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The Macintosh™ Advisor

Essential Techniques for Experienced Users

Cynthia Harriman
& Bencion Calica

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Preface

True confessions: I got into computers for the money.

When my student loans came due, I did what any red-blooded American boy would do—I panicked, shaved my beard, left all my morality behind, and went to look for a Real Job. Much as Dustin Hoffman in *The Graduate* was verbally pelted with advice to get into plastics, I was told by everyone I met to "get into computers." So I got a job in a computer store (just until the loans were paid off, mind you).

I was overwhelmed. "I'm never going to learn all this stuff. There are thousands of programs and they're all different, and I'd rather go to the beach anyway." But after much dedicated effort, I learned a few programs and started to be able to answer people's questions. I even started to do some of my own work on the computer. Quotes that used to take me an entire half hour to do by hand, I could now do in ten minutes—plus an extra forty-five minutes to load the program, find my files, hook up the missing cable, and make the printer work.

With access to a whole store of computers, I found myself steadily gravitating toward the Macintosh. Somehow, the work seemed less bothersome on the Mac, but I couldn't put my finger on why. Then one day a client said something that set off some serious bells in my head. He told me he'd been

working on one of those "produce or walk" projects for the president of his company, and in six days and nights of work with the Macintosh, he hadn't thought of the computer once.

That was it—the reason the Mac made more sense was that it let me concentrate on the work at hand, *not* on the computer. With other computers, my focus was split between my work and the operation of the machine; with the proper tool, all my attention stayed with my work. Helping normal, non-computer people learn to use this type of tool could make a positive difference in the world, and could be interesting and rewarding work even after all the student loans were paid off.

The Macintosh Advisor developed from this philosophy. It contains the techniques I've found most helpful in making the Macintosh the most efficent and powerful tool possible. Read through it, and pick and choose the information that enhances your work, as you explore computers as tools for the mind.

Ben Calica
Boston, Massachusetts

The Macintosh Advisor grew out of our personal experience, as Ben, the dedicated Mac enthusiast, worked to convince me that the Macintosh was a serious and powerful computer. An experienced user of other computers, I'd grown frustrated with the Macintosh soon after I bought it in early 1984. Manuals explained how but not why, and left out the most basic information. (I took my Mac back to the dealer the first time I got the bomb; nowhere, in any book, could I find a guide to error messages.) I cursed what I called the Mac's Father-Knows-Best operating system, as it arbitrarily spat disks out at me. I felt constrained by its meager 128K of memory and single disk drive.

No power. No options. Just a lot of handholding that I, as an experienced computer owner, didn't want any longer. Much as I loved the Mac's initial ease of use, when I was ready to take the training wheels off, no one could tell me how. Every book on the market was either aimed at beginners, or targeted at those with a real technical bent.

I met Ben just at this time. He countered each of my frustrations with quick pointers, then took the time to explain what was really happening behind the scenes. Before long, the depth and power of the Macintosh became apparent: there was a lot to the Macintosh, beyond the obvious. The Macintosh became my machine of choice, and the idea for *The Macintosh Advisor* was born. Ben thought up the words, I put them in the logical order and added a few of my own, and here it is.

Cynthia Wills Harriman
Portsmouth, New Hampshire

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We'd also like to thank the following people from Apple: Chris Espinosa and Martha Steffen on the West Coast, for keeping us up to date on Apple's new developments; on the East Coast, Beth Marshdoyle and Scott Newcome for supplying us with equipment. Our editor Bill Grout deserves special thanks too, for acting as our advocate at Hayden with the highest professionalism and patience.

Last but certainly not least, personal thanks go to those who provided the emotional support that kept us going. Ben acknowledges "the local Apple trainers (Beth, Lisa, and Peter) who hooked me on the Mac when it first came out. My mom, who believed in me through the whole process (Hi, Mom). Eric Larson, in the spirit of A.O.P. Productions, and George Voltz, who drove me all over New Hampshire. And, most important, Ski, who resisted all impulses to physically damage my computers for so long." Cindy's special thanks go to her husband, Lew, and children, Libby and Sam, for their deep love and understanding.

Introduction

It has been well-publicized that the Macintosh includes a programmer's toolbox, full of building blocks of code that professionals can use to cut down on the effort needed to create with the Mac. Less well-known is the fact that the Macintosh also supports a wide range of readily available options for non-technical users who are interested in streamlining their creative work on the machine.

Some of these time-savers are built into the Mac's system software, others are available through small utility programs, and still other improvements are related to hardware options. For each of these choices, *The Macintosh Advisor* offers:

- general non-technical explanations of how the program, product, or procedure works
- specific information on typical examples and procedures
- a checklist of points to consider in making your own evaluations

At first, the specific examples may interest you the most. In the long run, though, the background information and checklists will prove immensely useful, as today's specifics are nudged aside by tomorrow's new products and you need to make your own educated choices.

We have made certain assumptions in writing *The Macintosh Advisor*. First, we assume you're the type who uses the

computer as a productive tool, not a hobbyist or hacker who delights in clever tricks for their own sake. Every technique we describe offers immediate payback in added efficiency. Second, our specific examples assume you're using a Macintosh with at least 512K of memory and two disk drives: it's next to impossible to be productive with less. Finally—and most important—we've geared this book to the experienced user. We assume you already know common Macintosh terms like "shift-click," "drag," and "pull-down," and so will spare you another explanation of these basics. *The Macintosh Advisor* is not meant to be your first computer book!

The Macintosh Advisor should be kept next to your Macintosh as a reference. Turn to it when you feel like experimenting, when you want to know why something's happening onscreen, or when you want to solve a problem. With this approach in mind, the chapters are designed to be read in almost any order, although we do highly recommend that you start with Chapter 1 before you skip around.

Our goal for this book is to give you long-term knowledge rather than a lot of simple tips and tricks. We hope that as new techniques, programs, and peripherals reach the market, you'll be able to apply the information from *The Macintosh Advisor* to the task of understanding, evaluating, and implementing Macintosh options.

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CHAPTER

1

The Finder: Macintosh's Operating System

As a regular Macintosh user, you're probably aware of *what* the Finder does, but you may want to know more about *how* it works. This chapter explains the most essential behind-the-scenes facts about the Finder, so that you can understand how to:

- eliminate unnecessary and tedious disk swaps
- keep track of the system disk that controls your Mac
- speed into and out of your favorite applications more quickly
- use the hierarchical finder system efficiently

Chapter 1 ends with an encyclopedia-style guide to all the Finder's features. Use this section to pick up additional tips on some of the Finder's newer features, or as a reference.

Some of the information in this first section may already be familiar to you. If so, skip ahead, and learn something new. Understanding the Finder is so essential to using the Macintosh efficiently, though, that we recommend that most of you look through this information, to catch any possible gaps in your knowledge.

What's an Operating System?

If someone asked you what you're doing now, you'd say, "I'm reading a book." Yet, even though reading is the *main* "program" you're using, behind the scenes your body is doing lots of other things: breathing air, circulating blood, maybe tapping your foot unconsciously, or scratching your head.

Computers work pretty much the same way. Even while they're running one main application, like a word processing program or a spreadsheet, behind the scenes a set of programs known as the operating system is taking care of basic housekeeping procedures—chores like starting up and shutting down the computer, or listing, displaying, and copying individual files.

Like all computers, the Macintosh has an operating system. In the Mac's case, it's made up of several small programs that are located in two different places:

- ROM (Read Only Memory) built into your machine
- the System folder on a disk

Your Mac needs both of these resources to start up your machine and run any and all programs. Let's look at each in turn.

ROM

Part of the operating system is built into the Mac's hardware in ROM, or Read Only Memory. When you start your Mac without a disk in it, program instructions permanently encoded in ROM activate the disk drive, send out a few strategic beeps, and finally display the question mark/disk icon on your screen. You insert a **startup disk** (definition follows), and Mac proceeds with the opening ceremonies.

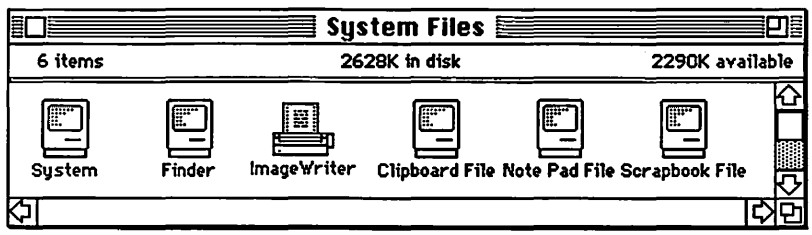


Figure 1–1. The Macintosh System folder.

The System Folder

Next, Macintosh looks for information in the System folder. Although six elements (the System file, the Finder, ImageWriter, Scrapbook, Clipboard, and Notebook) are usually found in the System folder, only the System file and Finder are generally essential to startup. (It's the presence of these essential files that gives a disk the potential to be a "startup disk.")

The System file is instrumental in starting the Mac, and also controls many individual resources, like the fonts and the Desk Accessories, that are available at all times. For the most part, though, the System file works in hidden and mysterious ways. It's not important that you know much else about the contents of the System file—except to understand that your startup disk must contain a System file, or your Macintosh won't function.

The Finder is the most visible part of the Mac's operating system. It's responsible for organizing your files—for literally helping you find the documents and applications you need to work with. Although technically a separate application, the Finder can be considered part of the operating system because of the types of things it does. The Finder:

- shows you which disk currently "controls" your Mac
- serves as the entrance and exit to your applications
- performs file housekeeping and other control procedures

Since you deal with the Finder every time you use your computer, the rest of this chapter will focus on ways to make the most of it. Let's start off by discussing some basic Finder facts that can help you eliminate unnecessary disk swapping.

The Dominant Disk

You've already learned that you must use a disk containing the System and Finder files to start up your Mac. At all times, the Mac designates one disk with these crucial files as the **dominant disk.** Then, whenever you try to do certain tasks—change fonts, print, or use a Desk Accessory, for example—your Macintosh looks for the dominant disk to read additional instructions from it.

If the dominant disk is still in the drive, you're in luck. If you've ejected your original disk, though, while it's still the dominant disk, the Macintosh will constantly ask you to switch back, as it frequently calls for System and Finder files. You'll eliminate most of your disk-switching frustrations by learning to control the dominant disk.

How the Dominant Disk Is Determined

Initially, Mac designates your startup system disk as the dominant disk. You can always tell which disk is dominant—it's the one in the upper-right corner of the Desktop. Barring some advanced technical tricks, there are only three ways this disk loses its dominance:

Automatically, to another floppy. If you insert another disk containing the System and the Finder, and start an application from that disk, the Macintosh automatically makes the new disk dominant under Finder version 4.1 or lower. Newer versions of the Finder do not usually switch to another disk unless the original dominant disk has been ejected. (Caution: If your new application is duplicated on the original disk, the original retains firm control. You must force the switch manually, as explained below.)

Automatically, to a hard disk. Better hard disks will automatically turn over control of the Mac to the System file on the hard disk. Starting an application from a System floppy will most likely cause the hard disk to relinquish control, as above; Apple's Hard Disk 20 and some others will retain control in this circumstance under the hierarchical file system.

Hot Tip

Manually. You can force the Mac to designate another disk as the dominant one. Here's how it's done:

1. Open the System folder of the disk you want to make dominant.
2. Hold down the Command and Option keys.
3. Double-click on the Finder icon in the System folder.

You'll see that the new disk takes over the dominant, upper-right position. If you've already ejected the old dominant disk, its icon disappears from the Desktop. (Common pitfalls: If you double-click the Finder without holding the Command and Option keys, you'll get the message "An application can't be found for this document". More seriously, if you select and double-click the System icon instead of the Finder, your Mac may crash and you'll have to restart the computer.

Printing and the Dominant Disk

One other fact may save you from some additional disk-swapping anguish. A third file from the System folder, the ImageWriter file (or any other printing resource file) is also tied closely to the principle of the dominant disk. Although it is not required to start up your machine, the Macintosh will call for the printer file from your dominant disk whenever you try to print. Keep this in mind: It's another reason to make sure you know which disk is running your Mac!

Shadow Disks

After you've ejected a disk, you may notice that its dimmed icon remains on the Desktop. This is convenient if you plan to return to the ejected disk later in your work session, but these shadow disks can cause unnecessary disk swapping if you're not careful.

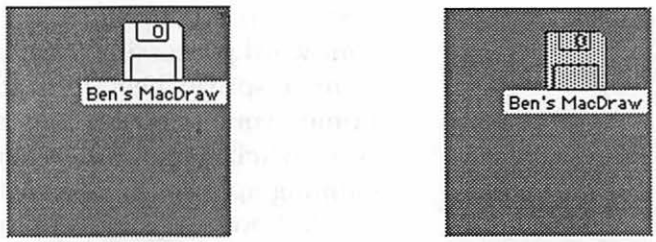


Figure 1–2. Shadow disks appear dimmed, as on the right above.

Whenever you shut down your Macintosh, its operating system carefully updates the Finder information of any disk on the Desktop. If you've moved or changed the Finder information of a shadow disk since it was ejected, Mac will ask you to reinsert the disk for updating.

The best way to avoid this kind of disk swap is always to "Trash" any disks you no longer need. Simply drag the shadow icon to the Trash Can, and drop it in (don't worry—dragging DISKS to the Trash can does *not* destroy them). All traces of the disk will disappear from the Desktop. An even better approach is to eject a disk and Trash its image all at once. If you drag the icon of a disk currently in your Mac to the Trash, the icon will disappear and the disk will automatically be ejected. Use this instead of Eject for disks you know you're finished with.

One exception to this procedure—the Mac won't let you Trash the dominant disk. With earlier Finders (below version 5.0), the icon stays put and you'll be told "Can't throw away the image of the startup disk". Later Finders eject the disk, but leave its shadow icon in the dominant position, just as if you'd used Eject from the File menu. If necessary, use the tricks you learned above to force a change in the dominant disk.

The Clipboard File

Although most disk swaps occur when the Macintosh calls for the dominant disk, another phenomenon involving the Mac Clipboard may also cause unexpected disk swaps.

The Clipboard is an area of RAM (memory) that Mac uses to shuttle information between programs. You've almost certainly used the Clipboard to move a MacPaint picture into your word processing program, or to merge a table of figures from a spreadsheet into an important report. Macintosh dumps your selection into memory, then patiently waits as you switch programs. When you tell Mac to paste, your clipping appears in its new location.

If, however, your clipping consists of more than a very small selection, the Macintosh won't try to fit it all in RAM. Then, a special Clipboard file is automatically opened on your dominant disk, to record your clipping. You switch disks, and try to start up your new application. You're

immediately hit with an annoying "Swap Disk" message for no apparent reason.

Actually the Macintosh is laboriously copying the Clipboard file from your old disk to your new disk, so your clipping will be available to your new program. If you indeed intend to transfer information from one program to another, you have no alternative but to put up with these swaps to get the job done.

Avoiding the Clipboard Swap

You may, however, have no intention of transferring anything. Keep in mind that *anything* you cut from a document gets dropped into the Clipboard. You may have been doing routine editing in one program, just before you decided to switch applications. You have no need for your discards to follow you to your next job, but Macintosh doesn't know that, so unnecessary disk swaps occur.

Hot Tip

To avoid swaps associated with the Clipboard:

1. Use Show Clipboard to make sure the Clipboard holds no useless data.
2. If it does, select a single blank space and cut it into the Clipboard.
3. This new, small cutting replaces the large selection, ensuring that the Mac won't use a disk Clipboard file.

Understanding one further detail about the Macintosh may also help you avoid Clipboard swaps. There are two ways to cut selected text:

- With the Edit Cut (Command-X) command. This method puts your selection in the Clipboard. You can then Paste or Undo the Cut. This cutting method can result in Clipboard swaps.

- With the Backspace key. This method completely destroys your selection, putting nothing in the Clipboard; it cannot be pasted or undone. Use Backspace to remove any selections you're sure you won't need again, since this method does not cause Clipboard swaps. (A few programs do not support the use of the Backspace key to cut selections.)

Summary

Now that you understand about dominant disks, shadow disks, and the Clipboard file, you should be able to avoid most of the Mac's annoying disk swaps. Follow these simple guidelines:

- Start your Mac with the application disk you'll be using: the fewer disks the Finder sees on the Macintosh Desktop, the fewer swaps it can potentially request.
- Whenever you eject and change disks to use a new application, make sure the dominant disk has changed, too.
- Always dump all unneeded disks in the Trash.
- Make sure the Clipboard never contains large clippings you don't really want anymore.

Controlling Startup and Shutdown

You'll have much better control over your Macintosh now that you know the behind-the-scenes rationale for all those seemingly arbitrary disk swaps. The next step toward gaining more control over the Mac and reducing mechanical delays comes through tips to streamline getting into Mac applications—and getting back out when your work is done.

Customizing and Automating Startup

The Finder spends most of its time handling two basic tasks: file maintenance and moving you to and from applications. If you're only using the Finder to get from one task to another, and have no need to copy or rearrange your files, you may

find it much quicker to bypass the full Finder each time you start up. Normal Finder procedures, after all, call for the Mac to draw an icon of every file and disk open on the Desktop, a time-consuming process that you may not need. We recommend three different ways to speed this process, and we explain the advantages and drawbacks of each.

Set Startup

If you have an application disk that is dedicated to one single program, you can have your Macintosh whisk you directly to your application and start up automatically, with the use of the Set Startup command. Here's how:

1. Select the application, by clicking on its icon. Let's say you want MacWrite.
2. Choose Set Startup from the Special menu in the Finder.

Now your chosen program—MacWrite in this case—will automatically load each time you start up your Mac with that disk.

Warning

Automatic startup may seem like a shortcut you'll want to implement on each of your application disks. A few caveats are in order, however. First, keep in mind that most programs automatically create a new document as they start up. If you intend to edit an existing document, Set Startup burdens you with an extra step: You must close the new file, then open your old one to get started. And, of course, if you want to manipulate your files, you'll need to backtrack to the Finder. You can undo Set Startup later, if you want, by setting Finder as the startup choice (remember, Finder is an application, too!):

1. Select the Finder icon from the System folder.
2. Choose Set Startup from the Special menu.

The MiniFinder

Although the Finder helps you do many things like copying disks and files, its main purpose (as its name implies) is finding files, to get you in and out of your work. Later versions (version 4.1 and up) of the Macintosh operating system offer an abbreviated Finder, called the MiniFinder, that speeds startup and shutdown operations. It does this by showing you only a selected subset of your available files, and by making available only a few Finder commands that are actually used for entering and leaving your work.

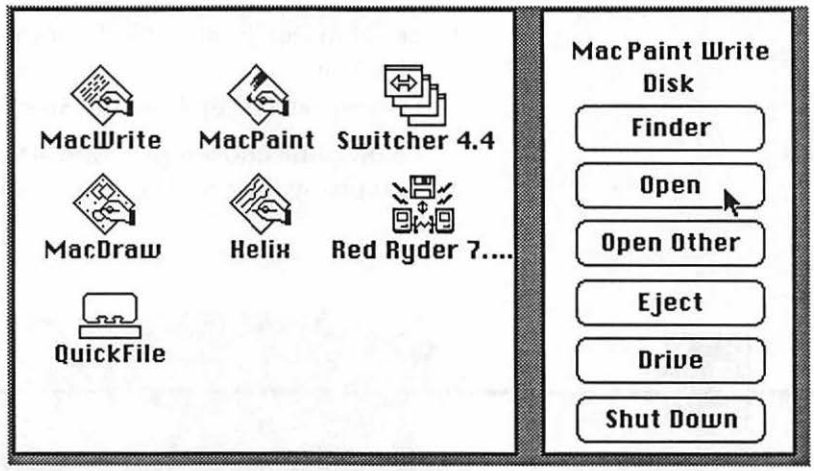


Figure 1–3. The MiniFinder.

The MiniFinder presents you with up to 12 files, neatly arranged in rows. These files can include both documents and applications. Along the right-hand side of the screen is a limited array of choices, as shown above, most of them normally available in the Finder. As you can see, the first of these choices returns you to the Finder—MiniFinder exists along with the Finder, not in place of it. Open Other, not a normal Finder feature, shows you a list box of all your files, so you can access programs and documents not displayed by the MiniFinder.

Setting up a MiniFinder for your disk takes just a few steps.

1. In the Finder, select the applications and documents you want included (shift-click or draw a marquee around multiple choices).
2. Then, select Use MiniFinder from the Special menu.
3. Select Install from the dialog box.

As soon as you click Install, the Macintosh sets up the MiniFinder screen for you. You can tell this has happened, since a small icon labeled MiniFinder appears in your System file. At this point, double-clicking this icon activates the MiniFinder; next time you start the disk, MiniFinder will be activated automatically.

Comparisons

MiniFinder Advantages and Disadvantages

The MiniFinder's advantages are many. It focuses your attention on only those files you've designated as your most important. It offers you access to the Finder commands you need for coming and going. But most important, it saves you time. Bringing up the full Finder is one of Mac's most time-consuming activities. The MiniFinder starts up more quickly, brings up the application of your choice more quickly, and even quits applications with greater dispatch. And you can make the MiniFinder work even more quickly, by simply hitting the Tab key instead of clicking the Drive button, and by hitting Enter for the Finder button (these shortcuts are available only with Finder 5.2 and above).

The MiniFinder can also be a great space saver, especially for those using 400K diskettes. It takes up only about 20K of storage space, as opposed to the Finder's 50K or so (the exact figure depends on the version). You can remove the Finder from a disk entirely, if you have no need of its other functions, and substitute the MiniFinder. Tips for this procedure:

- You can't throw out a Finder that's in use: make sure your disk is *not* the dominant disk, before you try to remove the Finder.
- Remove the Finder *before* you install the MiniFinder. If you put the MiniFinder on a disk that contains the Finder, then remove the Finder, you'll get an error message when you try to use the MiniFinder.

A few MiniFinder drawbacks must be mentioned, too. If you start a work session with a disk that has a MiniFinder, the Mac will interrupt you with a "Can't find MiniFinder" message every time you insert a subsequent disk without one. You'll have to take an extra step, choosing Open Other from the MiniFinder choices. And you can't get around this annoyance by putting MiniFinders on all your disks: The MiniFinder can't be installed on a data-only disk. As you try to install, you'll get the error message "Can't find an application for **filename**", after which the MiniFinder will appear to install itself properly. But when you open that disk, there will be no icons installed in the MiniFinder.

Other disadvantages to the MiniFinder include its use of RAM, its inability to access your Desk Accessories, and its inflexibility. While MiniFinder takes less than 20K, it may be hard to spare even this amount of space in RAM or on a disk that already contains the Finder. (See our suggestion above, and remove the Finder from your disk if space is extremely tight.) When you're using the MiniFinder, the Apple menu does not appear, so none of your DAs can be used. Finally, MiniFinder isn't as flexible as it could be. It requires you to set your files up ahead of time, and it *will not* update itself if your chosen files are renamed. The only way to update files is to repeat the entire MiniFinder installation procedure.

SkipFinder

An alternative minifinder, called SkipFinder, is available in the public domain. (Public domain software is available at little or no cost through user groups, and can be legally copied and shared. We'll be recommending such programs throughout the book. See Appendix B for sources for public domain software.) Although it's not quite as fast as Apple's official MiniFinder, it eliminates most of the MiniFinder's drawbacks.

Comparisons

Like the MiniFinder, SkipFinder is much faster than the full Finder. Also like MiniFinder, SkipFinder offers the necessary Finder commands to switch drives, eject disks, return to the full Finder, and reset your Macintosh. Its real advantages are that it gives you access to all your files in the same list box, it works with data and application disks, and it doesn't need to be installed ahead of time. As an added bonus, it includes the Finder's Print command, too! (Print is explained in full, later in this chapter.)

On the minus side, SkipFinder is slightly slower than the MiniFinder. It must be obtained through your nearest public domain software library (see Appendix B for a list of user groups), and added to your Desk Accessories. You'll learn how to add Desk Accessories in Chapter 3.

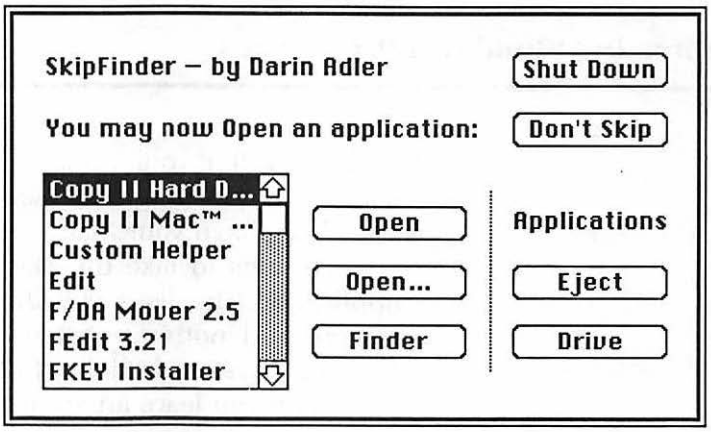


Figure 1–4. SkipFinder.

Which Should You Choose?

Our advice is that you choose some method of bypassing the Finder as a matter of routine. Odds are that your need to speed directly to your work is of daily, paramount importance; your need to perform routine file housekeeping with the full Finder is apt to be only occasional. Specifically we recommend:

- Set Startup, if your disk holds only a single application.
- MiniFinder, if speed is of primary importance.
- SkipFinder, if flexibility interests you most.

Data Disks: A Final Startup Tip

You can also speed up the process of starting a work session by being careful of when you put in your data disk. The important principle to remember here is that Macintosh reads the directory of a disk whenever you insert it.

If you insert both your application disk and your data disk as you begin, Mac will take the time to read both, before proceeding. Then, when you've started your application and go to Open a document, Mac will read your data disk again, as you switch drives. You can save a little time by waiting until this moment to push your data disk into the drive.

Granted, the time saved is minuscule. But any small step you take to control the time wasted in disk actions can easily become a useful habit, and can contribute largely to your overall satisfaction with the Mac.

Automating Shutdown Procedures

Unknown to most users, the Macintosh offers several shortcuts for ending your work sessions. Before we take a look at some of these, though, let's see what's really happening when you close down your Mac.

It seems to take the Macintosh a long time to quit an application. The disks whir, the Mac watch seems glued to the screen, and nothing obvious happens. Actually, the Mac's operating system is doing four major housekeeping chores each time you leave an application:

- Reminding you to save any changes. This is the only obvious part of the shutdown routine.
- Updating the Finder's directory information. Every change you make in the Finder needs to be recorded. This takes time, proportional to the changes you've made.
- Removing work files. Most programs create temporary work files as you use them. These are automatically removed as part of the quitting process. (If you don't quit properly, you may find some of these files on your disk next time you use it.)

- Redrawing the Desktop. Recording the graphic images of the Desktop takes time.

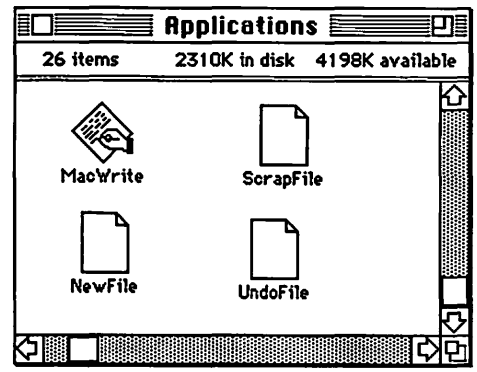


Figure 1–5. MacWrite uses these three work files routinely.

These four activities explain why it's important to quit your applications through the normal Close-Quit-Eject sequence. Macintosh, with its usual Father-Knows-Best approach, tries to make sure you don't bypass standard operating procedures. Playing along with Mac ensures that all changes in your files will be properly saved, and that your disks are properly maintained.

But sometimes you have legitimate reasons for bypassing the delays. For example, you may want to jump into MacWrite to print a quick copy of a memo you wrote yesterday. You make a few minor changes that you have no interest in saving, then print the document. Mac wants you to go through an elaborate and time-consuming shutdown routine, and you disagree. There are several options you can pursue.

Instant Ejection

You can pop your disks out of your drives at any time using

Command-Shift-1...ejects the internal drive
Command-Shift-2...ejects the external drive

Using these commands does not affect the program in progress. Just keep in mind that none of your changes will be saved when you use this easy out. You may also find this

useful if you need to temporarily eject a disk to lock or unlock it, without quitting your current application.

Shut Down

Shut Down is a feature of all later versions of Finder, starting with version 4.1. It's only starting to be implemented within commercial programs, but is always available to you at the Finder level, in the Special menu. It's a one-stop shortcut that updates the Finder's directories, cleans up and closes your files, then ejects both disks and restarts the system. You can then move directly into another program, or turn off your Macintosh.

Leave It On!

Of course, the easiest way to streamline your Mac's shutdown procedures is to just leave your computer on, running your favorite programs. The Mac requires no more electricity than a 60-watt bulb, and the life of some components is actually prolonged if it is *not* frequently switched on and off. Just make sure to save any files in use, and turn down your screen (the brightness control is on the left under the Apple logo) whenever you go away from your machine. Damage to the display can result if it's left on and unmoving for long periods. You may also want to consider purchasing a surge-protector if you leave the Mac on around the clock; the law of averages is more likely to catch up with you, as your Macintosh is exposed to more potential fluctuations in power.

A Reference Guide to Finder Procedures

Somewhere along the line, computer operating systems got a bad name. Rather than the faithful civil servants they were meant to be, operating systems were seen—sometimes for good reason—as stolid bureaucrats, blocking progress with mindless rules and syntax at every turn. Our tips for bypassing the Finder, though, aren't meant to imply that the Finder is nothing more than an unpleasant obstacle. On the contrary, the Finder is an important and useful tool. Our message is that the serious Macintosh user should be able to control

when and where to use the Finder. When it's needed, the Finder offers a great deal of power, to carry out the important tasks of organizing and maintaining disk storage for you.

The rest of this chapter consists of an alphabetical guide to all the Finder's features. Experienced users may want to skip this section, or merely skim it to check for any stray holes in their knowledge. Newer users, and those whose early Macintosh manuals don't cover recent improvements in the Finder, will find a variety of tips and essential reference information in this guide.

Copy

Copying Disks You can make an extra copy of an entire disk by simply dragging its icon to the backup disk. You'll get a warning message that reminds you that this procedure will wipe out the contents of the backup disk. Make sure you're using a new disk or a disk you want to recycle.

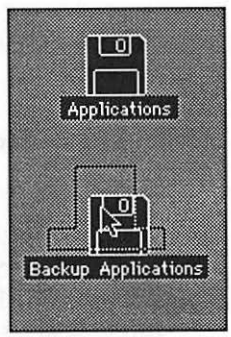


Figure 1–6. Dragging a disk's icon to a blank disk copies the entire disk.

Copying Files Use Duplicate from the File menu to make copies of an individual file or a group of files on the same disk. To copy a file to another disk, drag the file's icon to the new disk, and drop it there. You can shift-click or draw a marquee around several files and copy them all at once.

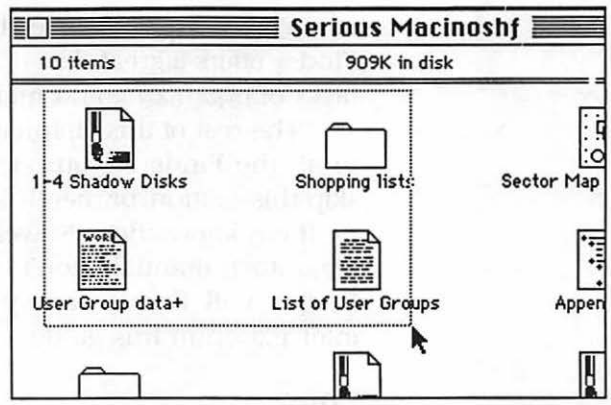


Figure 1–7. To draw a marquee, click the mouse in one corner of the group, then drag to the opposite corner of the group of icons and click again.

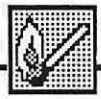
Desk Accessories

Desk Accessories are small programs that can be accessed through the Apple menu, even while you use other applications. Apple provides you with a few simple ones, but you can choose your own, to fit your work style. There are so many options here, we've dedicated all of Chapter 3 to Desk Accessories.

Desktop Housecleaning

Clean Up, from the Special menu, straightens the icons on your Desktop into neat, even lines. With Finder 5.2 and above, a special Clean Up trick is available. Select View by Small Icon, press the Option key, and hold it while selecting Clean Up. You'll find that all your files and folders will be lined up even more neatly, with no overlapping names.

Dragging icons to the Trash throws files away, though you can still rummage through the wastebasket and retrieve them, until the Trash is emptied. (Double-click on the Trash to see its contents, then drag any icons out if you've decided to keep them.) Empty Trash, also from the Special menu, completes the removal process. Trash is also automatically emptied whenever you eject a disk or open another document or application.



Hot Tip

Locked files cannot be trashed. Choose Get Info from the File menu, then unlock the file by clicking on Locked. Alternately, you can hold the Option key as you Trash, and again as you Empty Trash, to get rid of a locked file without first unlocking it.

File Organization

Few things are more frustrating than being unable to quickly identify and retrieve the file you want from your disk. Take advantage of the fact that the Macintosh lets you use much longer file names (up to 31 characters) than most computers, and avoid cryptic titles (see Names, below, for more discussion of this topic). If you prefer to keep your names somewhat shorter to avoid cluttering the Desktop, a few additional Finder features become essential:

Folders If your disk contains many files, you'll want to organize them into folders, much as you would with paper documents. You might, for example, divide the letters on your disk into two folders marked "business" and "personal." Within the personal folder, a further subdivision into "family" and "friends" might be in order. Granted, this means you'll have to open a few layers of folders to find what you want—but this is easier than fruitlessly opening several cryptically named documents in search of a specific file.

You create a structure of folders to organize your files by selecting New Folder, in the File menu. An icon labeled Empty Folder appears on the Desktop. You can rename the folder with the name of your choice, then drag file icons into the folder. When the folder is closed, only its icon appears in the directory, reducing the visual clutter of a crowded directory.

Folders can be nested one inside the other, to several levels to further organize large numbers of files. A mere convenience on diskettes, folders are essential in managing the large number of files usually found on a hard disk.

Get Info In addition to proper file organization, another way to eliminate confusion in locating a specific file is to take advantage of the Get Info command in the File menu. Get Info lets you record three lines of comments about any disk or file you create.

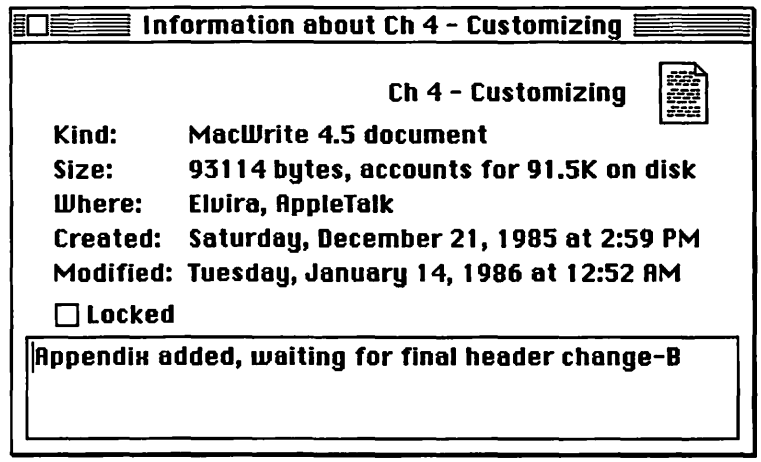


Figure 1–8. Comments in Get Info help identify a disk's contents.

Always make sure to record a few notes in Get Info, so you can learn more about a file before you open it. If this type of information has been recorded, you can select a file's icon, then choose Get Info from the File menu.

Hierarchical File Structure On diskettes of 400K or less, the Finder normally uses a "flat file" system for organizing your folders: Even if you've tucked files into folders that are inside other folders, all your files will appear in any list box, just as if the folders weren't there. The organizational advantage of folders that helps reduce Desktop clutter is useless in reducing list box clutter.

Starting with Finder version 5.0, it's possible to arrange the files on larger disks in what's known as a hierarchical file structure. Basically, this system means that list boxes can represent the folder system you've used to organize your Desktop icons. Let's say your disk contains six files and two folders that appear on the Desktop when you open the disk:

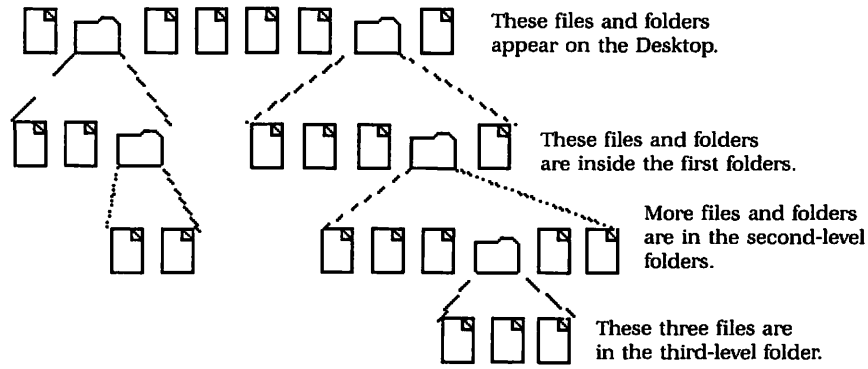


Figure 1–9. The hierarchical file system.

Both folders contain additional files and folders, conceptually forming a nested or hierarchical system. On the Desktop, you'd have to double-click on a folder to see its contents: This is the way the Finder has always worked.

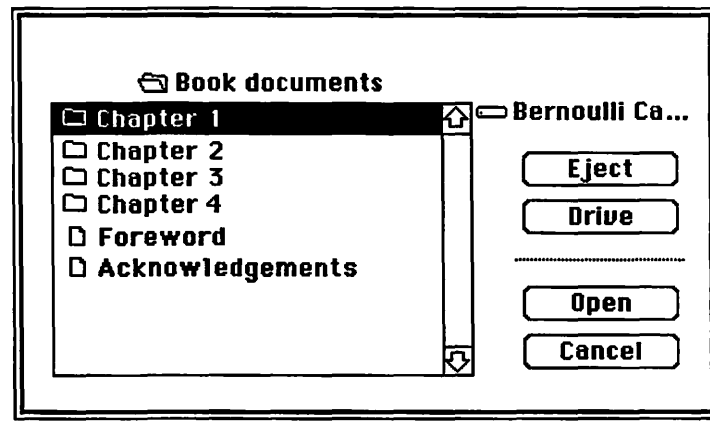


Figure 1–10. A list box, under the hierarchical file system.

With the hierarchical file system, list boxes work the same way, as shown above. Files and folders are differentiated in every list box by folder and file icons. If you open a folder, the folder's name appears above a new list that includes only that folder's contents. (This is known as a directory of the folder.) Rather than being bombarded with hundreds of file

names, at any time you see listed only the files from the specific folder you're "in."

You move "down" from one level to the next by opening folders; this can only be done one level at a time. However, you can come back "up" to any previous level more quickly: Click on the name of the current folder, at the top of the list box, and a pull-down menu appears, showing all the folders you opened to get where you are. Select any folder, to zip back to it.

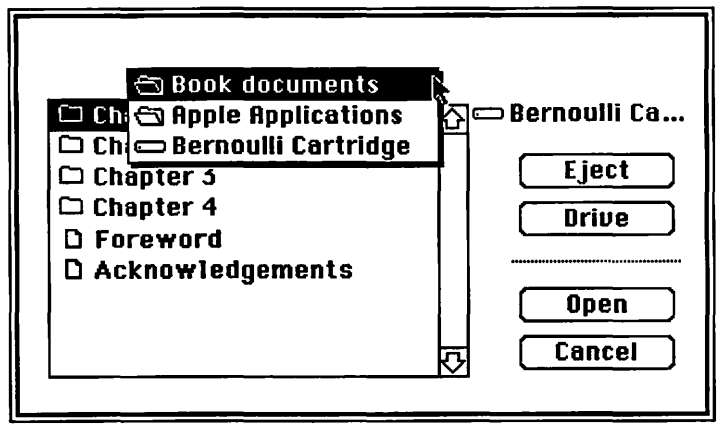


Figure 1–11. Click on the current directory to see its location relative to the Desktop.

The hierarchical file system presents both advantages and challenges. The obvious advantage is that it can corral the enormous number of files on a hard disk or large-capacity floppy into manageable groups, making it much easier to find any particular file. The challenge comes in taking a few minutes to think about the most sensible way to organize your "tree" of files. If you don't have a firm grasp of the filing system you've used, you may have to open several folders to search for a specific document; Apple does not provide any way to see a list of all your files at once.

Locking Files and Disks

Locked files cannot be erased or modified inadvertently. You lock a single file by selecting its icon from the Desktop, then selecting Get Info from the File menu. Click the box marked Locked, so that an X appears in it. Whenever you want, you can follow this same process to unlock a file: Clicking on the Locked box again removes the X. If you'd like to protect all the files on your disk, you can lock the entire disk by sliding the tab in the corner of the disk to the open position. (Yes, it's counter-intuitive. The open hole means locked, and the closed hole means unlocked.) No alterations can be made to any file on a locked disk.

Names

You can name any file, folder, or disk as you create it. To change a name, select it in the Finder, and use conventional editing techniques (backspace, cut and paste, etc.). Keep in mind that, in the old flat file system, two files on the same disk can't share the same name; with the hierarchical file system, you can use the same name again as long as the files are in different folders. Aside from that, your choice of names is almost unlimited. Here are a few pointers:

- Disk names can be up to 27 characters long.
- Document, application, or folder names can be up to 31 characters long.
  (These can be up to 63 characters long in Finder 4.5 and under.)
- Names can't contain a colon (:) or start with a period (.).
- Names cannot be changed when a file or disk is locked.
- The first part of a name should uniquely identify it.
- Each name should start with different letters, as far as possible.

Hot Tip

These last two tips make sense if you know how the Mac treats file names in dialog boxes, such as the lists you see when you select Open from an application menu. First, with Finder 4.5 and below, list boxes show only the first dozen or so letters of any name. If your files have names like Financial Report 1st Quarter and Financial Report 2nd Quarter, they'll look alike in an old dialog box. Try 1stQ Financial Report and 2ndQ Financial Report instead. With later versions of the Finder, list boxes show about twice as much of any name, largely eliminating this problem. Always make sure you're using the most current versions of the System and Finder.

Second, in most applications you can select a file from a list by typing the first letter of its name—or enough letters to uniquely identify it—instead of pointing with the mouse. If you need to type two or three characters to identify a specific file, type them in rapid succession, before Macintosh starts searching for your request! If you prefer to keep your hands on the keyboard, names with unique beginnings speed file selection.

New Disks

Macintosh, unlike most computers, lets you prepare new disks for use at any time, without interrupting your work. Whenever you insert a disk that's not initialized, the Mac automatically offers to prepare it for you. If you prefer to recycle an outdated disk instead, use Erase Disk from the Special menu. To erase only selected files from a disk, shift-click each file, then drag the group of files, all at once, to the Trash. You can use Empty Trash (from the Special menu) or let Mac take care of it, as noted above in "Desktop Housecleaning."

Printing

Printing Files You can tell Macintosh to print a series of files directly from the Finder. Simply select one or more documents on the Desktop. Then, select Print from the File menu. If Mac needs any additional application or data disks, it will tell you. You'll see the usual print dialog box, offering you options on print quality, number of copies, and type of paper. Once you've responded to the box, Mac proceeds to print each document in the queue.

Printing Catalogs You can print catalogs, or directories, of any disk or window on the Desktop. Use Print Catalog from the File menu; use Page Setup along with this procedure to specify the usual Mac page layout choices. Printed catalogs are handy for keeping track of your disk contents, but have one major limitation: they don't show the contents of folders.

Printing the Active Window You can dump the contents of your active window to the ImageWriter at any time, from the Finder or within an application, with the Command-Shift-4 key combination.

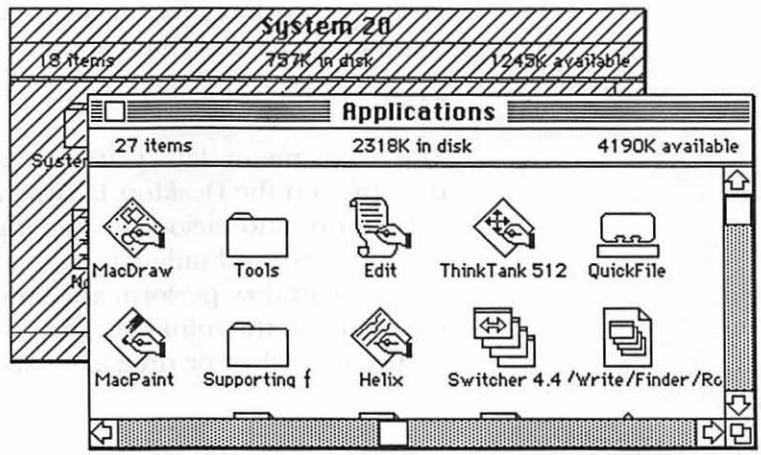


Figure 1–12. The Active Window lies on the top layer of the Desktop and is not dimmed out.

Printing Screen Contents Similarly, you can dump the contents of your entire screen to the ImageWriter, at any time, by pressing [CapsLock] then [Command]-[Shift]-4.

Printing to Disk You can create a disk snapshot of your current screen contents by pressing [Command]-[Shift]-3. This creates a MacPaint document on your dominant disk that you can edit, cut, and paste like any other MacPaint document. You can create up to ten "snapshots," which the Finder names Screen0 through Screen9. Rename or delete any of these shots, when you're ready to create more.

Shut Down

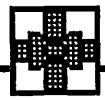
The Finder makes it easy to end a work session. The quickest way is to select Shut Down from the Special menu, causing the Mac to close out all files, eject all disks, and restart your machine. Alternately, you can select Eject from the File menu. One note: If you select for ejection the shadow icon of a disk that's already been ejected, you may get involved in unwanted disk swaps. See the complete discussion of Shut Down procedures earlier in this chapter for more.

Start Up

Finder procedures for Start Up include Set Startup and Use MiniFinder, as described above.

View

The View menu lets you change the appearance of any directory on the Desktop, between icons, small icons (Finder 5.0 and up), and various text arrangements. Earlier versions of the Finder would only let you manipulate files in icon form, but you can now perform any Finder procedure in text form, too. Just use the mini icon that appears to the left of the file name, and select or drag as usual.



Summary

Apple designed the Finder as an automatic transmission for your Macintosh. As in the automotive world, this makes for easy learning, but may make acceleration and handling seem a little sluggish once you get going. The hidden truth of the Finder is that you actually have a choice between automatic and manual "transmission": you can coast along with all the Mac's well-known elementary procedures, or take direct control, through increased understanding of the Finder's features.

CHAPTER

Speeding Applications

So far, you've seen a number of tips that help you use the Finder more efficiently, avoid disk swaps, and reduce the amount of time needed to set up and close down your work sessions. In this chapter, we'll go one step further, showing you ways to speed up the performance of your actual applications through creative use of the Mac's RAM. You'll find out about:

- **RAM disks**
  - what a RAM disk is
  - how RAM disks can make your Mac programs work faster
  - how you can "add" an extra drive at little or no cost, by using a RAM disk
- **Disk cache systems**
  - how a disk cache speeds disk accesses, without using much RAM
  - how to use the disk cache that comes with the Mac Plus
- **Switcher**
  - how to load up to eight programs in memory at once with Switcher
  - what all of Switcher's options can do for you
  - why multi-tasking programs can do more than Switcher can

How Programs Use Memory

Let's start with a little background information on how the Mac runs application programs. What happens when you start an application? Your Macintosh brings into temporary memory (RAM) certain core instructions that are basic to the operation of that program. As you use the application program, the Mac responds almost instantaneously, reading these instructions from RAM and carrying them out.

At some point, though, you select a menu choice or enter a command sequence that requires instructions not already in memory. The disk whirs or the dreaded watch appears, indicating that your Mac must seek additional information from the disk in order to proceed. New instructions are transferred to RAM, displacing some already there. When the transfer is complete, you can continue working.

The process of transferring information from disk to RAM is relatively slow, in computer terms, because it involves a mechanical device—the disk drive. If you can eliminate any of these disk transfers, your work speeds up tremendously. You can vastly speed up the process by making transfers from one part of RAM to another, however, since only electronic circuitry is involved. This chapter talks about three ways to store program instructions in RAM, instead of on disk, so that your work is seldom, if ever, interrupted by tedious disk accesses.

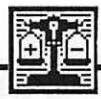
These three ways are:

- RAM disks—use part of RAM as a simulated disk drive. Once information is copied onto the RAM drive, "disk" accesses are quicker.
- Cache systems—store frequently used instructions in RAM, ready to be used. Caches anticipate what's likely to be needed next, and keep it on standby.
- Apple's Switcher—allows several programs to be loaded into RAM at once. Switching between programs is much faster when they're already in RAM.

RAM Disks

A RAM disk is not an actual disk (hardware) but a portion of your Mac's RAM controlled by the RAM disk software so that it acts just like an extra disk drive. You can vary the size of your RAM disk, to take advantage of any amount of memory that's available above and beyond current program and data use. Obviously, the more RAM your computer has, the larger your potential RAM disk.

You'll use your RAM disk program to tell Macintosh to treat a certain amount of RAM as an extra drive. Your new drive's icon appears in the Finder, where it can be selected or opened, just like any other drive. Using the same procedures as if you were copying between two mechanical drives, you load your RAM disk with selected files, then proceed with your normal work.



Comparisons

Advantages

A RAM disk is perhaps the most effective speed enhancer in existence. Any information stored in the RAM drive will be found and used by the Macintosh much more quickly than that stored in the mechanical drives. MacPaint, for example, loads in about 3 seconds from a RAM disk, compared to almost 20 seconds from a mechanical disk. Used properly, a good RAM disk program can completely eliminate intermittent disk accesses by your application. As an added bonus, your RAM disk, acting as an extra disk drive is a real convenience for housekeeping chores like copying several files between two data disks.

Disadvantages

While RAM disks bring RAM's speed to disk work, they also perpetuate RAM's major disadvantage: any loss of power, no matter how momentary, utterly destroys your RAM disk. It's probably not a good idea, therefore, to save data on your RAM disk. You'll have to back up frequently to protect yourself, thereby losing all the advantages of the RAM disk's speed. Use

it only to store a copy of your application and/or System files. (A public domain program called Crash Saver (Ken Dail, Newport News, VA) may recover some RAM crashes, though not those caused by power loss. If you use a RAM disk regularly, keep this around! See Appendix B for details on where to get this or other programs mentioned in *The Macintosh Advisor*.)

Another disadvantage of RAM disks is that any memory dedicated to the RAM disk is temporarily unusable for normal program or data storage. Therefore, programs that need most of your usual 512K memory won't leave enough extra RAM available for a RAM disk. As more than 512K of RAM becomes common in the Macintosh, this will be less of a problem. On a 512K Mac, programs designed for the 128K Mac are most apt to work best with a RAM disk.

Choosing the RAM Disk Program

A good RAM disk should:

- Make the RAM disk the dominant disk, automatically. Obviously, you can't start up with the RAM disk—but you should be able to easily switch control to the System and application on the RAM disk.
- Make it impossible to eject the RAM disk. Since there's no physical disk to reinsert when Mac asks for it, you'd better not eject your RAM disk accidentally! A well-written program will guard against this.
- Provide an automated startup procedure. You'll want a way to load your desired files automatically, without copying each to the RAM disk individually, over and over again.
- Allow a wide range of RAM disk sizes. You'll want the flexibility to choose a small RAM disk when memory is tight, as well as the ability to make the disk as big as possible when space allows. (Note: most RAM disks have an upper limit of total memory minus 128K.) If your Mac has more than 512K, be especially careful that your RAM disk program knows how to recognize this extra memory.
- Be inexpensive. RAM disks are available in the public domain and as very low-cost (under $30) commercial utilities. Avoid paying a premium price.

