guessed it—you're going to run out of RAM. So how much is enough?

## Identifying RAM usage

You can tell how much RAM the system or an application uses to get an idea whether you have enough memory.

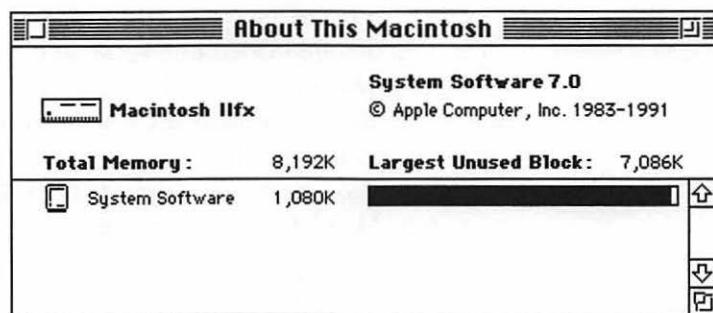
### How Much RAM Does the System Use?

You can find out how much memory your system is using at any given time by choosing About This Macintosh from the Apple menu in the System 7 Finder. "Total memory" indicates how much memory is available to your Mac (how much RAM is installed). You'll see a bar that indicates the amount of memory allocated to the system, and how much of that the system is actually using (Figure 3.1). The number next to the system shows how much memory is available to the system, which is indicated by the length of the bar: The dark part of the bar is the amount of memory that is actually in use. You can find out exactly how much that is in System 7 by using a little-known trick: Turn on Balloon Help and point to the dark bar (Figure 3.2). The Help balloon will tell you exactly how much memory is in use. In System 6, select About the Finder from the Apple menu. It will give you the same information, but it shows the system and Finder separately (Figure 3.3).

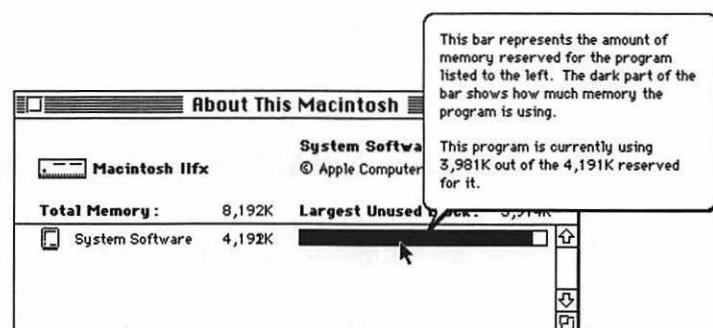


**Figure 3.1**

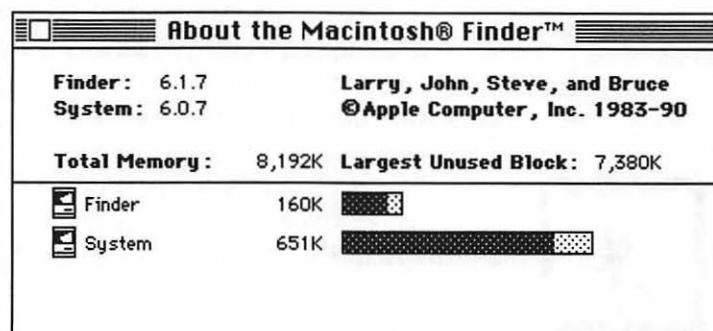
About This Macintosh shows that this Mac IIfx running System 7 has 8192K of memory, 1080K of which is allocated to the operating system.

**Figure 3.2**

Balloon Help shows exactly how much memory the operating system is using.

**Figure 3.3**

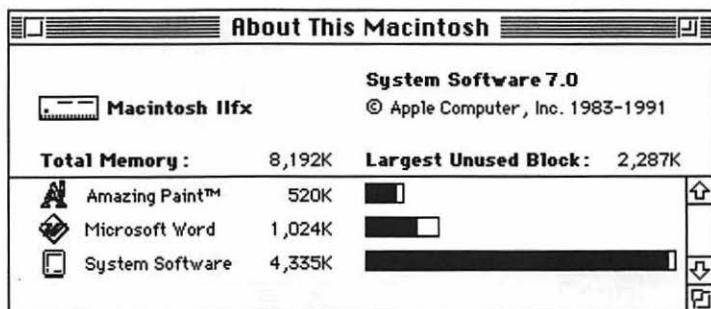
About the Finder in System 6 shows the amount of memory allocated to the system and the amount allocated to the Finder.



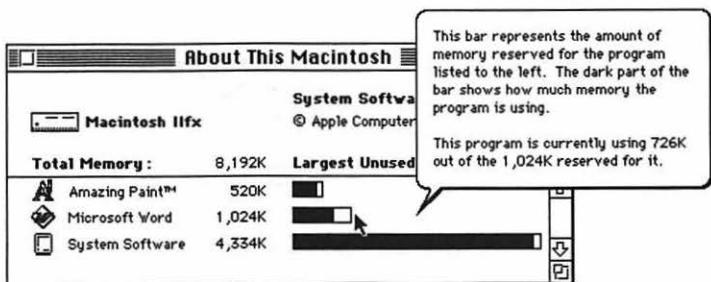
## How Much RAM Does an Application Use?

You can find out how much memory an application is using when it has already been launched by accessing the About This Macintosh (or About the Finder in System 6) from the Finder. (If you are in System 6, you must be using Multifinder to go to the Finder when an application is launched.) It will show you all launched applications and how much memory each has been allocated (Figure 3.4). In System 7, you can use the Balloon Help to see the actual amount in use (Figure 3.5).

**Figure 3.4**  
Choosing  
About This  
Macintosh  
from the  
Apple menu  
shows the  
amount of  
memory  
allocated to  
each  
launched  
application.



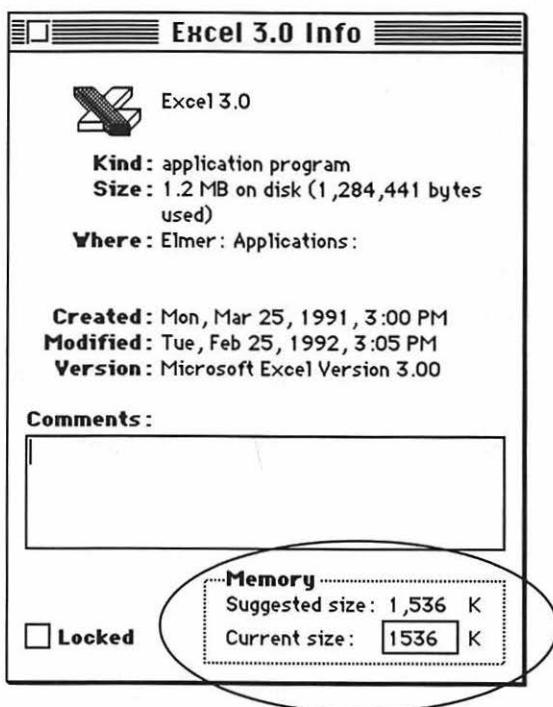
**Figure 3.5**  
Using Balloon  
Help, you can  
find out  
exactly how  
much  
memory each  
application is  
using.



It is also possible to find out how much memory an application will need before you launch it. Select the application's icon in the Finder and choose Get Info from the File menu. In

the lower-right corner of the window that appears you will see the Suggested size and the Current size of the application (Figure 3.6). The Suggested size is the amount of memory, in kilobytes, that the manufacturers suggest the application needs. The Current size is the amount that will actually be allocated to the program when it is launched. You can adjust this amount. It's generally not a good idea to set the application memory to less than the recommended amount. Your program will probably behave erratically and/or crash if you don't give it enough memory. You can, however, set the application memory in the Current size box to *more* than the recommended amount. Extra memory can help if you are using especially large files or if you want to have many open at once. And if you find your application is giving you "out of memory" warnings, freezing, or performing sluggishly, you might want to give it extra memory. Try increasing memory in 256K increments until you notice a difference.

**Figure 3.6**  
An application's Get Info window shows Suggested size and Current size.



## **RAM Upgrades**

It's all well and good to talk about running multiple applications, opening big files, increasing memory allocations, and using system extensions. But none of this is possible if you haven't got enough RAM.

### **How Much Do I Need?**

The amount of memory you need depends on a number of factors. Ask yourself these questions:

- **What version of the system am I using?** System 6 takes just under a meg; System 7 takes more than a meg. And that's in a basic, stripped-down version. Add some INITs, Control Panels, and fonts, and you'll get that up a meg or two higher in no time. My souped-up system takes over four megs.
- **What applications am I running?** Look at the amount of memory each of your applications takes. If all you are doing is word processing, you are in pretty good shape, since Word, for example, only takes 512K to run. Editing large TIFF files in Photoshop and importing them into QuarkXpress? You're going to need a bit more memory. Photoshop and Quark take 2Mb apiece, and if you want those big files to open and redraw at a reasonable speed, you're going to need some extra.
- **How many applications do I run at once?** Obviously, the more applications you run simultaneously, the more memory you'll need to run them. If you basically do all your work with Word and PageMaker, then consider how likely it is you'll simultaneously run more than two programs and a DA or two.

Add up all these factors to see how much memory you'll need, and then buy *more* than that. You will never hear any-

one say they have too much RAM, but you'll sure hear people complaining they haven't got enough. Ideally, you should buy as much RAM as you can afford. But it is critical that you have at least enough.

Anyone using System 7 is going to need at least 4Mb of RAM. With any less, you'll hit the wall with "out of memory messages" before you know it. If you're running a large database or color-editing program, you're going to want at least 8Mb. Again, the rule of thumb is to buy as much as you can afford. And remember, you can always add more later.

## Buying and Installing RAM

You can add more RAM to your Mac yourself or have a technician do it. Most RAM (except RAM for PowerBooks) comes in **SIMMs** (Single Inline Memory Modules). Each SIMM has several actual RAM chips on it. Macs with 1Mb of memory will have four 256K SIMMs; newer Macs come with two or four 1Mb SIMMs. You add RAM to your Mac by installing SIMMs into the slots available inside your Mac.

### RAM Size and Speed

SIMMs come in a variety of sizes and speeds. You can get SIMMs of 256K, one megabyte, 2, 4, 8, and 16Mb. The speed of the chips is measured in nanoseconds (billions of a second). The lower the number, the faster the chip. Faster chips mean less time to access memory. The speed of the chips you want depends on the model of Mac you own. Table 3.1 shows the various Mac models and the speed of chips required for them. Slots for SIMMs come in banks of two or four, depending on which Mac you own. You must fill the slots a bank at a time. For example, on a Plus or SE there are four slots, each of which comes with one 256K SIMM. The slots are in banks of two, so you must replace two at a time. To upgrade to 2.5 megs of RAM, you would remove one pair of SIMMs and replace them with 1Mb SIMMs. To upgrade to 4Mb, you'd replace all four with 1Mb SIMMs.

**Table 3.1**

Memory  
Speed

<i>Model</i>	<i>Chip Speed (in nanoseconds)</i>
Plus, SE	150ns or faster
Classic, SE/30, II, IIfx, IICx	120ns or faster
Classic II, LC, LC II, IISi	100ns or faster
IIfx	80ns or faster, requires special SIMMs
IICi, Quadra series	80ns or faster
Portable	100ns or faster, requires special chips with lower power
PowerBook series	100ns, requires special modules (not SIMMS)

## Installing SIMMs

Most vendors of RAM will include installation directions. I recommend you buy the SIMMs (more on that in a minute) and look at the directions. If you have a modular Mac (II series, LC, or Quadra), the directions that come with the SIMMs may be all you need, as installing RAM is a relatively simple procedure in those models.

If you have a compact Mac (Plus, SE or Classic), you should *not* try installing RAM without expert guidance. You could fry your Mac—not to mention yourself—if you mess it up. The voltage that is retained in the transformer *even after the Mac is turned off* is over 9,000 volts—enough to kill you. On the other hand, there is a great resource for you do-it-yourselfers: your local user group. Most user groups have regular do-it-yourself events where people get together to install memory. Experienced installers provide advice, tools, and directions. It's sort of a support-group for memory installation. Since you need to know about things like “discharging the fly-back transformer,” it is much easier if there is a person show-

ing you exactly what to do (and what not to do) than for me to provide a bunch of murky diagrams.

If you prefer, Apple-authorized technicians should be able to do the installation for you in about half an hour, so they can't really rack up service charges. Call ahead for hourly rates and ask for an estimate. Some places have so-called "minimum charges," meaning they have a two-hour minimum on service, even though RAM installation is not a very time-consuming process. And bring your Mac into the dealer or you'll pay through the nose for a house-call.

## Shopping for RAM

The best bargains in RAM are through mail-order. Not only do the major mail-order houses (MacWarehouse, MacConnection, Mac Zone, and so on) offer RAM, but there are tons of other vendors whose advertisements appear in the Mac magazines every issue.

The brand of the RAM is not really important. Apple's own brand of RAM is much more expensive than others, with no real difference in quality. Rather than buying by brand, consider the following:

- **Price:** Prices can vary drastically on the same or similar merchandise. Don't let a vendor convince you it's merchandise is of "higher quality." The only price difference should be between SIMMs of different sizes or speeds.
- **Guarantee:** Make sure that whoever sells you your RAM guarantees it for at least a year. Cheap RAM is no bargain if it doesn't work!
- **Installation Guides:** Many vendors offer terrific do-it-yourself guides. MacWarehouse, for example, not only sends along a clear, concise manual, but offers a video as well (free if you buy two or more SIMMs, \$29 if purchased separately). For those who can't find a user group hands-on session, these guides could be the next best thing for nervous modular Mac owners who want a demonstration. (As I said before, compact Mac owners should get an expert to do it, or at least guide them through it.)

- **Delivery Service:** Watch for extra charges. (Am I starting to sound cynical? I'm just a wary shopper.) A reputable place will send it via regular mail for free, overnight for a couple extra bucks.
- **Technical Support:** Whoever sells the product should be able to support it. And support should be free—preferably available through a toll-free number.
- **Surcharges:** Some dealers will add a surcharge for credit card orders. If you are planning to pay by card, make sure the price you are quoted is the credit card price. If you are purchasing the SIMMs from a dealer who will be installing it for you, be especially watchful.
- **Tax:** Ordering by mail can often save you tax dollars if the merchandise is shipped from another state.

## The Disk Cache

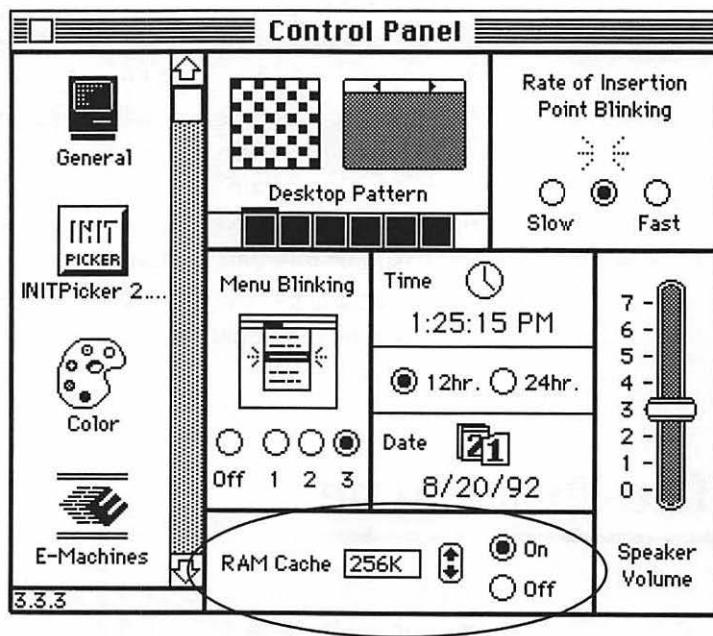
The **Disk Cache** (known before System 7 as the RAM Cache) is a portion of the RAM set aside for frequently accessed data. Data in RAM can be accessed much faster from here than from disk (up to 400 times faster). The cache also works as a buffer as you write data. Rather than write character-by-character to disk, the cache holds the data in RAM as fast as it's delivered and then writes it to disk when it is efficient to do so.

The larger the cache, the more data can be buffered, which can dramatically speed up performance. It does, however, take up some valuable RAM, which is then unavailable to applications. Also, if the cache is too large, the time it takes to search the cache for the needed data becomes too lengthy, so you lose your performance advantage. The trick is to reach the right balance of cache for your machine.

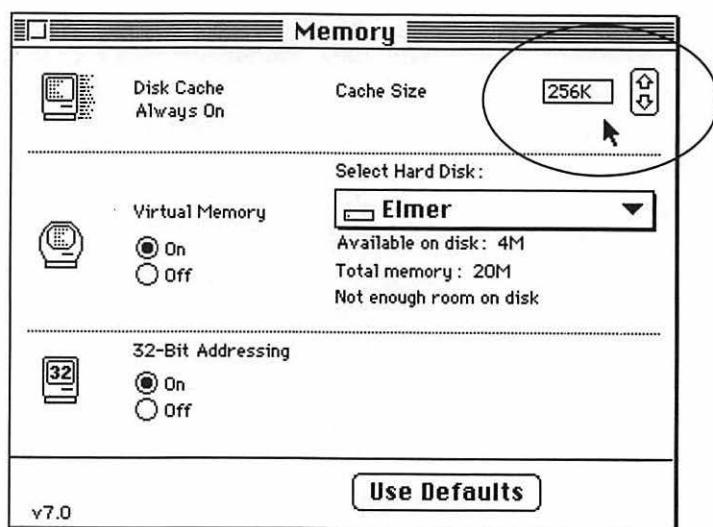
The RAM Cache is set through the General Control Panel in System 6 (Figure 3.6) and—changed to the Disk Cache—the Memory control panel in System 7 (Figure 3.7). Use the

up and down arrows to adjust the amount by 32K at a time. You will need to restart between adjustments for the change to take effect.

**Figure 3.7**  
Setting the  
RAM Cache  
in System 6.



**Figure 3.8**  
Setting the  
Disk Cache in  
System 7.



In System 6, you can choose to turn the RAM Cache off completely. If you are working with a 1Mb Mac, turning the Cache off is your best bet. You will not notice a performance difference when it's on and it will keep RAM from being available to applications. System 7 does not allow you to turn the cache off altogether, but to run System 7 you should have 4Mb of RAM to begin with, so you have enough to allot some to the cache.

Experiment with the cache to find the best performance difference at the lowest setting. Look for a difference in Finder performance, and give yourself a day or two to determine whether the setting is making a difference. A good place to start is by giving the cache approximately 32K for each meg of RAM installed, then increasing by 128K or 256K at a time. The highest setting you can give your RAM cache is 348K for each meg of memory, but you'll probably want to set it for less than that. Table 3.2 shows recommended settings. Start with those and adjust up or down until you find the number at which you are most comfortable.

**Table 3.2**  
Suggested  
RAM Cache  
settings

Megs of RAM installed	Recommended	Maximum allowed
1	32K or none	348K
2	64K	696K
2.5	96K	870K
4	128K	1392K
5	192K	1740K
8	256K	2784K

If you are not using Multifinder—and you probably *should* be—you ought to give up to 25 percent more of your RAM to the cache.

Some people are more sensitive to the performance differences of various RAM Cache settings. If you do not notice a

difference at increasingly higher settings, keep your RAM cache off (System 6 only) or set it at 32K. There is no point in wasting precious RAM on the cache if you do not notice a difference in performance.

## **System 7 and Memory**

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System 7 has two new features that help you make better use of RAM: **virtual memory** and **32-bit addressing**. (Chapter 2 has more information about System 7's features.)

### **Virtual Memory**

If you are using system 7 on a Mac with a 68030 or 68040 processor, you can try virtual memory. Virtual memory essentially tricks your Mac into thinking available hard-disk space is RAM. If you have the hard disk space available, you can effectively double your RAM. (You shouldn't use more virtual memory than you have real RAM.) Virtual memory is not as fast as real RAM, but it is faster than regular disk accessing, so it is an improvement.

### **32-bit Addressing**

Some Macs can use System 7's 32-bit addressing to take advantage of more than the usual 8Mb of RAM allowed under System 6. Of course, you have to purchase the RAM, but with some Mac models this means you can have up to 128Mb of RAM. If you are using really large color documents or keep bunches of programs open at once, you might want to take advantage of this feature of System 7. Be cautious, though, and check your software's documentation. As of this writing, there is still a fair amount of software out there that is not compatible with 32-bit addressing, and you don't want to buy megs and megs of RAM and then find out that you can't use them when you need them.

## RAM Disks

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A RAM disk is a risky business, but it's handy for those who want top-speed performance. A RAM disk acts just like a hard disk, except that it works much faster. You can use software or hardware to create a RAM disk, but either way it requires an additional purchase, plus several extra megs of RAM (at least 4Mb). You can store programs, files, even the System Folder on a RAM disk. You will notice a tremendous performance improvement in the Finder, particularly, if it is on a RAM disk. However, RAM disks can be dangerous, since RAM is not permanent. If you get a power interruption while using a RAM disk, you can lose it all. Before investing the money in a RAM disk, ask yourself:

- Do I desperately need more speed?
- Do I back up very frequently (daily at least)?
- Am I willing to risk losing the information?
- Can I afford it?

## A Few Last Words on Memory

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It seems that as software gets better and more feature-laden, developers are getting more and more lax about limiting memory requirements. Applications software is getting fat! New applications not only take megs and megs of disk space (I just installed the new version of Canvas, for example, to the tune of 6+ megs of hard disk space), but they take more and more memory to run. Many applications request at least 1500K. So, you won't regret buying as much memory as you can afford.

## **Questions and Answers**

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**Q:** Define the various types of memory.

**A:** ROM is built-in, unchanging memory. RAM is the Mac's workspace for temporary information. PRAM is a portion of RAM maintained by the battery that holds settings information. Disk memory is the storage space you read from and write to. Virtual memory is disk space used as RAM.

**Q:** How does the Mac use RAM?

**A:** The operating system, INITs, Control Panels, and applications are loaded into RAM for fast access as they are used. Applications stay in RAM until you quit them. The Finder and parts of the operating system remain there until shutdown or restart.

**Q:** How can you ascertain the amount of memory the system or an application is using?

**A:** There are a couple of ways. One: Choose About This Macintosh (System 7) or About the Finder (System 6) from the Apple menu for a list of all launched applications and the amount of memory allocated to each. Use help balloons to find out exactly how much memory is in use. Two: Select the application's icon in the Finder and choose Get Info from the File menu to see the Suggested Memory Size for an application and the actual amount allocated.

**Q:** What factors should you consider to determine the amount of memory you need?

**A:** The version of the system you are using, what applications you are using and their memory requirements, and how you use your system.

**Q:** Who should do RAM upgrades?

**A:** Compact Mac owners should have a technician or expert do it; modular Mac owners can do it themselves.

**Q:** Who can help with upgrading?

**A:** Vendors of SIMMs usually send installation instructions with the merchandise. User groups can offer advice and workshops. Apple technicians can do the upgrade for you in a reasonable amount of time.

**Q:** What should be considered when shopping for RAM?

**A:** Price, guarantees, installation instructions, delivery, tech support, surcharges, and taxes.

**Q:** What is the RAM, or Disk Cache?

**A:** A portion of RAM set aside for frequently accessed data. It can be adjusted in the General Control Panel in System 6 and the Memory control panel in System 7.

**Q:** How big should the RAM cache be?

**A:** 32K per megabyte of installed RAM is a good starting guide, but you should experiment until you find a setting that is ideal for you.

**Q:** What other memory-enhancements does System 7 offer?

**A:** Virtual memory, which is using part of the hard disk as RAM, and 32-bit addressing, which makes it possible for high-end Macs to use large quantities of RAM.

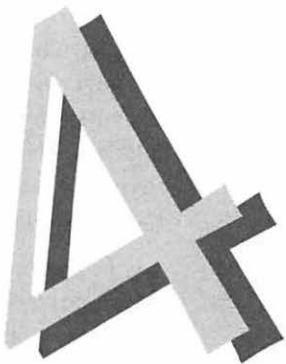
**Q:** What is a RAM disk?

**A:** A RAM disk acts like a hard disk but accesses data at RAM speeds. It is extremely fast and very volatile.

## CHAPTER 4 ♦ HARDWARE AND PERIPHERAL UPGRADES

No Mac is without the potential for improvement, and no Mac user can resist the temptation to upgrade something. Herewith, the scoop on how to upgrade your Mac and its peripheral devices. Topics covered include:

- Adding RAM ◊
- Accelerators and what they do ◊
- Apple upgrades ◊
- Clock speeds and CPUs ◊
- Coprocessors ◊
- Buying accelerator boards ◊
- Monitor options ◊
- The advantages of a large monitor ◊
- Monochrome vs. grayscale monitors ◊
- Color displays and the advantages of color ◊
- The video card ◊
- What to look for in a monitor ◊
- Keyboard options ◊
- Mouse options ◊
- Shopping for upgrades ◊



## I

t is inevitable that as you get more proficient with your Mac, you are going to want more from it. Most Mac models can be upgraded in one way or another to make them work faster, better, and/or harder. While there is always the option of going for an entirely new system, it is usually less expensive and often just as worthwhile to upgrade your Mac incrementally with added memory, accelerators, and peripherals.

## Upgrading the Mac Itself

The main reason for most upgrades is speed. Working with more memory or an accelerator can speed up your work dramatically. Every Mac user knows the tedium of waiting for a program to launch or a screen to redraw. When we know it's

possible for it to happen faster, it seems to take even longer. When I first upgraded to the IIfx from the plain Mac II, I reveled in what seemed like lightning-fast processing. I thought I'd never seen anything so fast. A year and a half later, I can't bear its sluggish performance and dream about the day I can add a 68040 accelerator. (I'm going to try really hard not to turn into a computer geek throughout this chapter, but I may have a few lapses.)

For some, it's not worth the investment to upgrade to a more powerful Mac. The real question is how much speed means to you. This depends on what you do with your Mac. Do you spend a lot of time staring at the watch cursor? Does it make you want to climb the walls? You might be a prime candidate for an upgrade.

## **RAM Upgrades**

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The first step toward upgrading your Mac's performance is to add more RAM. Adding memory will speed up many operations and make a noticeable difference in performance. (For more information about your Mac's memory, see Chapter 3.) It's also a relatively inexpensive way to soup up your Mac. One-megabyte SIMMs are available for as little as \$50 each through mail order. If you have 4Mb RAM, you can effectively double your Mac's memory-based performance for two hundred bucks. Not a bad deal. And it's an easy upgrade, because you can install memory yourself in a few minutes into any of the modular Mac models. If you have a Plus, SE, or Classic, it's a little tougher and probably a job for a technician, but it's not an expensive or time-consuming one.

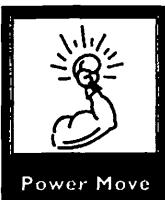
### **Why Add More RAM?**

One of the best reasons for upgrading is so you can switch over to System 7. (If you are not yet converted, reread Chapter

2). In theory, System 7 will run on a Mac with two megs of RAM, but in reality you will need at least four. And for those who complain about performance degradation under System 7, it's best if you have eight megs or more.

Of course, it's always best to have as much RAM as you can possibly afford. The more RAM you have, the more applications you can run. Running too many applications without enough memory means you can end up with error messages like "The application has unexpectedly quit," "Not enough memory to perform that action," or everyone's favorite, the blunt "Out of memory." Or worse, you'll get no error message at all, just erratic behavior or system crashes. Installing more RAM can solve those problems (or at least cut down on them). Certainly, if you get "Out of memory" alerts with any regularity, you need more memory.

Another advantage of having lots of RAM is that more RAM means you can run more system extensions (INITs) and control panels. INITs and control panels are keys to customizing your Mac. Most of the really neat stuff you can do to soup up your Mac, both serious and silly, means adding INITs and control panels. Each one takes a bit of memory when the Mac starts up, so it follows that the more memory you have, the more you can soup up your Mac. (For more about the wonderful world of INITs and control panels, see Chapter 8.)



## Accelerators

The next step in upgrading is to add an **accelerator**. An accelerator is a circuit board, also called a card, that is installed inside your Mac. It "accelerates" your Mac because its CPU is faster than the one built into the Mac. (CPUs are discussed in "Accelerator Speeds," below.) Upgrades are available through Apple for some Mac models, but there are also many excellent accelerators available from third parties.

A faster CPU means many basic operations will be a lot faster, including:

- launching and quitting applications
- scrolling
- screen redraw
- mathematical calculations
- find routines, both in the Finder and within applications
- spell checkers
- copying files
- execution of menu selections.

## Apple Upgrades

Apple has upgrade paths for most Mac models. The exceptions are the Plus, Portable, SE/30, IIfx, and PowerBook. Table 4.1 shows the upgrades available from Apple for various Mac models.

**Table 4.1**

Apple  
upgrade  
paths

512 and 512Ke	Plus*
SE	SE/30
Classic	Classic II
II	IIfc
IIx	IIfx
IIcx	Quadra 700
IIci	Quadra 700
Quadra 900	Quadra 950

*\*Don't bother with upgrading to a Plus. It's a waste of money. It will cost you around \$800, not including labor (yours or a technician's) or the new extended keyboard you'll want to go with it. Save your money. For \$200 more you can get yourself a brand new Classic.*

Apple upgrades are almost always a good, safe option. Once you've upgraded, you really have the new model. In terms of compatibility and performance, if you've upgraded to a IIfx, you've got a IIfx. The only difference is the box it comes in. The Apple upgrades are expensive, but they're good choices.

## Third-Party Accelerators

Installing accelerators is relatively easy for the Mac II family or Quadras. In the compact Macs (512, Plus, SE, and Classic), it's substantially more work. The older Macs were never meant for upgrading, and the newer ones were designed to be upgraded only by a professional technician.

There are many different types and brands of accelerators, so it takes some research to find the right one. DayStar Digital and Radius are two of the most well known and respected makers of accelerators; both have reputations for excellent products and support.

## Accelerator Speeds

Accelerators are measured by the clock speed of the CPU. (Read this part carefully even if you aren't planning an upgrade. This is the kind of stuff you can throw around to sound like a real expert.) **CPU** stands for central processing unit, which is the chip inside your Mac that pretty much runs the show. Now, just to confuse you, the term CPU is also used to refer to the whole box with all the guts in it, as opposed to the monitor or keyboard. In this discussion, however, we'll stick to the chip itself.

A **coprocessor**, like a copilot or co-sysop, is the sidekick to the processor. It is a chip that helps out by taking some of the burden off the processor. It is designed to perform a specific function and do it faster than the processor could do it. A math coprocessor, for example, does the math work. (I wish I'd had a math coprocessor when I was in school).

The clock speed (or clock rate) of a CPU is measured in megahertz (MHz). The operations of the CPU are based on the movements of a quartz crystal that pulses millions of times each second. The faster the pulsing, the faster your operations take place—operations like how often the CPU accesses memory or the hard disk, or how fast the screen redraws.

When you hear a term like “030,” it’s short for 68030, which is the type of chip in the Mac. One type of chip can come in a variety of clock speeds. The 68030, for example, can have a clock speed of 16, 20, 25, or 40. Table 4.2 shows the various Mac models and their chips and clock speeds.

**Table 4.2**

Macs and  
their chips  
and clock  
speeds

<i>Model</i>	<i>Chip</i>	<i>Clock Speed</i>
128	68000	8
512, 512Ke	68000	8
Plus	68000	8
SE	68000	8
Classic	68000	8
II	68020	16
LC	68020	16
LC II	68030	16
IIx	68030	16
IIcx	68030	16
SE/30	68030	16
Classic II	68030	16
IIci	68030	20
IIci	68030	25
IIfx	68030	40
PowerBook 100	68HC000	16
PowerBook 140	68030	16
PowerBook 145	68030	25
PowerBook 170	68030	25
Quadra 700	68040	25
Quadra 900	68040	25
Quadra 950	68040	33

The rule of thumb here: Bigger is better. Bigger numbers mean faster performance.

Some accelerators come with RAM, while others use what you have or let you install more. If an accelerator board comes with RAM, it'll be faster, but not surprisingly, it will be more expensive as well.

Another important feature to look for in an accelerator is a math coprocessor. Don't let the name deceive you; it's not just for engineers and mathematicians. A math coprocessor can speed up all kinds of technical processes, including drawing, analysis, spreadsheets, and database functions. It's worthwhile to look for an accelerator with a built-in math coprocessor.

## **What to Buy**

If you can afford it and your model is upgradable, you can't go wrong with the Apple upgrade. You won't have to worry about it being compatible with your software or anything else, since what you'll be getting is essentially a new Mac. It's also a very easy way to upgrade. The only drawback to an Apple upgrade is the cost.

The biggest drawback to third-party upgrades is compatibility problems. It can be a painful upgrade when you find that your software no longer works as it once did. But they generally cost less than the Apple upgrades, and you can also upgrade models for which Apple doesn't offer an upgrade. You have a greater selection with third-party accelerators, too, both in price and performance.

Since new and better accelerators come along regularly, you really have to do some research before you shop. Read your Mac magazines. The major mags (*MacUser* and *MacWorld*) usually do comparative reviews of accelerators at least annually. While "off-brands" may be just as good as the "name" brands, this is one time when I think it's better to go with the known entity. Stick to the recommended brands. If

you get some unheard-of cheapie, you could end up with compatibility problems from hell, and when you try to get service or support, the manufacturer may be reluctant—or may have disappeared. The accelerator is really a critical part of your Mac. If your mouse or keyboard is a lemon, it's a shame. If your accelerator is a lemon, you are really up the proverbial creek. I see it this way: You might buy a cheap brand of battery for your car, but you wouldn't buy a new transmission from Moe's Discount Transmissions 'n' Stuff.

## Monitors

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The early Macs had those great-looking but tiny little nine-inch screens. Although everyone loved those crisp little black-and-whites when they first came out, they are no longer enough for most Mac users.

### What Kind of Monitor Should You Get?

It used to be that using a Mac meant working with the limitations of a nine-inch screen. I never minded, since the advantages of using a Mac far outweighed the disadvantage of a small screen, and that small screen was so nice and clear, too. I never missed a larger monitor even when laying out entire books on a nine-inch monochrome. Time passed, and monitors grew. I worked my way up in the world, and I now have a nineteen-inch monochrome at home and a sixteen-inch 24-bit color at the office. I could *never* go back to the tiny little nine-inch screen.

### Choosing a Monitor's Size

External monitors start at twelve-inch and get bigger; the biggest I've seen is twenty-one-inch. The measurement is the

length of the diagonal measurement across the screen; a nineteen-inch monitor is nineteen inches from corner to corner. Actual viewing size is smaller than the actual measurements of the screen, since there will be a black frame around the edge of the viewing area.

There are two basic kinds of large monitors: **portrait** and **landscape**. There are also monitors that rotate from portrait to landscape. A portrait monitor is taller than it is wide, like a piece of paper held like a letter. A landscape monitor is wider than tall. When choosing a monitor, consider how you work. If you want to look at pages side by side or if you work on wide spreadsheets, you'll want a wide monitor. If you do more word processing or work on single pages at a time, you'll do fine with a portrait monitor (and they tend to be cheaper). If you have lots of money, get a really big monitor and it won't matter, because you can see both tall and wide views on a twenty-one-inch monitor.

The smaller monitors are popular choices for those who want a compromise between size and cost, particularly for color monitors. In general, a twelve- or thirteen-inch monitor will display somewhat less than a full page. A nineteen-inch monitor will display most of a two-page spread. On a twenty-one-inch monitor, you can see it all. If you are looking for a compromise, consider the sixteen-inch monitors. Large color monitors are especially expensive, and a sixteen-inch will let you see substantially more than a twelve- or thirteen-inch.

## Advantages of a Larger Monitor



The best argument for large monitor is the time you save. While the amount of time you spend scrolling around a small screen might not seem like a lot, the mathematics show otherwise. (This is, incidentally, a great way to convince a budget-conscious boss). Say you spend just one minute an hour scrolling around your work (six seconds every ten minutes—that's not an overestimate is it?). That's forty minutes a week if

you work eight hours a day at your Mac. Now, say you work fifty weeks (after all, you do get two weeks vacation, don't you?). That's two thousand minutes, or 33.5 hours. Next, multiply that by your hourly wage. If you earn twenty dollars an hour, you'll save \$670.00 worth of time. Not a bad savings, especially since you can get a really nice full-page monochrome monitor for less than that. Consider carefully how much time you will really save. Using the calculation above, but estimating a savings of fifteen minutes a day, you'll save 62.5 hours, or \$1,250 at twenty dollars an hour. Even if you aren't trying to convince someone else, you should consider what your time is worth and how much you will save. Time that isn't paid for by the hour still has value when you consider what else you could be doing with it.

Another, less tangible advantage of a larger monitor is the sense you'll have of what your work looks like. It's a lot easier to see what your work looks like when you can see the whole page at once rather than in little chunks. With a large monitor, you might find that you won't need to print your work as often while you are working on it. This is a particular advantage for those who share printers on a network and have to queue up printing jobs and then go to another room to pick up what they've printed.

I suspect that working on a larger monitor makes my work look better. Not only do I have a better sense of my work, but I am not so reluctant to try several variations of the same thing if I don't have to scroll all over creation just to see what it looks like.

When you work with more than one application at a time, it's nice to be able to keep more than one window open and accessible. The bigger the monitor, the more windows can stay open without cluttering up the screen. Having a bigger monitor is also like having a bigger desk. I like having lots of space on my real desk (I've already confessed I'm not the greatest at putting things away); the same is true for the Mac's desktop. A large monitor lets you keep icons and folders on the desktop without cluttering and your desktop will be more accessible under the open windows of applications.

There is an important warning I must impart here: If you work on a large monitor, it is *extremely* hard to go back to a small one. The bigger the screen, the harder it is to go back. Suddenly, all that scrolling becomes completely intolerable.

## Gray-Scale and Color Monitors

A monochrome monitor displays in black-and-white only. This is a bit misleading, since you will see gray on the screen. The grays you see are made up of combinations of black and white dots. Multiple shades of gray and fine shadings are possible only on a gray-scale monitor.

### Gray-Scale

A gray-scale monitor displays multiple shades of gray by using dots of black, white, and many shades of gray. The combination of all the grays can display images of photographic quality.

### Color

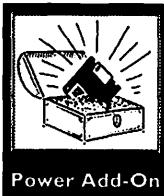
Color-monitor resolution is measured in bits and determined by the chip that is on the monitor's video board. Eight-bit color is the lowest-end color, showing up to 256 shades. The high end of color is 24-bit, which allows a display of over 16 million colors.

There is an insidious trend toward color. New Macs come ready to plug into one of Apple's color monitors. Software manuals assume you have color. Games sometimes won't even run in black-and-white. I disapprove of this tendency to push color on those who really don't need it. Color is very expensive, slows performance down, and often degrades the appearance of text on the screen. Word processors and spreadsheet jockeys don't necessarily need color, but they are being made to think that they do.

On the other hand, there are advantages to having color, even for those who don't use it to produce color work. Color is a fantastic organizational tool, both in the Finder and within applications. In a word processor or outliner, you can use color to organize your documents. Numbers in spreadsheets stand out when they are in color (especially if they are red).

If you want color for organization or to liven up your documents, or just for fun and games, get 8-bit color. Don't waste your money on 24-bit color, which will be noticeably slower, and cost a fortune; you really won't notice the difference onscreen. Two hundred fifty-six colors are plenty for almost anything you could want. You need 24-bit only if you do color desktop publishing, graphics/photographic editing, color separations, and the like.

If you do use 24-bit color, you still don't need more than 256 colors most of the time. If the monitor is set to display 16 million colors at all times, the Mac's performance will be *really* slow, especially in the Finder. Drawing a window in 16 million colors takes a long time. There are other options besides calling up the Monitors control panel every time you want to change the display options. HandOff II lets you assign monitor settings to applications. When you launch an application, the monitor automatically changes its display to the number of colors HandOff II has set. There are shareware solutions to almost any problem, and this one is no exception. One I particularly like is DepthGauge, which lets you pop up a menu of monitor settings with a mouse-key combination and then displays the number of colors you have set in the menu bar.



Power Add-On



Power Add-On

I am partial to the sixteen-inch color monitors, having been very happy with my E-Machines sixteen-inch. It is big enough to display most of what I am working on at any given time, but not as hideously expensive as the really big color monitors. I found the twelve- and thirteen-inch monitors too small to work with comfortably, since I had been so horribly spoiled by working with large black-and-white monitors. Upgrading is always a trade-off. If you are upgrading from a nine-inch black-and-white, a thirteen-inch color will probably seem divine. It's all in your perspective.

# Upgrading Your Monitor

Buying a new monitor often means buying a new **video card**. The video card provides the interface between monitor and Mac. The card is a circuit board that fits into one of the slots inside your Mac. Some of the newer, high-end Macs come with built-in color video. Table 4.3 shows the monitor upgrade path for each Mac model.

**Table 4.3**  
Upgrade  
path chart

Model	Monitor type	Comments
Older than Plus (128, 512K, 512Ke)	Monochrome only	Difficult to find available, compatible monitors; difficult to install. Not worth the effort. Upgrade your Mac instead.
Plus	Monochrome only	Can use only one monitor at a time. Sometimes disables nine-inch built-in.
Classic	Monochrome only	Can use only one monitor at a time.
SE	Monochrome only	Easy to install card. Uses one monitor at a time but both are available.
LC, LC II	Built-in video for 8-bit color or gray-scale	No need to buy card since video is built in. Can choose gray-scale or color. Usually sold with a twelve- or thirteen inch color monitor.
Mac II family	External monitors and add-in cards: monochrome, gray scale, color	Install cards with monitors; can have as many monitors as you have slots for cards. Models generally not shipped with any particular monitor (although lately thirteen-inch color has been fairly standard).
SE/30	Built-in monochrome, can use external monochrome, gray-scale or color	Some external monitor/card combinations will allow you to use built-in monitor simultaneously. Shop carefully.
Qudra	Built in support for 24-bit color	Supports most monitors. No need to buy card. If you are paying for a Quadra, you probably want a monitor that has 24-bit capability.
PowerBook or Portable	Comes with LCD screen	Can be attached to external monitors through third-party products.

The video card, combined with the monitor, determines the number of colors your Mac can display. If you can't afford color, consider buying a color-capable monitor. Later, when you feel you've got the money, you can add a color board. Similarly, most 8-bit monitors can be upgraded to 24-bit by changing the card. Sell the 8-bit card to someone who wants to upgrade to color.

## Shopping for Monitors

There's more to picking a monitor than just choosing size, color-capability, and price. Many factors contribute to how the screen is ultimately going to look.

### What to Look For

The monitor's **refresh rate** is how often the monitor redraws the image on the screen. This is not the same as the redraw after a change or when a dialog box goes away. The monitor displays and updates an image by drawing it over and over again at a rate of many times per second, just like a television. A screen's refresh rate is measured in Hertz (times per second). A good monitor will have a refresh rate of at least 72Hz. Even though you can't see the screen redrawing, a faster redraw rate will be less tiring on your eyes, and it will make a crisper picture.

A monitor's **resolution** is a measurement of the picture's clarity. The onscreen picture is made up of dots called **pixels**. The resolution is the number of dots (or pixels) per inch (**dpi**) on the screen. When measuring a screen, it is easier to get a sense of its size by looking at the number of pixels rather than the number of inches diagonally. To get a sense of the visual measurements of the screen (how much will actually display), you can divide the number of pixels the monitor displays by the resolution. For example, my RasterOps monochrome monitor has a nineteen-inch diagonal measurement. It has

1024 X 786 pixels, which it displays at 72 dpi. If you divide 1024 by 72, you get a smidgen over 14 inches.  $786 \div 72 =$  not quite 11 inches. So, my nineteen-inch monitor is actually 11-by-14. The number of dots per inch also affects how crisp the image is on screen. 72 is standard; many monitors come in higher resolutions (meaning crisper images). Like most other aspects of upgrade shopping (except price), the bottom line is: Go for the highest number. Ultimately, you want the most pixels at the highest resolution you can afford. One caveat about higher resolution monitors: Higher resolution will display an image smaller than the one it will actually print, making small type unreadable onscreen. It also means that the "actual size" view in your software will be misleading. For example, at 92 dpi, 12 point type will appear on your screen at about 8.5 points. Nine point type, quite readable on paper, will be extremely hard to read displayed at 6.5 points.

**Contrast** is very important, but it's not measurable by a number. Look at the screen—does it have a nice contrast? Are whites white, blacks black? Am I starting to sound like an ad for detergent? The best measurement of contrast is by eye. If possible, look at various monitors side-by-side so you can compare the picture.

**Distortion**, of course, should be avoided. Look especially at the edges of the screen for curves or distortion. Display type at different sizes to see whether the letters are wavy. Look at the edges of windows; they should be even and straight, both vertically and horizontally.

Examine the details onscreen, especially text, for **sharpness**. If you are going to be doing word processing, spreadsheets, data entry, or any other work that involves lots of text, study carefully the way a monitor displays text, especially in smaller sizes. Keep in mind that resolution plays a part here; higher resolution (dpi) means type will display smaller. Color monitors, which combine three dots for each pixel, will blur the text even further. A high-resolution color monitor, divine for a graphic artist working with four-color separations, could be a nightmare for a financial analyst writing spreadsheets and reports.

Avoid **screen flicker** like the plague. Stare at the monitor. Go ahead, be really rude about it. Watch for flickering. If there is *any* flickering, buy a different monitor. Flickering will make you crazy.

Many monitors come with their own built-in "extras." These include:

- tear-off menus (pull past the end of a menu and it will "tear off" and stay on the screen)
- cursor finders (press a key combination and the screen will highlight your cursor)
- built-in screen-savers
- glorified screen dumps (both cropable and timed)
- adjustable-type size in menus
- software to adjust screen settings (contrast, brightness, etc.)
- zoom
- panning (the screen pans when the mouse is moved off the edge of the monitor)

While some of these are neat tricks, most are not worth paying extra for. Many conflict with other software and end up disabled or disabling. My E-Machines comes with a cursor finder that hasn't worked in months. I think I may never know what it is conflicting with, but that could be because I'm not trying very hard to find out. There are utilities available that can perform most of the functions that come with monitors, and many are freeware or shareware. Don't pay extra for glamorous software.

Finally, get a monitor that has a good warranty and reliable service available. If you order your monitor through the mail, make sure it is warranteed and find out what you have to do should you need service.

There are many excellent brands of monitors to choose from. The Apple monitors are nothing exceptional. Unless you get a great deal on one (not likely unless you are also buying a Mac), don't follow the Apple party line.

## Picking a Monitor

Take the time to research your decision thoroughly. Read the magazines for reviews before you shop. Look at the monitors in action and use them if possible. When pricing, be sure to ask how much the monitor and card will cost you—unless you have built-in video, in which case, you should be sure the price you are quoted does **not** include the card.

# Input Devices

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An **input device** is anything connected to your Mac through which data comes in. Every Mac user has at least two, the mouse and the keyboard. Both can be changed or upgraded for more features or better performance.

## Keyboards

The early Macs came with an itty-bitty keyboard with no key-pad and no F-keys. A word on F-keys: The term **F-keys** is used two ways. In this context, I am referring to the row of keys above the regular keyboard with the letter F and a number on them: F1, F2, and so on, up to F15. The term also refers to a type of program that can be installed in your Mac's system software that will allow you to perform a system function using a keyboard command. The two F-key programs that come with the system software are the screen capture—Command-shift-3—and the command to print the screen to an ImageWriter printer—Command-shift-4. There aren't many F-key programs available commercially, but there are many shareware and freeware ones.

The idea behind the small keyboard was that it would be so much fun and so easy to use the mouse, you wouldn't need all those keys. Times changed and keyboards grew—the Plus'

keyboard had a keypad, and every subsequent model came with a choice of two ADB (Apple Desktop Bus) keyboards, the standard and the extended. (The Apple Desktop Bus is the type of connection Apple uses for input devices like mice and keyboards.) The standard ADB keyboard added the power key (to turn on the Mac) and the Escape and Control keys, and modified the layout slightly. The extended keyboard added F-Keys, a separate arrow pad, the navigation keys (Home, Page Up, Page Down, Help, and Forward Delete) and extra Command, Control, and Option keys on the right side of the keyboard.

You can upgrade by purchasing a bigger keyboard such as the ADB extended or one of the non-Apple keyboards that have various other keyboard configurations, such as the DataDesk 101.

Choices in keyboards are kind of personal. I personally love the Apple ADB extended. I love the feel of the keys (just a bit of resistance), the click (loudish), and all those extra keys. I am a heavy macro user (I hope you will be, too, after you read Chapter 9). The more modifier keys I have, the more macros I can make. Some people think the Control key and Escape key foolishly mimick the IBM keyboards. But since so many programs use the Option and Command keys for their built-in key commands, it's nice to have the Control keys for the macros I create myself. Then I don't have to remember convoluted key combinations involving Command-Shift-Option-something-or-another. For example, I use the Control key to launch applications: Control-p for PageMaker, Control-w for Word, Control-e for Excel. To use the Command key I would have to combine it with other modifiers or use non-obvious letter keys, since Command-p is almost always Print, Command-w closes windows or makes a view fit in the window, and Command-e does all sorts of different things, depending on the application.

I love having the extra set of modifier keys on the right side of the keyboard. Macros and keyboard commands are easier to execute with the extra set of keys. Another nice feature of both the ADB keyboards is the ADB port on either side of

the keyboard. You can plug either the mouse or the cable that goes to the Mac into either side. I also use the keypad, arrow keys, and navigation keys all the time. Although the mouse is invaluable, my hands spend most of their time racing across the keys.

Some people like a smaller keyboard, especially because it makes reaching over to the mouse less of a treck. Keyboard touch is also a matter of preference; some prefer a softer (and/or quieter) keyboard. Try out different keyboards to see what feels good to you. I do suggest, however, that you get an extended keyboard if you can afford it and you like the feel. The more you become a power user, the more you'll use the keyboard and the less you'll use the mouse. You'll be glad to have the extra keys.



## Mice

The mouse that comes with all Macs since the Plus is the ADB mouse (it uses the same kind of ADB port the keyboard does). It's light and slick and good for you. If all you want is a good, reliable, smooth-running mouse, stick with the one that came with your Mac.

There are many alternatives to the Mac's basic mouse. One of the most popular is the **trackball**. A trackball works sort of like a regular mouse turned upside-down. The base sits still on your desk and you roll an oversized ball with your fingers to make the cursor move. Most trackballs have more than one button. Typically, there is one to perform the regular click function and one to "click-lock," as if you were holding the mouse button down. Many also have other buttons or a chording feature (pressing two buttons simultaneously) that perform a programmable function (such as Close, Save, Open, or Undo).

Trackballs can be difficult to get used to. But most people who use one hate to go back to a regular mouse. I am a complete convert to the trackball. First and foremost, it takes up less desk space. I believe I've mentioned that I don't keep the

world's cleanest office, and I'll take as much surface space as I can get. My beloved Kensington trackball takes up only sixteen square inches of deskspace. Second, I feel I have more control over the cursor. Fingertip movement is much more delicate than wrist movement. Third, I love the click-lock feature. Lock on a menu and you can take your sweet time about making a choice without having to hold the button down. Click-lock in one corner, roll the ball along, and click again to select a large area or several items in a window. Click-and-drag operations are a breeze, since you can click-lock, roll wherever you want to go, and then release. Finally, the chording feature is great. I have mine set to Save. Now I can save from the keyboard, menu, or mouse (and of course, I save my work constantly).

I strongly recommend you try out a trackball, especially if you get tired when mousing or if you find yourself running off the edges of your mousepad a lot. Borrow one if possible, so you can try it for an extended period of time (it takes a while to get used to one). There are many wild, weird trackball shapes out there, each claiming to be more "ergonomically correct" than the next. I don't know much about physiology but I know what I like. Get the one that feels most comfortable. Kensington is the oldest trackball veteran; they even made one for the pre-ADB Macs. EMAC's Silhouette is a sexy and curvaceous little number that comes with your choice of trackball weights (in various decorator colors, of course). Not to be outdone, Kensington offers replacement trackballs in various rich jewel tones.

Another mouse alternative is the cordless mouse. These are used like a regular mouse except that there is no cord to get tangled up in or to cut you short. Cordless mice use infrared technology to coordinate the movements from mouse to Mac.

There are other, weirder mouse alternatives. One is a tiny little thing from Appoint that you manipulate with just your fingertips. It's called Thumbelina Mac. Another is more like a flat pad that you touch to get response. There's a touch-screen mouse, that you put over your monitor. The Curtis MVP

mouse is a trackball with a foot switch. For you games addicts, there is the Advanced Gravis Computer Technology MouseStick (say that three times fast). Mice for your Mac breed as fast as the real thing, so there are always new models available.

## Tablets

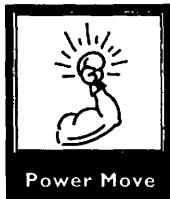
Tablets are a recent technology that are of particular interest to Mac artists. Using a pen on a tablet, you can “draw” on the screen. Some are actually touch-sensitive, meaning that pressing harder has a different result than a gentle touch. Combined with the latest paint programs, tablets make formidable tools for the computer artist.

I've used the Wacom tablet, and it's tremendous fun. I'm not a skilled artist, but I had a blast trying out all the different effects the delicacy of the tablet made possible. Using a pen is inevitably a more precise movement than any kind of mousing, and it shows. Of course, you can use a tablet for any kind of mousing, not just for graphics. But tablets are expensive and pointless unless you are doing graphics on your Mac.

## Shopping

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Shopping for Apple products means shopping with Apple-authorized dealers. Prices tend to be pretty close from dealer to dealer, although they will bargain. Generally, you can expect to pay roughly 30 percent less than list price on an Apple product. If you see an ad that seems too good to be true, it probably is. Unfortunately, there are some less-than-reputable dealers who will pull some sneaky stuff on you. A Mac will be advertised at a fabulous price, but when you go to buy it, it turns out that the price does not include the keyboard or mouse. Or it will have some weird third-party hard drive in it.

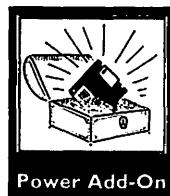


The best possible way to find a good local dealer is to ask for recommendations from other Mac users. Call your local user group and ask who they recommend doing business with. You'll want a dealer who not only provides you with a good price, but who will give good support to the products they sell you. This is one area where asking for advice is critical.

To give you an example, on a local New York City bulletin board I recently saw an innocent message from a woman who was considering making a purchase from a local dealer whose prices were substantially lower than its competitors. She asked, "Does anyone know anything about them? Is it as good a deal as it sounds?" By the next day the responses were pouring in. "Don't do it! They're criminals!" was one of the least caustic. Horror stories about pushy salespeople, bait-and-switch scams, and incompetent technical support flooded the board. Needless to say, the woman wisely shopped elsewhere.

Mail-order is almost always cheaper than buying from a dealer. Many mail-order companies will offer technical support over the phone and money-back guarantees. Unless you need the kind of support a dealer can offer, go with mail order. Mail order is definitely the way to go for ordering memory (SIMMs) and peripheral devices like mice and keyboards. The price difference is substantial; you can easily pay twice the price for SIMMs if you buy from a dealer instead of through the mail.

I order from MacWarehouse and MacConnection regularly, not only for software but for miscellaneous stuff like cables, SIMMs, and so on. I've been pleasantly surprised at some of the oddball stuff they carry. Generally, if I need a widget, I'll call one of them first to see if I can get one. Not only are their prices low, but it is incredibly painless. Call before 3:00 A.M. and it's on your desk by 9:00 A.M. the next day (actually, that same day). It doesn't get much easier than that. There are other good Mac mail-order houses besides these two; I've heard good things about Mac's Place and the Mac Zone, for example. Shop around for prices, and keep in mind what you want from a mail-order company: a guarantee, fast delivery, and technical support.



As much as I recommend mail-order, I also believe in finding a good dealer and sticking with him or her. It can be difficult to find a dealer who will let you take your time to comparison shop and really examine the merchandise. Shopping for computer hardware can feel like shopping for a used car. It is not at all uncommon to find high-pressure sales people who try to talk you into something you don't need and who are less than completely knowledgeable. If you are lucky enough to find a really nice dealer who lets you play with everything and is knowledgeable and patient, try to reward him or her with your business. Having a good relationship with a Mac shop can pay off. Once you have established rapport, you'll not only get better prices on future purchases, but you can call for technical support, information on other products, or what-have-you. Obviously, sometimes it won't make sense to buy from a dealer, but if a few dollars extra means good, reliable service and support, it is worth it.

## **Questions and Answers**

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**Q:** What does adding RAM do?

**A:** Adding more RAM makes processing faster, allows you to run more applications and/or System 7, and precludes crashes or limitations from running out of memory. More memory also means its possible to add more INITs/extensions and control panels.

**Q:** What does an accelerator accelerate?

**A:** An accelerator is a faster CPU chip that speeds up a variety of system operations, including launching, quitting, scrolling, and redraw.

**Q:** What can be upgraded through Apple?

**A:** A variety of Macs can be upgraded to better Mac models (see Table 4.1 for details).

**Q:** What is the difference between various accelerators?

**A:** Accelerators come in a variety of clock speeds. The faster the clock speed of the CPU (measured in MHz), the faster the performance of the Mac.

**Q:** What is a coprocessor?

**A:** A coprocessor is a chip that takes the burden of specific duties off the regular CPU and speeds up that particular kind of activity. For example, a math coprocessor handles mathematical calculations.

**Q:** What kind of accelerator is best to buy?

**A:** Apple upgrades, if available and affordable, are great. Otherwise, third-party accelerators are fine if you are careful to find a good one that has been well reviewed or recommended and has minimal compatibility problems.

**Q:** What are my options for monitors?

**A:** Depending on your Mac model, you can purchase an external monitor that is portrait or landscape, monochrome, gray-scale, or color, and in a variety of sizes.

**Q:** What are the advantages of a large monitor?

**A:** They are great time savers; they give you a better sense of your work; you can have more windows open at once; and you can keep more stuff on the desktop.

**Q:** What is the difference between a monochrome monitor and a gray-scale monitor?

**A:** A monochrome monitor has only black and white dots. A gray scale monitor has dots in black, white, and many shades of gray.

**Q:** What are the different kinds of color displays?

**A:** Color monitors range from 8-bit color, which displays 256 colors, to 24-bit color, which displays more than 16 million colors.

**Q:** What are the advantages of color?

**A:** Color is a great organizational tool both in the Finder and within documents. It is also great for games. Of course, it is necessary for those who are doing color work on their Macs.

**Q:** What does the video card do?

**A:** It works as the interface between the monitor and your Mac and determines the colors in the display.

**Q:** What should one look for when shopping for a new monitor?

**A:** In addition to size and color capability, look for a high refresh rate, good resolution and contrast, and no distortion or flicker. Extra features such as tear-off menus, zoom, or panning are a nice touch.

**Q:** What is the advantage of an extended keyboard?

**A:** An extended keyboard has excellent navigation keys and extra keys for creating macros, meaning you can spend less time reaching for the mouse.

**Q:** What are some alternatives to the standard mouse?

**A:** The most common mouse alternative is the trackball. Others include infrared mice, touch screens, and tablets.

**Q:** Why use a trackball?

**A:** It uses up less desk space, it has a more delicate touch, and the buttons are more versatile. Some also find it more comfortable to use.

**Q:** Where should I shop?

**A:** Ask around to find recommended dealers in your area. Consider mail-order for simple purchases. Look for a dealer who will be patient and allow you to consider many options.

## CHAPTER 5 ◊ DATA STORAGE

This chapter discusses data storage on hard disks, floppy disks, and other media. Topics covered include:

Hard disks and how they work ◊

Bits, bytes, kilobytes, megabytes,  
and gigabytes

Tracks and sectors ◊

Interleave ratio ◊

SCSI ◊

The first thing you should know about  
buying a hard drive

Internal drives vs. external drives ◊

Hard disk speed ◊

Pricing and shopping for hard disks ◊

Floppy disks and drives ◊

Protecting floppies from erasure  
and damage

Other data storage options ◊

# 5

## I

I'm going to assume you already have a hard drive of some sort. If you don't, you are in the dark ages and are certainly *not* getting the most out of your Mac, and you should run out and get one immediately, before the stores close. Actually, you should read this chapter before you run out and get one.

You may have found, as so many of us have, that your drive is not big enough. If you are shopping for a new hard disk, you should know something about what you are shopping for. And troubleshooting a hard disk is easier if you know how one works.

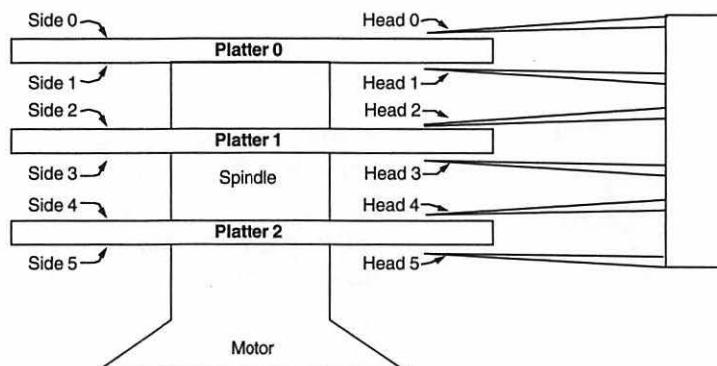
## Structure

In the center of the drive is the spindle motor, which spins the platters. Each platter is a flat disk (the **substrate**) coated with

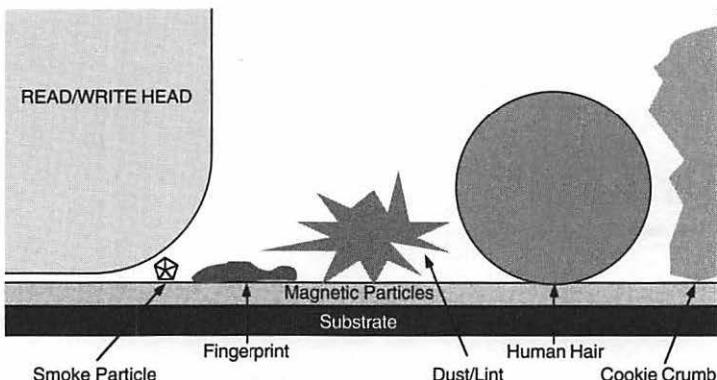
metallic oxide particles. The platters sit on the spindle. The spindle motor spins the platters in unison at a speed of 3600 RPM, or about 80 miles per hour.

A read/write head is suspended over the platter (like the arm of a record player), and moves across the surface, reading and writing data. As shown in Figure 5.1, a hard disk has data on both sides of the platter. (Read/write is also sometimes called I/O, or input/output.) When the drive is off, the heads retract away from the surface of the platters. As the drive spins up, the heads take off like a plane lifting off. While operating, the arm does not actually touch the platter, but sits micro-inches away. Figure 5.2 shows the approximate relative size of the distance from platter to arm to dust, hair, and smoke particles. The drive is housed in a plastic or metal casing for protection.

**Figure 5.1**  
The anatomy  
of a hard disk.



**Figure 5.2**  
The size of  
various  
contaminants  
relative to the  
distance of  
the read/write  
head from the  
platter.



If the drive is jarred while spinning, the heads can crash against the platter (this is called a **head crash**). At 80 miles an hour, this can cause serious damage, so avoid this. With a desktop computer that doesn't get moved around, this shouldn't be a problem.

You should always use the Shut Down command from the Special menu when turning off your Macintosh at the end of a session. This allows the system to close any files that are open and perform the necessary housekeeping so that when you start up again all information on the disk will be neat and orderly. At worst, if you turn off your Macintosh without using the Shut Down command, the computer may not be able to locate the System Folder when you restart and you will be faced with a blinking question mark.

The arm moves across the platter according to the instructions given to it by the computer. As the arm travels, it changes the metallic particles on the surface of the disk into magnets. If you remember your elementary school lessons about magnets, you'll remember that each magnet has a north pole and a south pole. As the heads move across the magnetic particles, they change the alignment of the poles. If the particle is aligned one way, it is an **on bit** with a value of 1; if it is aligned the other way, it is an **off bit** with a value of 0.

## Bits and Bytes

Every smidgen of data on your drive is made up of on bits and off bits. Because the data is all magnetic, a magnet can do a lot of damage to a disk. If you ever really want to wipe a disk out completely and make it totally unrecoverable, just swipe a good strong magnet across the surface. For this reason, you should be sure to keep anything magnetic away from your Mac. (I once destroyed all the data on a floppy by setting it on top of my datebook, which has a magnetic clasp.)

A **byte** is made up of eight bits. Each byte can represent up to 256 pieces of information. Picture a row of eight light switches, each of which can be on or off. There are 256 possi-



ble combinations of on and off switches. A byte of data is about one letter's worth. (This, incidentally, is a handy bit of information to know when you are working with word processing text files. You can estimate a file's length in characters—divide by six to get the number of words—by looking at its size in bytes. Most word processors have a character/word count feature built in, but hey, it's still a cool thing to know. It doesn't work for formatted files, since all the extra data about fonts and stuff takes up extra bytes.)

The next unit of measure is a **kilobyte** (also called a **K-byte** or **K**). Each kilobyte is 1024 bytes. The 1024 is not as obscure a number as it seems. If you think of those on/off bits, you can see how the computer works with multiples of two (the binary system). Do your powers of two and you'll see: 2, 4, 8, 16, 32, 64, 128, 512, 1024. Any of those numbers look familiar? If you have worked with a computer for a while, you will recognize them as part of the measurement system commonly used by computers. One kilobyte is equal to roughly one-half a typewritten page.

One megabyte is 1024K. The Mac tends to round that off to a clean one thousand when measuring file sizes. If you look at the Get Info window for a file's size, you'll see that it shows the file's size in K and in megabytes, but that it simply divides K by a thousand to get megabytes.

A **gigabyte** (or **gig**) is 1024 megs. That's a lot of data—more than a million K and more than a billion bytes. A one-gig hard drive seems like plenty to me, but I used to think a 40 meg drive was a lot. Who knows how much disk space one will need in a few years? Table 5.1 summarizes these units of measure.

## Tracks and Sectors

To make finding locations on the disk easier, the disk is divided into tracks and sectors. The **tracks** are concentric circles on the disk. They work like the grooves on a record. Just as you can move the needle to a specific track to hear a spe-

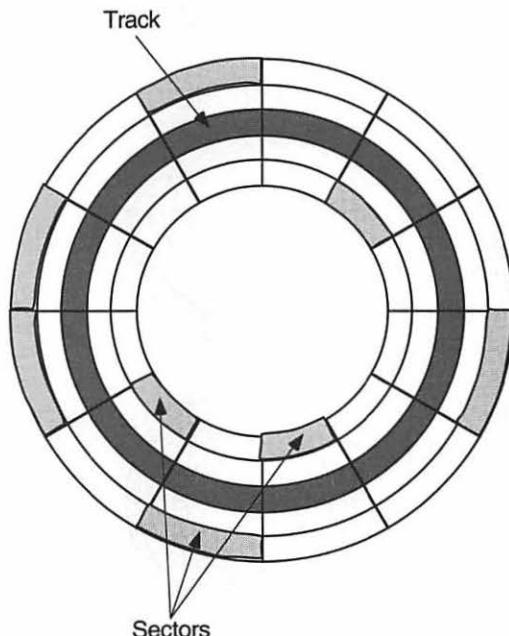
**Table 5.1**

Units of measure		
1 bit		Smallest unit of data, representing either 1 or 0
1 byte		8 bits/256 possible pieces of information/1 character
1 kilobyte (1K)		1024 bytes/one-half page
1 megabyte (1Mb/1 meg)		1024K
1 gigabyte (1 gig)		1024Mb

cific song, the read/write head will move to a track to find a file on the drive.

The tracks are further divided into **sectors** (see Figure 5.3). On a typical SCSI hard drive, there are 32 sectors per track, with each sector holding 512 bytes of information. These tracks and sectors are laid down when your drive is formatted in a process called **low-level formatting**.

**Figure 5.3**  
Tracks and sectors on a hard disk.



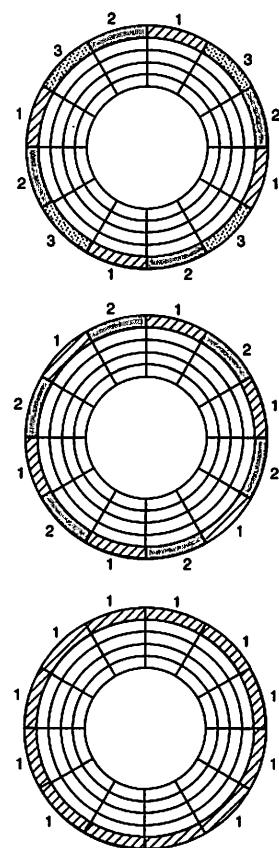
## Interleave

The software that does the initial low-level formatting also sets the disk's interleave. **Interleave** is the order in which the heads read and write data to the sectors. It is based on the speed at which your Mac can process data.

An interleave ratio of 1:1 means that data is read from sectors in sequential order. A 2:1 interleave means the data is read from every other sector, and 3:1 reads every third sector (Figure 5.4). To read one track of data, it will take one revolution with a 1:1 interleave, two revolutions with a 2:1 interleave, and three revolutions for a 3:1 interleave.

**Figure 5.4**

The order in which data is read from the disk at various interleave ratios. The top illustration shows an interleave ratio of 3:1; the middle illustration shows an interleave ratio of 2:1; and the bottom illustration shows an interleave ratio of 1:1.



You want the maximum interleave for your model of Mac. Except a couple of the early models of SEs, almost all models since the Plus work best with a 1:1 interleave. Most initialization software will automatically format your drive with the optimum interleave, and it is very likely that your drive is already formatted correctly. Unless you are using a drive from an old Mac with a new Mac, you probably needn't be concerned.

If your interleave is 2:1 or 3:1 when it should be 1:1, your Mac will be waiting unnecessarily for those extra revolutions, which degrades performance. However, it can be even worse the other way: If your Mac requires a 2:1 or 3:1 interleave and you have it set for 1:1, your hard-disk will end up making an entire revolution between each sector of data.

## Other Parts of the Drive

Other components of an external hard drive include the power supply, an air filter, and the SCSI controller board. The SCSI controller board translates data into a high-speed format to be transported back through the SCSI cable to your Mac.

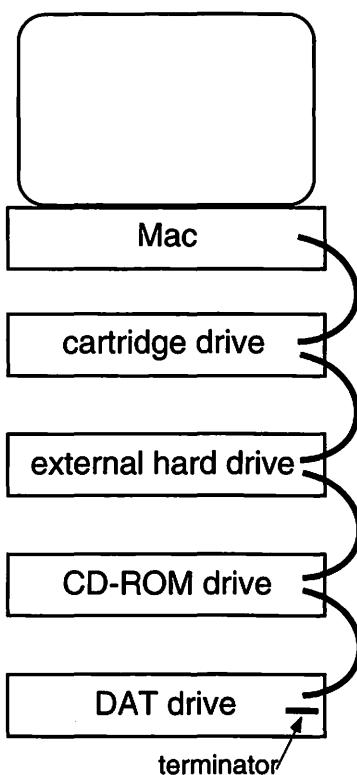
## **SCSI**

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**SCSI** (pronounced, some say appropriately, *scuzzy*) stands for Small Computer Systems Interface. It is the method by which the Mac transfers data at high speeds. The SCSI port is easily recognizable; it is the long narrow slot, with two rows of pins, on the back of your Mac. SCSI devices should come with a cable with the appropriate connector. (When you are purchasing SCSI devices—or for that matter, any devices—be sure that they come with the appropriate cable.) You may have to purchase it separately. The SCSI device itself may have on the back a 25-pin SCSI port, like the one on the Mac, or a 50-pin port. If you need to purchase a cable separately, be certain that the cable you get has the right kind of port.

A **SCSI chain** is the series of devices connected to your Mac's SCSI port (or SCSI bus). It can contain seven devices including the Mac itself. It is called a chain because each one is connected to the next in a series (Figure 5.5). Other typical SCSI devices besides hard drives are tape or DAT drives, scanners, CD-ROM drives, non-Postscript printers, or cartridge drives.

**Figure 5.5**  
SCSI devices  
are arranged  
in a SCSI  
chain.



SCSI is tricky stuff. The order of the devices, the length of the cables, the phase of the moon—all kinds of things can make your SCSI chain fail. Chapter 12, *Hardware Troubleshooting*, has more information about how SCSI works and doesn't work. If you have only a single SCSI device, you shouldn't really run into major difficulties.

# Data Storage

## The First Thing You Should Know About Buying a Hard Drive

Drives range in size from 20 Mb (about 25 regular 800K floppies) to several gigabytes, and they are growing all the time. Buy the biggest one you can afford. Bigger. Get a huge drive. Get a drive bigger than you think you could ever need. Get a drive bigger than that.

Software gets bigger and bigger as it gets better and better. Developers don't even try to make it small anymore. You will be amazed at how quickly you can use up the drive space. (See Table 5.2 for examples of how much disk space can be used with some typical Mac software.)

**Table 5.2**  
Some typical applications and the disk space they use

	PageMaker	2.5Mb
	Word	1.5Mb
	PhotoShop	7.1Mb (including Autotemplates and clip art)
	Canvas	4.6Mb
	Ten screen fonts	1Mb
	System Folder with a medium amount of customization (control panels, INITs, fonts, sounds)	8MB
	SAM	417K
	Excel	1.3Mb
	America Online	677K
	Quark Xpress	3.8Mb (including tutorial)
	Total	30.9Mb

As developers have made software more powerful and feature-laden, they've gotten a bit lazy about keeping the size and memory requirements down. When the Mac had no built-in hard drive and only 800K to a disk, applications had to be less than 800K. Furthermore, a 512 had only 512K of RAM, so applications had to be really conservative in using memory. Even when 1 MB Pluses with 20 MB hard drives became commonplace, software was lean and mean. While the capabilities of today's software leave the software of a few years ago in the dust, the days of lean and mean software are over. Applications routinely take up several megs of disk space and 1500K chunks of RAM out of the application heap. It becomes easier and easier to fill a hard drive with only the System Folder and a few applications, particularly if you use a lot of fonts, INITs/extensions, and the like. I have a single 40 meg hard drive that holds only my System Folder and three applications! Table 5.2 shows the disk space used by some typical software.

Keep in mind the size of your files. A database can take up several megs. If you work with scanned photos, remember that they can take more than a meg apiece, and even more than that if they are color. Even a plain old PageMaker document can take half a meg or more.

The files created on the disk when it is initialized—the boot blocks, directories, and so on (see Chapter 1 for details)—take up some of your drive space, too. It has nothing to do with how many files are on your drive or how big your system folder is; the hard disk will set aside a certain amount of fixed space for these files. The amount of space is fairly negligible on small drives, but it can account for several megs on larger drives.

## Internal vs. External

Most current models of Macs come with internal hard drives. If your Mac doesn't have one, you should consider purchasing one. Internal drives take up no desk space and are less expensive than external drives. The price break doesn't account for

much, though, because you have to pay a technician to install the drive. Still, you have one less piece of equipment to deal with, plug in, and/or account for (particularly when moving). On the other hand, if the drive needs to be serviced, you will lose the use of your whole Mac while it is in the shop.

External hard drives offer a number of advantages. They are generally easy to install. Just plug in a cable and you're ready to go. (Of course, there is the previously mentioned caveat: If you are chaining multiple SCSI devices, getting ready to go won't necessarily be that easy.) External drives are much more portable than internal drives. You can cart them around and even plug them into someone else's Mac. If an external drive needs to be repaired, you can send it out without losing the use of your Mac. (Of course, your Mac without a hard drive can be pretty useless.)

## Other Considerations

There is a lot more to shopping for a hard disk than size alone. The speed and physical size of the disk, the noise it makes, the software that comes with it, and, of course, the price are all important.

### Speed

**Access time** is a measure of the time it takes the drive to locate a particular track. While it is not the only measure you should use for evaluating a hard disk, you can use it to compare one disk to another. For speed comparisons, check the usage tests in magazine reviews. These tests measure the speed of typical daily operations, such as how long it takes to load a file, duplicate it, and so on.

The faster the processor in your Mac, the more important disk speed is, as it will be more noticeable. In other words, if you have an SE, you might not notice the difference between a disk with a 12ms access time and a disk with a 25ms access time. However, if you own a IIfx, you'll definitely see a difference.

While speed is important, it is also expensive. A speedy drive will cost significantly more than a slower one. Remember that you want as big a drive as you can possibly get, so if you have to sacrifice a little speed, do it. You won't notice the slightly slower speed nearly as much as you will notice when you run out of disk space.

## Footprint

If you have a compact Mac (512, Plus, SE, SE/30, Classic, Classic II), you can get a drive with **zero footprint**. Zero footprint means that the drive fits exactly under the Mac, not taking up any extra space on your desk. Of course, it does raise your monitor up several inches.

External drives, like most technological devices, are shrinking. My first 20 Meg drive was about a foot square, 4 inches thick, and it weighed a ton. Now you can get tiny little drives that fit in your pocket and hold 200 megabytes of data. This technology comes at a price; you'll pay more for a tiny drive than for a medium-sized one. You'll have to determine how much the convenience of portability and free desk space is worth to you.

## Noise

All hard drives make some noise, but the degree can vary tremendously. When turned on, a drive will make a gentle hum. During read/write processes, it will make a whirring, rattling, or scratching sound, which is normal. (If it actually squeals, you are probably due for a little repair.) While the whir of operation generally becomes background "white noise" that doesn't bother most people, a loud or annoying accessing sound can be nerve-racking. This is a lesson I learned by personal experience. The Quantum drive in my IIcx is very quiet, even in a silent room, only making a gentle, comforting rumble when accessed. My Cutting Edge removable cartridge drive not only has a loud hum, it practically does a death rattle every time I access it. It is extremely annoy-

ing. If you are sensitive to noise, be certain that the drive you choose is quiet. If you don't have the opportunity to try drives out at a dealership, get a drive with a guarantee, so you have the opportunity to work with it.

## Software

Hard drives almost always come with some kind of software. If you want the software that comes with the drive, you will save money. But make sure you aren't paying extra for a drive that comes bundled with some fancy software you don't need. Dealers may sweeten the deal by offering to throw in software. If you are offered software by the dealer in addition to what the drive's manufacturer has included, make sure that you are getting the original disks as well. The dealer might be simply offering to copy pirated software onto your drive, and you will be in for a rude shock when you go to call for technical support or an upgrade.

Of course, you don't need disks for public domain software (shareware and freeware), and hard drives often come with megs and megs of it. It's a great treat to sit down to 10 megs of shareware and find some real gems. Keep in mind, however, that shareware tends to be irregular in both performance and upgrades, and there could be software on your new drive that simply won't work for you or that will crash your Mac.

## Price

Figure cost by calculating dollars-per-meg. For example, if a 40Mb drive costs \$200, it's five bucks a meg. A 300Mb drive at \$600 is only \$2.00 a meg—definitely a better deal. Also, if you buy a drive now and find that it is too small later, you'll have to buy another at a later date. Then you are *really* spending money.

When calculating dollars-per-meg, find out what the disk's size is after formatting. One 80Mb drive may use 2Mb for for-

matting while another 80Mb uses 3.5 Mb. This can affect the cost difference.

Consider in your calculations that most drive manufacturers measure the data by counting a megabyte as 1 million bytes. Remember that one meg is 1024 K, which is 1024 bytes:  $1024 \times 1024 = 1,048,576$  bytes. That's a lot more than 1 million. (Think of it this way: One million pennies is \$10,000, but 1,048,576 pennies is \$10,485.76. It's a pretty substantial difference.) Since almost all drive manufacturers measure capacity this way, it won't make a big difference when comparing one drive to another, but you should know how much space you are getting for your money.

## Shopping for a New Drive

You are likely to get a better price on a hard drive from a mail-order vendor, as you would for many other peripheral devices. If you choose to buy your drive through the mail, make sure that it has at least a thirty-day guarantee. The advantage of purchasing from a dealer, on the other hand, is more accessible service.

There are many excellent brands of hard drives available. Apple drives are not particularly better than any other, and they are almost always more expensive (what a surprise).

The trick in choosing a hard drive is to know who manufactured the disk itself. Several different brands of drives can have the same actual drive mechanism inside. Quantum, for example, makes the drives that come with most Macs and many brands of third-party drives. You might find that drives from two different manufacturers, at two very different prices, have exactly the same mechanism. Sometimes a manufacturer will use two or more different brands of mechanisms in the same model of drive.

The best way to choose a drive is to talk to others to find out what drives they have had good experiences with. You want a drive that is going to be reliable, with good service behind it and solid performance. Experience with a drive is

the key to knowing how it will perform over the long run. This is the time to turn to your local user group. (Are you beginning to get the picture that I am a big believer in user groups?) BMUG, for example, the largest Macintosh user group in existence, publishes a semiannual newsletter with comprehensive product reviews based on the cumulative experience of its membership. You can't beat this kind of resource for assistance in choosing a hard disk that you will have to live with for some time to come.



## A Few Hard Drive Tips

Some basic preventive care can help your hard drive live a long and happy life. Here are a few basic dos and don'ts:

- **Don't** move your drive when it is on. This can cause a head crash.
- **Do** use the Shut Down command from the Special menu to turn off your Mac. This will allow the system to perform the necessary housekeeping so that all files are closed and the directory is updated.
- **Don't** smoke around your drive. I know all you smokers will ignore this piece of advice, but I feel obligated to give it to you anyway.
- **Do** keep the area around your drive clean and dust-free.
- **Don't** leave your drive on for extended periods when it is not in use. Whenever the drive is on the motor is spinning, so leaving it on unnecessarily will only shorten the life of your drive.
- **Don't** put anything magnetic near your drive.

## Floppies

The Mac can read three kinds of floppy disks. **Single-sided disks** hold 400K of data. These disks are now considered

obsolete; only old Mac 512s and 128s use them. You don't need to discard your old 400K disks, though, as you can use them in 800K drives.

**Double-sided disks** hold 800K of data. These were the standard for many years, and most commercial software is still released on 800K diskettes. All Macs since the Plus can read 800K disks.

**High-density disks** hold 1.4Mb of data. They are distinguishable from 800K or 400K disks by the extra notch in the diskette's case, opposite the tab for locking the disk. To read a 1.4Mb disk, you must have a **Superdrive**, also known as the **FDHD** (floppy drive high-density). Since 1989, the Superdrive has come on all new models of the Mac. (SEs and IIs that came out before 1989 will have a regular 800K drive.) The Superdrive not only reads high-density disks, but it can read DOS-formatted disks as well—with additional software. You will not be able to read a DOS disk just by putting it in the drive; you will need some kind of recognition software. DOS-Mounter from Dayna is a personal favorite, since it makes the translation painless: Load the DOS-Mounter control panel at start-up and you can mount DOS floppies on your desktop. (This capability *should*, of course, be built into the operating system of the Mac. Maybe in System 8?)



There is an FDHD upgrade available from Apple that is quite expensive. It is available as an internal or external drive, depending on the model of Mac you own. You can probably live happily without one for some time unless you need to share disks with IBMs and their ilk, or if you are sharing data with others who have high-density disks.

The magnetic coating of a high-density disk is thinner and has a stronger "coercivity" (magnetic strength) than an 800K disk. (Here is some totally useless trivia you can throw around to sound like an expert: The coercivity of an 800K disk is about 625 Oersteds, while a 1.4 Mb disk has coercivity of approximately 720 Oersteds. An Oersted, of course, is "the centimeter-gram-second electromagnetic unit of magnetic intensity equal to the intensity of a magnetic field in a vacuum in which a unit magnetic pole experiences a mechanical force



of one dyne in the direction of the field." (*Webster's Ninth New Collegiate Dictionary*). The coating is approximately half as thick as that on double-density disks. (Here's some more critical information for you: The coating is approximately 35 microinches thick, as compared to the double-density's 78 microinches.)

## Mixing Formats

400K drives have a second side and are physically identical to an 800K disk. Still, the second side probably has not been tested by the manufacturer—or worse it failed the tests. I don't recommend reinitializing 400K disks as 800K. Disks are not so expensive that it is worth risking your data to use the extra side. Your old 400K disks are good as 400K disks and that's about it. When they go, bid them a fond farewell.

If you punch a hole in the casing of an 800K disk, you can fool the Superdrive into thinking the disk is high-density, and it will initialize it as 1.4Mb. There's even a tool you can buy to do the punching. Fooling the Superdrive this way is really not a good idea. The high-density diskettes use finer magnetic particles than the regular 800K diskettes. The read/write head on a Superdrive cannot consistently read the coarser particles on an 800K drive. Worse than not being able to read the disk, the Superdrive might actually ruin the data on the disk.

If you put a 1.4Mb disk in an 800K drive, the drive will format the disk as 800K and it will work fine in any 800K drive. However, a high-density drive will think it's a high-density disk and not recognize the formatting. You can, if necessary, fool the high-density drive by covering the second hole in the disk's casing with a piece of tape. The drive will then think it's an 800K disk and read it. I don't recommend this procedure, since it's not the most stable way to read data, and the tape could come off in your drive. Your best bet is to take the data off the "fake" 800K disk and put it onto a real one. You can try reformatting the fake 800K as a 1.4Mb, but it is likely to be pretty unreliable, because the more powerful 800K drive may have clumped together the iron oxide particles.

Use disks for their intended purpose whenever possible. If you must cheat, get your data onto a more stable medium as soon as possible.

## How a Floppy Drive Works

Floppies are similar to hard disks in their operation. A floppy has magnetic particles on a substrate, as do hard drives. Double-sided and high-density drives have two read/write heads, one that reads the top of the disk and one that reads the bottom. Unlike hard drives, however, the read/write heads in a floppy drive actually touch the disk's surface. When you insert a new floppy and click Initialize in the dialog box, the system lays down the directory and desktop files.

Next time a floppy fails on you, crack open the case and take a look at it. You'll see the actual magnetic disk itself, the liner that protects it, and the rest of the disk's structure. You will see why a floppy disk is called a "floppy" when you see the thin, floppy plastic disk inside. (More trivia: The insider/techie name for the magnetic media itself is the "cookie," and the plastic case is called the "clamshell.")



## Floppy Maintenance

Floppy disks are hardy little fellas. They can take a fair amount of abuse and keep going. You can drop one, wing it across a room, spill something on it, step on it, or worse, and it will probably still work. That said, you should not abuse your disks. If you take a few precautions for their well-being, they will serve you well.

## Disk Erasure

The only thing disks are afraid of is a magnet, which is to a disk like kryptonite is to Superman. The risk of losing data

due to a magnetic field is nonetheless often overestimated. Here's the lowdown on the dangers of accidental erasure of disks:

- A magnet has to be within a few inches of the disk to do damage. Even a very strong magnetic field will not damage a disk unless it is quite close to the disk.
- Metal detectors at airports do not have high enough magnetic fields to do any damage to your floppies. If they did, they would also be a risk to people with hearing aids and pacemakers, and there would be a sign posted. X-Rays don't do anything to your disks, though the motors that operate the machines can damage the disks.
- Static electricity cannot hurt your disk. (It can, however, hurt your Mac! If you have a disk in the drive and give your Mac a static shock, it can damage the data on the disk.)
- The kind of magnet you might stick to your file cabinet or refrigerator can erase a disk if it comes in contact with the disk itself. If you have disks inside a file cabinet, a magnet stuck to the outside of the file cabinet isn't going to hurt the data on the disks.
- Neither heat nor cold will cause data loss. They can, however, distort the cookie, thus rendering your data difficult to read. For most temperature changes, bringing the disk back to room temperature will take care of the problem. If exposed to extreme heat (like, say, a fire), disks will become permanently distorted (ever leave a record or a videotape in your car?).

## **Preventive Measures**

Other than keeping disks away from magnets, there are a few basic techniques for keeping a floppy disk in good working order.

- **Do** keep the metal shutter closed. It's there to protect your disk against your prying fingers, dust, and the like.
- **Don't** use paper clips or rubber bands on disks.
- **Don't** stack too many labels on the disk. They could peel up and jam your drive.
- **Don't** place heavy objects on top of a disk.
- **Don't** use a ballpoint pen when writing on a diskette label once the label is on the disk
- **Don't** just drag everything on the disk to the trash when you want to reuse a floppy. Choose Erase Disk from the special menu instead. This has two benefits. First, it erases the desktop file completely, which can free up a little more disk space. Second, it runs the whole floppy through a checking and verification process to make sure the disk is in good working order. If it's not, the drive will reject the disk with an alert that the initialization failed.

If you run into problems with your floppies, head for Chapter 12.

One final word: Never hit the Initialize button unless you are sure you want that disk erased forever.

## **Other Data Storage Devices**

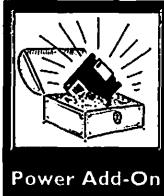
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Here are other data storage devices, which can be used in addition to (or in some cases, instead of) a hard drive.

### **CD-ROM**

CD-ROM is becoming more and more commonplace. By the time you read this, Apple will have already released a new Mac with built-in CD-ROM capability, the Performa 600 CD. CD-ROM stands for Compact Disk-Read Only Memory. As you can probably guess, that Read Only means you can't write to a CD-

ROM disk (yet). However, a CD *can* hold hundreds of megabytes of data inexpensively. If you have a CD-ROM reader, you can purchase reference CDs at relatively low prices. The most popular uses for CDs right now are for libraries of clip art and fonts. For example, Adobe has all of its fonts on a single CD-ROM disk. You can purchase the "Type on Call" disk for \$59 and have immediate access to fifteen fonts. Any time you want a new font from the collection, you can call a toll-free number, give them your charge card number, and they will give you an access code. Type it in, and *voila!* Immediate gratification. Vast collections of clip art, postscript graphics, and digitized stock photography are also available on CD-ROM.



Power Add-On

One of the newest and most spectacular uses for CD-ROM is for multimedia presentations. For example, children's books are available on CD, with multiple enhancements to make reading more fun. Not only will the computer "read" the book out loud, but the illustrations are animated. Clicking on a picture will bring up more information, an identifying label, a sound, or a hidden animated feature.

Other common uses for CD-ROM technology are multimedia encyclopedic references, educational presentations, and libraries of related information. CD-ROM drives range in price from as little as \$300 to \$1500 and up.

## Tape Drives

Tape drives have a cassette mechanism similar to audiocassettes. They are one of the most popular backup devices. With good backup software like Retrospect, you can back up a hard drive at lightning speed. Similarly, you can restore backed-up data very quickly.

The fastest and highest-capacity tapes are DAT—Digital Audio Tapes. A single DAT tape can hold up to 2.6 gigabytes. The tapes themselves are fairly inexpensive, averaging around \$20 apiece. The drives, however, are not cheap, averaging around \$1500. One major disadvantage of a tape drive is that you can't use it as an active storage device. In other words, you

can't read and write data to a tape drive as you work; you can use it only for backup. For more on tape drives, see Chapter 11, *Backing Up*.

## Optical Drives

Another new technology is the removable optical disk. These will likely become more popular as their prices drop and they become more commonplace. As of now, they are terribly expensive, costing between two and five thousand dollars.

Optical drives use a laser beam to read disks that resemble CDs. The drives come in two models, one that reads 128Mb disks, and one that reads 650Mb disks. The two disk sizes are not interchangeable (the 650Mb disks are physically bigger than the 128Mb disks).

## Removable Cartridge Drives

Removable cartridge drives have become a popular choice both as a backup device and as an alternative hard disk. Their operation is very similar to a hard disk, except that the platter itself is removable. The disk is enclosed in a plastic cartridge (hence the name). Working with a cartridge drive is like working with a giant floppy disk.

Each cartridge holds either 44Mb or 88Mb of data. Although there are several different brands of drives, most use mechanisms made by SyQuest. Because of this, SyQuest has become the Kleenex of removable cartridge drives; you will often hear the term **SyQuest drive** to refer generically to any brand of cartridge drive. The Bernoulli is a drive similar to the SyQuest, but it is manufactured only by one company, Iomega. Bernoulli's cartridges are 90Mb, and its drives are both slower and less expensive than SyQuest's.

Cartridge drives can work as fast as a regular hard disk, and they have the advantage of portability. They do tend to be

a bit noisier than regular hard drives, but they are otherwise an excellent alternative. Replacement 44Mb cartridges can be purchased for less than \$100—certainly less than a 40Mb hard drive. So, once you have made the initial outlay for the drive itself (around \$500–\$800), you can save some money. Cartridges are particularly useful for those who work with service bureaus, since you can just take a cartridge to the bureau rather than deal with stacks of floppies or hours of unstable modem time. They make great backup media because not only are they easy to use and transport (as are tapes) but they can be actively used (unlike tapes). If your drive fails or data is lost and you have a recent backup on a cartridge, you can be back to work instantly, without having to restore either your drive or your data.

If you choose to use a cartridge drive as an active drive on a daily basis, shop for a quiet one. I have a Cutting Edge cartridge, which drives me insane with its loud access sound. Of course, my other experiences with this drive are less than ideal. Cartridges jam in the mechanism, and the formatting software is troublesome. Needless to say, I don't recommend this particular drive. There are many excellent cartridge drives available. I've worked with a Mass Microsystems SyQuest drive with nary a problem.

## **Questions and Answers**

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**Q:** What exactly is a hard disk?

**A:** A hard disk is a platter (or several platters) covered with magnetic particles. The read/write heads access the data as the platters rotate at high speed.

**Q:** What is the difference between a bit, a byte, a kilobyte, a megabyte, and a gigabyte?

**A:** A bit is one particle of data with a value of 0 or 1. A byte is eight bits, equivalent to about one character (letter). One kilobyte (or K) = 1024 bytes. One megabyte (or meg) = 1024K. One gigabyte = 1024 megs.

**Q:** What are tracks and sectors?

**A:** Tracks and sectors are divisions on the surface of the disk that make it easier for the read/write heads to access data.

**Q:** What is the interleave?

**A:** Interleave is the order in which the heads read and write data to the sectors. Interleave can be set to 1:1 (each sector sequentially), 2:1 (every other sector), or 3:1 (every third sector).

**Q:** What is SCSI?

**A:** Small Computer Systems Interface, which is the method by which the Mac transfers data at high speed.

**Q:** What is the first thing one should know about buying a hard drive?

**A:** Get the biggest drive you can afford.

**Q:** Which is better, internal or external?

**A:** Internal drives take up no desk space and cost less than external drives, but they require professional installation. External drives are easy to install, more portable than internal drives, and simpler to send out for servicing.

**Q:** How is a hard disk's speed measured?

**A:** Access time is the measure of how long it takes a drive to locate a particular track. A fast access time is most noticeable with high-end Macs.

**Q:** What about noise?

**A:** All hard disks make some noise. Choose a quiet disk if noise bothers you.

**Q:** What's the best way to compare disk prices?

**A:** Calculate the dollars-per-meg after formatting.

**Q:** How should I shop for a drive?

**A:** Make sure you know who manufactured the mechanism inside the drive, and get recommendations from other users.

**Q:** What sizes do floppies come in?

**A:** 400K, 800K, and 1.4Mb.

**Q:** Can you mix formats?

**A:** You can, but don't. Your best bet is to use a floppy with its intended formatting.

**Q:** How does a floppy drive work?

**A:** Much like a hard drive, except that the heads actually touch the surface of the disk, and the rotation speed of the disk is slower.

**Q:** What erases or damages a disk?

**A:** A magnet in close proximity will erase a disk, as will touching the surface of a disk.

**Q:** What will protect floppies?

**A:** Keep them clean and away from magnetic, sharp, or heavy objects, and do not allow labels to pile up. Use the Erase Disk command from the Special menu rather than just dragging everything to the trash.