Using a RAM Disk

For best performance, you'll want to copy the key System elements—the Finder, the System file, and your printer file—as well as the application file you'll be using, onto your RAM disk. These are the files your Mac will be calling for regularly as you work, so you'll want them in RAM.

Choose the Size of the RAM disk You choose the size of your RAM disk. It must be:

- small enough so it uses only "spare" RAM
- large enough to hold essential information from your disk

If your application was designed for the 128K Mac, it's easy to figure that you have 384K (512K minus 128K) of spare RAM. If your program says it requires a 512K Macintosh, you may have to do a little sleuthing to figure out just how much—if any—"spare" RAM you actually have available.

In the Finder, list the files on your application disk by size, and jot down the size of your program file, the Finder file, the System file, and the printer file. Beyond this, allow a certain amount of extra memory for the temporary work files most programs create as they run: 50K should be plenty in most cases. The total of these is the size your RAM disk must be.

Start the RAM Disk You should use Set Startup to make sure the Macintosh sets up your RAM disk and automatically loads the proper files each time you start up with your application disk. Otherwise, you'll have to start the application yourself, and tediously copy your chosen files each time. Ideally, this startup routine should also eject the original disk once its contents are copied to the RAM disk, leaving you ready to work.

A Specific RAM Disk Example

Let's say you want to put the System and MacWrite onto a RAM disk, to speed up your word processing work. Here's how this would work with RAMStart, a public domain program by George Nelson (Waltham, MA):

1. Copy RAMStart to your MacWrite disk.
2. Create a new folder on the MacWrite disk.
3. Put RAMStart, MacWrite, and the System folder into this new folder. Name the folder anything you want, and note its size, since your RAM disk must be big enough to hold the folder's contents.
4. Select the RAMStart icon, then use Set Startup from the Special menu to make your disk boot directly to RAMStart next time you start a work session.
5. Start RAMStart now, by double-clicking on its icon.

At this point, the program creates a RAM disk, and it automatically copies *anything* that's in the same folder as RAMStart itself onto the RAM disk. As this procedure takes place, a box will appear onscreen, telling you that installation is taking place.

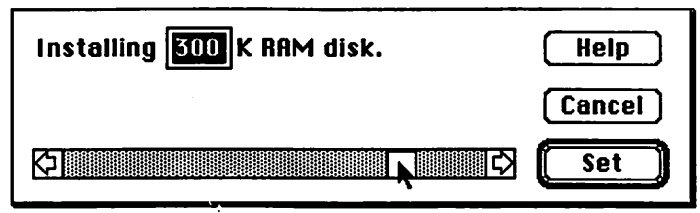


Figure 2–1. Setting the RAM disk's size.

RAMStart will use any previous setting as a default size unless you *immediately* move the scroll bar at the bottom or click on the numbered "---K" box at the top. (Don't hesitate—it will go away within seconds.) If you've noted the size of your RAMStart folder, click on the number box and type in the exact size you want. Otherwise, use the scroll bar. Putting the scroll box halfway along the bar would give half your available memory to the RAM disk, for example.

While you're working in this box, you can also ask for Help, to see lengthy documentation and tips for RAMStart. When you're ready, click Set to resume the installation process of the RAM disk in your specified size.

You'll know installation's done when the Finder reappears with RamDisk in the upper-right dominant position, and your original floppy is automatically rejected and removed from the Desktop. Double-click on the RamDisk icon to open it, then start MacWrite: You'll be amazed at how much faster it loads.

RAM Disk Tricks and Pointers

The Permanent System Trick

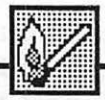
One of our favorite tricks is using the RAM disk as a place to keep the System permanently. After all, the System can be a major annoyance: first, because its size leaves room for little else on a diskette, and second, because your Mac switches Systems every time you begin a new application.

If the System is always available in RAM, your applications will load more quickly. You can also have a larger System on the RAM disk: put all your favorite fonts and Desk Accessories in, without worrying about disk space, and without having to put that System on each disk.

Implement this trick by putting all the System elements on their own disk, along with a RAM disk program. Then, use that disk to start up the computer, automatically copying the System files to the RAM disk. On another disk, keep copies of all of your most frequently used programs—without the System there, the disk holds several. This applications disk, and a third disk for data, can stay in the Macintosh's drives throughout the work session.

Desk Accessories Pointer

If you use a RAM disk to store your System files, remember that any Desk Accessory data—notepad entries or calendar appointments, for example—must be copied onto a "real" disk before you shut down your Macintosh. Always keep in mind that it's risky to store important data of any kind in a RAM disk. (See Chapter 3 for more information on such Desk Accessory programs.)



Hot Tip

Keep in mind that any disk in a mechanical drive will impair your RAM disk's performance because the Mac always checks the status of *all* its drives when it uses *any* of them. Keep mechanical drives empty whenever possible, *except* when you are saving data updates. Then, use the Open...dialog box to eject the disk immediately.

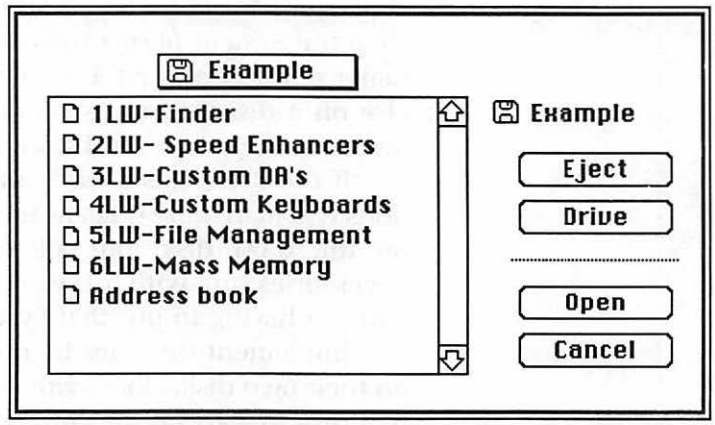
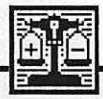


Figure 2–2. Use the Open command to eject disks any time.

Cache Systems

RAM disks use a lot of memory keeping an entire program in RAM so that your Macintosh can get additional program code quickly. Yet, when the Mac runs an application it almost never reads the *whole* program at the same time. Theoretically, then, you could get the same speed benefits using less RAM if you only kept *part* of your program ready and waiting in memory—as long as the part in RAM was the part your computer needed next.

In essence this is how disk caching software works. It sets aside an area of RAM that it uses to store the most recently used program instructions. Then, if your Macintosh calls for the same information again, access is greatly speeded by avoiding your mechanical disks. On the other hand, if your program calls for new instructions, it will have to activate the disk, with the usual delay. Some disk caches add a bit of intelligence to the caching process by analyzing disk accesses, and keeping the most frequently used program segments in RAM, rather than merely the most recently used segments. Even with this approach, though, any speed gains will not be apparent until *after* any procedure has been performed at least once.



Comparisons

Advantages

One advantage of a cache system over a RAM disk is that it requires less memory. You can use a cache system to hold parts of an application when you haven't room for a RAM disk holding your entire application file. Of course, a larger cache can hold more program segments at once, increasing the chances that any needed instructions can be found in RAM rather than on disk. Still, the smallest useful cache will always take less memory than the smallest useful RAM disk.

A second relative advantage is that the cache system's speed is not affected by the presence or absence of disks in your machine's mechanical drives. This avoids the bother of having to insert and remove your data disks each time you save, as you must to optimize the RAM disk.

Finally—and perhaps most important—cache systems avoid the RAM disk's inherent bias toward disaster. Even if you don't intend to use your RAM disk for data storage, it's just too easy to forget that that extra drive isn't really a permanent storage device, too easy to assume that, once you've chosen Save from the menu, your work is safe. Since a disk cache has no Desktop disk icon, and can't be accessed from the Save or Save As commands, caches offer most of the RAM disk's speed without this offsetting risk. (Some caches offer an option to

store parts of your work in RAM on its way *to* disk, as well as storing data on its way *from* disk. We'll discuss this further when we look at a specific example, below.)

Disadvantages

The major drawback to cache systems is that they are effective only for procedures that have already been performed once. Therefore, you'll see no obvious improvements at the beginning of your work session. In addition, any cache system is limited in the number of procedure sequences it can "remember." If you allocate more memory to it, the cache can hold more sequences.

Finally, you should be aware that some cache system programs will not work with certain hardware. In some cases, this is because the hardware includes its own caching software, which collides with most independent cache systems. General Computer's original Hyperdrives fall into this category, as does the Macintosh Plus. Get the vendor's assurance that the product will work with your hardware, or make sure you have a money-back guarantee.

Choosing a Cache System

There are several issues to consider in selecting a cache system. You'll want your cache system to:

- Leave a control program on each disk. After you install your cache the first time, you shouldn't have to drag out the cache system disk to speed up that same program again; the cache should be set up automatically when you load the program.
- Have a simple on-off toggle, to turn the cache off when you need extra RAM more than you need speed. You should be able to forego the extra speed on any installed disk, without having to go through a lengthy uninstall procedure.
- Be able to work with more than 512K of memory. The trend is always toward more RAM in the Macintosh, so you should take care not to trap yourself with an outdated program.
- Be compatible with Switcher (more on that soon). You may have some RAM left for a cache system, if you're running just two small programs under Switcher. The combination of these two systems is wonderful for increasing the speed of your Mac.

Using a Cache

You'll have to experiment to find the least amount of RAM that will optimize any specific program. Start by specifying the smallest possible cache, and time how long it takes for your application to start up. (Start up, quit, then start up again—remember that the cache doesn't help until the second time through.) Change the cache size, and time the startup again. Do this until the speed increases start to level off.

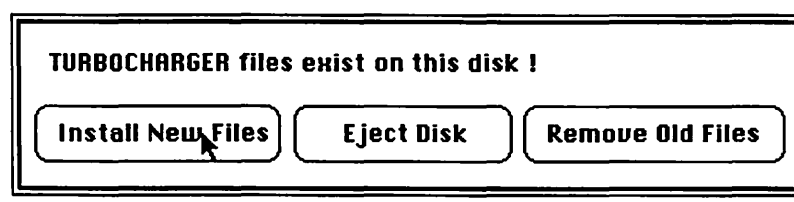
If this seems tedious, just keep in mind that the whole point of a cache is to speed up your application as much as possible, using as little of your precious RAM as possible. And remember—you only have to do this once!

Specific Examples of Cache Systems

We'll illustrate our discussion by taking a look at TurboCharger, a commercial cache system from Nevins Microsystems (New York, NY) and at the Mac Plus's built-in cache system. First, a step-by-step rundown of TurboCharger:

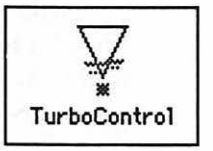
1. Start up your Mac, using the TurboCharger master disk. It will automatically launch the Turbo installer program, and display:

2. Following onscreen instructions, insert the disk containing the application you'd like to speed up. Note that it must be a startup disk—one that contains System files. Note: at this point you may erroneously get a message telling you that



The only flaw in this otherwise fine program is that it sometimes thinks a disk already has a cache set up , when in fact it does not. Ignore the message, and proceed by clicking Install New Files.

3. Once the cache system is installed, the System will reset itself, and automatically boot your newly "charged" disk. You'll know your disk has been turbocharged by the presence of the Turbo icon that will now appear on the disk.



4. This icon represents the Turbo Control application, which you can use to turn off the disk cache or resize it any time you use the "charged" disk. Click it, and a control box appears:

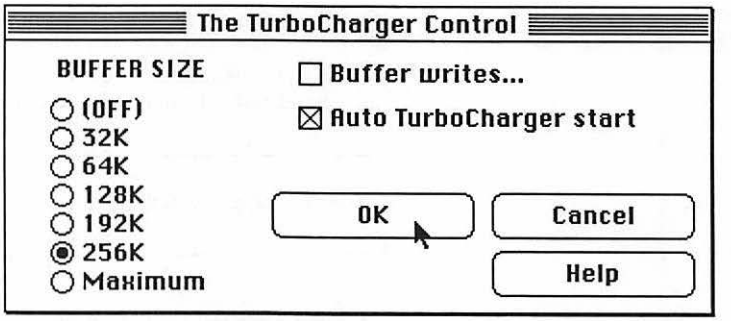


Figure 2–3. Setting TurboCharger's cache size and options.

Basically, you need to choose a size, using the guidelines earlier in this chapter, then specify your preference on two options:

- Buffer Writes improves speed, but does so by placing data in RAM, where it's extremely vulnerable. Not recommended.
- Auto Start invokes the TurboCharger whenever you start your disk. Recommended.

Help is a single screen that explains the terms and choices you face at this point.

The Mac Plus Cache

The Macintosh Plus comes with its own simple disk caching software, accessed through the Control Panel Desk Accessory. You can see the disk cache section on the lower right, when you open the Control Panel, like this:

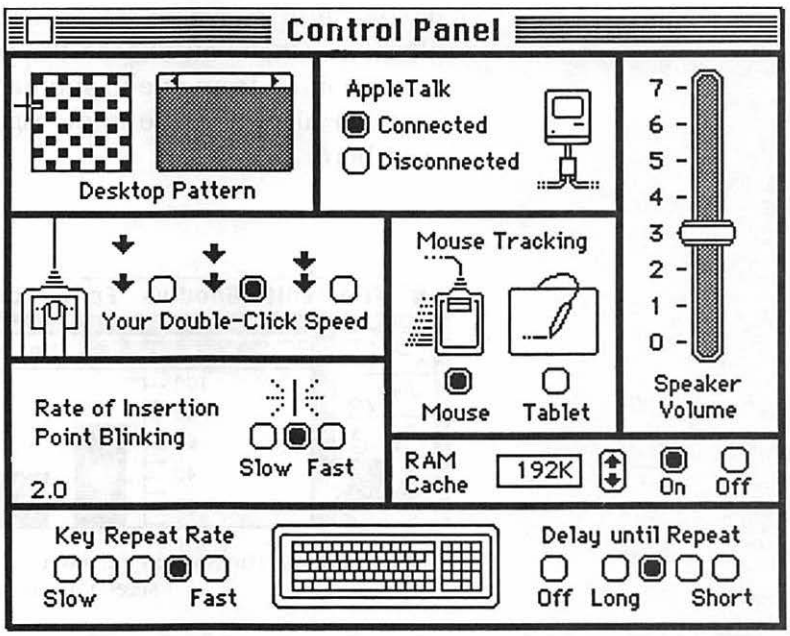


Figure 2–4. The Control Panel, with disk cache controls.

Operating Apple's cache is easy. Just click On, then use the up and down arrows to increase or decrease the size of the cache.

This cache doesn't give you the option of writing to the buffer (keeping data in the cache), which you shouldn't do anyway, and it does not have to be installed for each separate application like the TurboCharger. It's simple—but it doesn't lack anything you really need in a disk cache. If you're using a Mac Plus, you'll probably be happy with this cache. If you have a Mac 512K, check the shopping list in Appendix A for evaluation pointers, and go shopping for a cache system.

Switcher

Switcher lets you load and use several different application programs at what amounts to the same time. Switcher divides your RAM into several smaller sections, each of which can load and run its own program.

At its simplest, it's as if your 512K Macintosh were divided into four 128K Macs, each running a different application. Once you choose the programs you want to run, you can move from one to another with a simple click on the Switcher arrows in the upper-right corner of the screen, as seen here:

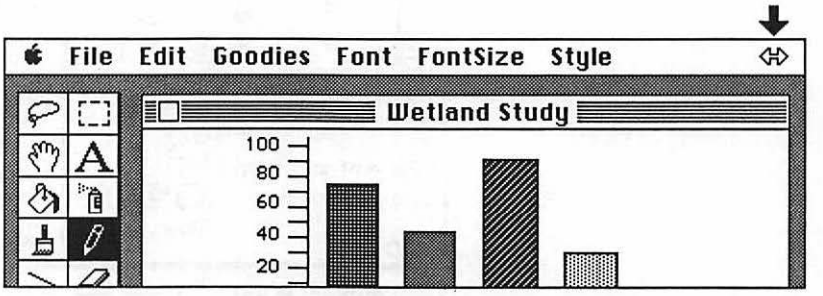


Figure 2–5. The Switcher arrow is in the upper right corner of the screen as you work.

Click, and instantly the next selected program appears on your screen, without any tedious shutdown or startup procedure. Click again, and choose another program, or return to the previous program with all your work just as you left it.

Comparisons

Advantages

Switcher's most immediately obvious plus is its incredible speed for changing between applications. Given the several menu selections and disk swaps normally required to change applications, Switcher's single quick click is astounding.

This speed translates into two types of work advantages. First, it's easy to leave up an application that you need infrequently, while you work with your favorite program. For example, you might keep a customer database up and ready, while you grind out a series of word processing documents. Whenever one of your customers calls, you can switch instantaneously to the database, and retrieve the customer's record. Then, you can return to your still-open letter in the word processing program with another simple click on the Switcher arrow.

Second, Switcher makes it extremely easy to cut and paste information between applications. With MacPaint and MacWrite working under Switcher, for example, you can start a report, then jump instantly to MacPaint to create a diagram. After you've created the image and copied it to the Clipboard, you can switch back to MacWrite—Click!—paste the graphics into your report, and continue writing. This is only a simple example; Switcher makes it easy to seamlessly integrate any of your favorite programs.

Disadvantages

If Switcher seems too good to be true, it must be noted that the program has several drawbacks:

- It takes a good deal of time to set Switcher up each time you start work. Even though you can save a Switcher set—a file of settings, applications, and attached documents to be loaded—each application takes its normal startup time. Startup can be tedious with just a single application; you'll definitely want to take a coffee break while your Mac loads two or three applications in turn.
- Switcher does not actually RUN more than one application at a time. It is not a multi-tasking program. It cannot, for example, print out a letter while you fill in a spreadsheet, or sort a large database while you create a graph.

- Switcher is NOT a windowing program. It cannot show screens from several programs at once; it only deals with one program at a time, "freezing" the others.
- Speed is improved only in switching between applications, not in running the actual applications.
- Because of System requirements, only three 128K applications can realistically run under Switcher on a 512K Mac. More memory is required for more applications.
- Switcher and your chosen applications use up so much RAM, it's unlikely you'll be able to use other speed enhancement programs, such as RAM disks, unless your Mac has more than 512K.
- Many powerful programs require so much RAM that there isn't enough memory left over in a 512K Mac to hold anything to switch *to*. Switcher is most useful for managing several 128K programs, or for running larger programs in Macs with more than 512K of memory.
- Some programs—mostly public domain software and games—that don't follow Apple's development guidelines will not run under Switcher at all.

Find the Most Current Version

Make sure that any copy of Switcher that you use has a version number of 4.4 or greater. Switcher was designed for Apple by Andy Hertzfeld, an original member of the Mac development team and the legendary programming genius responsible for other Mac gems like ThunderScan and Menu Editor. Switcher circulated for almost a year through CompuServe's Macintosh User Group Bulletin Board, so that the program could be thoroughly tested in all conceivable situations by avid Mac users. Even though Apple encouraged prerelease versions to be passed along freely throughout the user community, Switcher has never been a public domain program.

If you're using a version earlier than 4.4, your program is apt to be buggy, and the tips and procedures here may not apply. Ditch it, and get a better version. Version 4.4 of Switcher may not run reliably on the Macintosh Plus; look for a higher version number if you're using the Plus. Switcher was released by Apple in its first official version in the fall of 1985,

through dealers in a $20 package called Switcher Construction Set, and through other vendors, bundled with certain programs. (Microsoft was one of the first, including Switcher with each copy of Excel it sold.) You'll probably want the Construction Set package, since it's the only way to get more than rudimentary documentation.

Using Switcher

To use Switcher, you'll first need to set up a disk containing the Switcher program and the applications you'll be using. Since the goal of Switcher is to let you jump from program to program quickly, this master disk cuts down on disk swaps. Copy protection rears its evil head here, as the protection scheme used on some of your favorite applications may block you from assembling one all-inclusive disk. You can still use Switcher, but not as conveniently; you'll be prompted for disk swaps.

Setting Up Options

Start up Switcher by double-clicking its icon. Your screen displays the control screen, where you can specify the applications you want to run under Switcher, and customize certain options to your own preferences. Take care of the options first. Select Switcher from the main Menu Bar, then select Options from within the Switcher menu. Here's what you'll see next:

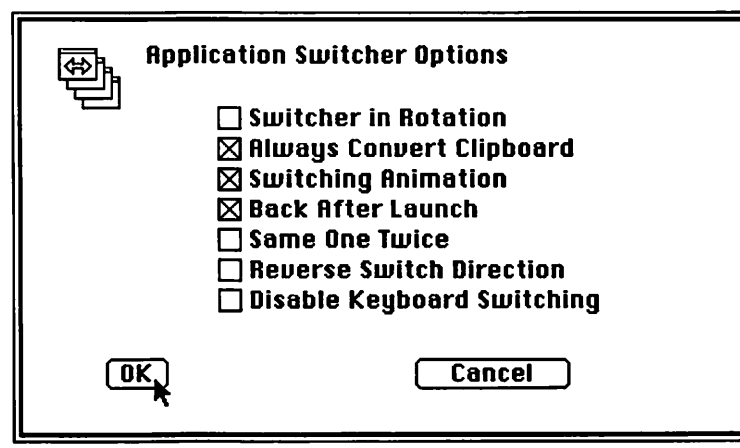


Figure 2–6. Switcher Options.

The key options to consider are "Always Convert Clipboard", "Switching Animation", and "Back After Launch".

Choose **Always Convert Clipboard** if you're integrating information from different programs; it tells the Macintosh to keep the same clipboard as you switch applications, making it very easy to carry information from one program to another. If you do not check this box, each application will maintain its own clipboard. (You may prefer separate clipboards if you're actually running separate programs with no need for integration.)

Most of *The Macintosh Advisor* was written using Switcher to paste MacPaint illustrations into MacWrite, with Always Convert Clipboard selected. Apple's Switcher manual, however, warns that some programs may behave erratically and that switching time is increased with this option checked. Because of this, you may want to leave Convert unchecked. Then, just hold the Option key as you switch applications. The Option key temporarily overrides the setting you've chosen for Convert.

Choose **Switching Animation** for fun—it makes your applications seem to rotate from one to another within your machine, when you switch programs. (This is a subjective preference. It will slow switching down considerably.) Programs rotate in a full circle, and you'll want to know which direction to go in order to get to your destination most quickly. You'll be better off if you note the order of your applications.

Back After Launch makes initial setup a little easier: Switcher immediately returns you to the control screen after you "launch" the first application, so that you can readily load another. You cannot use this option with some copy-protected software. Such software will prompt you to insert a key disk, and you'll need Switcher to pause while you do so, rather than whisking you back to the control screen.

Other Switcher Options

Switcher in Rotation Includes the Switcher control screen in the rotation. This is unnecessary; simply pull down the Apple menu and select Switcher whenever you need the control screen.

Same One Twice Lets you load two copies of the same application. This is usually unnecessary, but could be handy if you're cutting and pasting between two word processing documents, or integrating elements of two different graphic designs.

Beware, though, of some possible pitfalls. Some programs (notably MacPaint and MacWrite) create temporary work files as they operate. Such programs are very likely to crash under Same One Twice. If you run into this problem, try using two different copies—on two different disks—of the same application. This seems to work more reliably—but be careful!

Reverse Switch Direction As its name implies, this option lets you reverse the order of rotation of your applications. Rotation order is a matter of personal preference; to some, switching right means "show me the application to the right," while to others, it means "rotate everything to the right, so I can see the application to the left." Set this according to whatever seems intuitive for you.

Disable Keyboard Switching Switcher offers four Command key equivalents: Command-[(switch left), Command-] (switch right), Command-\ (return to Switcher screen), and Option-Command-Shift-. (emergency exit). These same key combinations, however, may have a different meaning in an application you're running under Switcher. If such a conflict exists, you'll want to tell Switcher to ignore all Command keys, and pass them through to the application.

Launching Applications

Once your options are set, you're ready to designate the applications you want to run under Switcher. Apple calls this "launching an application." At the control screen, follow onscreen directions by double-clicking on any open panel of the screen.

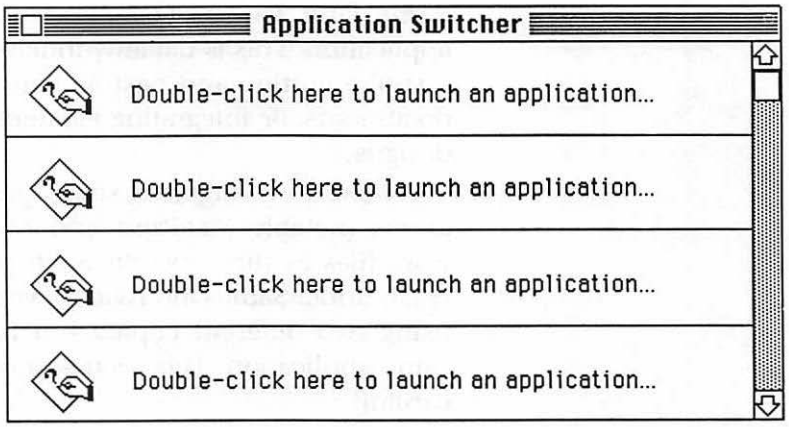


Figure 2–7. The Switcher main screen.

Choose the application you want from the list box that pops up, or switch disks or drives to choose another application. Repeat these steps until the applications you want are all "launched."

Attaching Documents

Switcher can start your chosen document as you load an application, if you tell it to. Click on any panel holding an installed application, then select Attach Document from Switcher's File menu. You'll be presented with a list box of all documents of the same type as the application. Select one, and it becomes part of your setup specifications. In the illustration below, MacWrite has been installed without any attached applications. MacPaint has the document **conc circles** attached; it will open with this document already loaded.

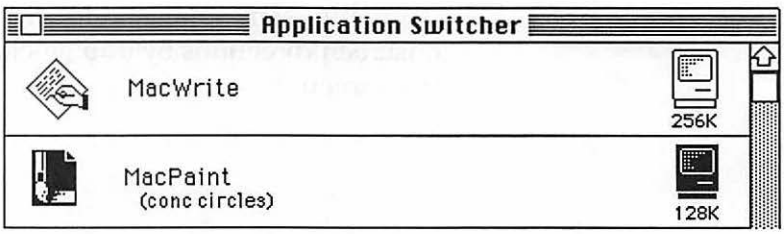


Figure 2–8. The MacPaint program has an attached document called "conc circles."

Saving and Loading Sets

Because the launch procedure is tiresome, you'll want to choose Save Set from the File menu to store your "launch menu" in a disk file. Next time, you can launch the same set of applications and attached documents by choosing Load Set from the File menu, and selecting the appropriate file by name from the list box that appears.

Returning to the Switcher Control Screen

You can return to the Switcher control screen to install new applications or change other settings at any time. Either pull down the Apple menu and select Switcher, or simply click on the middle of the Switcher double arrow.

Quitting Switcher

Switcher won't let you close up shop until you have quit each individual application in the rotation. Just saving your files is not enough; you must actually close and quit each program before Switcher will let you quit.

Hot Tip

One shortcut is possible: Once Switcher has only one application left in it, you can choose Quit from Switcher's File menu. This "turns off" Switcher, leaving your final application running with all your machine's RAM available to you.

Two Switcher Examples

Programs needing 128K or less are easiest to install under Switcher; those requiring more memory take a few extra steps to install. We'll show you examples of both types, so you'll understand the procedures involved.

MacWrite and MacPaint

Here's one of the simplest Switcher examples, using small applications:

1. Put MacPaint, MacWrite, and Switcher on the same disk.
2. Start Switcher from the Finder.
3. Under Options, check the boxes for:
   Always Convert Clipboard
   Switching Animation
   Back After Launch
4. Double-click on the first box of the Switcher control screen, then select MacPaint from the list box.
5. Double-click on the second Switcher box, then select MacWrite.
6. Save Set, to make it easier to use Paint and Write together next time.
7. Double-click on MacWrite or MacPaint, to start your chosen program.
8. Use the Switcher arrows to move quickly between applications.

MacWrite and Excel

Programs like Excel, which cannot run in 128K, require one extra step—the Configure Then Install command—to be launched. This step gives you the chance to decide how much memory to allot to the application. Here's a typical example:

1. Put MacWrite and Switcher on the same disk. Use a backup copy of your Excel program disk in your other drive. (Excel, at 380K, is too large to fit on the same disk as the others.)
2. Start Switcher from the Finder.
3. Under Options, check only the box for:
   Switching Animation (personal preference—skip it if you want speed)
4. Here's the extra step. Click once on the first box of the Switcher control screen, then select Configure Then Install from the Switcher menu. Change disks as necessary to choose Excel from the list box. You'll see this screen:

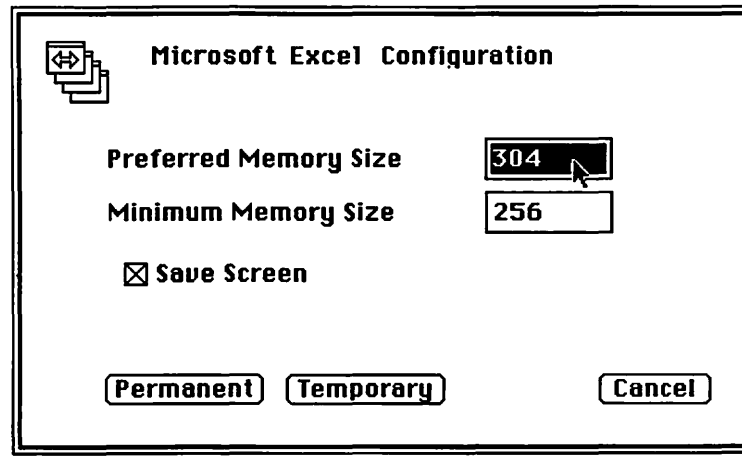


Figure 2–9. Configure Then Install procedure in Switcher.

Preferred Memory Size is the amount of RAM Switcher first tries to allot to the application. The number here is either 128K, or the amount previously configured, or an amount automatically requested by some newer programs. Minimum Memory Size is the absolute least memory with which the program will run. If it hasn't enough RAM to allocate the preferred memory, Switcher automatically tries minimum memory. The smallest allowable minimum memory under Switcher is 64K.

5. In this case, change the Preferred Memory Size to 256K, simply by typing in the new numbers. Click Permanent, to continue. Permanent writes a message in your Excel program file, telling it to ask for 256K under Switcher from now on. Selecting Permanent on some copy-protected or locked software may cause problems; some programs won't function properly if they detect that they're been "tampered" with.
6. Double-click on the second Switcher box, then select MacWrite.
7. Save Set, to make it easier to use Excel and MacWrite together next time, without repeating this procedure.
8. Start up one program or the other, with a double-click on the appropriate box of the Switcher control panel. With these two programs together, you have a complete integrated word processing, spreadsheet, and database system.

Note

If you're using large programs like Excel under Switcher regularly, we recommend that you use a hard disk and/or more than 512K of RAM. See Chapter 6 for a discussion of your options.

Tips for Switcher

If you pull down the Apple menu and ask for information About the Switcher, you'll see a screen with Andy Hertzfeld's picture and a few more ways to control the operation of Switcher. We'll explain more about the tips seen on this screen:

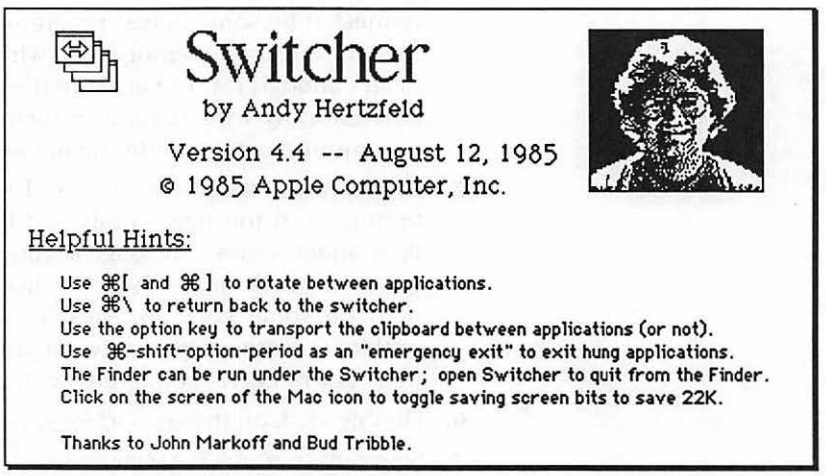


Figure 2–10. The About Switcher screen.

The first two are merely keyboard equivalents: You can use Command [and] instead of the Switcher arrows to move between applications, and you can return to the Switcher control screen without using the Apple menu, with Command -\. (Clicking on the center shaft of the Switcher arrow also returns you to the control screen.)

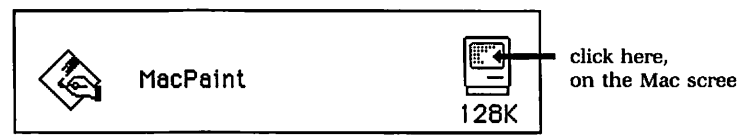
The Option key lets you quickly—and temporarily—change your mind about Switcher's treatment of the Clipboard. If you opted to Always Convert Clipboard, holding Option during Cut, Copy, and Paste operations will confine the Clipboard to a single program. If you chose not to Convert Clipboard when you started Switcher, holding the Option key will override that setting, and let you bring information straight through.

You'll welcome Emergency Exit (Command-Shift-Option-.) if one of your programs gets hung up. It lets you return to the Switcher control screen, with your other programs safe. Without this, you'd have to reboot the Mac (turn it off and on again), losing everything in memory.

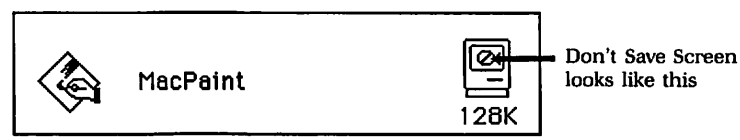
Saving Screen Bits

The last tip offers a way to free up as much memory as possible, so you can run larger programs or more programs under Switcher. Switcher jumps quickly between applications because it saves a "bit map"—a snapshot of each pixel, or screen dot—of your current document when you leave a program. Saving this information makes the program spring quickly to the screen when you return, but it uses precious memory—22K, to be exact, for each program.

You can turn off Save Screen in the Configure dialog box (see above) or at any time from the main Switcher screen. Click on the screen of any of the Macintosh icons in the application launch boxes.



You'll see the icon's screen change, to indicate Don't Save Screen.



Subsequently you'll notice a very slight slowdown in switching speed—but you'll have gained 22K of free memory for each icon you click. Click again on the screen if you decide speed is more important to you than memory.

Incidentally, you can check your memory status at any time with Show Info Window from Switcher's File menu. This command displays a window telling you how much RAM each program is using under Switcher, and how much RAM is currently free.

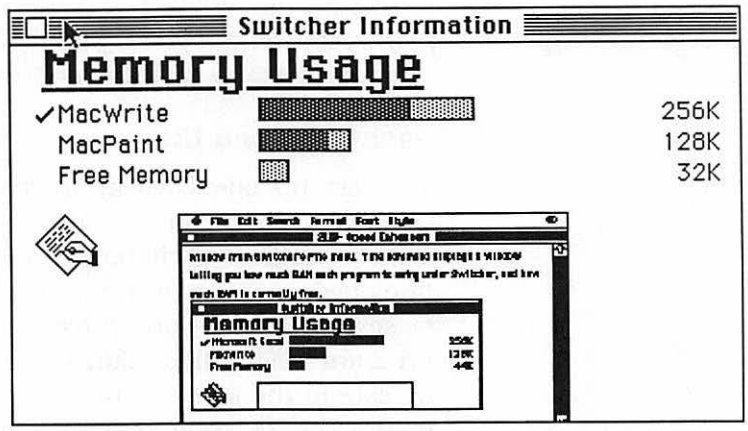


Figure 2–11. Switcher's Show Info window.

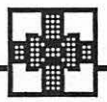
It won't all total 512K, because of System information and data in RAM. But if you turn off screen bits, as described above, you'll see the free RAM increase each time.

Switcher Combinations

Good marriages can be hard to achieve under Switcher. This can be traced to some peculiar incompatibilities between even the solidest of individual programs, or to the non-standard programming of any one application, neither of which is usually readily apparent. When you're trying out a new combination, make sure to save your work more frequently than usual, until you're sure the given applications can work together smoothly. The experimentation is worthwhile, though: Switcher is a wonderful program.

Beyond Switcher

As mentioned earlier, one of Switcher's major disadvantages is that it is not a multi-tasking program: it cannot actually *run* more than one program at a time. By rotating split-second segments of computer processing time between several programs, a true multi-tasking applications manager could log into a remote online database while you finish writing a memo, or print a thousand mailing labels while you graph some spreadsheet data—or maybe even perform all four of these tasks at once! If you're assessing a program of this type, many of the same issues involved with Switcher come into play. Additionally, you'll want to find out how the program allots CPU time to the individual applications: can you indicate your priorities, so that a crucial task gets more "turns," while background work is put last in line? Refer to the shopping list for multi-application programs in Appendix A.



Summary

RAM disks, cache systems, and Switcher all serve rather different purposes; their only common thread is that each makes creative use of RAM to optimize application performance on the Macintosh. Each serves specific purposes best.

Use a RAM disk when you need the services of an extra drive. The best example of this is when you are using several different programs, but want the same System files and Desk Accessories available for each. With this information in your RAM disk, your dominant disk is always in—no annoying disk swaps—yet your two drives are both free for programs and data. RAM disks become more viable with memory of over 512K; most smaller systems just don't have enough spare memory to set aside as a useful RAM disk.

Use a cache system when you want to speed up the performance of a single application. Cache systems can make a discernible difference in speed, using much less memory than RAM disks.

Use Switcher if you'd like to swap data between your favorite programs, or if your work finds you frequently bouncing between two unrelated tasks. With enough memory, Switcher makes it possible for you to create your own optimum integrated software, from your favorite stand-alone programs.

Whichever memory management programs you use, you'll find an obvious and gratifying improvement in the speed and ease of use of your application programs, and you'll see a lot less of the watch icon!

CHAPTER

Desk Accessories and FKeys

This chapter will explore two kinds of mini-programs called Desk Accessories and FKeys that can be used even while another application is running. You'll get information on:

- what defines a Desk Accessory
- what to look for—and avoid—in three major categories of Desk Accessories
- how to install Desk Accessories in the System file OR in an application
- how to get around Apple's limit of 15 Desk Accessories
- how to access the Macintosh's hidden function key powers, with FKeys

Desk Accessories

Pop-up calculator! Built-in appointment calendar! Handy notepad! Most computer users appreciate the convenience of mini-programs that can be called up with a few simple keystrokes, even in the middle of another application. On most computers, though, such mini-utilities can make your system incredibly unstable. The operating system of the average computer is not designed to manage more than one

program at once; "collisions" between the main program and any RAM-resident utilities can occur easily, bringing the computer to a crashing halt. Using one such resident utility is chancy, running two is decidedly risky, and multiple programs are certain disaster.

The Macintosh, on the other hand, was designed specifically to accommodate this type of utility. It stores programs on disk, rather than in RAM, but can call them up instantly. Its operating system can keep several programs safely open at once, without resorting to any computer sleight-of-hand. You can have more than a dozen of your favorite utilities close at hand with the Mac, and access them instantly by pulling down the Apple menu.

Apple calls these programs Desk Accessories and includes several simple examples with the Macintosh. There's the calculator, the clock, and the puzzle, for doing arithmetic, telling time, and killing time; the notepad and scrapbook for filing away information; and keycaps and control panel utilities to help you use your Mac. Apple's original DAs (as Desk Accessories are often called) are nothing to rave about, however. You'll want to take most of them off your disk, and replace them with programs that augment and complement the applications you use every day.

In this chapter, we'll tell you more about what characterizes a Desk Accessory. Then, we'll mention some specific examples, divided into three categories by function. Finally, we'll show you how you can install your own Desk Accessories into any System file, or even into an application file.

Desk Accessory Definition

The name makes sense: Desk Accessories are "tools" you'd like to keep conveniently accessible to your electronic workspace, just as you'd keep a stapler, an address book, and similar accessories nearby in a traditional work environment. But what exactly defines a DA? Desk Accessories range from simple calculators to full-blown spreadsheets, from notepads to 250-page text editors, from alarm clocks to 1000-year appointment calendars, from games to communications and utility programs.

It's not function, then, that defines a DA, but rather a few common traits. Desk Accessories are programs that:

- are not copy protected
- are usually under 25K in size
- do something you'd want available as you use another program
- have been specifically programmed as Desk Accessories

Desk Accessories are actually incorporated into the System file, so copy-protected DAs are out. Size and utility are important considerations, because Desk Accessories take up valuable disk space; you'll want to make sure to choose your Desk Accessories carefully. (Desk Accessories are getting larger, as more Mac users have access to hard disks and more memory.) And of course, only those programs that have been designed with the proper programming "hooks" to link into the Apple menu can be installed as Desk Accessories.

One other characteristic of Desk Accessories is worth noting: they're usually inexpensive or in the public domain. You can often get a great deal of value for very little money, through the use of Desk Accessories.

Four Categories

Desk Accessories can be divided roughly into four categories, depending on the way they're used:

Program Add-ons

These Desk Accessories include spell-checkers and word-counters, calculators and notepads, meant to augment other programs. In this category, many companies are now offering pull-down Help files for their applications, too.

Instant References

In this group are Desk Accessories, like phonebooks and appointment calendars, that need to be accessed at a moment's notice.

System Utilities

Desk Accessories that extend the Finder's capabilities and help you make more efficient use of your keyboard and printer are included here.

Games

Several programmers have created small games as Desk Accessories; Apple's Puzzle is a typical example.

Games are largely a matter of personal preference: we won't presume to tell you what's a good game and what's not. You can have fun making your own decisions in this category. Therefore, the bulk of this chapter will explore Desk Accessories as program enhancers, instant references, and system utilities. For each of the typical sub-categories available in these groups, we'll tell you the features you'll want to look for and avoid, then cite examples that illustrate these features.

In Appendix B you'll find the sources for all the programs mentioned in this chapter and elsewhere in the book. *Don't* rush out and get all these DAs, though; instead, use the examples to help assess the wide range of choices that are available today, and the even wider range that will be available tomorrow.

Program Add-ons

Rarely do your favorite programs include every feature you'd like. Desk Accessories let you add extra features and options to an application, without upgrading to another, more expensive program that may still be missing some important options. Again, the Macintosh excels when it comes to easy customization to your work style.

Notepads

The Apple Note Pad was designed to let you jot down notes and comments even as you run another program. It's extremely limited, though, in that it allows only 8 tiny pages of about 256 characters each—for a total approximately the size of one double-spaced page. Once these pages are full, you must erase them to write more; the Note Pad has only one storage file on disk, and cannot create others. Although you can cut, copy, and paste notepad text into other documents, you cannot directly print your work.

The idea of a notepad is good; it's just that Apple's Note Pad has very real limitations. A good notepad should be able to:

The idea of a notepad is good; it's just that Apple's Note Pad has very real limitations. A good notepad should be able to:

- save its own files on disk, in standard text format
- retrieve its own files and text files from other documents
- print on paper, without having to be pasted into another progam
- do elementary word processing tasks, like search and replace

While it would be great to have a full-featured word processor as a Desk Accessory, size restrictions dictate that even the best notepad will be limited. With even the features above, though, you could use a good DA notepad to record assumptions and layout as you create a spreadsheet, or to document a program as it's written. Similarly, you could use a notepad to give MacWrite multi-window capabilities, by cutting and pasting between the two programs.

MockWrite (version 4.2) MockWrite is part of a series of programs produced as shareware (if you like it, you pay—voluntarily) by Donald Brown of Des Moines, Iowa. It's a very good example of the genre of mini text processors that can replace Apple's Note Pad. MockWrite has only a few of the features of a dedicated word processor: It can cut, copy, and paste words or phrases, and find—but not automatically replace—text. It can save to disk in an unlimited number of separate files, and print, too. MockWrite uses Monaco 9 for its only font; it's incapable of changing fonts or print styles and sizes.

SideKick's Notepad + Borland International's SideKick is a collection of Desk Accessories, many of which we'll mention in this chapter. Notepad + is virtually identical to MockWrite (not coincidentally, it's written by Donald Brown, too) in features and function. The biggest drawback of both MockWrite and Notepad+ is that they cannot read regular MacWrite or Word files, but only stripped-down text-only files. Still, you'll probably want to use one of these instead of Apple's Note Pad, so you can handle larger documents, and create, name, and reuse note files.

See Appendix A for a notepad shopping list.

Scrapbooks

Macintosh's Clipboard temporarily stores selections you've cut from a document, in RAM. Its scrapbook stores such selections on disk, in a more permanent fashion. Apple's Scrapbook can hold up to 256 "scraps" (each selection, whether a word or several pages, equals one scrap); once more than about a dozen scraps are stored in the Scrapbook, it can become difficult to find and use individual selections.

The ideal scrapbook would help you organize collections of clippings that you'd like to have at hand to paste into your work. You might, for example, want to keep a selection of MacWrite rulers in one file, for instantly resetting margins and tabs. Another scrap file might contain boilerplate paragraphs for business letters, or selected graphics for letterhead designs. To make using these separate collections easier, a good scrapbook should let you access scrap files on another disk, too.

Multi-Scrap The Multi-Scrap DA (public domain, through user groups) lets you create any number of individual scrapbook files, with names you choose. This makes it possible to organize your scrapbooks by categories, as advocated above. When you use Multi-Scrap, you're presented with a list box that names all your scrapbook files. You open the appropriate file, then cut and paste as usual.

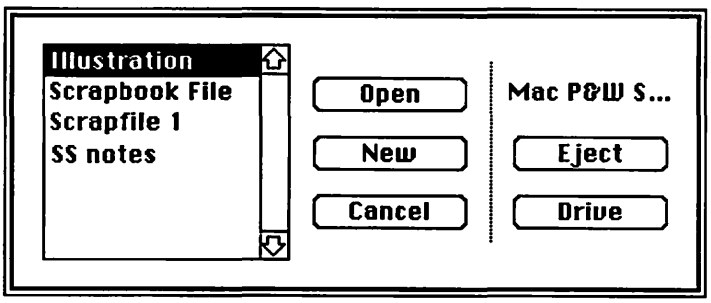


Figure 3–1. Multi-Scrap.

If you don't use a scrapbook much in your work, Apple's Scrapbook is probably sufficient for you. Programs like Multi-Scrap take an extra step, to choose a file, that can be tedious. Switch to something like Multi-Scrap, though, if you need to store and organize a large number of scrapbook selections, or access files on one disk while working with another.

Telecommunications Programs

Telecommunications programs make more sense as DAs than almost any other type of program. After all, you don't use telecommunications just for its own sake—you use it to send or receive specific documents. As a pull-down DA, your telecommunications program could work with your word processor, to send the article you've just created to your publisher, or with your spreadsheet, to send the final budget figures to the Seattle office.

As a minimum, you'd want a telecomm Desk Accessory to:

- look up and dial numbers from a phonebook database
- store and run automatic log-on sequences (such as passwords)
- send and receive text-only files (ASCII characters)
- send and receive binary files (exact bit-for-bit transfers)

Unless you're technically minded, you'd also want the program to make the telecommunications process as simple as possible: too many programs in this category assume the user's knowledge of a good deal of specialized jargon.

SideKick's MacTerm Borland's MacTerm (and its close relative, Donald Brown's shareware Mock Terminal) is a widely used DA telecommunications program. It uses a two-step approach, separating the configuration process from the communication process:

1. In the Finder, set up a configuration file. This file records communications parameters (see Chapter 8).
2. From any application, invoke the Desk Accessory. This adds a communications menu to your current application. You can then dial (accessing a seven-number directory), and start sending or receiving information.

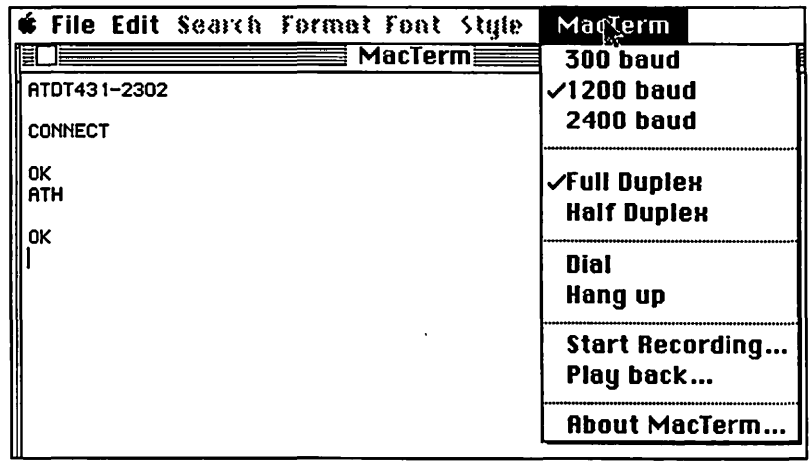


Figure 3–2. Borland's MacTerm.

MacTerm is a barebones telecommunications program. It can't handle any files beyond text, and it can't store passwords and other log-on procedures. Recommended only for those already familiar with communications.

Word Processing Tools

The final type of program in this category includes utilities like those that check your spelling, count the words in a document, or let you insert macro phrases in your text. Although these functions are sometimes included in other programs, you may need DA versions to fill the gaps if your favorite program does not include some feature you like.

The best document analysis tools

- will work with any text file (files with no formatting information)
- will work with formatted files (from MacWrite and Word)
- can be customized
- work quickly and reliably

The ability to work with text files means that you could save a spreadsheet with many labels as Text Only, then check its spelling, for example. The ability to work with formatted files means that your DA can process a file as the application produces it, without the additional step of converting the application's files to text-only. You'll also want your word processing tools to allow customization—adding names and

technical terms to a dictionary, for example. Finally, speed and accuracy are especially important. Glossaries, spell-checkers, and thesauruses deal with thousands of words as they work, and must process information quickly to be useful and attentive. Make sure to check all programs with a large document; performance of some DAs slows considerably as your documents grow.

Word Count This is a public domain utility that will be appreciated by students and by anyone who writes professionally. It will count the number of characters, words, and lines in a document.

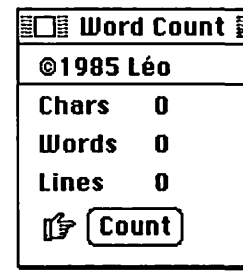


Figure 3–3. Word Count.

It's quick and reliable, but unfortunately only works with text files. (Text Only documents do not include information on page layout, boldface, underlining, etc.) If document size is important to you, get in the habit of saving as Text Only until final editing is done, so you can use Word Count at any time. Then format the document, and save it again choosing Entire Document instead of Text Only.

MacSpell+ This Desk Accessory from Creighton Development checks the spelling in your MacWrite documents. It's well-designed and easy to use, and comes with a 75,000 word dictionary that you can customize. On the down side, MacSpell+ works only with MacWrite and Microsoft Word, is extremely slow, and does not have some basic words in its dictionary.