**Q:** What are some other data storage options?

**A:** CD-ROM, tape drives, optical drives, and removable cartridge drives.

## CHAPTER 6 ◊ SYSTEM FOLDER MANAGEMENT

In this chapter we will discuss:

- What goes into the System Folder ◊ when the System is first installed
- What you do and do not need ◊
- Other System Folder residents ◊
- Organizing within the System Folder ◊
- Installing and upgrading system software ◊
- Multiple System Folders ◊
- What should not be in the System Folder ◊



orking with the Mac's System Folder is a tricky business. On the one hand, everything is easily available to you and easy to modify. On the other hand, everything is easy to screw up.

When you first install a brand new, pristine system onto a disk, the installer puts extraneous stuff in the System Folder. From then on, it's all downhill. Nowhere in any manual is it laid out exactly what should and shouldn't go into the System Folder. While there are no hard and fast rules to determine the contents of your System Folder, there are some basic guidelines for keeping it under control.

## **The Installed System**

First, let's look at the basic operating system. As you remember from Chapter One, all parts of the operating system not built

into the Mac's ROM are located inside the System Folder. The two key files in the operating system are the System and the Finder. But these are by no means all there is to the System. When you run the Installer program that comes with your set of original System disks, many files are placed on your drive. Table 6.1 shows what will be displayed inside your System Folder when you install a "virgin" System 6.

**Table 6.1**

System 6

<i>Item</i>	<i>Type</i>
System	System
Finder	System
ImageWriter	Driver
Clipboard	System
Scrapbook	System
LaserWriter	Driver
LaserPrep	Driver
AppleTalk ImageWriter	Driver
General	Control Panel
Key Layout	System
Keyboard	Control Panel
Mouse	Control Panel
Monitors	Control Panel
Sound	Control Panel
Startup Device	Control Panel
Easy Access	System
Color	Control Panel
DA Handler	Document
MultiFinder	System
Backgrounder	System
PrintMonitor	Application
LQ ImageWriter	Driver
LQ AppleTalk ImageWriter	Driver
LaserWriter IIsc	Driver

Table 6.2 shows what a virgin System 7.0 looks like.

**Table 6.2**

System 7

Item	Type
System	System
Finder	System
Clipboard	System
Scrapbook	System
ImageWriter	Extension
LaserWriter	Extension
AppleTalk ImageWriter	Extension
Personal LaserWriter SC	Extension
AppleShare	Extension
File Sharing	Extension
DAL	Extension
Network	Extension
Finder Help	Extension
Apple Menu Items	Folder
Control Panels	Folder
Extensions	Folder
Preferences	Folder
Startup Items	Folder
Brightness	Control Panel
Color	Control Panel
Easy Access	Control Panel
File Sharing Monitor	Control Panel
General	Control Panel
Keyboard	Control Panel
Labels	Control Panel
Map	Control Panel
Memory	Control Panel
Monitors	Control Panel
Mouse	Control Panel
Portable	Control Panel
Sharing Setup	Control Panel
Sound	Control Panel
Startup Disk	Control Panel
Users & Groups	Control Panel
Views	Control Panel
LQ AppleTalk ImageWriter	Driver
LQ ImageWriter	Driver
TeachText	Application
PrintMonitor	Extension

## Eliminating System Folder Files

Some of these initially installed files may be unnecessary. For example, both systems install LQ ImageWriter drivers. If you do not have an LQ ImageWriter, there is no reason for this file to be installed on your Mac. This is true for any driver (ImageWriter, AppleTalk ImageWriter, Personal LaserWriter SC, LQ AppleTalk ImageWriter) that drives a printer that is not connected to your Mac. System 7 installs the DAL extension, which helps your Mac's database share data with a mainframe, so it's not something your average home-office user needs. Similarly, if you are not connected to a network, you do not need the File Sharing extension, Network extension, File Sharing Monitor, or Sharing Setup control panel.

## Files Installed by Applications

Often directions for installing applications will instruct you to place files in the System Folder. Many come with installer programs that do the work for you, putting all kinds of interesting things into your System Folder. You probably won't be surprised to find out you don't necessarily need all of those files, either.

Typically, the files installed by applications are drivers, filters, and dictionaries. Chapter 7, "Applications: Their Needs and Requirements," has more details about what goes into (and what can come out of) the System Folder when you install applications.

## Overcoming System Folder Obstacles

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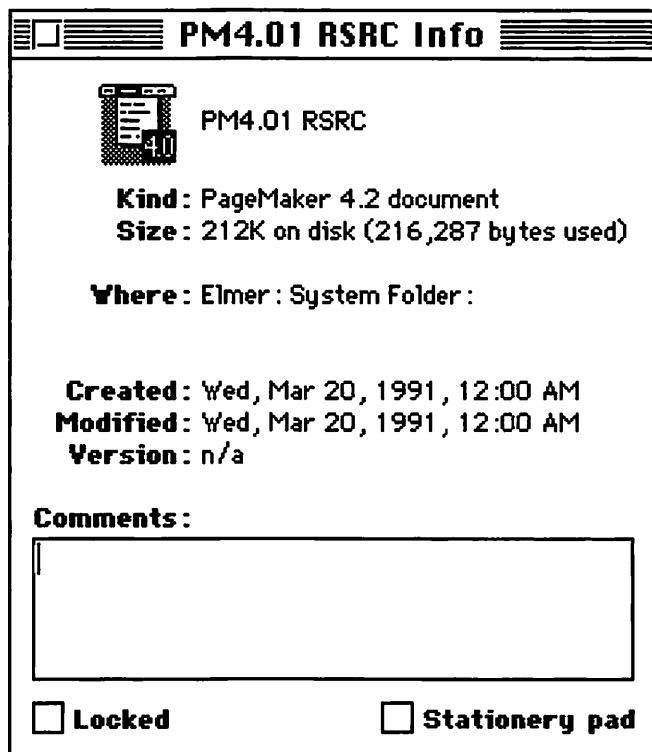
There are two things that make keeping the System Folder clean and organized a difficult prospect. First, the System Folder is home to the most mysterious, obscure, and technical

files you use. And second, most of the files have to stay loose within the System Folder, meaning that you can't organize them by putting them in folders within the System Folder.

## Identifying Files in the System Folder

The mysterious files are sometimes especially mysterious because of their peculiar names. Creepy-looking files with names like CasloFivForRom, LWNTX518.PDX, PM4 RSRC or PMF000 lurk about, and Get Info dialogs from the Finder window tell you nothing you don't already know (see Figure 6.1). Twelve different files are called LWNTsomething, and each of them is taking up 11K of disk space. What is all this junk? Table 6.3 shows a list of common file types found in the System Folder and describes what they are doing there.

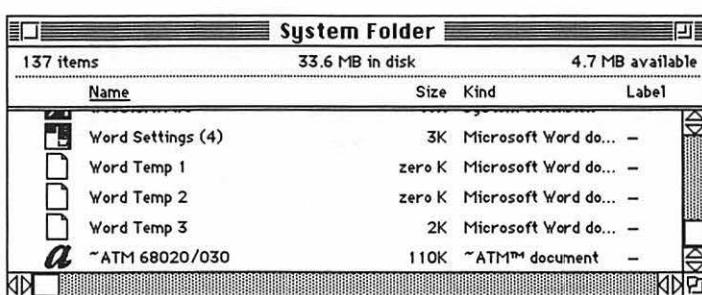
**Figure 6.1**  
The Get Info window does not identify this mysterious PageMaker file.



<b>Table 6.3</b> Common file types in the System Folder	
<b>Type</b>	Temp files
<b>Examples</b>	Word Temp 1 (or 2, or 3...or 23), PMF000, FileMaker temp
<b>Purpose</b>	These are usually created when a program crashes. They are the program's attempts to save its data.
<b>Notes</b>	If you have lost data in a crash, look for a <i>temp file</i> (the one with the largest number at the end, usually). Otherwise, periodically go through your System Folder and toss 'em. (Be sure their applications are not running.) They don't do you any good, and some programs (Word, for example) will search through every one before launching, thereby slowing your applica- tion's launch time significantly. Temp files are identified in the Finder window as documents of the application that created them, often with generic document icons (see Figure 6.2).

*Continued on page 139...*

**Figure 6.2**  
The Finder  
window shows  
that this temp  
file is a Word  
document.  
Note the  
generic  
document  
icon.



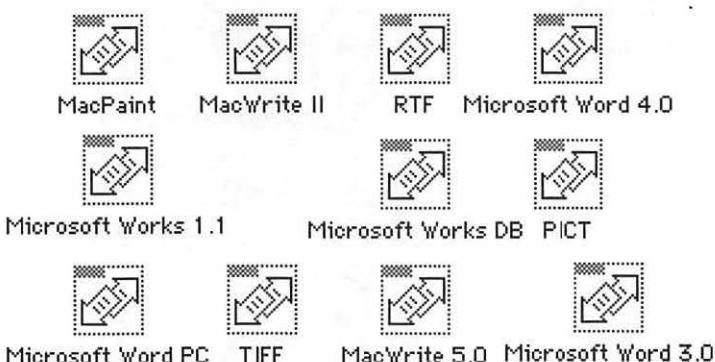
**Table 6.3**  
...Continued

<b>Type</b>	Drivers
<b>Examples</b>	LQ ImageWriter, LWNTX518.PPD, files that end in .apd, .ppd, or .pdx
<b>Purpose</b>	These files allow the Mac to work with attached peripheral devices, such as printers. Some come with the system, others are installed along with the software that comes with the peripheral device. They are identified in Finder windows as <i>Chooser documents</i> or just <i>documents</i> .
<b>Notes</b>	Get rid of the excess! Almost every System Folder I've ever seen has a driver or ten that it didn't need. Any printer driver named after a printer not attached to your Mac is a printer driver you don't need.
<b>Type</b>	Filters
<b>Examples</b>	RTF Import.flt, MacWrite II Import.flt, MacPaint, MS Word
	These can be particularly frustrating, since they are often named after the application whose files they filter. A file called MacPaint has some other application's icon (Figure 6.3). Huh? At least most applications put their filters inside a folder within the System Folder identifying the files as filters.

*Continued on page 140...*

**Figure 6.3**

These misleadingly named files are actually filters for MacWrite. They are in the Claris folder within the System Folder.



**Table 6.3**  
...Continued

Purpose	Applications use filters to read files from other programs.
Notes	<p>Look at the filters by application. Delete any filters for applications you don't have and/or won't need. For example, Word offers filters for many other word processors, several outliners, and a number of text formats. You'll want to keep some of the basic text formats (some of which have peculiar names like RTF and ASCII; when in doubt, don't throw it out), and any filters for applications with which you (or your coworkers) will be creating files. Throw away filters for applications you don't use. If you are reluctant to throw them away because you think you <i>might</i> need to read a file in that format someday, remember you can always reinstall the filter from your original disks.</p>

*Continued on page 141...*

**Table 6.3**  
...Continued

<b>Type</b>	Fonts
<b>Examples</b>	Couri, CasFivForRom, Helve, TimesBol, BitstCha...the list is endless.
<b>Purpose</b>	These are files (printer fonts) that are downloaded to your PostScript printer when you print.
<b>Notes</b>	You should recognize these unless someone else installed them on your system. You might have to work at these a bit, but you should be able to figure out which fonts they are. In any case, unless you never use the font, leave them be.
<b>Type</b>	Preferences (pref) files
<b>Examples</b>	DeltaGraph Preferences, Word Settings, PageMaker Defaults
<b>Purpose</b>	Applications use preferences files to remember how you prefer to work—for example, the default settings you prefer for a document's page setup, or where you want tool palettes displayed.
<b>Notes</b>	These may be loose within the System Folder or within a separate Preferences folder. A prefs file usually has the application's name in its name and is identified as a document of that application.
<b>Type</b>	Desk Accessory (DA) documents
<b>Examples</b>	Scrapbook
<b>Purpose</b>	Most DAs (under System 6) store their information in the System Folder.
<b>Notes</b>	With System 7, DAs become stand-alone applications and can be kept anywhere. But under System 6, they are installed in the System itself, and they keep their information in the System Folder. A desk accessory's document will be identified as a <i>System document</i> or as a generic <i>document</i> .

## Organizing the System Folder

A friend of mine recently got a brand new Mac with the system already installed on the hard drive. It was only a few days later when he called me in desperation—his Mac wouldn't boot at all. What could be wrong with a brand new Mac? Seeing that big mess in the System Folder, he had figured he'd keep things organized from the start. He created a whole bunch of folders inside his System Folder and organized all the files according to their type. Carefully, he put all the Startup documents in one folder, all the System documents in another, and all the Chooser documents in a third. One restart later, the Mac was unbootable. The moral of the story: Your System Folder is *supposed* to be messy. Unless an application's installation directions specifically direct you to do so, do not put files into any subfolders within the System Folder.

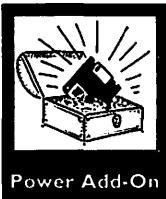
System 7 is much better about keeping itself neat. There are five subfolders inside System 7's System Folder that are *supposed* to be there: the Startup Items folder, the Apple Menu Items folder, the Control Panels folder, the Preferences folder, and the Extensions folder. The Extensions folder in particular helps keep things a bit neater, since it keeps all the peculiar INIT/extension files that enhance your operating system separate from the rest of the goods. Desk accessories can come out all together, and they can go wherever you keep applications or stay in the Apple Menu Items folder to work as they do under System 6.

You might see other folders within your System Folder. Applications from the same software developer can often share dictionaries, filters, and other files. A single folder within the System Folder can hold these shared files for all the applications. Aldus applications, for example, come with Installer applications that create an "Aldus" folder within the System Folder. This folder can be shared and accessed by Persuasion, PageMaker, Freehand, or other Aldus applications. If you have more than one application from the same company, leave the folder inside the System Folder. You could find, however, that there are extraneous files inside those subfolders. A good Installer will let you select what to install as you are installing.

(See Chapter 7 for more on installing applications and the contents of these folders.) If not, or if you have chosen to install everything, you might find that there are unnecessary filters, printer drivers, and so on within those folders as well. Determining which ones you really need may require a trip to the application's manual (gasp!). The cryptic names can be deceiving. Check the manuals to find out what exactly each program needs in order to run the way you want it to on your hardware configuration.

If an application's support files can be kept in the folder with the application, leave them there, unless they can be shared by other applications. In general, if a file can function outside of the System Folder, it should.

If you have added fonts and DAs to your Mac, you know what a mess they can make. Utilities such as Suitcase II and Master Juggler can help. These utilities allow you to put your font suitcases and desk accessories wherever you want them (that is outside of the System Folder and System) and open and close them as they are needed. This keeps your System trim and has the added advantage of speeding up some operations, since the System doesn't have to wait for all those fonts and DAs to load.



Power Add-On

## Installing or Reinstalling a System

When you install a new version of the system, always use the Installer program that comes on the disks. There is more to installing a system than just dragging the System and Finder files to the disk. Whether you are reinstalling the same version or upgrading to a newer one, the Installer will keep the changes that you have made to your system, such as the desk accessories or fonts that you have installed.

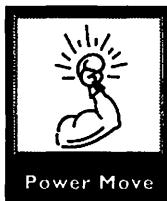
The Installer also has the ability to recognize what system you are working on and the system's particular requirements. For example, if you are installing the system onto a Mac Classic, the Installer gives you the option not to install the Color control panel, since it recognizes that your Mac will not need it. Similarly, the Installer will ask which hardware you are using and install the correct ROM patches for your Mac.

Always restart your Mac from the Installer disk to install a new system. The Mac cannot reinstall a system over a system that is running. When reinstalling the system to fix a bug or problem, restart from a bootable floppy disk (Disk Tools in System 7), *throw away* your old System and Finder files, and rename the System Folder something like "Old System." The Installer does not overwrite all the existing system software, so just reinstalling without first deleting the System and Finder files and deactivating the System Folder will not always eliminate the problem.

Before installing a new version of the system software, be sure to back up your hard disk completely. At the very least, back up your old System Folder. If anything doesn't work properly with the update, you can restore your System Folder from the back-up.

## Avoid Multiple Systems

Never have more than one System per disk. Otherwise, you will confuse the heck out of your Mac and invite crashes and other erratic behavior. Extra System Folders tend to sneak onto a hard drive when new applications are installed. This is especially true with older software; more recent releases do not include System Folders on the disks.



It is *possible* to have more than one System Folder per disk if you use a utility like System Picker. If, for example, you want to have a choice of System 6 or System 7 on the same disk, you can use System Picker to choose which will be the **blessed folder** (the folder used at startup). The Mac will ignore the other System Folder at startup.

## What Not to Put in the System Folder

Do not put anything into the System Folder that does not enhance the system or isn't required by an application. I'm willing to bet that there is something in your System Folder that does not belong there.

The most commonly misplaced items are applications. Applications do not belong in the System Folder. Utilities in particular seem to end up there. But even if a utility application is intended to modify or work with the system in some way, as long as it's a stand-alone application, it does not go into the System Folder. Anything that does not *have* to be in the System Folder should *not* be in the System Folder.

## Questions and Answers

**Q:** What goes into the System Folder when the System is first installed?

**A:** System files, drivers, control panels, and extensions. See Tables 6.1 and 6.2 for a complete listing.

**Q:** Do I need all those files?

**A:** Not necessarily. Networking software is necessary only for those on a network, and you need drivers only for those printers attached to your Mac.

**Q:** What else is in the System Folder?

**A:** Temp files, drivers, filters, fonts, preferences files, and desk accessory documents.

**Q:** Can I make my System Folder more organized?

**A:** Do not organize the files into subfolders within the System Folder. You can, however, move some files to other locations or remove them altogether.

**Q:** What is the best way to install a new version of the system?

**A:** Use the Installer program that comes on the system disks and follow directions carefully. Back up your old System Folder first. If you are replacing a damaged system, boot from a floppy and delete the old System and Finder files before running the Installer program.

**Q:** Can I have more than one System Folder on my hard drive?

**A:** Only if you have a utility such as System Picker. Otherwise, be sure you have only one System file and one System Folder on your drive.

**Q:** What should not go into the System Folder?

**A:** Anything that can go somewhere else and still function. Do not put applications or utility software into the System Folder.

## **CHAPTER 7 ◇ INSTALLING AND ORGANIZING APPLICATIONS**

Installing applications correctly and keeping them in the appropriate locations on your drive can save you disk space and keep your programs working properly. Topics covered in this chapter include:

- How to install applications ◇
- What to consider before installing ◇
- Where to keep applications ◇
- How installer programs work ◇
- Installing applications without an Installer program ◇



## A

ny new application comes with installation guidelines. If you read no other part of the manual, read the installation instructions. A number of factors can impact on the installation process. A few things to consider:

- Does an application have auxiliary support files (like Help files, dictionaries, and so forth)?
- Do the auxiliary files have to be in a specific location (in the folder with the application, in the System Folder)?
- Is the application a control panel, Desk Accessory, or INIT/extension?
- Are you using System 6 or System 7?
- What kind of Mac are you using?

While the installation directions in the manual can help with these questions, you can use a few basic guidelines to help.

- Keep each application and all its supplemental files in a folder, unless installation requires that a supplemental file go in a different location. Sometimes applications from the same software company can share dictionaries or other types of files if they are located in the System Folder.
- **Do not keep applications in the System Folder.** The System Folder is wacky enough without having applications in it. Unless installation directions specifically tell you to put a file in the System Folder, don't.
- You can try dragging the application out of its folder onto the desktop for easy access. The application might run but behave strangely. Many applications need to be in the same folder as their associated files.

## Using Installer Programs

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Whenever possible, use the installer that came with the application. Most large applications come with installer programs. The files are compressed and/or divided across several disks. The installer program takes a lot of the work out of installing. It will not only decompress the files, but also put them into the appropriate folders on your Mac.

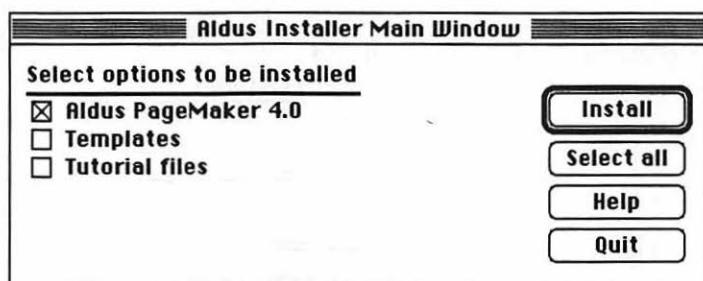
There are two problems, however, with installation programs. First, they will often install files you don't need, particularly if you choose the "easy install" option. Great numbers of filters, drivers, templates, and tutorials will be installed on your drive, and you might not even be aware that they are there. The second problem with an installer application is that it will sometimes put things inside your System Folder that don't have to be there.

When you use an installer program, always choose to customize the installation. As you go through the installation, you will see a scrolling list or a series of screens asking you to choose options for installation. Make sure you know what you are and are not installing as you go through the installation.

Figures 7.1–7.5 demonstrate the installation process for PageMaker. With all its applications (including Freehand and Persuasion) Aldus includes the Aldus Installer/Utility. It is typical of the installer programs that come with larger applications.

Figure 7.1 shows the first screen that comes up in the Aldus Installer/Utility. You can choose to install the program, the templates, the tutorial files, or any combination of the three. If you choose to install just the program, you can later run the Installer again and install the templates or tutorials. Templates and tutorials can take up a tremendous amount of disk space. Of course, if it is a new program, you will want the tutorial files. Just be aware that you do not have to install these files.

**Figure 7.1**  
The first  
screen of the  
Aldus  
Installer/  
Utility



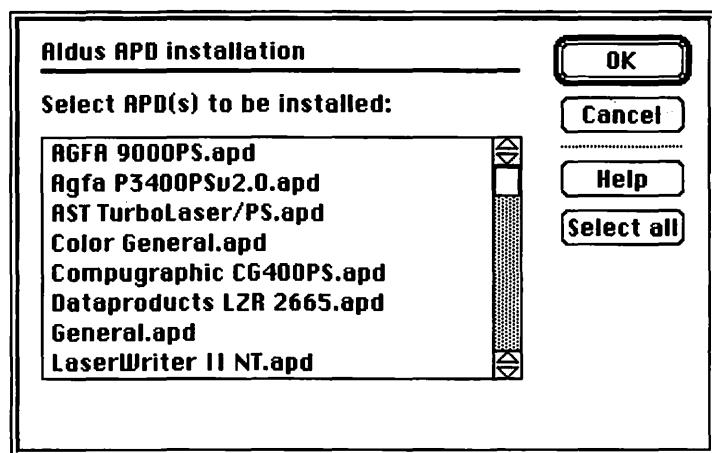
For this example, I have chosen to install only the PageMaker application. Figure 7.2 shows the second installation screen. The window asks you to choose which APDs — Aldus Printer Drivers—to install. This is where reading the manual comes in. If you choose **Select All**, you will end up with a lot of excess files on your drive cluttering up your System Folder. Aldus uses specific driver files with its applications. You should check to find out which drivers you will need and install only those.

The next screen in the installation process is the Filter window (Figure 7.3). Again, check the manual to determine which filters you need. Each filter makes PageMaker work with another application; if you don't have Acta and no one

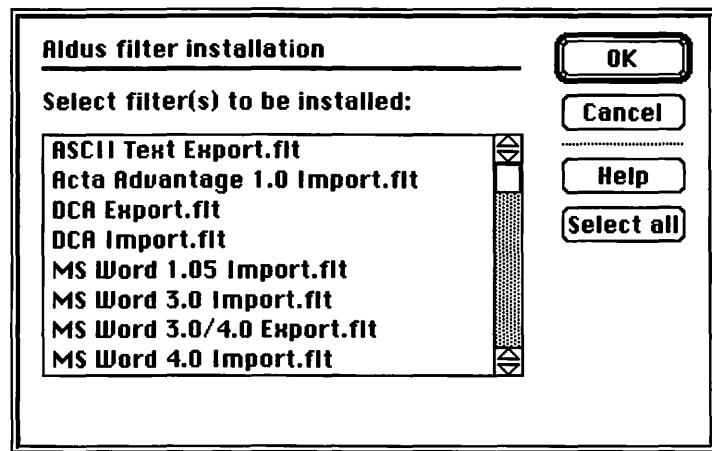
you work with has Acta, you don't need the Acta filter. Remember, you can always run the Installer again later and install any filters you need, so you can be conservative now. There is no need to install something just because you might need it someday.

**Figure 7.2**

The second screen of the Aldus Installer/Utility displays printer drivers available for installation.

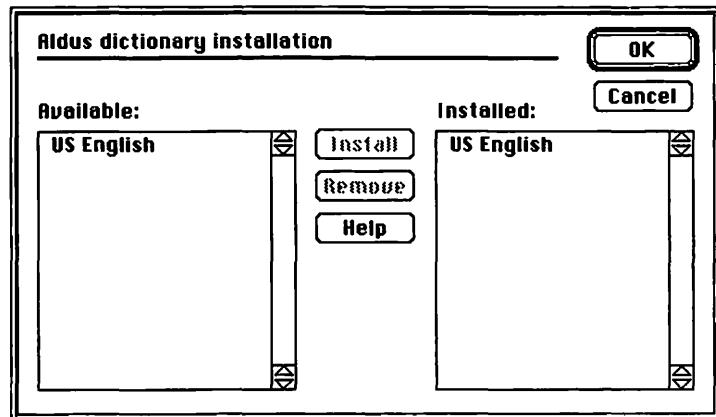
**Figure 7.3**

The Installer's third screen displays a choice of filters to be installed.



Next in the installation comes the Dictionary Installation window (Figure 7.4). If you have purchased extra dictionaries

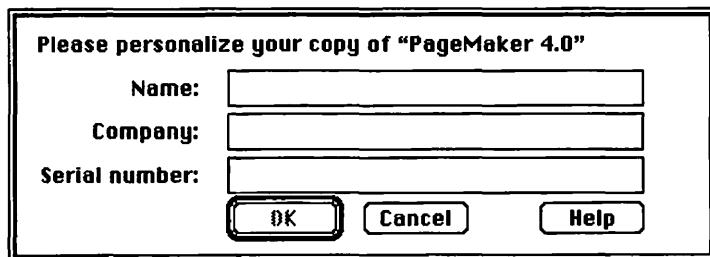
**Figure 7.4**  
The Installer's fourth screen displays dictionary options.



to go with the program, such as a medical or foreign language dictionary, they will be displayed in this window and you will have the option to install them.

Finally, you will be asked to personalize your copy of the software (Figure 7.5). The name and company you type in will be displayed whenever you launch the application, so don't make typos! The serial number—not required by all installers—comes from the disks or the manual. This protects the manufacturer against the spread of illegal copies of the software.

**Figure 7.5**  
After installation, you must personalize your software.



One more click and the installation begins. The program will prompt you (if necessary) to insert other disks as it decompresses files and puts them on your drive.

## Installing Simple Applications

---

Many simpler applications do not require an Installer; they come simply as files on a disk. If a program comes on a single disk with no compressed files, there is a very easy way to install it. Just drag the icon of the floppy to your hard disk. The Finder will create a new folder with the same name as the floppy disk and copy the contents of the disk to the folder. Beware of one problem with this method: If the floppy has a System Folder on it, the System Folder will be copied to your hard disk along with the application, creating the dreaded multiple System Folders! I haven't seen System Folders included with software for some time, but older software is likely to have System Folders lurking around on the disk somewhere.

## Questions and Answers

---

**Q:** What is the first step in the proper installation of applications?

**A:** Read the installation instructions in the manual.

**Q:** What else should be considered?

**A:** Are there support files? Does the application or its files have to be in a specific folder? Is the application a control panel or a INIT/extension? What type of Mac are you using?

**Q:** Where should the application be kept?

**A:** Keep the application and all its supplemental files together in one folder. If auxiliary files are to be shared with other applications, they should be in the System Folder. Do not keep applications in the System Folder. Applications may be kept on the desktop if they do not need to be in the same folder as the shared files.

**Q:** How do installer programs work?

**A:** Read directions carefully to identify the files that you will need to install and which are unnecessary. Install only the dictionaries, filters, drivers, and so forth, that your system requires.

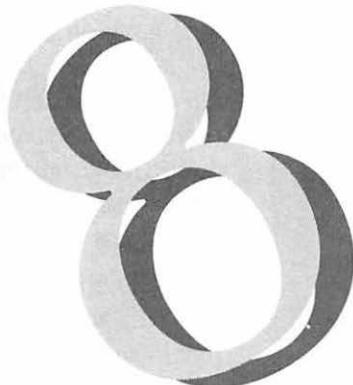
**Q:** What about applications that don't have Installers?

**A:** If an application comes on a single disk with no System Folder on it, you can drag the icon of the floppy to the hard disk to create a folder with the same name as the disk and copy all the files on the floppy to the folder.

## CHAPTER 8 ♦ SYSTEM SOFTWARE ENHANCEMENTS

What's INIT for me? You've heard the term, now learn what INITs are, what they do, and what other system software enhancements are available. Topics covered in this chapter include:

- INITs and what they can do ◊
- The application heap ◊
- The system heap ◊
- The Memory Manager ◊
- System heap growth ◊
- Resolving INIT conflicts ◊
- Control panels ◊
- Extensions ◊
- Desk accessories ◊



**I**t is a known law of the universe that the best things in life are the worst for you (think of Häagen-Dazs). Generalize that law to the world of your Mac, and you have INITs. They can be tremendous enhancers to your system, but they can also cause hair-raising problems. But if you know what INITs do and how they work, you can enjoy the benefits of them with little or no negative consequences.

## What's an INIT?

Basically, an INIT is a small program that loads at startup and (usually) performs a global function, regardless of what application you are using. When they load, they share memory with the system; they don't take a separate share of their own. A **control panel device**, or **cdev**, is an INIT that lets you customize it in some way through the Control Panel (System 6) or

a control panel window (System 7). The term **startup item** is sometimes used to distinguish INITs that load and perform their function all at once from those that load and then wait around for you to use them. However, with System 6 at least, you will generally hear the terms INIT and startup item used interchangeably. With System 7, INITs were renamed **extensions** (more on them later). From here on in, the term INIT will be used to refer to INITs, cdevs, startup items, or extensions unless specifically stated otherwise.

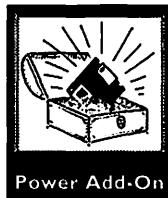
INITs are frequently blamed as the root of all system evil, and with some justification. They are possibly the most frequent cause of system crashes when inauspiciously combined, poorly programmed, or misused. However, they are a necessary—and even desirable—evil.

What's so great about INITs? They give you tremendous power over your Mac. The most powerful tools you can have as a user are the global, system-level INITs. And they are the key to personalizing your Mac, both functionally and playfully. **Universal macros**, for example, let you use the same keyboard commands to perform a function in any application. Many INITs are written to modify the Finder and system directly, both to increase productivity and to personalize the interface. Some are practical, increasing speed, ease of use, and/or performance. Others are playful, letting you make your Mac personal and totally unique by modifying windows, sounds, keyboard commands, or the desktop.

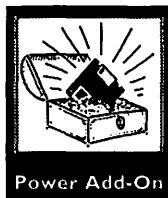
Many of the best INITs are **shareware** or **freeware**. Shareware is "try before you buy" software. The programmers of shareware distribute their software directly to the consumer through user groups, bulletin boards, and the like. You have the opportunity to examine the software. If you like it, you send a check directly to the person who wrote the software. Freeware is, well, free. (For more about shareware and freeware, see Appendix C, *Product Information*.) The authors of shareware and freeware are people who wanted more control over their computers, or capabilities not written into Apple's software, or a cheaper version of commercially available software. Some just wanted to be funny.

Table 8.1 lists some INITs that can significantly change your whole working environment. The list is by no means conclusive; it is merely a tiny sampling of the vast numbers and types of INITs available. Product information for these INITs can be found in Appendix C, *Product Information*.

**Table 8.1**  
Sample  
INITs



Power Add-On



Power Add-On

INIT/Control Panel	FUNCTION
After Dark	The best and most versatile screen-saver. Comes with twenty interchangeable, customizable modules that protect your inactive screen with various animations. More modules are available separately.
AltCDEF	Adds double arrows (both directions) to scroll bars in all windows and gives more control over scrolling functions
BeHierarchic or MenuChoice	Makes Apple menu hierarchical to allow fast and easy navigation through multiple levels of folders. See Chapter 10, <i>Hard Disk Management</i> , for more about how BeHierarchic, MenuChoice, and similar software can make you more organized and productive.
Bob	A mean one—if Bob is dropped into someone's system folder, on restart all text (filenames, menus, etc.) will disappear (only icons will be visible).
BroadCast	Sends simple messages instantaneously across an AppleTalk network.

*Continued on page 162...*

**Table 8.1**  
...Continued



CommentKeeper	Saves comments in Get Info boxes when rebuilding the desktop. This is especially useful in System 7 (which should have had this capability written into it) since comments can be seen and used in the Finder window. See Chapter 10, <i>Hard Disk Management</i> , for more on making the most of the Comments window.
Cursor Animator	Replaces standard pointer, I-beam, and watch cursors with animated cursors of your choice (e.g.; spinning globe, Moof the dog-cow, or "peek-a-boo").
DepthGauge	Controls depth of color (1-, 2-, 4-, 8-, 16-, or 32-bit) with a mouse-key combination.
DFaultD	Assigns a default folder for applications to save files to.
DOS Mounter	Mounts and reads DOS-formatted disks.
Escapade	Allows you to use the keyboard to select Cancel or other options in dialog boxes.
Finder Commands	Adds keyboard commands to all finder menu choices (including Restart, Shut Down, Empty Trash, and Make Alias in System 7).
Greg's Buttons	Makes buttons and dialog boxes colorful and three-dimensional.
Lip Service	"Speaks" a message of your choice at startup.
MacEnvY	Get comprehensive information about software and hardware configurations in a control panel.

**Talking Moose**

Puts an animated moose in your Mac. The Moose will pop up on your screen and speak witty or profound sayings at random intervals, and/or read menus, dialog boxes, and alerts. The Moose is generally regarded as a classic. It was one of the first widely distributed shareware programs written solely as goofy entertainment, with no claims to higher aspirations. Many people have become inordinately attached to the Moose, who is now available commercially (read, "for more bucks") from Baseline Publishing. Going commercial has not meant selling out for the Moose, who is still his humble, peculiar self.

**SCSIProbe**

Seeks out and mounts all available SCSI devices.

**sdrawkcaB**

A practical joker—drop this into someone's system folder and on restart they will find that all text onscreen (filenames, menus, etc.) is now backwards.

**sniff**

Gives your Mac the sniffles (at random intervals your Mac will sniff, sneeze, or clear its throat). Sniff is currently my favorite INIT. I suffer terribly from allergies and since misery loves company, it makes me feel closer to my Mac to feel like it suffers, too.

*Continued on page 164...*

**Table 8.1**  
...Continued



SoundMaster	Adds digitized sounds to system functions such as emptying trash, opening and closing windows, startup, shutdown, copying, and the system clock. The library of available sounds is nearly unlimited. Digitized from movies, television, or recordings, there are "clips" from sources both classic and obscure. Some examples: For a startup sound, Clint Eastwood saying, "Go ahead, make my day," or Hal from <i>2001</i> saying, "I'm completely operational, and all my circuits are functioning perfectly." For a shutdown sound, there's a rousing round of applause, or Bryant Gumbel saying, "It's been a good day here, we hope you've enjoyed it. Have a nice night." For a system beep, there's a man's voice saying "beep" or any number of boings and bonks lifted from cartoons. And when a disk is inserted, you hear a sound clip from the most famous scene in <i>When Harry Met Sally</i> . You get the picture.
Subliminal	Pops "subliminal" messages up on your screen at random intervals (or on your boss's screen: "Give [your name here] a big raise!")
Suitcase II	Opens and closes fonts, F-Keys, and Desk Accessories as needed without installing them into your system.
SuperClock!	Adds a customizable digital clock to your menu bar. For PowerBook users, it also displays a battery charge gauge.

VoiceBox	Speaks dialog boxes and/or alerts in the Mac's digitized "voice."
Wallpaper	Lets you put "wallpaper" on your desktop; colorful (well, if you have color), amusing patterns or pictures in the background.
Windows	Adds a Windows menu to the menu bar in all applications.
ZMakeAlias	Put a "Make Alias" button into the standard Save dialog box.
ZoomBar or WindowShade	Reduces open windows to just their title bars with a click, singly or one at a time. Lets you have many windows open at once without desktop clutter.

The Mac has a fixed amount of memory determined by how much RAM you have installed. This memory is split into various parts, each with its own function. Really juicy technical stuff like jump tables and system global variables and "exception vectors" use part of the memory. Another piece of memory is used by the stack, which is where lots more high-level stuff hangs out. The parts of the memory you need to be concerned with are the Application Heap and the System Heap.

## Application Heap

The **application heap** is memory available for allocation to applications as they need it. When you launch a program or open a file from where it is stored on your hard disk, the necessary information is read from the disk and placed into the computer's memory. Each program requires a chunk of mem-

ory to run. As each program is launched, memory is rationed out to it. When you quit a program, it releases the piece of memory it was using, and that memory becomes available to another program. The chunk of memory a program requires is called its partition. (This assumes you are working under Multifinder—with System 6—or with System 7. Under the plain Finder (a.k.a. Unifinder), each time you launch an application it takes up all the available memory until you quit. Unless you simply haven't enough memory, though, you should be working in multifinder or System 7 if you want to Maximize your Mac.)

## System Heap

The **system heap** is a chunk of memory reserved for the operating system. The system is pretty generous, though, and will share its heap with INITs.

INITs use part of the system heap so they can perform system-level or global functions. At startup, they take a part of memory and hold onto it (unlike applications, which let go of their share of memory when they quit). When INITs add themselves on, they add a bit to the system heap, so the heap grows.

## Memory Manager

A well-written INIT should know how much memory it needs and take it, but many many INITs are not well-written. Some don't check to see whether there is enough memory before they try to run.

To keep track of all the things that use the memory, the Mac has the (logically named) **Memory Manager**. Memory Manager will even reorganize the memory (after all, isn't reorganization what managers do?). To understand what the Memory Manager does, think of an office manager. The office manager doles out office supplies and schedules conference

rooms. If, for example, you need to use the conference room for a meeting, you just let the office manager know. Most of the time, everyone who needs to use the conference room can—there is plenty of time in the day. If there is a problem, sometimes the office manager has to juggle the schedule a bit. But if you just walk into the conference room without checking first with the office manager, you could walk right into a meeting in progress. And if you interrupt the wrong person, you could be in *big* trouble.

Unfortunately, this is exactly what many INITs do. They do not check first with the Memory Manager to see first whether memory is available or where to find it. They just help themselves to a chunk of memory, and end up crashing into another program.

## System Heap Growth

Some INITs only use a little memory at startup, and then need more when they actually run. (Sniff, for example, uses only a few kilobytes at startup, somewhat more for a sniff, and a lot more for the full sniff-snort-cough.)

Under Multifinder, the system heap can increase itself after startup if an INIT asks for more memory than is available, but it can never shrink again. This means your system heap can grow and grow like a mold until it takes over the whole system pie. Pretty soon, you'll try to run an application, and it will crash because it won't find enough memory.

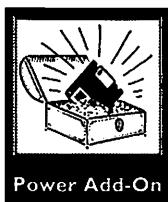
System 7 improves that little problem by making the system heap shrink, too. Of course, System 7 also changed many other technical aspects of the operating system, which means that all your old System 6 INITs could be incompatible in other ways.

## INIT Conflicts

And finally, the phrase you've heard before. INIT conflicts! INITs often conflict with other INITs. Worse, they conflict in

strange combinations. (A works with B as long as C is on, but if you turn C off, B crashes, but only if you are working in 8-bit color; but if you load B before A, A crashes when you run your spell-checker. Except on alternate Tuesdays or when the moon is full.)

It is possible to combat all this trouble. If you suspect you have INIT-induced system crashes, the first thing to try is increasing the system heap. This sometimes works. A little. (Under System 7, this adjustment of your system heap should be taking place automatically, so there's no point in adjusting it manually.) Under Multifinder, increasing the system heap (with one of the utilities written for that very purpose, such as HeapFixer, BootMan, or HeapTool) can help with the memory allocation problems. It will give the heap more room to add on INITs in the first place, and more room to give the INITs memory when they ask for it later. Or, in the case of the INITs that never check for available memory, it increases the odds that memory will be available when it is needed (it's like making the conference room available more hours of the day). This is always a good first measure to try, especially if you can see you are low on memory. Check under the Apple menu's About the Finder to see if you are low—there should be some white space at the end of the System Memory bar (experts disagree on how much, but experience tells me you can get away with as little as 5 percent, but you'd rather have 20 percent).



Power Add-On

You may notice that you have conflicts as soon as you load a new INIT. Try removing the last INIT you loaded and restarting. If that works, you know which INIT is causing the problem. But, of course, now you can't use your new INIT, which you had to have because it would make your Mac flash multicolored hearts and automatically write love poetry every time your secret crush walked by. So, you have to figure out which INIT that INIT was conflicting with, which means—you guessed it—removing them all, and putting them back in, one at a time.

Another way to resolve conflicts is to change loading order. Some INITs are very persnickety about going to the head of the line when memory is being handed out. Others like to get the last piece. If possible, watch the parade of icons

as you start up to pinpoint which is the culprit. Then try loading that one first or last. The easiest way to accomplish this is by renaming the INIT. Try adding spaces at the beginning of an INIT's name to make it load first. A "z" or punctuation character instead will make the INIT load last.

If you find after adjusting your memory (or under System 7) that you are still having problems, it's time to get an INIT manager. System 7 has Extensions Manager (from Apple), which is a basic tool that will let you turn extensions on and off selectively; it's free. Other commercial and shareware software will let you do more. Microseeds' INITPicker, for example, lets you create sets of INITs for various purposes and customize loading order without renaming. You can even call up INITPicker as you start up to change configurations on the fly.



Power Add-On

If you use many INITs and have frequent crashes, you really should be using a manager. Your alternative is to drag all INITs out of your System Folder and put them back in one at a time, restarting after each. Or, change their loading order. As you can see, this can get overwhelming. Try a quick mathematic permutation: Fifteen INITs, in all their possible combinations from one to all fifteen, in all possible loading orders, equals one jillion restarts.

INITs are the Lays' Potato Chips of the Mac world: You can't have just one. They are addictive. Entire online groups are devoted to them. Once you have tasted the power and pleasure of true customization, you will not want to give it up.

My name is Amy L., and I am an INITaholic. I run my primary Mac with about thirty INITs at once and try two or three new ones every week. And yes, my Mac crashes sometimes. It's worth it. After all, as long as I have a recent backup and some good recovery software, I really have very little to fear. I could quit any time. Really I could.

## Control Panel Devices

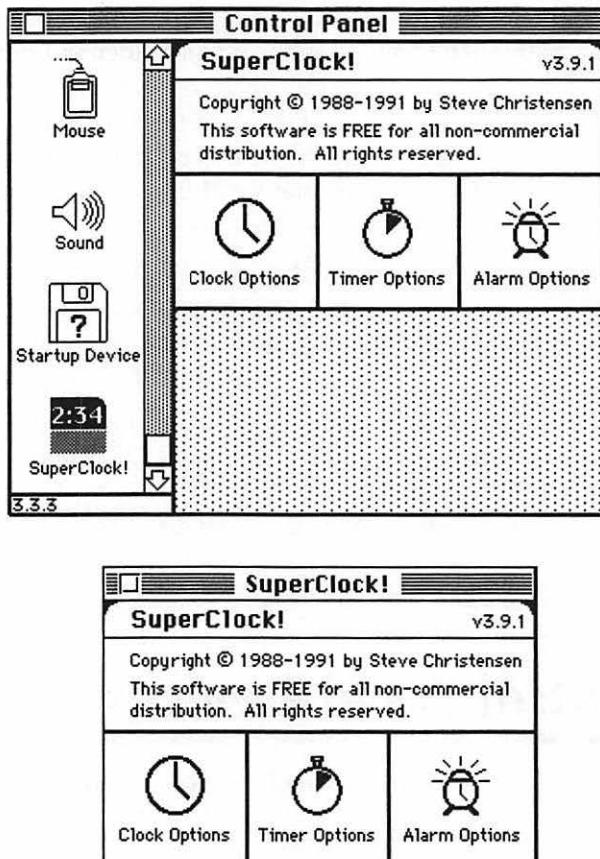
A **Control Panel Device** (or **cdev**) is a utility similar to an INIT that is configurable or customizable (though not all con-

trol panels need to be loaded at startup). Under System 6, all control panel devices appear in one scrolling window called the **Control Panel**. System 7 has given each control panel module its own window. With either system, control panels are available under the Apple menu. A control panel, unlike an INIT, lets you set preferences or parameters. For example, SuperClock! (see Figure 8.1) has three configuration options available: Clock Options, Timer Options, and Alarm Options. Clicking on one brings up a window with more information to allow you to further customize SuperClock (see Figure 8.2).

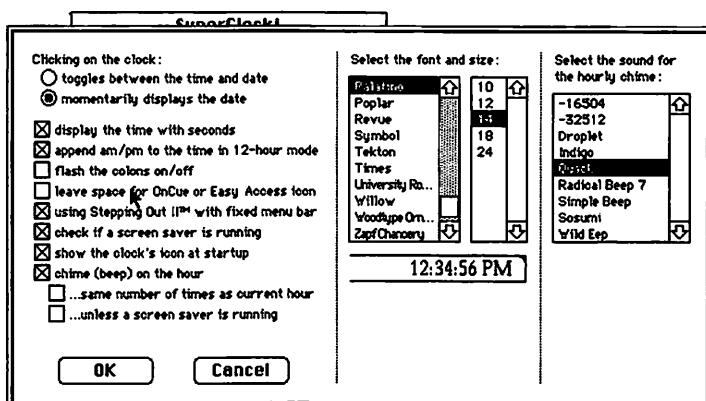
Control panels use memory in the same way INITs do. The only difference between cdevs and INITs is that cdevs are customizable. The concept is the same: small programs that share the system's memory in order to perform global functions.

**Figure 8.1**

The control panel device SuperClock! (as it appears under System 6, top, and System 7, bottom) has three configuration options available: Clock Options, Timer Options, and Alarm Options.



**Figure 8.2**  
 Clicking on the “Clock Options” button in the cdev SuperClock! brings up this window, which provides a variety of customization options for the clock.



## Extensions

With the release of System 7, Apple renamed INITs **extensions**. INITs are, after all, extensions to the abilities of the system software. Under System 7, extensions have their own folder within the System Folder, the **Extensions Folder**. Any extension dragged over the System Folder will be recognized and placed in the Extensions folder.

“INIT” and “extension” are basically synonymous. Apple uses only the term extension for its own releases. Anything written specifically for System 7 or to be compatible with System 7 will generally be called an extension. But many INITs written before the release of System 7 will be compatible with the system software. Commercial software publishers tend to use the more gracious “extension,” while hackers and shareware programmers still hang on to INIT. For the next year or two, while programmers and users get used to the new terminology, you will hear the two terms used interchangeably.

## Startup Items

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The term **Startup Items** was, until the advent of System 7, a synonym for INITs. With System 7, however, it is possible to make any application or file a startup item. By dragging an item (or an alias of it) into the Startup Items Folder (within the System Folder), you can make it launch at startup. You can simply open an application, or drop in a specific file you are working on. Upon restart, the corresponding program will launch and the file will open. You may have as many startup items as memory will allow.

Remember, though, that if you are working under System 6, software described as a Startup Item is probably an INIT. The name Startup Item is sometimes used because an INIT is a program that is launched at startup.

## Desk Accessories

---

**Desk Accessories** are small programs that are available to you at any time from under your Apple menu, no matter what else is running. Though most useful under the Finder, they have their place with Multifinder as well.

Most Desk Accessories, or **DAs**, are miniprograms that have no full-sized equivalent. The Calculator DA, for example, that comes with your system software, lets you have a simple desk calculator on hand at all times. Many DAs are games or silly entertainment, but many perform valuable functions as well.

Sometimes, DAs perform the function of larger programs without using as much memory or disk space. While they don't have the same capabilities as a larger program, they have the advantage of using far less memory—and, under the Finder, they can be run simultaneously with another program. Multifinder, of course, allows you to run more than one pro-

gram at once, but DAs launch faster and use less memory than their full-sized counterparts. In addition, they are easily accessible because they are always available from the Apple menu. Having a miniature word processor or drawing program can be very handy for quick solutions. If all you need is a graphic of a circle, it is much easier to call up a quick drawing DA, draw it, and copy it right into your open application, than to go back to the Finder, find your drawing program, wait while it launches, and so forth.

## **Questions and Answers**

---

**Q:** What is an INIT?

**A:** An INIT is a small program that loads at startup and performs a global function. It shares memory with the operating system.

**Q:** What do INITs do?

**A:** INITs give you the power to customize your Mac's interface and performance.

**Q:** What is the application heap?

**A:** Memory available for applications as they require it.

**Q:** What is the system heap?

**A:** A chunk of memory reserved for the operating system.

**Q:** What does the Memory Manager do?

**A:** It keeps track of all the applications and operating system software that use memory, dispensing chunks of memory as they are requested.

**Q:** What is system heap growth?

**A:** As each INIT and the operating system access system heap memory, the chunk of memory set aside for the system grows and grows.

**Q:** What are INIT conflicts?

**A:** When one or more INITs interfere with the operations and use of memory of other INITs.

- Q:** What can be done to resolve INIT conflicts?
- A:** Try increasing the system heap, removing the last INIT installed, and/or changing loading order. Then get an INIT manager.
- Q:** Is there a twelve-step program for INITaholics?
- A:** No, but there should be.
- Q:** What is a control panel?
- A:** A control panel, or cdev, is an INIT that is configurable or customizable.
- Q:** What is an extension?
- A:** An extension is an INIT under System 7.
- Q:** What is a desk accessory?
- A:** A miniature program that is accessible at all times in the Apple menu. With System 7, desk accessories (DAs) can be used like any other application.

## CHAPTER 9 ✦ KEYBOARD SHORTCUTS AND MACROS

Keyboard shortcuts and macros are critical tools to aid your quest to master your Mac. Learn about these features in this chapter:

- Keyboard commands and shortcuts ✦
- Floppy disk tricks ✦
- Finder shortcuts and tricks ✦
- Macros and their uses ✦

# 9

**E**very application has its own shortcuts and tricks. If you use an application with any frequency, you should take the time to find out what they are. There are so many popular applications out there that I can't begin to address all of them. I'm going to limit my discussion to the operating system and global functions. Whole books have been written on "tips and tricks." What follows is a compendium of my own favorites.

## **Tricks and Shortcuts**

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There is a certain irony in learning keyboard shortcuts on the Mac. The whole point of the Mac was supposed to be the intuitive interface, right? Ease of use? Point and click? Yes. And that is *still* the essence of the Mac. But once you have mas-

tered the operation of your Mac and its software, you can take on the challenge of learning keyboard shortcuts. I think of when I first learned to drive. I learned to drive on a big American car with an automatic transmission. It wasn't until driving felt natural to me that I tried to learn how to drive a stick-shift sports car. It's more difficult, and there's more to remember, but once I got it down, I was tooling around in a hot little two-seater like a pro. Hmm, increased speed, power, ease of use...is the analogy working for you? This is the power of the keyboard shortcut. Yes, you do have to remember key combinations—and yes, sometimes they are *not* intuitive (my personal favorite in commercial software is the obvious Command-Shift-m to Select All in Microsoft Word 4.0). But if you master them a few at a time, they'll become second nature. (When was the last time you thought about doing a Command-s?)

## Floppy Disks

Using floppy disks is something of a necessary evil. Here are a few tips to streamlining the process.

### Ejecting Floppies

If the Finder is asking for a disk that has been ejected, hit Command-period a few times and the dialog should go away. If you lock your floppies before you insert them, the Finder won't bug you so much. Even better, eject your disk without leaving behind the "ghost" icon, by pressing Command-Option-e (System 6) or Command-y (System 7). Under System 7 you can also select the disk's icon and choose Put Away from the file menu. These shortcuts accomplish the same thing as dragging the icon of the floppy to the Trash.

### Formatting and Copying Floppies

When a high-density disk is formatted as low-density (either in a regular 800K drive or in a DOS drive), the Superdrive will not

recognize it. It sees the second notch in the disk case and assumes it is high-density. You can fool the drive by putting a piece of cellophane tape over the second notch. Then copy the data to another disk—you don't want to keep using the disk with the tape, since the tape could peel up and damage your floppy drive.



Power Move

If you have two disk drives, you can do a quick format of a floppy by inserting a blank formatted disk into the second drive and dragging it over the first icon (thereby copying the blank disk to the other disk). This will save a minute or so over the regular disk-formatting command.

While we're on the subject of copying disks, did you know that you can change the default position of the Copy dialog box? Just grab the title bar and drag the box to your preferred location. When you click on the title bar and hold down the mouse button, there might be a delay before the cursor changes to an arrow. Wait for the arrow cursor before you try to drag the Copy window. This works for the Empty Trash and Find dialog boxes as well.



Power Move

It is always a good practice to make duplicates of original disks and do all your work—including installation—off of copies. (You *always* back up your original disks, don't you?) Sometimes, to run properly, a program or installer will require that the floppy disk on which it's located have a specific name. Often, however, the name the original disk came with has one of those tricky ™ characters. To be sure that your disks have *exactly* the right name, just copy the name of the first disk (Command-C), select the duplicate, and paste (Command-V). The name will be duplicated exactly. This trick works when copying any item in the Finder, actually—disk to folder, file to file, and so forth. The only time you can't do it, of course, is within a single window, because that would give you two items with the same name.



Power Move

If you are inserting an old disk that you are planning to erase, hold down Option-Command-Tab as you insert it. This combination will bring up the disk-formatting dialog faster than choosing Erase Disk from the Special menu. Just be sure that the disk you are inserting is one you really want to erase, since you don't get to preview the contents before you format it.

Another function you can perform while inserting a disk is rebuilding the Desktop on a floppy. Hold down the Command and Option keys as you insert the disk to display a dialog that will ask whether you want to rebuild the Desktop on the floppy disk.

To put a file larger than 800K (if you use double-density disks) or 1440K (if you use high-density disks) on a floppy, use a back-up program to split it across multiple disks. Alternatively, you can use a compression program to make it smaller and/or split it. When you need to use the file again, just restore it using the same back-up or compression program.

## The Finder

There are many ways to streamline the use of the Finder. System 7 added a slew of keyboard shortcuts that are absolutely worth taking the time to learn. The list of keyboard shortcuts is available under Finder Help in the Balloon Help menu. These navigation tools can speed up your work in the Finder tremendously. Figure 9.1 shows the Finder Help screens listing the Finder's keyboard shortcuts. Take the time to learn them. At first, an old Mac hand might find it hard to

**Figure 9.1**  
One of the screens displayed when you choose Finder Shortcuts from the Help menu.

Finder Shortcuts		
Selecting icons	To select an icon by name	Begin typing the name
	To select the next icon alphabetically	Tab
	To select the previous icon alphabetically	Shift-Tab
	To select an icon to the left or right (in icon views only)	Left Arrow or Right Arrow
	To select an icon above or below (in any view)	Up Arrow or Down Arrow
	To select more than one icon	Shift + click the icons, or drag to enclose them
	To make the desktop active	⌘-Shift-Up Arrow

remember to use the keyboard commands, and you might have to think about it consciously. Once you've gotten used to using the keyboard to navigate through the Finder, though, you will be glad you took the time, I promise.

Whether you use System 6 or System 7, here are a few tips you should know.

## Naming Files in the Finder

If you use a lot of aliases, you could find (as I do) the word *alias* at the end of a filename very annoying, and redundant to boot, since the name is already in italics. You might also find, however, that removing the word *alias* is a big pain. A tiny tip for making that chore easier—press the Down Arrow key to go to the *end* of the filename when renaming an alias file. Even better, make a macro! My Make Alias macro (Command-M, which should have been written into the software in the first place) is this sequence:

1. Choose Make Alias from the File menu (the alias is created and remains selected).
2. Press the Down Arrow key (to go to the end of the filename).
3. Backspace five times (to erase the word *alias*).
4. Then press return (to deselect the filename).

*Voila!* Aliases with no aliases. (And for those of you who are thinking, “But what if you *want* the word *alias* sometimes?”—my *other* Make Alias macro, Option-Command-M, makes a regular alias, word and all.)

## Rebuilding the Desktop

Rebuilding the Desktop is a necessary part of Mac maintenance. (See Chapter 12.) If you have System 6, to rebuild the Desktop you must hold down Command and Option while starting up (or restarting). With System 7, there is no need to restart. In the Finder, press the Command, Option, and

Escape keys. This keyboard combination will bring up a dialog box asking whether you want to “force quit” the Finder. Click on Force Quit, and as the Finder restarts hold down the Command and Option keys. The Finder will ask whether you would like to rebuild each disk that is currently mounted.

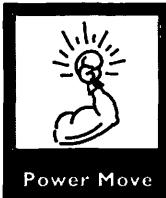
Sometimes you will want to recover a “lost” icon without rebuilding the whole Desktop (a process that can be time-consuming, to say the least). If you ever decompress a file and find that it has a generic icon instead of the swell custom icon you were expecting, you might be able to get back that icon with this quick fix (System 7 only). Select the file and choose Get Info from the File menu. Select the icon in the Info window and copy it—then paste it back in, and then cut it. Why? Copying it gives you something to paste. Pasting tells the system that this file has a custom icon, and cutting gets rid of the custom icon, theoretically restoring the original icon (the one you couldn’t see in the first place).

## **Speeding Up Finder Functions**

To speed up opening windows in the Finder, turn off the Calculate Folder Sizes option in the Views control panel. To make it go even faster, turn your color monitor to black and white (or to fewer colors) in the Monitors control panel. Windows displayed in Icon view will open faster, as the files are not sorted when the window is opened. The more items there are inside a folder, the longer a folder will take to open.

## **Copying in the Background**

With System 7, you no longer have to sit around waiting while the Mac copies files or formats disks. If you launch an application before you begin the copying, you can select it from the Applications menu and plug away while the Finder does its thing in the background. The application has to be launched first, though, because launching applications is a function of the Finder—and, of course, the Finder can’t do two things at



once. However! This is a *double trick* (calm yourself). If you have QuicKeys 2 (see the section on macros later in this chapter), you can create macros to launch your applications. Then, you can even launch applications while copying is going on. In fact, you can perform any QuicKeys function while the Finder is at work.

## Putting Away Files and Disks

Use the incredibly underused Put Away command. Move the folder or file on which you are currently working to the desktop. Leave it there for an hour, a day, a week—then just use the Put Away command to put it back where it came from. If you are using System 6, you might want to make a macro for the Put Away command. Try the keyboard equivalent that's built into System 7, Command-Y. Under System 7, the Put Away command will also eject floppy disks.

## Accelerating the Rename Delay

To rename a file in System 7, you must select the name only. You then have to wait several seconds (it feels like minutes) before the name is highlighted, then you can type a new name. To speed up the delay, move the mouse slightly; or hit the Return key after selecting the name and the name will highlight immediately.

# An Organized Desktop

## Snap to Grid

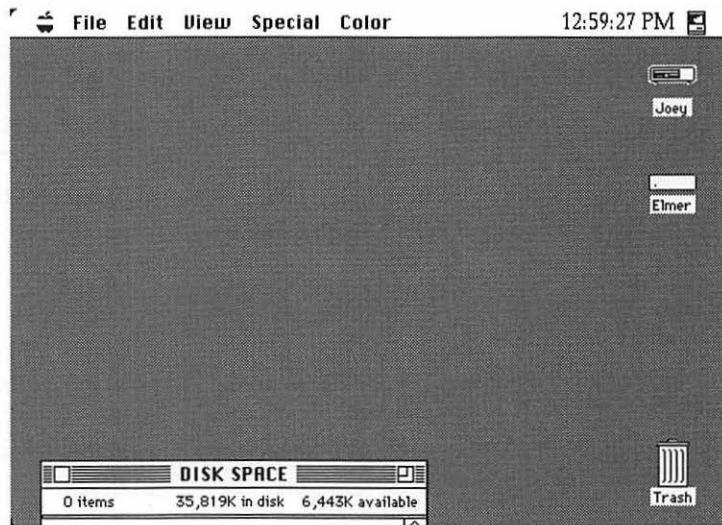
There is an invisible grid on your desktop that you can use to keep your desktop clean. Hold down the Command key while dragging an icon to snap the icon to the grid. This works both on the desktop and in the Finder windows. The Views Control Panel in System 7 lets you choose to snap to the grid automatically. (Command-drag then reverses to let you not snap to the grid.)

## Viewing Disk Size

System 7 has an option in the Views control panel that allows you to see the disk information (size and amount in use) when the windows are in list views. System 6 shows that information only in icon views. If you prefer List views but still want to see that information, there's an easy way. Create a folder called Disk Space on the root level of your hard drive. Open the folder, set it to view by icon, then make it small so that only the title bar information is displayed. Drag the window so that only the title bar is visible at the bottom of your screen (Figure 9.2).

**Figure 9.2**

In System 6, leave a Disk Space folder open in icon view at the bottom of your screen to show available space no matter what kind of Finder window view you prefer.



## Moving Finder Windows

To move an inactive Finder window without bringing it to the foreground, hold down the Command key as you click on the title bar of the window. You can then move it without activating it.

## Using the Option Key as a Modifier

The Option key also modifies a number of Finder actions. Holding down the Option key as you click on a Finder win-

dow's Close box will close all open windows on the desktop. Similarly, holding down the Option key as you choose Close from the File menu will change the selection to Close All. Incidentally, this also works in a number of applications. If you hold down the Option key as you open a folder, the parent folder (the folder that contains the folder you are opening) will close.

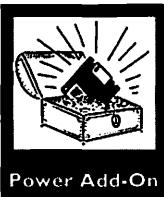
You can also use the Option key in conjunction with the Clean Up Window command. Under System 6, holding down the Option key as you choose Clean Up Window changes the selection to Clean Up. The command will force icons to fit within the window size you have set, starting from the upper-left-hand corner. With System 7, the command turns to Clean Up by Name (or whichever list view you have last chosen), and will fit icons within the window and arrange them accordingly.

## Blank Icons on the Desktop

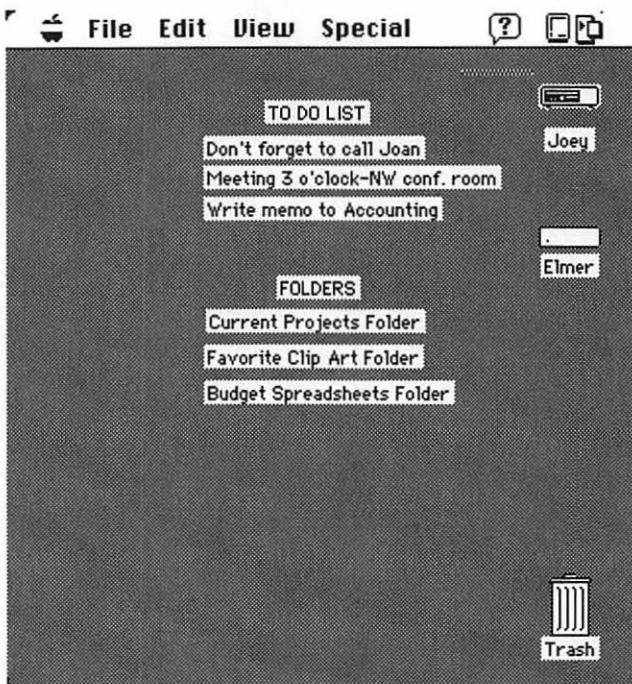
To save room on the desktop or leave messages to yourself under System 7, create a folder with no icon. Copy a square of white from any graphics program. Select the icon of the folder and choose Get Info from the File menu. Select the icon in the Info window and paste the white square in it. Your folder will have no icon, and will be displayed on your desktop as a line of text. You can write yourself notes or view several folders as if they were in a List view window (Figure 9.3).

## Easy Apple Menu Access

Keep an alias of the Apple Menu Items folder on your desktop, and keep one inside the Apple Menu Items folder itself. You'll want quick access for adding and removing items from the Apple menu. A swell little drag-and-drop utility called AppleEaseIn, by Peter Kaplan, makes this even easier. Drag any file or application over its icon and AppleEaseIn will create an alias of the file and put it into the Apple Menu Items folder.



**Figure 9.3**  
Keep icon-less  
folders on  
your desk as  
messages to  
yourself or to  
display folders  
on the desk-  
top in a list  
view.

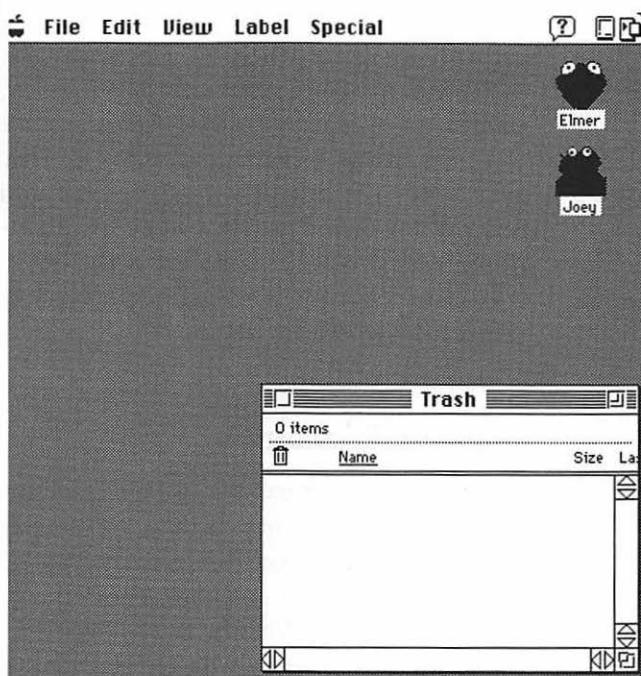


Use HAM, NowMenus, HandOff II, MenuChoice, or BeHierarchic to get hierarchical menus. Drop an alias of your entire hard disk into the Apple Menu Items folder. Anything on your disk will be available with one click—no more digging. See Chapter 10, *Hard Disk Management*, for more information on customizing the Apple Menu.

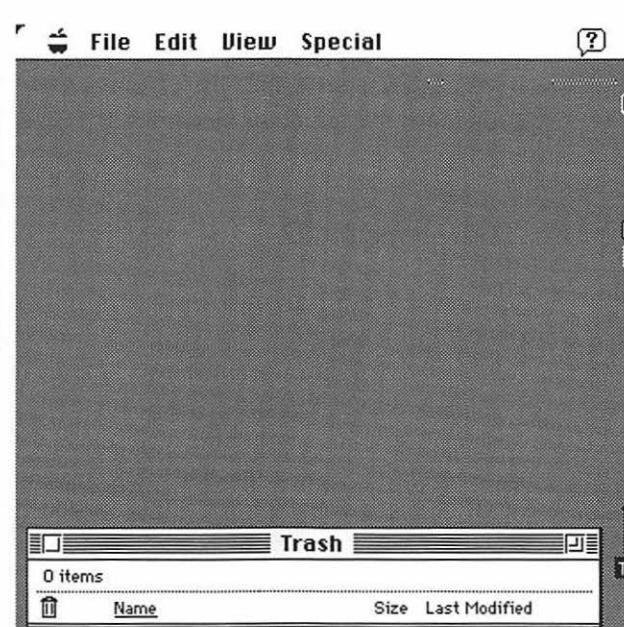
## Better Trash Access

You can make the trash more accessible. Open the trash and drag the window to make it larger. Then you don't have to aim so carefully. Options are a big square in the lower right (Figure 9.4) or perhaps in a “strip” along the bottom of the screen (Figure 9.5). Don't make the trash *too* large, though, or you'll find yourself inadvertently throwing things away when you are just trying to move them.

**Figure 9.4**  
Open the  
Trash window  
and leave it  
open to make  
a larger target.



**Figure 9.5**  
Keeping the  
Trash window  
open as a strip  
at the bottom  
of your screen  
makes for  
easy drag-  
down  
trashing.



With System 7 you can also make aliases of the trash. You can sprinkle these wherever it is helpful. If you have a large monitor, for example, put a trash can in both corners. Just be careful not to make the aliases *too* accessible—you don't want to throw things away inadvertently. For example, I keep an alias of the trash inside my By Name folder, where I keep many of my data files. I've named it with a tilde (~) so that in Name view it will be displayed at the bottom of the list. This way, I won't accidentally drag items to the trash when moving or selecting within the window.

### **Copying Filenames**

Select filenames or icons in a Finder window and Copy. This will copy the filenames to the clipboard; from here you can paste them into a word processor, a spreadsheet, or onto the Note Pad. Use this as an alternative to the Print Window command. Using Print Window just to print a list of a folder's contents, for example, can be exceedingly slow, because the printer has to generate the graphic representation of the window, icons and all. It is much faster to copy and paste the list and then print it as text. There is a small hitch, though—the length of the list you can copy is restricted to 256 characters. If you have a very long list to copy, just break it down and copy it a small bunch of filenames at a time.

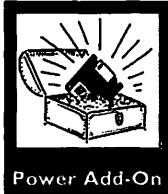
### **Easy Start-up Sounds**

To hear a sound at start-up (I enjoy listening to the Jaws theme, for example), just drop the sound into the Startup Items folder. If you don't want to hear it, hold down the Shift key just after the Finder's menu bar is displayed but before the desktop shows (it might take a couple of tries to get the timing right). Holding down the Shift key will prevent the launching of all items in your Startup folder. If you hold down the Shift key too soon, your extensions will not load either.

## Calendar/To Do List/Reminders

There are many reminder programs, To Do programs, and calendar programs available for the Mac. I'm partial to First Things First, which offers a floating icon that always stays in the foreground and has highly customizable to do lists. However, if you don't feel like dropping your hard-earned cash on a calendar or a To Do program, here are a couple of low-budget tips.

Use your Note Pad DA (free with the System, or get the better shareware product Note Pad II, for \$20) for a To Do list. Categorize your lists—use page one for Things To Do Today, page two for People To Call, page three for Long-term Projects, and so on. If you have System 7, you can put an alias of the Note Pad into your Startup Items folder and it will be displayed on your desktop whenever you turn on your Mac.



Power Add-On

If you have a good macro program (and you should!), you don't need a reminder program. Both QuicKeys 2 and Tempo II Plus have the capability to create reminders that will popup at predetermined times.

## Navigating Dialog Boxes

There are many complaints about the standard GetFile dialog box—the one you see when you open or save a file. There are ways to navigate through the dialog that will make life easier. You can use the Up and Down Arrow keys to move up and down through the list of files. Type the first few letters of a filename to jump to it in the list. The tilde key (~) will take you all the way to the bottom of the list. Command-Up Arrow and Command-Down Arrow will move you through levels of folders. The Tab key will cycle through all mounted drives, as will clicking on the disk name. The Return or Enter key will open a highlighted folder or file.

Try some of these techniques in other windows that have lists (lists of files in installer windows, for example, or com-

mands in Word). Typing the first few letters of a filename almost always will move you through the list to the file.

Command-period is a great universal command. It is an all-purpose way to say *Stop! Cut it out! Now!* to your Mac. It will choose the Cancel button in almost all dialog boxes (as will the Escape key). It will cancel printing, and if you do it soon enough after double-clicking, it will cancel the launching of a program or the opening of a file.

Another universal command that everyone should know (but many do not) is that the Return key (and usually the Enter key as well) will select the highlighted button in any dialog box.

## Easy Access



Easy Access comes with every Mac but was not intended for every Mac user; it was intended for those who are physically impaired and have trouble using the keyboard or mouse. But every Mac user can take advantage of Easy Access in two ways. First, it can help you recover if you've lost your cursor—if your mouse or disappears (from buggy software or from loose cables). Instead of restarting from the on/off switch or the programmer's switch (and possibly losing data), invoke Easy Access (which, of course, you have installed in your System Folder) by pressing Command-Shift-Clear. Mouse Keys is now on, and you can use your numeric keypad as a substitute mouse. (The keys surrounding the 5 move the cursor. The Zero key locks the mouse button down to select an item, and the period key unlocks it.)

Second, you can use Easy Access for fine-tuning graphics. The keypad keys nudge the cursor one pixel at a time. You can use this delicacy when moving objects in a graphics program by selecting the object and using the keyboard to move the object to a precise location.

## Applications Menu

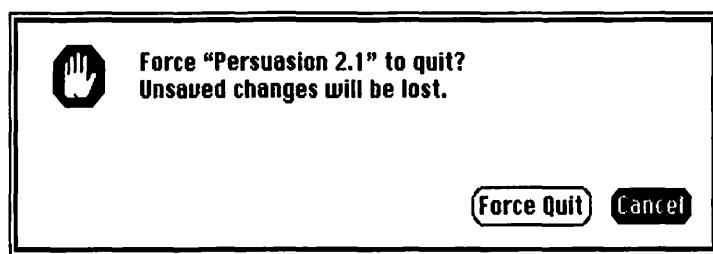
System 7 introduced the Applications menu. One great feature of the menu is the Hide function, which lets you hide either the active application or all other applications. If you hold down the Option key when choosing an application from the menu, it will automatically hide all the other open applications.

If you Option-click on the desktop, you will switch over to the Finder and all open applications will be hidden. Option-clicking on any open application's window will take you to the window and hide all other applications' windows.

## Getting Out of Hot Water

System 7 added a Force Quit feature to help you recover from crashes. If you are frozen or crashed, try pressing Command-Option-Escape. You'll see a dialog box asking whether you want to quit the foremost application (see Figure 9.6). Click on Force Quit. You'll quit out of that application, but you'll have the opportunity to save any other work you might have open. Save and quit out of all open applications and then restart from the Special menu. Using the Command-Option-Escape emergency hatch does not leave your system especially stable, but it does give you the opportunity to save your work and restart gently.

**Figure 9.6**  
Pressing Command-Option-Escape will bring up this dialog box, allowing you to quit out of a crashed application.



Be sure to have an emergency boot disk or two available at all times. Now that's it. Go read Chapter 12 and Chapter 13 if you want more troubleshooting stuff.

## Sharing a Mac with a Copilot

To share your Mac (while demonstrating something or learning something for example), just have your copilot bring his or her own keyboard and mouse and plug it into the second ADB port, if your Mac has one.

## Taking Advantage of the Built-in DAs

Use the calculator to calculate complex mathematics. Either type your figures into the calculator, or, if you want to be sure to avoid typos, you can type them into the Note Pad or a text document. Then copy and paste the equation into the calculator. It will perform the calculation and provide you with the correct total.

If you wish, you can copy the correct time and date from the Alarm Clock DA. You really should have QuicKeys or Tempo II Plus instead, however, because they will not only paste the time and/or date, but let you format it in a number of different ways.

## Printing

Use recycled paper. Not only does it help the environment, but it is more flexible than "new" paper and therefore less likely to jam in the printer. Recycled paper is also reputed to hold the toner better.

To speed printing up a bit, try saving before you print and then quitting the application immediately after the Print command.

Make sure all Macs on your network have the same printer driver. Otherwise, you will have to reset the printer between jobs.

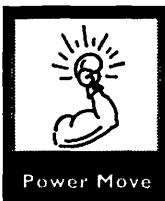
If you don't keep your printer on at all times, or if your Mac isn't attached to a printer, you can queue documents in PrintMonitor for later printing. Open PrintMonitor and choose Stop Printing from the File menu. You can then send documents to be printed, and they will be displayed in the queue in the PrintMonitor window. Whenever you are ready to print, you can choose Resume Printing from the File menu.

## Miscellaneous Stuff that Didn't Fit into Any Other Categories

When all other methods of file compatibility fail, try using the clipboard to move graphics from one application to another. Yep, good ole copy and paste can almost always transfer images at a basic level.

To save room on your hard disk, try saving documents in text format only.

## Macros



Here's the best advice I can give you about improving your Mac speed. Get a good Macro program. I'm partial to QuicKeys 2, but there are several other good ones (such as Tempo II Plus).

### What's a Macro?

Macros, for the uninitiated, are recordings of multiple keystrokes and other actions on your Mac. Almost any repetitive task can be recorded in a macro. This can be an unbelievable



Power Add-On

timesaver. The most obvious use for macros is to create keyboard shortcuts for basic Mac tasks—such as making menu choices or typing text strings. Creating macros for these functions is the best way to get familiar with a macro program and an easy way to improve your Mac environment. With a potent macro program such as QuicKeys 2 or Tempo II Plus, however, you can do extremely sophisticated, complex functions with a keystroke. Although I hesitate to use the “p-word,” creating sophisticated macros is *programming* for the rest of us. Creating powerful, multiple-task macros is really just building a series of smaller macros.

## Basic Macros

Macros are either program-specific or universal. For example, you can create a universal macro to type your name and address so that you can pop it into anything you’re working on. An example of a program-specific macro would be a formatting command in your word processor or the application of a filter in Photoshop. Universal macros are those that can be invoked no matter what application you are in. An example of a universal macro would be one that selects a printer from the network or types the date.

The most basic use for macro programs is to create key commands where programmers have left them out. You can even change functions by using macros. For example, there are some deviant programs that don’t print when you hit Command-p. You can make a macro to make up for the program’s deficiency. (MacFlow, an otherwise neato program, does not save when you hit Command-s! I think this is the most heinous infraction for a Mac programmer. We *rely* on Command-s. I Command-s every few lines when I type. It’s become such a habit that I screw up all the time when I am forced to use that *other* computer or a typewriter.)

Apple published *Apple Human-Interface Guidelines* to tell programmers some of the sacred keyboard commands with the goal of making a consistent interface between programs.

The guidelines set aside certain keyboard commands as reserved for specific purposes and no other. Here they are:

Command-?	Help
Command-N	New
Command-O	Open
Command-Q	Quit

Macros are great for launching applications, desk accessories, or control panels. Both QuicKeys and Tempo II have add-on modules that expand the functions of the program even further. QuicKeys calls its add-on modules *extensions*. QuicKeys extensions includes Choosy, a nifty selection that lets you bypass the Chooser and select a printer with a keyboard command. Another is Mounty (don't be put off by the cutsie names), which mounts any shared volume, again with a single command. Once you've used macros for functions like these, you'll never go back to the clunky alternative.

## Fancy Macros

Once you've mastered creating basic macros, you can start building more sophisticated sequences of macros. You've got a macro that types your name and address, for instance. How about one that builds the better part of a document for you? If you write a lot of interoffice memos, for example, you can create a single macro that will:

- launch the word processor
- create a new document
- type **MEMORANDUM**, center it, and format it in Helvetica bold
- type *To:* and wait while you type in the recipient's name
- type *From:* and your name
- type *Re:* and wait while you type in the subject line
- type in the current date

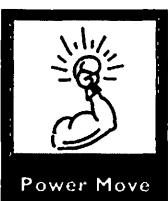
- save the memo to a specific predetermined folder and wait while you name it
- position the cursor to begin typing the body of the memo.

This is just an example. Use your imagination to think of ways to use macros to automate the tasks you perform frequently.



Oh, and by the way—make a reminder macro (QuicKeys calls them messages) that pops up on your screen every hour to tell you to take a break. Stretch a little, blink, get up and move. It's important for your health and it will make you work better. Take it from someone who spent 16-hour days in front of a Mac (not a practice I recommend, by the way).

## General Tips for Improving Your Mac Skills



This is the tips section of the book, after all, so here it is: Amy's Top Ten List of Things to Improve Karma with Your Mac.

10. Try the Option key with everything for interesting results (option menu choices, option-key commands).
9. Go to the MacWorld Expo once. I don't want to hear you can't afford it. Save up for the plane ticket. Don't worry if you have to stay in El Cheapo Motel and Body Shop, because you will be in good company (with lots of self-employed Mac "consultants"). If you can go on your company's expense account, so much the better, but if you have to pay for yourself, it's probably tax-deductible. Go, look, listen, talk to everyone, crash a party or two, pick up 64 pounds of literature you'll take home on the plane and then never read, and bring your kids buttons and pens that advertise software companies.<sup>1</sup>
8. Go see Paula Poundstone do stand-up somewhere (she's even better live than on TV). This has nothing to do with the Mac specifically, but it will improve your mental well-being in general to laugh that much, and that can only help.

7. Read the manual, at least, before you call technical support.
6. Buy your software; don't pirate it. You'll get up-to-date software, manuals, and tech support.
5. Get a modem. If you don't want to pay the fees for a service like CompuServe or America Online, try calling your local BBS. A half hour off-peak long-distance call to the extremely helpful BMUG BBS will cost less than a half-hour on CompuServe, and you'll learn plenty. And if you join BMUG, you'll have access to freeware and shareware that will change your life.
4. Pay for your shareware. It's honorable, it'll give you a nice warm fuzzy feeling, and it will encourage those programmers to keep making great shareware.
3. Bug knowledgeable people. If you are lucky enough to be friendly with people who know more than you do, take advantage of the opportunity to learn from them. Watch, ask questions, all that stuff—the trick is just to make them feel really smart. There is a sort of hierarchy of Mac knowledge that means that someone will someday (if they don't already) bug the hell out of you with a bunch of stupid questions, but then *you* will get to feel smart.
2. Use keyboard shortcuts and make your own with a macro program.
1. Read. Read, read, read, read, read. Appendix B has details on some recommended reading resources. If it seems like some of the stuff is going over your head, don't despair—it will start to make sense. There is no better way to access information.

<sup>1</sup>*My editor doesn't like footnotes, but I am really digressing here, and I couldn't in good conscience put it in the main body of the book. I just wanted to mention that if you play your cards right, you may never have to buy a pen again. My father used to go to scientific conferences when I was a kid and bring home jillions of pens that advertise things like "Gamimune® N Immune Globulin Intravenous (Human)." Now my pens say "E-Machines—E-Magination at Work™". So start bringing those pens home now, and start your collection. It could help fund your child's education.*

## **Questions and Answers**

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**Q:** Why should I use keyboard commands when I have a mouse?

**A:** They are faster, and can increase your control over the Mac. Ultimately, they are easier to use (not to mention easier on your hand).

**Q:** What are some good ones?

**A:** Look them up under their categories in the chapter!

**Q:** What is a macro?

**A:** Macros are recordings of multiple keystrokes and other actions on your Mac.

**Q:** What are macros used for?

**A:** Automating repetitive tasks.

**Q:** What are some examples of basic macros?

**A:** Basic macros include key combinations for menu commands, text strings, or launching applications.

**Q:** What are complex uses for macros?

**A:** Macros can be used to automate unlimited series of tasks and functions.

**Q:** What are some other ways to improve my Mac skills?

**A:** Use the Option key, go to MacWorld, see Paula Poundstone, read the manual, buy your software, ask questions, pay for shareware, use a modem, use shortcuts, and read. (Whew!)

## CHAPTER 10

## HARD DISK MANAGEMENT

This chapter discusses techniques for organizing and managing your hard drive. Topics covered include:

- Using names as an organizational tool ◊
- Using labels as an organizational tool ◊
- Organizing with customizable icons ◊
  - Using Get Info comments to help organize the hard disk
    - Categorizing files ◊
  - Organizing with the Apple menu ◊
  - How aliases can help you organize ◊
    - Where applications go on the hard disk
  - What application launching utilities do
- How stationery pads help organize the hard disk
  - The one thing you must do to keep a well-organized hard disk

# 10

## I

I'm not exactly what you would call a neat person. I tend to peer at visitors to my office over large piles of papers and magazines, and there is a sort of netherworld somewhere beneath my desk amongst the cables and surge-protectors where a small family of used Post-Its and dropped writing implements live. But—I have an awesomely organized hard disk.

The advantages to an organized hard disk are myriad: No extra or duplicate files, fast access to anything, the ability to manipulate multiple files at once, even taking pleasure in your work. (Well, okay...) And let's not forget increased productivity, the manager's favorite watchword!

# Getting Organized

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The desktop metaphor—with its folders and files and trash can—is pretty obvious. You do, of course, file alphabetically when you list by name, as you would in a file cabinet. But there are many other ways to organize files and software.

## Names

The first step in creating the ultimate organization system is naming your files. How many files do you have with cryptic names? C'mon, 'fess up—I'll bet you have at least three files with names like Memo 4/12, GJM Memo, or Memo 2. And six months later, do you know which one is which?

Mac file and folder names can be up to thirty-one characters, disk names up to twenty-seven. This is a wonderful advantage—use it! Why name a file DirPres92 when you can name it Director's Presentation 1992? Users who have come from DOS environments seem to have special trouble adjusting to the naming freedom on the Mac. (DOS users, for you total Mac purists, can only use eight characters and can't use spaces, lower case, or most punctuation). You can even use punctuation in your file names—except for the colon, which the Mac reserves for its own use. If you take the time to give your files a really descriptive name when you first save them, you can more easily find them later.

There are specific tricks you can use when naming files to further refine your organizational scheme. Other operating systems use filename extensions to help programs identify them. An extension is a three-letter code preceded by a period. It comes at the end of a file's name. For example, an excel file on a DOS-based machine would have the characters .XLS at the end of the name, like this: FORECAST.XLS. This makes the file FORECAST recognizable to Excel. Programs for the Macintosh do not require filename extensions to know what kind of file they are, so files do not have extensions. But you

can use your own made-up extensions as an organizational tool. For example, if you have a whole bunch of files related to a single project, say—the aforementioned forecast—you could name them all appropriately, but add .FCT at the end of each filename. Then, if you need to search for any one of those files, or collect them all together, you can spot them easily (Figure 10.1). Even if they are in different folders, you can use System 7's Find All at Once option or another good file-searching tool (MasterWord Seek, Disktools) to find them simultaneously and select them for you.

**Figure 10.1**  
A group of files with a common filename extension are easy to pick out of a list.

High Priority Work				
	8 items	37 MB in disk	4.2 MB available	
	Name	Size	Label	Comments
1	1992 Financial Plan.FCT	2K	-	↑
2	Cover Memo.FCT	2K	-	
3	Forecast Slides.FCT	35K	-	
4	Inventory Request	2K	-	
5	Projected Sales.FCT	2K	-	
6	Recycling Memo	2K	-	
7	Table o' contents.FCT	2K	-	
8	Weekly timesheet	2K	-	↓

If you prefer, you can put identifying letters at the beginning of filenames to keep the files together alphabetically in a window viewed by name. (See Figure 10.2). There's a disadvantage to that technique: When you are in an Open/Save dialog, you must scroll through the list to find your file; you can't just type the first couple of characters. (If you don't know that trick, try it: When you are in the Open/Save dialog, type the first couple of letters of the name of the file you want. The window will scroll down and highlight the first file with those letters at the beginning of the name. It's a real time-saver.)

**Figure 10.2**

Associated files identified by initial characters all stay together in a window viewed by name.

This week's projects			
8 items	37.1 MB in disk	4.1 MB available	
Name	Size	Label	
FCT 1992 Financial Plan	2K	-	↑
FCT Cover Memo	2K	-	
FCT Forecast Slides	35K	-	
FCT Projected Sales	2K	-	
FCT Table o' contents	6K	-	
Inventory Request	2K	-	
Recycling Memo	2K	-	
Weekly timesheet	3K	-	↓

## Labels

You can use the Colors menu in System 6 and the Labels menu in System 7 as organization tools. If you have a color monitor, take advantage of System 6's Color menu to code your files and folders. One technique is to use the colors to indicate increasing levels of priority: green and blue meaning low priority, orange and red representing high or immediate priorities. You can use the colors to represent categories, if you prefer—blue for invoices and red for memos, for example. You'll find that consistently using the color labels will make it easier for you to identify files at a glance. And don't forget that those colors are customizable! Just double-click on the color in the Color control panel device to choose a new color from the spectrum. I, for one, hate that default brown, and the yellow is too hard to see. Purple and fuchsia are much more my style.

System 7 improves greatly upon the Color menu. In the Labels menu (System 7's replacement for the Color menu), each color has an associated label. Both colors and labels can be customized. (For more on how to customize the labels, see

Chapter 2, *System 6 vs. System 7*.) You can make the labels appear in your windows and even sort lists according to label (Figure 10.3). Again, you can choose your labels according to whatever works for you. Mine are Immediate!, Procrastinate, Boring Stuff, Fun Stuff, Top Secret, Public Knowledge, and Do Not Compress (for AutoDoubler, a compression utility that I have set to compress all files except those which are in folders labeled Do Not Compress).

**Figure 10.3**  
Windows can  
be sorted  
according to  
labels.

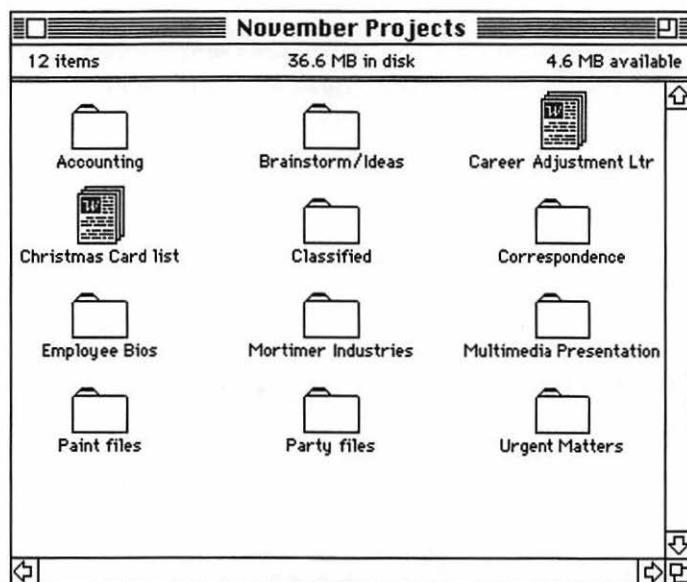
Name	Kind	Label
Copy for furn brochure	Microsoft Word do...	IMMEDIATE...
Hourly timeslips	Excel 3.0 document	IMMEDIATE...
Inventory Request	Microsoft Word do...	Procrasti...
Projected Sales/Furniture	Microsoft Word do...	Boring St...
Projected Sales/Patio	Microsoft Word do...	Boring St...
Contract with MI	Microsoft Word do...	Top Secret
Mort indust. board slides	Persuasion 2.1 doc...	Fun Stuff
Mort's furniture brochure	PageMaker 4.2 doc...	Fun Stuff
Times full page ad	PageMaker 4.2 doc...	Fun Stuff

## Icons in System 7

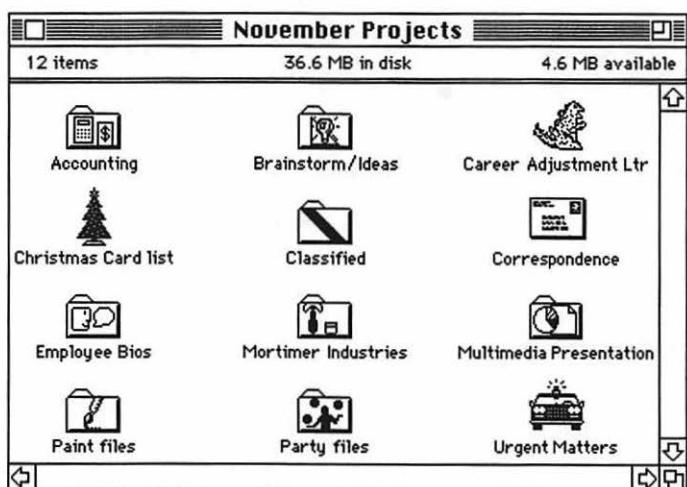
Another organizational feature available in System 7 is the customizable icon. You can make any graphic into an icon for a file or folder by pasting it into the file's Get Info window (as described in Chapter Two). Okay, now, I know what you're saying: "That's an organizational tool!?" Yep. There are two ways it's helpful. If you are really compulsive, you can use a custom icon as a tool to group files together, making custom icons for each project, for example. But really, custom icons can help organize in a more subtle way. If you go to the trouble of creating a new icon for a file or folder, you're not likely

**Figure 10.4**

Files and folders in this window have the default icons.

**Figure 10.5**

Files and folders in this window have custom icons.



to forget that icon. Look at Figure 10.4, which shows a window full of default icons. Compare it to Figure 10.5, in which each folder has a custom icon assigned by me. Now here's a little test: Find the folder called *Classified* in each window. Which one took you longer? I'm willing to bet it was easier for you to find the one with the "no" symbol than to read each

folder's name. And you didn't even put that icon there. Files with custom icons are easier to identify by sight. So you see, it can make it easier for you to find things in your windows.

## Get Info Comments

If you choose Get Info from the file menu, there is an under-used little box at the bottom of the window for adding comments about the file. These are handy on occasion with System 6, but with System 7 they are much more useful, since the comments you put there can be seen in Finder windows. You can add a comment of up to 180 characters long (although only about twenty show in the Finder window). There is one (big) hitch: When you rebuild your desktop (a necessary maintenance procedure covered in Chapter 13) you lose your Get Info comments! But there is a fix! A swell little control panel called CommentKeeper will squirrel away your Get Info comments while your desktop is being rebuilt and neatly replace them once the Finder is back up and running. Norton Utilities also offers a comment-saver as part of their package.



Comments can be great for organizing files. They give you a way to add extra information to files, and you can sort the files by comment. Use them to add more discriminating information, to categorize files, or to show a status line. Here's an example of how I use comments to help organize files. I frequently download files from BBSs. Many turn out to be junk, but every now and then I'll come across a gem I think is worth sharing. Now, I'd like to upload this file to my favorite BBSs, but I don't remember which one I got the file from in the first place. I don't want to duplicate a file that's already there, and other BBSs like to know the source of the files that are uploaded. So, when I first download a file, I add a comment indicating which bulletin board I downloaded it from. I copy the identified file onto a floppy disk, and I'm all set. Later, if I decide I want to upload something, I can be sure it's not a duplicate, and I can identify it for the benefit of others (Figure 10.6).

**Figure 10.6**

Using Get Info comments makes it easy to see the source of each of these downloaded files.

Name	Comments
Anirama.sit	MAMUG BBS 6/19/92
Freddie 1.1 A.cpt	MasTRE BBS 6/8/92
GIFConverter2.2.9-> 2.2...	MAMUG 5/92
MaoMoleoule.cpt	NYMUG BBS 5/28/92
MacsBar.sit	MAMUG 6/19/92
Molecules.cpt	NYMUG 5/28/92
NYCZIPLo.cpt	MAMUG 7/7/92
The Sound-Trecker V1.0...	MAMUG 6/18/92
Val-Speak.cpt	MAMUG 6/19/92
ZTerm v0.9.sea	MasTRE BBS 5/19/92

Sorting by comment can also come in handy. If you are creating several drafts of the same illustration, for example, name them descriptively and put a version number in the comments window. That way, you can keep track of which came first, and you can even choose to sort them in the order that you created them (Figure 10.7).

**Figure 10.7**

Using Sort By Comment keeps these illustrations in consecutive order.

Name	Comments
Original Interior	01—Original w/o modification
DJ's modifications	02—D.Jacobson's revisions to ori...
w/o reception hall	03—same as 01 but w/o receptio...
MR's revisions	04—M. Roth's changes to Jacobso...
MR alternate	05—Alternate M. Roth plans

## Categorization

We've talked about naming and labeling files, but how do you choose those names and labels? There are millions of ways to organize. What follows are a few suggestions.

## Organizing by Application

Some Mac users like to organize their files according to what applications they used to create the files. They will have a folder for MacWrite files, a folder for Canvas files, and so on. In fact, many put the files right into the same folder with the application itself. Beginners are especially partial to this excuse for an organization system, since the default folder when first saving a new file is the folder of the application in which you are working.