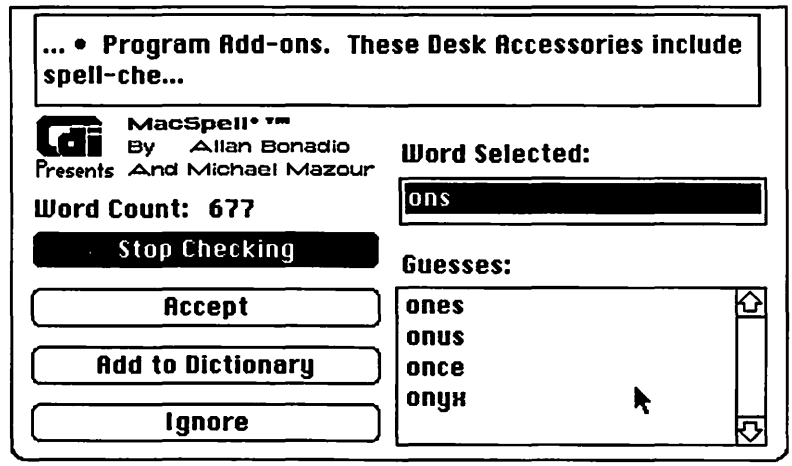


Figure 3–4. MacSpell+.

Among other things, a good speller will:

- read at least text, MacWrite, and Word documents
- have the "intelligence" to:
  - evaluate known words if common suffixes like -s, -ed, -ing are added
  - suggest the correct equivalent for phonetically misspelled words
- include spelling-related options, like hyphenation and synonyms

Most spellers work best with a hard disk, for speed and for the storage of large and customized dictionaries. See Appendix A for a complete shopping list.

QuickWord QuickWord is a commercial DA from Enterset of San Francisco. It works with almost any application, as an "abbreviation expander." You set up a table with your own short abbreviations and their equivalents, and QuickWord types the full word, phrase, or even several paragraphs whenever you merely type the abbreviation. Throughout this book, for example, QuickWord typed the word "Macintosh" whenever we typed "M", based on the table illustrated here. Highly recommended.

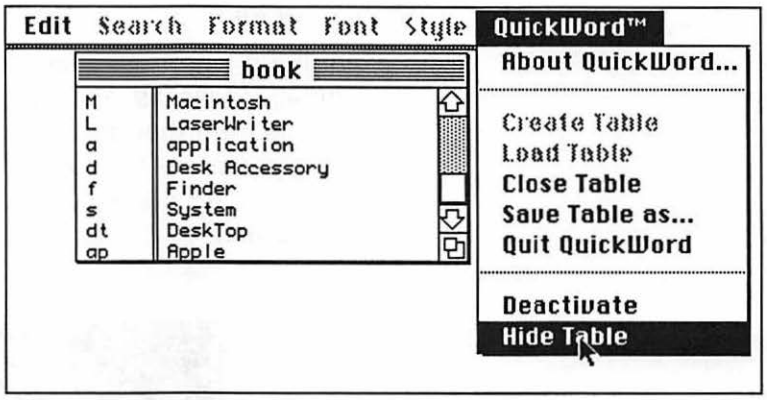


Figure 3–5. QuickWord's menu and a table of abbreviations.

QuickWord works through a system that's becoming more common with more sophisticated Desk Accessories: It adds its own pull-down menu to the menu bar of the main application you're using. Generally, the other menus belonging to your application will be dimmed out, focusing your attention on the DA. In this example, QuickWord has been added to the MacWrite menu bar.

Instant References

The first group of Desk Accessories featured utilities that work closely with the main application you're using. Instant references are DAs that are unrelated to the work at hand, but need to be immediately available at odd moments throughout your workday. For example, you may want to keep a computerized appointment book. It's essential that you be able to grab your calendar and make a date without the bother of closing down the work you're doing, and loading up a separate calendar program.

Switcher performs a similar function, in letting you jump from program to program at will. No program can take up less than 64K of your Mac's memory under Switcher though—a real waste for simple utilities that are available as Desk Accessories. Save Switcher for the big guys.

Alarm Clocks

It's a common misconception that computer users do not own watches or clocks, and must always have some way to read the time from their machines. As a result, clocks are one of the more common DA groups available, ranging from small digital timers that tuck away in a corner of the screen, to the ultimate, Big Ben:

Figure 3–6. Big Ben.

We show it here because it's a digitized masterpiece that should be seen (yes, the hands really go around when it's working). Since you may not want to devote 9,685 bytes of disk space and one of your valuable DA slots just to telling time, though, here are some guidelines for picking alternative timekeepers:

- Does it use military (24-hour) or standard (am/pm) time?
- Is it digital (numbers only) or analog (face, hands, and numbers)?
- Does it have an alarm feature, and if so:
  - can you change the sound of the alarm?
  - can you set more than one alarm at a time?
  - can it give you a message when an alarm sounds, explaining the alarm?
- Can you use the clock to reset Mac's internal clock?

Apple's Alarm Clock The alarm clock that comes with your Mac is rather useful, since it includes an alarm feature, to remind you of important deadlines. With a simple four-step procedure, you can set the alarm clock to "ring" at any time of the day. Choose Alarm Clock from the Apple menu, and the clock appears, as in box 1 below. Click on the icon in the right-hand corner, to see the date and three icons for setting time, date, and alarm, as in box 2.

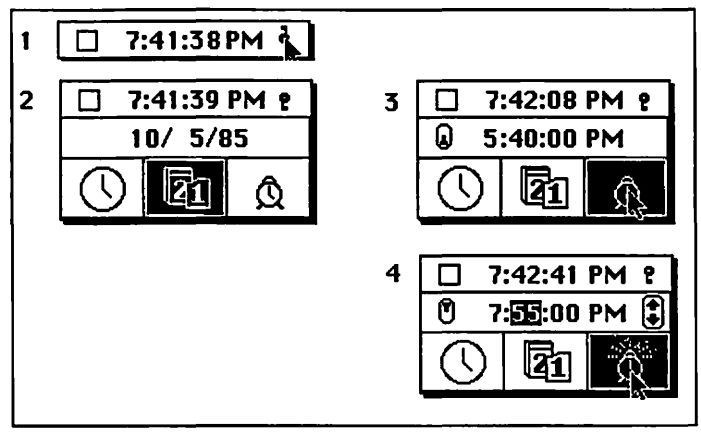


Figure 3–7. Apple's Alarm Clock DA.

When you click the alarm clock, the previous alarm setting replaces the date, as you can see in box 3. Click the numbers to reset the alarm, use the up and down arrows to change AM and PM, then click to pull out the alarm button. You can tell the alarm is set, in box 4, by the changes in the alarm clock icon and in the button next to the alarm time.

The main drawbacks of the Apple alarm clock are that it can only set one alarm, that only the time and not the date can be set, and that there's no reminder message. (There's no point in knowing that "it's time" if you don't remember what it's time for.)

SideKick QuikSheets Alarms SideKick gets around some of the Apple alarm's limitations. It lets you set up to 15 alarms, with time, date, and comments, as part of its QuikSheets DA. QuikSheets alarms are easy to set and use. Keep in mind that you'll have to have your alarm file in one of your drives (again, a hard disk makes swaps unnecessary). When the alarm goes off a small beep sounds, and the Apple menu icon flashes until the alarm is turned off, and you ask to see your reminder. You decide whether to keep the reminder or remove it, then return to your work.

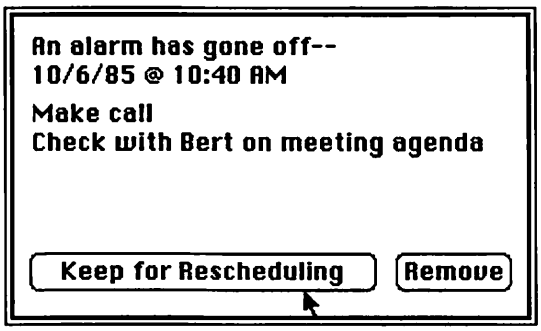


Figure 3–8. SideKick's QuikSheets.

Both the Apple Alarm Clock and SideKick QuikSheets use the same single tone for an alarm, which is easily confused with other Macintosh alert beeps. They both also suffer from the fact that your Macintosh must be turned on for them to really be effective, although the flashing Apple will alert you if an alarm was triggered while the machine was off. SideKick carries the additional baggage of a data file, which must be in your machine at all times for optimum performance. However, if you keep your machine on throughout the working day, and especially if you use a hard disk drive, an alarm system can be very useful. See Appendix A for a full shopping list.

Calendars

Appointment calendars have traditionally been one of the standard examples used by people who deride computers as "solutions to a problem that doesn't exist." Early examples required you to shut down the program you were using, change disks, and boot up the calendar program every time you wanted to record or check an appointment.

Calendars as DAs make much more sense: All your appointments are at the ready, no matter what you are doing. You can use the wonders of word processing to enter and update appointments. With some of the more sophisticated examples, you can even search for key words and phrases, like "dentist" or "board meeting" to find an important appointment.

SideKick CalendarBook One of the most complete calendar programs comes with Borland's SideKick. This appointment scheduler displays the current month's calendar, with a space for notes and meetings below:

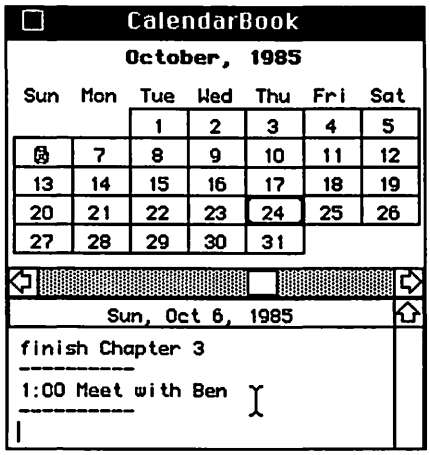


Figure 3–9. The SideKick CalendarBook.

The notespace appears for the selected date; other dates with entries appear circled, as does the 24th above. You can search for key words, print individual calendar pages, or see an entire week's schedule details at once. These features are controlled through a pull-down menu that attaches itself to the main menu of whatever application you're currently running.

The major drawback of CalendarBook is that it uses a scroll bar to change the month and year. This makes it difficult to jump directly to another date in a different month.

Calendar Several calendar programs exist in the public domain, too. One called Calendar, while not as full-featured as CalendarBook, illustrates an alternative (and superior) way of changing the month and year, by clicking on the appropriate boxes. Calendar lets you enter notes, and highlights dates with entries, just like CalendarBook. It can't print or search for information, however.

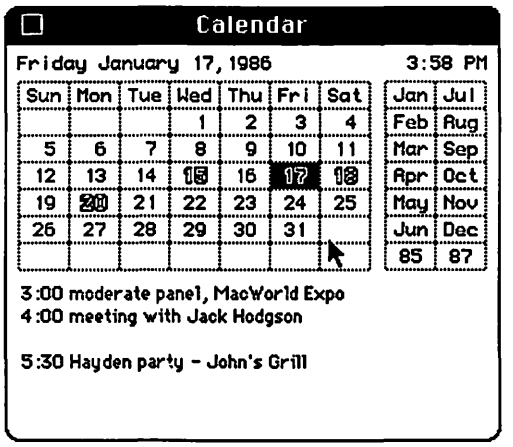


Figure 3–10. Calendar, also called Calendar with Notes.

Despite the advantage of a Desk Accessory calendar over a stand-alone program, both Calendar and CalendarBook share the disadvantages of any computerized appointment book: They only work when the computer is on, they require that a data file be online, and they're impossible to carry in your back pocket when you leave the office. See Appendix A for a full shopping list.

Calculators

A calculator or adding machine has long been considered a desktop essential, and it continues to be, on the electronic desktop. Apple's standard calculator is a simple four-function calculator that fulfills the average person's quick calculation needs, at little sacrifice in memory (only 2.4K).

If your work requires complex trigonometric or logarithmic calculations, or if you need binary/hex/octal conversion or powers and roots, there are several commercial, public domain, and shareware programs that will interest you. Some of the best known are the HP12C scientific calculator (from Dreams of the Phoenix), the shareware Cray3 Calculator (from Desktop CAD), and Borland's Calculator+.

Most of these complex calculators work just like their hardware equivalents. Features you should check for include:

- the ability to cut and paste calculations from and into other programs
- a memory function, as with any good calculator
- a print-tape capability, enabling you to keep track of the entries you've already made, cut an entire calculation into another document, or cut the results of one calculation into another
- the ability to use the keyboard (or even better—the numeric keypad) instead of the mouse for quick data entry

If you can't find any calculator that suits your needs exactly, you may want to buy a "calculator construction set" program. These commercial programs help you design and build your own DA calculator, with customized functions and keys. Weigh carefully, however, whether you need a computerized calculator at all. A hand-held one may do just as well, without sacrificing any memory, or any valuable DA slots.

ClickOn Worksheet The ultimate calculator, of course, is the computer spreadsheet. Spreadsheets are scarce in the public domain, partly because they're tricky to program, but also because MultiPlan's early debut encouraged avid programmers to turn away from spreadsheets and try to fill other market gaps.

If you feel the need for an instant spreadsheet, T-Maker Graphics puts out a commercial DA called ClickOn Worksheet. It's too slow and small (50 rows by 20 columns) for serious spreadsheet users, and rather large (almost 34K) for a DA, but it may meet some specialized needs. For example, a businessperson may want to log expenses to a spreadsheet whenever they're incurred, or a sales rep might want to keep complex commission and discount formulas at the ready, for quick quotes.

ClickOn Worksheet, while not a full-featured spreadsheet, fulfills many roles that a calculator just isn't up to. It can store dozens of complex formulas in memory at once, it allows words as well as numbers, it can print presentable reports, it can display simple graphs, and it can create and store disk files for future use.

Address Books

Address books, or Rolodexes, are another useful DA, keeping adresses and phone numbers immediately at hand. There are pros and cons with Rolodexes, much as there are with calendars. You must keep rather lengthy data files, and you may regret the lack of portability; yet you can search for names and numbers easily, and you may even be able to have your computer automatically dial phone calls.

MacDialer, a SideKick DA, is a good example of the features you'd want in an address book program. It can store names, addresses, and numbers (you can in fact keep several different "phonebooks" for different sets of friends or business associates). It can dial the phone for you, if you have a modem attached. It can search for specific names. Refer to Appendix A for an address book shopping list.

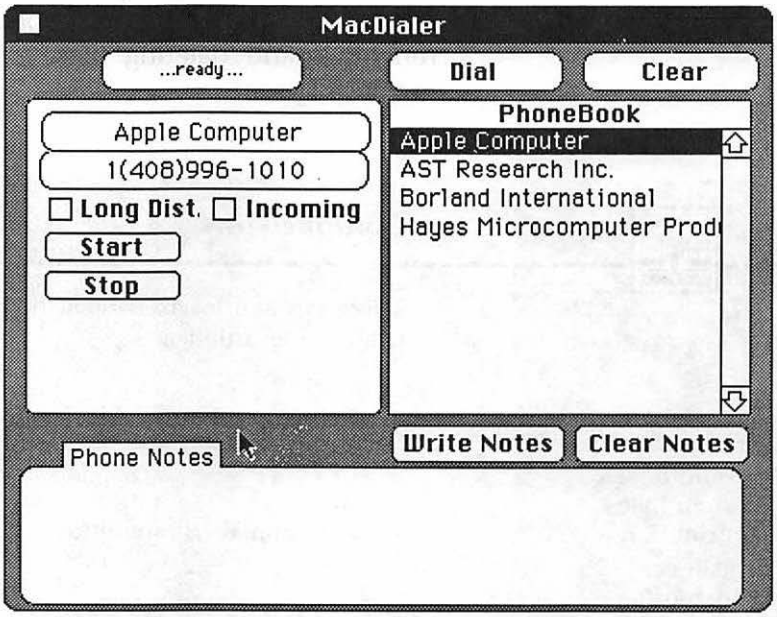


Figure 3–11. MacDialer, from Borland's SideKick.

System Utilities

System Utilities make the Macintosh's housekeeping chores easier, or help you to get the most from your hardware. Most of our favorites are involved with letting you use parts of the Finder from within an application.

Finder Add-ons

Apple's Finder is designed so that you must quit an application you're working on in order to rename or delete files, or check the amount of space remaining on a data disk. This often turns out to be a monumental inconvenience. If it were possible to take care of these tasks while you work, you might never see a "Sorry disk full—delete files or change disks" message bounce you out of your favorite program.

Running the Finder under Switcher may help you do these jobs without interrupting your work, but will tie up a large part of your memory. To address this need at little cost in additional RAM, many DAs augment the capabilities of the Finder, or make it possible for you to do Finder-like tasks from

within a program. The most common of these tasks include renaming and deleting files, and checking free disk and memory space.

Comparisons

This chart summarizes the features of four of the most widely used Finder utilities:

	MiniDOS	DiskInfo	Extras	DAFile
Program details				
size, in bytes	2.8K	14K	7.1K	8.3K
distribution	public domain	shareware	shareware	shareware
File features				
Rename file	√	√	√	√
Delete file	√	√	√	√
Ren/Del invisible files	no	no	√	√
Show file type	no	√	no	show & rename
Show file size	√	√	no	√
Sort files	no	√	no	no
Set quit file	no	no	√	no
Locate files in any directory	no	√	no	no
Disk features				
Show disk location	no	√	√	no
Show default drive	no	√	√	no
Change default drive	no	√	√	no
Show free space	√	√	√	√
Eject/change disks	√	no	√	√
Memory features				
Show free space	no	√	√	√
Compact memory	no	√	√	no

Let's take a look at each of these, as Finder DAs have perhaps the most universal audience of any Desk Accessories.

MiniDOS is obviously the smallest and simplest of the three. It's also the quickest and easiest to use, as all its functions are in one box.

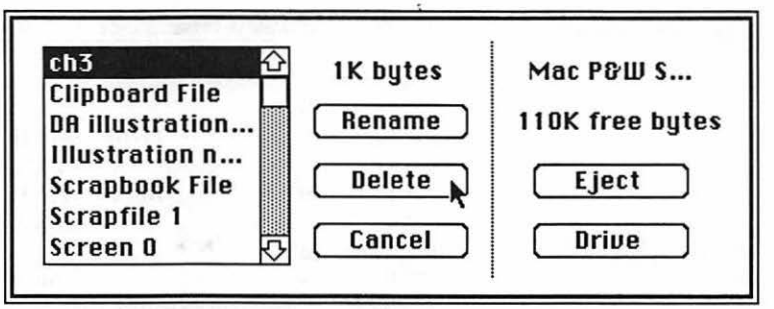


Figure 3–12. MiniDOS.

At a glance, you can see file size and free disk space. You can rename or delete a selected file, or do similar activities on another disk. Even though other programs have more features, MiniDOS has the most important ones, the ability to rename and delete. This may be enough for you.

DiskInfo does the best job of telling you about your files, in excruciating detail. Its opening screen gives disk information for any disk icon on the Desktop (even shadow disks).

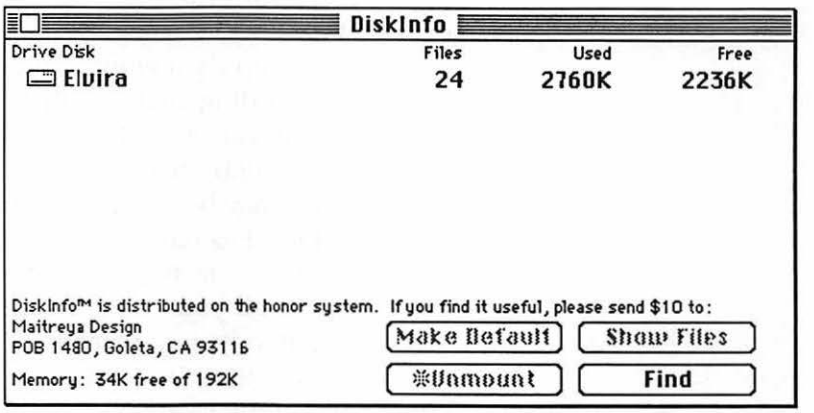


Figure 3–13. Disk Info's main screen.

Notice that the location (internal, external, or hard disk) of each disk is displayed; the hard disk shows here. You select a drive, then click the Show Files button.

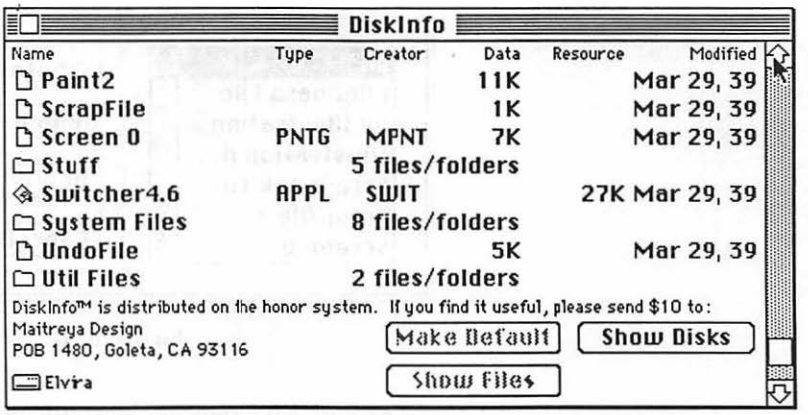


Figure 3–14. DiskInfo's Show Files screen.

It can be very useful to see more information about a file you are about to delete or rename. DiskInfo tells the type of file, and the program that created it; it tells whether the file contains data or program instructions, and it includes the date of last modification.

DiskInfo, like many other DAs, adds an extra choice to the main menu bar when it's active. With the pull-down menu you can sort your files by name or by date, choose to display disk and file size information in bytes or kilobytes (e.g., 2,296 vs. 2K), or compact memory. Compacting memory frees up RAM, by discarding anything that is not currently being used; this operation can often free up as much as 40K of memory. Be warned though, that the resources it throws out of RAM as unnecessary may be needed again soon; your work can slow down as the information is reloaded from disk.

As a bonus, starting with version 1.34, DiskInfo can also look through all your disks to find a particular file, even if you've forgotten its name or the directory it's in. For instance, let's say you're searching for information about an important contract with the Deepsix Demolition Company. Simply click the Find button on DiskInfo's main screen, and you'll see a dialog box. Fill in the box with any words you think might be in the file's name, click a button on the right to tell DiskInfo how exact a match it must find, then click Find. Information will appear at the top of the dialog box, as shown below, telling which drive and folder contains a file that matches your search criteria. This information is the best part of Find:

it means you'll never "lose" a file in the hierarchical file system by forgetting which directory it's located in.

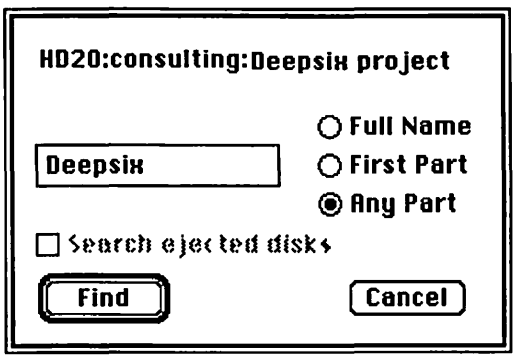


Figure 3–15. DiskInfo's Find option.

You can keep clicking Find repeatedly, to look for additional files whose names are a likely match. With this and so many other features, DiskInfo is a well-designed and solid program, containing all of the features you need in a Finder enhancing program.

Extras has most of the features of DiskInfo. Its glaring deficiency is that it gives you no information beyond names about the files you are manipulating—not even file size. This makes it difficult to use its delete feature to efficiently free up disk space.

Extras installs itself in the menu bar when you select it from the Apple menu; you may think nothing has happened, as nothing appears on the screen. Pull down the Extras menu, as seen above, and you can choose to show disk space or show free memory. These separate modules can stay on your screen if you want to refer to them regularly. You can also compact memory, as explained above, and set a quit file—a program you'd like to start up automatically when you quit the current application.

Finally, Extras lets you delete and rename files, with two special twists: you can choose to access invisible files, and you can turn off the verification alert that appears as you delete a file. It's probably dangerous to do either of these. Invisible files are an essential part of some commercial

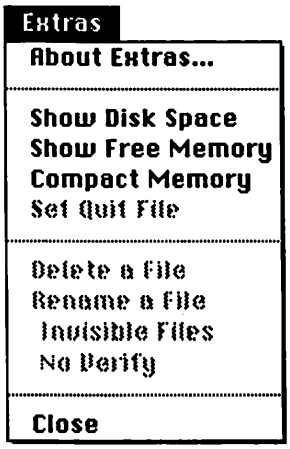


Figure 3–16. Extras.

applications; you might render a program unusable by tampering with them. And unless you never make a mistake, it's unwise to make file deletion too immediate and automatic.

Users report that the some versions of Extras (through at least version 1.5) are buggy, and should be used with care. Don't leave Extras open while you work.

DAFile was designed as a developer's tool, and this DA is for the more technically minded. Here's how it looks when you first choose it from the Apple menu.

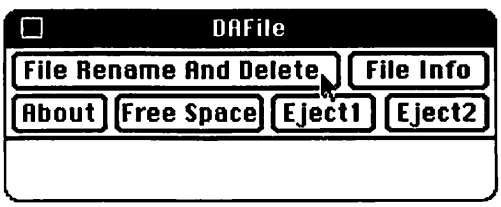


Figure 3–17. DAFile.

DAFile's six options are accessed by clicking on the appropriate space.

About: Asks you to send 5 or 10 dollars to the author (Ken Winograd), and includes his address.

Free Space: Tells you the amount of free space (in kilobytes) on any diskettes currently inserted in the drives.

Eject 1 and 2: Eject the internal (drive 1) or external (drive 2) drive's contents.

File Rename and Delete: Lets you rename or delete any file. Just be careful not to hit the Delete button when you only mean to rename!

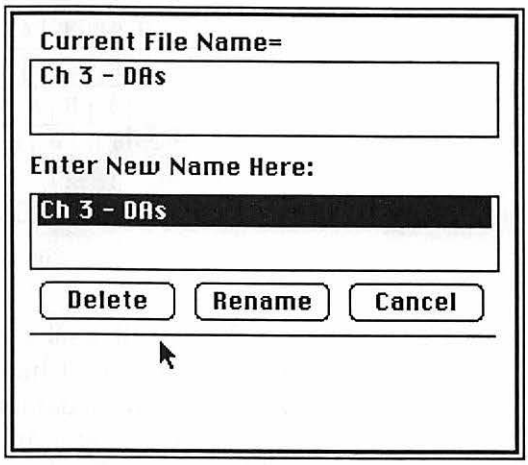


Figure 3–18. DAFile's Rename and Delete option.

File Info: Shows a great deal of very technical information about any file. For the average user, this information is unnecessarily complex. However, this option also lets you change the file type of any file, a troubleshooting technique described in Chapter 9.

Because DAFile's only unique feature is its ability to change file types, you may prefer to use one of the other Finder add-ons mentioned earlier. Give it another look, though, as you explore troubleshooting techniques later. A full shopping list for Finder add-ons is included as Appendix A.

Keyboard Guides

The original Macintosh came with a keyboard guide called Key Caps. This Desk Accessory is useful when you want to check on the keys used to produce unusual symbols, like © or •, or make use of the accent symbols available with the Mac. Open it up, and it displays the keyboard; press Option and it shows you all the Option key combinations.

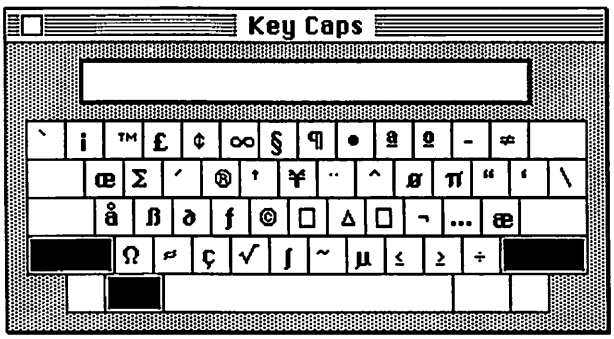


Figure 3–19. Old Key Caps.

This is all well and good for the Macintosh's normal system fonts, like Chicago, Geneva, and Monaco. But when you're using unusual fonts, and would like to be reminded of all their characters, Apple's original Key Caps still gives you nothing but the screen shown above, in Chicago font; there's no way to change fonts in the original Key Caps DA.

New Key Caps In late 1985, Apple started anonymously circulating a new Key Caps DA in the public domain. With the advent of the Mac Plus, this became the official Key Caps Desk Accessory. Installed in your DAs, New Key Caps shows you all the actual characters in any font you select. Shown here, for instance, are the optional characters for Manhattan font, from Miles Computing:

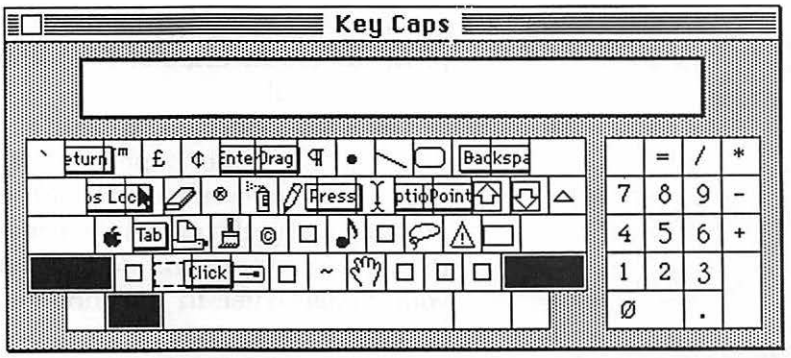


Figure 3–20. New Key Caps.

Interestingly, new Key Caps can sense whether you're using the Mac keyboard or the Mac Plus keyboard with the numeric keypad. It will add or omit the keypad part of the diagram as appropriate.

There are two things to keep in mind when using new Key Caps. First, you must select your font from the KeyCaps menu that appears in the main menu bar; new Key Caps does not automatically use your current typing font. Second, as you can see by the illustration, strange characters often do not fit on the keyboard diagram, making for a rather scrambled appearance.

Despite these small failings, the new Key Caps does make the utilization of unusual fonts much easier. If you're still using Apple's earlier Key Caps DA, switch to the newer one; it's available from user groups, and at your Apple dealer.

Printer Utilities

Printer utilities include any DA that helps you get better use from your printer. The most promising—and most disappointing—of these are print buffers (also called spoolers). In theory, print buffers are supposed to let you keep working with your Macintosh even as your printer's printing. In reality, this goal has not, at the time of this writing, been realized. Some buffers free up your computer, but print only in draft mode, without formatting (underline, bold, fonts, etc.). Others may cut the time your computer's held up by as much as 35%, but do not eliminate the wait. Still others save time, but may

suddenly spew out garbled text. See a further discussion of print buffers in Chapter 6, and evaluate any potential purchase carefully.

Apple's **Chooser** (known as **Choose Printer** in early versions) is another type of print utility. Not a buffer at all, Chooser is concerned only with getting your Mac to use its ports properly. If you're only using an ImageWriter connected to the printer port, you don't need Chooser. If you've hooked your ImageWriter to the modem port, or if you're using a LaserWriter, your Mac needs to be informed through Chooser. You can get this DA from your Apple dealer, at no cost.

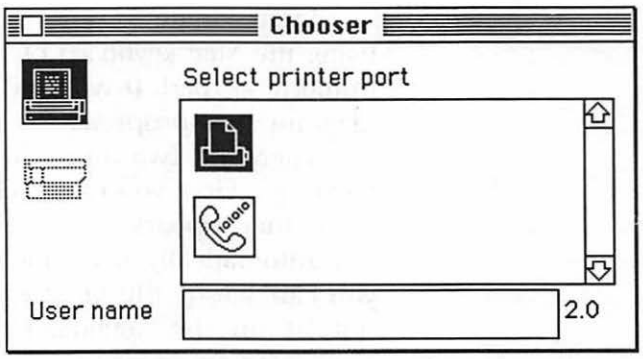


Figure 3–21. The Chooser.

This illustration shows that the printer port is currently connected to the ImageWriter. Any devices for which the dominant disk holds a resource will be pictured on the left, with all available ports in the scroll box. The space for user name lets you identify your own output when it is networked to a central printer.

Installing Your Own Desk Accessories

The Desk Accessories you see when you pull down the Apple menu are those installed in the System file of your dominant disk—usually, the original Apple ones. You can remove these accessories, and add others of your own choosing up to a current limitation of 15, through an Apple-supported program called Font/DA mover.

Interestingly, the Mac's DAs couldn't be readily customized when the machine was first released in early 1984. Apple may have assumed the average user was uninterested in or incapable of changing Desk Accessories; the Apple menu may have been seen as something commercial programmers were most apt to utilize. More likely, the question was academic, because no Desk Accessories existed outside of those that came with the machine.

Then, a shareware program called Desk Accessory Mover, by Donald Brown, started to circulate in the underground of Mac zealots. The Mac programming community responded by steadily churning out Desk Accessories, almost all of them on the public domain/shareware circuit. Apple followed up, finally, in the spring of 1985, by releasing Font/DA Mover with its next system upgrade.

Desk Accessory Files

There are three sources for the Desk Accessories you want to install: They can come from another System file, or from an application file, or they can exist as independent files from commercial or public domain disks. A look at the Finder illustrates this:

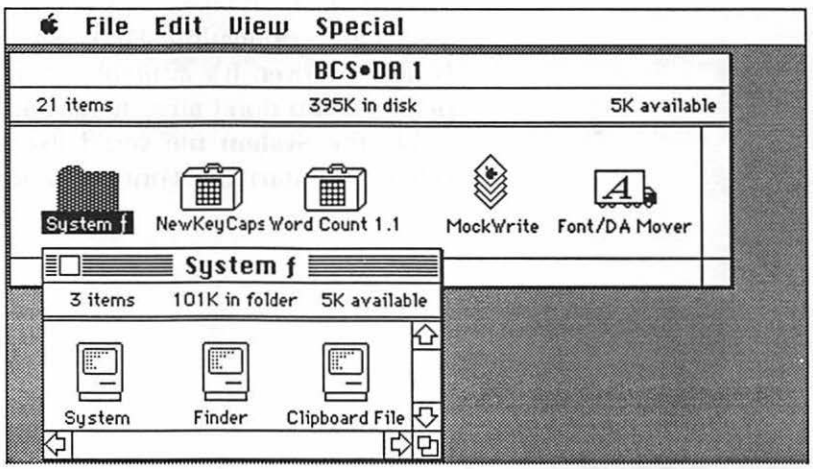


Figure 3–22. Newer DA files use a suitcase icon; old ones are like MockWrite, above.

Desk Accessories look like little suitcases, when they exist as independent files prior to installation in a System or application file. You use the Font/DA Mover—which has a moving van as its icon—to "pick up" the luggage, and carry a copy of it into the System or application file. This is all done from within the Font/DA Mover, NOT by shuffling icons in the Finder. Once DAs are installed, the receiving file gives no visible hint of which ones are inside. But of course, you can just pull down the Apple menu to find out.

Warning

Old Desk Accessories, often found on public domain disks, use another symbol, seen above labeled MockWrite. These files cannot be installed with Font/DA Mover, but must use the old DA Mover. Once they've been installed, though, they can be used like any other DA.

Using Font/DA Mover

Let's run through the steps involved in installing DAs in a System file, then take a look at a slight twist, for adding DAs to a specific application. First, get the most recent version of Font/DA Mover. It's available at no charge from your Apple dealer, if you don't already have it. Copy it onto the disk that holds the System file you'd like to update with new DAs. When you start the Font/DA Mover, you'll see a screen like this:

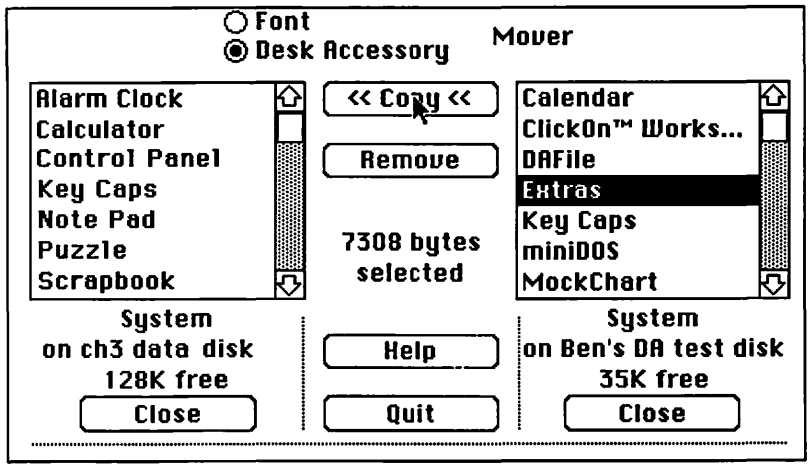


Figure 3–23. The Font/DA Mover.

(The screen will appear with Font selected. Click on Desk Accessory after the program starts up, or hold the Option key as it boots, to go directly to Desk Accessories.) On the left are listed the DAs in the System file of your dominant disk, no matter which drive it's in. In this case, you can see the original Apple DAs. In the right-hand box, Font/DA Mover always lists the DAs from a file on any disk in your second drive.

Desk Accessories can be stored singly, in their own files, or with several packed in the same file. If one of the Font/DA windows shows a file name instead of DA names, the Close box will toggle to Open, so that you can list the individual DAs and select the one you want.

Once your DA is selected, click the Copy button to install it into the System file of the other disk. You can also "uninstall" DAs from the System by clicking the Remove button. Remember that you can currently install only 15 Desk Accessories in any file. If you try to install more, you'll see:

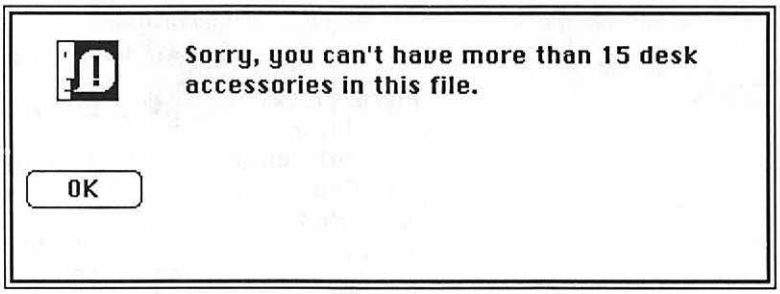
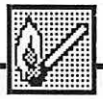


Figure 3–24. This error message informs you of your limit of 15 installed DAs.



Hot Tip

Beating the Limits

If you're a confirmed Desk Accessory addict, one way to get around this limit is by installing some of your DAs in application files. (This works for fonts, too.) You may want a spell checker installed directly in MacWrite, or a calculator installed in your favorite spreadsheet. Desk Accessories installed in application files appear in the Apple menu only when that application is running; they are joined by those in the dominant System file.

Font/DA Mover puts Desk Accessories into an application just as it does into a System file, with just one extra step. Start up Font/DA Mover, then press the Option key, and keep it held down, as you click the Open box in the lower right (shown toggled to Close in our illustrations). Holding the Option key will make a list of all the files on your disk appear, instead of just the DA files. Pick the application you want, and a list of its Desk Accessories (if any) appears in the box. The example here shows MacWrite, with Creighton Development's MacSpell+ already installed.

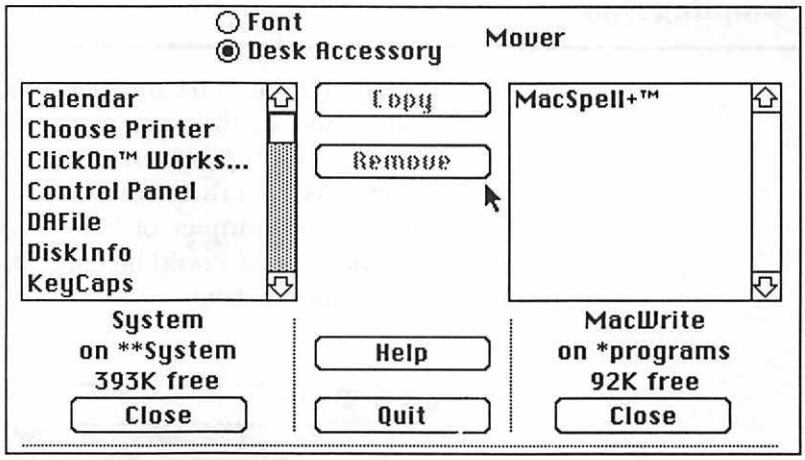
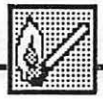


Figure 3–25. Adding a Desk Accessory to an application file.

Other DAs could now be added to MacWrite, using the same exact procedure used above for adding DAs to a System file.



Hot Tip

Another way to get around the current 15-Desk Accessory limit is with a shareware DA called Other... (Loftus E. Beker, Jr.). If Other... is one of your 15 DAs, it acts as an empty slot for the temporary use of any one DA. Choose Other..., and you get a list box of all the DA files currently in your Mac's drives; selecting one installs that DA until the next time you reboot. Early versions of this program may not run with some applications, notably the Microsoft line.

Sampling DAs

It's bothersome to try out Desk Acccessories, since they must be installed in the System file before they can be used. A shareware ($10) program called DA Sampler (Kevin Harman, Gardner, NC) gets around that problem, by letting you browse through any number of Desk Accessories quickly. (Other..., described above, could be used for the same purpose, but DA Sampler is quicker.)

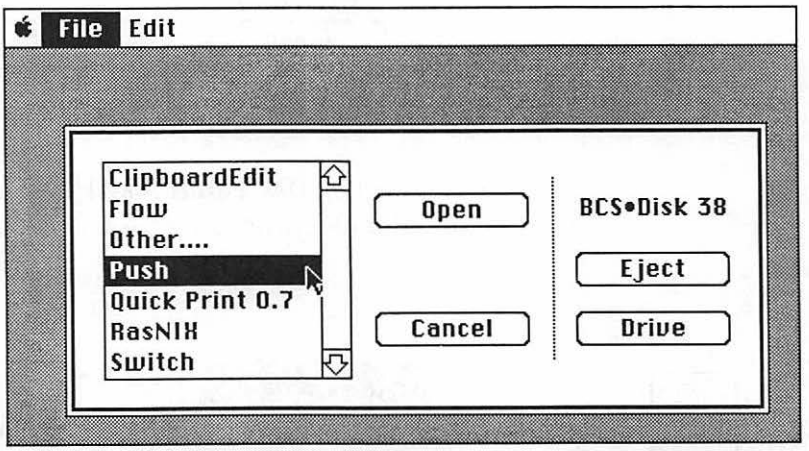


Figure 3–26. DA Sampler lets you select Desk Accessory files to try out.

Pick a file, and it's installed under the Apple menu until you pick another file, or as long as you stay in DA Sampler. It's a real time-saver.

Function Keys

Function keys are closely related to Desk Accessories. Like DAs, function keys (or FKeys as they are called) are generally small utilities or program add-ons that are accessible from within any application you may be using. Unlike Desk Accessories, FKeys are accessed through special key combinations rather than through the Apple menu.

We've already explained the Mac's four permanent FKeys in Chapter 1, though you don't know them by this name. They are:

Command-Shift-1	ejects your internal diskette
Command-Shift-2	ejects your external diskette
Command-Shift-3	takes a "disk snapshot" of the current screen
Command-Shift-4	prints the active window's contents to the ImageWriter

These four key combinations are the same in every Macintosh, activating these four same utilities whenever they are used. You can create six similar combinations, using the 5, 6, 7, 8, 9, and 0 keys, and assign your own choice of utility program to each, with a program called FKey Installer. FKey Installer was written by Dreams of the Phoenix (Jacksonville, FL), and has been released into the public domain for non-commercial use. (A reasonable license fee is charged for commercial use.) It lets you see the FKeys currently installed in your System file, as well as install and remove any FKeys.

Your best bet for finding FKeys is through a bulletin board or user group. Since both the code and the purpose of most FKeys are very limited, few commercial developers have released FKey files. Some of the more interesting files we've found in the public domain are:

- **Clip Key.** Lets you draw a box around anything on the screen. As soon as you finish the box, your selection is posted to the clipboard. Acts like a more selective screen snapshot utility.
- **Date Key.** Types the current date wherever your cursor is located. Handy at the top of business letters and in databases.
- **Fade to Black.** Dissolves the screen to black, then brings it back when you hit any key. A useful utility to protect your screen when you leave it on and unchanged for long periods.
- **Other.** Like the Desk Accessory of this name, lets you temporarily install and use any Desk Accessory. Use this FKey, and you won't have to waste one DA slot on Other.

This is only a small sample of available FKeys, but should serve to show you the type of activities that function keys typically accomplish.

An FKey Example

Here's how you'd use FKey Installer to make your own key combinations.

1. Load the FKey Installer program, by double-clicking its icon in the Finder. You'll see a screen of copyright information, then the screen below will appear:

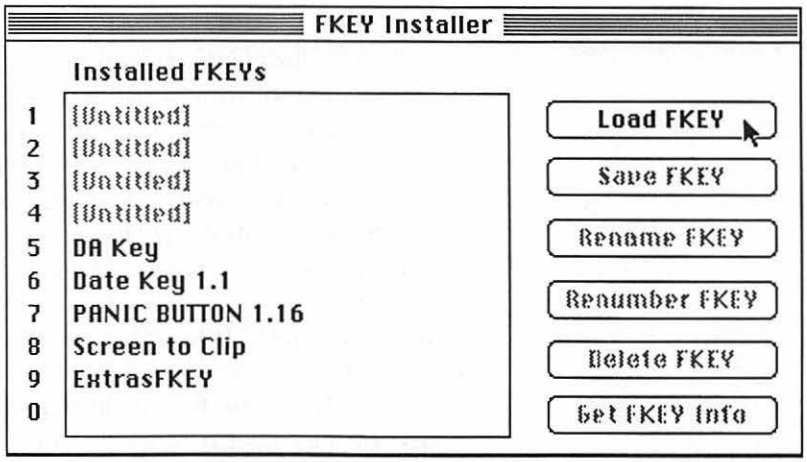


Figure 3–27. FKey Installer.

This is the main FKey Installer screen. It shows you your currently installed FKeys on the left, and lists a number of options on the right. Only the first option is available. If you select one of your current FKeys, the other options, which are self-explanatory, become available.

2. Click on Load FKey. You'll see a list box of available FKey files. You may use the normal eject and disk options to access other FKey files. Select a file, by clicking.
3. All FKey files are set up with a default number. If there is no FKey associated with that number already, your new function key file will be automatically installed. If that spot is taken, this screen appears:

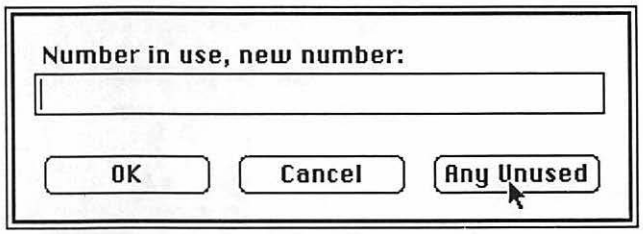


Figure 3–28. FKeys can be attached to the 5, 6, 7, 8, 9, and 0 keys.

You enter another number and click OK, or ask the program to find an empty slot itself by clicking Any Unused. Your FKey will then be installed.

FKeys are handy because they are accessible directly from the keyboard, and because they help you save your DA slots for more complex utilities. The burden is on you, though, to keep track of your FKeys and how to invoke them; there's no pull-down menu as with Desk Accessories, to jog your memory. We recommend that you use one standard set of FKeys in your work, so that you can more easily remember your assigned key combinations.

Summary

Desk Accessories and FKeys offer tremendous flexibility and power for customizing your favorite programs and your whole Macintosh work environment. If you're using floppy disks, remember that the DAs and FKeys you can use at any time are those in the current application or on THE DOMINANT DISK. On the positive side, this means that you can set up different combinations of FKeys and Desk Accessories in the System of each of your disks. On the down side, this could mean a lot of extra work if you like the same set of DAs on each disk. To get around this:

- You can boot with the same System disk each time. Leave the System off all your other disks, so that the dominant disk won't change each time you use another program. You'll be in for a lot of disk swapping, though.
- Put your customized System on the disks you'll be using with each application. With today's larger applications, you may have to put the System on each and every one of your data disks, if there's no room on the program disk. This cuts down on swapping, but it's a lot of work, and leaves almost no data storage space on your floppy.

With Desk Accessories, as with so many of the power pointers in this book, you'll find that a hard disk makes things much easier and faster. Put all your fonts, FKeys, and favorite DAs in one big System file on the hard disk, or put fonts and DAs in specific applications, and you'll never have to worry about storage space, dominant disks, or swapping.

CHAPTER

4

Customizing Applications

The primary goal of *The Macintosh Advisor* is to help you feel in control of every aspect of your work with the Mac. A large part of control lies in knowing that the computer is doing things *your* way, instead of insisting on performing only in *its own* way. This chapter explains how you can easily customize applications or system files to your preferences, by:

- changing the appearance of any and all screen icons
- putting new messages in any dialog boxes
- editing any font
- adding Command key equivalents to any menu

All of these tricks can be done with a tool called the Resource Editor. Menu changes can be made with the Resource Editor or with another utility program called the Menu Editor. Both of these tools share the same status: they're owned and copyrighted by Apple, but are distributed legitimately through public-domain-like channels.

Warning

These tools, especially the Resource Editor, can be dangerous. Since they actually make changes in the code of your programs, they can have unexpected results. Make sure that you only try these techniques on an *extra* copy of your program diskette. (See Chapter 5 if your disk is copy-protected.) Note that we said "diskette," too: don't risk the hundreds of files on your hard disk by experimenting anywhere but on a single diskette.

Macintosh Resources

Before we can talk about the Resource Editor, it's helpful to see how Apple defines a resource for the Macintosh. All Macintosh programs are extremely modular: instead of consisting of one long continuous piece of code, they are split into component elements known as **resources.** These include the dialog boxes, alert boxes, fonts, menus, icons, cursor shapes, Desk Accessories, screen messages ("strings"), and the code itself. Programmers use these resources, or building blocks, to create applications.

The modular approach has several advantages. It:

- Saves disk space, as the same building blocks can be used and reused in several parts of an application.
- Promotes consistency among applications, as programmers use the same resources in different applications.
- Eases translation of applications. It's much easier to change the language of all the screen messages when they're isolated from the rest of the program code.
- Makes customization possible.

The first three points are of direct interest mainly to programmers. The last advantage provides those of us with a less technical inclination the chance to make useful—and surprisingly easy—changes to any application, or even to the System file, by editing selected resources.

To illustrate this with commonplace examples, we'll take a look at the Resource Editor, demonstrating its use in

customizing the graphics, dialog messages, and fonts in your System and Finder files. Then, we'll show how both Resource Editor and Menu Editor can be used to change the menus in the Finder. (These examples use version 4.1 of the System and Finder.)

We'll stress our previous warning again here—it can't be emphasized too strongly. The Resource Editor was designed as a programmer's utility. It actually changes your program. Even though your changes should not affect the workings of your program, some applications may depend on a complex interrelationship of instructions. On the small but serious chance that your changes may have inadvertent side effects, please use the Resource Editor only with an extra copy of any application, and not with a sole original.