This system is, in my humble opinion, pretty deficient. Often a project will have several associated files in several different applications, and using this system will leave them scattered all over your drive. Furthermore, you will find quickly that you are scrolling through long lists of a particular applications files looking for a specific one. Finally, if you don't remember what you named a file, you are in big trouble—you'll end up looking through thirty different Excel files before you find the one you want.

## Organizing by Project/Person

The most natural way to organize files is probably by project or person. If you name folders as you would name manila folders for your file cabinet, you can't go wrong.

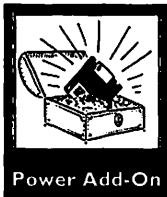
If your work involves lots of different clients, it is probably easiest for you to organize by client. Create a folder for each client and inside it make folders for each project you do for that client.

If you work for one company and most of your work comes from one source, name your folders by project. Remember to use all your letters! Name them descriptively. If you have many, many projects, try breaking them down into categories by type (brochures, presentations, budgets, reports, and so forth).

Use folders within folders. Obviously, you don't want to bury things too deeply, but one or two levels down won't hurt.

You'll have to play around to find the right balance between levels of organization and the tedium of opening and closing windows. (See Chapter 9 for keyboard commands and shortcuts to streamline Finder operations like opening and closing folders.) If you are using System 7, you can bury things a little deeper, since you can put aliases of them in more convenient locations.

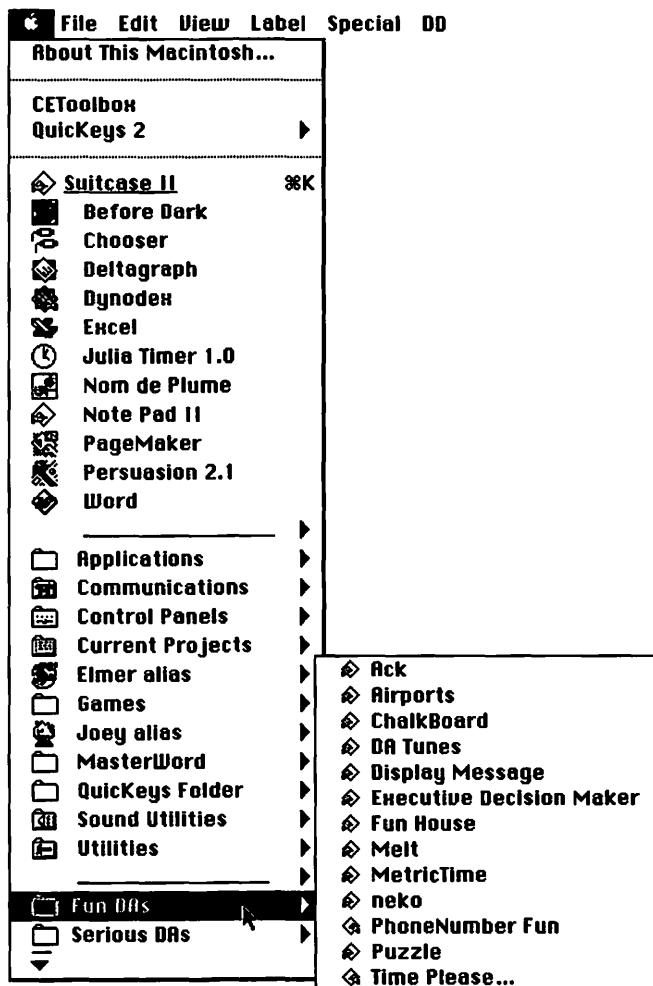
## System 7's Apple Menu



System 7 users, take advantage of the ability to put anything in the Apple menu! And get yourself a hierarchical menu utility. HandOff II, a great commercial control panel, has a hierarchical menu utility. Hierarchical menu utilities make submenus pop up for each folder in your Apple menu (Figure 10.8). Each submenu can have submenus up to several levels deep, depending on which utility you are using and how you have it set. A terrific bargain is the shareware Control Panel BeHierarchic by Fabien Octave (only \$10.00). There's HAM (Hierarchical Apple Menu), which I've never used but about which I have heard good things. NowMenus, part of the Now Utilities package, also provides hierarchical menus. Whatever utility you use, you'll find it speeds up your productivity tremendously. I can't even estimate the amount of time I save using hierarchical Apple menus.

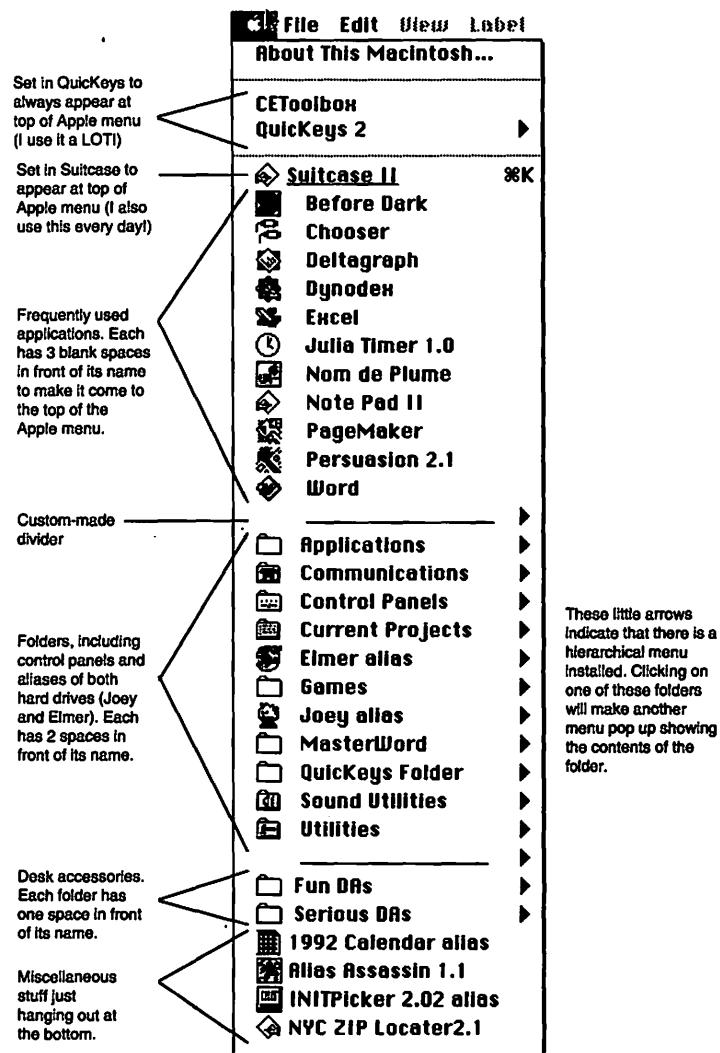
You can put folders, files, applications, and aliases into your Apple menu. Organizing the Apple menu is not just limited to a long alphabetical list. Putting spaces at the beginning of a name makes it jump to the top of the list. (This is true for windows as well as for the Apple menu items.) Two spaces make an item go higher on the list than an item with one space, three higher than two, and so on. Using this trick makes it possible to group the items in your Apple menu virtually any way you want. I'll explain how mine is organized as an example (Figure 10.9) Obviously, you should organize yours any way that works for you.

**Figure 10.8**  
A hierarchical Apple menu utility makes submenus pop up for each folder in the Apple menu.



The top of my Apple menu has aliases of my most commonly used applications. I put three spaces before the beginning of each alias's name to make it come to the top of the list. Then I have a divider, which is made by creating a folder and naming it with a bunch of dashes. Since punctuation comes alphabetically after Z, it goes to the bottom of the list. I put three spaces at the beginning, then the dashes, to make it the last item in the first portion of the list. To make it look more

**Figure 10.9**  
The organization of my personal Apple menu.



like a divider, eliminate the folder icon by giving it a custom "blank" icon. Copy a bit of blank space in a paint program and then paste it into the icon spot in the Get Info window.

The second section of my Apple menu has a selection of folders. Each folder has two space characters in front of the name. There is the Control Panels folder, of course, and a folder called Applications. Inside the Applications folder are aliases of every single application in my possession. If I ever

need to find one, no matter how obscure, I can pull it up with one click. There is also a folder called Current Projects. I put an alias of anything I am currently working on in this folder. Again, when I need access, one click brings it up. The section is again marked off with a divider.

The third section of the Apple menu is the DA section. All the DAs are organized into two folders, each named with a single space in front, called Serious DAs and Fun DAs. Serious DAs has all the important stuff, like the Calculator and Dynodex DA (my address book). Fun DAs has everything from the sublime, such as DA Tunes (a DA that plays a selection of music), to the ridiculous, such as the classic Executive Decision Maker (a DA you can turn to for random answers to those important executive decisions—kind of like a glorified, computerized Magic 8 ball). Finally, with no spaces in front, is the rest of the junk I want in my Apple menu but which doesn't fit into the rest of the categories.

## Using Aliases as an Organizational Tool

The ability to make aliases is one of the best features of System 7. Aliases are a terrific organization tool. Each alias acts as a pointer to the file it is linked to. You can make as many aliases of files, folders, and applications as you want. The only drawback to aliases is that they can create a bit of desktop clutter, but even that can be solved with a couple of handy freeware utilities:

- **Alias Assassin** rounds up aliases whose “parent” files have been trashed or lost and lets you delete them or relink them.
- **ZMakeAlias** allows you to make an alias from within a file by putting a Make Alias button in the save dialog box.
- **Alias Finder** is a “drag and drop” utility for finding an alias’s parent file. To find the original file linked to an alias, drag the alias to the Alias Finder icon and it will open the window containing the parent file and highlight it. I find this one particularly useful, even though the same result

can be achieved by choosing Get Info from the File menu and clicking on the Find Original button. Alias Finder achieves the same results with one drag.

Refer to Appendix C for more information on these utilities.

Since you can make multiple 1K aliases of an application in System 7, you can put them in convenient locations for launching the application. This is one of the easiest (and cheapest—no other software to buy) ways to launch applications with System 7. Drop aliases in the Apple menu as I described above, and you get a menu of applications. Keep aliases of your most commonly used applications on your desktop, along the left side or across the bottom. (More on launching applications later in this chapter.)

Another great use for aliases is cross-referencing. On my drive I have one folder called By Name and one called By Subject. Within the By Name folder is a folder with the name of each person I work with. Inside the By Subject folder are folders named for each project or subject I work on. Each time someone asks me to do something for a given project, I'll put the file in the project folder and an alias in that person's folder. Since many people work together on a single project, I don't have to keep track of who gave me what when it's all in the project folder. On the other hand, when someone comes along asking for his files from the sales meeting, I don't have to remember what that particular person gave me way back when.

Aliases can even be used to organize files that are archived on floppies. Put the file on a floppy and an alias on your hard drive. Later, when you want the file, double-clicking on the alias will bring up a dialog box prompting you to insert the disk. It's an easy way to keep track of which files are on which disks. Since aliases take up only about 1K each, you can keep track of hundreds of files while sacrificing very little hard disk space.

## Organizing Applications

Applications also need to be organized on your hard drive. All commercial software comes with installation directions—fol-

low them. Often, applications will have supplemental files that need to go in the System Folder or some other strange location. Many recent releases of applications have installers that put everything in the right place for you. Basically, there are three things to remember: Give each application its own folder, don't put anything in the System Folder unless installation directions specifically require it, and do not drag an application out of its folder onto the desktop. Read Chapter 7 for more about the care and feeding of applications. And follow the directions that come with your software. If there is one time you really should read the manual, it's when installing applications.

## Alternative Ways to Launch Applications

I think the best way to organize applications is to find as many ways as possible to launch them without actually double-clicking on the icon. I keep every application within its own folder and all those folders in another folder on my hard drive, called, imaginatively enough, Applications. I almost never delve into those folders. There are too many other, better ways to launch an application.

### Templates

If you are using System 6, you can create template files for your applications. In those applications that let you make templates, make a file and save it as a template. Otherwise, just do a Save As... after you open the file and give it a new name. Leave the files on your desktop. It's a bit primitive, but it beats digging through folders to find your applications.

### Application Launching Utilities



A much better solution is an application-launching utility. There are many on the market, and they each offer a variety of features—On Cue II, HandOff II, and others. Often they are packaged with a bundle of handy utilities. Launching programs are basically utilities that add an applications menu to

your menu bar that lists all available applications. Just choosing from the menu will launch the application. Doesn't that beat digging through folders? This is the kind of utility that makes you wonder how you did without it.

Another great feature of some launchers is application substitution. Ever get that annoying Alert box telling you that the Mac cannot find the associated application for the file you have just double-clicked? Application substitution lets you specify what applications to use when that happens. Double-click on a MacWrite file and watch Word open it. Double-click on a Stuffit file and watch Compactor open it. No more annoying alert boxes!

### **Launching from Stationery Pads**

Stationery pads, available as part of some applications with System 6 and with all applications as a part of System 7, are like templates—only better. They are files that let you set preferences and styles within a given application, saving it as a template. You can file stationery pads wherever it is appropriate (or leave them on your desktop) and use them to launch the applications, and you get the extra bonus of having the file all set up and ready to go. Make a variety of stationery for your applications and keep them where they belong—memo stationery in a Memo folder, for example.

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## **The One Thing You Must Do to Keep a Well-Organized Hard Disk**

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There is only one thing that I'm going to say you *must* do. Make a folder and put it somewhere accessible on your desktop. I recommend the lower corner near the trash (not *too* close). This folder is for all the stuff you don't have the time or patience to file. It's where you put stuff you haven't made folders for. It's basically the equivalent of that table just inside your

front door where you drop your mail, your keys, and other “things to file.” Call this whatever you want—I change the name of mine occasionally just to keep myself aware of it. Right now it’s called “Put us away, please!” In any case, if you use it and remember to clean it out occasionally, you won’t lose files and you won’t end up with junk all over your hard disk.

Organizing your drive can be very satisfying, even fun. Use your imagination, and find a system that works for you. Don’t feel locked into something if it’s not working for you. I organize by client and project; you might find that keeping a folder for every month is ideal. Play around with it until you get a system you can use consistently. There’s no point in having this great system of multiple cross-referenced files if everything is going in the “file me” folder.

## Questions and Answers

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**Q:** How can names be used as an organizational tool?

**A:** Give files long, descriptive names. Use extensions to tag files. Put letters at the beginning of filenames to keep them together alphabetically.

**Q:** How can labels be used as an organizational tool?

**A:** Assign categories to colors (System 6) to code files. Rename the default labels (System 7) to assign categories and view them in Finder windows. Sort by label to keep files with the same label together.

**Q:** What good are customizable icons?

**A:** Use the same icon for several files to identify them as part of a group. Assign new custom icons to make files more easily identifiable by sight.

**Q:** How can Get Info comments help organize the hard disk?

**A:** They add extra information about your files. Use the Comments field to identify the files and/or group them. Use them to add more discriminating information, categorize files, or show a status line. Sort by comments to group together items with the same comment.

**Q:** How should files be categorized?

**A:** There is no set answer. Use whatever organizational system works for you. A good general technique is to organize by person and project. Give files and folders descriptive names.

**Q:** How should I use System 7's Apple menu?

**A:** Put aliases of your most frequently used applications and files in the Apple menu. Use space characters to change the alphabetical sorting order. Get a hierarchical Apple menu utility.

**Q:** How can aliases help?

**A:** Put aliases in the Apple menu folder. Use them to place copies of a file in a cross-referenced folder. Keep track of files archived to floppies.

**Q:** Where do applications go on the hard disk?

**A:** Give each application its own folder. Don't put anything in the System Folder unless installation directions specifically require it, and don't drag an application out of its folder onto the desktop. Read the installation directions that come with the software.

**Q:** What do application-launching utilities do?

**A:** They create a menu of all available applications from which you can launch the application. Some also substitute one user-selected application for another.

**Q:** How do stationery pads help organize the hard disk?

**A:** Applications can stay in their own folders while stationery pads are placed wherever it is convenient and are used to launch applications.

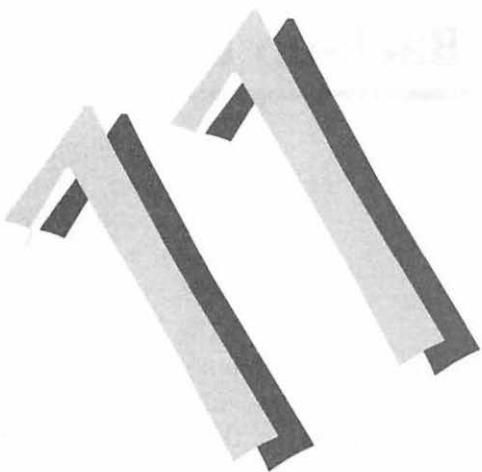
**Q:** What is the one thing one must do to keep a well-organized hard disk?

**A:** For stuff you don't feel like filing or don't have a place for, make a folder—and use it.

## CHAPTER 11 ◊ BACKING UP

Backing up is a critical safety procedure. This chapter covers:

- Backup basics ◊
- Types of backup ◊
- The backup process ◊
- The essential software ◊
- The essential hardware ◊



## B

ack up. Back up. Back up. You've heard it a million times, but do you listen? You've probably heard this, too, but here it is again:

**MURPHY'S LAW OF COMPUTING:**  
**IF YOU DO NOT BACK UP, YOUR HARD DISK WILL FAIL.**  
**WHEN IT FAILS, YOU WILL BE FACING A CRITICAL DEADLINE.**

In essence, backing up is just a matter of copying files to a second storage device. Backing up should be like brushing your teeth: You do it because you should; you do it every night; you don't really think about it; you feel satisfied when you're done.

## Back-up Basics

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Backing up floppies is a simple matter of dragging a file to more than one floppy or of duplicating floppies in the Finder. Backing up a hard disk is a little more involved, but it is not as awful as it is sometimes made out to be. In fact, it can be quite painless.

The most common way of backing up is to copy files to floppies using the Finder. This method is relatively easy and definitely inexpensive. It has its faults, though. Copying files at the end of the day means that you have to remember at the end of the day which files you worked on during the day. That's often not easy. It can also take a lot of time to identify the files and then wait for the Finder's less-than-speedy copying. And if you work on large files (larger than the capacity of a floppy disk, that is), this method doesn't work at all.

If you do want to back up to floppies without purchasing back-up software, there are a few strategies that can make it go more smoothly and give you better odds that you won't miss anything.

### Backing Up to Floppies

Plan to back up at the end of each day, and set aside the time to do it. Prepare your floppies by naming them appropriately (something like "Backup [date] 1"). Then use one of the following techniques.

#### System 7 Method One

As you work during the day, make an alias of every file you work on and put it in a folder on your desktop. Call this folder "today's backup" or something like that. At the end of the day, use the aliases as a checklist to make sure you back up each file to the back up disk. You won't have to rely on your memory to know which files you worked on each day.

## System 7 Method Two

Do a Find command and set the modifiers to All files modified since [the previous day's date] and Show files all at once. When everything is highlighted, simply drag to your floppy, and you are all set. This method is good only if the files you work on are small. If you have more than a single floppy's worth of files, you won't be able to copy them all at once.

## System 6 Method

Copy any file you worked on to a floppy. To help your memory, jot down on your Mac's notepad the name of any file you work on during the day. In fact, you can select the filename in the Finder, copy it, then paste it to the notepad. It's pretty painless, and it will give you an accurate listing of what you've worked on during the day.

Any of these floppy methods will work only if you do it every day. Most people think it's worth it to shell out some money for backup software.

# Types of Back-up

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Back-up software can be configured to do either a complete back-up or incremental back-up. A **complete back-up** copies the entire contents of the hard disk to the back-up media (floppies, tape, and so forth). An **incremental back-up** copies only those files that have been changed since the last back-up.

All good back-up software will perform either kind of back-up, using one of two techniques. Some software replaces the last backed up file with the most recent version. This method uses the minimum of back-up media (the fewest disks, for example) to give you an up-to-date copy of all your files.

Other applications use an **archiving** method, which adds changed files to the back-up without replacing older files. While this takes up more storage space, it has the advantage of allowing you to access older versions of your files.

The most versatile software gives you the option of doing either kind of back-up. A good back-up program will also offer the versatility of backing up according to specific criteria, such as all files since a certain date, or all files of a specific type.

## The Back-up Process

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The procedure for backing up is basically simple. The first step is to back up everything on your hard disk. This can take some time, depending on the size of your hard disk. Figure on approximately ten minutes or so for every 20 megs. (This is only a rough estimate. The speed will depend on the complexity of your files and the performance of your software.)

Once you have backed up the whole drive, every subsequent back-up—which you should perform at the end of each work day—will back up only files that have changed. Unless you work on many files during the course of the day, this will only take a few minutes.

Always keep at least two sets of back-ups. Although this means a little extra work at the beginning (you'll have to back up your whole drive twice), it really will require no more work in the long run. Simply alternate back-up sets on alternate days. This protects you in the event that one set of back-up disks gets lost or damaged. You will still have data that's no more than one day old. For the best security, take one set of disks off-site every night. Then even in the event of fire or theft, your data will be protected.

Ideally, you should keep *three* sets of back-ups. It means allocating a lot of floppies or cartridges or whatever to back-up, but with three sets you can rotate a set off-site and still have two at the office. If this seems excessive, think of this:

Something gets corrupted or crashed and you lose your file. No problem, just grab the back-up, right? So you insert the back-up disk and then discover—it's your drive that's ruining the data. Or maybe it's a Trojan horse (a particularly insidious type of virus that systematically destroys data). It's a little far-fetched, but really, once you've made the investment in the back-up media, it's no harder to use three back-up sets than two.

Some people prefer just to back up documents, relying on original disks for applications. Back-up software will often regard some system software or applications as changed just because you have used them, and back them up. Backing up only documents, the theory goes, will save time. I don't recommend that you back up only documents. Often you'll change settings of control panels, preferences, and dictionaries without even thinking about it. You would want these changes to show up if you were restoring from a back-up.

It only takes a few more minutes to back up the system and application files as well, and you'll be on the safe side. If backing up is like brushing your teeth, making extra backups is like flossing. You know you should; it's really much better for you if you do both; and it only takes a few extra minutes. Get in the habit of backing up everything from the start, and you will not regret it.

## The Software

Many drives come with back-up software. If yours did, try it and see whether you like it. If you don't, or if you don't like the way the software does back-ups, try one of the third-party packages available. Retrospect is a highly regarded archiving program, which lets you modify your back-up and restore specifications at a sophisticated level. You can also schedule automatic, unattended back-ups with this program.

Redux also gets good reviews. It's easy to learn, it's flexible, and it's less expensive than Retrospect. It even lets you do back-up according to type of files (for example, only Microsoft Word files).

Fastback is particularly good for backing up to floppies. It initializes disks on the fly—much faster than the Finder does—so you can throw unformatted disks into the drive with no delay. Also good for backing up to floppies is DiskFit Pro. It saves to floppies in a Finder-readable format for instant retrieval.

DiskTwin is a unique back-up program. It requires a second hard drive. As you work, it automatically duplicates everything you do to the second drive. Your data is always completely current. DiskTwin is expensive, since you need a second hard drive, but it is incredibly easy and transparent.

HD Backup from Apple came with System 6. It is not System 7-compatible and has no plans to be. As for its performance under System 6, well, remember that it's free. It's very slow and it doesn't do incremental backups, so you have to wait forever as it backs up everything.

## The Hardware

You can back up to floppies, tape drives, removable cartridge drives, or to another hard drive. Obviously, a tape, cartridge, or hard drive is preferable from the standpoint that you don't have to monitor the back-up process and continuously insert floppies. Floppies, of course, are cheaper. For more information about backup hardware, see Chapter 5, "Data Storage."

## The Just in Case Emergency Quick and Dirty Back-up

Whenever I finish working on a critical file, I throw that file on a floppy—right then, on a floppy all by itself. In fact, as I work I try to keep a floppy in the drive. Periodically I drag my file over to the floppy in the Finder. This makes for a really recent back-up for important files, which makes me feel more secure. If a file should become corrupted as I'm working on it

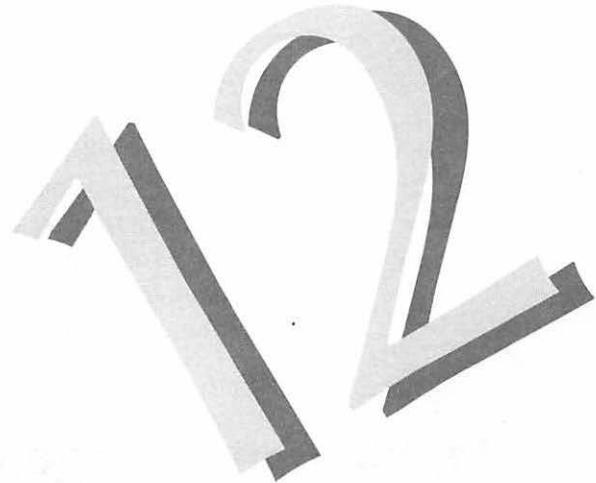
(lightning could strike, you never know), I have a spare copy no more than a couple *hours* old. And it's nice to have around just in case I really mess something up or if I change my mind and want to go back to where I was. When I'm done with the file and it has been properly backed up, I just use the floppy for some other current file.

No matter what method you use, the main thing is that you do *some* kind of backup. I hate to nag, and I'm sure you are tired of hearing it, so I'll stop here. Just back up, will ya?

## CHAPTER 12 ✦ SOFTWARE TROUBLESHOOTING

No matter how close a relationship you build with your Mac, sooner or later it will let you down. This chapter tells you how to prepare for and respond to software problems, including:

- ◆ Preparing in advance
- ◆ Making an emergency disk
- ◆ First steps when your Mac starts acting up
- ◆ Rebuilding the desktop
- ◆ Resolving INIT/extension conflicts
- ◆ Diagnostics and repair
- ◆ Reinstalling the system
- ◆ Reinstalling drivers
- ◆ Zapping the PRAM
- ◆ File structure
- ◆ Types and creators
- ◆ Creating and erasing files
- ◆ Optimization and defragmentation
- ◆ System errors
- ◆ Alert messages



## T

here isn't a Mac user who hasn't agonized over unexpected crashes, erratic behavior, applications that unexpectedly quit, and worst of all, lost data. Frustration with your Mac can be dramatically lessened with some basic knowledge, good maintenance practices, and a solid set of troubleshooting tools.

When it comes to troubleshooting your Mac, there are three key pieces of advice that I hope you will take to heart. First of all, back up regularly. I've already harped on the importance of regular back-ups, so I will not do it to excess here. Just remember, though, that the more you back up, the less time you will have to put in some day when you lose your data. Even the most practical and nonsuperstitious people know that the computer fails only when a) you have a pressing deadline, and b) you haven't backed up.

The second key to troubleshooting is to have a good file-recovery and diagnostics program. I am most familiar with the Norton Utilities for the Macintosh and can recommend it very highly. There are other products that perform similar diagnos-

tics and repair, such as the well-rated Microcom 911 Utilities. I am not familiar with the competitive products, but there are others comparable to Norton Utilities. In this chapter I will discuss using Norton Utilities.

The third recommendation is that you take the time *before* there is trouble to make a handful of emergency disks and keep them at hand at all times. An emergency disk is a floppy disk that you can use to boot your Mac. Once you have started up from a floppy, you can start diagnosing and solving your problem.

## Making an Emergency Disk

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If you have Norton Utilities or a similar product, you already have an emergency disk. Norton comes with an emergency disk that holds system software and the key diagnostic and recovery software. Make several copies of this disk, and put them in convenient locations. You can't have too many emergency disks.

You can also make your own emergency disk. You can restart from any disk that has basic system software on it, but it's a good idea to have a couple of disks around specifically for that purpose. On those disks you can add Apple's troubleshooting software, Disk First Aid. Disk First Aid is a simple and sometimes effective tool. It has a single function, which is to try to repair a damaged hard disk. When you run Disk First Aid, it will either repair your disk or not. It is not nearly as versatile or effective as Norton Utilities and similar packages, but it is a step in the right direction.

### Emergency Disk—System 6

Initialize a floppy disk (either 800K or high-density). Using the Installer from your Macintosh system disks, install the minimum system onto the floppy disk. Alternatively, you can copy the original System Tools disk to the new floppy, and then discard everything except the System Folder and HDSC

Setup. This will give you the basic system software from which to boot your Mac.

To this disk, add Disk First Aid. If you have a non-Apple hard disk, you should install the disk's initialization, or formatting software onto the emergency disk. The initialization software should have come with your disk.

Make a few copies of the disk and lock them. You now have emergency disks.

## **Emergency Disk—System 7**

Making an emergency disk for System 7 is a bit trickier, since System 7 takes up more disk space. An 800K disk will only have room for the software you need to start up. You will not be able to put Disk First Aid or your hard disk's initialization software on the disk. A high-density (1.4Mb) disk will have room enough for everything.

To make an emergency disk for System 7, copy the Macintosh Disk Tools disk from your original system disks. If your Disk Tools disk is high-density, then it has a minimal System 7 already, along with Disk First Aid and HDSC Setup. But if your Disk Tools disk is double density, then it has System 6 on it. Copy the disk a few times, lock them all, and you are set for an emergency.

If you use System 7, I recommend keeping a set of System 6 disks on hand as well as a System 6 emergency disk or two. Often what doesn't work under System 7 will work under System 6—assuming you don't have a newer Macintosh which won't run System 6. Having the resources to do a quick switch of operating systems can be a lifesaver in a pinch.

## **First Step in Times of Trouble**

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Whenever there is trouble—many bombs, applications unexpectedly quitting, dialog boxes, things are particularly slow, or

other peculiar behavior—immediately back up anything that hasn't been backed up already. Then restart. Bombs and erratic behavior are warnings from your Mac that there is trouble in River City. You will not always get warnings—you could just come in one morning, turn on your Mac, and face a sad Mac icon. So if your Mac is courteous enough to give you warnings, heed them.

## Restarting

In many cases, a simple restart can take care of your difficulties. The Mac gets tired, too. Memory gets fragmented, INITs are misallocated, the application heap bumps up against the system heap, and the Mac gets crotchety on you. Restarting refreshes the Mac, clears out the memory, and lets you start from scratch. Whenever your Mac gets peculiar, always try restarting as your first troubleshooting step. It can't hurt, and it could help.

Of course, restarting might *not* help. If your Mac continues to crash or otherwise fails to perform, it's time to move on to other troubleshooting techniques.

## Check Cables

The next step after a restart is to check cables and power cords. This may feel dopey, but it's worth the effort. Ask yourself, is everything turned on? Is your keyboard plugged in? I once came in the office on a Monday morning to find I couldn't get a thing to show up. Not even a sad Mac! Heart-attack city. After a couple of restarts, I realized everything sounded okay—I even heard my custom system-start-up sound. I figured dejectedly that somehow my monitor blew. Then I finally caught on—the office maintenance person had accidentally turned the brightness knob on the side of my monitor all the way down. So: Check the obvious first. There is nothing more humiliating and frustrating than spending hours troubleshooting unsuccessfully, calling a technician for an expensive service call, and then finding out that a cable wasn't properly attached.

Whenever you plug or unplug a cable, *be sure everything is turned off*. You can do serious, permanent damage to your Mac hardware if you leave the power on while you plug or unplug anything. Electrical jolts can zap chips or mechanisms within your Mac. And be sure to turn off *everything*, not just the item you are plugging or unplugging. For example, if you are disconnecting one item in a SCSI chain, be sure *all* items in the chain are turned off, as well as the Mac itself.

## **When You Can't Start up**

It is always disheartening to boot your Mac only to find that you cannot get it to start up. You might be confronted by a sad Mac icon or a flashing question mark, or nothing at all. Perhaps the Mac starts the boot process, but it crashes before the desktop is displayed. You've restarted, checked your cables, and you're sure that everything is on. Now what? When the Mac doesn't boot, don't panic. It is very unlikely, actually, that you will not be able to recover your data.

## **Restart from an Emergency Disk**

When you can't boot your Mac, try rebooting from one of your emergency disks. If nothing happens, try another floppy. It's possible that one of your emergency disks is damaged, too.

If you still get no response, your Mac's hardware is probably injured. You could have a bad chip or electrical component, or an internal connection might be loose or broken, particularly if you hear the "death chimes" (a series of notes) as you start up. See Chapter 13 for some actions to take when you have possible hardware problems.

Once you have restarted from the floppy disk, there are several possible outcomes. We'll look at what can happen, how to troubleshoot the problems, and then take an in-depth look at those troubleshooting techniques.

## Mac Boots and Mounts Your Hard Disk

If the Mac boots and you see your hard disk's icon on the desktop, you are in pretty good shape. Here's the troubleshooter's list:

- Rebuild the Desktop
- Resolve INIT/extension conflicts
- Run a diagnostic and repair program like Norton's Disk Doctor
- Reinstall the System software.

## Mac Boots But Doesn't Mount Your Hard Disk

If, when you restart from the emergency disk, you cannot see the icon of your hard drive, you might need to do a little more work. Try the following:

- Repair the disk with Disk Doctor or Disk First Aid
- Install new drivers
- Replace the System software
- Zap the PRAM
- Resolve INIT conflicts
- Check SCSI devices.

## Mac Boots But Wants to Initialize Your Hard Disk

When you restart from your emergency disk, you find that your Mac starts up fine, but it gives you a dialog box asking whether you want to initialize your hard disk. *Don't do it!!!* Initializing your disk will severely damage your directories. It will confound your efforts to recover data. It might still be

possible at this point to retrieve this data, but it is going to be more difficult. As a rule of thumb, don't ever initialize a disk that you think has good data on it, whether it is a floppy or a hard disk. If you initialize a floppy that you think is good, you really won't be able to get any data back off the disk.

If your Mac is asking you to initialize your hard disk, it is probably because the directory, boot blocks, or driver has been damaged. The directory keeps track of all the files and their locations. The boot blocks are the information on your hard disk that helps the Mac start up. Drivers help communicate with peripheral devices. See chapter 1 for more information about directories and boot blocks.

Damage to these files does not mean you can't get your data back. It also does not *necessarily* mean your drive hardware is damaged. Before you get too concerned: Rebuild the desktop, and run Disk Doctor.

## **You've Tried Everything, and the Mac Still Won't Boot**

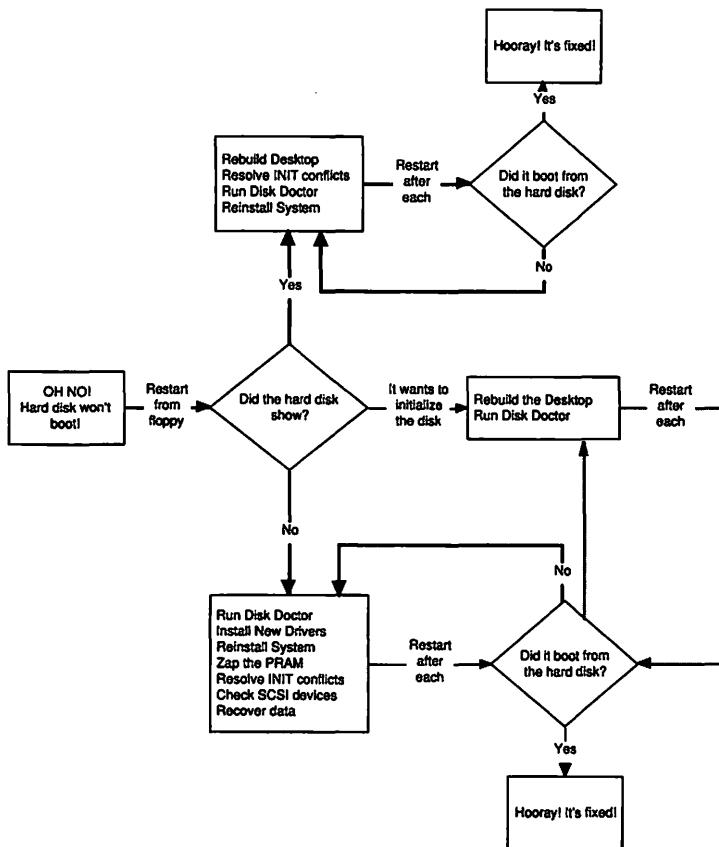
If nothing you do seems to help, you could have a hardware problem. After you have recovered any data that wasn't backed up with Format Recover (or with some other recovery utility), you can start checking for hardware problems. Chapter 13 has more information on what to look for.

## **Troubleshooting Techniques**

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Okay now, let's look at the how-tos of all these techniques. Some of the basic procedures for troubleshooting are summarized in the flow chart in Figure 12.1.

**Figure 12.1**  
A flow chart  
of basic  
troubleshooting  
procedures.



## Rebuild the Desktop

The Desktop is an invisible file—or files—that keeps track of files, names, icons, and locations. It is also responsible for remembering which windows are open, where they have been positioned on the screen, and what view you prefer to see them in. (Do not confuse the Desktop file with the gray desktop of the Finder. They are different things.) The Desktop is a packrat. It keeps everything, including information about old files that have been deleted, old windows, and so on. Sooner or later, the file grows to take up a fair amount of disk space. And unfortunately, the Desktop is something of a slob. With all that obsolete information included, it loses stuff and can't keep things straight. Eventually, it can get corrupted or damaged.

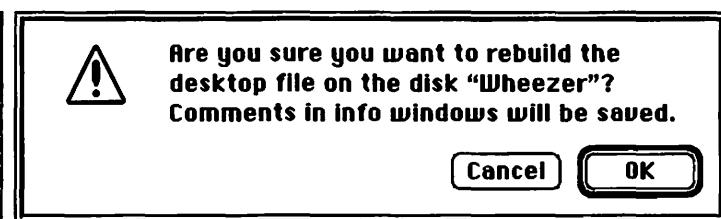
Periodically, you have to do a spring cleaning for the Desktop file. This is done by rebuilding the Desktop. Rebuilding the desktop cleans out all the old junk. It also redisCOVERS some lost information. If, for example, you have icons that are generic document or application icons instead of custom icons, rebuilding the desktop will access that information and give you back your custom application icons.

There's a drawback to rebuilding the Desktop: All comments that you have entered in the Get Info window will be erased. Although this is a problem that *should* have been solved with System 7, it is true of all versions of the System. Fortunately, there are several third-party fixes for this problem. Norton Utilities' Format Recover has a Save Finder Comments option. There is also a shareware extension called CommentKeeper, which will write the comments to a separate file before the System rebuilds the Desktop, and then copy the comments back to the files after the Desktop has been rebuilt. CE Comments from DiskTop performs a similar function.



To rebuild the Desktop file, restart and hold down the Command and Option keys. A dialog will be displayed for each mounted disk, asking whether you are sure you want the Desktop to be rebuilt (Figure 12.2) and warning that you will lose all Finder comments. I have CommentKeeper installed, so the dialog box changes to indicate that the Finder Comments will be saved. Click on the Yes button and wait several minutes (depending on the size of your hard drive)—and that's it. Your Desktop will be rebuilt, although on the surface, things probably won't look much different.

**Figure 12.2**  
When you rebuild the Desktop, this dialog appears for each mounted disk.



System 7 lets you rebuild the Desktop without restarting. From the Finder, hold down Command-Option-Escape (the Force Quit command). The Mac will ask whether you are sure you want to Force Quit the Finder. Click Yes, then hold down Command and Option as the Finder rebuilds itself.

Rebuilding the Desktop is a good idea for regular maintenance. Once a month or so, rebuild the Desktop on any regularly mounted hard disk. This will prevent errors from a damaged Desktop file and keep all your icons up-to-date.

But let's get back to our crashed hard disk. You've tried rebuilding the Desktop, but when you restarted, it still wouldn't boot from the hard disk. Time for the next step. Restart from your Emergency Disk.

## Check INIT/Extension Conflicts

Conflicting or poorly written INITs and/or extensions can be the root of much evil on the Mac. (See Chapter 8 for more information on INITs and extensions.) But how do you know whether that's what's causing the problem? Here are a few signs of INIT, extension, or Control Panel-related difficulties:

- The Mac begins the start-up process, but it crashes before the Desktop appears.
- The Mac seems to loop infinitely through the start-up process, getting just to the desktop and then starting all over again.
- You have just installed a new extension, control panel, or application, and suddenly everything is crashing.
- Every time you invoke a control panel or extension-related function, you crash.
- You are getting seemingly unreasonable memory errors (not enough memory or applications unexpectedly quit).

When seeking to solve an INIT problem, the first question to ask yourself is, "Have I recently installed anything?"

Consider new applications, not just new INITs or Control Panels. Some applications' installers will toss an INIT into your System Folder without so much as a by-your-leave. The last piece of software to move into the neighborhood is usually the one causing trouble.

If the most recently installed software is an INIT, extension, or Control Panel, it's a pretty safe bet that it is the cause of your problem. Remove the offending file and restart. If you have no problems, then you have found the source of the trouble. (I know, I know—you just bought the damn thing, you don't want to get rid of it. We'll get to that in a minute.)

If you don't have anything new, you need to do some detective work to see whether you have an INIT problem before you try to figure out which INIT it is. Restart the Mac while holding down the Shift key. This will disable all INITs completely. If you can restart successfully and everything seems to be in working order, you have an INIT conflict. (Note: Your Mac will not be quite the Mac you are used to, of course, because all INITs have been disabled. You should make sure that the hard disk mounts, that you can launch and quit applications, that you can print, and so on.)



The frustrating thing about INIT conflicts is that they can be so hard to pinpoint. If you use System 6, you can try increasing the System Heap a little bit. Use one of the shareware utilities such as HeapFixer or BootMan. The truth is, it probably won't solve the problem, but it doesn't hurt to try, and on occasion it can help. (See Chapter 8 for more information about the System Heap and INITs).

If increasing the System Heap doesn't work, or if you are using System 7, the next step is to try to isolate the offending INIT. (For the rest of this discussion, I will use the term INIT to refer to anything that loads up during start-up—INITs, extensions, or Control Panels.) If your Mac begins the boot process but crashes before the Desktop appears, it is almost definitely crashing because of an INIT. Restart your Mac as usual (no Emergency Disk) and watch the beginning of the start-up process as the icons parade across the bottom of your screen. Each of those icons is displayed as its corresponding

INIT or Control Panel is loading. Note which icon is displayed right before the crash. Then restart from an Emergency Disk.

Open the System Folder and look for the item that loaded before the crash. See which item follows alphabetically (and is therefore the next to load). If you are using System 7, you will have to look in the Extensions folder or the Control Panels folder, depending on which the last pre-crash item was. Remove from your System Folder the item that loaded just before the crash, then restart.

If your Mac starts up without a hitch, you've found the culprit. If not, try restarting from the floppy and replacing the one you removed. Then remove the INIT that *follows* the last one that loaded (the next one alphabetically within the folder), then restart. It is possible that the system crashed as it was loading and that the icon was not displayed before the crash. Once again, if you can restart successfully, you have found the guilty INIT.

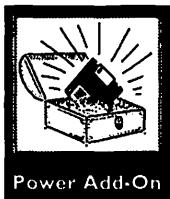
If you still can't restart, you will have to do more in-depth detective work. You might also find that your Mac is loading all the INITs before crashing, or crashing before any load.

Finding a bad INIT can be a time-consuming process. To cut the time down, try working with half your INITs at one time. Move half the INITs from your System Folder to another location on your drive and restart. If your Mac is still crashing, remove half again, and restart again. Continue removing by halves until the Mac is working successfully. When you have isolated a small group, you can continue using the process of elimination until you find the trouble-maker.

Now, let's say you know who the culprit is, but you can't live without the little sucker. INIT conflicts can sometimes be solved by changing the order of loading. INITs are a bit peculiar in how they use memory. Sometimes a temperamental INIT will work only if it goes first, or last, or before some other INIT. Some INITs, like spoiled children, behave only if they get to go first. Try renaming your brat so that it will load before all the others. Make sure, however, that it loads *after* any virus protection you have installed. If that doesn't work, try renaming it so that it loads near the end. Be careful,

though, not to name your troublemaker so that it loads after the INITs that are intended to load last, such as ATM.

There is a simpler way to avoid this torture—software that can help you identify and solve INIT conflicts and problems. There is a free utility for System 7 called Extension Manager, written by an Apple engineer, which lets you turn extensions and Control Panels off and on without having to remove them from the System Folder. More versatile commercial utilities include INITPicker from MicroSeeds and Startup Manager from Now Utilities. Both let you turn extensions off and on. They also let you create sets of extensions to accommodate different requirements, and they allow you to select which set you desire at startup. If you have more than a handful of INITs and control panels, you should definitely get one of these utilities.



Power Add-On

If you have determined that an INIT conflict is not the problem, then it is time to ask the Doctor.

## Disk Doctor



Power Move

Disk Doctor is a part of the Norton Utilities for the Mac package. It provides an easy way to identify and repair problems with your hard disk.

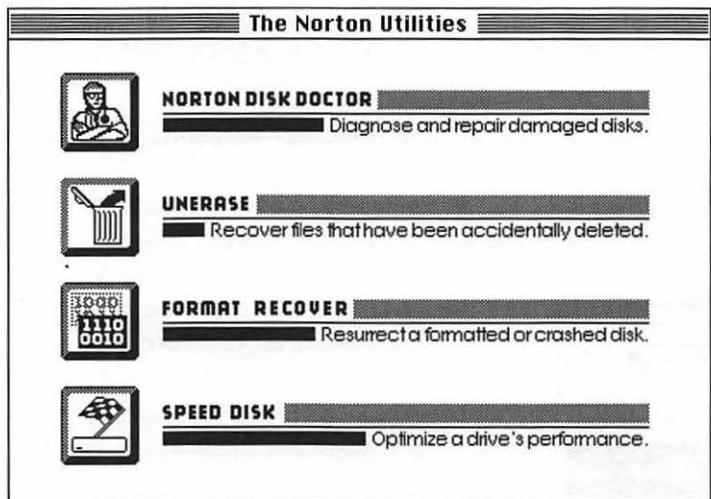
When you launch the Norton Utilities, four options are presented to you (see figure 12.3).

- **Norton Disk Doctor** diagnoses and repairs damaged disks.
- **UnErase** recovers files that have been accidentally deleted.
- **Format Recover** resurrects a formatted or crashed disk.
- **Speed Disk** optimizes a hard disk's performance.

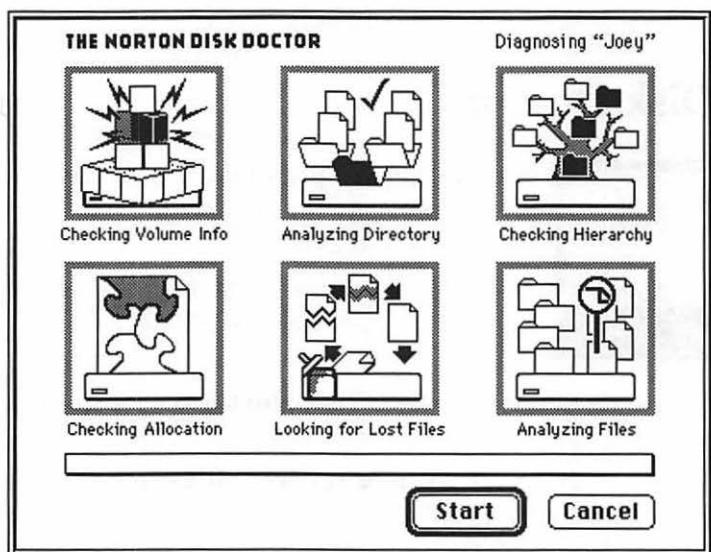
Clicking on Disk Doctor will run a diagnostic program on critical parts of your disk that are common sources of trouble (see Figure 12.4). It examines the boot blocks, all the directory information, the volume bit map, and files themselves. As it

**Figure 12.3**

Norton Utilities offers four troubleshooting options.