Starting Up the Resource Editor

Begin by copying the Resource Editor to your current dominant disk. (You'll need plenty of room. Resource Editor takes up 130K.) Then, double-click its icon to begin the program. You'll see two boxes like those on the left below, listing all the files on each disk presently in your machine. Open the System file (listed last in the second box in our example), and you'll see a box like the one on the right, listing all System file resources as four-character names. Now your screen will look something like this:

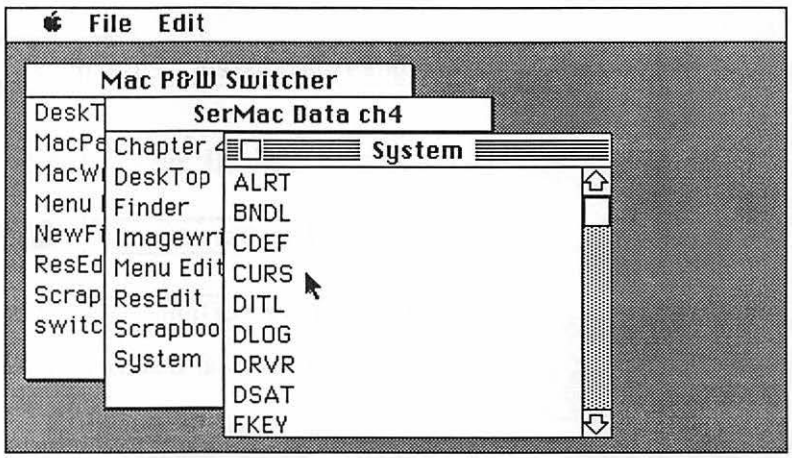


Figure 4–1. The front box shows the resources in a System file.

This list varies for each and every application, although several of the resources are common to many programs. Some are more understandable, and more easily altered, than others. The System file has over two dozen resources. About half of these are in hexadecimal form, an indecipherable gibberish to those not fluent in lower-level programming languages. Several others are only slightly less obscure. Nine resources deserve a closer look.

Customizing Graphics

The first six "fun" resources in the System file involve the icons you see onscreen as you work. The cryptic names of these files are:

CURS	the "wait" watch, and various cursors
ICN#	the Macintosh icon (symbolizes System, Finder, etc.)
ICON	diskette, dialog box heads, port icons
PAT	background patterns used on the Desktop
PAT#	a pattern library other programs can draw on
PICT	a library of custom pictures, used throughout a program

Here's an illustration of each of these graphic sets:

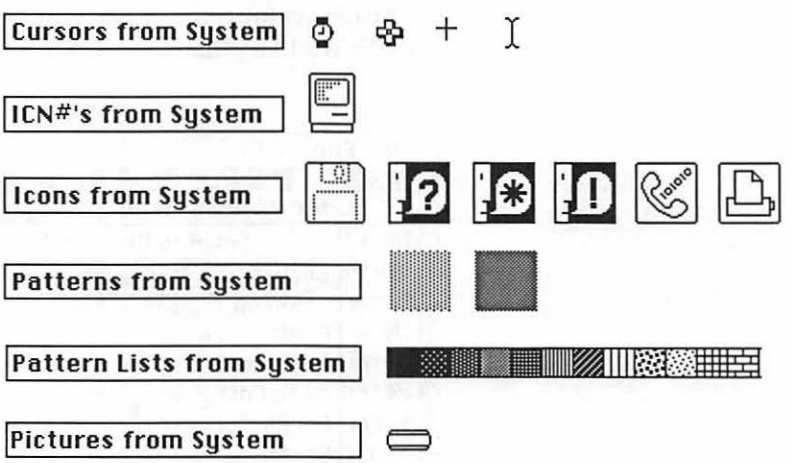


Figure 4–2. Graphic resources from a System file.

So that you can follow the editing of a specific resource from beginning to end, let's demonstrate a simple example: You're tired of staring at the watch icon, seeing time stand still at 9:00. Here's how to reset the hands on the watch:

1. Open (double-click) the resource CURS.
2. A list of the four cursors shown above appears. Open the watch icon, by double-clicking on it.
3. Three magnified, fat-bits style watches appear. You can change these images by simply clicking in any location, to switch a pixel on or off.

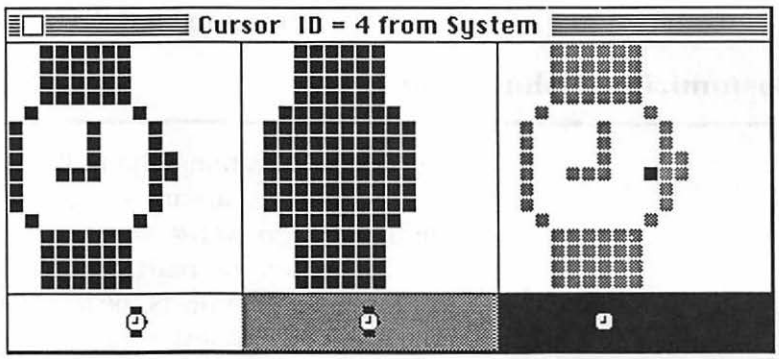


Figure 4–3. Detail of the watch icon.

Why three watches? The one on the left is the actual icon. Click the bits on this to change the time. In the middle is the watch's "shadow" or background. It normally shows as solid; if you click off all the bits inside, your watch will be transparent as it appears on the screen. The right-hand watch shows the active point of the icon. (This concept is better illustrated by the MacPaint cursor. Its active point is in the center of the cross; the active point positions the results of the cursor's actions.)

All icons have an actual icon image. Most have either a "shadow" image or an active-point image that can be edited, and sometimes both. You can change any icon, now that you know the principles behind these three fat-bits images.

Saving Your Changes

Once the watch appears as you'd like, you must back out of the resource, and save your changes:

4. Close the fat-bits window.
5. Close the cursor window.
6. Close both final windows, with the File menu's Close command.
7. Save the System file, when the dialog box then asks you to.

Editing any of the other graphic resources works just the same way. The Finder's graphics are all in the resource called ICN#. (Here's where the Trash Can is found, for example.) Experiment a little with the Finder and System graphics, until your Mac environment reflects your personality.

Customizing Dialog Boxes

In most applications, the building blocks Macintosh uses to create dialog boxes are found in two resources, DITL (dialog item list) and STR# (strings). DITL contains most of the boxes—letting you rearrange the location of the Okay box, for example. STR# reflects the fact that string is a computer term for any series of text characters strung together into words and labels: it contains the onscreen message used by your application. We'll look at the Finder, to illustrate how these work.

The Finder's dialog item list resource contains eight separate building blocks, some as simple as

or more complex, like

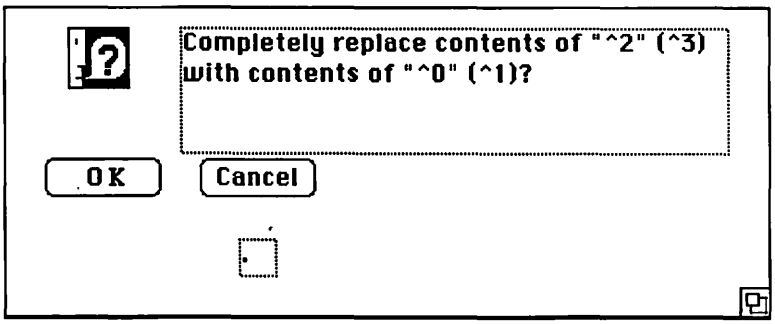


Figure 4–4. This familiar dialog box appears when you copy a disk.

You can click on any element—text or box—in any of these dialog items, and Resource Editor will let you edit it.

Most of the text used in these onscreen announcements is in the STR# resource. Here you'll find 110 text strings of various sizes, divided into two groups. Group 129 includes longer messages, such as

The string	Are you sure you want to throw away "" which contains a system file?
The string	Can't throw away the image of the startup disk.
The string	Can't move or duplicate the Trash.

Figure 4–5. String resources are text messages.

Group 128 specializes in small chunks—mostly words, like Clipboard, Trash, Internal Drive, External Drive. It also includes several of the Finder's more discouraging memory messages, all of which start with "There isn't enough memory...". Remember that one of the reasons for the modular resource approach is international, to ease translation. It's much simpler to change words like Trash or External Drive once; then, any part of the program can call for a certain string number whenever it needs that word.

Warning

One important point is worth noting. Many dialog items and strings are set up to use variables (changing information) from your application. In the examples above, the number of files is filled in in the box, and file names and disk names are substituted for the numbers and empty quotes. Be very careful not to change anything that might affect these variables, as it may impact adversely on your application's performance.

Also keep in mind that any changes you make play havoc with the important Macintosh concept of consistency between applications. Unless you use the same System and Finder files (from a RAM disk or a hard disk) each time you use your Mac, or unless you change *every* System and Finder you use, you'll find that changes bring you nothing but confusion.

Our advice is that you use the DITL and STR# resources only to change those few messages that, for personal reasons, irk you the most. (We especially like to change the words Startup Disk to Dominant Disk.)

Customizing Fonts

In addition to experimenting with the graphics and screen messages in your applications, you may want to create your own fonts, or augment the fonts you already have. Although there are scores of ready-made commercial fonts available, and other utility programs that make font creation very simple, the Resource Editor does a credible job—and, at least for the present, it's freely distributed.

Our example uses the System file, since that's where all your fonts are located. We'll experiment with the mechanics of font editing, then conclude by adding a new character—⌘—to the standard Geneva font.

First, you'll need to bring up the font you want, in Resource Editor:

1. Start Resource Editor.
2. Select the System file.
3. Select Geneva 12 font from the list of fonts available.

A new window appears on your screen, similar to the one below, but with an upper-case A in the center and the number 65 in the lower corner. You'll press the o key on your keyboard, to jump to that letter, since we'll be experimenting with the letter o for practice. (You can also click on the right-hand character in the numbered box, to advance to the letter o.) Your screen should look like the one shown in Fig. 4–6.

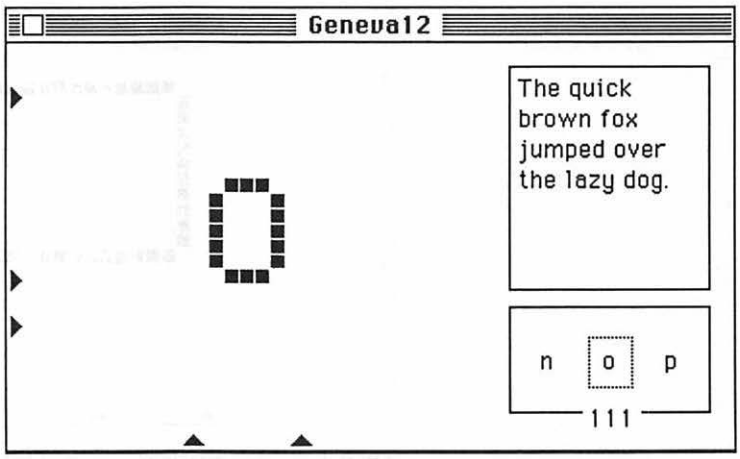


Figure 4–6. A closeup of the letter o, in the font resource.

Before you experiment with this letter, a few words about the components of this window are in order. You already found out that the characters in the lower right let you advance the "starring" character, one by one. The number represents the ASCII code for each letter. Since computers prefer to deal with numbers, each character on the keyboard has a corresponding ASCII code between 0 and 255. The box above it shows your changes in context, in an average sentence. (As most typing students know, this sentence contains all the letters of the alphabet except s. It's useless for displaying uppercase letters and punctuation, though.)

The rest of the window is a fat-bits editing area, where you can invent your own character. The five triangles mark the space bounded by adjoining characters. On the left, the middle one marks the line, while the upper and lower ones (known in typesetting jargon as the leading markers) show the point at which any alterations will collide with characters in the line above and below. At the bottom of the window, the arrows (called kerning markers) show the normal left and right edges of the character's space. Here's a look at what happens if you exceed these bounds:

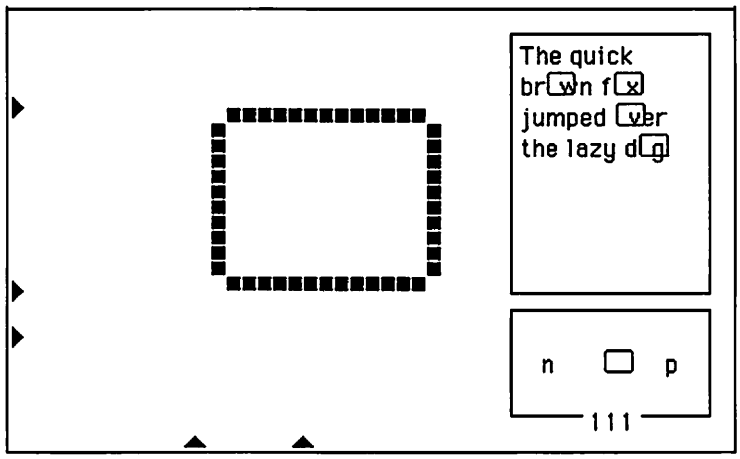


Figure 4–7. Boundary arrows determine a letter's placement relative to other letters.

You can drag the boundary arrows in any direction, to make the space allotted for your character larger or smaller. It's probably best to stay within the bounds for normal letters, but to adjust the space when you create special characters, as you'll see below.

Now you know the basic ground rules of font editing. It's worth noting again that this procedure is too tedious for creating entire fonts; it's probably best for adding a few needed special characters to your regular fonts. In our Macintosh consulting work, for example, we frequently need to reproduce the ⌘ symbol.

Here's how to add it to the normal Geneva 12 font:

1. Open Geneva 12, under the Resource Editor, as above.
2. Scroll through the ASCII numbers at the lower right, until you find the first unused ASCII code number, 218. (An unused code shows up as a small empty box.)
3. Draw your new character in the fat-bits area. Adjust the boundary arrows as needed, by dragging them.

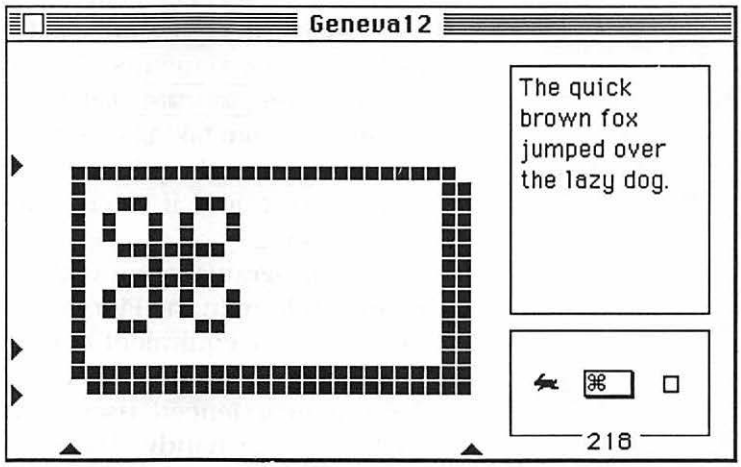


Figure 4–8. The font resource lets you edit in a fat-bits window.

4. Finally, you need to figure out which key (or combination of keys) corresponds to the ASCII code you've used: having this stored away as "character #218" does you no good unless you know which keys to press to use it. See the complete table in Appendix C to check.

This example was useful in *our* environment. You may find that a few mathematical or scientific symbols are welcome in a particular font, or even a few graphic mini-icons. If you buy commercial fonts, you may have the typefaces you want in one, and the graphics and symbols you need in another. With Resource Editor, you can have the necessary tools combined in one customized font, with a little effort.

Customizing Menus

You can make decorative changes to your menus, to list options in shadow or boldface, or in another font. This is fun, and rewarding cosmetically—but hardly essential to controlling your Mac and optimizing its performance. The more important use for menu alteration is to add keyboard equivalents (Command key combinations) to your menu choices.

Keyboard equivalents act as shortcuts for the Macintosh's pull-down menus. They let you enter menu choices by pressing the Command key in conjunction with another key, saving you from taking your hands off the keyboard to use the mouse. Keyboard equivalents are especially useful if you're a touch typist, and if you're quite familiar with the program you're using.

All programs come with at least a few keyboard equivalents built in. In the Finder, for example, Command-E is well-known as the equivalent of Eject. Some programs offer more keyboard equivalents than others, making them very efficient for the experienced user. If your favorite programs don't include these handy shortcuts, you can use the Resource Editor or the Menu Editor to insert them yourself.

We'll make the same menu changes with both of these programs, to help you see the difference between them. Then, we'll conclude with some thoughts on the subject of assigning letters in keyboard equivalents.

Changing the Finder's Menus

The first step to setting up keyboard equivalents involves figuring out which combinations are already being used in your program. (Although you can modify existing keyboard equivalents, this may lead to confusion.) It's a good idea to start by printing out "maps" of the keyboard:

1. Open the Key Caps Desk Accessory.
2. Press Caps Lock-Shift-Command-4 to dump the screen to your printer.
3. Repeat the process, so you'll have two copies.

Then, riffle through the Finder's menus and make note on one of your maps of the keyboard equivalents already used in the Finder.

Command-N	New Folder	Command-Z	Undo
Command-I	Get Info	Command-X	Cut
Command-D	Duplicate	Command-C	Copy
Command-E	Eject	Command-V	Paste
		Command-A	Select All

This step accomplishes two things: It tells you which keys have already been used, and it gives you a chance to review the menu options for which you might want keyboard equivalents. (Note: Check your program's manual to make sure that certain Command key combinations aren't being used for other procedures not listed in the menus.) Let's say you're the tidy type, and you'd like a quick way to execute the Clean Up command, under the Special menu. You note that Command-C has already been used, so you decide to use Command-K.

Now open the Resource Editor, select Finder, then select MENU from the list of available Finder resources. You'll be offered a cryptic, numbered list to choose from next:

MENU ID = 5
MENU ID = 4
MENU ID = 3
MENU ID = 2
MENU ID = 1

This list actually corresponds to the different pull-down menus in the Finder: MENU 1 is the Apple menu, MENU 5 is the Special menu, and the others correspond to the menus in between. You'll choose MENU ID = 5, presenting you with a screen something like this:

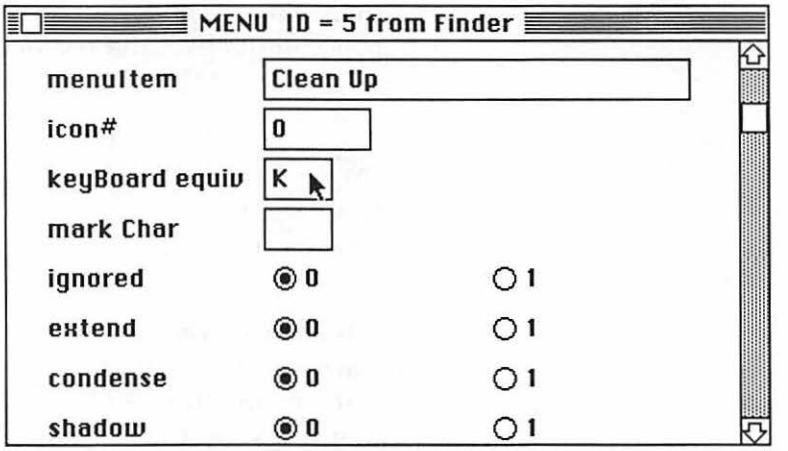


Figure 4–9. Adding Command-K to the Clean Up command with Resource Editor.

Actually, as you can surmise from the scroll bar at the right, this window has been advanced, until the menu choice for Clean Up appears onscreen. Each menu item is listed, with the choices seen above.

menuItem	You can change the words that appear.
icon#	You can specify that an icon from the ICN# file should appear with the words.
keyBoard equiv	Here's where you put your entry, as shown.
mark Char	You can specify that a checkmark should appear when the menu item is chosen.

Then follow several attribute choices (not all of which appear here): You can make your menu item appear in shadow style, outline, boldface, and more. Simply click the 0 (zero) choice for off, and the 1 (one) for on—typical computer jargon!

As always with the Resource Editor, you'll get a chance to save your changes to the Finder file as you back out of the program. If you go to the Finder now, you'll see that Clean Up now has the keyboard equivalent of Command-K added to it.

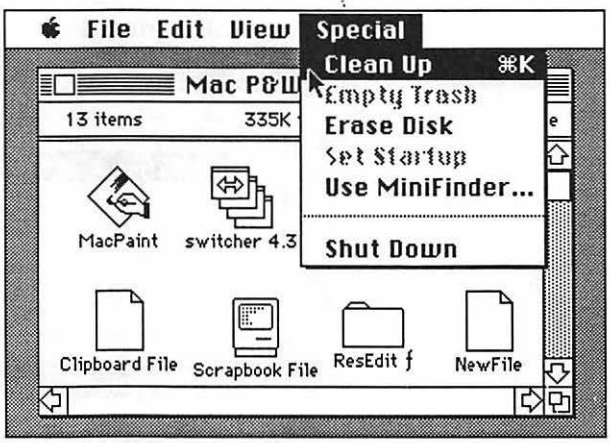


Figure 4–10. The keyboard equivalent now appears in the menu.

Considering the sophistication of this procedure—you're actually going into the program and changing the way it works—it's not surprising that the process is a little arcane.

Since changing menus is the most popular area of customization with most people, there is an easier way. The previous example used Resource Editor so that you could better evaluate the full capabilities of that program. Our easier way uses the program Menu Editor, by Andy Hertzfeld of Switcher fame.

Changing Menus with Menu Editor

Menu Editor, as its name implies, is more limited in scope than Resource Editor. It focuses only on menu customization, but does so in a way that's more understandable for the non-programmer. As soon as you start up Menu Editor, you're presented with a list box, showing all the applications on your disk that have menus. As usual with list boxes, you can switch or eject disks to get access to additional choices.

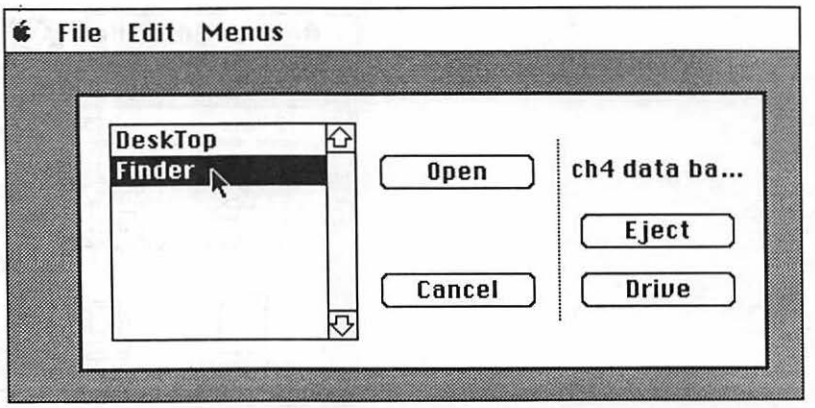
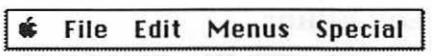


Figure 4–11. Selecting an application to edit, with Menu Editor.

An important caveat is in order here, though: early versions of the Menu Editor have a bug that makes it impossible to modify the menus of any application that is not on the same disk as your copy of Menu Editor. If you select an application from the list box, and then a blank screen appears, you've made just such an invalid choice.

Let's assume you've made sure the Finder is on the same disk as Menu Editor, and you've selected it from the list box. Here's what you'll see:



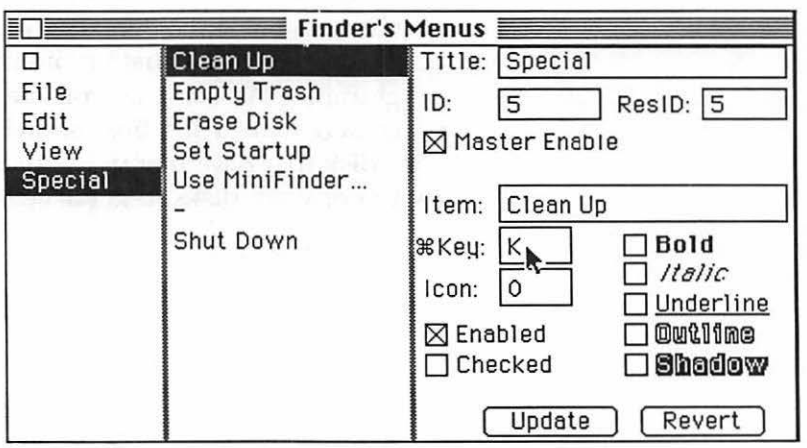


Figure 4–12. Adding a Command key equivalent with Menu Editor.

This arrangement—of the same basic information you faced while doing this task with the Resource Editor—seems more logical, more Mac-like. The screen is divided into three sections. The left one shows the five main menus in the Finder, without resorting to obscure ID numbers. The middle section shows the pull-down options of whichever menu you've highlighted on the left.

Finally, on the right is the essence of the program—the section that lets you modify the menu. The parts we'll focus on now are in the center. Just as in Resource Editor, you can type in a keyboard equivalent, and easily change the type style of any menu choice. If you'd like to see your results immediately, you'll note that Menu Editor temporarily appends the option you're altering to its own main menu. Click the Update button at the bottom of the screen, then pull down the Special menu and take a look!

When you're done, it's *essential* to save your file. Another shortcoming (some would call this a bug) of Menu Editor is that, unlike most Mac software, it will not alert you if you leave the program without saving your changes. Select Save from the File menu to record your personalized version of the Finder on disk.

The Philosophy of Keyboard Equivalents

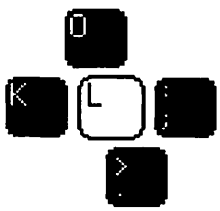
There are a few issues that are important to consider when you're adding [Command] key equivalents to your menus. The first is the system you select for assigning keys and the second involves consistency with other Macintosh programs.

Mnemonic vs. Positional

The mnemonic system usually uses the first letter of a command in its keyboard equivalent. The word (pronounced nem-ON-ic) comes from the Greek, and, in fact, refers to anything that assists the memory. As this implies, mnemonic keyboard equivalents are easy to remember. Properly done, mnemonic equivalents should also be easy to guess: Even if you haven't used a specific command equivalent before, you should be able to stab at the keyboard and figure it out on your own.

This system does have its drawbacks, though. The Macintosh's visual interface was designed on the premise that pointing and positional clues are easier to use intuitively than text information. With mnemonic keyboard equivalents, you must think of a text item, then use your knowledge of phonics to invoke the corresponding shortcut.

For this reason, some people prefer a positional system for assigning keyboard equivalents. With this system, related operations are assigned keys in groups. This makes it easier to perform several operations rather mechanically, in quick succession, without any inner translation between action and key press. Microsoft Word, for example, uses a diamond of key positions to substitute for up, down, left, and right cursor movement.



This approach is much harder to learn initially, but becomes second nature, and seems much more intuitive, once learned.

Best of Both Worlds

Although there are people who feel very strongly that one system or the other is ideal, we prefer the middle ground, combining both approaches. Here are a few ideas you might try:

- Use positional arrangements for any movement options, as in the example above.
- Use mnemonics for most other choices, but mix them with positional keys when it makes sense. Probably the best example of a mixed system is the ubiquitous Command-X (Cut), Command-C (Copy), Command-V (Paste) sequence. Copy is obviously mnemonic; Cut could be positional—it's next to Copy, or mnemonic—the X looks like a pair of scissors cutting; and Paste is entirely positional.

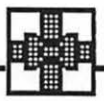
- Use the Option key to augment your mnemonic choices. For example, you might press Command-S for Save, but use Command-Option-S for Save As. You might do the same with other closely related commands like Open and Close.

(This last idea deserves a bit of how-to elaboration. You can enter any combination like Option-S just by holding the Option key while you type S, in Resource or Menu Editor. You'll see a strange symbol on your screen and on the menu, however. For example, Option-G in most fonts produces the copyright symbol ©; when you see ⌘ © on a menu you may be hard-pressed to remember immediately that this stands for Command-Option-G.)

Conventions

The final important point to note in assigning keyboard equivalents is that you should observe Macintosh conventions whenever possible. One reason the Mac is so easy to use is that there is a definite continuity from one program to the next: Command-E always ejects the disk, Command-V always pastes from the Clipboard, and so on. This is in stark contrast with the IBM PC world, where Control-Q can mean Save the File in one program, and Erase it in another!

If you change any of these widely used conventions, you'll find yourself confused whenever you use new software. And that means you'll lose the ease and efficiency for which you wanted keyboard equivalents in the first place. If you need ideas, examples are given in Appendix C.



Summary

You should now be able to use the Resource Editor or the Menu Editor to put your own personal stamp on any program. Regardless of whether you decide to make many such changes, just the knowledge that you *can* provides a marvelous feeling of control over your work environment.

CHAPTER

Disk Management Utilities

Because the Finder is so essential to Macintosh computing, much of this book focuses on ways to make the Finder more powerful, responsive, and efficient. This chapter will continue the theme of programs for power and efficiency by discussing:

- utilities that help you keep track of your files
- programs that can format several new or used disks in rapid succession
- programs that let you copy entire diskettes quickly with just one drive
- the different types of copy protection, and how each impacts on your work
- the moral, legal, and common-sense arguments for backing up your own software
- the use of copy-protected software on hard disks

Locating and Listing Files

Whenever you open a disk on the Macintosh Desktop, you see a list of all its files on the screen. It can be frustrating, though, to wait the requisite seconds for all the files to appear, then discover the file you're looking for isn't there. Cataloging programs can help, either by listing files more quickly, or by providing you with a printed directory of the disk.

The Macintosh seems slow in showing the contents of a disk principally because it's doing so much work: It's telling you each file's name, the type of file, the application it belongs with, and its size. It's "remembering" the placement of each file icon, and redrawing it, if you've chosen to View by Icon. If you have no need for all this information, a cataloging program can list your files more quickly.

Here's a typical example, using a simple public domain program called Browse, from MusicWorks, Inc.:

1. You start up Browse, and see this screen:

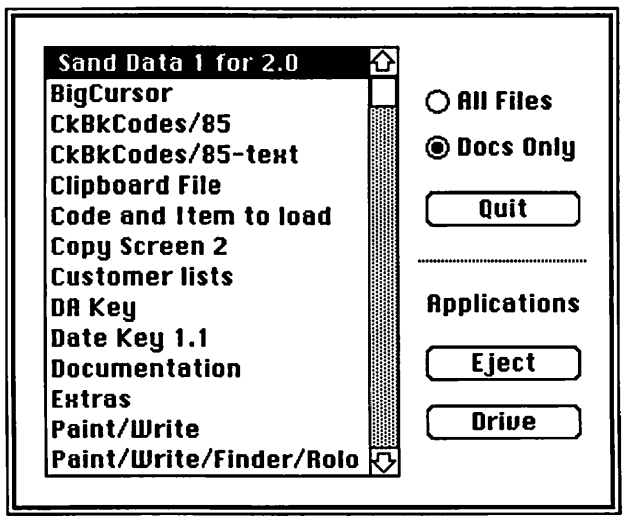


Figure 5–1. Browse.

2. Insert a disk, and its files are listed onscreen in an average of 2 to 3 seconds, in contrast to the usual 2 to 30 seconds for the Finder.

3. Hit the Eject Button, and switch disks, to quickly scan each subsequent disk until you find the file you're looking for.

Other cataloging programs go much further than Browse. Some can print out a list of your files on paper or on a disk label that you can decorate with a wide selection of borders. These programs have little use except with archive disks, for which you can use Print Catalog in the Finder. Active disks change files frequently enough that today's listing is obsolete tomorrow—and who needs a paper copy if your cataloging program lets you quickly scan a disk's actual contents?

Keep in mind that the main rationale for a program like Browse is to quickly locate particular files. Use them whenever speed is your primary concern. However, since most quick-cataloging programs don't take note of the application that created a file, be aware that you will not be able to start an application from a catalog program by simply selecting its data file. There's a reason the Finder does those seemingly time-consuming things! See Appendix A for a complete shopping list.

Preparing Disks

Whenever you save a file, your computer puts the data in the first available location on the disk. When you try to save a file on a brand new disk, the computer can't figure out where the first available location is: it's quite difficult to find the "beginning" of an unmarked circle. So as you know, you must initialize (also called format) the disk.

Initializing does four things to your disk:

- maps each side used into electronic sections, 80 concentric circles called tracks and 800 pie-shaped areas called sectors
- sets up a directory, an area of the disk reserved to record information about each file on the disk
- sets up a File Allocation Map, an area of the disk reserved for information about where data is located on the disk
- erases any information already on your disk

One of the nice things about the Mac is that it will automatically give you the option to initialize any disk it can't read, as you work; with most computers you'll lose your file if you haven't initialized your disks ahead of time. Still, you may lose your train of thought by having to pause and initialize a disk in the middle of your work. And you may lose your sanity if you ever decide to recycle several disks by initializing them all at once. An initializing utility program will help.

Mass Initializer is a typical initializing utility. It's a solid, no-frills, public domain program that lets you initialize, or format, any number of diskettes, one after another. Its nicest feature is the fact that it lets you set safeties—customized instructions that tell the program how to react if it is faced with a disk that has already been formatted. (A formatted disk may well contain data that you do not want to erase inadvertently.) These four safeties are illustrated below. You can tell Mass Initializer to automatically eject a formatted disk, to pause with a screen message then eject if you hit Return, to pause then reformat on Return, or to automatically format no matter what.

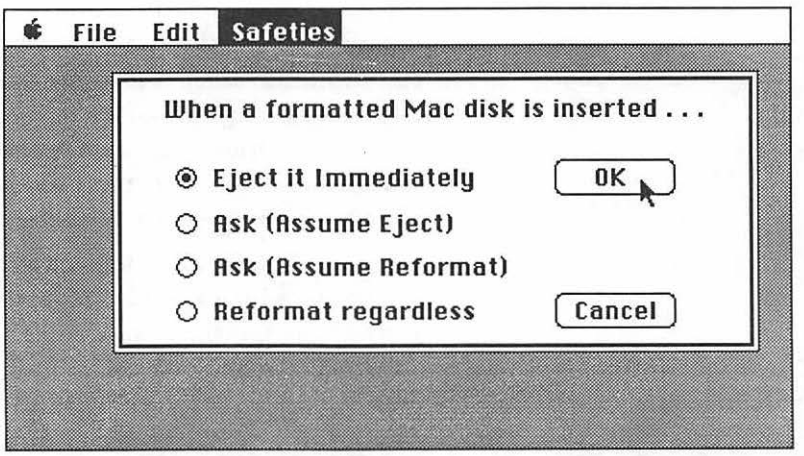


Figure 5–2. Mass Initializer's safety options.

Most initializing utilities seem to take slightly less time to initialize a disk than the usual one-shot Mac initialize routine does. Your real saving, however, is in the convenience of being able to prepare a whole box of disks as soon as you buy them, and in being able to easily recycle old disks. One note of caution: If you're using 800K diskettes, make sure the initializing utility you're using is capable of formatting double-sided diskettes. Many early programs can handle only 400K (single-sided) diskettes.

Copying Disks

Apple provides you with Finder techniques for copying single files, groups of files, and entire diskettes. For most purposes, these simple icon-dragging procedures will be sufficient. You may want other tools, though, if you need to:

- make mass copies of the same disk, as quickly as possible
- speed the diskcopy process on a system with one diskette drive
- make backup diskettes for your own protected software
- install protected programs on your hard disk

You're bound to run across most, if not all, of these circumstances in the course of normal computing, so you need to know about file management utility programs for copying.

Mass Copying/Speed Copying

When your Macintosh normally copies an entire disk, it's actually copying each file individually—as you might guess from the "...files left to copy" message it displays. This process can take awhile, because parts of a single file may need to be found and gathered up from all over your disk. Why is this? When you modify or add on to a file you already created, it can't fit in the same disk space as before. Just as you take time to find the next part of a newspaper story that's too big for the front page ("continued on page 37"), your Mac slows down as it jumps from one part of a spread-out file to another.

Comparisons

The advantage of this system is that, on the new copy, each file has been "reassembled" into a single connected group of data. Your disk accesses will probably speed up considerably, compared to the old disk. The drawback is that this file-by-file assembly process—especially on a disk with many files—takes a seemingly interminable amount of time for the average two-floppy diskcopy; even more if you're using just one floppy, as most hard disk users are.

Mass copy utilities take a different approach: They read the entire disk into RAM, then create an exact "photo-copy" of it—with files spread out just like those on the original. Reading the disk takes around 20 seconds on average. Then, since the entire disk's contents are sitting in RAM, it's easy to make several copies of the disk in turn, or to make one copy without endless disk swaps. The average copy takes about 25 to 40 seconds to complete, from start to finish.

If you have a two-diskette-drive Macintosh, you'll appreciate a mass copy program when you need to send copies of your sales data to 10 branch offices, or when you've just been elected public domain software coordinator for your user group: in other words, any time you need to make multiple copies of the same disk. If you have just one diskette drive—as most hard disk drive users do—you'll find it vastly easier to use a mass copy program anytime you need an extra copy of an entire diskette.

Just remember that the results of the two diskcopy approaches are different. If you're making several copies of a disk, you may want to use Apple's diskcopy routine to reassemble the files, and make disk access more efficient. Then use a mass copy program to make additional copies.

512K Copy is a good example of this type of file management utility. Available in the public domain, the program was written by Micro Analyst of Austin, Texas. It lets you copy any disk in less than a minute; no swaps are necessary, even with a single diskette drive.

You start the program, which automatically ejects its own disk from the drive. You insert the original (source) disk, and click Read Disk; once it's ejected, you insert a blank and click Copy. Status messages in the top line of the window help you understand what's happening at all times.

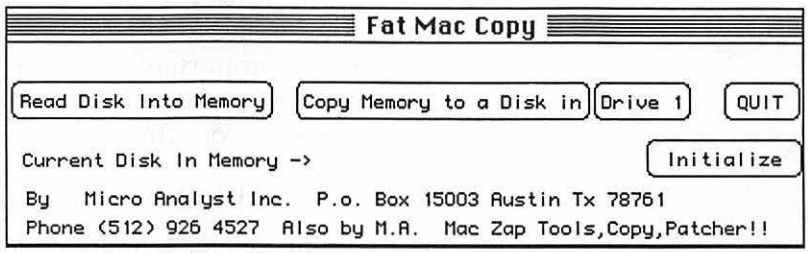


Figure 5–3. 512K Copy.

One of the nicest features of 512K Copy (aka Fat Mac Copy) is that it will automatically initialize any disk that needs it. (The Initialize button exists so you can initialize without copying.) The real bonus is that this is one of the fastest initializing routines around: At less than 20 seconds, it's much faster than the Finder or Mass Initializer. 512K Copy's only possible drawback is that it does not have any safety features to keep you from accidentally writing over a disk that already holds data.

Mass Copier is a shareware program ($15, CE Software, Des Moines, IA), similar in performance and function to 512K Copy. It's a little slower, but somewhat easier to understand. Its main advantage is that it verifies each disk to make sure you're not copying to or from a disk with any disk errors. Chapter 9 explains more about verification.

Here are the features to look for in a mass/speed copy program:

- copies entire original disk into RAM
- initializes disks that need it
- makes additional copies without rereading original
- uses only one drive, without swaps
- copies a disk in less than half a minute

Copying Protected Software

Copy-protected software makes most honest users resentful. Software pirates will find a way to copy anything; most protection schemes only inconvenience the non-pirate. While most of us wholeheartedly agree with the rights of software authors to receive a fair return for their efforts, we in turn expect the fair and unfettered use of software we have already paid for. It's important to understand the different ways vendors try to protect their disks, and the effect that each method has on you, the user.

Why You Need to Copy *All* Your Disks

You'll want to be able to copy all your software, either to use it on a RAM disk, to install it on a hard disk, to customize it, or to protect yourself against physical damage to or loss of the disk.

Some vendors think that providing an extra copy of the protected program disk is enough. This may shelter you from the worst consequences of physical damage and loss, but it avoids the issue of legitimate RAM disk and hard disk use, and the essential subject of customization.

One of the Macintosh's strongest points is the ease with which you can customize any program you want:

- by adding Desk Accessories to the System
- by adding Desk Accessories to specific applications
- by changing fonts
- by editing icons and onscreen messages
- by adding key equivalents to any menu

The Macintosh has been designed in a way that lets the average user manipulate program details to an unusual extent. But these techniques are risky to use on copy-protected software; you should always experiment only on a copy of your application disk, in case your tinkering causes unexpected results.

For all these valid reasons, it's important to understand how copy protection affects you, what your legal options are, and how to obtain full use of your own software. From your end, as a user, you'll find five common copy-protection schemes: Required Key Disk, Periodic Key Disk, Master Re-

quired, Limited Copies Only, and Uncopyable. Let's take a look at each.

Required Key Disk This type of protection allows you to make as many copies as you want, but requires that you insert the original master disk (or key disk) to start up the application. Then, it pops the key disk out, so you can actually run the program from a copy. The best of these don't require the key disk again until the machine is rebooted.

The main advantages of this system are that you can make plenty of backup copies, and you can run the program from a customized backup. Also, since the key disk is required only at startup, this type of protection does not let you in for a lot of extra disk swapping. The disadvantage is that, if your key disk is damaged, you may not be able to use your application. Microsoft favors this approach.

Periodic Key Disk Some schemes require a key disk not only at startup, but at random intervals while the program is running. The periodic key disk system is designed to make it difficult for two people in the same office to use the same program at the same time simply by starting up one after the other. In most cases, this system calls for the key disk about four or five times out of every one hundred program launches.

This scheme is much more annoying to the average user since the extra disk swaps can get tedious. And, as above, you're out of luck if your key disk is damaged or misplaced. Omnis 3 and PageMaker are popular examples of this system.

Master Required This type of protection requires that the master program disk be present in the drive as you run the program. Although you can make copies of the disk, they're virtually useless; they can't readily be used for running the application, and sometimes can't be used to repair/replace damaged files on the original. Jazz uses this system but provides you with a backup disk. ThinkTank used to provide you with a single, vulnerable master (the worst system of all), but now offers an unprotected version for additional money.

The drawbacks of a required master disk are quite obvious. You must have your master with you at all times. You dare not risk altering or customizing your master. You can't

readily run these programs from RAM disks (copying to memory is unauthorized, too)—or run them under Switcher (how can three programs all have the master disk inserted at once?). There are no advantages to this system.

Limited Copies Only Some vendors allow you to make a limited number of copies of a program—usually one or two. Their disks are equipped with a counter that monitors the backups you make. The backups produced under this system usually have some sort of protection built into them—often one of the above.

A limited number of copies are better than none. However, if anything goes wrong during the copy process, you may waste one of your precious copies. And you may still well be wary of customizing a copy, when you know you may be endangering your only backup.

Uncopyable Uncopyable programs make themselves known very obviously, with a message such as, "This program cannot be duplicated or moved." Usually, no backup comes with the program, and none can be obtained from the vendor. This system is common on game programs. The theory is that, while your business may depend on having backups of your more serious programs, no one ever went bankrupt when his only copy of a game suddenly crashed.

Copy Programs for Copy-Protected Software

Software vendors use several systems to render their disks uncopyable, ranging from the inclusion of stray bits in weird spots to minute laser-burned holes. Code on the disk tells the program to expect this anomaly on an authorized disk; any copy without the flaw is inoperable. That's the general approach, of course: copy-protection schemes are non-standard and unpredictable, and don't always fall into neat categories.

Several commercial programs are capable of breaking down the various protection schemes, to back up copy-protected software. Some create an exact duplicate of the copy-protected disk, complete with its own copy protection. If the disk uses a "stray bit" system, this is a good approach. Others actually break the copy protection—a necessity on

laser-burned disks—resulting in copyable duplicates of the original. These programs operate by actually disabling the code that tells the program to look for the flaw.

Under federal copyright law, you have limited rights to make archival copies of your own legally owned, registered software. Of course, as soon as you give—or sell—your copies to someone else, you are in direct violation of the law. Keep in mind also that you do not, in many cases *own* the software you use. The fine print of most shrink wrap license agreements says that you have paid your money for a license to *use* software that still belongs to the seller. If you don't own it, you can't even make archival backups. Check the laws in your own state, to be sure.

Two Ways to Copy Disks

How can something be copied, if it's copy protected? There are in fact two ways that most copy programs work. They're known as *sector copying* and *bit copying*, and a little bit of technical elaboration is necessary to explain the two.

Sector Copying Usually your computer transfers information between RAM and your disks, or between one disk and another in sectors—a group of data is transferred all at once. A sector is always 512 bytes, or characters. (By character, we mean any A, B, or C, any punctuation mark, and so on.) And by established computer conventions, each byte is made up of 8 bits, or off/on signals. (Like the Morse Code, where every message is made up of dots and dashes, every signal that passes through your computer is made up of on and off signals.)

A *sector-copy* system takes one sector of information at a time, and deposits it on the other disk. It loads up exactly 512 bytes, then sends it over. Theoretically, this will result in an exact duplicate, once all the sectors are copied. Copy-protection schemes throw a wrench into the system, with tricks like:

- insisting that a few specific sectors contain less than 512 bytes
- including a few extra stray bits in certain sectors

If this has been done, sector copying, with its mindless insistence on 512 byte units, will miss the trick sectors. When the program is started up, instructions look for the trick areas, and reject the disk when they are not found. If this is the case, *bit copying* may prove more effective.

Bit Copying Other copy programs examine and transfer individual bits instead of whole sectors of data. With this approach, any extra stray bits are usually found, and any "short" sectors are reproduced, bit for bit. As you might logically expect, however, bit copying takes an inordinate amount of time.

Sector copying, then, is fast but often useless in dealing with copy protection. Bit copying can often reproduce a protected disk, but is painfully slow. Luckily, most commercial copy-protection programs are clever enough to use the best of both methods, by quickly sector copying the majority of the disk, then bit copying any area that seemed to present irregularities.

Here's an example of the process usually necessary to copy protected software, using the popular Copy II Mac, from Central Point Software:

1. Start up Copy II Mac. When you start the program, you'll see a screen on the legal ramifications of copy-protected software. We agree that you should be aware of your rights and responsibilities.
2. First, try to sector copy your original disk. This gets most of the information copied properly. Select the drive you'll use for your original, and for your duplicate, then follow onscreen prompts. If you choose Sector Copy with Format, Copy II Mac will initialize your duplicate disk first, to make sure it's absolutely clean.

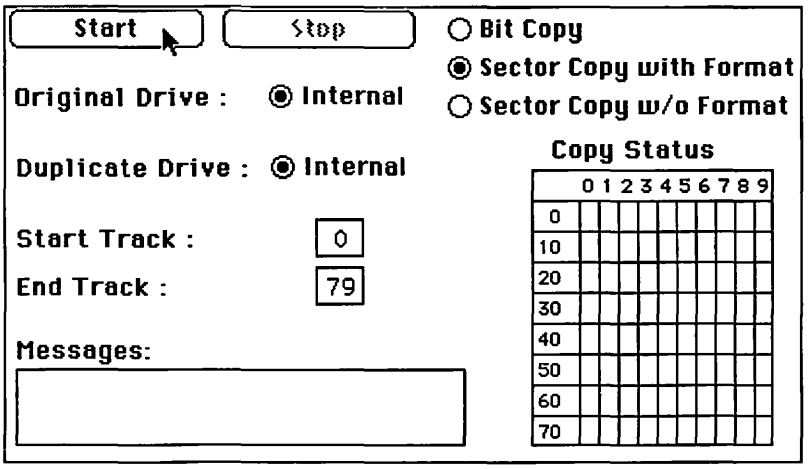


Figure 5–4. Copy II Mac's main screen.

3. Sector copying flags any sectors (it calls them blocks) that it considers suspicious. You'll see a message in the Message Box on the lower right, telling you which block it's having trouble with. A corresponding entry is made in the Copy Status map on the right, which contains a square for each track on the disk. Note any tracks that contain a letter, instead of a dot—here's where the copy protection probably resides. (The individual letters don't matter much; you'll proceed in the same manner, no matter the letter.)

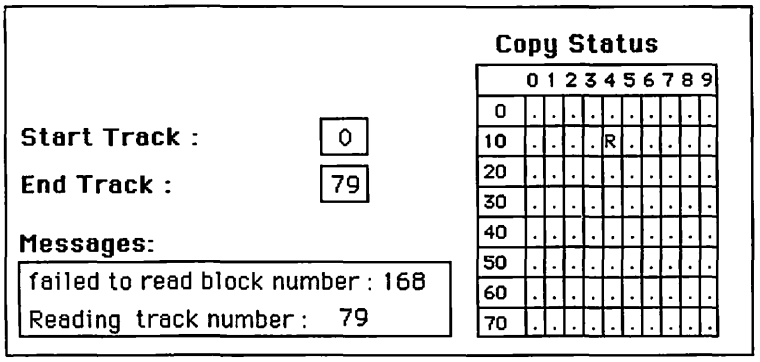


Figure 5–5. Copy II Mac will flag any areas that can't be copied.

4. Next, you need to bit copy the troubled tracks. Select bit copy, then change the Start and End Track boxes to indicate the tracks to bit copy. In this case, the number 14 would be entered in each, since there's only one track that didn't appear to copy well.
5. Once the bit copy is complete, return to the Finder and try your new duplicate. If it is not a working copy, it will probably tell you immediately, by refusing to boot, or by showing a message like "Insert your authorized program disk, please."
6. If the disk does not work, try bit copying the same track(s) again, after selecting "Keep Track Length" and "Synchronize Tracks" from Copy II Mac's Option Menu. Some common protection systems tamper with the characteristics of tracks, as well as those of sectors; these options can sometimes catch these systems. Use them as a last resort, though—they slow the process down even more.
7. Try the program again, after this.

Your disk may appear to copy just fine—each track in the Copy Status shows a nice neat dot—but still not work. Why not? New protection schemes are constantly coming out with new ways to defeat both bit and sector copying. One major company, for example, uses a disk holding 404K, instead of the usual 400; when your copy program thinks it's done, an extra few bytes are missing.

Your disk may also appear to copy just fine, and even work perfectly, but then fail after several uses. This isn't so strange if you consider that almost any kind of copy protection consists of introducing some sort of irregularity onto a disk; disks with irregularities can and do malfunction. Keep your original close by, so you aren't caught short by this sort of all-too-frequent failure.

The example above demonstrates the normal steps for copying—sector copy, bit copy any tough tracks, then bit copy again with more exacting standards. It really must be stressed, though, that nothing is really "normal" about copying protected software, because nothing is at all normal about copy-protection schemes. As fast as these schemes are updated and "improved," new versions of all the popular copy programs are released, to keep up with the changes.

Therefore, the shopping list for copy programs is at best inexact. In general, you want to make sure any copy program you buy:

- can sector copy
- can format the duplicate disk if desired
- indicates tracks with possible errors, after sector copying
- can bit copy
- is updated regularly at a reasonable cost

These generalities will make sure you'll get a program that will probably work with *some* applications. If you're looking to archive a specific application you use every day, the appropriate shopping list contains only one item:

- Make sure your program can copy the application you need copied

It's always wise to make a call to the vendor, and make sure the copy program you're considering has been tested with the application you want to back up: There's really no other way to shop for copy software. For a shopping list for copy programs, see Appendix A.

A Word about Hard Disks

Hard disks bring up additional issues for copy protection. If you have bought a hard disk to avoid constant disk swapping, and to make your programs run much faster, you will resent being unable to copy the programs you own onto your hard disk.

Software that is protected with a key-disk system will probably allow you to copy your application onto the hard disk; remember that this system allows you unlimited copies. Generally, even though you must leave the key disk in your internal drive, greater speed is still achieved: The computer reads program code from the hard drive, and goes to the original floppy only to check for authorization information. You can customize the copy on the hard disk, but you must keep track of your key disk, and insert it when you are requested to.

The most common trend for hard disk users is a variation of the limited copy-protection scheme. You are allowed a limited number of copies, or installs, onto your hard disk, as seen below.

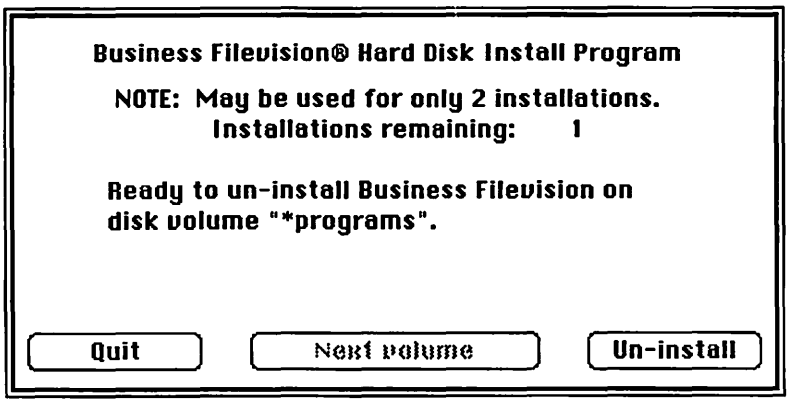


Figure 5–6. A hard disk install program should let you uninstall, too.

Often, you are also allowed an equal number of "uninstalls": Each time you uninstall, the copy counter on your original goes up one, allowing you to reclaim your limited copy rights.

This may seem ideal, but problems still abound:

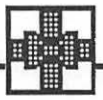
- If your hard disk crashes, you cannot uninstall; your copy is gone.
- Some program modifications (the permanent memory button in Switcher is one example) may accidentally uninstall your program, and waste a copy.
- If you try to back up your hard disk, the existence of the protected program on the disk may make backup difficult. Although the more sophisticated backup programs allow for this, some do not.

Luckily, there are commercial copy programs especially designed to work with hard disks, too. Copy II Mac comes with a program called Copy II Hard Disk, that helps you install your own software on your hard disk. Its arsenal of weapons is limited though; since the original diskette is being copied onto a much larger hard disk, it cannot just make an exact copy.

A Final Philosophical Word on Copy Protection

Remember, *The Macintosh Advisor* is concerned with explaining how you can get the most out of your Macintosh. While we in no way advocate the illegal duplication of software, we believe that copy-protection schemes impinge heavily on

efficient use of your computer, and you should be aware of the alternatives to using protected software. Whenever possible, vote with your wallet, by buying unprotected programs, and write letters to vendors and to national magazines telling them how you feel.



Summary

Tips for Disk Management Utilities

A few notes about all the programs we've mentioned are in order here. Each fits the definition of utility only if:

- It actually performs something useful to *you*.
- It takes up as little memory or disk space as possible.
- It's easy to use (even if it's not so easy to learn).
- It's dependable, solid, and bug-free.
- Its cost is reasonable.

These first few points are obvious. Don't get carried away by fancy utilities that perform seemingly glorious tasks, if those tasks don't benefit you and the way you work. (Like the electric can opener—does the thing take up a lot of valuable space just to do some job you could do better by hand?)

The last three points can be considered together. Most of these programs are in the public domain, or have counterparts there. Public domain programs often have little documentation, and may take a short while to get comfortable with. They can also range from programming masterpieces to bug-ridden nightmares. Sort out the good ones, though, using our guidelines, and you'll be rewarded with several valuable shortcuts.

CHAPTER

RAM Upgrades and Hard Disk Drives

There's just so far you can push a Macintosh 512K with floppy disk drives. Even if you use all the pointers in this book, even with all the utility programs, all the command-key shortcuts you can find, at some point you will lust after more memory and a better and faster disk drive. This chapter will help you sort out the issues and choices you'll face when you decide to upgrade your hardware, including:

- When do you need more memory? How much should you get?
- What are the procedures and terminology you should know to get the best RAM upgrade?
- How does the RAM in the Mac 512K differ from that in the Mac Plus?
- What hardware features should you look at when choosing a hard disk?
- Which provides faster data transfers, the SCSI port, the drive port, or the serial ports?
- Does the software that controls the hard disk affect its performance?

Everything you'll need to know to answer these questions is contained in Chapter 6.

Memory Upgrades: When Do You Need More?

It's been said that RAM is like Chinese food: no matter how much you get, a half hour later you want more. Acknowledging that there's no such thing as enough RAM, though, what rational arguments can be mustered for convincing your wallet that you really must add memory to your Macintosh?

Three things are apt to tip you off that it's time to consider a memory upgrade:

New programs demand more memory Lots of people postponed the original memory upgrade from 128K to 512K, until new programs began to be released that would not run in 128K. This same impetus happens at every level: from 512K to 1M (megabyte, or one million characters), from 1M upward. As soon as enough users have bought more memory, developers write more complex programs that cannot operate in the smaller amount.

New programs prefer more memory Many programs will operate in a smaller amount of memory, but their performance is optimized with more RAM. Usually this is because the program is written in modules, of which as many as possible are kept in memory. The speed of your program depends on whether it must go to the disk to get the next set of program instructions, or whether it already has the information in memory. In other cases, increased RAM lets you keep more data in memory instead of on disk. Either way, you'll get better performance. The first disk-based MacWrite is a good example of this: even though it will work with 128K, it works faster and avoids bothersome "can't do that, not enough memory" messages if it can have more RAM.

Program combinations require more memory If you're running Switcher or any other system that lets you keep more than one program in memory at the same time, you'll fill up your RAM quickly. Even with each program running with as little memory as possible (see Chapter 2 for tips), this is a prime reason for needing more RAM.

A RAM Primer

Before you decide to purchase more RAM, it's a good idea to understand what you already have. The 512K of a standard Macintosh is contained on sixteen 256k chips. If this seems confusing, it is. The confusion stems from the difference between bits and bytes. A bit is a single on/off signal; every piece of information that your computer uses is made up of collections of on/off signals. Eight of these signals, or bits, are necessary to represent one character (like the letter B). This group of eight bits is called a byte. Your overall memory is measured in kilo*bytes*, where each kilobyte represents one thousand characters. Memory chips are measured in kilo*bits*, where each kilobit represents a thousand on/off signals. Therefore, a 256 kilobit memory chip can actually hold 32 kilobytes of information (256,000 ÷ 8 = 32,000). 16 chips × 32K each = 512K (kilobytes!) of RAM in your Macintosh.

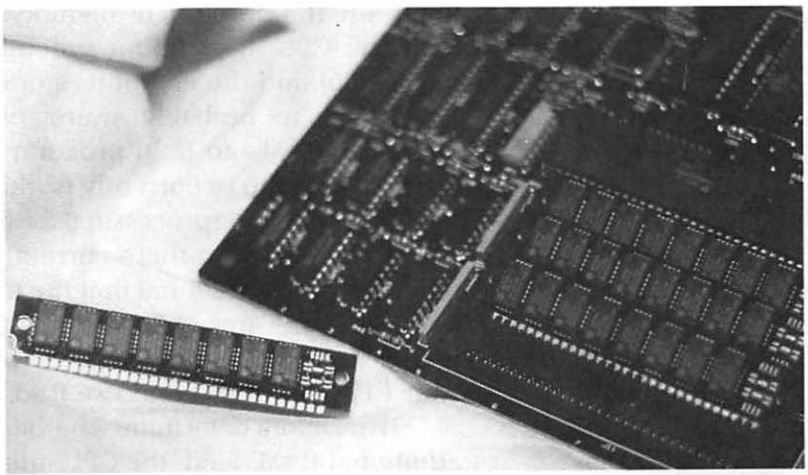


Figure 6–1. RAM chips come on four SIMM boards in the Macintosh Plus. (Photo by Ben Calica.)

A Macintosh Plus is set up a bit differently. Instead of RAM chips soldered directly to the main circuit board, it uses clusters of eight RAM chips on a small circuit board called a Single Inline Memory Module (SIMM). Each of the four SIMM boards plugs into circuits on the machine's motherboard. At its introduction, the Mac Plus used thirty-two 256 kilobit chips (eight on each of the four SIMMs), for a total of one megabyte. The SIMMs were designed to be exchanged for new SIMMs holding one megaBIT chips, as the larger chips became available, quadrupling the memory of the Macintosh Plus to 4 megabytes.

How High Is Up?

How much memory can the Mac handle? At the present, space inside the system unit is probably the deciding factor on the amount of memory any Macintosh could use. Advances in chip technology, making it possible for "bigger" chips to fit in the same space, offer the best way to increase memory capacity in the Mac's small case. There are other limits on the amount of memory, however, determined by both the CPU (the central processing unit, the computer's main chip) and the computer's operating system.

As you're probably aware, computers use temporary memory—RAM—to hold program instructions, and to hold the data that you're currently working with. The CPU does all the real "thinking" (processing) for the computer, but can only process information that's currently in RAM. With this close relationship, it's essential that the CPU be able to link up with ("address") any area of RAM at any time. In short, added RAM is useless for anything but a RAM disk (see Chapter 2), unless your CPU can find it and use it just like ordinary RAM.

Two factors determine whether the CPU can find and use additional RAM. First, the CPU must be physically capable of addressing the amount of RAM you install. The central processing unit in a Macintosh is the Motorola 68000, a chip designed to address as much as 16M of RAM (16 megabytes—sixteen million characters of information). However, Apple designed the Macintosh to address no more than 4 megabytes of RAM, by using the memory addresses above this level for its ROM. Therefore, it would take a major design change to expand any Macintosh beyond 4 megabytes.

Second, the CPU has to know to look for the additional RAM. It's the job of the computer's operating system to act as traffic cop for the different parts of the system. If the operating system tells the CPU it only has 512K of RAM, it won't look for anything more, no matter how many memory chips are actually there. So every time you increase the memory in your Macintosh, you must make sure that the operating system will tell the CPU about the new amount of memory it should address. Like a postman with a new route, the CPU must be told where it is supposed to pick up and deliver data.

The operating system's memory instructions for the CPU are in your machine's ROM. As a result, there are two ways to change them when you add more memory:

Change the ROMs Obviously, replacing your Mac's ROMs with new ROMs containing new memory instructions would take care of the problem. If the ROMs must be changed, you'll need a dealer to go inside your machine.

Use a Software Patch Alternatively, the company that adds more RAM could give you a disk, to be run each time you start up your Macintosh. Code on the disk would tell the machine to ignore its usual memory instructions, and substitute those on disk.

We'll explore the pros and cons of each of these approaches below, as we go further into the issues you should consider in upgrading your Macintosh.

Compatability Issues

Apple vs. Non-Apple

The original Macintosh was released with 128K in early 1984. Apple offered an official upgrade to 512K in October of the same year, and the 1M Mac Plus upgrade in early 1986. The outrage that met Apple's decision to ask $1000 for its original upgrade from 128K to 512K may have been a factor in convincing the company to offer upgrades from the 512K to the Mac Plus at a more reasonable cost and in flexible increments (new ROMs and 800K drive, new 1M motherboard, and new ports, new keyboard). When Apple upgrades

its own machines, you can count on the company to upgrade the operating system properly, too. So, any official upgrade should be without risk.

Apple's official offerings are only part of the story, though, since third-party vendors have been selling a large number of additional upgrades since early in the Macintosh's history. These vendors have done a healthy business, mainly by offering more memory than Apple officially does, offering it sooner, and making it available at considerably cheaper prices. A third party upgrade introduces several factors that you should consider, however:

- RAM and ROM issues: How compatible is the upgrade with Apple norms?
- Installation methods: Does it modify the Mac's circuit boards?
- Heat and fans: Will it damage your Mac, or sound too noisy?
- Software: Are any useful utility programs included with the upgrade?
- Company support and stability: Will anyone be there tomorrow?

We'll take a look at each of these issues in turn, citing examples from four major vendors so that you can make intelligent decisions about the trade-offs involved. The products used as examples include: the 2 Megabyte MonsterMac (Levco, San Diego, CA), the 1 Megabyte MacMegabytes (BeckTech, Berkeley, CA), the 1.5 Megabyte FastMac (MassTech, Groton, MA), and the 1.5 Megabyte Hyperdrive 2000 (General Computer, Cambridge, MA). As always in *The Macintosh Advisor*, these examples are cited to help you learn to make your own judgments about all the products on the market, not to recommend that you consider only those mentioned.

RAM and ROM Issues

As we noted earlier, it's important to make sure that your CPU is physically capable of addressing any additional RAM, and that your ROMs have been changed to keep the CPU informed of the new RAM. RAM installed under these conditions acts just like your previous RAM, and is known as *contiguous RAM* (contiguous means near). Some third-party upgrades give you extra RAM that is *not* contiguous, and doesn't act like normal RAM. You *can* use this extra RAM as a RAM disk (an extra high-speed disk drive—see Chapter 2), for some improvement

in performance, but your programs will not be able to use this RAM for longer documents or bigger spreadsheets. Make sure to ask the vendor whether his upgrade can be used for program data.

Another thing to ask is how the upgrade treats the video area of memory. Part of your RAM (about 21K) is reserved for your screen's exclusive use; this is always near the "end" of RAM, the highest memory addresses in your system. When you upgrade, the area where the Mac expects to find video information is smack in the middle of your RAM. Another change in ROM or in software is necessary to tell the Mac about possible changes in the location of the video RAM. Without getting too technical, suffice it to say that a careless vendor might sell you an upgrade that could interfere with screen output on some of your programs.

Next, you'll want to know how the operating system has been modified to address the changes in memory. Some vendors use a software modification, making it necessary for you to start your computer with a special disk. (You may want to keep one special startup disk, or go through the tedious task of updating the System file on all your system disks.) Other vendors put in new ROMs at the same time they add the memory. Each system has its drawbacks. Software modifications are more bother in the short run, since you must use a special disk, but protect you from the long-range problems inherent in ROM substitutions.

ROM changes are more convenient. If a vendor supplies you with new ROMs, everything your Mac needs to know about its changed memory is permanently encoded on a chip inside; no extra effort or consideration on your part is necessary. Keep in mind, though, that your ROMs include plenty of other information, besides that needed for the upgrade. If a vendor makes his ROMs identical to Apple's, he gets sued for copyright infringement; if he makes his ROMs different from Apple's, your hardware or software may not work perfectly. Be aware that this may turn out to be a problem.

Installation Methods

Inside, the Macintosh actually contains just four main parts: the monitor, the internal drive, the analog board (a circuit board along the left side, holding the power supply and other components), and the digital logic board, containing most of the Mac's essential circuits and chips. Known as the motherboard, this last lies horizontally along the bottom of the machine and contains the CPU, the RAM chips, and the ROM. Because of differences in the Macintosh and Macintosh Plus motherboards, let's look at installation issues for each in turn.

Macintosh 512K The motherboard is full in a 512K Mac; since there's no room for additional RAM chips on the board, third-party upgrades involve attaching a subsidiary board, called a daughterboard, to the motherboard. The most important distinction between upgrade boards in this area is in how the daughterboard attaches to the motherboard. The preferred method is with a clip around the CPU, so that the original board is not permanently altered in any way. All four of our test units used the clip-on approach, although earlier versions from Levco and BeckTech were soldered on. (Check for this if you're buying an upgraded used machine.)

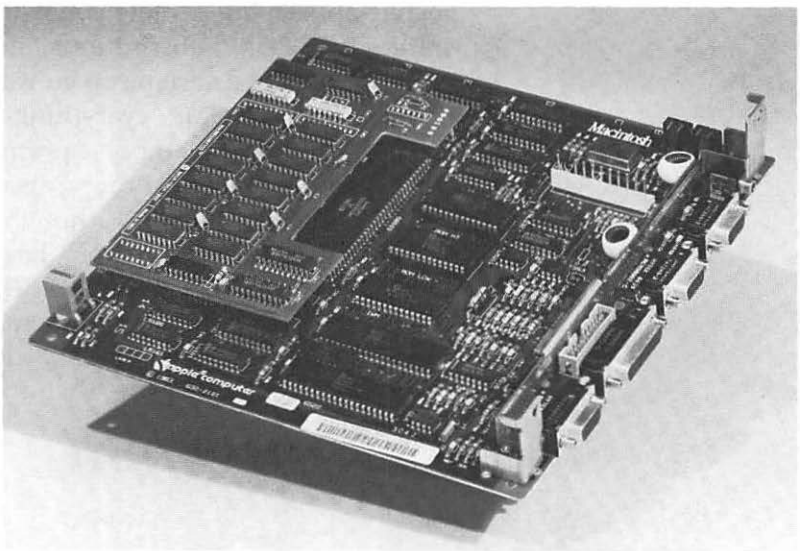


Figure 6–2. Some RAM upgrades use an extra circuit board called a daughterboard. (Courtesy of BeckTech.)

Many upgrades, however, are actually soldered to the motherboard. This is not a good idea, because:

- You'll have to pay more for future official upgrades. Your dealer won't accept your motherboard in trade for future enhancements on the same terms as an unaltered board.
- A careless installation may damage your Macintosh. The Mac's motherboard incorporates four layers of minute circuitry. Boards that are soldered on must have pins removed through all these layers; even the smallest error can be fatal.

Warning

Some vendors sell upgrades as a handful of chips, requiring you to cut several original chips from your motherboard, and solder in the new ones. This is the ultimate folly. Unless you're experienced with digital circuitry, don't ever try to solder anything in your computer yourself. As above, the soldering is extremely tricky on a multi-layer board, meaning you could easily damage the computer. And, once you open your Mac, the back of the picture tube with its 15,000 volt charge is exposed—meaning you could easily damage yourself!

Macintosh Plus The Plus is much easier to upgrade, due to its Single Inline Memory Modules (SIMMs) described earlier. RAM upgrades for the Mac Plus consist of removing the four SIMMs, and replacing them with SIMMs that contain 1 megabit RAM chips. For those unwilling to swallow the higher cost of the 1 megabit chips, clip-on daughterboard upgrades like those for the Macintosh 512K, using 256K chips, are available at lower cost. With these upgrades, the issues are exactly as outlined above.

Heat and Fans

The Macintosh was designed to cool with natural air currents; hot air rises within the machine, and is dissipated through vents on the top. Steve Jobs, it is said, was adamantly opposed to fans, and insisted on convection cooling. When you add an extra board to the machine, you may upset the carefully contrived flow patterns inside, either by blocking the air's passage or by creating additional heat from additional circuits and chips. 1985 and earlier versions of MassTech's FastMac were especially prone to overheating: disks inserted in the drives of a FastMac-equipped Macintosh became hot to the touch in a matter of minutes.

Because of the heat issue, many upgrade manufacturers either include a fan as part of the upgrade, or offer one as an option at additional cost. Our experience shows that a well-ventilated Mac can survive without a fan, even with some third-party upgrades, but we suspect a fan can add to the life of your machine. Despite the obvious benefits for your machine, you should be aware of a few negatives before you rush out to buy a fan:

Noise The primary disadvantage of a fan is the noise that it produces. This is not a problem in most office settings, where the background noise already exceeds that of the fan. But if you do even a small portion of your work in a quiet environment, you may be surprised at how annoying a fan can get. Its steady hum can be physically fatiguing, and somehow makes the computer seem impatient with you when you pause to think. (If this sounds far-fetched, think how distracting your pencil would be if it buzzed while you worked.)

It's important to check out any fan in the environment where you'll be using it; the noise level in stores may mask sounds that will be thoroughly irritating in a quiet office or home. The only fan we've used that seems unobtrusive is the Levco MacBreeze piezoelectric fan.

Dust Depending on whether the fan is forcing air in or out, one side of the machine is going to get a significantly increased amount of dust. The only logical solution for this is to have the fan force filtered air in, or draw the air through filters on the side vents—but filters, in turn, block the air flow. This may explain why fans rarely have any provision for dust control.

Portability Some external fans are rather large and impractical to pack in a Macintosh tote bag. Keep in mind the size of your bag when deciding on one of these fans, so you don't set yourself up for an unpleasant surprise. Some fans, like BeckTech's Fanny Mac, make even short treks difficult by covering up the handle in the top of your Mac.

In summary, you may want to ask about heat build-up if you're contemplating a third-party upgrade. Your Macintosh will run much cooler with a fan, but dust, noise, and size may be issues.

Software

Once your machine has more RAM, utility programs designed to take advantage of that memory, such as RAM disks and cache systems (see Chapter 2 for discussion) can come in quite handy. General Computer's Hyperdrive 2000 RAM upgrade, sold only as a package deal with a hard disk drive and CPU enhancements, includes both RAM disk and cache software that is very well-written. It uses good visual effects to show you what part of your RAM is assigned to the RAM disk, to the cache, and to your application programs. Its RAM disk automatically loads your selected programs at startup and is protected by a built-in crash recovery program. Its cache system is compatible with the Mac Plus's cache system. Although these are generally low-cost programs to buy, it's an added plus if these utilities come bundled with your RAM upgrade at no extra cost.

Company Support and Stability

When upgrading, you'll want to make sure you have a reliable company on your side, now and in the future. Check to see if the company that makes and installs your upgrade has been around for long—it's the best way to predict whether they'll be around for much longer. Is this the company's first product? What is their track record for supporting their customers? Ask for the names of satisfied customers, or check computer magazines for reviews. Ask them to put in writing their policy for supporting customers if Apple makes hardware or software changes that affect their product. The four companies we reviewed have a solid track record in the field, and continue to be compatible with major Apple changes, but there are dozens of small companies with two-inch ads in all the Mac magazines, offering upgrades for temptingly low prices. Proceed with caution when you're dealing with the little guys.

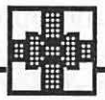
Look into any warranties offered by the company, too. Be aware that, if your Mac is still covered by an Apple warranty or service agreement, adding unauthorized parts inside will void the warranty. Find out whether the company's warranty covers other components of the Macintosh—e.g., power supply, motherboard, and monitor—that may be affected by the installation of an upgrade.

Finally, find out how repairs are handled, both in and out of warranty. Will you have to send your Mac to East Snowshoe, Oregon or Kumseemee, Korea, for repairs that take six weeks? Can you get a board swap at the corner computer dealer in six hours? Even with these assurances upfront, keep in mind that you'll be out of luck if your vendor goes out of business and you need repairs. If your upgrade is a clip-on, you can toss it, swallow your losses, and get an Apple upgrade. If you've had your motherboard soldered, you'll need to get a whole new motherboard.

Final Issues

As if the questions raised above weren't enough, two final issues may be important whether you get an official Apple upgrade or an unoffical third-party one. The first concerns your power supply. Additional RAM may tax the Mac's power supply system, if you own one of the earliest Macs. If you bought your Macintosh before October 1984, when the 512K Mac was introduced, you may want to check with your dealer before you add any more RAM.

The second thing you should be aware of is the fact that some programs are written in such a way that they cannot use any memory beyond 512K. If you have a favorite program that you use all the time, and you're thinking of upgrading your memory specifically to improve performance or data storage with that program, call the program vendor to make sure you're on the right track.



Summary

You can't go wrong with an Apple upgrade, but you may spend more money than necessary. Consider all the issues carefully, then choose the best upgrade for your needs. Refer to our RAM upgrade shopping list in Appendix A as you make your decision.

Hard Disks

Most pioneer Mac users started out with one drive and 128K of RAM. "Nice machine," we all thought, "but when it gets a second drive, it'll really start to sing." The second drive came out, and things got faster...but not quite as much as everyone had hoped. "More memory. That'll really get this machine off the ground," we all decided. 512K came along, and things got faster, and more convenient...but still not quite as much as everyone had hoped. Then Apple introduced the Mac Plus, with 1 megabyte of memory and the 800K drive, but some-

thing was still missing. As good as the Macintosh was from the start, there has always been the feeling that it could be even better.

The one single thing that *does* make the Mac (or *any* computer) a viable, powerful machine, in our opinion, is some sort of mass storage device, like a hard disk. With a hard disk, every disk access operation is several times faster. With a hard disk, all your programs are immediately at hand. Your system can have the maximum number of fonts and Desk Accessories, with no concerns about space. Your favorite system utilities are immediately available. Switcher becomes smooth and effortless. Files—such as big databases—can be larger than floppy-capacity. Hard disks make a huge difference in the perceived power of the Macintosh.

Apple finally addressed this fact in late 1985. Their announcement of the hierarchical file system began a process of standardization and acceptance that had been long overdue in the fragmented Mac hard disk market; the introduction of the Mac Plus with its SCSI port furthered the process. Even with this burgeoning standardization, though, there are several software and hardware issues and options you'll need to be aware of in assessing hard disks. The rest of this chapter will give you the information you need to make intelligent decisions about Macintosh hard disks. We'll use mass storage systems from Apple Computer (Hard Disk 20), Paradise Systems (Paradise 10), Personal Computer Peripherals Corporation (MacBottom 20), General Computer (Hyperdrive 20), IOMEGA (Bernoulli Box), LoDOWN (LoDOWN-10), and SuperMac Technologies (Dataframe 20) to illustrate our points.

Hardware Issues

On the hardware side of the fence, some of the major concerns about hard disks include:

- Size and placement: Will the disk fit near or in your Mac?
- Hard disk technology: What type of hard disk storage will you choose?
- Mechanical reliability: Can the disk tolerate moves?
- Connections to the Macintosh: Does the disk use the SCSI port, drive port, or serial port?

- Noise: Does the unit's fan affect your concentration?
- Speed and performance: Have you eliminated annoying delays?

Of course, cost is an important concern, too. Paradise Systems has a history as the price leader in serial-port hard disks, while LoDOWN offered the first inexpensive SCSI port disks. But since prices change daily, and value is a combination of cost and features, we'll let you be the judge of the true cost of any hard disk, after you've assessed its features.

Size and Placement

Storage size for hard drives starts at a modest 5 megabytes (the maximum on the earliest Mac hard drives); 10 and 20 megabyte drives are most common at this writing, with larger capacities becoming more commonplace day by day. To put this in perspective, a 20 megabyte drive is the equivalent of fifty 400K diskettes.

Comparisons

As for physical characteristics, hard disk drives can be internal or external. With an internal drive your Mac keeps its small footprint, and is as convenient as ever to tote around (but of course, heavier). In addition, internal placement makes it easier for a hard disk to hook directly to the bus (the main data expressway) of the computer, resulting potentially in faster operation.

On the down side, internal drives can't be switched among computers in an office environment, like freestanding ones can. If your computer's malfunctioning, you can detach an external drive and use all your programs and data on another computer; with an internal drive, both the drive and the computer are useless when one goes down. An internal drive disrupts the Macintosh's normal airflow, and may physically block you from installing a RAM upgrade. Also, installing *anything* inside a warranteed Mac voids the warranty. (The Hyperdrive, from General Computer, Cambridge, MA, has been sanctioned by Apple, and is an exception to this.)

External drives can either fit under the computer, like the Apple 20 and MacBottom, or stand next to your machine. The under-machine arrangement is preferable, not only because it keeps your Mac's footprint small, but also because it raises the screen closer to optimum viewing height. If you must carry your Macintosh around with you frequently, stop to figure out how you'll fit the hard disk in your tote bag. Some external drives, like the Paradise 10, come with an extra power supply which must also be tucked away somewhere—make sure to find out.

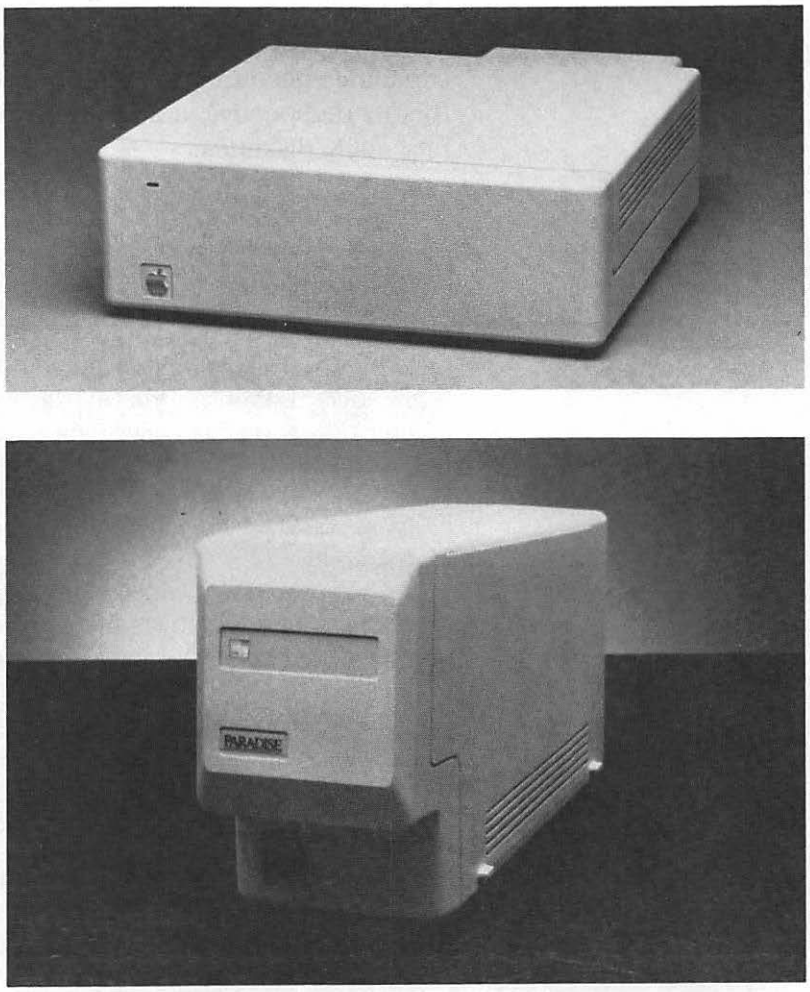


Figure 6–3. External drives can fit under or beside your computer. (Courtesy of Apple Computer, Inc., and Paradise Systems, Inc.)

Hard Disk Technologies

Hard disks consist of non-removable rigid platters that spin at high speed inside a case. A drive head, riding on a thin layer of air, reads and writes information on the disk. This standard approach is known as a Winchester drive, and is used on the large majority of hard disk drives.

Two alternative technologies are gaining in popularity, the removable Winchester and the Bernoulli Box (which we'll describe shortly). Each of these features removable data cartridges of 5 megabytes or more. Removable cartridges offer tremendous advantages, including:

- Secure storage: Data can be taken out and stored in a safe.
- Portability: Data can be carried to another similar drive.
- Expandability: Your drive will never get full.

Analyze your data needs, and decide whether you need a removable cartridge system, or if you can stick with more conventional (and usually less expensive) fixed disk technology.

Mechanical Reliability

All Winchester drives, removable or not, tend to be sensitive devices. If the thin cushion of air that separates the drive head and the platter is destroyed by rough movement while the disk is working, the head can crash onto the surface of the disk, with inevitable data loss and possible hardware damage. Better Winchesters will be specially shock-mounted to reduce the potential for damage, but all can be sensitive to rough handling.

The Winchester's sensitivity can manifest itself in other ways, as well. The space between the platter in a hard drive and its head is microscopic. If even the smallest contaminants—dust, chalk dust, and cigarette smoke are notorious—get into your hard drive, they can also cause a head crash and loss of data. Although Winchesters are carefully sealed against such hazards, keep your work area as particle-free as possible.

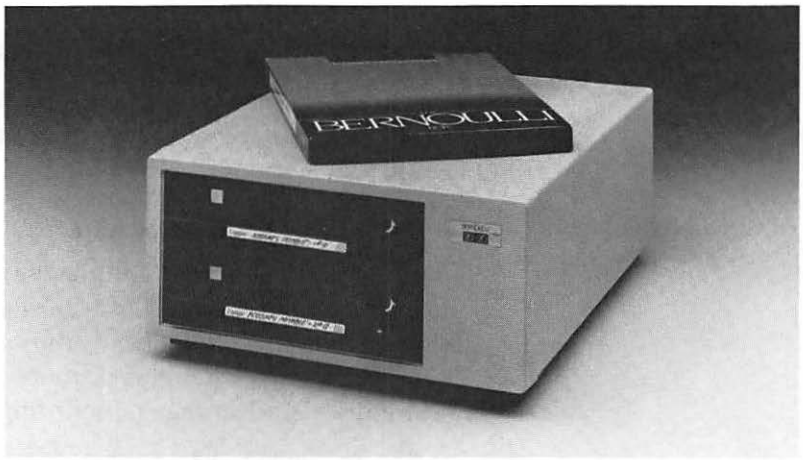


Figure 6–4. The Bernoulli Box by IOMEGA. (Courtesy of IOMEGA Corp.)

The Bernoulli Box is much more reliable than other hard disks: in fact, it's not technically a "hard" disk at all. With the Bernoulli, a flexible disk is drawn toward the drive head by suction that results from currents of air rushing through the thin gap between the disk surface and the head. If the suction fails, the disk falls away from the head, protecting its data. This system makes the Bernoulli much more reliable. (Salespeople for these devices delight in dropping the unit while it's working, to demonstrate its sturdiness.) If reliability is your main concern, you should seriously consider a Bernoulli-based mass storage system like IOMEGA's Bernoulli Box.

Connecting to the Macintosh

Apple originally encouraged third-party manufacturers to connect their hard disks to one of the Mac's serial ports. As a result, most drives made before 1986 connected to the printer port. With this type of connection, a special disk called a boot disk must be used to start the computer, telling the Mac to treat its serial port like another drive.

If a hard drive uses up one of your ports like this, check to see if the drive comes with an extra port. (And test that the port works; early Tecmar (Tecmar Corp, Solon, OH) drives had the port, but fine print in the manual explained that it was "not implemented yet.") This extra port enables you to hook

your printer into the hard drive. Data meant for the printer then passes through the hard disk and continues on to the printer. And you've still got your modem port to use for other purposes.

If you're using AppleTalk (to connect to a LaserWriter, for example), bear in mind that AppleTalk *insists* on being connected to the printer port: you cannot substitute the modem port *or* daisy-chain off another device in the printer port. If you're contemplating the purchase of a serial-port hard drive, make sure the drive can work just as well from the modem port when it will be used with AppleTalk.

Apple's Hard Disk 20 surprised competing vendors at its introduction by connecting to the disk drive port on the Mac, giving it greater data transfer speed than serial-port drives. The HD20 includes an extra disk drive port, letting you daisy-chain another hard disk or a floppy drive off of it. Although there was some speculation in late 1985 that other manufacturers would follow Apple's lead in producing drives connected to the floppy-drive port, the almost-immediate introduction of the Mac Plus with its SCSI port dampened those prospects.

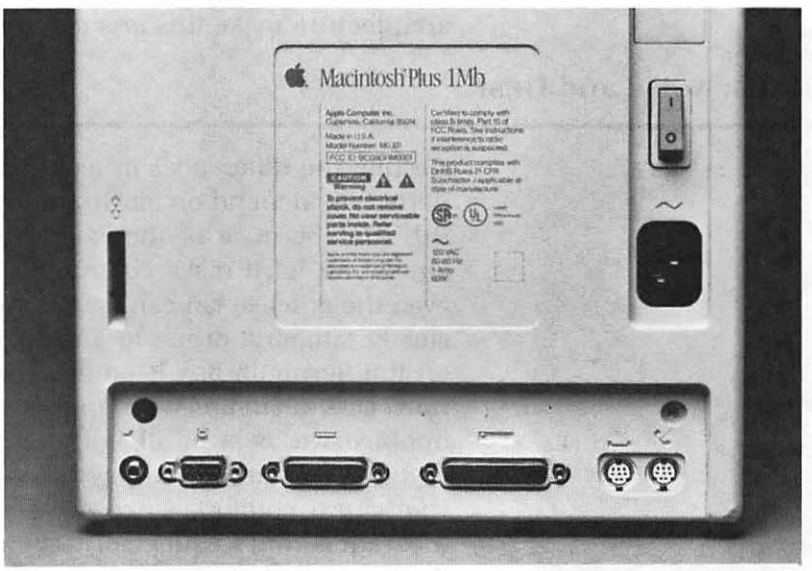


Figure 6–5. The Mac Plus ports (from right): modem, printer, SCSI, drive, mouse. (Courtesy of Apple Computer, Inc.)

SCSI stands for Small Computer Systems Interface, and is unattractively pronounced as "scuzzy." Its capabilities, luckily, are more attractive than its name. SCSI is a peripheral-connection standard that is already familiar to major computer manufacturers; although Apple has modified the standard slightly, existing products can, with cabling and driver-software adaptations, be connected to the Mac Plus SCSI port. Since up to eight devices can be daisy-chained through one SCSI port, it's almost impossible to "use up" this port by connecting a hard disk to it.

SCSI, with a data transfer rate 11 times faster than that of the Macintosh's printer and modem ports, is the external connection of choice for the Macintosh Plus. For the Macintosh 512K, the important issue to be aware of is, if your hard disk uses up *any* of your ports, to make sure it gives you one back, in return.

The ideal connection in both the Mac 512K and the Plus, of course, is directly to the main bus of the computer. Internal drives are connected this way. Drives connected to the main bus are almost invariably faster (unless the software that controls them is badly written), and will never rob you of one of your ports. While most other computers use internal hard drives routinely, the original Mac's small size and closed architecture make this less common.

Fans: Noise and Dust

Despite the differences in technology, both Winchesters and Bernoullis depend on air flow to operate properly. Because of this and because of the extra heat a hard disk generates, almost all hard disks come with fans. As discussed earlier, even the quietest fan can have an unwelcome effect, adding a steady, fatiguing drone to a quiet work atmosphere. The fan on the Bernoulli Box is among the loudest, while the Apple Hard Disk 20 (in line with Apple's anti-fan history) is relatively unobtrusive. Best of all is the Dataframe 20, which comes without any fan. Pitch may be as important as loudness to your aural comfort, since different people are sensitive to different sound frequencies. Listen to any drive personally, in the setting where you'll be using it, before making a final decision.

If your disk and fan are internal, the increased airflow means increased dust in your machine. While this isn't immediately disastrous, it may shorten the natural life of your machine, since there's no filtering mechanism on the vents.

Speed and Performance

Sure you want your hard disk to fit on your desk. Sure you want it to be quiet and reliable. But mostly you want speed! How do you assess the overall speed and performance of a hard disk?

Judging the performance of a hard disk involves, first, assessing its reliability. You'll need to read reviews and talk to other hard disk users for this step. Judging speed is even more subjective. Here are a few pointers for comparing hard disks:

- Note the number of seconds, and the procedure, involved in starting up the hard disk. Time it until the Desktop is up and ready.
- Pick one program to use as a benchmark. Copy the program onto each hard disk you'd like to compare, then time the number of seconds the program takes to boot on each disk.
- If your disk uses partitions (see below), time your benchmark program again as it loads, with several partitions open. Some disks may seem fast, but can bog down considerably when several sections of the hard disk are in use at once.

This simple approach gives you a ballpark start to assessing speed and performance. Naturally, you'd have to work with a number of programs, and check more than just loading speed to really compare several disks equitably. In general, internal disks are fastest, SCSI-connected drives second best, drive-port hard disks third, and serial port drives in last place on the speedway. Within each category, and sometimes across the edges of these divisions, differences in the system software that controls the hard disk drive can create significant differences in performance. Definitely try before you buy, and study comparative reviews in magazines.

Software Issues

As if there weren't enough variables just with hardware, software adds a few more twists to the hard drive assessment process. Some of the software issues you'll want to address include:

- RAM: How much extra RAM does the hard disk software consume?
- Partitions and folders: How does it organize hundreds of files?
- Backup: Can you quickly and safely make copies of all your data?
- Security: Are passwords available?
- Software utilities: Are any software utilities included?

As with any piece of computer equipment, a hard disk is only as good as the software that controls it. Once you've made some basic hardware decisions (internal vs external; fixed vs removable, etc.), take a long and hard look at the software you'll be dealing with day after day.

System Demands for RAM

Before Apple's ROM upgrade of early 1986, the Macintosh's operating system just wasn't prepared to handle a hard disk; each vendor had to write software to augment the operating system, in order for it to recognize the drive. This software had to be loaded into RAM each time the drive was started up, leaving you less RAM for all your other tasks. In some cases, as much as 60K of additional RAM had to be given over to system overhead! With hard disk code included in ROM, newer mass storage devices used with the Mac Plus generally require much less RAM. Check for yourself the amount of RAM used by any hard disk's system software: Using Disk Info (see Chapter 3), check to see how much free memory your machine has when the hard disk is in use but no applications have yet been loaded. Compare this to other hard disks, using the same procedure.

Partitioning

Part of the system software that came with the early Mac hard disks was concerned with *partitioning* the hard disk. Partitioning divides the disk up into several manageable portions, called partitions, drawers, or volumes. Since many partitioned disks are still on the market—whether new or used—we'll take a few minutes here to describe this approach.

Keep in mind that every time you open a disk, the Macintosh carefully draws an icon for each of its files in the Finder. If a hard disk, with its potential contents of hundreds of files, were treated as one big disk, Finder operations would be intolerably slow, and you'd be hard pressed to locate any specific file easily among the many on disk. Once a disk is partitioned, each section is treated by the Finder as a separate diskette. This makes it easier for you, locating files in the Finder, and similarly helps the Mac, in speeding any disk accesses it needs to do.

The number of partitions you choose, and what you put in them, is generally up to you. Hopefully, size won't be a factor; while some partitioning systems ("static" systems) insist that you dedicate a set and finite area of disk space to each partition, the best programs use what's called dynamic sizing. With dynamic sizing, any partition can grow or shrink as necessary, until the total limits of the hard disk are reached. You'll want to take a look at the manual that comes with any early hard disk, and check out the way its partitioning program works, both at setup and in operation. Check out the following features in partitioning software:

- Is it easy to create new partitions?
- Is there a limit to the potential number of partitions?
- Are partitions dynamic or static?
  - If static, what range of sizes can be set?
  - If static, can you change sizes later?
- Can you mount a new partition from within an application?
- Can the software automatically mount selected partitions at startup? How many?

Since the Macintosh's original operating system was equipped to handle diskettes only, dividing the hard disk into several simulated diskettes was the best possible solution to the management of large numbers of files. But partitioning has its limits. Just as you must "mount" (insert) and unmount (eject) individual disks in order to access their contents, so must you mount and unmount individual partitions, or volumes, in order to use them. Each open volume slows the Mac down more and more, since it must carefully keep track of every icon in every volume on the Desktop.

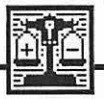
Folders: The Hierarchical File System

Because of the limitations of the partitioning approach, Apple instituted a hierarchical file system for hard disk management when it introduced its own hard disk. Starting with version 5.0 of the Finder and version 3.0 of the System, any disk with a capacity greater than 400K will automatically be set up in the new system when it is formatted. Old-style diskettes (400K) will continue to use the original "flat file" system.

To those experienced with partitions and volumes, the simplicity of the hierarchical file system (HFS) comes as a decided relief. HFS is nothing more than a logical extension of the use of folders, available since the Mac's early days.

Folders have always allowed you to organize files into logical groups, to reduce Desktop clutter. You could, for example, put all your spreadsheet tax calculations in a folder named "income tax," then put that folder inside another one labeled "Excel data." Only the latter would appear on the Desktop; you could double-click to open it, displaying the Income Tax folder, then Open that to see any individual tax files. The files and folders you would see at any time would be limited to those in the most recently opened folder. (See illustration in Chapter 1.)

In the Finder, folders work the same with HFS as they did under the old "flat file" system. The change comes in list boxes, whenever you choose Open from the File menu in a program. With the hierarchical file system, list boxes, like Desktop windows, show only those files and folders in the current folder. Within the list box, you can double-click on any folder to open it, and see a new list box showing only the contents of the new folder.



Comparisons

The advantages of the hierarchical file structure are many:

- There's really very little to learn; the whole system makes sense to anyone who's used folders on the Desktop.
- Folders are unlimited in size (up to the finite capacity of the hard disk). You do not have to predetermine the size limit of any folder as you would with a static partition system.
- It's unnecessary to mount and unmount individual folders; all folders are available to you at any time.

The only disadvantage is a temporary one: some software may not be able to access different folders (also called directories) under the hierarchical file system. This is true only of software programmed in disregard of Apple conventions and guidelines, so it is the responsibility of the software publisher to upgrade such products.

Partitions vs. HFS

The basic problem of any hard disk is that it can be difficult to organize and locate individual files within its enormous storage space. You could compare this large storage space to an unorganized warehouse, full of boxes:

- The partition approach divides the warehouse into several small rooms. Even though the individual rooms are still filled with unorganized boxes, it's easier to find things in the smaller spaces. However, it takes extra time to open and close each room, and the rooms are usually of a finite size.
- The hierarchical file system organizes the entire warehouse, so that similar boxes are stored together. Anything can be found quickly, without opening and closing doors, and storage groupings can expand if necessary.

General Computer Corporation uses a system that combines some of the features of both partitions (which GCC calls "drawers") and the hierarchical system. Its Hyperdrive internal drives use drawers to give you security control over access to different areas of the disk, yet these drawers can take advantage of the hierarchical file system. This system also makes it possible to create drawers that work with the flat file

system, a necessity for any outdated programs incapable of running under the HFS system.

Management Tips

Whether you're using a partitioning system or the hierarchical file system, you'll want to put some serious thought into the way you organize your hard disk. For us, the best scheme includes:

- one large and well-fed System folder or partition
- one folder or partition holding all your applications
- data folders or partitions organized by project or subject

The System folder should have in it all your favorite fonts and Desk Accessories; remember, size hardly matters with a hard disk. It's unnecessary to put the System in any other place, as long as you keep your System folder or partition open at all times.

Then, you'll want one partition or folder holding all your applications. If you're using partitions, keep this one open whenever you're working, and make sure there's a copy of your printer resource—ImageWriter or LaserWriter files—in it: some programs can't print without this information on the same "disk."

For the rest of the hard disk, we favor organizing data files by project or subject, much as you would in a conventional file drawer. Two advantages accrue from this:

- It's easy to find related work files.
- It's easy to back up a session's work.

Some people set up different folders or partitions for each program, but this doesn't seem to make as much sense. Think about it: Your hard disk should be organized to mirror the way you work. You don't do several unrelated projects in Excel, then go on to MacWrite; instead, you work on a specific report, which may incorporate both spreadsheet files and word processing.

Despite our strong biases, the bottom line is that you should organize your hard disk in any way that makes sense to you. We only urge you to put some thought into the question, for the sake of efficient hard disk use in the long run. Both partitioning systems and the HFS will show you only a small group of your files at any time; you'll need a good organizational scheme to make sure you can find any file at any moment.

Backup

Once you've organized your new hard disk and put any information on it at all, you'll need to make backup copies of your data. (The expression "Double or Nothing" was coined by a computer user. If you make backups, you'll never need them; if you don't, you'll certainly find yourself someday with nothing, just where there was a file the day before.) The backup system you decide upon depends on several factors:

- the size of your largest individual file
- the number of files modified in the average day
- other hardware available to you

Several systems are available. The simplest involves using the Finder's copy abilities with floppy disks. If you work with a small number of files during any session, and each individual file is smaller than the capacity of a diskette (400 or 800K, depending on your diskette drive), just copy your work from the hard disk onto diskettes regularly.

With this type of backup, the hierarchical file system scores yet another advantage over some partition systems. While some systems won't let you drag a partition's icon over onto a diskette to copy the whole thing (you'll need to select and copy the individual files(s) instead), you can always drag a folder over onto a diskette. Of course, you'll still have to make sure that the contents of the folder will fit on the diskette.

Better hard disks come with a special backup program. These programs usually have some distinct advantages over manual diskette backup:

- Incremental backup. You can choose to back up all the files changed since last Tuesday, or all your MacWrite files, or any of a number of variations.
- Large files. Dedicated backup programs will often let you spread a file over several diskettes, allowing you to back up files larger than will fit on one diskette.
- Speed. For backing up several megabytes, a dedicated backup program is often much faster than making individual file copies, icon by icon.

In spite of these apparent advantages, most of the earliest backup programs turned out to be buggy and unreliable. Even as the quality improves, though, two major disadvantages remain:

- The files stored on the backup disks generally are not regular Macintosh files; they cannot be used unless the entire set of backups is loaded back onto the hard disk with a special restore program included with the backup utility. So, if your hard disk malfunctions, your backup disks can't be used in a floppy drive.
- Copy-protected software installed on the hard disk cannot be backed up and restored. The vendors of such software will tell you that you should "uninstall" each program whenever you back up your hard disk. Obviously no normal person with several protected applications is going to back up regularly if this much bother is involved.

The ideal backup program would ignore application programs, allow incremental backups, and swiftly create diskette-usable files. Hopefully, such a programming paragon will exist by the time you read this.

When to Back Up

The general rule of thumb is that you should schedule your backups in direct relation to the amount of time you can afford to resurrect lost data. If you use your computer sparingly, you may be able to coast for a week. If your computer is used non-stop, you may want to back up twice a day. Yes, it's a bother whenever you do it. No, there's no easy way. Eventually it becomes like brushing your teeth—something everyone does, but no one gets too excited about.

Security

Some hard disks come equipped with a security system, to protect selected files or partitions from unauthorized access. From a security point of view, partitions can be an advantage: when files are stored in separate "rooms," it's easier to lock up certain groups of them. Security systems usually fall into two groups:

Password protection Individual files or groups of files can be tagged with a certain password; only those who give the proper password can have access to the files. Passwords are usually effective against inadvertent loss (or advertent snooping) from fellow workers, although a knowledgeable and determined hacker can sometimes penetrate the protection. The biggest danger with passwords comes in forgetting them. If you can't remember your password, there's no direct way to access your data. Write the password down someplace safe, or keep an unprotected copy of the data in a locked drawer.

Encryption Encryption actually scrambles the data you store on disk. In order to use the file again, it must be unscrambled. While this provides a very thorough level of protection, the main danger is similar to that of passwords: lose the key, and your file is gone.

Print Spoolers

The final software utility often included with hard disks is a print spooler, a program designed to free up your Mac while the printer is working. Waiting for the printer to finish printing is a problem with any computer; even though the computer can send data out the printer port very quickly, the printer can't "catch" the information as fast. Print spoolers, in theory, take output meant for the printer, and store it in a sort of loading dock, an unused area of RAM or part of a hard disk. The computer, knowing that the data has been sent, starts in on the next task; it doesn't care that the printer is still slowly being fed data.

With most computers, spoolers are very common, and work very well. Almost as soon as you invoke a print command, your machine is freed up for the next job, while the printer is fed simple text characters from the loading dock. Printing with the Macintosh involves more than simple text characters, though. Whenever you're printing, you're using the Mac's CPU (central processing unit) to form complex fonts and graphics. The Macintosh can't start in on any other task until the CPU is finished helping with the print process.

Print spoolers on the Macintosh, then, must do more than just shoot data out to left field; they must work with the CPU to create a print file that is *then* stored in extra RAM or on part of the hard disk. Your Mac is not free until the print file has been created, and the extra step adds time to the total printing process. Any advantage, therefore, is more pronounced in large files. In one typical example, a file took 18 minutes to print without the spooler. With the spooler, it took 23 minutes, but the computer was free for another job after the first 13 minutes.

Our basic observation on print spoolers is that, while they can cut down the time required to print large files, you should not expect any dramatic time saving. If printing speed is an issue, you'll get greater gains from using one of the three built-in fonts in the ImageWriter II, for quick but presentable drafts.

Summary

In a very short period of the Macintosh's history, hard disks evolved from an outrageously expensive luxury to a reasonably priced necessity. Yet, there are still wide differences in available hard disk drives. Use our shopping list in Appendix A to help you consider your options carefully when you compare hard drives.

CHAPTER

7

Options for Better Input and Output

Several popular add-ons give you the potential for easier input and higher quality output with your Macintosh. We'll take a look at some of them in this chapter, by exploring:

- how the LaserWriter works, including a discussion of PostScript
- pitfalls and pointers for LaserWriter operation, including font selection and use
- how to take advantage of a laser printing service, rather than buy your own LaserWriter
- options that enhance or replace the mouse for easier pointing and selecting
- digitizing tablets and scanners for better graphic input

While hard disks and RAM upgrades can be assessed on a relatively objective, technological basis, the choices represented in this chapter are more likely to be affected by matters of individual need or preference. We'll help you become aware of the features to consider in making your own personal decision about these additional hardware options.