**Figure 12.4**

Norton Utilities' Disk Doctor runs diagnostic procedures on critical parts of your disk(s).



proceeds, it will inform you of any errors it runs into, and it can usually fix the problem. When it works, Disk Doctor can be a lifesaver. A few minutes with the Doc, and you can be up and running again.

Of course, Disk Doctor might not be able to fix your problems. Indeed, it might not find any at all! If you still can't boot from your hard disk, you need to move onto the next step.

## Reinstall the System

A damaged System and/or Finder can sabotage all kinds of Mac events, including (especially) start-up. Fortunately, it is easy enough to replace the operating system.

Restart from one of your trusty emergency disks. Open the System Folder on the hard disk and throw away the System file and the Finder file. Empty the trash. You must throw away your old System and Finder before you install a new one. Installing over an existing System and Finder only updates the files; it does not replace them. If you update damaged files, they will still be damaged when you restart.

Once you have thrown away the System and Finder, restart with the first installation disk from your system disks (System Tools for System 6, Install 1 for System 7). Reinstall the system and restart.

## Install New Drivers

Drivers are files that help your Mac communicate with peripherals. Unfortunately, they are easily damaged by crashes or power interruptions. Once a hard disk's drivers are damaged, the drive can crash or refuse to mount.

Your hard disk comes with an application that can be used to install new drivers. It is generally the same software that is used to initialize the hard drive, so make sure you don't do that instead! If necessary, force yourself to read the manual to find out how the software is used to reinstall the drivers for your hard drive. If you have an Apple hard disk, this application is HDSC Setup, found on the System Software Disks.

## Zap the PRAM

This exotic-sounding procedure is actually pretty modest. The **PRAM**, or **Parameter RAM**, is the part of memory that is powered by the Mac's battery. It controls a number of system-wide preferences, including several Control Panel settings. **Zapping the PRAM** resets these functions to their default settings so that you can start afresh. The affected control panels include:

- **General**—cursor-blinking, menu blink, RAM cache (System 6)
- **Keyboard**—key repeat rate, delay until repeat
- **Mouse**—tracking, double-click speed
- **Sound**—beep sound
- **Startup Device**—Start-up device (will default to internal HD)
- **Memory** (System 7)—32-bit addressing, disk cache size.

Once you have zapped the PRAM, you will need to reset these Control Panels to reflect your preferences. The method for resetting the PRAM varies according to which Mac and System software you are using.

### Plus

Turn off the Mac and disconnect the power cord. Open the little door on the back of the Mac and remove the battery. Wait about ten minutes and replace it. You have zapped the PRAM.

### Any Model Since the Plus Running System 6

Hold down Option-Shift-Command with one hand, and choose the Control Panel from the Apple menu with the other. A dialog will be displayed, asking whether you want to zap the PRAM. Click Yes and wait a few moments.

## Any Mac Running System 7

Restart while holding down Command, Option, and the letters p and r. No dialog box appears, but when you hear the start-up sound for a second time, you have zapped the PRAM and you can let go of the keys.

## Check SCSI Devices

SCSI devices can be extremely temperamental. Cable length, order of connection, location on your desk, alignment of the planets, and a number of arbitrary factors can affect their performance. Chapter 13 discusses all the various adjustments you can make to your SCSI devices to improve their performance.

## When a File Is Damaged

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Sometimes a file will fail for no apparent reason. You go to open the file, and suddenly the application doesn't recognize it or can't open it. Maybe you even know why—you crashed while in the middle of saving the file, perhaps. In any case, you need to get into the file *somewhat*—there's important data in there! But first, a little information on how a file is structured.

## File structure

Every data file is constructed of three parts. **Header** data indicates to the application where a file begins. The **body** of the data is the information itself, and the **end-of-file** data shows the software where a file ends. If a file's header or end-of-file (EOF) data becomes damaged, the file cannot be read. However, the data could be perfectly fine.

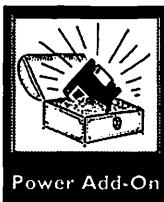
There are, fortunately, ways to access the file, even when it claims to be unreadable. You can access the data through the

Norton Utilities editor. A little easier is CanOpener, from Abbot Systems, Inc. CanOpener can open almost *any* file in one way or another. At the very least, you can access the bulk of the data in a file, even if all formatting is lost. While this is not necessarily ideal, it provides a last resort far better than recreating a file from scratch.

## Type/Creators

Every program uses two codes to mark its files: the **type code** and the **creator code**. These codes tell the Finder which application goes with which file. These are actually fairly logical (unlike many aspects of programming). The creator code indicates which application created the file. The type code specifies which type of file the application made. (Some applications make only one type of file; others make many different types.)

If the type or creator codes become damaged or corrupted, you will not be able to launch the application by double-clicking the file. You might not be able to open the file at all. The data could be fine but inaccessible. If you double-click on a file and get the "Application could not be found" dialog, type/creator codes could be the problem. Fortunately, these are easy to fix with ResEdit or the amazing Set File Attributes shareware application.



Power Add-On

The great thing about type and creator codes is that they are easy to change, and you can use them to trick an application. Do you remember those old elementary-school filmstrips where the mother duck raises the little chicken as her own because someone put the egg under her so she figured it was hers? Well, some applications are that gullible. Tell the application that the file is its type, and it will open and read it. For example, change a PC Lotus file's type and creator to XCEL and XCEL, and the Finder will tell Excel it is an Excel file. (In fact, it will even acquire an Excel icon.) Excel is trusting enough to believe the Finder and will just open it right up.

Another tool for changing type and creator codes is the illustrious ResEdit. ResEdit is a tremendous tool for digging around in files, changing your environment, and generally getting down and dirty with your Mac. Appendix C has more information about this dangerous and exciting tool.

## Creating and Erasing Files

When you save a new file, a part of the operating system devoted to handling new files called SFPutFile offers you the familiar, standard Save dialog box. Once you have clicked on the Save button, the File Manager takes over.

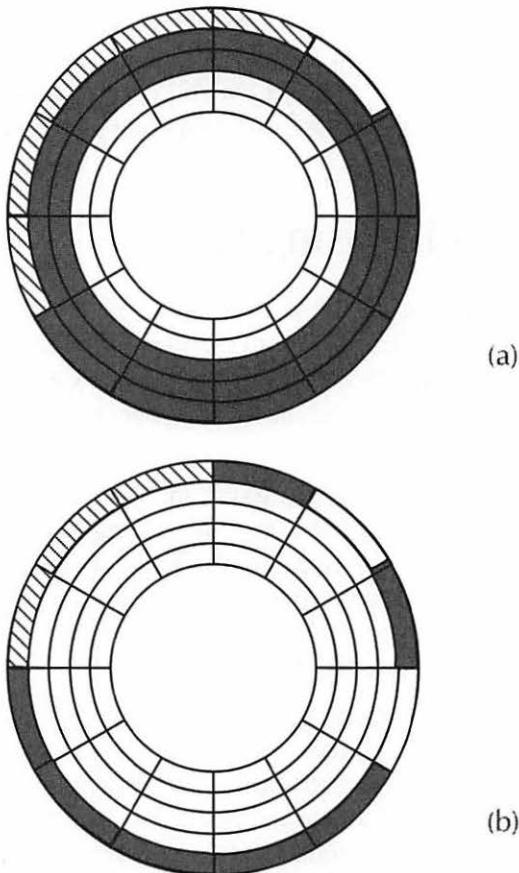
File Manager is the part of the operating system that handles files. It is the traffic manager of your hard drive. When you save a file, the File Manager files its name and the Directory ID number for the folder you want to save the file to, and it gives the file a number for the volume info block. (Go back to Chapter One for more information about the volume info block and Directories.)

File Manager looks at the file to see how much room it will need on the disk. It then consults the volume bit map, the map of your hard disk, to see whether there is a section of the disk that has enough free space for the file you're saving. If it finds a big enough space, it will mark the space reserved and then copy the file from RAM to the space on the disk. Once copied to the disk, the file is permanently saved. File Manager will then record the file's name and directory ID, along with information as to the file's location on the disk, in the hard disk's directory.

The File Manager tries to keep all the data that comprise a file together in contiguous sectors. But the more the disk is used, the more unlikely it is that there will be a block of sectors large enough for every file. The operating system writes the file to whatever blocks it can find. A file scattered across noncontiguous sectors is called **fragmented** (Figure 12.5).

**Figure 12.5**

(a) When a file is saved, the File Manager attempts to write all the data to contiguous sectors. (b) If there is not enough space, the file will be fragmented on the disk.



## Erasing a File

When you erase a file, all the information that the File Manager diligently recorded in the directories is wiped away. The directory no longer has a record of that file. The volume bit map is updated to indicate that the sectors where the file was located are now available for use.

That's it! The actual data still reside on the disk until another file is saved and the File Manager chooses to write the

information to those sectors. At that point, the new data overwrite the old and the old file is really gone.

But until then, it is still possible to go back and get that data. Fortunately, there are programs that will do the detective work for us. Norton Utilities comes to the rescue once again with the UnErase feature. UnErase will scan the disk looking for the file you have inadvertently deleted and can usually recover at least part of the file. If you have taken precautions and installed Norton's FileSaver before you ran into trouble, it should be able to find the file easily. FileSaver keeps track of old directory information that you have wantonly deleted, so that the UnErase program can find out where the file was kept.

One of the obstacles to easy recovery is fragmentation. As more and more files are saved and erased, it becomes less and less likely that the File Manager will be able to find contiguous sectors for the data. Fragmented files are more difficult to recover than whole files. They could show up during your recovery process as several files, which will need to be reassembled.

It is a good idea to optimize your hard disk regularly in order to prevent fragmentation difficulties. This is discussed below.

## Maintenance

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### Optimization

One of the processes that can improve your hard disk's performance is known as **optimization**. Optimization consists of two parts: **defragmentation** and **blocking bad sectors**.

#### Defragmentation

Files are frequently fragmented—and you will probably not notice for some time if your disk is fragmenting. However, if the fragmentation gets bad enough, it will start to take a long time for the Mac to put the files back together before you can

use them. It will take longer for applications to launch, and longer to access files. It will also add excess wear-and-tear to your hardware as the read/write heads access the disk over and over again, searching for the correct sectors. And of course, if your hard disk should fail and you need to recover data, fragmented data will be harder to recover.

Defragmenting the disk is easily done with software like Norton's Speed Disk, part of the Norton Utilities. Defragmenting reorganizes all the data so that each file is written to continuous blocks. Before optimizing your hard disk, you should back up all your data.

### Blocking Bad Sectors

The second part of optimization is blocking bad sectors. Bad sectors (or bad blocks) are sectors on which the magnetic structure has become damaged or weak. An optimization program will scan the disk for these bad sectors, move the data from them to a secure area, and mark the sectors as unusable—that is, it will *block* them. The next time the operating system is looking around for places to write data, it will avoid those blocked sectors.

## When All Else Fails

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If you have tried everything and still can't get your disk to boot, you still haven't lost everything. If the disk will mount when you start from a floppy, you can back up anything you need. Then you will need to reinitialize your hard drive with the software provided with the drive. This will erase all data, so make sure you have everything backed up and all your original disks ready to reinstall software.

If you can't get the drive to mount at all, you can *still* recover data. The newest version of Norton's utilities package includes SUM (Symantec Utilities for the Mac). SUM provides comprehensive recovery utilities that let you recover almost

anything. It can be a tedious process, but it definitely beats losing data! Once you have recovered everything you need, you can reinitialize your drive and start fresh.

## Other Software Troubleshooting

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There are so many ways in which the Mac can crash, files can fail, and applications bug out that it is daunting to consider them all. However, there are a few things you should know when the Mac starts getting weird on you.

### System 7's Force Quit

System 7 has a built-in escape hatch for when an application freezes up or crashes. Pressing Command-Option-Escape will quit out of the foremost application. You then have the opportunity to save your work from any other open application before restarting (which you should do immediately after saving your work).

### Desk Accessories Under System 7

If System 6 DAs crash under System 7, try running them from a suitcase with Suitcase II or installing them in the System file. (To install DAs into the System file of System 7, just drag the suitcase to the system folder. The Mac will handle the rest.)

### “Application has unexpectedly quit”

If you get an “Application has unexpectedly quit” alert box, the Mac is trying to tell you something. Consider it a low-level crash, and save your work and restart immediately.

## Increasing the Finder Memory

If the Finder is running out of memory, you will get dialog boxes telling you that the Finder cannot open any more windows or asking you to close windows or quit applications. To add some breathing room for the Finder, you can increase its application memory size. Just select the Finder and choose Get Info from the File menu. Add 100K or so to the memory size. If you are using System 7, you will need to restart from a System 6 floppy first, as System 7 does not allow you to change the Finder's application memory size.

## When You Need Help

The best way to get good technical support is to know your problem. Be prepared to answer questions about what kind of hardware you have, what version of the system software you are using, what application or applications aren't working, and what INITs and Control Panels you are using. Write down the ID numbers for any bomb message you get as well as exactly what the bomb says. Note the order in which the bombs appeared. Document how often the bombs appear and what you were doing right before each crash.

Before calling anyone, check your manuals! If you can't find a solution for your problem in the manual, *then* call. Have all the information described in the preceding paragraph ready when you call. If possible, be in front of your Mac when you call. And if (heaven forbid) you have to hand over any hardware for repairs, either to a technician or a manufacturer, include all the information you have documented as well as the details of any telephone conversations you have had regarding the problem. Meticulous recording of this information will save you a great deal of time and stress when dealing with technical support people, and it will make them happy, too. They will be more willing to help someone who has done the homework.

## Read the You-Know-What

We all know and love the short learning curve and famous interface that lets us learn Mac software so easily, but you can save yourself some serious heartache if you'll just crack the manual every now and again. And you might learn some really interesting new things about your software in the process. If you are having trouble with your software, a look in the manual could be all it takes to find a solution.

## Identifying System Errors

When the system bombs, the error messages displayed are less than helpful. "Sorry, a system error occurred. ID = 02." Well, thanks for clearing that up! With system 6.0.7, Apple added descriptive messages. These were either a practical joke or a demonstration of why programmers should not write for the rest of us. My personal favorite: "Internal error: bad hole record index detected by line walker." I'm so glad we cleared that up.

Actually, the translations of the individual messages is not terribly critical. As a rule, the end-user does not need to know that a -51 is a rfNumErr, or a refnum error. And though I feel bad for the Mac knowing that a -66, or a noNybbleErr, means the Mac couldn't find five nybbles in two hundred tries, it doesn't really solve any problems. There is a free desk accessory by Bill Steinberg that defines all system errors in these terms for those who are interested.

For the rest of us, it helps to know the *type* of errors you are getting. Some errors present an alert box, which can be dismissed with a click. More serious errors will be accompanied by an ID number. The most serious errors, of course, cause crashes. Table 12.1 outlines some of the basic system-error information. Some of the more common bombs are described in Table 12.2.

**Table 12.1**

Basic system error information

Number	Specific Errors	Type	Comments
-17 to -28		I/O Errors	Check SCSI arrangement and cables and/or reinstall the drivers.
-19	Can't read from the disk		
-20	Can't write to the disk		
-33 to -61		File errors	File could be damaged or corrupted. Try UnErase or other recovery software.
-39	End of file error		
-40	Can't find header (start of file)		
-41	Memory full		
-42	Too many files are open		Close some files.
-43	File not found		File is missing or damaged. Can also be an error saving file. Try using save as command.
-45	File is locked		Adjust attributes. Check for locked file in Finder.
-47	File is busy		File is in use.
-49	File already open		
-53	Volume ejected		Mac is trying to access a volume that has been ejected or that it thinks has been ejected.
-54	File is locked		Mac cannot write to a file that is locked.
-57	Not a Macintosh disk		Disk is not formatted for use with a Mac or the Mac thinks it isn't. Don't initialize a disk you think is good!

Number	Specific Errors	Type	Comments
	-58	Filing system error	Directory could be damaged. Use Disk Doctor.
	-61	Writing error	Mac cannot write to a read-only file.
-64 to -81		Disk Errors	Problems with disks. If not a power or cable problem, try restarting with new floppy and reinstall drivers.
	-64	Drive not connected	Check power and cables.
	-65	No disk inserted	Reinsert floppy. Check cables and power.
-85 to -88		Clock-chip Errors	Zap the PRAM.
-91 to -98		AppleTalk Errors	Check that AppleTalk is on. Check cables and verify that on network is turned on.
-1024 to -1029			
-1096 to -1105			
-3101 to -310			
-100 to -102		Scrap Errors	Try reinstalling system.
-192 to -195		Memory Errors	Restart to clear memory. Reinstall system. Add more RAM if problem persists.

**Table 12.2**

Some common bombs		
	01	Memory error. The Mac is looking for memory that isn't there. This could be a software problem (bug) or a hardware problem. Try reinstalling the software. Check for INIT/extension conflicts.
	02 and 03	Most common on older Macs with 68000 chips, it usually means that there is a software incompatibility or bug.
	06	The application is pushing the limits of the memory. Probably a bug or incompatibility.
	07 to 12	Internal Macintosh errors. Software could be incompatible or possible hardware error.
	13 and 14	Interrupt error. Operations have been interrupted (did you accidentally press the programmer's switch?) Restarting could help.
	16 to 24	System file is corrupted or damaged. Reinstall the system software (remember to trash the old one first).
	25	Memory is full. You either need more RAM or the application made a mistake. Quitting applications and/or restarting could help.
	26	Application launch failed. Reinstall the application and/or the system software.
	27	The volume bitmap is damaged. Try reinstalling system. If that isn't effective, try Disk Doctor.
	28	The "stack ran into the heap." Application memory collided with system memory. Restart and try again. Install more RAM if problem persists.
	33 and 35	More memory errors. See above.

## Alert Dialogs

A number of Alert dialogs give textual messages. Knowing what they mean can reduce alert-phobia, since most are relatively benign. Table 12.3 explains some of the more common Alert messages.

**Table 12.3**

Some  
common  
Alerts

<i>Disk Errors</i>	
	<b>Disk needs minor repairs.</b>
	<b>Do you wish to repair the disk?</b>
	As scary as that sounds, it is not a big deal. The Desktop file has been damaged. Repairing the disk merely rebuilds the Desktop.
<b>Disk full</b>	
	Pretty self-explanatory—the disk is full. Even changing the name of a folder requires a little bit of disk space. You might rebuild the Desktop for a few extra K-bytes.
<b>Disk is unreadable or not a Macintosh disk:</b>	
	<b>Do you want to initialize it?</b>
	If the disk is not a Mac disk or is unformatted, all is well. Go ahead and initialize. Otherwise, either the Desktop file is corrupted or the disk itself is damaged. Check that the floppy can spin freely. Rebuild the desktop. Try Disk Doctor.
<i>File Errors or Finder errors</i>	
	<b>Error saving file</b>
	Try using a Save As... command to save the file under another name. If that doesn't work, try saving to a different disk. Restart.

*Continued on page 260...*

**Table 12.2**  
...Continued

**Items cannot be duplicated or copied**

Selected file or files are locked or open. Copy files individually to find the problem file. Close or unlock the file and try again. Restart and try again.

**File couldn't be written or was skipped**

This annoying error shows up during file copying or moving, usually when you are trying to do too many files at once. Copy the files one at a time. If a file won't copy, it might be damaged. Open the file and Save As... with a new name. Call the Disk Doctor if the file won't open.

*Application errors*

**The application is busy or missing**

I really hate this one. The application might be missing or damaged, someone else on the network is using it, or it can't recognize the file you are trying to open. Check that the application is in working order by opening a different file. Check the file's type and creator codes.

*Memory errors*

**Not enough memory to...**

Another self-explanatory one. Try quitting applications and closing windows. Increase the application memory size for troublesome applications. Install more RAM.

**The application has unexpectedly quit**

Once again, you have run out of memory. Quit other open applications. Increase the application memory size for the program that quit.

The Mac can be temperamental, without a doubt. The Mac will sometimes behave in ways that just don't seem reasonable—and the causes of these behaviors are what I like to call "moderately obscure." But most of the time, you can isolate your problem and eliminate it. It's rare that you will actually lose data, and even rarer that you can't recover at least part of your data. And after all...you did back up, didn't you?

## **Questions and Answers**

- Q:** What are the three basics of troubleshooting preparedness?
- A:** Back up regularly, have a good file-recovery and diagnostics program, and make several emergency disks in advance.
- Q:** What is an emergency disk?
- A:** A disk with basic system software and troubleshooting software such as Disk First Aid.
- Q:** What's the first thing to do when things go flooey?
- A:** Restart and try again.
- Q:** What if that doesn't work?
- A:** Check the cables (after turning off all the power).
- Q:** What should I do if I can't start up my Mac?
- A:** Restart from an emergency disk and try to mount your hard disk.
- Q:** What are some of the things I should try in order to fix the problem?
- A:** Try rebuilding the desktop, resolving INIT/extension/Control Panel conflicts, or zapping the PRAM. Run a diagnostic and repair program like Norton's Disk Doctor. Reinstall the system software. Check your SCSI devices.
- Q:** Can I get data back if my drive is really damaged?
- A:** Yes. Usually it is possible to recover all or most of the data on a crashed drive. Use SUM (part of the Norton Utilities package) or similar data-recovery software.

**Q:** What happens when a file is erased?

**A:** The directory information is eradicated and the sectors on which the file resided are marked as available. The actual data is not erased until a new file is written over the old data.

**Q:** What is optimization?

**A:** Optimization consists of defragmentation and blocking bad sectors. Defragmentation moves data on the disk so that files are located on contiguous sectors. Blocking bad sectors is the process of marking sectors that have gone "soft" as unusable.

**Q:** What should be done before I call tech support?

**A:** Read the manual. If the answer you need isn't there, prepare a record of the problems you have had and the actions that led up to them.

## CHAPTER 13

## HARDWARE TROUBLESHOOTING

When the Mac's hardware gives you trouble, you can be prepared and save yourself some anxiety and some dough. In this chapter about hardware troubleshooting techniques, you'll find out about:

- ◆ Preventing problems
- ◆ Safety precautions
- ◆ Opening the Mac
- ◆ Cleaning the Mac
- ◆ Recognizing hardware problems
- ◆ Solving hardware problems
- ◆ Checking SIMMs
- ◆ Fixing sticktion
- ◆ Getting bugs out of the hardware
- ◆ Upgrading memory
- ◆ Adding boards to the Mac
- ◆ Upgrading a hard drive
- ◆ Solving monitor problems
- ◆ Solving floppy-disk problems
- ◆ SCSI chains, addresses, termination, and other kinky stuff
- ◆ When to leave the Mac on and when to turn it off



## **Preventing Problems**

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Many hardware problems can be prevented with a little maintenance. It is a strange phenomenon that people who are otherwise responsible owners of electronics don't do anything to maintain their computers. Would you allow clumps of dust and crud to accumulate in your CD player? Probably not. But unless you've recently cleaned it, your Mac probably has all kinds of crud inside of it. Much prevention consists of simply keeping your Mac clean.

Another important part of prevention is having the right working environment, and essentially that means using common sense. Keep your work area clean. Avoid smoking around the Mac. Keep food away from the Mac, particularly spillable food. Don't keep the computer in a room that gets too hot or too cold.

To prevent damage to both your Mac and yourself, you must take proper precautions when opening your Mac's case. So first, a look at safety.

## Safety Precautions

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Computers are susceptible to electrostatic discharge, a.k.a. static electricity. Static electricity is the electrical charge caused by friction. The same shock you get when you walk across the carpet and then touch a doorknob can fry a computer chip beyond recognition. Therefore, you should make sure you ground yourself before opening a Mac.

If you have one of the compact Macs (a Plus, SE or SE/30), it is much more difficult to perform hardware repairs or upgrades. It can also be more dangerous, both to you and your equipment, because of the high voltage stored in the Mac's CRT (over 9,000 volts, even when turned off—enough to kill you). Anyone who wants to work on one of these Macs should watch someone else do it first, or do it with the guidance of an expert. Contact your local user group; many offer instructive seminars in which you can learn from people who know what they are doing.

Modular Mac owners have it a lot easier. You can pretty much poke around with impunity—as long as you are grounded and everything is turned off. To ground yourself, you will need a **grounding strap**, which is available at any electronics or computer store. It's a strap that wraps around your wrist and connects to the computer chassis or the power cable. It carries the charge you collect as you move around away from the computer's delicate chips and into the metal frame or to the ground.

## Opening the Box

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First things first: *always remember to turn everything off before you connect, disconnect, or open anything!*

Whenever you start assembling or disassembling your Mac, you must be very meticulous. Keep track of all your screws, and note how each device is connected to the next. It will be of great comfort when you are reassembling.

Opening the modular Macs is very easy. At the back of the case is a single screw (which, if anyone has ever opened your Mac before, is probably already lost). Remove this screw, then press on the two latches at the back of the Mac. Tilt the lid up. That's it! Just a note: The Mac IIs have an unusual feature to their case. When you lift the lid, it will make a hideous cracking sound, as though you just did irreparable damage to the box. Don't worry, you haven't done anything wrong; it is *supposed* to sound like that.

## Cleaning the Mac

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It is a good idea to clean your Mac on occasion. The dirt, dust, hair, smoke, and crud that accumulate inside the Mac's case might eventually work their way into critical components of the Mac and cause problems, possibly even loss of data. Dirt also can block the Mac's cooling system and cause it to overheat.

Open the case of your modular Mac. (Again, I think compact Mac owners are best off leaving repairs to the professionals. There's a consolation, though—the design of the compacts makes them much less susceptible to the kind of dust and crud that modular Mac owners will need to clean out of their Macs.) You will see your hard drive and floppy drive (or drives) side by side on a metal frame at the top of your Mac. To clean your Mac properly, you'll need to remove the drives. You need to remove the drives to add memory or do other repairs anyway, so it's a good thing to know how to do.

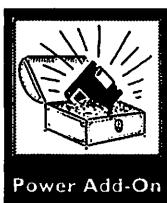
## Removing the Drives

The actual construction of the innards of the Mac is pretty basic. The drives are screwed to a plate, which in turn is

screwed into the case. All of the delicate components of the Mac are attached to the **motherboard**, which is the circuit board at the bottom of the Mac. The motherboard holds all the chips in your Mac, the CPU, and the SIMMs. But let's get back to the drives. To remove them, unscrew the four screws that hold the plate into the case of the Mac. The drives will be attached to the plate. They will also be attached to the motherboard below it by a thick cable. The cable can be unplugged by gently moving the tabs at each side outward, then pulling up. As you unplug the cable, note which side faces in which direction, so that when you reassemble the components the cable will not be turned around. If there is no easy way to remember, you might want to put a sticker on the cable to indicate "this side up."

## Cleaning out the Mac Case

Once you have removed the drives, you will probably see dust balls and crud. (This is a messy job, so be prepared.) Pick out whatever you can with your fingers. The best tool for finishing the job is a can of compressed air, available at photography supply stores and the more informed computer stores. Compressed air is sort of nothing-in-a-can—air with an aerosol propellant that forces it out through a small tube. You can work the tube into the small crevices in your Mac to blow the dirt out of it. Blow air over the surface of the motherboard and into the corners. If you don't have compressed air, do the best you can with your lungs, but be forewarned—you are looking at major dust in the face.



## Cleaning the Floppy Drive

The mechanism on a floppy drive can become jammed or sluggish if it gets dirty. Dirt can also jam the mechanisms that rotate the disk and move the read/write heads. If you find that disks seem to stick when they are ejected or

inserted, or if you are getting lots of disk errors, it's time to clean your drive.

Turn everything off. Open the Mac and remove the plate with the drives attached to it. You will need to remove the floppy drive from the plate to clean it well. The entire floppy drive is encased in its own shell. The shell is screwed to the plate, usually with four screws (it depends on the model). If you unscrew the screws, the drive will lift off the plate.

Once you have removed the drive, it is time to blow the air out. Once again, haul out the compressed air. (If you must use your lungs with this one, you won't get the dust on your face.) Blow the air from the back end of the drive case out through the front, where you would insert the disk.

## Cleaning the Mouse

If your mouse seems jumpy or unresponsive, it probably needs to be cleaned. Cleaning the mouse is quite simple. First turn off the Macintosh, then disconnect the mouse and turn it over. You will see a plastic ring with two notches on the bottom of the mouse. This ring holds the ball inside the mouse. Turn the ring counterclockwise to line the notches up with the notches beneath them. Turn the mouse over and hold your hand underneath to catch the ball and the ring. You might need to tap the mouse on your palm to release the ring.

Clean the rollers inside of the mouse. You can use a cotton swab and alcohol to wipe the rollers clean. Another effective way to clean is to scrape the rollers gently with a straightened paper clip or toothpick. I generally find the paper clip the most convenient at the office, since I don't, as a rule, keep swabs or toothpicks in my desk.

Clean the ball by wiping it with a soft, dry cloth. Do not use alcohol or anything else on the ball. Blow into the mouse's case to get rid of any remaining dust and crud. Drop in the mouse ball and replace the ring.

## Cleaning the Keyboard

The keyboard is a pretty hardy piece of equipment. It certainly gets more punishment than any other part of your Mac. Not only does the keyboard get constant use, it also tends to be the recipient of dropped crumbs, spilled coffee, and general detritus, so it's not altogether surprising that the keyboard may occasionally malfunction. Fortunately, it is easy to fix.

The most common ailment the keyboard will suffer is the missing letter. You are typing along happily one day, and suddenly a letter disappears. Or a key will seem to stick. Once again, it's time for a little house-cleaning. Turn off the Mac and unplug the keyboard.

Remove the top of the keyboard by unscrewing the two screws on the bottom on either side. Clean the stuck key with a cotton swab dipped in water or alcohol. The keyboard, unlike other components of your Mac, can be washed with water without sustaining any damage. Give it a good damp scrubbing to get all the nooks and crannies clean. The key is just to *let it dry completely* before you plug it back into the Mac!

## Recognizing a Hardware Problem

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It can be difficult to pinpoint hardware problems, but there are a few signs that make it easier to identify them. The first of these signs is the Sad Mac.

Usually, when you start up your Mac you will see a Happy Mac—a Mac icon with a happy face. The cuteness of this can be unbearable the day you start up the Mac and see the Sad Mac—you guessed it, a Mac with a frowny face. The Happy Mac indicates that the Mac has passed its own internal self test, called the **POST**, or the **Power On Self Test**. The POST checks that all components are working. If the POST fails, you will see the Sad Mac.

You might also hear what I like to call the death chimes. When you start up your Mac and all is well, the Mac plays a chord (C major, I think, depending on what model Mac you have). When all is not well, you will hear a broken chord (an arpeggio). This chord always indicates a hardware problem, not a software problem. It is not, however, a cause for panic (necessarily). It could be something as simple as a SIMM that is not firmly seated in its socket—an easily solved problem.

Another way to determine that yours is a hardware problem is by the process of elimination—your Mac is crashing, freezing, and generally behaving badly, and you have tried every possible software solution. Must be the hardware!

## What To Do with a Hardware Problem

If you start up and hear the death chimes, turn off everything and wait a few minutes. Then restart. Sometimes the Mac will fail the POST test when it is a **cold boot**—starting up after being off for a long time. Restarting a few times might “warm it up” enough to take care of the problem.

Still no luck? Time to check the obvious: our old friends, the cables and power. Turn everything off and check the power cord at both ends—unplug it completely and replug it into the sockets, tightly. Restart.

Still hearing the death chimes, huh? Time to crack open the box. The mechanical parts of the drive and the day-to-day movements of the box it comes in (tapping, jiggling, bumping into your desk) can eventually work some of the connections loose. Turn everything off. Check all the cables and connections *inside* the case—in particular, check the cables connecting the drive(s) to the motherboard.

Restart once again. (Incidentally, you can restart your Mac with the case open, as long as everything is plugged in as it should be. You will notice, however, that it will be a lot louder!) Okay, so we have restarted a couple of times, checked the power, checked the outer cables, checked the internal

cables, restarted... and it's still not working. Time to check for loose SIMMs. Those SIMMs really get around, and SIMMs improperly seated in their sockets are a very common cause of the death chimes and other problems. Remove the plate with the drives and disconnect the drive cables. Underneath, on the motherboard, you will see the SIMMs in their sockets. If you don't know what they are, read the section on upgrading memory a little later in this chapter. Check that each SIMM is firmly seated in its socket between the clips. Confirm that each is straight up and down, that it is aligned in its socket, and pushed all the way into the socket. Place the drive plate back into the box, reconnect the cables, and restart. You needn't screw the plate back into the case until you are sure everything is working right.

Now, if everything is *not* working right, it's time to rob from the rich and give to the poor. If you have access to an extra SIMM the same size and speed as the ones in your Mac, you can test for a bad SIMM much as you test fuses in a fuse box. (Again, if you want to know more about SIMMs, read the section on upgrading memory later in this chapter.) If you can, snag a working SIMM from an unsuspecting friend's Mac. One by one, replace the SIMMs in your Mac with the borrowed SIMM, restarting after each. Keep track of which is the borrowed one! This may sound tedious, and it is. But it can save you a lot of money, time, and stress, since it may save you a trip to the shop. After all, if you have to take your Mac in for servicing, you will lose the use of it for a fair stretch of time and you'll have to pay for the privilege. Not to mention the fact that you have to haul the thing back and forth.

Back to our testing. If you find that the Mac will restart when you replace a particular SIMM, you have found your culprit. You have a bad SIMM. Lucky for you, SIMMs are relatively inexpensive to replace and you can do the work yourself. (I say *relatively* inexpensive because, depending on the amount of RAM on the SIMM, it will cost from around \$5 to \$130 to replace it. By comparison, if you have a problem with the motherboard, it could cost several hundred dollars plus labor.) Purchase a replacement SIMM from one of the good mail-order resources (see Appendix B) and replace the dud

with your new SIMM. *Voilà!* It's all better. Be sure to return the purloined SIMM to its rightful owner.

If you know no one from whom you can beg a tester SIMM, you might want to consider purchasing a "spare," depending on your financial resources. It's a form of insurance for your Mac. It's not likely that a SIMM will fail, but if one does, you can identify the problem and fix it within an hour, all for the cost of the SIMM you bought "just in case." If it turns out that something else is causing the problem, at least you know that you didn't spend a lot of money in service fees finding that out, since you will be able to tell your technician that you have been able to rule out SIMMs as the source of the problem. A one-megabyte SIMM runs around \$40 dollars. An hour of labor at a service store can cost up to \$100. You do the math.



Power Move

## When All Else Fails

If you have tried everything in this chapter and you still hear the death chimes, you could have a damaged power supply or a problem with the motherboard. It's time to call your friendly neighborhood technician. When you do, be sure to discuss with him or her not only what happened (when and how the Mac failed) but what you have already tried. Although the techniques laid out here are basic, they are the first steps a technician will take, and you will pay for the time it takes to do these diagnostics!

## Sticktion

**Sticktion** is a delightfully onomatopoeic name for the phenomenon in which the heads on the read/write arm stick to the platter of the hard drive so that the platters cannot spin. Sometimes the problem is that the arm sticks in one position. The platters will spin, but the arm can't move to the correct track on the disk.

## Recognizing Sticktion

Sticktion is most recognizable to the ear. If you can start up your Mac (from another disk) but you can't mount your drive, listen carefully. You will hear the drive's fan but not the spinning sound of the drive itself or the slight scratch of the access sound. Or you might get the drive to boot, but it sticks when you try to access data. That is the arm sticking. Listen for the sound of the drive booting and then stopping.

Sticktion is a defect of the drive. If you think you have sticktion, get the diagnosis confirmed by an authorized technician, because you are going to have to duke it out with the manufacturer of your drive. You need to get your disk replaced. Some of the Quantum drives used in older Macs were particularly bad about sticktion—so much so that Apple had an official free-replacement deal for a time. In any case, if you have sticktion, take it up with the maker of your drive.

## One More Obscure Possibility

It's pretty unlikely that you will have this problem, but I have such a great Helpful Hint for it that I must share it with you. You might have...real bugs! Yes, real live bugs. It's possible for ants, gnats, termites, and other itty-bitty bugs to get into your Mac's case and even (yecch) nest there. And yes, they can damage the Mac. You will have to gas 'em to get rid of them, as you won't want to spray inside your Mac. But the fun part is keeping them out. The best way to do it is with...drumroll please...pantyhose! Cover the vents and disk slot of your Mac with pantyhose. Cut off the legs and slide the hose over the Mac so the crotch is at the back. When you are away from your Mac, tie the opening at the front shut to keep out the critters. If you live in a really buggy area, you might consider it!



# Adding Things and Improving Things

Sooner or later, you will want to upgrade your Mac in one way or another. Some upgrades are easy to do yourself. The most common upgrade, and probably the first you will want to do, is to add memory to your Mac.

## Upgrading Memory

As with other tasks that involve opening the Mac, compact Mac owners should probably leave the upgrading to a professional. But for modular Mac owners, adding memory is a cinch.

Each Mac model has a slightly different configuration of memory. Some have RAM soldered in. All except the PowerBooks and Portable have rows of sockets for adding SIMMs. The rows are clustered in groups of two or four called **banks**. Table 13.1 shows each Mac's memory configuration.

**Table 13.1**  
Memory configurations for Macs

Mac (Model)	RAM soldered in	Number of Banks	Sockets per Bank
Mac Plus	0	2	2
SE	0	2	2
Classic	1	1	2
Classic II	2	1	2
LC	2	1	2
IIxi	1	1	4
LC II	4	1	2
SE/30, II, IIfx	0	2	4
IIfx, IIci, IIcx	0	2	4
Quadra 700	4	1	4
Quadra 900, Quadra 950	0	4	4
Portable	1	0	0
PowerBooks	2	0	0

When you open the Mac and remove the drives, you will see your Mac's motherboard. Look for the banks where the SIMMs go. You will see the groups of sockets. Filled sockets will have thin strips of plastic, the SIMMs, set on edge in the slot. Adding memory is simply a process of popping SIMMs into the empty sockets or removing the existing SIMMs and replacing them with higher-capacity chips. When you purchase your SIMMs, be sure that they come with instructions (most do). The instructions will guide you through the process of installation.

There are just a few things to remember about installing memory. Each bank must always be completely full or completely empty. A bank of four cannot have one, two, or three SIMMs in it; it must have a set of four. Each set of SIMMs (enough to fill each bank) must be the same size. You cannot have one-megabyte SIMMs in three of the slots and a four-megabyte SIMM in one slot; all four must be either one meg or four megs.

The Macs that have more than one bank of SIMMs have a hierarchy to them. If you are going to leave a bank empty, you should put the SIMMs in the bank with the higher priority, which is commonly called Bank A. On the Macs with two banks, the bank on the right (as you face the bank) is always Bank A. The Quadra 900 and 950, with four banks each, are a bit trickier. As you face the front of the Mac, Bank A is the set of four at the upper left. Obviously, on the Macs with only one bank, all sockets must always be filled.

Since Bank A has the highest priority, it should have the higher-capacity memory if you are combining 1Mb SIMMs and 256K SIMMs. If you are adding higher-capacity SIMMs (4, 8, or 16Mb), you must consult the installation directions for proper placement.

If you are upgrading an older Mac, you will be replacing 256K SIMMs with 1Mb or higher-capacity SIMMs. These days, there is very little market for 256K SIMMs. You probably won't be able to sell them (or even give them away). But resist that temptation to turn them into contemporary jewelry. If you keep them around for emergencies, you won't be sorry. One



day you might hear the death chimes or find that you can't boot because you have a bad chip on one of your 1Mb SIMMs. You'll be glad to limp along with your old memory rather than lose the use of your Mac altogether.

If you need more information about RAM, please review Chapter 3, *Memory*.

## Adding a Board

Adding video boards and accelerators can be simple. You may be concerned that this type of upgrade will void your warranty, since the warranty warns that you will be beheaded if you so much as think about opening up the box. Well, something like that. The fact is, third-party upgrades are not illegal as long as they follow Apple guidelines. Adding a third-party board will not void your warranty if it is a simple matter of clipping it onto the motherboard or placing it into one of the Mac's slots.

Most video boards, which add to or improve the display capabilities of your Mac, are designed to fit into one of the Mac's existing slots; they are therefore easy to install. Some accelerator cards are also easily installed by clipping them onto the motherboard. Others, however, require soldering the board into the Mac. Any upgrade that requires wielding a soldering iron definitely voids the warranty on your Mac and must be performed by an Apple-authorized VAR (value-added reseller). Before you purchase any upgrade card, ascertain what is involved in installing it and how much it can cost you if you have to have it done by an authorized technician.

## Upgrading a Hard Drive

If your drive fails or has just gotten too small for reasonable use, you do not necessarily have to buy an all-new, expensive drive. You can upgrade just the mechanisms in your existing drive. Purchase a SCSI mechanism and you can upgrade your old drive yourself. You'll find potential vendors in the back of

the Mac trade magazines. Open the case of the old drive, take out the old mechanism (usually a matter of removing some screws and unplugging some cables), and add the new mechanism. There's a hitch if you are upgrading the drive in an older Mac—you will probably need to reformat the disk with the proper interleave. For that, you will need formatting software like Silverlining.

## Monitor Tips

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If your monitor is flickering or distorted, check the cables. If that doesn't work, try moving various components of your system around. Other monitors, some external drives, the CPUs speaker, your stereo—any or all can be interfering with the monitor and cause the flickering. I once had a horrible monitor flicker that I could *not* seem to get rid of. I tried everything short of dismantling the damn thing. Finally, I moved the CPU to the other side of the monitor, and that did the trick. It's what we like to call a "moderately obscure" phenomenon.

## Floppy-Disk Troubleshooting

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You have inserted a floppy and the dialog box comes up with *This disk is unreadable: Do you want to initialize it?* or one of the other initialization dialogs, like *This is not a Macintosh disk* or *This disk is improperly formatted for this drive*. Think twice before you hit that Initialize button. You should reinitialize that disk only if you a) know without a doubt what is on that floppy, and b) don't mind losing that data. Reinitializing low-level reformats your disk, so you will *not* be able to recover the data. Often, when the drive can't read the disk, you won't even have to go through recovery procedures. Try simply reinserting the disk once or twice. Try another drive. Is the disk too hot or cold?

Give it a little time to come to room temperature. If you can't get the floppy to work for you, you can probably recover the data with Norton Utilities or a similar data-recovery program.

## Ejecting a Floppy

If a floppy disk sticks and won't eject, try holding down the Command-Shift-1. This will force a disk in the first or internal drive to eject. Command-Shift-2 will eject a disk in an external drive or the second of two internal floppy drives.

If that doesn't eject the disk, restart the Mac. If the disk doesn't eject on shutdown, hold down the mouse button as the Mac restarts.

If those methods don't work, you can use the highly sophisticated technical tool of the professionals—the straightened paper clip. Stick the end of the paper clip into the tiny hole to the right of the disk slot and push straight back. You'll feel a bit of resistance. When you push gently, you will eject the disk. If you have to force it, don't.

Finally, turn everything off and open the case. You will see the small lever next to the disk slot, which is what you were trying to push with the paper clip. Opening the case gives you better access, and you can try pushing the lever gently with your finger. Again, don't force it. If a gentle but firm push doesn't eject the disk, you have a more serious problem. You will need to take the drive to the dealer to have a service technician remove the disk.

If disks are sticking frequently, the drive might be dirty. Give it a cleaning as described above.

## Cleaning a Floppy

If you spill anything on a floppy (coffee, Diet Pepsi, Yoo-Hoo, whatever), you can actually rinse the disk and let it dry. Just be sure that it is completely dry before using the disk again.

## Moving Hardware

Don't slide a hard drive across your desk. The feet on the bottom, meant to stick to your desk, *will* stick to your desk. This will cause thuds and vibrations that could crash your hard disk.

When you move your equipment, you might get nervous about losing track of what cable goes where. You can easily label your cords before you unplug them to make reassembly easier. Fold an address label over the cord and write on it the name of the port it goes into. Not sure of the name? Draw a little icon to match the one that is on the Mac above the port. Still nervous? Try putting small matching labels on the Mac. Then it's just a matter of putting tab A into slot A.



When transporting your Mac, stick an old or blank floppy (that is, one you don't care about) in the drive—unless, of course, you saved that yellow plastic pseudo-disk that came with your Mac, in which case you can use that instead. (I'm sure *lots* of you have that set aside where you can easily find it). Keeping a disk in the drive when transporting it will help protect the read/write heads.

## New Hardware

If you've just bought something new, turn it on and leave it on for a while. If possible, give it a lot of work, too. Really abuse the hardware for a week. If something is wrong, you will want to know it as soon as possible—while the guarantee is still in effect.

## SCSI Voodoo

SCSI, as we learned in Chapter 5, stands for Small Computer Systems Interface. SCSI is the standard way to connect periph-

erals to a Mac. Peripherals connected by SCSI are called SCSI devices, and they can include hard disks, CD-ROM drives, and non-Postscript printers.

SCSI is tricky stuff. The order of the devices, the length of the cables, the phase of the moon—all kinds of things can make your SCSI chain fail. Understanding a little bit about SCSI devices can help you when an external hard drive suddenly fails to appear or when you get unexplained errors.

SCSI devices connect through a port on the back of the Mac. The **SCSI port** (or **SCSI bus**) is easily recognizable; it is the long narrow slot with two rows of pins. SCSI devices can have either 25-pin or 50-pin SCSI ports; you will need to purchase carefully to make sure you have the correct cable for each of your devices.

## The SCSI Chain

A **SCSI chain** (also called a **daisy-chain**) is the series of devices connected to your Mac's SCSI port. You can connect up to six devices. It is called a chain because each one is connected to the next in a series. Each device in the chain has an **address**, like the house numbers on a block. The internal hard disk is considered the first item on the chain (or house on the block) and has the address 0 (zero). The Mac CPU itself has the address 7. Any SCSI device you add can have any of the other addresses from one to six, as long as no two devices have the same address. If SCSI addresses conflict, your system might crash, or you might not be able to mount one or more devices. If a device doesn't mount, its icon will not be displayed on your desktop and it will not be accessible for your use.

## SCSI Addresses

Most devices will allow you to change the SCSI address (also called the **SCSI ID**). Some have DIP switches, which are tiny

switches like the fuses in a fuse box, only smaller. Flipping the set of switches into a series of up and down settings sets the ID number for the SCSI device. The ideal tool for setting DIP switches is the highly technical straightened paper clip, although a fine-point pen can be used in a pinch. Another typical mechanism for changing SCSI addresses is the thumbwheel, a small wheel you turn with your thumb to select numbers, like the lock on a briefcase. Consult the manual for a particular device to determine how to set the SCSI address.

When the Mac starts up, it looks at SCSI address zero first. If there is nothing there it will go to address six. From there it works its way down the chain (five, four, and so forth), mounting the devices in succession.

## Terminating a SCSI Chain

Both ends of the SCSI chain have to be **terminated** to keep data from traveling back and forth along the chain endlessly, causing errors and crashes. Internal hard disks, which are at the beginning of the SCSI chain, already have termination built in. The external SCSI device that is last on the physical chain of peripherals must be terminated as well. Some devices are terminated internally; others require a SCSI terminator, which plugs into the empty port on the last device in the chain. Many SCSI devices are shipped with a terminator, and they can also be purchased separately. Just to add an extra challenge, the IIfx requires a special black terminator that is shipped with the Mac CPU.

If you have a SCSI device that is terminated internally, it must go on the end of the chain—otherwise, that is connected after it will not be properly accessible to the Mac. What if you have more than one internally terminated SCSI device? You must remove the termination from one of the devices. This will require delving into the dreaded manual. (But you can mutter about your “internally terminated SCSI device conflict” and sound really technically knowledgeable.)

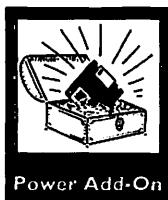
## Cables and Ordering of Devices

Termination is only the beginning of your SCSI worries. Cable length for the entire chain should not exceed 18 feet, which means that you need to use short cables between devices. Once you get a couple connected, you'll really enjoy the challenge of trying to keep the cable length short while still finding room for all the devices. Also, some devices prefer a longer cable or a shorter cable. Try swapping cables if the SCSI chain doesn't respond well.

Some devices need to be in a certain order to operate properly. If installing a new SCSI device leads to crashing, erratic behavior, or the inability to mount the drive, try changing the order in which the drives are connected on the chain.

SCSI devices often come with their own INITs. Like any INIT, these can cause trouble. Checking for INIT conflicts is another good idea if a new device is making trouble.

The PRAM can affect on a SCSI device's behavior as well. Zapping your PRAM could help if you have lost an external device and it won't mount. For more information on zapping the PRAM, see Chapter 13. (By the way, I think "zapping the PRAM" is my favorite techno-jargon of all time. Just say it to yourself a few times. Doesn't have a great ring to it? "Terminating the SCSI chain" is a close second.)



There is an extremely useful shareware Control Panel device available called SCSIProbe (by Robert Polic). SCSIProbe will scan for peripheral devices, display information about each device, and attempt to mount any unmounted device. I highly recommend SCSIProbe for anyone who has any SCSI device attached to his or her Mac. It is extremely helpful in identifying SCSI ID numbers and for getting reluctant drives to mount.

SCSI devices are sensitive to their surroundings. If a device is located too close to the CPU, for example, it may behave erratically because of the magnetic interference coming from the Mac. Try moving SCSI devices to locations free from possible interference.

## SCSI Solutions

SCSI devices and SCSI chains can be very temperamental. If you suspect SCSI trouble, try the following:

- Use SCSIProbe
- Zap the PRAM
- Check termination
- Check addresses
- Check cables
- Swap cables
- Reorder devices
- Change location of devices.

## Leave It On or Turn It off?

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You've probably heard both sides of the argument: Should you leave your system on when you aren't using it, or should you turn it off? Some say leave it on all the time. Others say you should turn it off whenever you aren't using it. Still others say just turn it off when you are done for the day.

Leaving your Mac on all the time is not a good idea. Not only does the Mac use a fair amount of electricity (costing anywhere from 35 to 60 cents a day, depending on your configuration and local power rates), but it is rough on your hardware to leave it on at all times. Moreover, the monitor raises the temperature in the room, so you could spend more for air-conditioning. Like any piece of electronics, your Mac has components that are stressed with use. Leaving them on constantly will shorten their life-span. One particularly vulnerable piece, for example, is the monitor, which has a cathode ray tube that can burn out after a long period of time.

On the other hand, it can also be rough on your Mac to power it up over and over again. Repeated power cycles stress

the power supply, the hard disk, and the monitor. The power supply can handle only a limited number of cycles (albeit the number is in the thousands), and the more you turn it off and on, the shorter its life will be. Starting up over and over again can reduce the lubrication in a hard drive and put stress on the read/write arm.

The best solution is a compromise. Turn everything off when you are done for the day. In between, when you leave your Mac temporarily but plan to return, you might want to turn off your monitor to save a bit on the electric bill and protect its internal components. If you don't have a screen saver, you must turn off your monitor, or at least turn the screen adjustment until it is black.

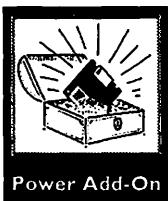
## Some Do's and Don'ts

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A few parting words of advice for protecting your hardware.

- Don't cover up the cooling vents on the sides of your Mac. Make sure that they always have a couple of inches of space all the way around to breathe. This will keep your Mac cool. A cool Mac is a happy Mac.
- Always use the Shutdown and Restart commands whenever you can. Unless you are crashed and unable to restart from the Finder, you should always shut down from the menu. Turning your Mac off abruptly does not allow the hard disk to park the heads safely and can damage your hard disk and/or your data. If you shut down, disconnect, or turn off the power while a read/write action is in progress, you will almost certainly corrupt or lose data.
- Always turn everything off before unplugging or opening anything. This is especially important for peripherals connected to the ADB port, like your keyboard and mouse. It is much easier to forget to turn off the Mac before unplugging the mouse than it is to forget to turn off the Mac before opening the CPU case.

- Never turn off any peripheral while the Mac is running. Devices connected together have a constant flow of information. Turning off any one device can interrupt the flow, potentially crashing your system and losing or damaging data.
- Protect your equipment with a surge protector. These range from simple \$20 power strips with basic protection built in to very expensive **uninterrupted power supplies** (UPS) that will protect your Mac from almost any electronic malady. At the very least, you want a surge protector that will protect your Mac against the common spikes of electricity that can damage your computer.



Power Add-On

## Questions and Answers

**Q:** What are some of the ways to prevent problems?

**A:** Maintaining the computer, keeping it clean, having a good working environment, and using proper safety precautions.

**Q:** What are the proper safety precautions?

**A:** Leave compact Macs to the experts, or at least get a demonstration from one. Ground yourself before opening a modular Mac.

**Q:** How do I open the case on a modular Mac?

**A:** Press the latches on either side of the Mac and tilt the lid up.

**Q:** How do I clean the Mac?

**A:** Open the case, remove the drives, and remove any dirt you can pick out with your fingers. Blow out the rest of the dust and crud with a can of compressed air.

**Q:** How do I remove the drives?

**A:** The drives are attached to a plate that is attached to the Mac's case with four screws. Remove the screws and disconnect the cables that attach the drives to the motherboard.

**Q:** What about cleaning the floppy drive?

**A:** Unscrew the drive's case from the plate that holds it in the Mac. Blow air from the back of the drive out the front (where you insert the disk).

**Q:** Can the mouse be cleaned?

**A:** Yes. Remove the ring on the bottom of the mouse and tip out the ball. Scrape off the crud with a paper clip, toothpick, or cotton swab. Wipe the ball with a soft dry cloth and replace it.

**Q:** How do I clean the keyboard?

**A:** Remove the top by unscrewing the screws on either side on the bottom. Clean between the keys with a moistened cotton swab (water is fine). Allow the keyboard to dry completely before using it.

**Q:** What indicates a hardware problem?

**A:** When you see a Sad Mac or hear the broken chord, you probably have a hardware problem. Another sign of a hardware problem is when the Mac behaves erratically and software troubleshooting won't solve the problem.

**Q:** What is the first thing to try with a hardware problem?

**A:** Try restarting the Mac a few times.

**Q:** Then what?

**A:** Check that all cables are properly connected and that everything is turned on.

**Q:** That didn't work!

**A:** Open the Mac's case and make sure all internal connections and cables are tightly in place.

**Q:** Keep going...

**A:** Check that all SIMMs are firmly seated in their sockets.

**Q:** I thought that would work for sure, but no go.

**A:** Try replacing each SIMM in succession with one you know is in working order to identify a malfunctioning chip.

**Q:** I can't believe that after all this my Mac still doesn't work.

**A:** Call an authorized technician and carefully explain the problem and everything you have tried thus far.

**Q:** What is sticktion?

**A:** When the heads on the read/write arm stick to the platter and the platter cannot spin, or when the platters spin freely but the arm is stuck in one position.

**Q:** What are the signs of sticktion?

**A:** You hear the drive's fan but not the spin of the platters, or the drive boots but then fails when you try to access data.

**Q:** What if real bugs get in my Mac?

**A:** Gas them out; then cover the vents and disk-drive slots with an old pair of pantyhose.

**Q:** What's involved in upgrading memory?

**A:** Adding memory is a simple process of inserting SIMMs into the sockets on the motherboard.

**Q:** What is a bank?

**A:** A group of sockets that must be filled together with SIMMs of the same size.

**Q:** What's involved in adding a board to the Mac?

**A:** Some boards are easy to install, as they are inserted into one of the Mac's existing slots or clipped onto the motherboard. Others involve soldering hardware into the Mac and require an authorized technician.

**Q:** If my hard drive fails, do I need to buy a new one?

**A:** Not necessarily. You can purchase just the mechanism of a drive and replace the old mechanism in your failed drive.

**Q:** What should I do if the monitor doesn't work?

**A:** Check the cables. Move components around on your desk. Try to find possible sources of interference.

**Q:** The Mac says a floppy is not a Mac disk, but I know it is one.

**A:** Do not initialize the disk. Reinsert it once or twice, try another drive, and/or let the disk warm up. If necessary, use file-recovery software to remove the data from the disk.

**Q:** The floppy disk sticks in my drive.

**A:** Try Command-Shift-1 if the floppy is the internal drive, Command-Shift-2 if it is in an external or a second internal drive. Restart while holding

the mouse button down. Insert a straightened paper clip into the hole to the right of the drive slot. As a last resort, open the case and push back the ejection lever.

**Q:** It keeps sticking.

**A:** Clean the drive.

**Q:** I just spilled a banana frosted onto my floppy.

**A:** Rinse the disk in water and let it dry completely.

**Q:** Is there anything I should know before I rearrange hardware on my desk?

**A:** Don't slide a hard disk across the desk. Label all the cables and plugs for easy reinstallation. Keep an old floppy disk in the disk-drive slot when moving the Mac.

**Q:** Anything special I should do with a new piece of equipment?

**A:** Turn it on and keep it on for a week to identify possible problems.

**Q:** What are SCSI devices?

**A:** External devices connected in a chain to the Mac's SCSI port.

**Q:** What's a SCSI address?

**A:** The unique number assigned to a device on a SCSI chain.

**Q:** What is termination?

**A:** Termination provides a stopping point at either end of a SCSI chain.

**Q:** What order should SCSI devices go in?

**A:** Only trial and error can tell you for sure, but SCSI devices are particular about what order they go in.

**Q:** What else can I do to troubleshoot my SCSI chain?

**A:** Use SCSIProbe, Zap the PRAM, check termination, check addresses, check cables, swap cables, reorder devices, and/or chain the location of devices.

**Q:** Should I leave my Mac on constantly?

**A:** No. Turn your Mac off when you are done for the day. Leave it on for short periods during the day when you are away from the Mac. Turn off your monitor if you are leaving for an hour or more.

**Q:** Anything else?

**A:** Don't cover up the cooling vents on your Mac. Always shut down from the menu if possible. Turn all equipment off before connecting or disconnecting anything. Never turn off any peripheral while the Mac is running. Protect your equipment with a surge protector.

## CHAPTER 14 ◇ PERSONALIZING YOUR MAC (THE FUN STUFF)

If you are anything like me, you turned to this chapter first. This has all the fun stuff in it—all the keys to personalizing your Mac. You'll find out about:

Adding sounds to Finder events

Extracting sounds from other sources

Startup screens

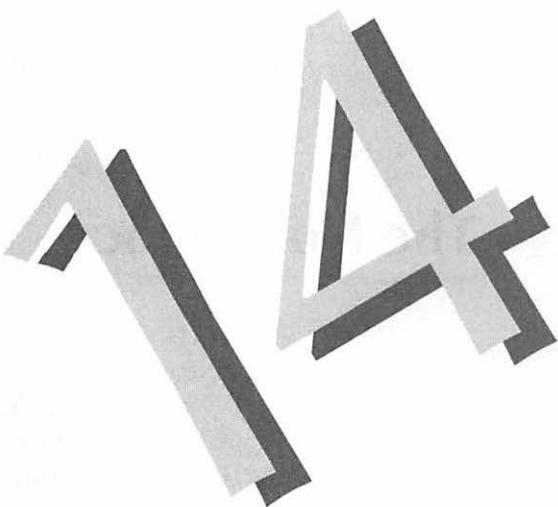
Desktop patterns

Custom icons

Custom cursors

Screen savers

Easter eggs and secret tricks



hen the Mac first appeared on the personal-computer scene, many PC users scoffed at the "toy computer". When Macs gave birth to a new technology called desktop publishing, there was grudging acceptance of the Mac as a powerful graphics tool. It took a long time for Macs to be taken seriously across a variety of personal-computing applications. But let's face it—the Mac is a fun computer.

When I was learning to use the Mac, I worked with people who knew more about it than I did. Sure, I wanted to learn from them; I wanted to know what they knew about the system and how to use it. But most of all, I wanted my Mac to look and act like their Macs. On their Macs, fish swam across the screen. Music played. The Mac made a barfing sound when disks were ejected. I mean, this stuff was *cool!*

To this day, I think it's the personalization that sets the true Mac aficionado apart from the average Joe User. When there is so much opportunity to personalize your working environ-

ment, why live with the boring beeps and dull grays of the default settings?

## The Noisy Mac

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The Mac's capability to play digitized sounds was one of the things that quickly set it apart from other personal computers. First it was just a collection of some unusual system events. Before long, programmers came up with utilities to add sounds to the Startup and Shutdown routines. Then came SoundMaster, and the world of Mac sounds was revolutionized.

### SoundMaster

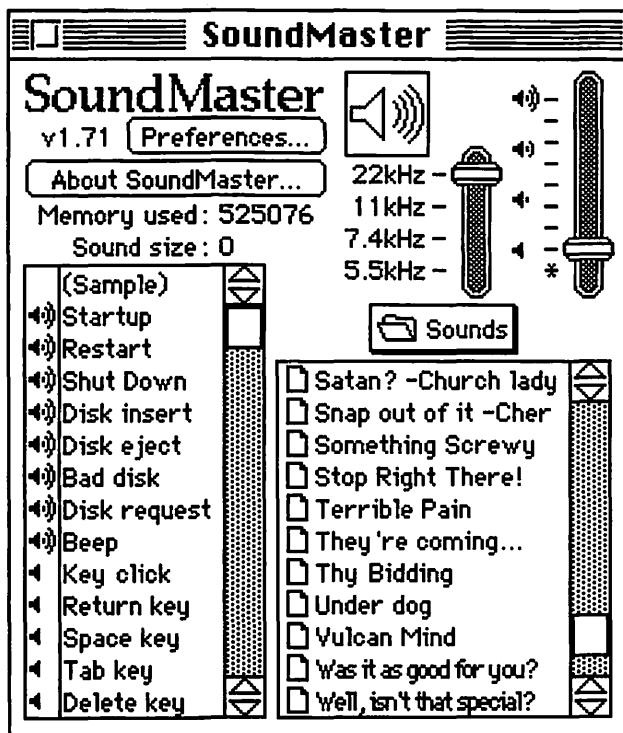


SoundMaster, a classic shareware program by Bruce Tomlin, lets you attach sounds to all kinds of Finder events. Resizing windows, emptying the trash, opening and closing windows, Startup, Shutdown, Restart, copying files, inserting and ejecting disks, dragging, and hourly chimes are a few of the activities to which you can add sounds. Your Mac acquires a whole new personality when it speaks, boings, and quotes famous people (Figure 14. 1).

Sounds can be digitized by using a third-party product like MacRecorder or by using the microphone that is included with all Macs since the IIci. **Digitizing** sounds is a process of recording sounds into a digital form that can be stored as a resource on a disk that can then be read by a computer.

And, oh! what sounds are available! People have gone completely nuts in recording sounds. Every imaginable cartoon boing, great movie line, political sound-bite (or is that sound-byte?), disgusting bodily sound (or simulation thereof), animal noise, and TV theme song has been digitized. You can obtain sounds through user groups, bulletin board services, and companies that sell disks of shareware, such as the inex-

**Figure 14.1**  
SoundMaster  
lets you assign  
digitized  
sounds to  
Finder events.



haustible collection of Educorp. Just to give you an idea, here are a few of the more than four hundred sounds I have collected:

- Kathleen Turner saying, "Was it as good for you as it was for me?"
- Meg Ryan's deli simulation
- Darth Vader saying "What is thy bidding, my master?"
- Homey the Clown's "Homey don't play dat!"
- "Party on Wayne! Party on Garth" from Wayne's World
- Elmer Fudd pointing out that "Something scwewy's going on awound here!"
- The snotty lady from the commercial who says "You're not dealing with AT&T"

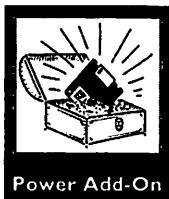
- TV theme songs: F-Troop, Twilight Zone, Three's company
- Clint Eastwood's "Go ahead, make my day."
- Wargames' anxious computer saying, "Shall we play a game?"
- Hal from 2001 protesting, "I'm sorry Dave, I'm afraid I can't do that."
- Superman's intro: "Look! Up in the Sky! It's a bird...it's a plane...it's superman!"
- The Wicked Witch of the East crying, "Look what you've done" and "I'll get you my pretty, and your little dog, too!"
- President Bush sharing his opinion of broccoli
- The Jaws theme
- Roaring, cheering applause
- Every imaginable sound from Star Trek. (There is a peculiar connection between computer users and Star Trek; whole bulletin boards are devoted to the discussion of the show, both the classic and *The Next Generation*. I would like to understand the correlation, but I'm afraid.)

You can see how this can get to be fun. When I start up in the morning, I can hear the Mac reassure me that "I'm completely operational and all my circuits are functioning perfectly" in the voice of Hal from 2001. My windows zoop open and zip shut, and every time I empty the trash, Jambie from PeeWee's Playhouse says, "It is done." When I make copies, Rich from Saturday Night Live observes, "Makin' copies!" When I restart, the Terminator (a.k.a. Arnold) says, "I'll be back." And when I shut down for the night, Bryant Gumbel bids me goodnight with "It's been a good day; we hope you've enjoyed it. Have a nice evening."

## Other Sound Utilities

MacRecorder lets you digitize all kinds of sounds, as do the built-in microphones in the recent models of Macs. You can

also extract them from games, HyperCard stacks, and other applications that feature sounds you like. SoundExtractor is a shareware program that does just what it says—it extracts sounds from applications. It recognizes only one type of sound resource, the snd resource, but most sounds are in snd format. SoundMover is another classic shareware utility. Unfortunately modeled after the non-intuitive Font/DA Mover, it extracts a variety of sound resources and puts them into the system file, suitcases, or System 7 sound files. SoundMover has an “Open any...” feature that will look for anything remotely resembling a sound in any file. You can also do basic editing on the sounds to combine them or cut them apart. A little smoothie called Overlay Sounds is a drag-and-drop utility for System 7. Drop any file or application over the icon and it will find all the sounds in the file and present them in a window. You can then play the sounds and, if you want to, save them to separate files (Figure 14.2).

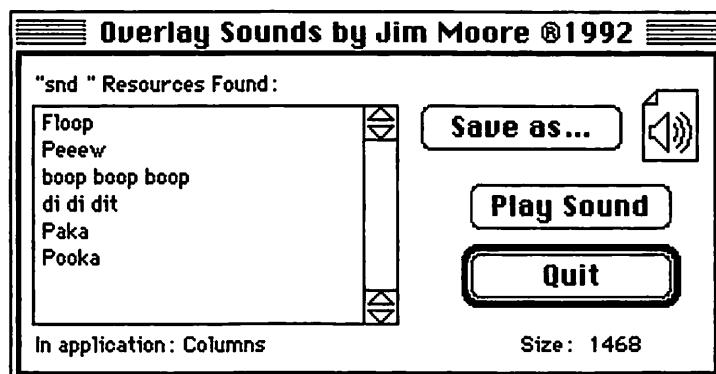


Power Add-On



Power Add-On

**Overlay Sounds**  
extracts sounds from any file that is dragged over its icon and presents them for listening or saving.



If you have System 7, it is easy to add sounds for system beeps. Just drag a sound to the System file and it will be installed in the system. When you choose the Sound Control Panel, the sounds you have added will be displayed as choices for your system beep. You can also easily add a startup sound by dropping a sound into the Startup Items folder in the System Folder.

## The Pretty Mac

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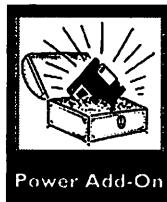
One of the nicest ways to customize your Mac is to use visual enhancements. The most common ones are startup screens, desktop patterns, and custom icons.

### Startup Screens

When you start up the Mac, you see that friendly but dull box that greets you with "Welcome to Macintosh." That is the **Startup screen** that comes with the Macintosh system software. It is easy to replace that Startup screen with a picture of your choice, in full color, and to fill your whole screen if you are so inclined. Many graphics programs have an option to save files in a "startupscreen" format. The file must be named Startupscreen and placed in the System Folder. You can have a whole collection of Startup screens if you are so inclined; but you can only have one in your system folder at one time. Look for graphics and illustrations of all kinds available as startup screens from bulletin boards and shareware collections. (You'll notice an abundance of screens featuring R- or even X-rated pictures of women; stuff like that is even more popular than Star Trek.)

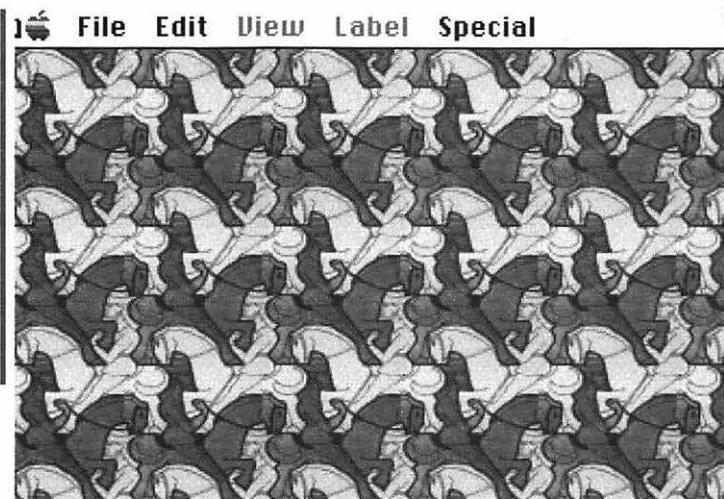
### Desktop Patterns

The General Control Panel lets you change the desktop pattern and color (if you have a color monitor). But you can go way beyond silly patterns of colors. The resources that make up the desktop can be modified and the patterns enlarged to create beautiful, elaborate pictures on your desktop. Two utilities make it simple. WallPaper, the most popular, is a commercial utility that lets you assign one of many patterns that come with the program. You can also create your own or look for WallPaper patterns on bulletin boards. Before Dark is a share-



ware program with similar functions. Some patterns are extremely elaborate and colorful, but I find them to be nerve-racking. Other people don't seem bothered by a raucous desktop. But for people like me, there are plenty of subtle, eye-soothing patterns that are much more interesting than the plain desktop (Figure 14.3). Just as you decorate a room to show individuality and to make it a place that pleases you, you can decorate your Mac's desktop to make a personalized environment.

**Figure 14.3**  
Before Dark lets you install custom desktop patterns for a more interesting environment. Many are in spectacular full-color.



Of course, you can decorate the outside of your Mac as well, but you are on your own for that.

## Custom Icons

Custom icons, once the province of the ResEdit expert only, have become accessible to the rest of the Mac users with the advent of System 7. With a simple copy and paste, you can place new and exciting icons for folders, files, and applications. Copy the graphic of your choice from another file or folder or from a graphics program. Select the file to which you would like to assign a custom icon and choose Get Info from

the File menu. In the window that's displayed, simply select the old icon and paste in the contents of the clipboard for a new look. The Mac will resize any graphic you choose to fit into the icon size.

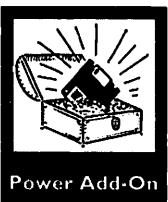
Collections of custom icons can be found on bulletin boards and from user groups. Spectacular 3-D folders, amusing digitized celebrities, and favorite cartoons are just a sampling of what is available.



There is also a number of programs devoted to the creation of icons. I Like Icon, from the people who brought you the Talking Moose, lets you create elaborate icons and animates them for you. Icondler is a shareware program that creates a Custom Folder icon out of any application's icon.

Custom icons not only make your Mac more personal, but I think they make it easier to use. When you have assigned a custom icon to a file, it is easier to recognize and find that file at a later date.

## Custom Cursors

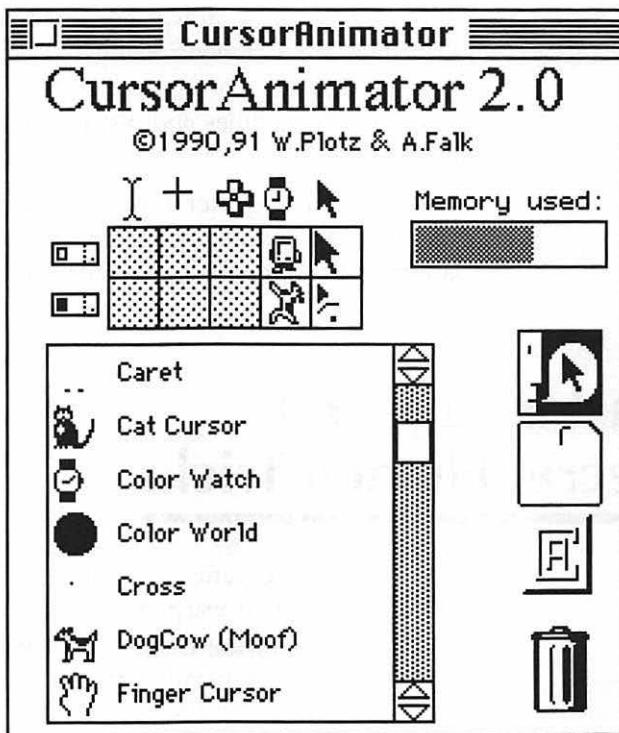


Custom cursors, like icons, used to be only available for ResEdit hackers. An amazing utility called Cursor Animator came along to change all that. Cursor Animator is a simple Control Panel that lets you assign custom animated cursors in the place of the system defaults. Instead of the tedious spinning watch, you can watch a globe spin, a spaceship fly, or a yin/yang symbol rotate, to name a few (Figure 14.4). You can also assign alternate cursors to the non-animated cursors, such as the arrow and the insertion point. CursorAnimator comes with a number of fun cursors, and many more are available on bulletin boards.

## Screen Savers

You know, of course, that you must have a screen saver to protect your screen from burn-in during periods of inactivity. If you leave an inactive image on the screen for too long (some

**Figure 14.4**  
Cursor Animator lets you choose from a menu of alternative cursors.



say as little as half an hour) it will burn into your CRT, leaving a ghost image behind. Screen saver software automatically blanks your screen after a preset time period. Most then fill the screen with some sort of moving pattern or animation.

After Dark is the best of the many wonderful screen savers available for the Mac; if only because so many independent programmers have jumped into the ring with add-on modules. There are also free and shareware screen savers, so you don't have to make a major investment to protect your monitor and customize your environment. And if you have \$35 or so (or ask Santa) you can get After Dark, and have a ball. After Dark includes the famous fish tank module, which displays beautiful realistic fish on your screen, and the infamous flying toasters, which are...well...flying toasters.

After Dark has been so hugely popular that there have been two sequels: More After Dark and The Art of Darkness.

The former features Mowin' Man, which must be seen, and a full-fledged three-dimensional game. The Art of Darkness is a book and disk set. The book gives the background and history of the various modules and instructions for creating your own modules.

While I think After Dark is a must-have, there are less expensive options. Many shareware programs resemble After Dark modules, including one of the first screen savers, Moire.

## Easter Eggs and Secret Hidden Tricks

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Programmers are generally not without a sense of humor (although it is often warped) and they invariably love to take credit for the amazing things they have done. This combination has led to the peculiar tradition of hiding secret tricks inside software.

These secret tricks are hidden features of the program with absolutely no redeeming intellectual value. Often they are the programmer's way of taking a bow, or of thanking beta testers or other supporters. A secret trick might consist of a picture, an animated sequence, or a tune. They are only found by doing something you wouldn't normally do, such as holding down a peculiar keyboard combination or option-clicking an odd location.

Secret tricks are also known as Easter eggs. According to "secret trick expert" Brian Kendig (who generously shared information about most of the tricks that follow), tricks are called Easter eggs because they are, like the holiday treats, hidden (and somewhat silly) treats that are fun to find.

How are they found? Some are easily discovered, especially when you catch on to the programmer's tricks. For example, the Option, Command and Shift keys tend to play a frequent role in revealing Easter eggs, and About... boxes are a

common location for them. Others, however, are found only by truly intrepid hackers, or are passed down by word of mouth through inside sources.

What follows is a selected list of Easter eggs. While I could not test each and every one of these tricks, I have it on good faith from people who have tried them that they work. If you can't get one to work for you, please accept my apologies, write it off to a software conflict, and go on to the next.

You might find it more fun to try the tricks without reading what the trick does first. Let yourself be surprised.

## **Hardware**

Some Easter eggs are actually built into the ROM of the Mac. Depending on your model of Mac, you can get some interesting results by using the interrupt button, or debugger, on your Mac. The interrupt is the button next to the reset button on the side of your Mac. When pressed, it brings up a blank dialog box with a ">" prompt much like the ones used in that *other* operating system. Entering code into that box sends instructions to the operating system.

### **Macintosh Plus**

Press the interrupt button (on the left side of the Mac, closest to the back). If you are using System 7, you can choose shutdown from the menu first, then press the switch when the "you may turn off your Macintosh safely" dialog is displayed. In the dialog box that appears, enter *G 40E118* (that's a zero, not the letter "o").

In the upper-left-hand corner of the screen you will see a tiny message that reads, "Stolen from Apple Computer."

### **Macintosh SE**

In the Debugger dialog box, enter *G 41D89A*. (See above for instructions for getting into the debugger.)

You will see a slide-show of four bitmapped pictures. These guys are the Macintosh development team. (Don't they just look like computer whizzes?) To get out of the endless cycle of the slide-show, restart (use the Reset button in front of the interrupt button).

Alternatively, enter **G 4188A4** into the Debugger.

In the upper-left-hand corner of the screen you will see a tiny message that reads, "Stolen from Apple Computer."

## Macintosh Classic

As you turn on or restart your Classic, hold down Command and Option and the letters *x* and *o*. Why *x* and *o*? While under development, the Mac Classic was called the Mac XO.

The Classic will start up from a minimal operating system built into the ROM. It has System 6.0.3, Finder 6.1x, and AppleShare. This is kind of fun to see, but don't think that you can toss your System Folder and use this instead—this version of the System is not recommended for use with the Classic.

If you have ResEdit (see Appendix B for more information about ResEdit), check out the ROM-disk. You'll find a folder called "Brought to you by." Inside the folder you will find folders named after the designers of the Classic.

## Macintosh IIci

In the General control panel, set the system date to *9/20/89*, which is the release date of the Mac IIci. Set the monitors Control Panel to 8-bit color. Restart while holding down Command, Option, and the letters *c* and *i*.

The color picture you see is of none other than the IIci design team. Click the mouse to see them off and continue booting as usual.

### **Macintosh IIfx**

In the General control panel, set the system date to 3/19/90 (the release date of the IIfx). Restart while holding down Command-Option-f-x.

The attractive group shown in full color—in a photo identical to that on the IIci—is the team that designed the IIfx. Click the mouse to dismiss the picture and continue startup.

### **Apple Fax Modem**

While holding down the button on the front panel, turn on the modem. You will hear three beeps. After the beeps, press the button on the front of the modem three times in the exact rhythm of the beeps.

If you have good timing, you will hear the modem speak to you. The three developers of the Apple Fax Modem digitally recorded themselves saying their names: Peter, Alan, and Neal.

## **System**

System software is just full of hidden tricks. Try some of the following.

### **Multifinder 6.0**

Just before your lunch hour, select About Multifinder... from the Apple menu. For about an hour, leave the dialog box that is displayed up on your Mac. (You won't be able to use your Mac while you are waiting.) When you come back from lunch, you'll see something different from what you left there.

On your screen you'll see a message reading

I want my,  
I want my,  
I want my l-k and f-l

I assume it's a reference to the "look and feel" that is the basis of the Mac interface and the subject of more than one lawsuit. That's all I know, and no, I don't know why there are dashes there.

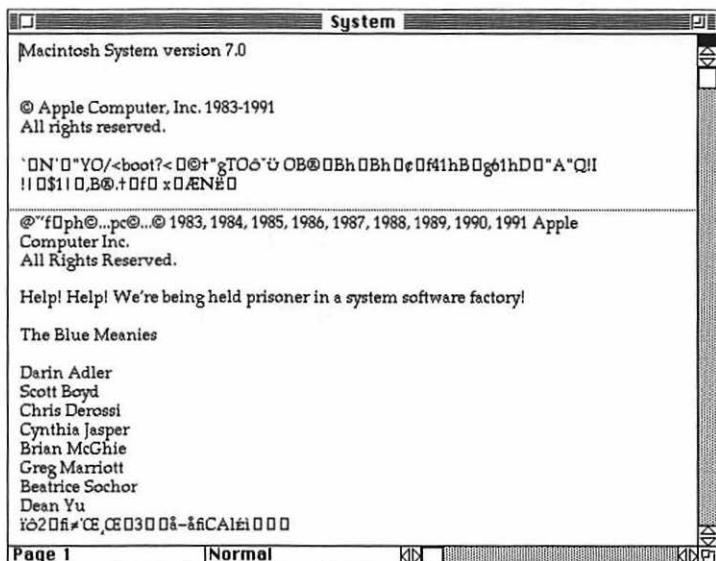
If you are a ResEdit user, you can find this message in the STR# resources of the Multifinder file. (See Appendix B for more information about ResEdit.)

## System 6.0.7 or 7.0

Using Microsoft Word (or any word processor that opens any file), open a copy of the System file. (In Word, choose Commands... from the Edit menu (Word 4) or from the Tools menu (Word 5). Scroll down to Open Any File and click on the Do button. You'll see a dialog box that presents everything on your drive. Open the System File. If you have an extended keyboard, hitting Shift-F6 will give you the same dialog box.) What you are looking at is the data fork of the file.

What you'll see is the phrase "Help! Help! We're being held prisoner in a system software factory!" The names listed in the System 7 file are the developers of System 7, a.k.a. the Blue Meanies (Figure 14.5)

**Figure 14.5**  
Opening the system file with Word's Open Any File... command reveals this hidden message.



## **System 7.0**

Here's another interesting text string to look for with ResEdit. Open STR# -16415 in the System file of System 7.

The first string in the resource reads "May you code in interesting times."

If you have System 7, try naming a floppy disk "Like Wow Man. HFS for 7.0!" The space after the period should be an option-space. Eject the floppy using the Command-E keyboard command. Double-click on the disk's greyed icon.

The Mac will ask you to please reinsert the disk, except that it will call the disk HFS for 7.0 by dns and ksct. The initials are those of David N. Feldman and Kenny S. C. Tung, authors of the HFS extensions for System 7.

## **Finder 7.0**

Hold down the Option key while choosing About this Macintosh from the Apple menu.

The menu listing will change to About the Finder. When you select it, you will see a picture of a mountain range. This picture is from the original About the Finder command from System 1.0. If the creation date of your invisible Desktop file is May 13, 1991 (the release date of System 7) or later, you will see a scrolling list of names as well. These names are all the developers who have worked on the Finder since the Lisa (the Mac's predecessor).

Turn on Balloon Help, and repeat the previous action.

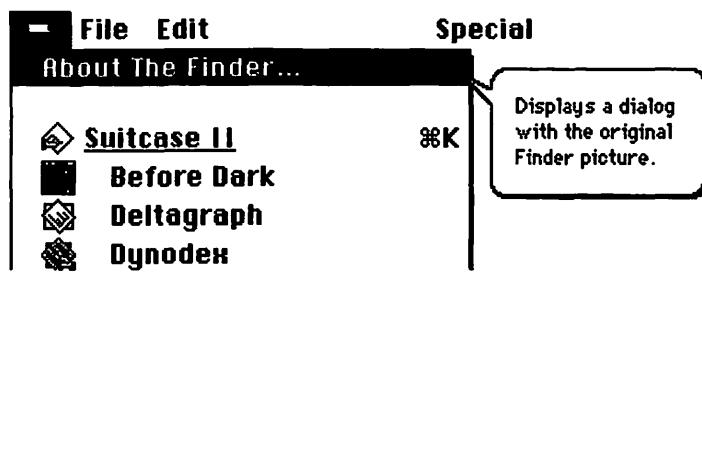
When you point to About the Finder, the balloon will read "Displays a dialog with the original Finder picture." (Figure 14.6)

For extra excitement, hold down Command and Option and choose About this Macintosh.

Not only do you get the exciting changes described above, but you'll get a goofy-faced cursor as well.

**Figure 14.6**

Turn on Balloon Help and hold down the Option key as you select About this Macintosh from the Apple menu to see this balloon.



### Caches 7.0.1

Turn on Balloon Help and point to the version number in the Caches control panel.

The balloon reads "Wink, wink."

Now Option-click on the version number.

The 040 icon whooshes aside, revealing the name of the programmer.

### Caps Lock 7.0.1 on a PowerBook

Turn on Balloon Help and point to the Caps Lock file icon.

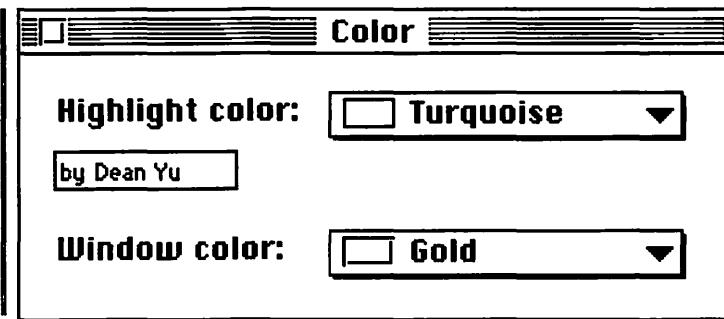
The Balloon Help reads, This file allows your Macintosh TIM or Derringer to display an icon... TIM and Derringer were the working names of the PowerBooks. Apple neglected to change the help text for the extension before System 7.0.1 was released.

### Color Control Panel 7.0

In the Color control panel, click on the highlighted sample text.

You'll see the phrases by Dean Yu and & Vincent Lo alternate (Figure 14.7).

**Figure 14.7**  
Clicking on  
the sample  
text in the  
Color control  
panel reveals  
the  
programmers'  
names.

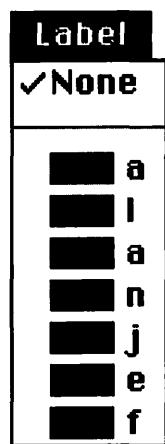


## Labels Control Panel 7.0

In the Labels control panel, delete all the names of the labels so that they are all blank. Restart the Mac and look at your Labels menu.

The labels have changed to None, a, l, a, n, j, e, f (Figure 14.8). Guess who they are?

**Figure 14.8**  
Erasing all the  
label names  
and restarting  
creates  
unusual new  
labels.



## Map Control Panel

The Map control panel, an otherwise somewhat useless device, is just loaded with fun hidden features. For starters, click on the version number.

The version number and the name of the author, Mark Davis, will be displayed in the City field until you release the mouse button.

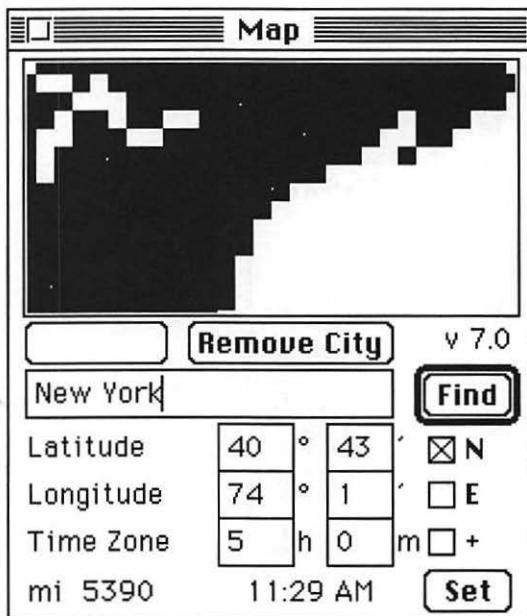
Now Option-click on the Find button.

The map will take you to every location it knows in alphabetical order.

Open the Control Panel while holding down the Shift and/or Option key.

These keys magnify the illustration of the map. Shift will magnify it somewhat, Option will magnify it more, and Shift-Option will bring you in extremely close. Of course, the resolution doesn't change, so you just get a bitmapped mess (Figure 14.9).

**Figure 14.9**  
Holding down the Shift and Option keys as you select the Map Control Panel zooms in for a closer look (for what it's worth).



Click anywhere on the map and drag off the edge of the picture.

You will scroll around the world for as long as you hold down the mouse button.

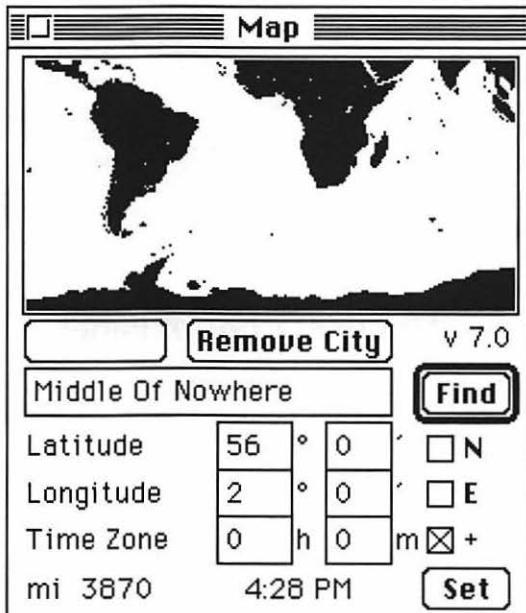
You can paste any picture into the Map control panel, but the best one comes with System 7's scrapbook. Copy the beautiful color map from the Scrapbook, paste it into the Map, and it will work just as the black and white version does. It also looks better when you zoom in for a closer look.

If you have version 7.0, type *MID* as the city name, and click Find.

*MID* stands for Middle of Nowhere. The map will take you to an otherwise insignificant location in the middle of the South Atlantic Ocean (Figure 14.10).

**Figure 14.10**

Didn't you always want to know exactly where the Middle of Nowhere is?



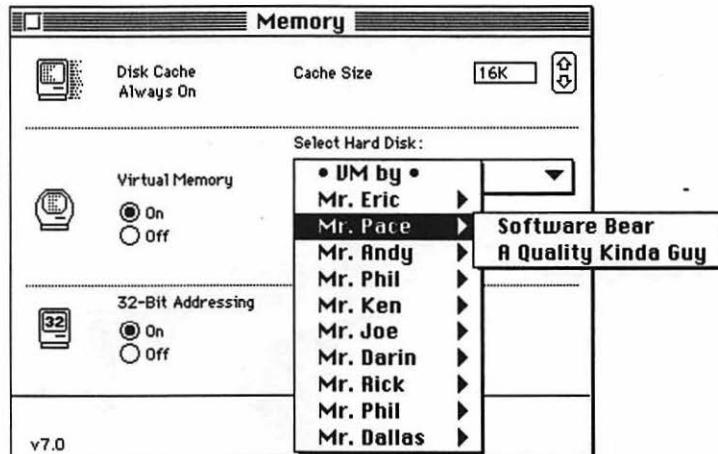
## Memory Control Panel 7.0 with Virtual Memory

Turn on virtual memory. Hold down the Option key while clicking on the pop-up menu used to choose a hard drive.

The pop-up menu changes to a menu of the names of the programmers. Select each name to reveal a submenu with additional comments (Figure 14.11)

**Figure 14.11**

Unusual credits are hidden in the Memory control panel.



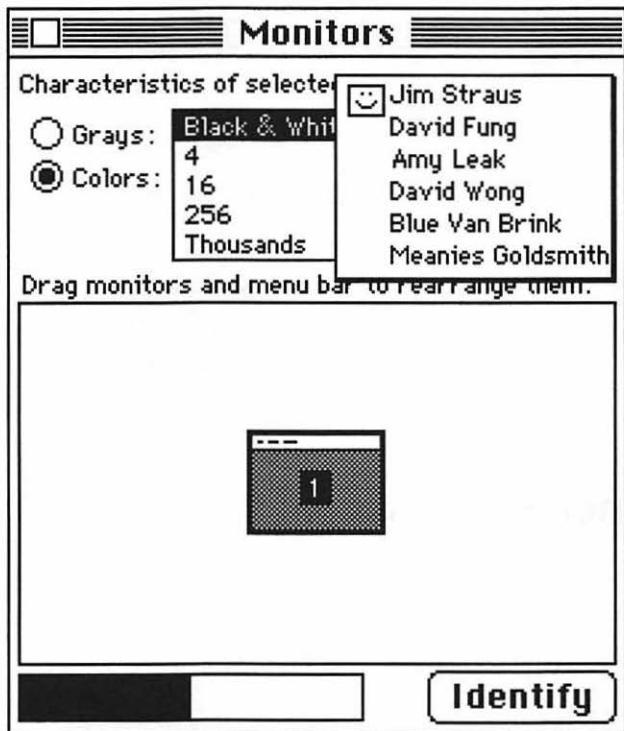
## Monitors Control Panel 7.0

Click the version number (7.0) in the Monitors control panel window. While you hold down the mouse button, repeatedly hit the Option key.

Clicking on the version number pops up a list of the names of the creators of the Monitors control panel. Pressing the Option key will make the smiley-face cursor stick out its tongue. Keep tapping the Option key, because after several taps, the names on the list will start to rearrange themselves and change slightly. First and last names will be replaced with the words Blue and Meanies (Figure 14.12)

**Figure 14.12**

The Blue Meanies get a bit confused in the Monitors control panel.



## Puzzle Desk Accessory 7.0

You can copy any picture and paste it into the Puzzle; it will be resized to fit the Puzzle window. You now have a new and challenging puzzle. In the Scrapbook you will find a neat picture of two linked diamonds that fits perfectly into the Puzzle (and, incidentally, is much harder to solve than the Apple logo!). You can also copy an unsolved puzzle and paste it into the scrapbook to see how it will look solved. You might want to copy the Apple logo to the scrapbook before you paste new pictures into the puzzle.

## Finder 7.0 and MacsBug

Turn on Balloon Help and point to the MacsBug file if you have MacsBug.

The balloon reads: This file provides programmers with information proving that it really was a hardware problem..

## **QuickTime 1.0**

Turn on Balloon Help and point to the QuickTime file.

The balloon reads: time n. A nonspatial continuum in which events occur in apparently irreversible succession from the past to the present to the future.

# **Other Software**

Many, many programs have hidden Easter eggs. Once you have looked at some of these, you might want to start looking for some of your own.

## **Claris CAD**

Hold down the Option key and select About Claris CAD.

You will see a summary of your system configuration.

## **ColorSnap**

Select About ColorSnap, which comes with the Computer Friends ColorSnap 32+ card, and click on each of the two programmers' faces.

Clicking on the guy on the right clothes him in Freddie Krueger garb and adds the caption Hacking the Freddie Krueger way. Clicking on the left face replaces it with a can of Mountain Dew with the caption Mountain Dew, the programmer's beverage of choice.

## **Dark Castle**

Play Dark Castle on Christmas day. If you have better things to do on Christmas day, try resetting the system clock in the General control panel to December 25, any year.

A seasonally appropriate tree will be displayed in the foyer of the castle.

## **Disinfectant**

The About Disinfectant box is fun even without modification. Selecting it from the Apple menu reveals a parade of viruses marching along to John Philip Sousa's *Liberty Bell March* (a.k.a. the Monty Python theme song) opposite a bitmapped photo of John Norstad. Pretty soon, a big foot comes along and stomps the viruses. For a change hold down a menu while the box is displayed.

The parade of viruses will stop, and you won't see the foot. The music, however, goes on, and you will eventually hear the entire composition. If the music stops at any point, release the mouse button and pull down the menu again.

## **FaxMaker**

(the fax utility that comes with the PowerBook 170)

Choose About FaxMaker from the Apple menu. In the box that appears, click on the FaxMaker icon.

The arrow pointer changes into a mouse, and a scrolling list of the developers appears.

## **Finale 2.x**

Select About Finale from the Apple menu. Leave the dialog on the screen for a few seconds.

The conductor will walk away.

## FlashWrite II

Hold down the Option key as you select About FlashWrite II from under the star logo.

An interesting quotation appears.