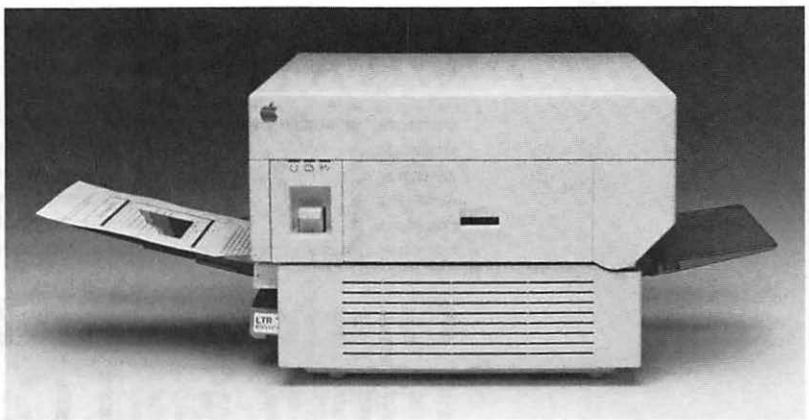


Figure 7–1. Apple's LaserWriter. (Courtesy of Apple Computer, Inc.)

Better Output: The LaserWriter

Apple's LaserWriter offers high-quality output of mixed text and graphics with a rich variety of fonts. As a bonus, it's quiet enough to be used in the office and can easily be shared by several users. Let's take a look at how it achieves its high level of quality, then go into a few pointers for getting the most out of the LaserWriter, whether you own it yourself or use one of the increasingly common LaserWriter services.

Measuring Print Quality

Except on daisy-wheel printers, the quality of print output is generally measured in dots per inch, or dpi: The more dots, the denser and clearer the image of each letter appears. (The term is somewhat misleading; a 100 dpi printer will print 100 dots horizontally by 100 dots vertically, or 10,000 dots per *square* inch.) In standard mode, the ImageWriter is designed to mirror the Macintosh's screen image of 75 dpi. In high resolution mode, the ImageWriter prints at about 150 dpi. Apple's LaserWriter can handle both quality business correspondence and graphics, with an output of 300 dpi (that's 90,000 dots per square inch!). While still technically dot-matrix, since each letter *is* made up of individual dots, the final effect is one often termed "near-typeset quality," and used in place of expensive typesetting for a wide range of business jobs.

How It Works

Simply stated, the LaserWriter is mechanically comparable to a desktop copy machine. Like a copier, any laser printer produces a printed page by:

- coating a rotating drum with a fine layer of negatively charged ions
- magnetically sketching a copy of the page to be printed onto the drum, leaving an image of positive charges
- spreading toner (composed of meltable plastic and black pigment) on the drum, where it adheres to any positively charged area
- transferring the toner to paper, then fusing it to the paper by pressure and heat

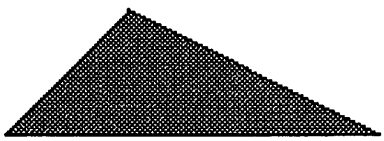
The major difference between a copier and a laser printer involves the manner in which the page image is transferred onto the drum. Copiers use an exact model of the page—your original—to create an image on the drum, in a process similar to photography. A laser printer has no original to refer to; it relies on signals from the computer to drive a laser beam, which places the proper text or graphics onto the drum.

Sending signals to the laser beam is a more complex process. Recall that any image or text is made up of individual dots. At 300 dpi, it can take almost 8,000,000 dots to make up each 8 × 11 page. That's eight million signals that the computer has to send to the laser printer to process a single page. Each eight signals (computer bits) take up one byte of memory, so storing eight million signals (bits) would require about one megabyte of RAM.

Even though most laser printers use the same basic procedure, and in fact are built from the same Canon print engine, some are more equal than others to the task of managing millions of signals efficiently. Most of the early competitors to Apple's LaserWriter, for example, just couldn't handle this many signals at once: the Hewlett Packard LaserJet originally contained a meager 59 kilobytes of memory, enabling it to process only five square inches of graphic printing at a time. The LaserWriter, in contrast, has 1.5 megabytes of RAM—over seventeen times as much—enabling it to process an entire page of even the most complex graphics at once.

A Page Description Language: PostScript

While brute memory power helps, the ideal would be to avoid sending separate signals for each dot that makes up the page in the first place. To illustrate how this might work, let's say that your page contains a triangle like the one below.



Reproducing the triangle dot by dot would take hundreds of signals, something like this:

place a dot at position 1352 horizontal, 2100 vertical
place a dot at position 1351 horizontal, 2101 vertical
place a dot at position 1352 horizontal, 2101 vertical
place a dot at position 1353 horizontal, 2101 vertical
[etc.]

An image created this way is called a bitmapped image: to show it on the screen, or on paper, requires "mapping" (locating the position of) each "bit" (signal representing one dot). As this example shows, even the simplest image would require an enormous number of signals to drive the laser beam to record each dot.

This same triangle, though, *could* be produced with fewer than half a dozen signals, something like this:

place a dot at position 1352 horizontal, 2100 vertical
place a dot at position 1200 horizontal, 2200 vertical
place a dot at position 1500 horizontal, 2200 vertical
connect these dots
fill the resulting shape in, with shade 3

Such a system would not only simplify the printing of each image on a page, but would also make modifications very easy: change one signal—the location of one corner of the triangle, for example—and the whole picture would change. An image made up of individual dots, by contrast, would require hundreds of individual changes.

The LaserWriter in fact uses the type of signal-shorthand described here, through the use of a page description language called PostScript (Adobe Systems, Palo Alto, CA). PostScript provides the LaserWriter with the most efficient means of translating screen graphics and fonts into instructions that drive the laser beam.

It's not necessary to understand much more about the actual workings of PostScript, as long as you know that it's an extremely elegant and versatile way to create a page image. Not only does PostScript allow for the easy integration of text and graphics—a feat of which most printers and most non-Macintosh programs are incapable—but it does so in a way that encourages modification and experimentation. PostScript can easily do things that might be difficult with traditional typesetting: rotate a title at a rakish angle, automatically enlarge and reduce graphics without distortion, arrange words in graduated sizes on a triangular pennant, and so on. Once it has defined the basic shapes of fonts and pictures in a page, PostScript can manipulate and rearrange the information easily.

The Macintosh can get a head start on the page-description process by taking advantage of an internal utility program called QuickDraw, which it's already using to put images on the screen efficiently. When you get ready to print with the LaserWriter, you normally trigger a two-step process:

1. Your application program sends information to a translator program that converts the QuickDraw data into PostScript. Usually, the translator program is Laser Prep, supplied by Apple with the LaserWriter. Some applications use their own prep program to produce PostScript code directly, rather than convert from QuickDraw. This can result in finer resolution, since QuickDraw is only optimized for the screen's 75 dpi.
2. The prep program sends PostScript commands to the "brains" of the LaserWriter, a powerful 68000 chip like that in the Mac itself. By using powerful software known as the PostScript processor, this chip drives the laser beam.

The rest of the process is generic to all laser printers, as described above: Toner adheres to areas defined by the laser beam, and the finished page is produced. The unique power of the LaserWriter, specifically, comes in its use of PostScript to drive the laser.

Speed

The mere words "laser printer" conjure up science fiction images of blinding speed. In fact, the LaserWriter's speed varies widely, from a respectable output of about 8 seconds per page for simple text to 15 minutes or more per page for the most complex graphics.

These differences are explained by the fact that every page must be translated into PostScript before it can be printed. Text pages are quickest, since they draw on the built-in font information already rendered in PostScript. Graphics that are already defined as objects (three points, connect the lines, fill it in, for example), are next in speed, as the PostScript processor can generate code for such objects readily. Complex bitmapped images, originally created dot by dot, take the longest, as each dot must be calculated separately.

Keep in mind that it's the original page description that takes varying amounts of time. If you want multiple copies of ANY type of document, the LaserWriter will print out a copy about every five seconds—once the layout for that page has been calculated the first time.

Reduction and Enlargement

The power of PostScript makes it possible to enlarge or reduce any graphics or text, without distortion. Reduction and enlargement tend to slow the print rate a bit. Usually, these options are controlled through the Page Setup option in the File menu, although this can vary in individual programs.

Smoothing

Smoothing adds extra pixels (dots) to graphics, to smooth them out. For example, it makes a diagonal line look like a ramp instead of like a set of jagged stairs. Choose Smoothing from the Page Setup dialog box, if you're printing graphics or non-laser fonts (remember that the LaserWriter treats these fonts as graphics).

Fonts

The original LaserWriter has four standard fonts built into its 512K of ROM: Times, Courier, Helvetica, and Symbol. Each of these has several variants such as bold and italic associated with it, bringing the total of these built-in fonts to a baker's dozen. The LaserWriter Plus includes more than 20 additional fonts, in 8 megabytes of ROM, and the ability to download additional fonts into RAM. Since the PostScript instructions for producing each of these fonts are already stored in the printer, they can be generated in any size, and at any angle, and remain distortion free.

Standard Macintosh fonts like Geneva and Venice can be printed on the LaserWriter, too, but the quality of the printed page will not be as fine; as the Mac translates from QuickDraw to PostScript, individual letters may turn out choppier and less well-proportioned than the fonts built into the LaserWriter that are already optimized for PostScript processing. Basically, this is because the LaserWriter treats the Mac fonts as graphics that just happen to be shaped like letters.

Note

To help you achieve the best possible output, the LaserWriter will automatically change your screen fonts to laser fonts, if you choose an option called font substitution. This process, accessed through Page Setup in the File menu, changes Geneva to Helvetica, New York to Times, and Monaco to Courier. Unfortunately, as the new font is substituted, the sizing of and spacing between individual letters is not adjusted. Since such spacing varies considerably from font to font, your final output may have unusual spacing and right margin problems if you use font substitution. For important final drafts, you should manually select your entire document, then change the font to Helvetica, Times, or Courier.

Here's a sample of original laser fonts and their Mac screen font equivalent under font substitution. Note the difference between the quality of the laser font and the screen font, then note the differences in size and spacing between a laser font created through font substitution and one created by changing the original document font before printing.

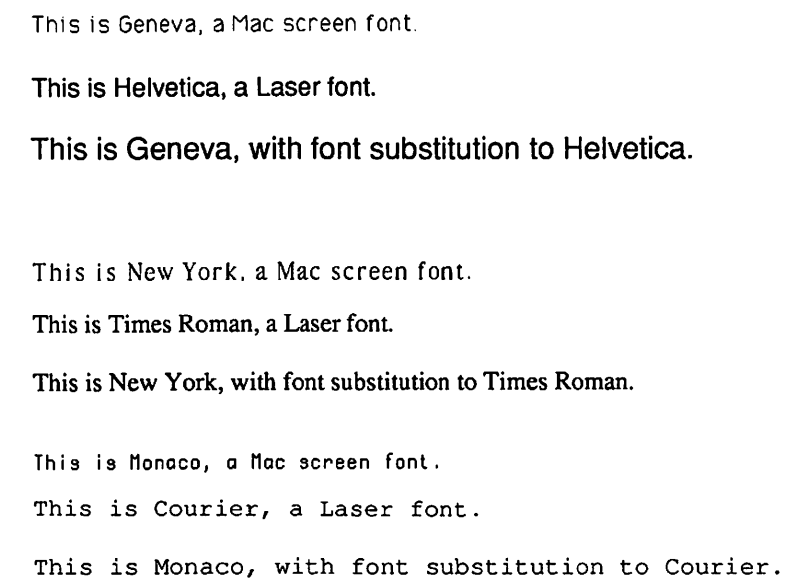


Figure 7–2. Laser fonts provide better print quality than screen fonts.

This example illustrates the higher quality output of laser fonts over Macintosh screen fonts. Even though you'll probably want to choose laser fonts for text, it's nice to know that it's possible to print alternative fonts—especially picture fonts like Taliesin, an architectural font including buildings and trees—on the LaserWriter.

Font Selection

It's easy to get carried away with fonts and think of them only as decorative elements. Take a cue from the professional typesetter: Select one main font to convey the tone of your document, and use stylistic variations like italics and boldface sparingly. Some (admittedly subjective) guidelines you may want to consider:

- Courier is rather unattractive, mimicking as it does a normal typewriter. Use it when you want output that doesn't look computer-generated (like for "personal" form letters), or when the content of a document is such that you don't want the reader distracted by novel print output.
- Helvetica is a simple, unadorned font. Fonts in this category, with no extra edges on each letter, are known as sans serif typefaces. Helvetica's very matter-of-fact appearance is well suited to titles and headlines, but difficult to read in concentrated paragraphs.
- Times Roman is considered by professionals to be the most readable of fonts, especially for long documents. It was first designed for newspaper use, and continues to be widely used in magazines and newspapers today.
- Boldface and italics should be used consistently. Choose one of these for all the quotations in a document, or all the unfamiliar jargon, or for the headlines and main points in a piece. Decide on the important elements in a document that the reader should be able to scan for easily, and use these emphatic styles to help information be assimilated effortlessly.

These are our own guidelines. You'll probably develop your own as you work. The important thing is to put some thought into the process, to be consistent, and to avoid mixing styles and fonts wildly within a single document. The guiding principle is that font selection should contribute to the clarity and impact of your document. Refer to *Words into Type* (Prentice-Hall) or *Pocket Pal* (International Paper Company) for further information on this subject.

Printing with the LaserWriter

Installing the LaserWriter

Your system disk must be installed for the LaserWriter before you'll be able to print a single word. The machine comes with an installation disk, containing the necessary utility programs and fonts.

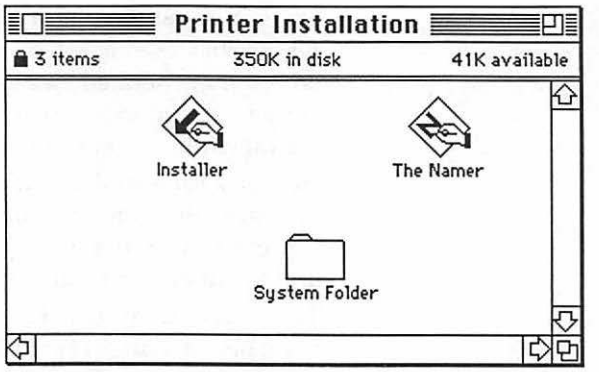


Figure 7–3. The Printer Installer program.

Click on the Installer icon, and you'll see this screen:

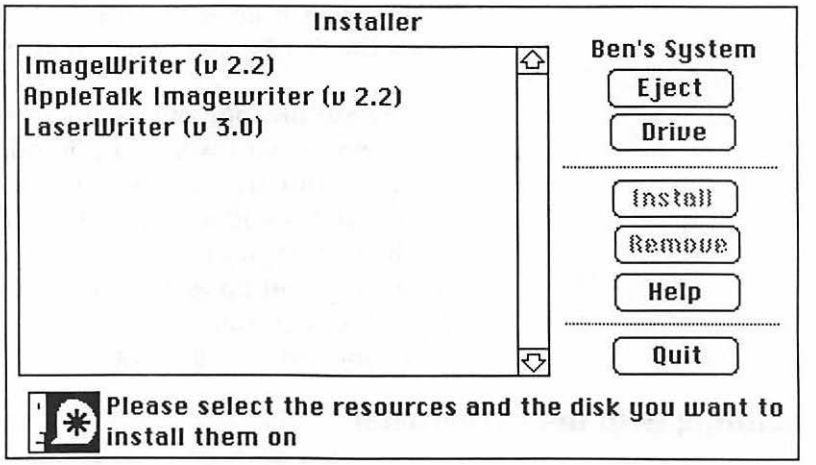


Figure 7–4. You can choose from three printer resources.

The Printer Installer can put ImageWriter, AppleTalk ImageWriter, and LaserWriter resources on your disk, but more than one choice will take up prodigious amounts of space; this is unrealistic if you're working with 400K diskettes. First make sure the disk you're installing for the LaserWriter shows in the upper-right corner (use Drive and Eject if necessary), then double-click on the LaserWriter choice in the scroll box. The Installer then reads your target disk, and reports on the effects of installing or removing LaserWriter files on your disk, like this:

Installation will leave 18K free on this disk; Removal will free zero K.

This message will also inform you if there is not enough space on the disk to install the LaserWriter; you must have 101K for the process. If space is adequate, you can now click the Install button.

Install adds two files to your disk: the LaserWriter resource, and the Laser Prep file. It also adds new fonts to your System file: Courier 10, Helvetica 10 and 12, and Times 10 and 12. The LaserWriter can use PostScript to create any size laser font, but your screen can depict clearly only those you've specifically installed. You may want to use the Font/DA Mover (see Chapter 3) to install additional sizes of the laser fonts for clearer screen representation.

If you need to reclaim space on your disk, you can uninstall the LaserWriter by clicking Remove in the Installer. You should know, though, that this reclaims only 59K of the 101K used by the install process. This is because only the LaserWriter and Laser Prep files are removed; the additional fonts are still in your System file, and can only be removed with the Font/DA Mover.

Pitfalls

Despite all the praise heaped on the LaserWriter, a few glaring limitations must be noted.

- What you see on screen will not correspond directly to the LaserWriter's output, because of resolution differences between the screen and the printer. Make sure to check final output for unexpected breaks in lines and paragraphs.
- There's no straightforward way to print envelopes with the LaserWriter. You must use the LaserWriter's manual feed option, which stops to print a page of manual feed instructions *every* time you choose this option. (The LaserWriter Plus, fortunately, skips the instruction sheet.) The steps include:
  1. Make sure your address onscreen is in the position it will appear on the envelope. We put it about 4" from the left edge, and about 2" from the top.
  2. Select Landscape mode from Page Setup in the File menu. This tells the LaserWriter to print sideways.

3. Select Print from the File menu, click Manual Feed then OK. Wait for the manual feed instructions to come out of the printer.
4. Feed the envelope in the manual feed guide, holding the envelope right side up with the stamp edge trailing.

- Normal computer mailing labels can be fed through in single sheets with the LaserWriter's manual feed option. You can avoid the tedium of manual feed, though, by buying sheets of blank xerographic labels, and putting them in the regular paper tray (put them face down). Since these labels are designed to feed through copiers, you should have no trouble sending them through the LaserWriter. If your database or mailing label program can print only one label across (known as "one up") and your blank label sheets are in pairs ("two up"), do half your labels, then turn the label sheets around in the tray and run the other half.
- In some circumstances, the right margin of your document will unexpectedly cut off portions of words on the ends of lines. This is most often due to font substitution (see above). Turn off font substitution, or better yet, change your document to one of the laser fonts.

Laser Printing Services

In case you have the need for better quality printing before you have the financial resources to purchase a LaserWriter, an increasing number of computer dealers and independent print shops are now renting LaserWriter time by the page or by the hour. If you can't find one, try asking your local user group for a recommendation.

In general, you are *just* renting time; you won't get a great deal of help in setting up your pages. While the LaserWriter can produce high quality copy, it can also produce a high quality mess. Don't expect to walk in with an entire book or thesis on disk, select Print from a menu, then walk out with a masterpiece! A few pointers may help you minimize the expense and frustrations you may encounter.

Preparation Tips

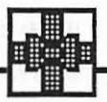
- Use tabs and forced page breaks, rather than spaces and carriage returns, to lay out text on screen. Then, the layout will remain relatively intact no matter the changes in font or point size.

- Decide what laser fonts you'll use for printing, and do a dry run on the ImageWriter. Make sure to select Tall Adjusted from the Page Setup menu, to make the resulting layout as near to the LaserWriter's final result as possible. (While Tall is recommended for text-only documents, Tall Adjusted works best for any graphic work on the ImageWriter. Since the laser fonts are graphic images to the ImageWriter, this option provides the best results.)

Store Tips

- Bring a copy of your program disk with the LaserWriter already installed. Installing the LaserWriter takes time, and a fair amount of free disk space, neither of which you're apt to have if you come to the store unprepared. The store will probably let you make an extra copy of the installation disk for this purpose.
- If your work includes lots of bitmapped graphics, make sure to choose a store that charges by the page, rather than by the hour.
- If you need multiple copies of the same work, take your laser original to a copy shop for a few cents per page.

Typical charges for LaserWriter services vary widely, from about fifty cents per page to a high of five dollars. Some stores, recognizing the setup assistance they may have to render, charge more for the first page (five to ten dollars) then much less (fifty cents to a dollar) for subsequent pages. Stores that charge by time average around twenty-five dollars per hour.



Summary

Apple's LaserWriter is more capable and powerful than most of its competitors, due to copious RAM and the use of PostScript. If you frequently need to produce high quality business correspondence, camera-ready copy, or integrated text and graphics, you should look into this technology.

Better Input: Beyond the Mouse

Your most pressing need for increased performance may be tied to input, rather than output. The Macintosh's mouse serves several purposes:

- It moves the cursor to different areas in a document.
- It selects text or graphics for subsequent manipulation.
- It facilitates selections from pull-down menus.
- It makes graphic input possible.

There are on the market several devices that, like the mouse, augment the keyboard in facilitating information input. These devices are roughly divided between those that are designed to facilitate graphic input, and those that are meant mainly for moving and selecting.

Moving and Selecting: Mouse Options

A mouse should let you easily and naturally "travel" around a document, or make selections, in an automatic, effortless way. For some, the mouse that comes with the Macintosh has limitations:

- It gets gummed up, resulting in erratic operation.
- It requires a reasonably sized clean space on your desk.
- It requires you to move your hands from the keyboard.

We've taken a close look at several options that address the problems listed above. Here are the pros and cons of each option we reviewed:

Mouse Pads

A mouse pad is a thin rectangle of foam rubber with a smooth fabric surface, usually measuring about six inches by eight inches. The pads are offered by several companies, including Mouse Glide, Commerce, CA; Mouspad by MousTrak, Mill Valley, CA. Mouse pads isolate the mouse from irregularities in the surface of your table or desk, and provide the optimum friction for smooth rolling. They reduce the area of clear desk space used for mousing, and keep the mouse cleaner. If your mouse works erratically, and needs to be cleaned frequently,

Figure 7–5. A mouse pad makes a big difference at a small cost. (Courtesy of Magnum Rubber Division.)

try buying one of these inexpensive rubber pads. For under ten dollars, the mouse pad can make a huge difference at very little cost.

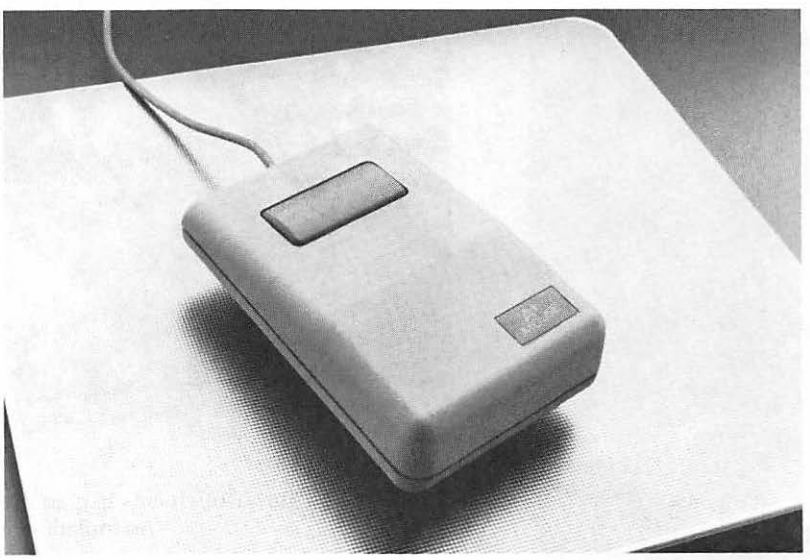


Figure 7–6. The A+ Optical Mouse. (Courtesy of Mouse Systems Corp.)

Optical Mouse

The optical mouse (A+ Mouse, Mouse Systems, Santa Clara, CA) tracks movement by bouncing light off of a reflective grid, rather than with a ball. Because there is no ball, an optical mouse doesn't collect dirt as the mechanical mouse does and so it works consistently and smoothly. In our experience, this smoothness translates into increased precision and control. Try the optical mouse before you buy, to make sure it feels comfortable in your hand. Where the mechanical mouse slants upward toward its cord, the A+ optical mouse slants downward, a position some people find awkward. If you move your Mac around a lot, also keep in mind that the optical mouse won't work at all without its special pad; you'll have one more thing to pack and carry. Consider the optical mouse if your original mechanical mouse is damaged—at discount, this mouse can cost less than Apple's replacement cost for a standard issue mouse.

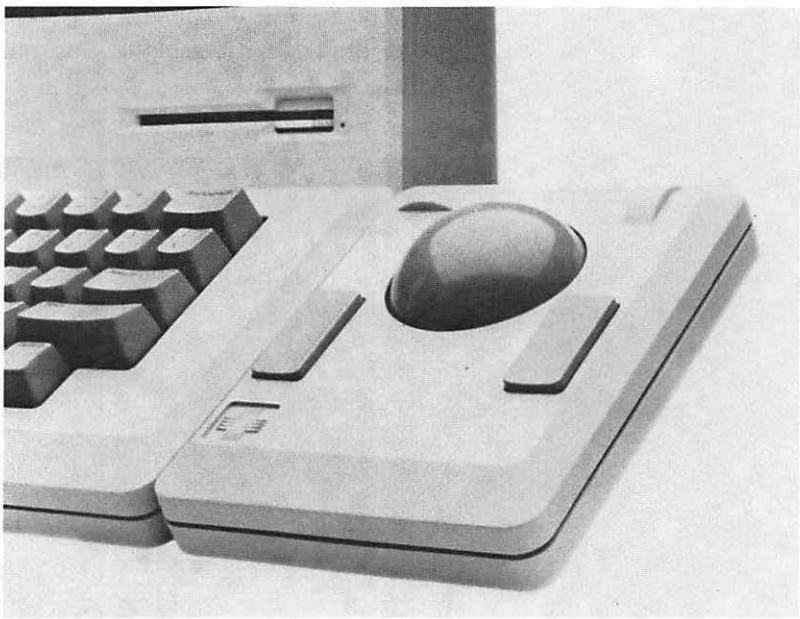


Figure 7–7. TurboTouch acts like an upside-down mouse. (Courtesy of Assimilation, Inc.)

TurboTouch

TurboTouch (Assimilation, Cupertino, CA) is essentially an upside-down mouse. Its large ball is mounted in a base, with a click button on either side; it attaches to the side of your keyboard with Velcro. You rotate the ball to move the pointer, and use either button just as you would use the mouse button.

TurboTouch can speed up mousing operations, once you get accustomed to the fast and ultra-sensitive rotation of the ball. It's also a boon for people with messy desks, who no longer need to dig a hole for their mouse. On the down side, TurboTouch may be difficult to get used to. In particular, dragging is difficult, because you must hold your thumb still on the button while your other fingers rotate the ball. Some people claim that they miss the full-arm pointing feeling of actually moving the mouse. TurboTouch may be excellent for touch typists who want to stay closer to home row, but is very much a matter of personal preference. Most people use TurboTouch for a few weeks before deciding that they can't live without it—or that they can't live with it. Make sure to buy from a store that has a good return policy, to allow for this familiarization period.

View Control System

Informally, some Macintosh owners call the View Control System (Personics, Concord, MA) "the headmouse." Its most obvious component is a headset with three ultrasonic sensors at the top and above your ears. To move the pointer, you simply rotate your head: look up, and the pointer moves up; look right, and the pointer moves right. A box, which must be placed on top of the Mac, senses your motion. Two buttons, clamped to the keyboard under your space bar, work as click buttons. Glance up at a menu choice, press a button, then glance down, and the pointer carries out your selection.

Figure 7–8. You can keep your hands on the keyboard, with the View Control System. (Courtesy of Personics Corporation.)

The VCS is a welcome option for speed typists, who hate to take their fingers from the keyboard to use a mouse. In line with this, it's best with text-intensive work, and somewhat difficult to use for graphics entry in programs like MacPaint. The major disadvantages of the VCS are mechanical: the cord that connects the headset to the control box is long enough to get in the way, yet too short to allow normal movement around the workplace. The headset itself feels somewhat cumbersome, and its appearance is unlikely to find acceptance in an office environment. The VCS eliminates the mouse's need for desk space, but is rather difficult to use as a graphics device. You may find that the View Control System grows on you, but it's definitely weird for office use.

Graphics Input

As computers like the Macintosh bring increased graphic capabilities to the workplace, the availability of reasonably priced and versatile graphics input devices becomes more and more important. These graphics devices can be grouped, for the sake of discussion, into two opposite camps: those that help the artistic unleash their creativity, and those that help the less artistic enhance their talents. In common, though, all graphics devices serve the purpose of *digitizing* images, or translating pictures into signals that can be understood and manipulated by the computer.

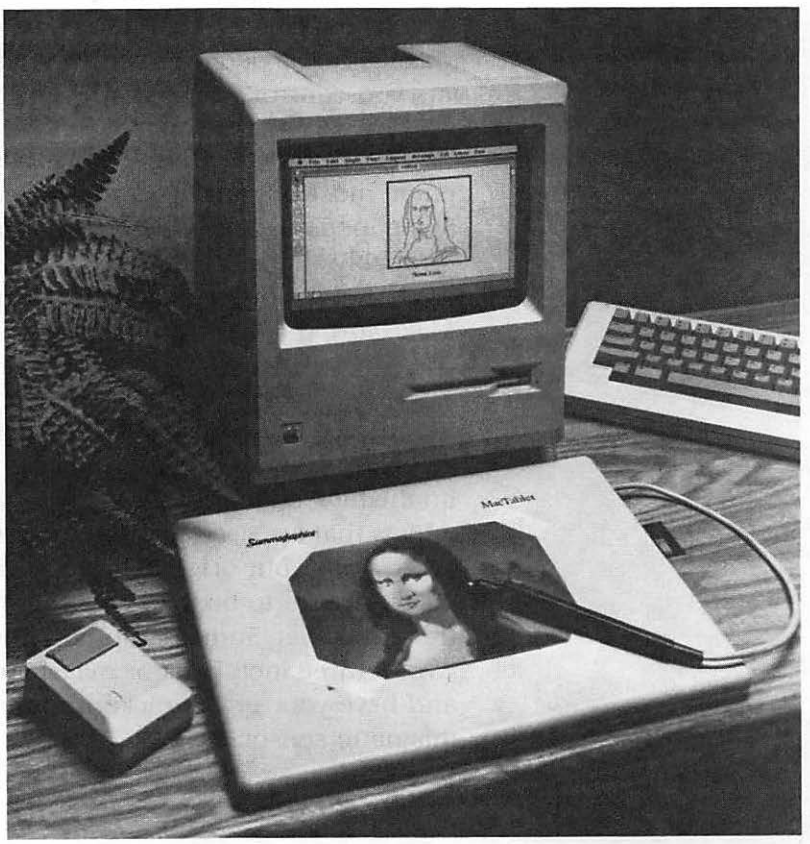


Figure 7–9. The Summagraphics MacTablet. (Courtesy of Summagraphics Corp.)

Digitizing Tablets

Freehand art is a real challenge to create with a mouse. The mouse is too fat to hold comfortably like a pen or pencil, and not sensitive enough for detail work. Digitizing tablets offer a better alternative for creative work, by combining a flat tablet with a thin, pen-like stylus. As you draw, sensors in the tablet record the position of the stylus, and transfer your work to the screen. You may still find it easier to create your work on plain paper, then use a digitizer (below) to feed your work into the Macintosh.

Here's what you should look for when considering a graphics tablet:

Pen Size and Feel Some graphics tablet pens are the same size as a normal pen or pencil, while others are much fatter. Make sure the pen feels comfortable in your hand, and that it lets you control your work precisely.

Pen Activation System Just as you click a mouse button to enter most actions, you must also click the graphics pen. Some pens "click" when you apply pressure to the point (probably the most intuitive system) while others have buttons on the side of the pen, or even on the edge of the tablet. Make sure the "click" procedure you're buying feels natural to you.

Sensitivity of the Digitizing Elements Most digitizing tablets work equally well for freehand work, or drawing directly on the tablet. There is a wide difference in the performance of tablets that are used to trace pictures overlaid onto the tablet. With some, your original must be very thin, on a single sheet, for the image to be picked up by the tablet. With others, like the MacTablet (Summagraphics, Fairfield, CT), you can place a two to three inch book or magazine on the tablet, trace away, and have your image picked up and recorded by a powerful magnetic sensor.

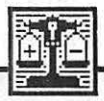
Connection Some tablets connect to the Mac's mouse port, while others use the machine's serial ports. To conserve the Macintosh's more versatile ports, it's preferable to have a mouse port connection, as long as the tablet has its own mouse port to connect the mouse in "daisy-chain" fashion.

Graphics tablets are sometimes seen as children's toys, due to the popularity of a few early limited ones aimed at the educational market. Today's graphics tablets, however, should be considered by graphics professionals as serious tools.

Digitizers

Where the graphics tablet calls for freehand input or tracing, digitizers take an existing image and convert it into a MacPaint-type document made up of individual dots. The applications for this are enormous: a digitizer could be used to put product illustrations in a catalog, employee photos in a database, pictures in a company newsletter, or any number of uses.

The major limitation of the digitizer is that it creates a bitmapped file; every image is recorded as a collection of individual dots rather than specific objects. This has several ramifications. First, complex images take up a great deal of storage space, as the Macintosh must remember the position ("map") of each individual dot ("bit"). Therefore, even moderate sized databases with pictures included can quickly outgrow floppy disk storage capacity. Second, since each image is made up of dots, you cannot use picture information to search for specific data, such as all products with a 3-inch cog, or all employees with big noses. Finally, because of the bitmap approach, digitizers are useless for entering text that will later be changed with a word processor. Since each character is nothing more than a set of dots, you won't be able to edit digitized text, except graphically, dot by dot.



Comparisons

Two major types of digitizers are common: scanners and camera-based digitizers. Camera-based digitizers photograph an image, but record the results in computer signals rather than on film. Their main advantage is their flexibility in capturing any object, flat or three-dimensional. They can also take images from any video output, such as VCR's, videodisks, and so on. On the negative side, considerable skill in lighting and focusing may be needed to get a decent image, and it may be expensive to get all the equipment needed. Camera-based digitizers generally cost around $400, not including the video camera.

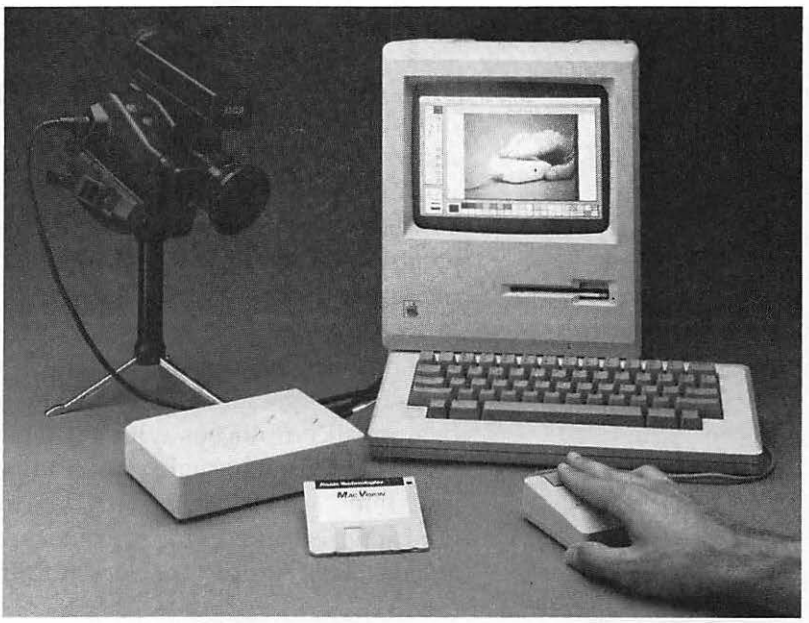


Figure 7–10. The MacVision digitizer is camera-based. (Courtesy of Koala Technologies Corp.)

One example of a camera digitizer is MacVision (Koala Technologies Corp., Santa Clara, CA). It uses a standard video camera (which can be purchased separately) and a small MacVision control box attached to one of your serial ports. Using Koala's software (written by MacPaint author Bill Atkinson), your Macintosh takes input from the camera and translates it into a MacPaint image. As the image builds on the screen, you use buttons on the control box to adjust the brightness and contrast of the digitized image.

Rather than use a video camera, scanners pass an electronic eye over the original image, immediately translating it into a bitmap file. The best known scanner is the ThunderScan, from ThunderWare (Orinda, CA). It looks very much like a lopsided ImageWriter ribbon, and in fact, that's how it works. You remove the printer's ribbon, snap in the ThunderScan, and slip a picture or photo in the printer's roller. Then your printer essentially works backwards, feeding information *into* the Macintosh.

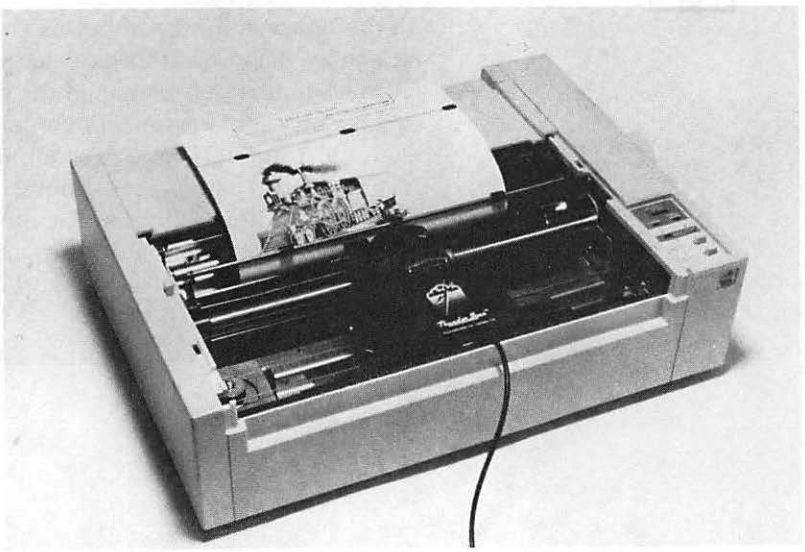
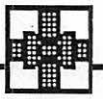


Figure 7–11. ThunderScan uses your ImageWriter as an input device. (Courtesy of ThunderWare, Inc.)

ThunderScan's advantages are many. It's inexpensive, around $200, and requires no additional video equipment. It can make enlargements and reductions of the images it scans, and can adjust contrast and brightness, even after an image has been captured. Best of all, ThunderScan can take advantage of the LaserWriter's fine resolution, printing out at up to 288 dots per inch.

The major limitation of ThunderScan is that it can only handle flat objects that are small enough to be rolled through the ImageWriter. You'll have to take a photo of any three-dimensional object first, and of course it can't be on instant film—the resulting photo would be too thick for the ImageWriter. Also, ThunderScan can take quite some time processing a single image. You may also experience some problems with slippage as you roll a photo through the printer, making a repeat scan necessary.



Summary

All the options discussed in this chapter merit long and hard reflection before you decide to purchase: the LaserWriter, because of its expense, and all the others, because they are so much a matter of personal preference and style. With all of the alternate input devices, we recommend that you read as many reviews as you can, borrow from friends if possible, and shop around for a store with a 30-day money-back guarantee. If you can match your personal style to any of these tools, you'll add considerable power, pleasure, and functionality to your Macintosh.

CHAPTER

8

IBM to Mac: Transferring Data

For many of you, the Macintosh is your first computer, and it's the only machine you use. You may work in an all-Macintosh office, or use the computer only at home or in an independent business. If that's your situation, you may want to skip this chapter. If you've been using an IBM PC or similar computer, though, and want to bring your personal hordes of data over to your new Macintosh, or if you work in an environment where it's essential to share data between IBMs and Macintoshes, the information here may be just what you need. This section will discuss the issues involved in transferring data between the Mac and the IBM PC, including:

- how to understand the specialized jargon used in data transfers
- how to connect the computers—with modems or direct cabling
- why you may need both a file transfer program AND a file translation program
- the specific pros and cons of various commercial data transfer products

Sending Information between Macs and IBM PCs

If you're switching from an IBM PC to a Macintosh, or using both regularly, you're likely to want to transfer data from one machine to another. You may want to take a 1-2-3 file from the office, work at home in Excel, then bring the file back to the PC on Monday. You may want to bring a WordStar file to MacWrite, add graphics, then print it on the LaserWriter for a presentation. You may want to transfer your employee data base from dBase III to Microsoft File, so you can add photo IDs of all your people.

Sharing information between the dissimilar IBM and Macintosh may at first seem like an impossible task: The diskettes are different, the programs are different, the operating system is different...how can they possibly communicate? Transferring most data back and forth, though, can actually be surprisingly simple. There are four basic steps involved:

1. Physically connect the two computers with a wire. This can be a direct connection or a phone line.
2. Electronically connect the two computers. You'll need some sort of communications program.
3. Actually send the file(s).
4. Translate the data to allow for different data formats in different programs.

In this chapter, we'll explain the basic concepts and some of the jargon involved in each of these four steps, to help you understand and evaluate various transfer and translation options. Then we'll show specific examples of products that can be used to send information between the Macintosh and the IBM. (Note that we use the names "IBM" and "PC" to refer to any MS-DOS machine that emulates the IBM PC.)

Be aware that intermachine communications, even at its simplest, involves a host of technical terms and details that may be new to you. The time you spend reviewing the concepts and jargon at the start of this section, though, will pay dividends in avoiding disorientation and confusion when you actually try these procedures.

Connecting the Two Computers

There are several ways to connect the two computers. If your Macintosh and PC are in the same office, you can make a straightline connection, by plugging a cable from one into the other. If the computers are in separate offices—or even separate states—you'll want to use phone lines to make the connection. Finally, if you're in the market for another PC, you can use MacCharlie, a complete IBM-like computer that hooks directly to your Mac. Let's look at all these options in turn.

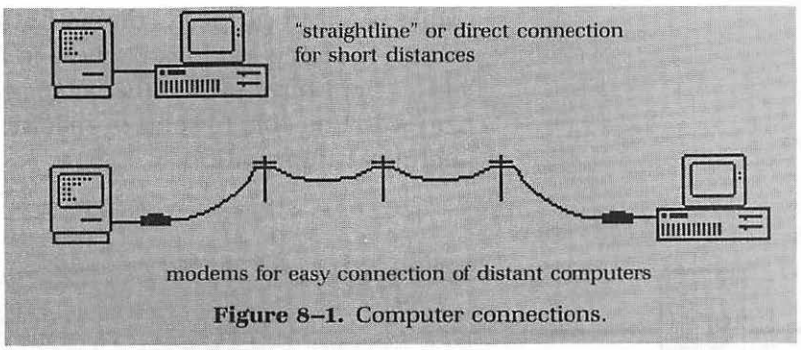


Figure 8–1. Computer connections.

Straightline Connection

The two serial ports on the Macintosh can be used to hook the machine to any other equipment. Even though they're labeled "printer" and "modem," these ports are meant as gateways for *any* information that is passing between your computer and any other device. If you're trading files, the other computer acts like an input or output device, using the Mac's port either to input a file or to catch the Mac's output. Basically, then, connecting computers is just a matter of plugging one end of a cable into the Mac, and the other end into the PC. It's conceptually no different from connecting a printer, or a hard disk drive, or any other peripheral: with the proper cable, it's easy.

What is the proper cable? Any cable is a collection of wires that connect wires in your computer to wires in some other piece of equipment. In this case—what we call serial communications—each computer uses three wires: one to send data, one to receive it, and one that acts as a ground. Common sense says it's essential that the "send data" wire in one computer get plugged into the "receive data" wire in the other, and that the ground wire be properly connected. It's the job of the cable to make these connections.

The connections would be easy if there were only three plugs ("pins") in every serial port. Unfortunately, serial ports have from 8 to 25 pins, making connections seem something like a shell game—"Is it under this one? This one?" If your cable is wired properly, all you have to do is plug it in and it works. If each wire doesn't come in at the right pin and go out at the right pin—even if the cable seems to plug in just fine—you won't be able to send or receive data. (See Appendix C for technical information.)

Hot Tip

Luckily, you may already own a cable that's properly wired to connect a Mac and a PC: your ImageWriter I cable. With its small (9-pin) end connected to the Mac as usual, the "printer" end, with its 25-pin connector, may plug directly into the serial port on your PC. Try it, as you experiment with this chapter, and you may find you can save the cost of a new cable.

Being properly wired will do you no good if you can't plug the connectors in, though. Some problems you may run up against:

Male/Female The ImageWriter cable has a male (protruding pins) end. Some compatibles have a female plug (holes), and can connect directly. IBMs and some other machines have a male serial port. You'll have to buy a "gender changer" at an electronics shop to connect the male cable to the male port.

Parallel vs Serial Most IBM PCs have both parallel and serial ports sticking out the back of the computer. Generally, these two ports are *not* labeled, and look very similar. The visible difference is that the serial port is male (protruding pins) and the parallel port is female (holes). The functional differences are enormous, so the two *cannot* be substituted for each other. Although the ImageWriter cable will fit perfectly in the parallel port—without even using a gender changer—there's a small chance you may damage your hardware if you do so. Make sure you have the serial port! (Note: This information applies to actual IBMs, and may differ for some compatibles.)

9-pin IBM port The IBM AT and some other machines use a 9-pin serial port. You can get a converter cable to bridge the gap between this port and the end of your ImageWriter cable, but the cost may equal or exceed your savings in using the ImageWriter cable. Check it out.

8-pin Mac Plus Port The Macintosh Plus uses "mini-8" circular 8-pin serial ports. If you're using a Mac Plus, you'll need Apple's peripheral adapter cable. (At Apple's list price of $20, you may be better off buying a new cable, unless you need the adapter for other peripherals, too.)

ImageWriter II Newer ImageWriters use mini-8 couplings (like those on the Mac Plus, above) to attach to the Mac. The printer end of the cable is a small round connector that bears no resemblance to any port on the PC. You're out of luck and will have to purchase another cable.

Choosing a Null Modem Cable

If you can't use an ImageWriter cable, you'll need to buy what's known as a null-modem cable. Try your local computer or electronic supply store; make sure to specify the connectors you need on either end to fit your Mac or Mac Plus, and your PC. If you're technically minded, or have a friend who's handy with a soldering iron, you might want to try making your own Mac to PC cable. See Appendix C for specifications.

Modem Connections

For distant computers, the principle is the same—wire the two computers together—but rather than string your own wire, you'll want to take advantage of phone lines that already interconnect different locations. Phone lines weren't designed to transmit computer signals, though, so at each end of the connection you'll need a modem, attached to each computer. The modem's main function is to translate computer signals into phone signals and back again, so that the existing phone network can do double duty as a very long computer cable. Almost any modem will do, although you'll find the job easier with a modem that knows how to dial and answer the phone for you, and that can operate at a speed of at least 1200 baud (see the following discussion for definition).

Communications Software

Once your computers are wired up, you'll need a communications program to act as gatekeeper for the transfer process. The communications program lays down the ground rules for the transfers, and helps you control your hardware during the session. In simplistic terms, it's like this: Your computer is playing catch with the other computer, tossing files back and forth. You have to make sure that both sides know how fast the ball will be thrown, who's supposed to throw and who's supposed to catch, how to tell when the ball's been caught properly, and so on. The specific rules aren't nearly as important as making sure that both sides agree to observe the same rules.

Note

Unfortunately, a lot of jargon is used in communications rule-setting. We recommend Alfred Glossbrenner's book *The Complete Handbook of Personal Computer Communications* (St. Martin's Press, NY) if you'd like to learn more about these terms and procedures. The following is a brief explanation of some of the most important terms:

Baud rate This is the data transfer speed, roughly equivalent to how many bits are sent or received each second. Modems usually use 300, 1200, or 2400 baud, while straightline connections usually use 9600 baud.

Data bits, stop bits Each character in your data is made up of a series of bits—0s and 1s. Data bits tells how many (7 or 8) bits are in each character. Stop bits tells how many (1 or 2) bits signal the end of each character. Imagine a message in Morse Code: if you can't separate each series of dots and dashes into distinct characters, you'll never decode it! The stop bits signal separates one distinct byte of data from another, just as a space separates two letters in the Morse alphabet.

Parity Parity helps the communications program tell if your data's been garbled in transmission. Your choices are even, odd, and none. The choice you make for parity depends partly on the choice you made for data bits. If you're sending unformatted text—known as ASCII characters—each character in your file is made up of seven 0s and 1s. Therefore, you would set data bits at 7. Yet, information generally travels through your computer in bytes, or sets of 8 bits. This extra bit can be used to check for errors in transmission. For example: The ASCII code for the letter A is 1000001. Using simple math, these 1s and 0s add up to 2. Parity adds an extra bit up front as it transmits: even parity adds whatever's necessary for each character to add up to an even number; odd parity makes sure each character adds up to an odd number. Here's how an A would be transmitted under each parity system:

with even parity	01000001	adds up to 2, an even number
with odd parity	11000001	adds up to 3, an odd number

The receiving computer can ask for another try at any byte that doesn't add up to the agreed-upon parity. If you're sending formatted files or spreadsheets—anything but simple text—each character in the file is made up of eight 0s and 1s; you would set data bits at 8. Then, you must choose none for parity, as there's no extra bit to use for parity checking.

Echo Echo determines whether you see a copy, onscreen, of the characters being sent. Some programs automatically echo to the screen, others don't. The simple rule here is, if you're seeing two of everything onscreen, turn echo off; if you're seeing nothing, turn it on.

Duplex Half duplex means that signals can travel in only one direction at once; full duplex means data can go both ways at the same time. Even if you're only sending a file in one direction, you'll want full duplex so that error checking and other behind-the-scenes communications essentials can go back and forth quickly.

Protocols As in diplomatic circles, protocol refers here to certain agreed-upon rules of acceptable and expected behavior. Usually, in communications it's concerned with making sure one block of data has been properly received before the next is sent—a more thorough form of error detection than parity checking. Protocols slow down transmission considerably, but result in much more accurate transfers. Common protocols include XModem and Kermit.

It can't be stressed enough that the individual settings don't matter nearly as much as making sure the settings on one computer match those on the other. You don't have to actually understand these terms at all. Set your baud rates to be equal, specify the same stop bits, data bits, and parity on each end, and use the same protocol if any—and your data transfer should proceed smoothly.

If you're not sure of the settings on the other computer, and have no way to find out, you should first try 1200 baud rate, no parity, 8 data bits, and 1 stop bit (known in communications shorthand as 1200-N-8-1), then try 1200 baud, even parity, 7 data bits, and 1 stop bit (1200-E-7-1). These are the most common settings.

Sending the Files

Naturally, actual procedures will differ according to the communications program you're using. You can consult your own communication program for exact details, or look at our specific examples later in this chapter. Generally, though, a file transfer session over phone lines will go something like this:

1. Make a normal phone call to the person on the other computer. Agree on all your settings and tell your colleague to get ready, then hang up.
2. Have your modem dial the other modem, connecting the two computers by phone line. You should see some onscreen confirmation—often the word CONNECT—telling you the two computers are linked.
3. After you're connected, you should be able to see anything typed on the other computer's keyboard, and vice versa. Typing a few characters is a good way to confirm that data is indeed flowing reliably between the two computers. Hang up and try again if you see unrecognizable characters on the screen. Your phone line may have too much static for data transmission.
4. Use your communication program's commands to send the file. The procedure usually consists in choosing Send a File from a pull-down menu, then selecting the file to send from a list box. On the receiving end, your colleague will need to select Receive a File before you start sending. He or she also usually indicates the name of the file that the receiving computer should create to store the transferred copy.
5. Remember to hang up when you're done, either through program commands or with a switch on your modem. Accidentally leaving the two computers connected can be expensive if the call is long distance!

Sending files through a straightline connection (sometimes called a null modem, since no modem is used) is similar, but without the phone steps needed.

Translating the Data

After the transfer is complete, it's unlikely that any program on the new computer will be able to read the file. Some fine-tuning will most likely be necessary. This is because your file consists of more than just the obvious data you see onscreen or on the paper; it also includes invisible characters that tell a word processing document about its fonts and margins, or a spreadsheet about its formulas and number formats, and so on. Almost every program on the market stores information in a way that is unique to that application; special formatting characters and clever data compression techniques make interchange of files difficult, even once they have been physically transferred from one machine to another.

A few standards have emerged. Although almost no programs use these standards as their default way of filing information, many offer at least one standard alternative from these choices:

- ASCII. This is a "straight" data file, with no formatting characters included other than tabs and returns. This is what your Mac creates if you choose "Save As Text Only". The name stands for American Standard Code for Information Interchange, and it is indeed the most standard system, understood by most applications.
- DIF. This stands for Data Interchange Format, promulgated by the creators of VisiCalc as one of the first standards for file storage and exchange. It's common for spreadsheets to offer this as an alternative file choice.
- SYLK. SYmbolic LinK is a standard supported by Microsoft. It can be used to transfer information between any Microsoft products, and is recognized by many spreadsheet programs.
- WKS. Lotus development's WorKSheet format can be recognized and translated by a wide number of spreadsheet and database programs; most applications have a means of reading WKS files simply because Lotus 1-2-3 has been so popular and widespread.
- DBF. Similarly, the Data Base Format file created by Ashton Tate's dBase is often one that spreadsheet and database programs can "understand" through translation utilities included with the application.

The existence of several different standards—and hundreds of non-standard exceptions—for storing information means that when you send a file, you have three choices:

- You can send only the data, by saving the information in an ASCII file before you send it. Hopefully, the program you plan to run it with on the receiving computer has an option to import straight ASCII text from another program.

  Even though ASCII files are easily transferred, you'll have to do a slight translation. IBM files contain a line-feed at the end of each line, while Mac files don't. This means that line-feeds must be added when going to a PC and stripped when coming from a PC to a Mac. Diddler (see Chapter 9) is a program that can do this conversion for you.
- You can use only applications that include translation utilities to accept or create files in another program's favorite form. With a versatile program you can make sure the file is saved in a compatible common format before you start, or translate it after it's been transferred.
- You can use a communications program that also has translation capabilities. Such a program will translate a file's format to that expected by another program, as it transfers the file from one computer to the other.

The Best of the Bunch

Given the number of variables involved in transferring files, we'd like to simplify the situation by discussing specific options for specific situations, based on our experience.

In-office transfers

- For computers located within a few feet of each other, a product called MacLink is the best way to easily connect two machines, transfer files, and translate them.
- If you're in the market for a PC-compatible computer, a unit called MacCharlie offers some intriguing ideas for the ultimate connection between the two machines.

Long-distance transfers

- MacLink is our top recommendation for sending files long distance, too. The product can dial through a modem, and both transfers and translates files, so they're ready to use on the other machine.

- Electronic mailboxes can be the ideal solution for some files, especially if you can't be bothered coordinating schedules with someone on the other end.

MacLink, MacCharlie, and electronic mailboxes all fit our criteria of being simple and relatively non-technical: each product adds a shell of user assistance to the file transfer process. Although our main recommendations assume that most people would rather not get involved in the mechanics of data communications, we've also included specifics on doing your own transfers with generic telecommunications programs.

MacLink

As explained earlier in the chapter, there are actually several steps involved in getting files from the Mac to the PC or vice versa. The ideal transfer product, then, would be one that takes care of all of these steps for you:

- connects the two computers with a wire
- sets up communications rules
- sends the files
- translates between different program formats

The product we've found best for this is MacLink, from Dataviz of Norwalk, Connecticut. It includes software for both machines that doubles as a communication program and a file translation program. An eight-foot direct-connect cable is available as an option.

Once you've connected your two machines by plugging the supplied cable in at both ends, here's how a sample MacLink session might go:

IBM PC

- Put MacLink disk in PC, and start MacLink by typing MacLink [enter].
- Leave all settings as is, to transmit at 9600 baud.
- Type **O** (Online) to connect with the Macintosh.

Macintosh

- Put MacLink disk in Macintosh, and start MacLink by double-clicking its icon.
- Leave all settings as is, to transmit at 9600 baud.
- Click **Connect** to connect with the PC.

After a few seconds, you'll see a confirmation message on each machine, telling you the two are connected. After this point, everything is controlled from the Macintosh; ignore the PC.

Selecting the Files First, MacLink presents a simple screen so you can indicate the source of the files on the PC, as well as the Macintosh disk on which to store any incoming files. You can click to change the Mac settings, or type in new PC settings.

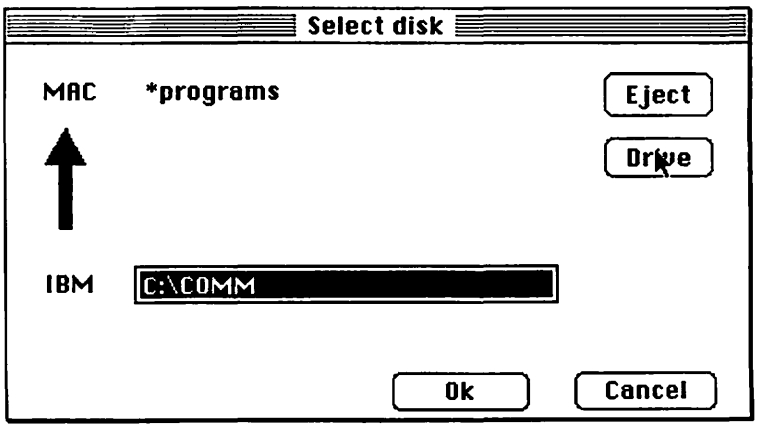


Figure 8–2. MacLink shows the source and target disks for transfer.

The bold arrow clearly illustrates that files are being transferred from the directory called \COMM on the IBM, to the disk (or volume) called programs on the Macintosh.

As soon as you click Ok, you'll see a listing of the available source files. MacLink gets them from the PC, and displays them on the Mac.

IBM PC disk unit is c:\comm

Name	size	file contents
README.DOC	384	MultiMate file
README.ML	1920	Binary file
GRAPHS.BAS	1152	Binary file
BCSART.DOC	3072	MultiMate file
SAMPLE.TXT	1536	Binary file
BUDGET86.WKS	8064	Lotus (WKS or WRK format)
SAMPLE.WS	1664	WordStar file

Figure 8–3. MacLink shows the IBM's directory on the Mac screen.

You simply click to select any file, highlighting it as shown above. Then you specify your translation preferences in the next dialog box.

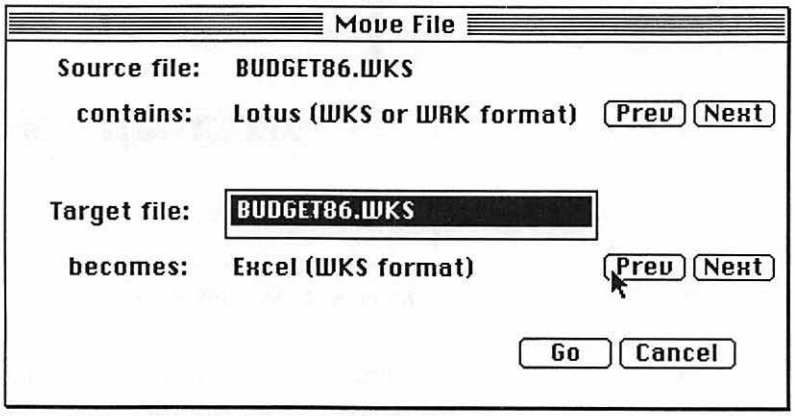


Figure 8–4. Transferring the Lotus 1-2-3 file BUDGET86.WKS to the Mac as an Excel file.

MacLink looks at your file and figures out what type it is, then presents you with its best guess of your translation preferences. If you agree, simply click Go to start sending the file. It's easy to change the translation settings, though. Clicking Prev or Next cycles you through several possible options for the selected file. This Lotus file, for example, could be translated to an Excel, Multiplan, Jazz, or DIF file, according to your needs.

Once you click Go, the transfer takes place, with confirming messages on each screen. In very little time, the transfer is complete. You can then quit MacLink and use the file, or choose another file to send. To reverse the procedure, simply select To IBM PC from the Control menu.

MacLink for Long-Distance Transfers

As an added bonus, MacLink can be used over modems, too, for long-distance transfers. The procedure starts out just as explained previously, except that each computer is attached to a modem, and thence to a phone line. Once the MacLink software is booted on both machines, you must change the communication settings from the default Cable to Modem. MacLink automatically switches from 9600 baud to 1200 baud when you select Modem.

From this point on, everything is controlled from the Macintosh. Select Phone from the Settings menu, and enter a phone number in the resulting dialog box.

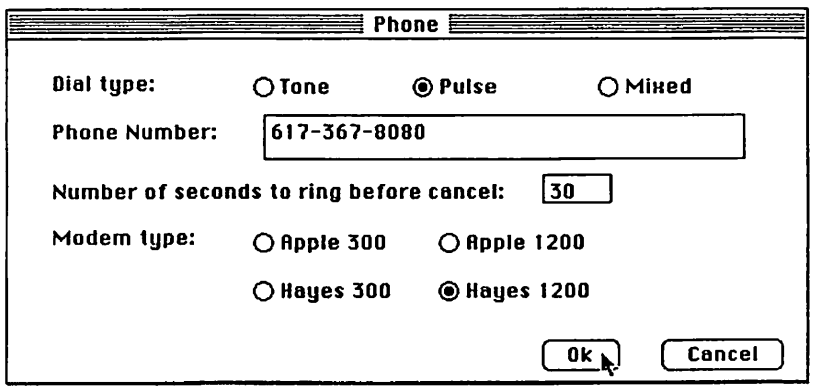


Figure 8–5. MacLink can connect two computers by modem, too.

Close the box, then select Connect/Dial from the Connect menu. The Mac will dial the PC's phone number; since the PC is expecting a call, the connection is established readily. Then, the file transfer and translate process goes forth just as if the machines were cabled together.

Since all MacLink procedures are controlled from the Mac, you could even leave your office PC set up in MacLink, dial in from home to get files to work on, then dump your finished work back to the PC. A security password system eliminates the potential risks in leaving the PC open to anyone who might dial in.

Although MacLink's manual is not as comprehensive as it could be on the subject of long-distance transfers, the product still rates highly for its simple and thorough treatment of the subject of file transfers. It's one of the few understandable products available in the entire field of telecommunications.

MacLink's ability to remove so many bothersome variables from the file transfer process more than justifies its cost (list: $125, optional cable $30). If you don't want to get involved in learning telecommunications, but just want something that WORKS for intermachine file transfers and translations, this is an excellent product.

MacCharlie

Although MacLink seems like the ultimate PC to Mac connection, it's conceivable that you could need a product that not only transfers whole files between the two machines, but also:

- can run MS-DOS in a Mac-like environment
- can directly cut and paste parts of files between the two machines

A product called MacCharlie from Dayna Communications (Salt Lake City, UT; $1295–$1612) approaches this ideal. It brings much of the Mac interface—scroll bars, Desk Accessories, windows—to the IBM world, but cannot translate files and is extremely expensive as a transfer solution alone.

MacCharlie is actually an entire IBM-compatible computer that hooks to the side of your Macintosh. It has up to 640K of RAM and two diskette drives of its own, but uses the Macintosh monitor for its display. A keyboard extension slips over the Mac keyboard, adding the necessary IBM keys.

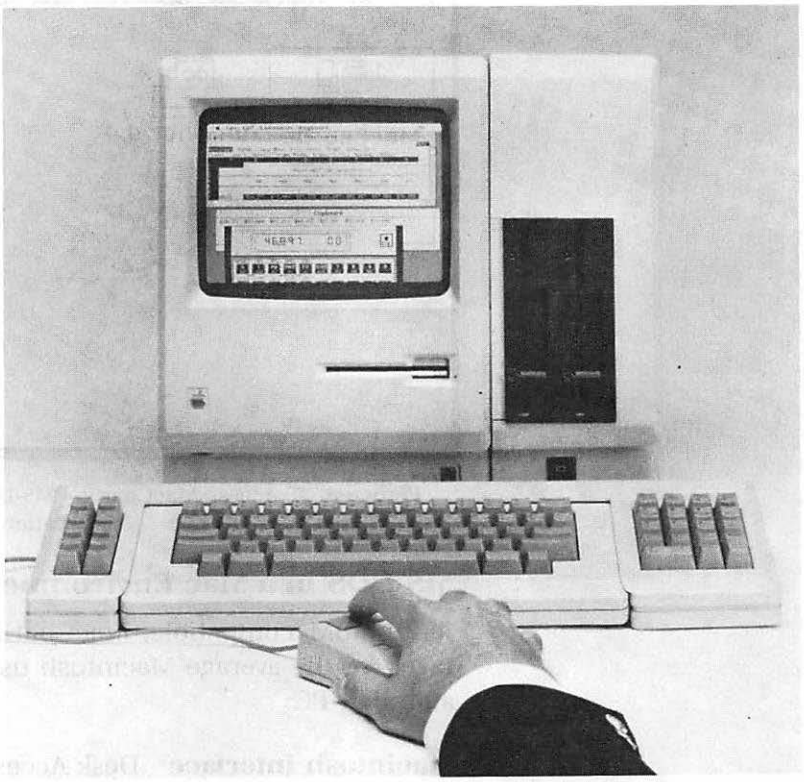


Figure 8–6. MacCharlie from Dayna Communications. (Courtesy of Dayna Communications.)

Your Macintosh can still behave as always with MacCharlie attached, running all your normal Mac programs. To use its IBM capabilities, slip a DOS disk in MacCharlie's drive, and the MacCharlie disk in the Mac, then simply click the MacCharlie icon on the Macintosh MiniFinder.

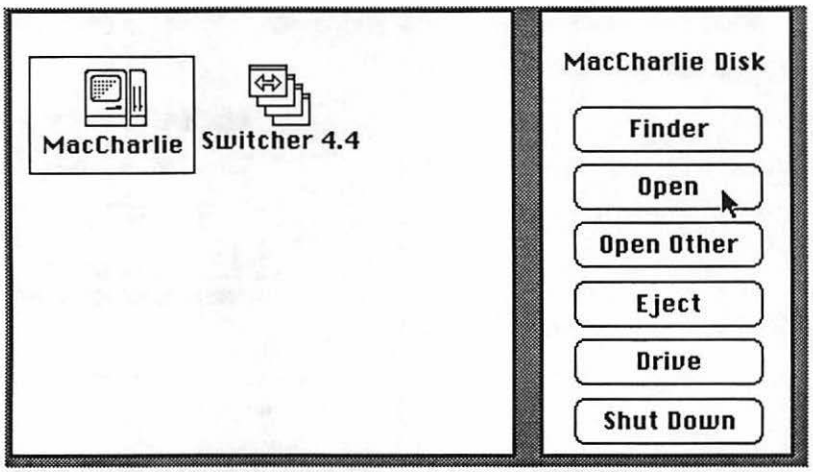


Figure 8–7. Access MacCharlie's MS-DOS world like any other Mac application.

MS-DOS in a Mac Environment

As an IBM compatible, MacCharlie features several advantages for the average Macintosh user, as compared to a free-standing PC:

Macintosh Interface Desk Accessories and scroll bars are still available to you while you run MS-DOS, lessening the disorientation that can be caused by frequent machine changeovers. Scroll bars can be very handy in DOS, to page back up a long directory listing, for example.

Clipboard The Mac Clipboard still functions, even while you run IBM software, and the File menu's ready with the necessary commands. This makes it easy to cut selections from an IBM program, then paste them into your favorite Macintosh application, or vice versa. (These selections will only be screen pictures. Spreadsheet formulas, for instance, will not be clipped, just the numbers.)

Printers MacCharlie can output IBM software to the ImageWriter, saving the need for two printers.

Cutting and Pasting: Partial File Transfers

MacCharlie's ability to use the Clipboard means that parts of files can be exchanged between the two machines, a feat that's generally impractical through any other method. This means that on-the-fly integration becomes realistic, especially with Switcher. By running a Mac application in one Switcher partition, and an IBM program in another, you can easily cut and paste information between the two. You could, for example, cut part of a colleague's 1-2-3 spreadsheet into a report written in MacWrite, a process that would take several extra steps with a full-file-transfer product like MacLink. MacCharlie scores points on this one.

Full File Transfers with MacCharlie Lacking

MacCharlie is less than successful with file transfers. You must know the exact name of your source file (no MacLink-type choice of clicking on a directory listing), a tedious drawback. More seriously, MacCharlie has almost no ability to translate files before or after they're transferred. It can transfer text (ASCII) files easily, even performing the necessary line-feed adjustments for PC-Mac transfers automatically, and it can also make direct binary transfers.

While MacCharlie is laudable as the first machine to truly integrate Mac procedures into the IBM world, its weakness in file transfers makes it difficult to recommend, especially in view of its price. (Even if you're in the market for a PC, MacCharlie's lack of expansion slots—an expansion chassis is available for more money—and inability to run IBM graphic software make it a poor choice.) MacCharlie is worth noting, though, in exploring the components of the ideal transfer device. This ideal system would:

- work with any IBM compatible you already own
- allow Clipboard cutting and pasting from one machine to the other
- allow common use of all Mac peripherals, including the LaserWriter
- not only transfer files, but offer several format translation choices

It's more likely that these needs will be met best and soonest by networking hardware and software that can transfer information and share equipment without Mac-Charlie's expensive and limited approach. Keep your eyes out for products that meet these criteria, in the rapidly evolving computer market.

Electronic Mailboxes for Long-Distance Transfers

Electronic mailboxes let you send a file from one computer to your "mailbox," then later collect the mail with the other computer. (The same procedure can send a file to anyone else subscribing to the same mail service, too.) These electronic mailbox systems are maintained by several data services on large mainframe computers; your "mailbox" is simply a small portion of the mainframe's hard disk storage, assigned to your name. So, instead of sending a file to another personal computer, you're sending information to a large computer that acts as an intermediary holding area—but the procedure's almost the same.

Comparisons

There are several advantages, though:

- The data service tells you what settings you should use, assigns you a mailbox, and explains the procedures necessary to deliver and collect mail. A good manual should lead you step by step.
- You don't need a second person to operate the other computer.
- Time is not an issue: You can send files from your PC at work to a mailbox, then pick them up on the Mac at your convenience.

There are a few disadvantages, however, also:

- You'll be charged an annual fee to subscribe to the service, plus a small charge each time you send a "letter" (file).
- You can only send ASCII files on most services. It's impossible at this time to send a spreadsheet, for instance, with all its formulas intact.

The best way to choose an electronic mail service is to find out what your friends and colleagues are using. There are two reasons for this. First, you can exchange files with them if you subscribe to the same service. Second, they'll be best equipped to tell you about any quirks or difficulties in procedures or billing that are associated with a specific service.

Using Generic Communications Software

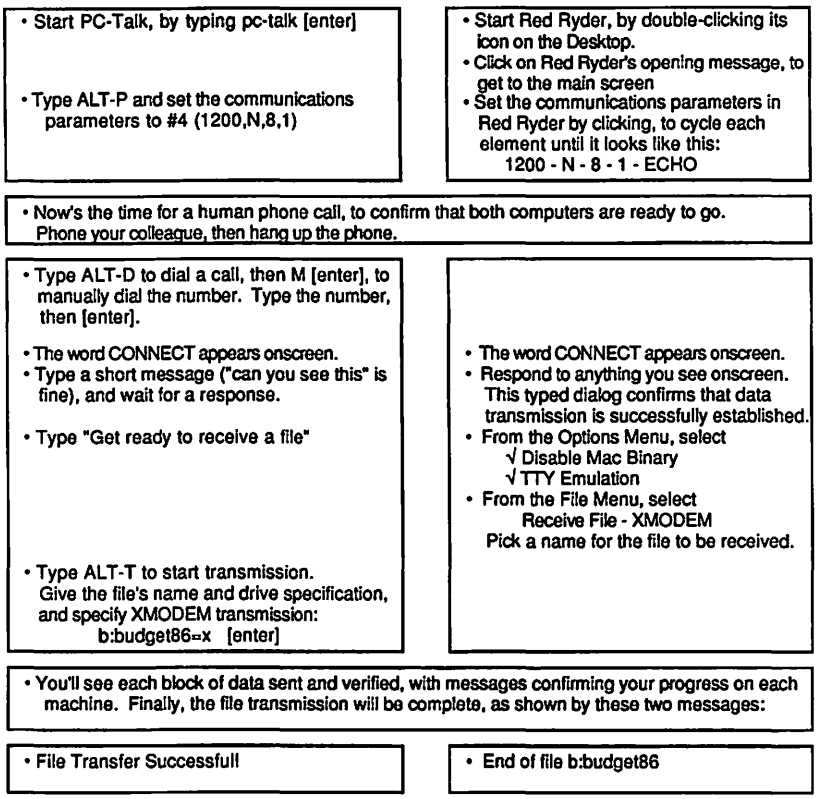
Each of the products discussed above—MacLink, electronic mail, and especially MacCharlie—comes at a price, and is dedicated to limited and specific tasks. If you own a modem, though, you may already have the components you need to transfer files, with no additional expense. This is the do-it-yourself approach, using a general communications program rather than one of the specialized products described above. We'll run you through, step by step.

Using Modems

Let's say you want to send the spreadsheet file called *budget86* from the PC to the Mac. Although there are several possible hardware and software combinations you can use for this approach, our example will feature the lowest possible cost solution. We'll assume you're using:

- PC-Talk III, shareware for the IBM PC by Andrew Fluegeleman
- Red Ryder, shareware for the Macintosh by Scott Watson

Properly connect auto-dial/auto-answer modems capable of at least 1200 baud to each computer and to your phone lines. Then, follow this entire step-by-step procedure:



Remember that once the transfer is complete, you may still have to translate the file so that your Macintosh program can read the PC file. (Spreadsheets transferred by this procedure from Lotus 1-2-3 can be automatically read by Microsoft Excel.)

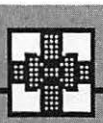
In theory, there's really not much to it. Bad phone lines, incorrect internal modem settings, and a number of other factors can affect modem to modem transmission, though. If you're inexperienced in this area, and have no wish to learn by trial and error, you may be better off with a dedicated product like MacLink.

Direct Connect

If you must regularly transfer information between an IBM PC and a Macintosh in the same office, you can follow the same procedure above. Just direct-connect the two machines (with the ImageWriter cable, if possible), and skip the phone-dialing

steps in the previous scenario. As soon as the computers are physically connected, you should be able to type messages back and forth, and send files.

But you'll still have to come up with the proper cable, transmit the files, and translate them if necessary. The lack of translation facilities in normal communications programs remains the biggest drawback in this approach. After all, having a file physically present on your disk means nothing if your program can't read that file.



Summary

The system you choose to provide a physical link between the Mac and the IBM PC depends heavily on your individual needs. There are several viable alternatives, as described in this chapter. Here's a summary of each system's significant characteristics:

	Electronic mailbox	-Comm cable	programs- modems	----Maclink---- cable	modems	MacCharlie
Send ASCII (text-only) files	√	√	√	√	√	√
Send spreadsheets, other files		√	√	√	√	√
Translate file formats				√	√	
Combine partial files						√
Computers in same office	√	√	√	√	√	√
Computers at a distance	√		√		√	
Requires two people			√			
Offers Mac-like MS-DOS						√
Can be operated by a novice	√		√	√	√	√

Use these guidelines to choose the product that meets your needs, and you should be able to share data between the IBM and the Macintosh easily. If you need help in understanding the IBM's commands and procedures as you work with both machines together, refer to Appendix C.

CHAPTER

9

Troubleshooting

Although the Macintosh is an extremely reliable machine, and easy to use, inevitably you'll have problems at some point with your hardware or software. When this happens, you'll want to know how to:

- track down the source of a hardware problem
- identify a faulty program disk
- recover information on damaged disks by:
  - fixing System files and rebuilding the Desktop
  - repairing bad sectors
  - changing the file signature
- "unerase" trashed files

This chapter is geared at teaching the elementary diagnostic and remedial skills needed to solve most of the Mac's problems, using a collection of utility tools including DAFile (Ken Winograd, Manchester, NH), Diddler (FreeSoft, St. Louis, MO), FEdit (John Mitchell, Sunnyvale, CA), MDS Edit (Consulair Corp.), and MacTools (Central Point Software, Portland, OR).

What Constitutes a Problem?

Problems can be either obvious or obscure. You'll know right away when you have an obvious problem: you flip the switch and your Mac does nothing, or more spectacularly, the entire screen trembles and dissolves into visual static, accompanied by the eerie moan of distressed electrical components. Obscure problems, not as readily apparent, can include everything from intermittent noises in your disk drives to disappearing data files. In short, whenever things don't go just as you expect them to, you've got a problem, and you need to start tracking it down.

Problems can exist in any of three general areas—hardware, program disks, or data disks—so tracking problems consists of these major steps:

- Is it hardware or software?
  A hardware problem should be traced to a specific part of the Macintosh.
- Is it the data disk or the program disk?
  A software problem should be traced to a specific disk.
- Should the problem be referred to a professional?
  Program disks and most hardware problems should be referred to your vendor, for exchange or repair. Data disk problems can only be tackled by you.

In this chapter of *The Macintosh Advisor* we'll show you a series of logical procedures to follow in trying to locate the source of a problem. Then, we'll explain how to save your damaged data disks whenever humanly possible.

Tracking a problem can be a complex procedure. As you read this chapter, please refer to the troubleshooting chart in Figure 9–1 to help guide you through the many steps that may be necessary to close in on the problem.

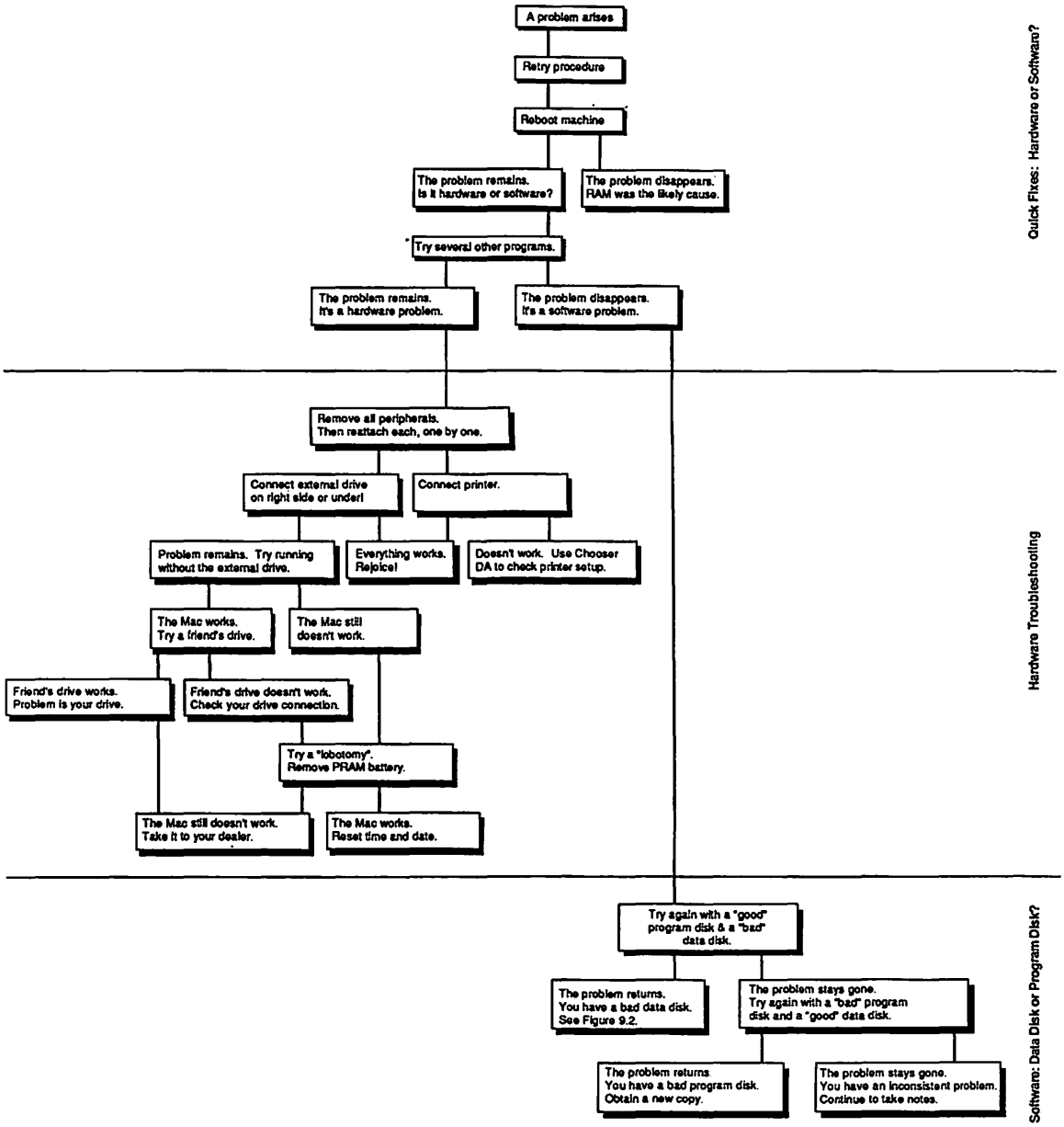


Figure 9–1. Hardware and software troubleshooting.

Simple Problems: Retry and Reboot

At any moment, your Macintosh has thousands of electronic signals scurrying through its circuits. The wonder is not that problems occasionally crop up, but that they don't occur more often. One stray electronic signal—a bit of static, a small fluctuation in electric current—can cause an apparent problem in any computer. Therefore, when your computer acts in unexpected ways, the first thing to do is to try the same procedure again, even a few times in a row if necessary. Often this alone will make your problem disappear.

If the problem persists, it may be that these unwanted signals, or stray bits, have gotten stored in RAM where they continue to interfere with your work. Try rebooting your computer, next: turn it off, then on again to clear out all of RAM. Then, get back to the work you were doing, and try the same procedure again. If it works now—as it most often will—you've solved the problem. If the problem remains, you'll have to track it down, as outlined above, to determine whether the culprit is your hardware, your program, or your data disk.

Make Backups and Take Notes

If you've made a backup of your disks, you may be tempted to just pop in your spare disk, and continue working at this point. Hold off, though, and make *another* copy of your backup first, making sure to lock your original backup first. The problem you're experiencing might also ruin your only backup copy, if you continue as before. The goal of regular backups is to make sure you always have *two* good copies of every important disk you own. Especially when your computer is not acting normally, make sure to be zealous about backing up. (Take care of this now if you *didn't* have a backup already, too. If the problem is not in your data disk, you'll want an extra copy of your good data. If a damaged data disk is part of your problem, you'll need an extra copy of the damaged disk to follow our suggested recovery procedures. Some badly damaged disks must be copied with special methods. See **Bit Copy the Disk** if your disk can't be copied by the normal process of dragging its icon in the Finder.)

Once you've made this extra copy, you *can* proceed to work with it, as long as it functions properly. After all, your main goal here is to get back to work as quickly as possible. Keep in mind, though, that the same problem may recur when you're facing a desperate deadline if you don't take the time to do a little sleuthing now.

Your detective work should start with a little note taking. You'll need these notes to detect a pattern in any intermittent misbehavior, or to explain the problem to a service person. Some things to take note of include:

- your hardware configuration (RAM, disk drives, etc.)
- the program you're using, including its version number
- the System and Finder versions you're using
- the brand of disks you're using
- what side of the Mac the external drive is on
- any funny sounds you hear
- how long you'd been working when the problem arose
- any changes since you last worked with your current disks
- any changes in fonts or Desk Accessories
- any error messages displayed on the screen

Using your copied data disk, try to continue with your work. If the problem resurfaces intermittently, just make frequent backups, and continue to take notes. Until a consistent pattern appears, the effort spent tracking down a problem will almost always be futile.

Hardware vs. Software

Your first task in pinpointing a problem is to try to determine whether it's caused by hardware or software. Try an entirely different program, with its own attendant data. (Lock the disks by sliding the small tab toward the edge of each disk, or use easily replaceable programs like MacPaint and MacWrite, along with unessential data...just in case your problem is damaging disks.) If the problem's gone, software may be the culprit. Skip to the section below labeled, "What if It Isn't Hardware?".

Narrowing Down a Hardware Problem

It's more than likely that your problem will be confirmed by experimentation with another program. If it's a problem saving or retrieving files, or printing data, you'll discover that it persists in all your application programs. This points rather clearly to a hardware problem. Your task now is to figure out what part of your Macintosh is malfunctioning:

- a drive, printer, or other peripheral attached to the Mac
- the Mac's parameter RAM (explained on next page)
- the Macintosh itself

Basically, the technique for this is to strip the Mac of any extra cables and peripherals, then slowly reassemble your equipment, in order to isolate the source of the problem. (We've seen a Mac entirely disabled by a faulty modem cable.)

Be aware as you trace hardware problems that intermittent trouble can be caused by loose connections or faulty chips that act up only after the Mac heats up from use. This is why it's important to note the duration of any work session when you're having problems. You'll feel like Sherlock Holmes as you see a time pattern emerging, pointing to a hardware problem.

Printer Problems

Error messages such as "Can't print this document" or "Printer not ready" are most frequently solved by checking the Chooser (formerly Choose Printer) Desk Accessory. If your Mac has not been properly told which printer you're using, and to which port the printer's attached, it won't print. Select the appropriate port and printer by clicking in this Desk Accessory (see examples below).

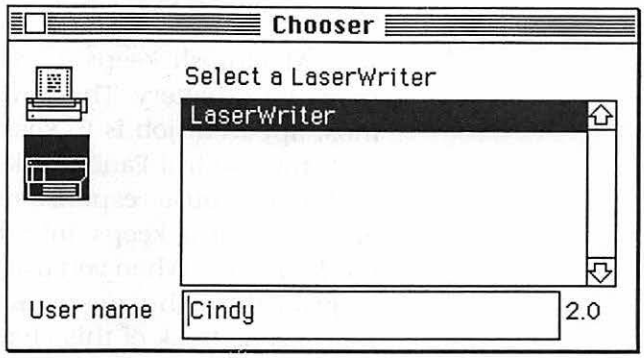


Figure 9–2. Check the Chooser DA if you're having trouble printing.

Disk Drive Problems

Drive problems can be traced to the drive's location, a problem with the drive itself, or a problem with the Mac's disk drive connection. Make sure any external disk drive is on the *right* side of your Mac, or beneath it. On the left, signal interference from the Mac's power supply may make it impossible for the drive to read your disks reliably. It's also cooler on the right side of the computer, making the left an unsuitable location for the drive. Don't put your drive on top of the Mac either—you may block essential vents on the machine, and power supply interference can still be a problem.

If relocating the drive doesn't help, try running the program without the second drive attached. Programs that "require" two drives can usually be run on one, if you start with a system disk, then eject it for the program disk. If the problem disappears, you may have a problem with your external drive. To double-check, borrow a drive from a friend. If your friend's drive works, you'll know your external drive needs servicing.

Your friend's drive may not work either, though. At first this seems to indicate a problem with some other part of the Mac. But remember, your machine worked fine without any second drive at all. The truth is most likely that there's something wrong with the connection between your Mac and *any* external drive you attach. You'll want to check the set of instructions your computer has stored in RAM to control the drive connection.

Parameter RAM

Your Macintosh keeps a small bank of RAM charged at all times by a battery. This RAM is called parameter RAM; its most apparent job is to keep track of the settings you make with the Control Panel Desk Accessory—things like the date and time, mouse response rate, and speaker volume. Parameter RAM also keeps information about your printer and modem ports. When you use Chooser or an application menu to print through your modem port, for instance, parameter RAM keeps track of this change.

Hot Tip

From time to time, parameter RAM may be contaminated by the same type of stray data bits that can get into your regular memory or on your disks. If you've determined that your drive connection is not functioning properly, or if you've determined that something besides your external drive is creating a problem with your Macintosh, you should try cleaning out your parameter RAM. This is affectionately known as giving your Mac a lobotomy.

You do this by turning off the Mac, and removing the battery from the back of the machine. Without any power, parameter RAM slowly "forgets" everything it ever knew. Leave the battery out for about five minutes with the Mac still off, to be sure that parameter RAM has returned to all its default settings. (If you are curious and very technically inclined, there's a public domain program called PRAM (Ken Winograd, Manchester, NH) that lets you check parameter RAM settings at any time.) Then, replace the battery, making sure to align the positive and negative poles with the icons on the battery case.

Hopefully, when you boot up your machine again, you'll find that it works fine. If so, this simple fix has just taken care of the problem. (Remember that you must reset the date, time, and any other custom settings you prefer, as they've all been wiped out.) If not, there's nothing more you should try to do; you must take your Mac to the nearest competent technician for servicing. Bring along your notes, to cut down the service time for which you're likely to be charged.

What if It Isn't Hardware?

We suggest you check out hardware problems first, as they can get worse or damage additional data if left untreated. However, you may have found that, when you used another application and its data, your problem went away. In that case, you would have skipped the hardware section above, to concentrate on a probable software problem with either your original program disk or its accompanying data.

Software Problems: Program Disk or Data Disk?

The only way to determine whether it's your program disk or your data disk that's turned outlaw is to do controlled tests, pairing each suspect disk with a known good disk. Make sure you have the following disks, before you start:

- Disk 1: the program disk you were using when the problem occurred
- Disk 2: a copy of the data disk you were using when the problem occurred
- Disk 3: your backup copy of the program you were using
- Disk 4: another working disk of data files created with the program in question

The first two are considered the suspect disks, as they were present at the scene of the crime. The final two disks are the control disks, so they must be in good working shape. Test them together, to be sure; they should work, since you've eliminated hardware as the cause of your problems.

Once you've assembled the proper disks, pair them off to find the problem, like this:

Good program disk, bad data disk

First try the good program disk (Disk 3) with the copy of your suspect data disk (Disk 2). As before, make sure your program disk is locked, to limit any possible risk to it. (No changes can be recorded on a locked disk. Note, though, that some programs will work only with the disk unlocked.) The problem must be connected to your data disk, if it persists now. Perform any necessary file recovery, as explained below.

Bad program disk, good data disk

You should try the opposite combination now (Disk 1 and Disk 4) if the problem did not reappear yet. At this point you suspect a bad program disk. It's getting pretty obvious: The problem disappears when you use entirely different copies of both disks, and it disappears when you replace the program disk.

If the problem doesn't surface with any of these combinations, you've got one of those dreaded intermittent conditions we referred to earlier; just take notes, make lots of backups, and keep your fingers crossed. More likely, though, this test will confirm the diagnosis of a sick program disk. Return it to the software company for a replacement, or make an extra copy of your working backup, if possible.

Warning: Technical Jargon Ahead

Hardware problems and application disk problems all end with the same ultimate solution: Send the item back whence it came, and get someone else to solve the problem. You can't pass the buck, though, on data disk problems. You've got to learn how to deal with them yourself, unless you truly enjoy recreating hours of data entry. (Note that we use the term "data disk" to refer to any information on disk that's not part of your application program. With today's sophisticated programs often filling a floppy, System and data files frequently share the same disk.)

You should know up front that file recovery can get more than a little technical. We'll keep it as simple as possible, but a certain amount of jargon and technical detail is unavoidable if you want to make any attempt to save important data. Just look at it this way: we're not asking you to get your medical degree in Disk Doctoring, just to take a quick crash First Aid course.

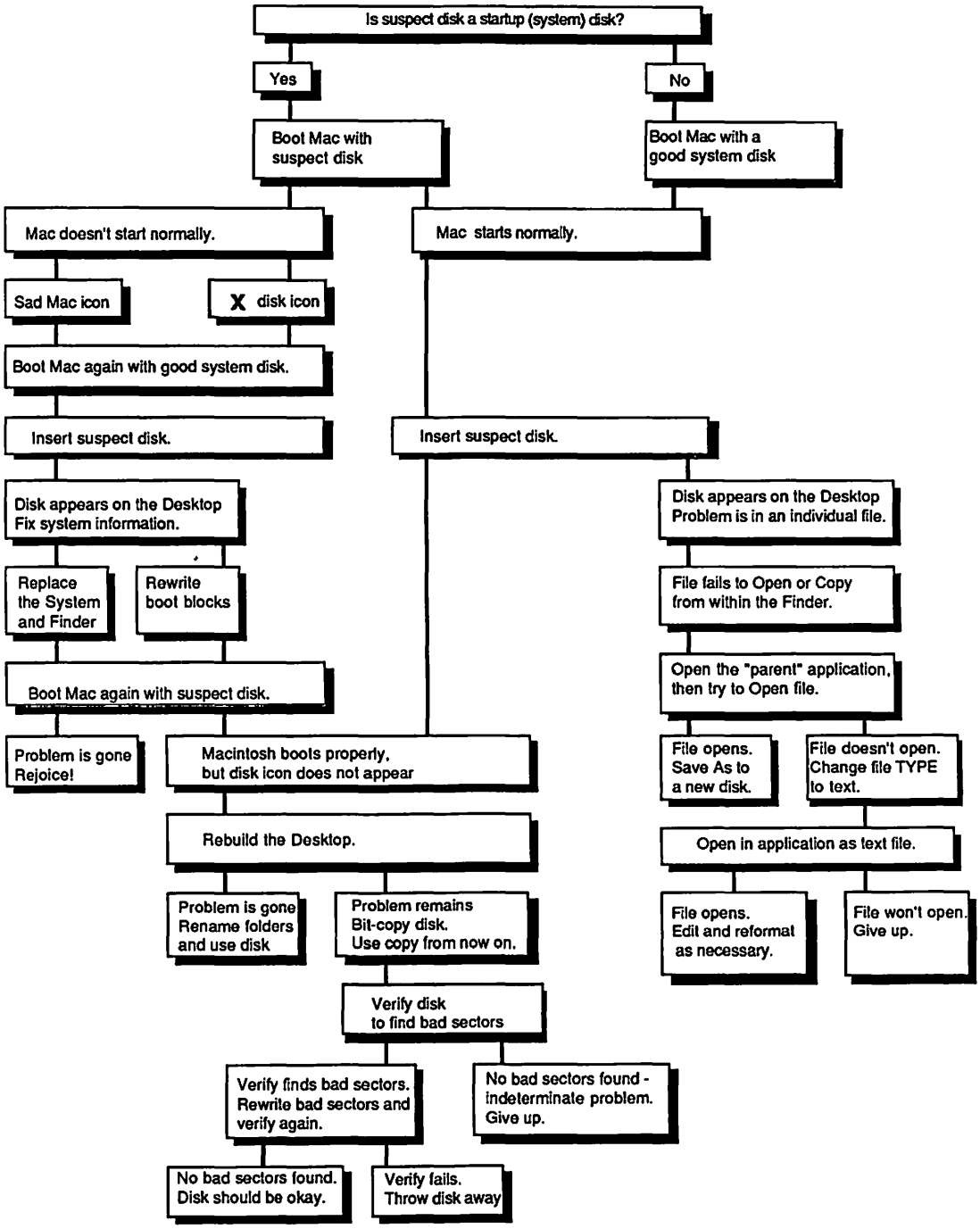


Figure 9–3. Data disk troubleshooting.

How to Save a Destroyed File or Disk

Now that you know the problem is your data disk, there are several possible culprits:

- your System files
- other essential system information
- your data itself
- other important file information
- the actual physical disk

Let's take a look at a systematic procedure for isolating and trying to fix data disk problems. Follow along with Figure 9–3 as you read the text to help you keep track of the steps involved in tracing a data disk problem.

System Problems or Data Problems?

The first step is to determine whether the disk's problem lies in its System information or in the data itself. Shut down your machine, and restart with the suspect disk in the drive. (Skip these steps if your disk is not supposed to contain System files, and continue at **Rebuilding the Desktop**, below.)

If the Mac doesn't boot properly, you'll get one of these icons:

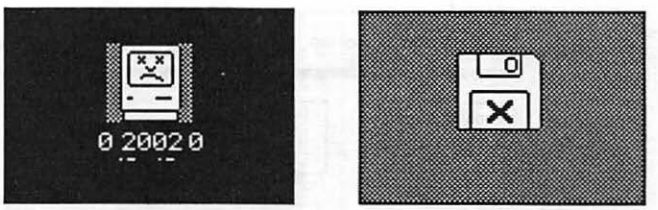


Figure 9–4. The "sad Mac" and the X disk.

The sad Mac on the dark screen indicates system software problems. Most often, it means that the disk once had System files, but there are no usable ones there now. This could mean simply that you've Trashed the files at some point to make room for more data—or that the System files have been damaged inadvertently. In any event, the sad Mac signals a dead end; you'll have to reboot the machine to recover.

The X icon simply means the disk has no System files, and can't be used to boot the computer. Chances are, there's nothing wrong with the disk at all.

In either case, take the damaged disk out (hold the mouse button down while rebooting, if the Mac won't eject your damaged disk otherwise), then use another known good System disk to proceed. Once the Macintosh is properly booted, insert the questionable disk in the other drive. If the disk icon appears at this point, you have a problem with the disk's essential System information.

Faulty System Files

Several parts make up a disk's System information—information the disk must have in order to start your computer. The parts include the System file, the Finder, and the boot blocks (explained below). Probably the easiest way to get around faulty System files is to initialize a new disk, copy working System and Finder files onto it, then copy the files from your damaged disk onto the new disk. New boot block files are created automatically when you copy the System file to your disk.

If you'd prefer to fix your old disk, though, follow these steps. First, copy new System and Finder files to the damaged disk (use the ones on the good disk you just booted with). Click the OK button when you're asked if you'd like to "Replace items with the same names with the selected items"; the new files will replace your old System files, and simultaneously replace the boot blocks on your disk. Be aware that the Desk Accessories and fonts on your disk will change unless the new System file is identical to the old one. Boot again with the suspect disk, to check it. The problem will most likely be gone, meaning it was caused by some corruption of the System, Finder, or boot blocks.

Boot Blocks

If you've spent a good deal of time customizing the fonts and Desk Accessories on a disk, you may be frustrated at having to lose them when you try to repair a disk, as described above. It may be that only the boot blocks on your disk are damaged, and that replacing the entire System file is unnecessary. The next section will explain just what the boot blocks are, and tell you how to replace them without disturbing the System file on a disk.

Your Mac's ROM (Read Only Memory) contains a small amount of "boot" information—instructions that tell the computer how to start itself up. (In fact, that's where the word boot comes from—the computer is pulling itself up by its bootstraps.) The last of these ROM instructions tells the Mac to start up the disk drive, and look for continued instructions in a particular spot on the disk in the internal disk drive. If a disk does not have this information—or it's been damaged in some way—the computer can't start up (you'll get the sad Mac, as described above).

What is this vital information on your disk? For one, the boot blocks store the name of the program Mac should start running first. Usually, this is the Finder; if you've used Set Startup or the MiniFinder, the boot blocks tell the Mac what other program to start up automatically. In addition, the boot blocks contain information about the Clipboard, which can get rather complex when Switcher's running with separate Clipboards for each program.

Since all this information is so important, it's easy to see that you'll have to repair your boot blocks if they're not functioning. As you already saw, the easiest way to fix the boot blocks is by replacing the System file. If you're reluctant to do that, try a procedure using FEdit, a rather technical shareware program (John Mitchell, Sunnyvale, CA) that's essential for many disk analysis and rescue chores. Here's how FEdit works for fixing boot blocks:

1. Load FEdit.
2. Select Open Volume from the File menu. "Volume" means any physical diskette or hard disk partition.
3. Indicate the disk that you want to fix.
4. Select Write Boot Blocks from the File menu.

At this point, you'll see the screen below. Click OK to write a new set of standard boot blocks on your disk.

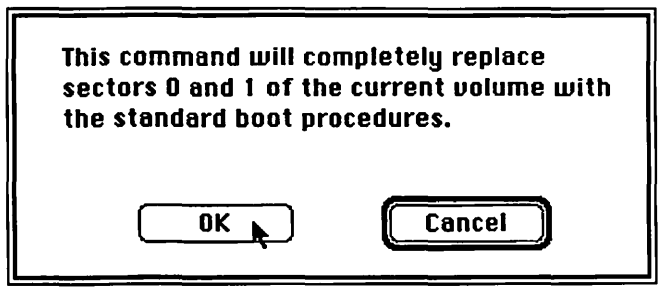


Figure 9–5. Rewriting the boot blocks.

Note that this is the *standard* boot block information. If you had used Set Startup to run something other than the Finder (like MiniFinder or another application) at startup, this information would be lost. If you'd like to make sure that customized boot blocks, rather than standard ones, are written on your disk, choose Edit Boot Blocks instead of Write Boot Blocks. It's found in the same File menu in FEdit. You'll get the screen below, listing all the information your boot blocks contain. You can type the name of your desired startup program in the space marked Initial File to Run, then click Update.

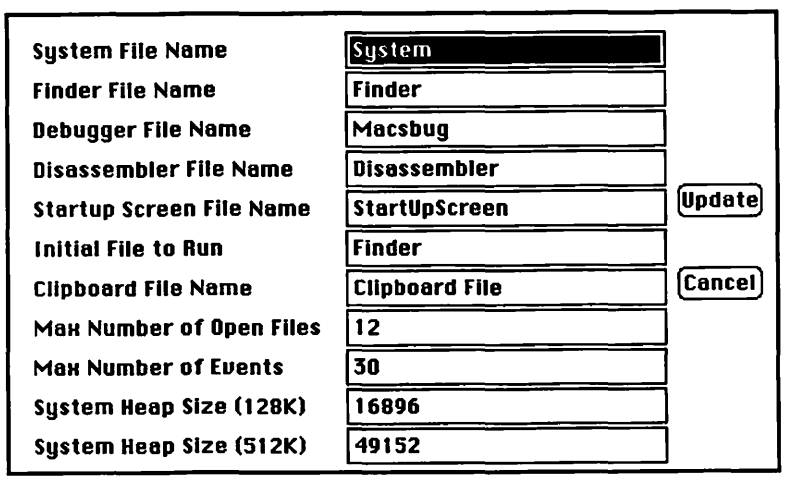


Figure 9–6. The components of the boot blocks of a System disk.

The rest of this information is generally of a technical nature, so just ignore it for our purposes. All in all, the fix is really quite easy, for something that sounds so complex.

Rebuilding the Desktop

Now you've seen how to fix faulty System, Finder, and boot block information, as well as how to change only the boot blocks on a startup disk. The rest of the information in this chapter applies to all data disks, whether or not they are startup disks.

Occasionally, you may insert a disk only to discover that it takes an interminably long time for its icon to appear on the Desktop, or that it never appears at all. In the latter case, you may get a message telling you the disk is unreadable, like this:

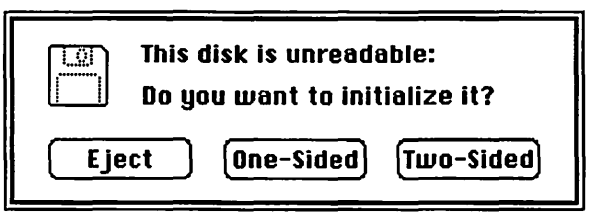


Figure 9–7. Don't initialize a damaged disk when you see this message!

Click Eject. Since initializing erases any information on the disk, you most definitely do *not* want to initialize your damaged disk. It can also happen that you'll simply see nothing—as if you'd never inserted the disk at all.

The most likely cause for this type of behavior is a damaged Desktop file. Every disk has a hidden Desktop file where it stores information about the icons and folders it contains. This file is created when you first initialize the disk and updated whenever you make changes in the disk's contents. The Desktop file is called a hidden file because its icon never appears on the Desktop, and it cannot be copied or otherwise manipulated by the Finder. You'll know it's there, though, because your disk says something like "0 items, 4K in disk" after it's initialized. If this file is damaged, the Finder finds it difficult or impossible to open and display the disk's contents.