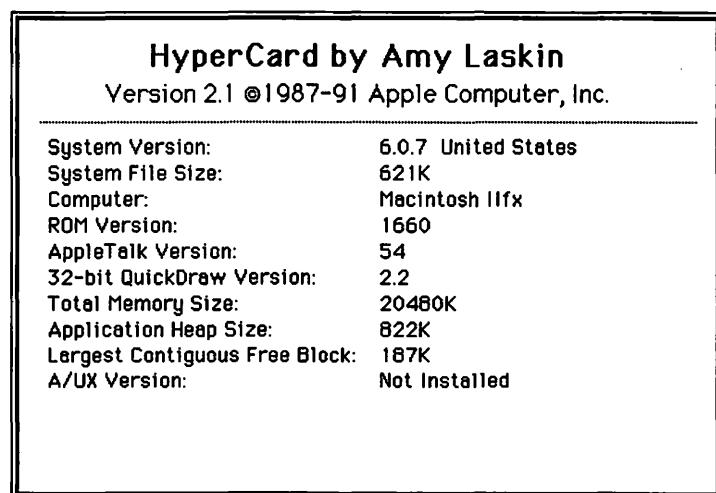
## HyperCard 2.x

Hold down the Option key as you select About HyperCard... from the Apple menu.

With either HyperCard 2.0 or 2.1, you'll see a card that gives you the credit for writing HyperCard. Actually, it inserts the name you have entered as the Chooser name to read HyperCard by [chooser name] (Figure 14.13). If you have HyperCard 2.1, you will also see a description of your system configuration. And if you have a Quadra, look closely at that configuration—it will say your system is a "Macintosh Macintosh."

**Figure 14.13**

Hold down the Option key as you select About Hypercard to get credit for writing the program.



## **Installer**

(the application that comes with the System software)

Launch the Installer version 3.0.1 (the version that comes with System 6.0.7 and 6.0.8). You'll see the initial "Welcome" dialog box. Click Okay to dismiss the dialog; then just type the word *ski* (there is no field to type it into; just type it).

A rather amusing list of credits will appear. You also get the opportunity to choose from five Wait cursors to watch during installation. Your choices include the counting hand, a spinning globe or disk, the boring wristwatch, and a series of moving dots.

If you have version 3.2 of the Installer, hold down command and option while the Easy Install screen is up.

The Help button turns into an About button. Clicking on it brings up a few screens of credits.

## **Jam Session**

This is another About box that's interesting all by itself. Choose About Jam Session from the Apple Menu.

The credits are displayed on the label of a record. You'll hear the click of a needle that's reached the end of an old record. When you click the mouse to dismiss the dialog, you will hear the scratching noise of the needle being lifted off the record.

## **KiwiEnvelopes! 3.1**

KiwiEnvelopes! has a fun animated sequence in its About box. Choose About KiwiEnvelopes! from the Apple menu.

The animation shows a letter being deposited into a mail truck. The truck then drives off the screen. After it leaves, a marquee is displayed featuring the names of the development team.

## Lotus 1-2-3

Excel's little stab at their competitive product did not go unnoticed by the Lotus developers. Set the Mac's date in the General control panel to the date of any full moon that has passed (try 2/18/92, 3/18/92, 4/17/92, or 5/17/92). Launch Lotus 1-2-3, and select About 1-2-3 from the Apple menu. Press Command and click on the registration information area on the right.

A scrolling list will appear, displaying the names of the team that produced Lotus 1-2-3 for the Mac. Watch for the last line.

## MacDraw Pro

Hold down the Option key while selecting About MacDraw Pro from the Apple menu.

The resulting dialog box shows a summary of your system setup.

## MacPaint 2.0

This Easter egg is only in a few, rare copies of MacPaint. Once Claris caught the "hidden feature" of the program, they ensured that it was eliminated from all subsequent copies of the program. To find the Easter egg, hold down the Tab and Spacebar keys while choosing About MacPaint from the Apple menu.

An R-rated bitmapped picture appears, featuring a zebra-striped woman riding a zebra—bare-back, so to speak.

## Metamorphosis Professional 2.0

Hold down the Command and Option keys while selecting About Metamorphosis Pro from the Apple menu.

A screen appears, proudly advertising “Bug Tussle Professional, The Totally Awesome Font Conversion Utility.” A list of developers is included.

## **Microsoft Excel 3.0**

This is a particularly fun trick, because it is so incredibly obscure; you really have to work for this one. Open a new worksheet. Go to cell IV16384 (the last cell in the spreadsheet). To get there quickly, press Command-Right Arrow and Command-Down Arrow. Using the scroll bars, scroll down and right as far as possible until only the single cell is showing. Set the cell’s height and width to zero. Your window will be empty except for the little square in the upper-left-hand corner that you normally click on to select the entire spreadsheet. Click on that box.

You’ll see a little anti-Lotus show: A 1-2-3 logo dances across the screen, only to be stomped by Excel. The show is followed by a list of Excel’s programmers and beta-testers. When the normal Excel window comes back, scroll away to keep the show from repeating.

Here’s another obscure hidden show inside Excel. Set the style of any cell to *excel*. To set the style, select Format Styles and type the word *excel*. Then choose About Excel... from the Apple menu and click on the big Excel icon.

A brief animation with the caption So good, it hurts alternates with the names of the developers and the phrase Recalc or Die!

If you are running Excel under System 6 on a color Mac, hold down Shift-3-d as you launch the program.

Instant System 7 effects! The Excel tool bar will have System 7’s three-dimensional look instead of the usual boring System 6 look.

## Microsoft Word

The English dictionaries of Microsoft Word (version 3.0.1 and 4.x) have some very interesting cross-references. Try spell-checking these two words, spelled exactly as they are here: "childcare" and "supression."

For childcare, the spell-checker has but one suggestion: "kidnaper" [sic]. Sick is right. As for "supression," the checker gives some good suggestions. But oddly enough, it includes "Cupertino" among its choices. Is this a snide attempt at Apple-bashing?

If you have version 4.0, select About Microsoft Word and Command-click on the Word icon.

The resulting dialog gives the names of beta-testers of the program.

## Microsoft Word 5.0

If you have version 5.0, hold down Command and Shift as you select Preferences from the Tools menu.

At the bottom of the Preferences list you will see a new choice, Credits. Select it to see a list of the names of the Word 5 developers.

## Norton Utilities

Choose About Norton Utilities from the Apple menu. Command-click on the little rhomboid just in front of the version number in the About box.

If you have version 1.1, a list of the developers is displayed. Version 2.0 is a lot more interesting. The cursor turns into a picture of a hand holding an eraser. Move it around the About box and it will leave a trail of zeros in its wake. When you have filled the entire box with zeroes, a brief melody plays and a picture of the developers is displayed.

There is an About box in the main program window of version 2.0 as well. Choose this About Box, and Command-click the same rhomboid.

You'll see a great cartoon of the same four developers with the program's artist.

## **PageMaker**

Hold down Shift while you select About PageMaker from the Apple menu.

If you have version 3.02, you'll see a list of PageMaker's makers. If you have 4.x, you'll see some interesting "java" credits scroll by.

## **Quark XPress 3.1**

Turn on Balloon Help, select About Quark Xpress from the Apple menu, and point to the word Quark in the dialog box.

The balloon reads, A fundamental particle.

## **QuicKeys 2**

Open the QuicKeys window and click on the logo to bring up a credits window. Wait for about half a minute.

A familiar battery-operated bunny walks across the window beating a drum. After it crosses, the message QuicKeys keeps on going! is displayed.

Now, there is more to this trick than meets the eye. There is a way to make a safe fall from the sky and squash the bunny! I know because I did it once. But I forgot how! I've tried a jillion different key combinations with no luck. So I pose the challenge to you to find it.

## Ragtime 3.1

For a slight twist on the usual Credits screen, hold down Command and Option as you select About Ragtime from the Apple menu.

The developers' names are displayed in their own signatures.

## Remember? DA

In the Remember? DA window, select What About Me. Wait about a minute.

A rather interesting message scrolls across the bottom of the dialog.

## ResEdit 2.x

Hold down Shift, Option, and Command as you choose About ResEdit from the Apple menu.

You are offered the opportunity to enter something called "pig mode," and you will enjoy some charming oinks. Pig mode is actually not completely pointless; it makes the program more efficient by compacting and purging resources several times a second. This is not of much use to the average user however, and it slows down ResEdit performance.

If you hold down only the Command and Option keys as you choose About ResEdit, you can see some credits.

## Simple Player (for QuickTime) 1.0

Hold down the Option key as you select About Simple Player... from the Apple menu.

The illustration of two movie frames now feature gray-scaled cats in the frames.

## **TextEdit**

Choose About SoundEdit from the Apple menu for a really amusing Easter egg.

Does the System Error bomb look familiar? Watch as the fuse burns and the bomb explodes. Don't you wish all bombs would do that?

## **Spectre**

Games are especially full of hidden features. I'm partial to this one because of the way it is invoked. From anywhere in the game, just type *god*.

Suddenly, you *are* one—you are treated to a bird's-eye view of the entire battlefield at once.

## **Speed Disk** (from Norton Utilities 1.1)

Command-click the little rhomboid just in front of the version number.

The letters in the name SPEED DISK swap themselves pair-by-pair until the name eventually unjumbles itself again.

## **THINK Reference**

This one made me giggle. In the entry for FindWindow, go to the Returns section and see what it says about *inDrag*.

In parentheses are the words *transvestites take note*.

## **To Do! 3.1**

Option-click on the copyright message at the bottom of the window.

A poem by the author is displayed. You might have to make the window a little bigger to see all of it.

## **WriteNow 2.2**

Select About WriteNow from the Apple menu. Then Option-click on the screen that appears.

Little animated men will run out and change all the letters one-by-one.

Wasn't that fun?

# **Questions and Answers**

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**Q:** How can I make funny sounds come out of my Mac?

**A:** Use sound utilities like SoundMaster to assign digitized sounds to various functions.

**Q:** How do I make sounds for my Mac?

**A:** Use MacRecorder or the microphone built into all Macs since the IIci.

**Q:** What do Startup screens do?

**A:** Startup screens replace the boring Welcome to Macintosh box with a picture of your choice.

**Q:** How are Startup Screens made?

**A:** They can be created in a number of graphics programs. Many BBSs have collections of Startup screens available for downloading.

**Q:** Can the Desktop be customized?

**A:** Yes, with a utility such as WallPaper or Before Dark. These utilities replace the pattern on your desk with a much more exciting pattern that you choose from a collection.

**Q:** How do I make custom icons?

**A:** If you have System 7, you can paste any graphic into any file's Get Info box to create a new icon. (If you have System 6, you will need ResEdit; see Appendix B.)

**Q:** How can I get rid of that annoying clock cursor?

**A:** Replace it with a cursor of your choice with Cursor Animator.

**Q:** How do I make custom icons?

**A:** If you have System 7, you can paste any graphic into any file's Get Info box to create a new icon. (If you have System 6, you will need ResEdit; see Appendix B.)

**Q:** How can I get rid of that annoying clock cursor?

**A:** Replace it with a cursor of your choice with Cursor Animator.

**Q:** What do screen savers do?

**A:** Screen savers protect your screen from burn-in. They blank the screen and (usually) replace it with some animated entertainment.

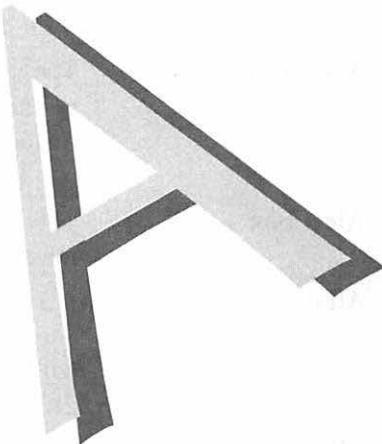
**Q:** What are Easter eggs?

**A:** Hidden tricks written into software that would not be found in normal use of the program.

**Q:** What should I do if I figure out how to make the safe drop on the bunny's head?

**A:** Contact me immediately by writing me care of my publisher or sending me e-mail at ALaskin on America Online.

## **APPENDIX A** ♦ **GLOSSARY**



<b>8-bit color</b>	Capable of displaying up to 256 colors at once.
<b>24-bit color</b>	Capable of displaying more than 16 million colors at once.
<b>32-bit addressing</b>	The technology that makes it possible for some Mac models to use large amounts of RAM (more than 8 Mb). 32-bit addressing is available in System 7's Memory Control Panel.
<b>Accelerator board</b>	An add-on circuit board that upgrades the Mac to a higher speed or more powerful (faster) processor.
<b>Accelerator card</b>	See <i>accelerator board</i> .
<b>Active window</b>	The window in front of any other open windows and currently selected. The active window can be recognized by its gray title bar.
<b>ADB</b>	Apple Desktop Bus. The connection port for the mouse, trackball, keyboard, tablet, and so forth.

<b>Address</b>	A location on a disk (a part of a sector) by which data is identified; also a number assigned to a device in a SCSI chain.
<b>Addressing</b>	The term for the process used by the operating system to find a specific piece of information in memory. Every memory location has an address, and the operating system keeps track of those addresses in its directories.
<b>Alert box</b>	The box displayed when the Mac wants to give you a message; often accompanied by a beep.
<b>Alias</b>	A small file (System 7 only) that is a pointer to another file. Double-clicking an alias opens the original file that the alias represents. An alias is about 1 or 2K in size and its name is always in italics.
<b>Allocate</b>	To set aside a portion of memory or disk space for a specific use.
<b>Apple menu</b>	The menu at the left of the menu bar, so called because of its Apple icon. It is the menu from which you choose desk accessories under System 6. Under System 7, anything (file, folder, application, and so forth) you put in the Apple Menu Items folder is displayed under the Apple menu.
<b>AppleShare</b>	Software used by Macintosh to allow Mac to share files across a network.
<b>AppleTalk</b>	Apple's networking software. Allows Macs to communicate with other Macs and with AppleTalk printers. Built into all Macs and LaserWriters.
<b>Application</b>	A program. Software that is used to accomplish a specific task or tasks and that creates files.
<b>Application menu</b>	The menu on the right side of the menu bar that displays which applications are open and lets you choose between them. Hides and displays open applications' windows.
<b>Archive</b>	Long-term storage of files.
<b>Background</b>	When a program is doing something (downloading, for example) while you work on something else, the program is said to be working in the background.

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<b>Background printing</b>	The ability to send a file to the printer and then continue your work while the file is processed. Also called print spooling. Background printing is built into Multifinder and System 7, but it doesn't work with all software. Commercial products combine spooling with other features, such as changing print order.
<b>Back-up</b>	A copy of a file, files, or an entire disk. To make a copy or copies. Something you should do very frequently and regularly.
<b>Bad sector</b>	An area on a disk that cannot be read.
<b>Balloon help</b>	A feature of System 7 that gives pop-up descriptions or explanations of objects to which you point on your screen—such as icons, menu items, or dialog box choices.
<b>Bank</b>	A set of sockets for SIMMs that must all be filled for any one to work.
<b>BBS</b>	Bulletin Board System. An electronic forum for communication. Using a modem, you can call a BBS and exchange information and communication with other computer users. BBSs range from small-scale, local chat areas to large, national exchange areas. See <i>downloading</i> .
<b>Bit</b>	The smallest unit of information that a computer recognizes, representing a value of either 0 or 1 (off or on).
<b>Bitmap</b>	Images created from dots on the screen, usually 72 per inch. Bitmap is the graphics format used by paint programs.
<b>Bomb</b>	Bummer. When the system crashes, or fails. Also used to refer to the little icon of a bomb that appears in a Bomb dialog box.
<b>Boot</b>	To start up the computer. Sometimes used to refer to launching an application.
<b>Boot block</b>	The first few sectors on a formatted disk that provide information for the operating system, indicating that the disk can be used for startup.
<b>Boot blocks</b>	The first blocks on a disk that contain the instructions for starting up the system.

<b>Bug</b>	The earliest computers were quite large, and often bugs would fly into them, causing huge problems; hence, bug came to be a term for anything that can make the computer crash. Don't snicker; I've heard of both ants and termites doing some serious damage to Macs. (If ants are threatening your Mac's welfare, try covering the vents and disk drives with pantyhose.)
<b>Bulletin board</b>	See BBS
<b>Bundled</b>	Something included with a purchase. Hard disks often come with <i>bundled software</i> .
<b>Bus</b>	Hardware used to connect peripherals to the Mac. Includes SCSI Bus and NuBus.
<b>Byte</b>	8 bits of information, representing 256 possible values, which is enough to represent a single character (a letter, number, or symbol).
<b>Cache</b>	An area of RAM (memory) set aside for frequently accessed or recently used data. Can be set in the control panel (General in System 6, Memory in System 7) (Sounds like <i>cash</i> ).
<b>Card</b>	A board that plugs into your Mac to enhance its performance in some way.
<b>Catalog B-Tree</b>	A directory used by the operating system, which tracks information including the physical location of files and their size on disk.
<b>CD-ROM</b>	Compact disk read-only memory. An optical storage medium that holds a tremendous amount of data on one disk for reading only. You cannot modify the data on a CD-ROM.
<b>CDEV</b>	See <i>Control Panel Device</i> .
<b>Central Processing Unit</b>	The chip on the motherboard that manages the operating system. Often abbreviated as <i>CPU</i> .
<b>Check box</b>	A small indicator within a dialog box for selecting an option; an X in a check box indicates that the option is on.
<b>Chooser</b>	Desk accessory included with the system software for choosing among devices such as printers or modem connections.

<b>Clipboard</b>	An area in RAM (memory) set aside for holding the text or graphics you have copied or cut. Pasting pastes a copy of the contents of the clipboard. The clipboard holds only one item at a time. To flush the clipboard, copy a single character twice.
<b>Close box</b>	The little box in the upper-left-hand corner of most windows in Macintosh software. When clicked, it makes the window close.
<b>Cold boot</b>	Starting the Mac from a powered-off state, as opposed to restarting when the power is on by choosing Restart from the menu or hitting the programmer's switch.
<b>Command key</b>	The key with the picture of the apple and the little cloverleaf/doily/pretzel. Usually located to the left of the space bar on most keyboards. The Command key has no function of its own, but is used in conjunction with one or more other keys to modify their functions. Command key combinations are often used as a shortcut for menu items. A command key combination is invoked by holding down the command key <i>at the same time</i> as the other keys.
<b>Compact Mac</b>	The Mac 512, Mac Plus, SE, Classic, Classic II; all Macs that have a monitor and CPU combined into a single unit.
<b>Control key</b>	Another modifier key found on some keyboards; used in conjunction with other keys. See <i>Command key</i> .
<b>Control Panel Device</b>	A device that loads with the system and enhances it. You can change the settings of a CDEV by accessing the Control Panel under the Apple menu.
<b>Control Panel</b>	A desk accessory included with System 6, or a folder with System 7. It provides ways to adjust a number of system parameters to customize the way your Mac works (such as the key-repeat rate or mouse speed).
<b>Coprocessor</b>	A chip that works with the CPU, taking on part of its responsibility for processing data. A math coprocessor, for example, does all the math work for the CPU.
<b>Corrupted</b>	Data that has been damaged or scrambled is called corrupted. Corruption can be the result of a crash, a virus, or a power interruption.

CPU	Central Processing Unit. The chip that does most of the work in your Mac, managing the operating system and controlling most of the calculations. Often referred to by the last three numbers of its name, such as the "040" to refer to the Motorola 68040 chip. Sometimes the entire box that holds the computer's guts is called the CPU.
Crash	All-too-frequent occurrence when the Mac fails in some way. A program can crash, meaning it no longer functions, or the system can crash, requiring a restart. A crash will cause you to lose any data that hasn't been saved.
Creator	Four-letter code attached to a file indicating which application created it. The Mac uses the creator code to determine which application it should launch when you double-click on a file.
DA	Desk Accessory. A program that is available at all times under the Apple menu. Under System 6, DAs are installed into the system and only available under the Apple menu. With System 7, DAs act like regular double-clickable applications. They are recognizable by their left-handed icon.
Daisy-chain	See <i>SCSI chain</i> .
Data	Information stored in the computer in bits and bytes.
Data fork	Of the two forks that are part of all Mac files (data and resource), the one that contains actual information that is part of the file. Applications and System software hold most of their information in the resource fork; a word processing file stores its information in the data fork.
Default	Any setting or value the computer regards as standard unless given alternate instructions by the user. For example, the default Desktop is gray, but this color can be changed by the user.
Defragment	The process of rewriting a file on the disk so that a single file is written to contiguous sectors of the disk.
Desk Accessory	See <i>DA</i> .

<b>Desktop file</b>	An invisible file on any Mac disk, it contains information for the Finder about the files on the disk.
<b>Desktop</b>	The gray (by default, although it is customizable) “surface” on which you work. Finder windows open up on the desktop.
<b>Dialog box</b>	The message boxes that appear when the Mac is asking you a question or for some input. Dialog boxes usually require a choice on your part.
<b>Directory</b>	One or both of the invisible files on a disk that contains information about the volume itself and the files stored on it. Used by the operating system to keep track of all the names and locations of all files on a disk.
<b>Document</b>	A file created by an application. For example, a word processor is the application; a letter is the document.
<b>Download</b>	To copy information (files) from another computer to your computer. You can also receive information from a BBS or an on-line service. Data is transmitted via a modem or through a connection with a mainframe computer.
<b>Dpi</b>	Dots Per Inch. A measure of the resolution of a monitor, printer, or scanner. Literally, the number of dots in an inch, so the higher the number, the crisper the image.
<b>Driver</b>	Software designed for communicating between the Mac and a peripheral such as a hard disk or a printer.
<b>Extension</b>	A file that adds to or changes the performance of the system. Extensions go into the Extensions folder within the System Folder (System 7 only) and load at startup. See INIT (extensions under System 6 are called INITs).
<b>Extents B-Tree</b>	A directory used by the operating system to keep track of fragmented files, including where each fragment is and its size on disk.
<b>File Manager</b>	The part of the operating system that handles file input and output.

<b>Finder</b>	The part of the operating system that controls the appearance of the desktop and routine file-management activities, including opening, closing, moving, and trashing files; reading, ejecting, and initializing disks; and launching applications. The Finder is the application that is visible when no other application is in the foreground.
<b>Format</b>	To make a disk readable to the Macintosh software is to <i>format</i> the disk. Also used to describe styles (font, size, and so forth) applied to type or the layout of a page.
<b>Fragmentation</b>	What happens when files are written to the disk on noncontiguous sectors, so that the file is fragmented across the disk.
<b>Freeware</b>	See <i>public domain software</i> .
<b>Gigabyte</b>	1,024 megabytes.
<b>Gray-scale</b>	True grays displayed on screen, not just black and white simulating gray. Requires a gray-scale or color monitor.
<b>HFS</b>	Hierarchical Filing System. The system the Mac uses to organize files on the disk.
<b>Incremental Back-up</b>	A back-up of only those files that have been modified since the last back-up.
<b>INIT</b>	A start-up document (System 6) that loads at boot time. See <i>extension</i> .
<b>Initialize</b>	Erase a disk and format it appropriately for reading by the operating system.
<b>Interface</b>	The protocol or conventions of communication among devices or between the user and the computer.
<b>Interleave</b>	The order in which the hard disk reads and writes to sectors on the disk.
<b>Invisible file</b>	A file not usually visible to the user under ordinary circumstances.
<b>Keyboard shortcut</b>	A keystroke used as a substitute for a menu command or mouse action.

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<b>Kilobyte</b>	K-byte, K., 1024 bytes. Data equivalent to approximately one half a typewritten page.
<b>Launch</b>	To start up an application.
<b>LocalTalk</b>	The cables and connectors used to link Macs together.
<b>Macro</b>	A sequence of events programmed by the user to be evoked by a single keystroke.
<b>Math coprocessor</b>	A chip specifically designed for handling mathematical computations.
<b>Mb</b>	See <i>megabyte</i> .
<b>Megabyte</b>	1024 kilobytes or 1,048,576 bytes.
<b>Megahertz</b>	Millions of clock cycles per second. The measurement of a speed of a computer's processes. The higher the megahertz of a computer, the faster its speed.
<b>Memory</b>	Computer information is stored in memory. Memory includes ROM, which is nonvolatile memory built into the Mac; RAM, which is volatile memory for fast access and temporary storage of information; and disk space, which is long-term storage memory.
<b>MHz</b>	See <i>megahertz</i> .
<b>Modem</b>	A device that allows computers to communicate with one another across telephone lines.
<b>Modifier keys</b>	The keys on the Mac that do not generate a character by themselves but which can be used in combination with other keys to perform functions. Command, Option, Control, Shift, and Tab can all be used as modifier keys.
<b>Modular Mac</b>	Macs with a physically separate CPU and monitor.
<b>Monochrome</b>	A black-and-white screen. Can simulate grays by combining black and white.
<b>Motherboard</b>	The main circuit board in your Mac, it holds your Mac's brain.
<b>Mount</b>	To display a disk on the desktop.
<b>MUG</b>	Mac User Group. A group of Mac users, usually of a variety of levels of expertise, who exchange informa-

tion, shareware/freeware, advice, and common interest. Something that every Mac user should be a member of. (Never use a preposition to end a sentence with.)

<b>Network</b>	A collection of connected computers and the hardware and software that connect them.
<b>NuBus</b>	A protocol used by late-model Macs (the II series and after) for communication at high speeds with add-on expansion cards.
<b>Operating system</b>	The program that controls the actions of the computer, providing basic and universal functions such as file and memory management. System 6 or System 7 software, combined with the parts of the operating system built into the ROM (hardware) of your computer, make up the entire operating system.
<b>Optimizer</b>	A program for reducing fragmentation and arranging files on the disk for fastest possible access.
<b>Parameter RAM</b>	See <i>PRAM</i> .
<b>Peripheral device</b>	A hardware device attached to your computer, such as a hard drive, printer, scanner, or CD-ROM player.
<b>Port</b>	A connection or “plug” through which the Mac sends and receives information.
<b>PRAM</b>	Parameter RAM. A portion of RAM maintained by the battery that stores some of the Mac’s default settings, including the clock. (Pronounced Pee-Ram)
<b>Processor</b>	A chip that processes information.
<b>Programmer’s switch</b>	The switch on the Mac that allows you to restart or interrupt and enter the Debugger. The switch has two parts, one for each function.
<b>Public-domain software</b>	Software that has been made available for free to the public by its author at no cost to the user.
<b>RAM</b>	<i>Random Access Memory</i> (meaning any address within the memory, chosen at random, can be accessed as easily and fast as any other address.) Temporary memory where the Mac stores information it is working with. It is also known as volatile memory, because

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	information in RAM is not saved if the system crashes. RAM is stored in SIMM chips inside the Mac.
<b>Read</b>	To access data from a disk and transfer it into the computer's RAM.
<b>Reboot</b>	To restart the computer.
<b>ResEdit</b>	A powerful resource editor program that allows you to customize your Mac's interface in many ways. See Appendix C for more information.
<b>Resolution</b>	The quality of screen display or printed output measured in dots per inch.
<b>Resource fork</b>	The part of a file that contains resources used by applications and the operating system.
<b>Restore</b>	To retrieve information that has been backed up.
<b>ROM</b>	Read Only Memory. A chip in the Mac that contains part of the operating system. It cannot be changed or erased.
<b>SCSI</b>	(pronounced scuzzy) Small Computer Systems Interface. A protocol used by the Mac for high-speed transfer of data through a series of peripherals.
<b>SCSI chain</b>	A series of devices connected to one another in a chain, one after another, with the first in the chain connected to the Mac. Also known as a daisy-chain.
<b>SCSI ID</b>	The number assigned to each device in a SCSI chain to give it a unique address.
<b>Shareware</b>	Software made available by the author on a trial basis. Usually, shareware is downloaded free or offered at a small cost (the price of duplicating disks) and the user is requested to try the product for a limited number of days. If you like the software, you are asked to send a small fee (\$5-\$40) directly to the author. A tremendous source of wonderful software.
<b>SIMM</b>	Single In-line Memory Module. A small board with several (usually eight) RAM chips, which can be added to your Mac to give it more memory.
<b>Startup disk</b>	A disk which has all the necessary files (including the Finder and System) to start up the Mac.

<b>Startup document</b>	See INIT.
<b>Sticktion</b>	When the read/write heads of a drive are stuck and the platters cannot spin, or the arm is stuck and unable to move across the spinning platters.
<b>System</b>	The file used by the Mac for general operating procedures including starting up.
<b>System error</b>	See crash.
<b>System heap</b>	An area set aside in the memory for holding system information including extensions loaded at startup.
<b>System software</b>	The software required to operate the computer, including the System and Finder.
<b>Telecommunication</b>	Communication between computers via telephone lines and modems.
<b>Terminator</b>	A small device to give an end-point to a chain of SCSI devices.
<b>Tracks</b>	Concentric circles on a disk which are divided into sectors and used to store and organize data.
<b>Upgrade</b>	To improve existing hardware or software.
<b>Upload</b>	To copy software to a remote computer via telecommunication.
<b>User group</b>	A group of computer users who meet to share information and provide technical support.
<b>Utility</b>	A program specifically designed to alter, analyze, or improve the use of a computer.
<b>Video card</b>	The interface between the monitor and the Mac.
<b>Virtual memory</b>	A technology included in System 7 that tricks the Mac into thinking it has more RAM than is actually installed by using available hard disk space as RAM.
<b>Volume</b>	A storage device such as a disk.
<b>Volume bitmap</b>	A map of a disk which indicates which sectors are in use and which are free.
<b>Warm boot</b>	A restart from a power-on state; see cold boot.
<b>Write</b>	To transfer information from the computer's RAM to an external location, such as a disk or a printer.
<b>Zap</b>	To wipe out or clear, as in zapping a file.

## **APPENDIX B** ♦ **RESOURCES**

Magazines ♦

Newsletters ♦

Events ♦

User Groups ♦

ResEdit ♦



## Magazines

If you use a Mac, you should subscribe to at least one Mac magazine. It's that simple. If you aren't already a subscriber, go out and buy one issue of MacWorld and one of MacUser. See which one you prefer and subscribe.

The reason I am so adamant is because reading the trade magazines is the easiest way to get a lot of information, and it's cheap, too. They provide current information about hardware and software, excellent tips for use, and lots of good comparative reviews. They are a terrific learning resource and a great reference tool.

If you can afford it, try several different magazines. Each has its own personality and unique features to offer.

## **MacUser**

Of the two major Mac magazines (along with MacWorld), *MacUser* is the more "hip". It has as regular columnists some of the amusing personalities of the Mac community, including Bob LeVitus, Andy Ihnatko, and John Dvorak. The magazine regularly features comprehensive product reviews which can be invaluable, particularly when you are choosing hardware.

**MacUser**  
P.O. Box 56986  
Boulder, Co 80322-6986  
800-627-2247

## **MacWorld**

*MacWorld* is the other major Mac glossy. It, too, is an excellent resource for information and advice. MacWorld has excellent how-to information covering a variety of user needs. The consumer column is consistently the best. And, of course, they are the sponsor of the wonderful MacWorld expo.

**MacWorld**  
Subscriber Services  
P.O. Box 54529  
Boulder, CO 80322-4529  
800-234-1038

## **MacWeek**

*MacWeek* is a tabloid-sized weekly full of the most current information about what's new in the world of Macs. If you qualify, you can get *MacWeek* free. To qualify, you must be someone who buys a lot of Macs, and not all qualified subscribers will receive the magazine (apparently there are a limited number of free subscriptions). Or, you can pay to subscribe to *MacWeek* at \$99 a year.

MacWeek is highly technical and hardware oriented. If you like to know the latest information about the hot new Macs, it's the magazine for you. You can also learn a lot if you can wade your way through the ultra-techie jargon and occasional bad headline puns. And it has the best advertisements featuring the lowest prices.

**MacWeek**  
**Customer Service Department**  
**c/o JCI**  
**P.O. Box 1766**  
**Riverton, NJ 08077-7366**  
**609-461-2100**

## **Aldus Magazine**

*Aldus Magazine* is free bimonthly to anyone who purchases an Aldus program. And if you own an Aldus program (PageMaker, Persuasion, or Freehand), you want this magazine. It not only features terrific help columns on all the Aldus software, but it has really interesting articles on all sorts of related topics. It's not technical or dry in the least. If you don't own an Aldus product, you might still enjoy the magazine's feature articles. The subscription price is \$18 for six issues (one year).

**Aldus Magazine**  
**Aldus Corporation**  
**411 First Avenue South**  
**Seattle, WA 98104-2871**  
**206-628-2321**

## **Newsletters**

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Once you subscribe to one or two magazines, you will start getting literature in the mail asking you to subscribe to

newsletters. As a rule, newsletters tend to be very expensive, because they have no advertising and rely on subscriptions for income. Newsletters tend to have a very specific audience and are terrific for that particular group, but can be a waste of money for everyone else. Before subscribing to any newsletter, see if you can get a sample issue first.

## Events

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One good way to get a lot of information is to attend computer and Mac events in your area. If you live in an urban area or near a college campus, look for local computer fairs and other events.

### MacWorld Expo

The ultimate Mac event is the MacWorld Expo. MacWorld is a huge gathering of Mac fanatics from all over the country (and even other countries) that occurs twice a year, once in San Francisco, and once in Boston. There are also MacWorld Expos in other countries. Literally hundreds of thousands of Mac users, vendors, developers, and other interested parties descend on the host city like a B-Movie Invasion of the Computer Geeks. MacWorld features the Expo, a showcase of over 500 Mac vendors demonstrating and selling software, hardware, accessories, and everything else. The Expo alone is worth the trip to MacWorld, and it's only \$20 if you pay in advance. And of course, there is no better place to pick up free pens and other silly give-aways. The MacWorld Expo also has a conference program featuring seminars, demonstrations, and lectures. Beg, borrow, or steal your way to the MacWorld Expo at least once; it's an experience not to be missed. For more information about the expo, see *MacWorld Magazine*.

## User Groups

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User groups are affiliations of Mac users. They feature regular meetings at which you can see software demonstrations and schmooze with other Mac users. Many of them can be expert resources who can help you with your Mac questions. User groups are also an excellent source of shareware and freeware, and most publish informative newsletters. Apple has a toll-free number you can call for information about the user group nearest you: 800-538-9696, extension 500.

### BMUG

BMUG is the most famous of all Mac user groups and deservedly so. They put out a biannual "newsletter" that has hundreds of pages. One of the best features of the newsletter is the recommended products section, which is based on a consensus of the opinions of many Mac users who have used the products over an extended period of time. These reviews provide a nice counterpoint to the information available in magazines, which tends to be based on a single reviewer's experience testing a product for a limited time. The newsletter alone is worth the \$25 six-month membership price, and if you have a modem, you get the bonus of the BMUG bulletin board system (BBS). The BBS is yet another great source of information and expert advice. BMUG also offers a huge library of shareware and freeware, available for downloading from the BBS or through the mail for a nominal disk-copying fee.

**BMUG**  
**1442A Walnut St. #62**  
**Berkeley, CA 94709-1496**  
**510-549-2684**

## ResEdit

---

I put information about ResEdit in the section on resources not as a bad pun, but because it is a resource in and of itself. ResEdit is a powerful little program that lets you mess around with all the stuff that affects the appearance of your software, such as menus, windows, and sounds. I recommend ResEdit, but with a caveat—you should get yourself an expert, a book, or a user group seminar. Without some form of instruction, you will at best be frustrated by ResEdit; at worst, you will destroy your software.

One excellent guide is BMUG's publication *Zen and the Art of ResEdit*. It comes with the latest version of ResEdit and a number of other interesting and useful files. It is a lucid and friendly guide to this powerful program.

***Zen and the Art of Resource Editing, Third Ed.***  
**Derrick Schneider, Hans Hansen, Noah Potkin**  
**BMUG Inc./Peachpit Press**  
**1442A Walnut St. #62**  
**Berkeley, CA 94709-1496**  
**510-549-2684**

## **APPENDIX C** ♦ **PRODUCT INFORMATION**

**Shareware ♦**

**Freeware ♦**

**Commercial Software ♦**

**Hardware ♦**



## W

hat follows is product information for those products mentioned in this book. Do not consider mention to necessarily mean endorsement; look to the text for specific comments about the products.

Much of the software listed is shareware or freeware. Shareware is software written by a programmer, often an amateur or a hacker, to be sold on a "trial basis." It is usually distributed through user groups and on bulletin boards and online services. You can try the software for a given number of days, and if you decide you like it, then send a small sum (usually only \$5 to \$35 dollars) directly to the author. Freeware is like shareware, except that you don't have to pay for it at all. Occasionally, a programmer will have an unusual form of payment, such as "postcardware," which asks you to send a postcard to the author, or "charityware," which asks that your donation be sent to a charitable agency of the author's choice. All of the shareware listed here is easily obtained from user groups and bulletin boards.

As for the commercial software, I have provided the publishers' addresses for you to use to get more information. If you are interested in purchasing the software, order it from one of the mail order houses for the best prices. Several mail order companies are listed after the products. Only software that cannot be bought anywhere else should be purchased from the manufacturer.

For hardware, you'll want to go somewhere where you can compare various types of equipment, if possible. Before doing business with any company, do a little research. The quickest way is to post a message on local bulletin boards asking for other users' opinions. If you don't have access to a BBS, try going to a local users' group meeting and asking around. Either way, you will find people respond fast and furiously to questions about vendors, detailing experiences both good and bad.

**After Dark**

Berkeley Systems  
2095 Rose Street  
Berkeley, CA 94709  
415-540-5536

**Alias Assassin**

Bill Monk/Monkware  
MacUser (Ziff/Davis)  
Freeware

**AltCDEF**

Alexander S. Colwell  
Freeware

**AppleEaselIn**

Peter Kaplan  
1025 Reynolds Rd., #9U  
Johnson City, NY 13790  
Freeware

**Art of Darkness, The**

Berkeley Systems Design  
1700 Shattuck Ave  
Berkeley, CA 94709  
415-540-5535

**AutoDoubler**

Salient Software  
124 University Ave., Ste 300  
Palo Alto, CA 94301  
415-321-5375

**Before Dark**

Craig Marciak  
908 Yellowbrick Road  
Chaska, MN 55318

\$10 Shareware

**BeHierarchic**

Fabien Octave  
12 Av. de l'Aigle  
B01150 Brussels, Belgium  
\$10.00 Shareware

**Bob**

(freeware; available from user groups or bulletin boards)

**BroadCast**

Joachim Lindenberg  
Roonstrasse 26C

W 7500 Karlsruhe, Germany \$25.00 Shareware	<b>DOS Mounter</b> Dayna Communications 50 S. Main St., 5th fl. Salt Lake City, UT 84114 (800) 531-0600 (801) 531-0600
<b>CommentKeeper</b> Maurice Volaski	<b>DynoDex</b> Portfolio Systems 159 Flushing Ave. Brooklyn, NY 11205 800-729-3966
<b>Cursor Animator</b> Wilhelm M. Plotz Siedlungsstrasse 21 A-4222 St. Georgen a.d. Gusen Austria Europe Postcardware (send a post- card to the author)	<b>E-Machines Monitors</b> E-Machines 9305 SW Gemini Dr. Beaverton, OR 97005 503-646-6699
<b>DayStar Digital Accelerators</b> DayStar Digital 5556 Atlanta Highway Flowery Branch, GA 30542 800-962-2077	<b>EMAC Silhouette Trackball</b> <b>Escapade</b> Christopher Wysocki Freeware
<b>DepthGauge</b> Tom Johnson and Dan Segel “EctoWare”—the authors ask that you purchase a CD or cassette of performer Happy Rhodes (one of whose albums is titled Ecto) as pay- ment for the software	<b>Excel</b> Microsoft 1 Microsoft Way Redmond, WA 98052 800-426-9400
<b>DFaultD</b> John Gotow 129 Iron Run Road Bethel Park, PA 15102 \$20 Shareware	<b>FastBack II</b> Fifth Generation Systems 10049 N. Reiger Road Baton Rouge, LA 70809 800-873-4384
<b>Disinfectant</b> John Norstad Academic Computing and Network Service Northwestern University 2129 Sheridan Road Evanston, IL 60208 Freeware	<b>Finder Commands</b> <b>First Things First</b> Visionary Software 1820 SW Vermont, Ste. A Portland, OR 97219 503-246-6200

**561 Pilgrim Dr., Ste. D**  
Foster City, CA 94404  
(800) 783-ARES  
(415) 578-9090

**Freehand**  
Aldus Corporation  
411 First Ave. South  
Seattle, WA 98104  
206-622-5500

**Greg's Buttons**  
Greg Landweber

**HAM**  
Inline Design (division of  
ALP Software Inc.)  
308 Main St.  
Lakeville, CT 06039-1204  
(800) 453-7671  
(203) 435-4995

**Hand Off II**  
Connectix  
2655 Campus Drive  
San Mateo, CA 94403  
800-950-5880

**INITPicker**  
MicroSeeds Publishing, Inc.  
5801 Benjamin Center Drive  
#103  
Tampa, FL 33634  
813-882-8635

**Layout**  
Mike O'Connor  
Objects Inc.  
99 Rosewood Dr.,  
Northwoods Business Park  
Danvers, MA 01923  
(800) 424-6644  
(508) 777-2800

**MacEnvy**  
Blue Cloud Software (Ken  
McLoud)  
Freeware

**MacRecorder**  
Farallon Computing, Inc.  
2000 Powell St., Suite 600  
Emeryville, CA 94608  
510-596-9100

**MacWrite**  
Claris  
5201 Patrick Henry Dr.  
Box 58168  
Santa Clara, CA 95052  
408-727-8227

**Mass Microsystems**  
**Removable Cartridge**  
**Drives**  
Mass Microsystems  
810 West Maude Ave.  
Sunnyvale, CA 94086  
800-522-7979

**MasterJuggler**  
ALSoft  
P.O. Box 927  
Spring, TX 77383  
800-257-6381

**MenuChoice**  
Kerry Clendinning  
P.O. Box 26061  
Austin, TX 78755  
\$15.00 Shareware

**Metamorphosis Professional**  
Altsys Corp.  
269 W. Renner Rd.  
Richardson, TX 75080  
(214) 680-2060

<b>More After Dark</b> Berkeley Systems Design 1700 Shattuck Ave Berkeley, CA 94709 415-540-5535	<b>PageMaker</b> Aldus 411 First Ave. South Seattle, WA 98104 206-622-5500
<b>MouseStick</b> Advanced Gravis Computer Technology	<b>Persuasion</b> Aldus 411 First Ave. South Seattle, WA 98104 206-622-5500
<b>MVP mouse</b> Curtis Manufacturing Co., Inc. 30 Fitzgerald Dr. Jaffrey, NH 03452-1931 (800) 548-4900 (603) 532-4123	<b>Pyro</b> Fifth Generation Systems 10049 N. Reiger Road Baton Rouge, LA 70809 800-873-4384
<b>Nom de Plume</b> Bill Monk/Monkware MacUser (Ziff/Davis) Freeware	<b>QuicKeys 2</b> CE Software P.O. Box 65580 Des Moines, IA 50265 515-224-1995
<b>Norton Utilities for the Mac</b> Symantec Corporation 10201 Torre Ave. Cupertino, CA 95014 800-343-4714	<b>Radius Accelerators and Monitors</b> Radius 1710 Fortune Drive San Jose, CA 95131 800-227-2795
<b>Note Pad II</b> Arthur Britto II 1850 Arch Street #3 Berkeley, CA 94709 \$20 Shareware	<b>RasterOps Monitors</b> RasterOps 2500 Walsh Ave. Santa Clara, CA 95051 800-468-7600
<b>On Cue</b> Icom Simulations 648 So. Wheeling Rd. Wheeling, IL 60090 800-877-ICOM	<b>Rename Delay Editor!</b> Retrospect Dantz Development 1400 Shattuck Ave., Suite 1 Berkeley, CA 94709 510-849-0293
<b>Overlay Sounds</b> Jim Moore Freeware	

<b>SCSIProbe</b>	10201 Torre Ave.
Robert Polic	Cupertino, CA 95014
Freeware	800-343-4714
<b>sdrawkcaB</b>	<b>SuperClock</b>
Mark Adams	Steve Christensen
Freeware	Freeware (available from user groups and bulletin boards)
<b>SilverLining</b>	<b>SuperMac Monitors</b>
LaCie, Ltd. (a subsidiary of Quantum Corp.)	SuperMac Technology
8700 S.W. Creekside Place	485 Potrero Ave.
Beaverton, OR 97005	Sunnyvale, CA 94086
(800) 999-0143	800-624-8999
(503) 520-9000	
<b>Sniff</b>	<b>SyQuest Cartridges</b>
Timothy Miller	SyQuest
Freeware	47923 Warm Springs Blvd.
<b>Sound Mover</b>	Fremont, CA 94539
Ricardo Ettore	415-490-7511
67, rue de la Limite	<b>System Picker</b>
1970 W. Oppen	Kevin Aitken
Belgium	20990 Valley Green Dr., #635
<b>SoundExtractor</b>	Cupertino, CA 95014
Alberto Ricci	(408)974-5899
Corso De Gasperi 45	Freeware
10129 Torino, Italy	
\$5.00 Shareware	<b>Talking Moose</b>
<b>SoundMaster</b>	Baseline Publishing
Bruce Tomlin	<b>Tempo II Plus</b>
15801 Chase Hill, #109	Affinity Microsystems
San Antonio, TX 78256	1050 Walnut St., Suite 425
<b>Suitcase II</b>	Boulder, CO 80302
Fifth Generation Systems	800-367-6771
10049 No. Reiger Rd.	<b>Thumbelina Mac</b>
Baton Rouge, LA 70809	Appoint, Inc.
800-873-4384	1332 Vendels Circle
<b>SUM II</b>	Paso Robles, CA 93446
Symantec Corporation	(800) 448-1184
	(805) 239-8976

**TurboMouse**  
Kensington Microware  
215 Park Ave. So.  
New York, NY 10010  
800-535-4242

**Wacom Tablet**  
Wacom Technology Corp.  
501 S.E Columbia Shores  
Blvd., Ste. 300  
Vancouver, WA 98661  
(800) 922-6613  
(206) 750-8882

**Wallpaper**  
Thought I Could  
107 University Place, Ste. 4D  
New York, NY 10003  
(212) 673-9724

**Windows (utility, not Microsoft's PC product)**  
Joachim Lindenberg  
Roonstrasse 26C  
W 7500 Karlsruhe, Germany  
\$10.00 Shareware

**Word**  
Microsoft  
1 Microsoft Way  
Redmond, WA 98052  
800-426-9400

**ZMakeAlias**  
Mike Throckmorton  
Freeware

**ZoomBar**  
Brian Westley  
1026 Blair Ave.  
St. Paul, MN 55104  
\$5.00 or a disk of "stuff"  
Shareware

## Places to Shop

For software, go first to one of the mail order companies listed below for best prices and fast service.

**MacWarehouse**  
1690 Oak St.  
P.O. Box 3031  
Lakewood, NJ 08701  
800-255-6227

**Mac's Place**  
8461 154th Ave. NE  
Redmond, WA 98052  
1-800-367-4222

**MacConnection**  
14 Mill St.  
Marlow, NH 03456  
800-800-4444

**Mac Zone**  
17411 NE Union Hill Road  
Redmond, WA 98052-6716  
800-248-0800

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# MAXIMIZING YOUR MAC: THE ULTIMATE MAC GURU'S GUIDE

Discover the secrets of your Mac's operating system and the voodoo that makes it all work—or not work. Get the ultimate performance levels out of your Mac by learning what and how to upgrade, maintain, repair, and customize. Learn how to speed up and simplify your work processes with shortcuts and macros. And impress your friends and your boss by knowing where to find the Amazing Hidden Bunny, how to make your Mac belch on command, and other great tricks!

**AMY LASKIN** has been working and playing with Macs since 1986. As a Macintosh consultant specializing in desktop publishing, she has worked with countless hardware and software configurations in a variety of professional environments, including publishing, advertising, and finance. Educated at Vassar and Parsons School of Design, Amy Laskin learned everything in this book the hard way.

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