A quick internal procedure—built into your Mac's system software—can sometimes rebuild this Desktop file. Simply hold down the Option and Command keys while you insert the disk, to trigger Apple's built-in Desktop recovery program. The procedure doesn't take long, and requires no fancy extra-cost programs: why not try this one before bothering with the System and Finder files, or the boot blocks? The answer is that the rebuilding process replaces all your folder names with catchy titles like "unnamed #1" and "unnamed #2," and resizes your windows. You won't want to put up with this mess until you've tried all the other options above.

An Unreadable Disk

If your disk still refuses to appear in the Finder, the Macintosh may ask if you want it initialized. You'll definitely want to decline Mac's generous offer to initialize your disk, since that process irrevocably erases all data on the disk. Even though the Macintosh seems to have given up, there's still a chance you'll see your data alive.

Data Problems and Disk Media Problems

At this point, you've determined that your data disk problems are almost certainly not caused by System, Finder, boot block, or Desktop file errors. These are easy to check; this information is relatively standard from disk to disk, and can be repaired or replaced if there's a problem. Once these areas have been eliminated as the probable cause of your trouble, only two likely sources remain: defects in the data files you created, or physical defects in the disk.

Physical defects can't generally be repaired (although we once removed peanut butter from a client's diskette), and your own unique data can be difficult to recover. Prepare yourself now with the basic mindset that your disk is gone. Anything you recover now is a serendipity, closely akin to raising files from the dead. A further caution: the techniques used to attempt any further recovery can cause additional damage to your data, just like the side effects of a strong medicine. If you have not already done so, make a copy of the disk before you start this serious first aid.

Bit Copy the Disk

For some damaged disks—especially those that won't appear in the Finder—you'll have to use a commercial backup program to make your extra copy. (After all, if a disk won't appear in the Finder, you can't use conventional icon-dragging procedures for copying.) This type of program, referred to as a bit-copy program (see Chapter 5), may also be effective if you've gotten the message "Some files couldn't be copied or were skipped." Where the Mac's normal disk copying process checks to make sure each file is intact as it copies, a bit-copy program doesn't stop to pass judgment; it just gives you an exact copy of your bad disk, bit for bit, no questions asked.

Whatever program you use (we like Copy II Mac, as discussed in Chapter 5), follow directions and take notes, as the program points out which tracks have errors. Later on, this information may come in handy as you try to fix the disk, so take advantage of the fact that the copy process reports these statistics for you.

Repairing Bad Sectors

Continuing errors indicate that some part of your disk has a piece of information the Mac can't read, or that it thinks is wrong. This can be caused by something being recorded in the wrong place, or by physical defects in the disk. In all likelihood, your computer will rebel every time you try to pass over this messy spot on the disk, even going so far as to refuse to read the entire disk. The "mess" is a 512-character pile of scrambled electronic signals, characters that have become, unfortunately, irrevocably lost. There is no way to unscramble the actual data that was stored in that area. Your main goal at this point is to remove the mess, so that the damaged area doesn't trip you up enroute to other intact data.

Your Mac considers this 512-character pile a sector. You can get rid of a bad sector by writing a copy of a blank, clean sector over it. You might think of it like showing a child a picture of a nice, clean room, then saying, "Now, get rid of that mess, and make your room like just like this." To do this, you must know the location of your bad sector, and the location of a spare good sector that can be used to copy over the mess.

Finding a Bad Sector

There are 800 sectors on the normal single-sided Macintosh diskette. (Double-sided disks have 800 sectors on each side, but the principles are similar.) These sectors are arranged on 80 tracks, or concentric circles that electronically segment the disk. The outermost tracks hold 12 sectors each, then each track holds fewer and fewer sectors as the concentric circles become smaller. The innermost tracks hold just eight sectors each, something like the simplified illustration shown in Fig. 9–8.

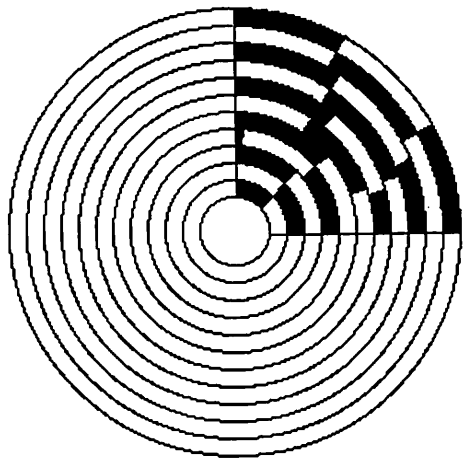


Figure 9–8. A diskette has 80 tracks and 800 sectors on each side.

Out of all these sectors, you must find the bad sector(s) before you can repair your disk. In our experience, sector repair is best done as a two-stage process. First, use MacTools, a program bundled with Copy II Mac (Central Point Software, Portland, OR), to find the bad sector. Then use FEdit (mentioned above) to clean up the damaged area.

Verifying: Finding the Bad Sector(s)

MacTools includes a menu option called Verify that scans an entire disk and reports on any bad sectors it finds. Here's how it works:

1. Load MacTools. You'll see a window for each disk or hard disk volume currently mounted.
2. Select the disk to Verify, by clicking its window.
3. Select Verify from the Disk menu.

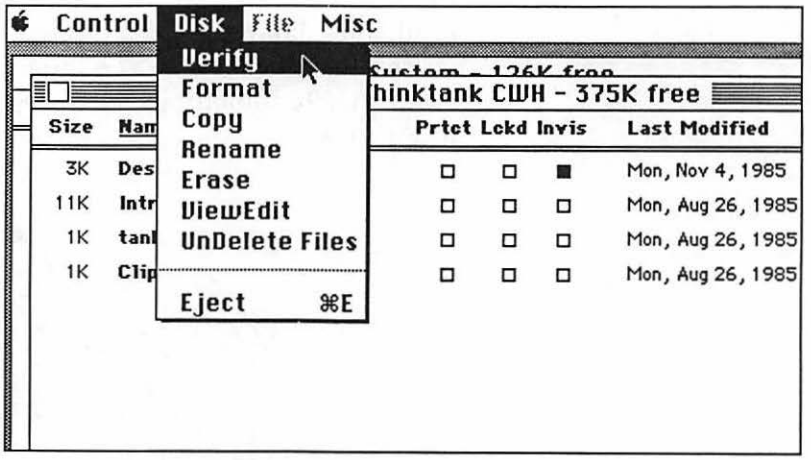
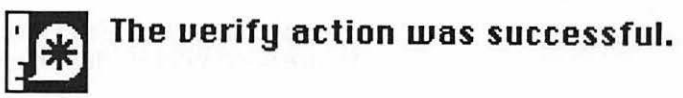


Figure 9–9. MacTools' Verify option checks disk sectors.

4. If the disk has no data errors, Verify will return this message, indicating that there are no bad sectors on the disk:



5. If Verify detects data errors, it will report their location, like this:

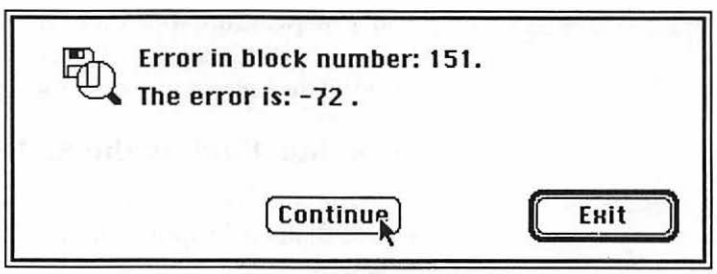


Figure 9–10. Verify reports the location of any bad sectors, or blocks.

Verify uses the term block instead of sector; in this context, the two can be considered equivalent. Jot down the error location on paper, as this is essential information, then click Continue. Verify will continue checking, and will report any additional errors it finds. Take note of each error location that Verify reports and keep clicking Continue, until the process concludes and MacTools returns you to its main menu.

Finding a Good Sector

Next, you need to determine the sector number of an unused good sector. To do this, you must exit MacTools and open FEdit.

1. Start up FEdit, and select the disk you're using.
   a. Open FEdit.
   b. Select Open Volume from the File menu.
   c. Indicate the volume (diskette or hard disk partition) that you want to fix.
2. Find a spare good sector.
   a. Choose Volume Sector Map in the Display menu. You'll see the screen below, where all the white rectangles represent blank sectors:

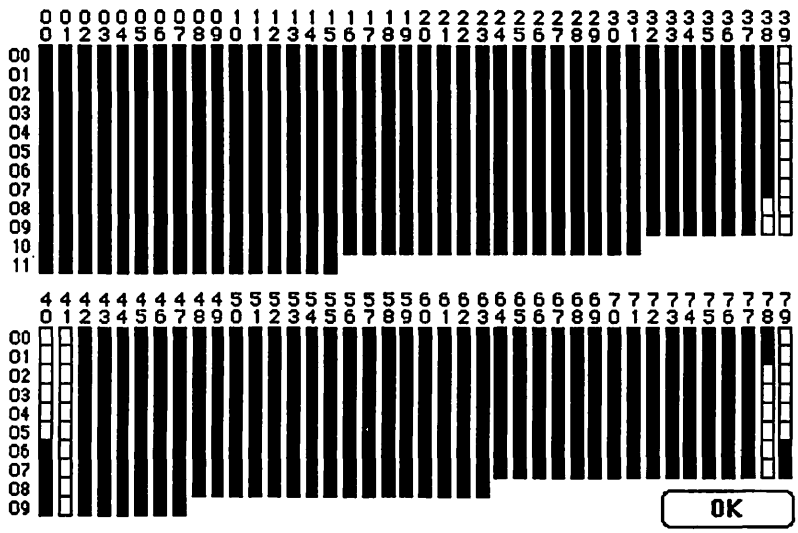


Figure 9–11. Sector Map of a single-sided disk.

   b. Figure out the address number of one of the blank sectors. The first blank sector in the illustration above is sector number 436, the white box at Track 38, Sector 09. Sectors are numbered consecutively starting with Track 00, Sector 0 as sector 0; Track 00, Sector 1 as sector 1; Track 01, Sector 00 as sector 12, and so on. Counting by hand is tedious, so we've included a sector numbering guide in Appendix C.

3. Take a "picture" of the clean sector.
   a. Select Read Sector from the Edit menu.
   b. Enter the number of a known good, blank sector in the space provided onscreen.
4. Clean up the bad sector by replacing it with the copy of the clean, blank sector.
   a. Turn on Extended Write in the Options menu. This is a toggle, and will appear checked when it's on.
   b. Select Write Sector from the Edit menu.
   c. Enter the sector to write to—the bad sector's number.
5. Repeat this whole procedure for any additional bad sectors. You will not have to select Extended Write each time.

Verify the disk again, to make sure you've fixed the problem. If it verifies, all is well. By this, we mean that you can now successfully use the other data on your disk. There is no reliable way to recreate the data that was in the bad sectors; you'll have to reenter it.

An Important Note on Verify

It's logical to ask, "If Verify finds disk problems, why use all those other detective methods described above?" Verify finds scrambled data—bad bits that cannot be read. Often, a disk problem stems from readable data that makes no sense in context, or missing data—neither of which Verify can detect. Therefore, a number of different techniques must be used to track down and solve any particular disk misbehavior.

A Physical Disk Problem

If a disk does not verify after you clean up the bad sectors, there's a physical problem with the disk. Get rid of it! Disks aren't *that* expensive that it's worth taking any chances at all by reusing a defective disk. If you're watching your pennies, or if you're just scientifically curious, you may want to make absolutely sure that the disk is indeed damaged before you discard it.

Try this if you'd like:

1. Copy any usable files onto another disk. (You've probably done this as part of the process above, but it bears repeating.)
2. Initialize the bad disk, using Erase Disk in the Finder, or any other format program.
3. Reverify the suspect disk. If it verifies, you can reuse it.

With absolutely no data left after the Format process, any errors found by Verify must be caused by actual physical problems with the disk. *Immediately discard the damaged disk.* Don't leave the disk lying around. Be aware, though, that most manufacturers will let you return a damaged disk for trade-in.

Balky Files

As we mentioned above, Verifying can't flag readable data that makes no sense in a specific context, or missing data. Yet these situations are apt to be the cause of certain disk problems. For example, you may see a disk appear in the Finder, but discover you can't copy or move one of its files. The likely culprit is a problem with some special identification information that is stored with each file on your disk. When this information is missing or incorrect, the Finder can't properly manipulate your file, meaning *you* can't get at your data.

Don't give up yet. There are two ways you may still be able to get at that data. They are:

- by using the application that created it
- by editing the file's ID information

Use the Application to Save As

If you can get the file to open from within its "parent" application, as explained below, you can save it as a different file, and the essential file identification information will be rewritten.

1. Open the application that created your file.
2. Select Open from the File menu.
3. Insert the disk containing your balky file.
4. If the file appears in the list box, open it.
5. Use the Save As command to copy your file to another disk.

Your file should work fine on its new disk; all the Finder information should have been resurrected by this process. Check it out to be sure. Remember, though, that you still don't know why this vital information was missing. You may have a problem with the original disk, so:

1. Copy any and all other files onto another disk.
2. Reinitialize the disk.
3. Verify the disk, to make sure there are no physical problems.

Your original disk can be reused if it passes this test. If not, discard it.

File Signature Problems

Using Save As only works, though, if your file appears in the list box when you choose Open from inside your application. If it doesn't work, you have more serious problems, but there's still one more chance to avoid reentering all your data. You can go into the file and manually change the file identification information—known as the file signature—yourself.

To do this, you need to understand a little bit more about what's in a non-graphic data file. Every file you create with your Macintosh can have two types of information stored in it: the actual data, and program-specific formatting information. The data are your words and numbers. The formatting characters control screen characteristics, such as fonts and margins in a word processing file, or columns and range names in a spreadsheet.

It's quite easy for almost any program to read straight data from almost any file. Formatting characters are quite another thing: a tab character may indent a paragraph in a word processor, separate the fields in a database, and separate the columns in a spreadsheet. This explains why most applications let you save a file in two forms:

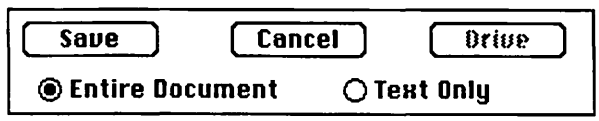


Figure 9–12. Click Entire Document, and formatting characters are saved in the file.

When you save an Entire Document, your file contains data and formatting characters: you'd choose this if your data will be used only with its original application. If you click Text Only, your file contains straight data with no formatting characters. Now the file can be read by a wide range of other application programs.

You have two chances then, in manually adjusting a file signature. First, you can make sure this ID matches perfectly with the application, so that both data and formatting characters will be understood. If that fails, you can identify the file as a text file. You'll lose all the program-specific formatting this way, but you may be able to save the data. The next section explains everything you'll need to know about file signatures and how to change them.

The File Signature

To match each file up with the proper application, every file has a *signature:* 2 four-letter names stored with the file that tell which application created a file, and what kind of file it is. These two names are:

Creator Creator is a four-letter code for the program that created the file. Some common examples of creator codes include:

Application	Creator Code
MacWrite	MACA
MacPaint	MPNT
ThinkTank	TANK
Excel	XCEL

File Type The other four-letter code tells the file type. A single application, or creator, often produces more than one type of file. Although these names are usually rather cryptic, a little imagination may tell you what the four letters stand for (we've decoded our examples here). Some examples, from MacWrite and Excel:

File	Type Code	The Cryptic Code Means
MacWrite data only	TEXT	text
MacWrite formatted	WORD	word
Actual MacWrite program	APPL	application
Excel spreadsheet	XLBN	Excel binary
Excel graph	MCBN	Microsoft Chart binary
Excel macro	XLPG	Excel [macro] program
Excel text	TEXT	text
Actual Excel program	APPL	application

Some examples of the way Macintosh uses signature information may also help to illustrate the importance of this system:

- When you select Open from an application, the list box shows all the files with the proper creator code for that application. It will also show any other files with type codes it can read—such as text files—regardless of the creator.
- When you drag a file to the Trash, you get a confirmation box asking "Are you sure you want to remove the application xxx?" if the type is APPL, for application. You won't see this box if the file has any other type.

Restoring the Original File Signature

First you'll want to try recreating the full file signature—the exact creator and type. To do this, you'll first need to look at an intact file from the same application, to find out what the proper file signature codes are. Then you'll need to edit the file signature, and try again to open the file. The easiest tool we've found for this job is DAFile, a Desk Accessory introduced in Chapter 3. You can use DAFile to check the file signature of any file, as well as to change it. Here are the steps you'll follow, after making sure DAFile is installed in your Desk Accessories:

1. Open DAFile, by selecting it from the Apple menu. Then select File Info.

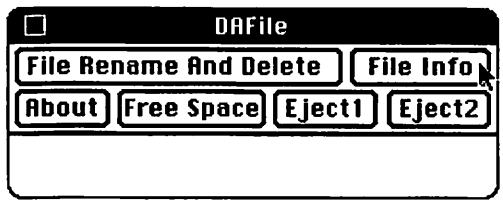


Figure 9–13. DAFile.

2. You'll see a list box, giving you access to all your currently mounted files. Choose a file you're sure was created by the same application as your damaged file.
3. DAFile will show you information about your current file, as illustrated below. Much of it is technical detail that does not matter here. Turn your attention to the lower part of the screen, where Type and Creator are displayed with the file signature codes in the boxes below. (Our example shows a fully formatted "entire document" MacWrite file.) Jot the codes down on paper.

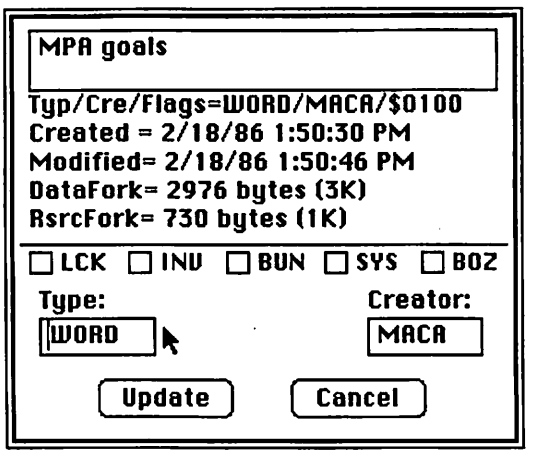


Figure 9–14. DAFile's Disk Info screen.

4. Click Cancel to close this screen, then select File Info again from the DAFile menu. Select the name of your damaged file, this time. Since DAFile lists *any* file, regardless of Type or Creator, your file should show up here, even though it didn't show up in your application's Open list box.
5. You'll see the same screen as above. This time, though, you'll click on the Type box and edit its contents, then click on the Creator box and do likewise. Use the information you jotted down in step 3 to fill in the boxes. (If these boxes already hold the expected information, move on to **Changing the File Signature to Text.**)
6. Make sure to click Update when you're done. The changes do not become part of your file until you do this.
7. Close DAFile by clicking its close box. Then try opening your damaged file with its parent application. Hopefully it's a damaged file no longer, and it will open.

Changing the File Signature to Text

But what if your file still won't open in its own application? Sometimes, for unknown reasons, an application "disowns" a particular file, and just *will not* recognize the file as its own offspring. In this case, you should disguise the file as a TEXT file, to get it past the guards. (Of course, this won't work with a graphics file, such as one from MacPaint.) This process is almost identical to the one above:

1. Open DAFile, and choose File Info.
2. Select your damaged file from the list of files offered.
3. Change the type of the file to TEXT. The creator does not matter.
4. Click Update, then close DAFile.
5. Try to open your damaged file. Your application will show you a message something like this:

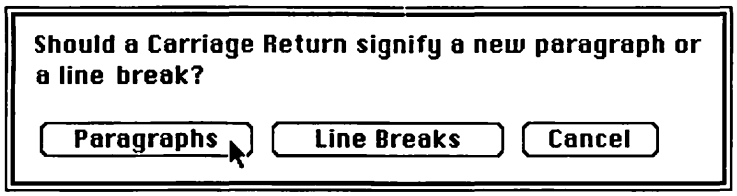


Figure 9–15. All text files need to be told how to interpret carriage returns.

Click Paragraphs. You're helping your file regain a little of the most basic formatting information it's missing. Then you'll see another message, telling you the file is opening as "Untitled". These steps or similar ones occur in most applications whenever you open a text file; they are unrelated to the fact that you are trying to recover a damaged file.

Editing file signatures can be done with both FEdit and MacTools, too. Just so you'll be familiar with all three approaches, we've used MacTools later in this chapter (See **Recovering a Trashed File**), and will outline the FEdit file signature editing process here:

1. Start up FEdit.
2. Select Open File from the File menu.
3. Select the file with which you're having trouble.
4. Select File Finder Attribute from the Display menu.
5. Type your changes in the Type and Creator boxes. Just ignore all the other technical jargon on the screen.

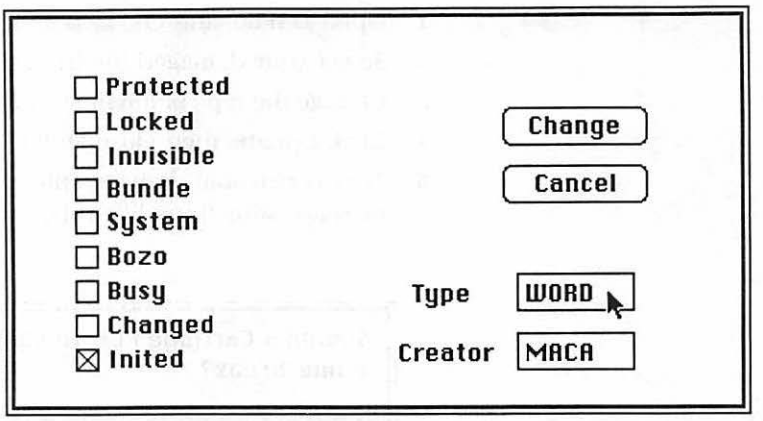


Figure 9–16. Changing a file signature with FEdit.

6. Click the Change button, to record your entry.
7. Quit FEdit, then try to open your file.

Cleaning Up a Text File

Chances are good that your file can now be read with any word processing program, even if it started out life as a spreadsheet or database file. But what will appear on the screen? That depends on the original source of the file, and on any damage the file has suffered. Damage aside, word processing files have the best chance of being readable; other files may produce stray islands of text surrounded by strange symbols.

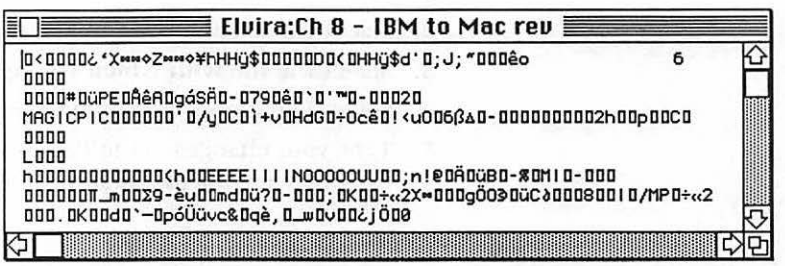


Figure 9–17. A text file with too much "garbage" is not worth saving.

These symbols represent the formatting characters from the original file and/or damage to the file. You won't see these characters in an undamaged text file that was created by choosing Save As Text Only, because that procedure leaves the formatting information out of the file. Our file, though, was originally created as a fully formatted file, then *changed* to the type TEXT. So the characters are in the file, but the application just won't try to interpret them. If these characters predominate, you may want to just throw in the towel, and start reentering your file from scratch. Otherwise, the next task is to strip the symbols out of the file, leaving just the good data. (Unfortunately, there's no reliable way to restore these symbols to their original functions.) A public domain program called Diddler, by Scott Watson, is especially useful for this.

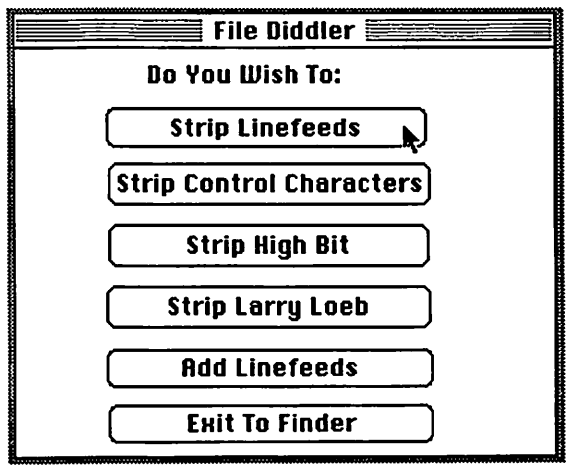


Figure 9–18. Diddler helps clean up control characters in text files.

It's a simple but effective program. After you start it up, you see one menu screen of click-buttons. Some of Diddler's features are useful for cleaning up text files, while others are helpful for translating files transferred between the Mac and other computers (see Chapter 8). Here's what each does:

Strip Control Characters Gets rid of the majority of stray formatting characters.

Strip Linefeeds Returns the document to one long string of text with a carriage return at the end of each paragraph, which is the natural state of a Macintosh word processing document. *Don't* do this if the document is a database or spreadsheet; wait till you've looked at it with an editor (see below).

Strip High Bits Some IBM programs—notably WordStar—use an extra bit to store each and every character in the file. You'll have to strip off this extra bit before another program can understand the data.

Strip Larry Loeb Loeb is a friend of the author. Choosing this joke option gives you a strange pseudo-error message, without doing anything for your data.

Add Line-feeds Not usually needed for cleaning up Mac files, this option puts a line-feed at the end of each line in the document. You're more likely to need this if you're preparing a file to be sent over to an IBM PC, where line-feeds are almost ubiquitous.

For file cleaning, the first two options are the ones to use. The rest are usually used for file transfer cleanups. Most word processing documents should be quite readable once line-feeds and control characters are stripped. If not, or for database and spreadsheet files, additional detail editing may be needed.

Cleaning Up with an Editor or Word Processor

Diddler removes most of the control characters, but tabs, returns, and spaces may still be in disarray if they were damaged earlier. Now a word processor is the best tool for final cleanup, provided it can:

- show invisible characters
- search and replace individually and globally
- read TEXT files from any source reliably

Microsoft Word can do most of this; a program owned by Apple but freely distributed called MDS Edit is even better—especially for those who haven't invested in Word. You can get MDS Edit from most user group or bulletin board public domain collections.

Figure 9–19. A tab starts this sentence and a return ends it, with spaces between words.

Most programs expect to see data in a specific pattern, in order to read it. The usual forms are:

- *Word Processor:* Files will have a return only at the end of each paragraph.
- *Database:* Fields will be separated by tabs, records by returns.
- *Spreadsheet:* Columns will be separated by tabs, rows by returns.

Your job, with an editor, is to remove any remaining stray control characters, clean up any extra spaces between words, and make sure tabs and returns are in the right spots. Your basic weapon is the editor's search and replace command, supplemented by a great deal of tedious hand editing.

Here's how a typical cleanup session goes:

1. Open MDS Edit, and select the file to be edited.
2. Select Show Invisibles from the Format menu. Tabs appear as arrows in MDS Edit, spaces as diamonds, and returns as a right-angle character. Now you'll be able to see all the characters that may need to be cut.
3. Clean up remaining control characters, by selecting and cutting. Often the beginning and end of a file will be full of control "garbage."

4. Fix the tabs:
   - by hand, if most of the tabs are correct
   - using Change in the Search menu, if the majority of tabs need to go

   You'll need a trick to enter "tab" in the Find box, since pressing the tab key here will move you to the next box:
   a. Select a tab character in your document (remember, it's an arrow).
   b. Cut it to the clipboard, then paste it into the Find box.
   c. Change the tabs to spaces, using Change in the Search menu and entering a space in the Change To box.
5. Fix the returns. Use the same procedure as for tabs. Again, it will be necessary to cut a return from the document and paste it into the Find box; pressing return will simply finish off the command.
6. Get rid of extra spaces. It's common to have extra spaces in a damaged document. The best way to remove the extras without eliminating *all* spaces is with Search and Replace. Simply Find two spaces, and Change To one space, repeatedly. Large blocks of space characters will be quickly whittled down, leaving a single space in their place.

You should now be able to open up your application and read the rehabilitated file into it as a text document. Make sure to check your results carefully, from within the program. Databases with a misplaced tab may have a few corrupted fields, but will generally be intact, as long as there is a return after each record. Spreadsheets, on the other hand, may be completely corrupted by a single misplaced tab: one number in the wrong cell may throw off hundreds of calculations. Be extremely careful with data you've brought back from the brink.

Undeleting Files

Speaking of data brought back from the brink, it may even be possible to recover files that have been Trashed. This is because the Mac—like most other computers—doesn't actually remove any file data when it erases a file; it just removes some important directory information that tells the disk how to find the file.

Every disk contains a great deal of information besides data. This information includes:

- A Directory: Size, creation and modification times, file signature, and a unique file number are part of every file's directory listing.
- A File Allocation Map: This table tells the Finder where the parts of each file are located, and which sectors of the disk are available to receive new information.

When a file is erased, the Mac removes its name from the directory, and updates the File Allocation Map to consider the old file's sectors up for grabs. No actual change is made to the file's data, though, until you put new information on the disk that parks itself on top of the old file, wiping it out. Therefore, if you've accidentally erased an important file, *do not* use that disk again until you've attempted to recover the file.

Recovering a Trashed File

Get out MacTools as soon as you realize you've mistakenly trashed a file.

1. Open MacTools, and select the proper disk.
2. Select UnDelete Files from the Disk menu.
3. You'll get a dialog box, confirming your intent, like this:

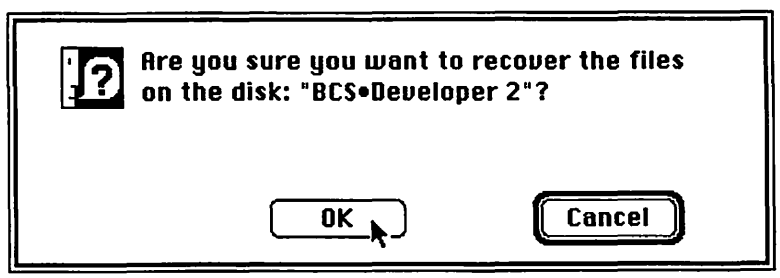


Figure 9–20. Recovering "erased" files with MacTools.

As soon as you say OK, file recovery takes place. Each sector that contains data for that particular file also contains an identifying tag, with the file's unique number. The recovery process scans the disk, collects all sectors with the same file number tag, and fills in new directory information and File Allocation Map information.

You can also perform this procedure with MacTools, choosing InfoEdit from the Files menu of that program. The MacTools version lets you rename the file at the same time, and forgoes the technical choices seen on the left in FEdit.

But there are a few things this procedure can't figure out all by itself: the file's name and its file signature. You know how to name a file—just type it in the Finder—and you've seen how to use DAFile or FEdit to change a file signature. Since we're already working with MacTools, though, let's explore how the process can be finished off without leaving MacTools.

1. Select InfoEdit from MacTools' Files menu.

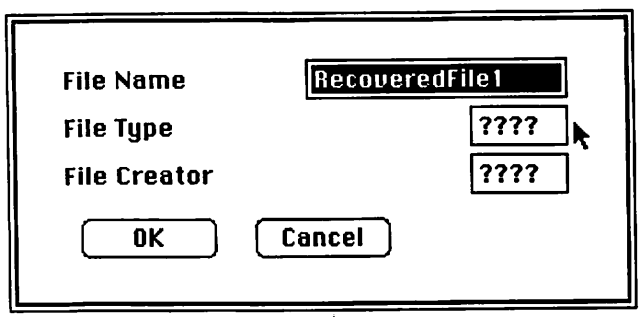


Figure 9–21. You must restore the file signature of unerased files.

2. Change the name, the file type and creator, then click OK. In our example below, the file has been changed to a MacPaint file of the type PNTG (painting). Changing the name is up to you. But the file *will not* open until the type and creator are appropriate. Look at other files, with utilities like DiskInfo or DAFile, or with the File Info option in MacTools, to learn all the Type/Creator combinations for your most commonly used programs (see **Restoring the Original File Signature** for a step-by-step description of this procedure).

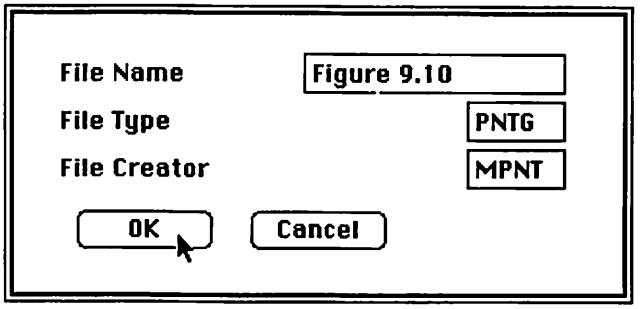


Figure 9–22. A MacPaint file signature looks like this.

Recovering Several Files at Once

MacTools can recover more than one file at a time. In fact, whenever you initiate the undelete command, MacTools looks for any and all orphan sectors on the disk, and will create additional files if it finds more than one file number. Sometimes this mass-recovery ability will help you resurrect a damaged disk that otherwise can't be read.

Be warned that a great deal of time, patience, and experimentation may be called for, since you may not have any idea of the names, types, and creators of any of your recovered files. There's no easy answer, especially if you store several types of files on the same disk. Just keep trying different combinations of type and creator, until you hit on the right one.

Hard Disk Recovery Tips

Although the explanations in this chapter are geared toward diskettes, most of these techniques are equally valid with hard disks. Of course, you won't be able to make an extra copy of your entire hard disk before you start your recovery attempts, but you can fix the System files, rebuild the Desktop, repair bad sectors, change file signatures, and undelete trashed files on a hard disk. Just make sure that you have the appropriate version of any utility programs, one that's geared to work with disks over 400K or 800K in size.

Summary

The tools we recommend you have for file recovery include FEdit, Diddler, MacTools, DAFile, MDS Edit, and Copy II Mac. No one of these does everything; each is valuable in its own way. To help you decide when to use each one, here's a comparative table of features:

	FEdit	MacTools	Diddler	MDS Edit	Copy II Mac	DAFile
Strip line-feeds			√			
Strip returns			√	√		
Strip control characters			√			
View invisible characters				√		
Edit invisible characters				√		
View as text file				√		
File Sector Map	√					
Volume Sector Map	√					
Edit file signature	√	√				√
Undelete files		√				
Verify files		√				
Rewrite boot blocks	√					
Edit boot blocks	√					
Format disk		√			√	
Bit copy disk					√	

Equipped with this first aid kit of utility programs—and a little diagnostic knowledge—you should be able to take on most of the common illnesses that can strike your hardware and software. Although you won't be able to "cure" some situations, at the very least you'll be able to give a more informed and in-depth assessment of the symptoms to your service person. What's more, you'll have the personal satisfaction of no longer feeling helpless when trouble appears.

Appendices

In line with *The Macintosh Advisor's* goal of giving you the concepts and specifics you need for understanding, evaluating, and implementing Macintosh options, three groups of appendices follow:

Appendix A: Shopping Lists—Much of this book covers the suggested criteria for evaluating various products and options. The evaluation pointers for each major topic have been expanded and reproduced here, in list form. We recommend you photocopy these lists, and use them to takes notes as you judge potential purchases.

Appendix B: Sources—This section is an address book of resources. It includes sources for every public domain, shareware, and commercial product featured in the book, as well as listings for user groups and magazines.

Appendix C: Technical References—A few tables and examples, because of their size or technical complexity, are not included in the main chapters. These include a list of Desk Accessories and their sizes, a table of ASCII codes for each key and key combination on the keyboard, and examples of command-key equivalents, as well as an MS-DOS dictionary, technical details on cable pin-outs for connecting IBMs and Macs, and a map of disk sector numbers.

APPENDIX

Shopping Lists

Shopping List for RAM Disks

Program Details	Size, in bytes	_____
	Distribution: Public domain, shareware, or commercial?	_____
	Cost	_____
Features	RAM disk made dominant disk automatically?	_____
	RAM disk program disk automatically ejected?	_____
	Loads RAM disk automatically?	_____
	Loads specified files into RAM disk automatically?	_____
	What is the minimum size of the RAM disk?	_____
	What is the maximum size of the RAM disk? Over 512K?	_____
	Can RAM disk be any size you want, or limited preset choices?	_____
	Impossible to eject RAM disk?	_____
	Warns you to back up before shutting down?	_____

Shopping List for RAM Disks (cont.)

Background	How long has it been on the market?	_____
	How many versions have there been? (the more the better)	_____
	What is the current version number?	_____
	How are upgrades handled? From company or dealer?	_____
	Is there any charge for upgrades?	_____
	Do you know anyone who uses it?	_____

Shopping List for Cache Systems

Program Details	Size, in bytes	_____
	Distribution: Public domain, shareware, or commercial?	_____
	Cost	_____
Features	Does it install a control program on application disks?	_____
	How much space does the control program take?	_____
	What is the minimum size of the cache?	_____
	What is the maximum size of the cache? Over 512K?	_____
	Can the cache be any size you want, or limited preset choices?	_____
	Will the cache start up automatically, once installed?	_____
	Can the cache be easily turned off to save RAM?	_____
	Can the cache be resized after it is running?	_____
	Does the cache work with hardware you own or plan to buy?	_____
Background	How long has it been on the market?	_____
	How many versions have there been? (the more the better)	_____
	What is the current version number?	_____
	How are upgrades handled? From company or dealer?	_____
	Is there any charge for upgrades?	_____
	Do you know anyone who uses it?	_____

Shopping List for Multi-Application Programs (Switcher and Beyond)

Program Details	Size, in bytes	_____
	Distribution: Public domain, shareware, or commercial?	_____
	Cost	_____
Features	Does it allow true concurrent or multi-tasking operations? (e.g., Can one program print while you're working in another?)	_____
	Can you choose which applications get priority for CPU time?	_____
	Is there a limit to the number of applications you can run?	_____
	Is switching between applications almost instantaneous?	_____
	Will it allow the Clipboard to be shared?	_____
	Will it allow independent Clipboards?	_____
	Can each application use its own fonts and DAs?	_____
	How much RAM does the program use for its own overhead?	_____
	Can it automatically load predetermined sets of applications?	_____
	Can it also automatically load documents into an application?	_____
	What is the minimum size an application can occupy?	_____
	What is the maximum size an application can occupy?	_____
	Can applications be given any amount of RAM, or preset sizes only?	_____
	Is there a Quit All option, to safely close each application?	_____
	Does it work with hardware you now own, or plan to buy?	_____
Background	How long has it been on the market?	_____
	How many versions have there been? (the more the better)	_____
	What is the current version number?	_____
	How are upgrades handled? From company or dealer?	_____
	Is there any charge for upgrades?	_____
	Do you know anyone who uses it?	_____

Shopping List for Notepads

Program Details	Size, in bytes	_____
	Desk Accessory or application	_____
	Distribution: Public domain, shareware, or commercial?	_____
	Cost	_____
Features	Can it read any text-only document?	_____
	Can it save notes in a disk file?	_____
	Can its files be opened and read by other word processors?	_____
	Can it print on both the ImageWriter and LaserWriter?	_____
	Can it be quickly accessed, while you run another program?	_____
	What is the maximum size document it can handle?	_____
	Does it allow multiple documents to be open at once?	_____
	Can it find and change (search and replace)?	_____
	Does it allow font, size, and style changes?	_____
	Does it use true tabs, or just add groups of spaces?	_____
	Can it display invisible characters (like tabs and returns)?	_____
Background	How long has it been on the market?	_____
	How many versions have there been? (the more the better)	_____
	What is the current version number?	_____
	How are upgrades handled? From company or dealer?	_____
	Is there any charge for upgrades?	_____
	Do you know anyone who uses it?	_____

Shopping List for Spelling-Checkers

Program Details	Size, in bytes	_____
	Desk Accessory or application	_____
	Distribution: Public domain, shareware, or commercial?	_____
	Cost	_____
Features	Can speller be accessed from within an application?	_____
	Does it work with text, MacWrite, and Microsoft Word files?	_____
	How big is its main dictionary?	_____
	Can you add to main dictionary, or make additional dictionaries?	_____
	Can the program check hyphenation?	_____
	Does it include a thesaurus?	_____
	Does it suggest substitutes for misspelled words?	_____
	Are its substitutes based on phonetic analysis of your error?	_____
	Does it display misspelled words in context?	_____
	Can it recognize known words with endings (-ed, -ing, -s)?	_____
	Is it fast enough? Try with a *long* document, before you buy.	_____
	Can it create a log of errors, or must you be there as it checks?	_____
	Can you monitor its progress (percent of document complete)?	_____
	Can you abort the checking process at any time?	_____
Background	How long has it been on the market?	_____
	How many versions have there been? (the more the better)	_____
	What is the current version number?	_____
	How are upgrades handled? From company or dealer?	_____
	Is there any charge for upgrades?	_____
	Do you know anyone who uses it?	_____

Shopping List for Clocks

Program Details	Size, in bytes	_____
	Desk Accessory or application	_____
	Distribution: Public domain, shareware, or commercial?	_____
	Cost	_____
Features	Does it use military (24-hour) or standard (am/pm) time?	_____
	Is it digital (numbers only) or analog (face, hands, numbers)?	_____
	Can it be installed on the menu bar?	_____
	Does it work with any application?	_____
	Does it have an alarm feature?	_____
	Can you change the sound of the alarm?	_____
	Can you set more than one alarm at a time?	_____
	Does it give a message to explain a sounding alarm?	_____
	Can it show you the time in other parts of the world?	_____
	Can it reset Mac's time and date, without the Control Panel?	_____
Background	How long has it been on the market?	_____
	How many versions have there been? (the more the better)	_____
	What is the current version number?	_____
	How are upgrades handled? From company or dealer?	_____
	Is there any charge for upgrades?	_____
	Do you know anyone who uses it?	_____

Shopping List for Address Books

Program Details	Size, in bytes	_____
	Desk Accessory or application	_____
	Distribution: Public domain, shareware, or commercial?	_____
	Cost	_____
Features	Is it always accessible, as you run another application?	_____
	Does it work with all your favorite applications?	_____
	Can it create files readable by other database programs?	_____
	Can it open and read files created by other database programs?	_____
	standard format: tabs for fields, returns for records	_____
	MS merge format: commas for fields, returns for records	_____
	Does it make sure all data is in one file, for consistency?	_____
	Can you create multiple data files if you want to?	_____
	Are information categories preset, or can you design a form?	_____
	Can you sort addresses in alphabetical order? By zip code?	_____
	How fast can the program locate a record?	_____
	Can it print mailing labels from address records?	_____
	Will the program dial the phone for you?	_____
	Can it record the caller, subject, and duration of phone calls?	_____
Background	How long has it been on the market?	_____
	How many versions have there been? (the more the better)	_____
	What is the current version number?	_____
	How are upgrades handled? From company or dealer?	_____
	Is there any charge for upgrades?	_____
	Do you know anyone who uses it?	_____

Shopping List for Personal Calendars

Program Details	Size, in bytes	_____
	Desk Accessory or application	_____
	Distribution: Public domain, shareware, or commercial?	_____
	Cost	_____
Features	Is it always accessible as you run another application?	_____
	Does it work with your favorite applications?	_____
	Does it make sure all data is in one file, for consistency?	_____
	Does it cover more than one year? How many?	_____
	Can you easily jump to any date, to record appointments?	_____
	How much information can be recorded on one date?	_____
	How easy is it to reschedule an appointment to another date?	_____
	Can you view your appointments a day at a time?	_____
	a week at a time?	_____
	a month at a time?	_____
	Can you easily print records for similar time periods?	_____
	Do editing features like cut and paste work in the program?	_____
	Can you search for names or other key words?	_____
	Is there an alarm feature?	_____
Background	How long has it been on the market?	_____
	How many versions have there been? (the more the better)	_____
	What is the current version number?	_____
	How are upgrades handled? From company or dealer?	_____
	Is there any charge for upgrades?	_____
	Do you know anyone who uses it?	_____

Shopping List for Finder Add-ons

Program Details	Size, in bytes	_____
	Desk Accessory or application	_____
	Distribution: Public domain, shareware, or commercial?	_____
	Cost	_____
File Features	Can the program rename a file?	_____
	Can it delete a file?	_____
	Can it rename and delete invisible files?	_____
	Can it show file types? Edit file types?	_____
	Can it show file size?	_____
	Can it sort files?	_____
	Can it start another program, when you Quit the current one?	_____
Disk Features	Does it show which drive (internal/external) disks are in?	_____
	Does it show which disk is the default disk?	_____
	Will it change the default disk, if you want?	_____
	Does it show how much space is left on a disk?	_____
	Does it help you eject and change disks?	_____
Memory Features	Does it show how much RAM memory is available?	_____
	Will it compact memory to free up extra RAM?	_____
Background	How long has it been on the market?	_____
	How many versions have there been? (the more the better)	_____
	What is the current version number?	_____
	How are upgrades handled? From company or dealer?	_____
	Is there any charge for upgrades?	_____
	Do you know anyone who uses it?	_____

Shopping List for Cataloging/Labeling Programs

Program Details	Size, in bytes	_____
	Desk Accessory or application	_____
	Distribution: Public domain, shareware, or commercial?	_____
	Cost	_____
Features	Will it list all the files on a disk, even those in folders?	_____
	Can it keep a master list, from several disks? How many?	_____
	Does it store the list as a text file?	_____
	as a database file, readable by another program?	_____
	Will it update the master list whenever files are renamed?	_____
	Does it record the creation date, and date last modified?	_____
	Does it record the file size? In bytes or kilobytes?	_____
	Does it record the file type and creator?	_____
	Can it print on both the ImageWriter and the LaserWriter?	_____
	Can it print disk labels? Are blank labels provided?	_____
Background	How long has it been on the market?	_____
	How many versions have there been? (the more the better)	_____
	What is the current version number?	_____
	How are upgrades handled? From company or dealer?	_____
	Is there any charge for upgrades?	_____
	Do you know anyone who uses it?	_____

Shopping List for Disk Copying Programs

Program Details	Size, in bytes	_____
	Distribution: Public domain, shareware, or commercial?	_____
	Cost	_____
Features	Can it sector copy?	_____
	Can it bit copy?	_____
	Can it synchronize the tracks of the disk?	_____
	Can it keep the track lengths the same?	_____
	Does it automatically verify the disk as it copies?	_____
	Does it report the nature of any disk errors it encounters?	_____
	Does it have some way to indicate its progress? (percent complete)	_____
	Can the program take advantage of more than 512K of RAM?	_____
	Does the company provide a list of programs it will copy?	_____
	Does it include a recovery tools program (many do)?	_____
	Does it include a hard-disk copy program?	_____
	Is a list included, of programs that can be copied to the hard disk?	_____
Background	How long has it been on the market?	_____
	How many versions have there been? (the more the better)	_____
	What is the current version number?	_____
	How are upgrades handled? From company or dealer?	_____
	Is there any charge for upgrades?	_____
	Do you know anyone who uses it?	_____

Shopping List for RAM Upgrades

Hardware Details	Cost	_____
Design and Operating System Concerns	Does the additional RAM act like normal RAM (contiguous)?	_____
	Does the upgrade interfere with the video display area of RAM?	_____
	Are operating system changes made with software or ROMs?	_____
	If ROMS, do they replace or supplement the Apple ROMs?	_____
Installation	Do you have an early, weaker power supply?	_____
	Is the upgrade clipped onto the motherboard?	_____
	Can it attach in a Mac Plus SIMM socket?	_____
	Is the upgrade soldered onto the motherboard?	_____
	Does the upgrade consist of loose chips that you must solder?	_____
	Will the upgrade interfere with an internal hard disk?	_____
Operation Issues	Is a fan recommended? Does the vendor include it?	_____
	Is the fan internal or external? Will it fit in your carrying case?	_____
	How noisy is the fan? (Check in a quiet room.)	_____
	Can your programs use the additional RAM?	_____
Special Warranty and Repair Issues	What warranties cover the upgrade? Other parts of your Mac?	_____
	How long are realistic turnaround times for repairs?	_____
	Where must you take/send your Mac for service?	_____
	Will upgrades be offered to keep pace with Apple changes?	_____
Background	How long has it been on the market?	_____
	How many versions have there been? (the more the better)	_____
	What is the current version number?	_____
	How are upgrades handled? From company or dealer?	_____
	Is there any charge for upgrades?	_____
	Do you know anyone who uses it?	_____

Shopping List for Hard Disks

Hardware Details	Cost	_____
Size and Placement	Is the disk external or internal?	_____
	Is it portable? Consider size and durability.	_____
	Does it fit under the Mac, or only to the side?	_____
	Is there an additional power supply?	_____
Removable Cartridges	Does it have removable cartridges?	_____
	How fragile are the cartridges?	_____
	How heavy are the cartridges?	_____
	How expensive are the cartridges?	_____
Connections to the Macintosh	Through which port does it connect?	_____
	Does it give an equivalent port back in return?	_____
Heat and Fans	How noisy is the fan? (Check in a quiet room.)	_____
	Does the fan have a filtering mechanism to reduce dust damage?	_____
Software Issues: Partitioning and Folders	Does the disk work with Apple's HFS?	_____
	If not, does it have some kind of partitioning system?	_____
	Is it easy to create new partitions?	_____
	Is there a limit to the number of partitions?	_____
	Are the partitions dynamic or static?	_____
	If static, what range of sizes can you set?	_____
	If static, can you change sizes later?	_____
	Can you mount a partition from within any application?	_____
	Can the software automount selected partitions at startup?	_____
	How many?	_____

Shopping List for Hard Disks (cont.)

Miscellaneous Software Issues	Is a startup disk required, or can you boot from the hard disk?	_____
	Does the startup disk (if any) automatically eject itself?	_____
	How much working RAM does the system software require?	_____
	Does the disk come with a backup utility?	_____
	Does it allow incremental backup?	_____
	Must backup files be restored to a hard disk to be usable?	_____
	Will it back up one large file onto several disks?	_____
	Does the disk come with security software?	_____
	Can you protect individual volumes or folders?	_____
	Can you encrypt individual files?	_____
	Is there any provision for forgotten passwords?	_____
	Does the disk come with a print spooler? Does it work?	_____
Special Warranty and Repair Issues	What warranties cover the hard disk? Other parts of the Mac?	_____
	How long are realistic turnaround times for repairs?	_____
	Where must you take/send your hard disk for service?	_____
Background	How long has it been on the market?	_____
	How many versions have there been? (the more the better)	_____
	What is the current version number?	_____
	How are upgrades handled? From company or dealer?	_____
	Is there any charge for upgrades?	_____
	Do you know anyone who uses it?	_____

Shopping List for IBM to Macintosh Conversion Programs

Program Details	Size, in bytes (Macintosh program)		_____
	Size, in bytes (IBM program)		_____
	Distribution: Public domain, shareware, or commercial?		_____
	Cost		_____
Features	Can the product direct-connect the Mac and IBM?		_____
	Is the necessary cable included with the product?		_____
	Can the product dial phone calls and work with modems?		_____
	Which machine controls the transfer process?		_____
	Any other special hardware required?		_____
	Can it send and receive files in text-only (ASCII) format?		_____
	Can it send and receive files in binary format (bit-for-bit)?		_____
	Can the product translate between different file formats?		_____
	On the IBM side ...	ASCII (with line-feeds)	_____
		DIF (Data Interchange Format)	_____
		WKS (Lotus 1-2-3)	_____
		SYLK (Microsoft MultiPlan)	_____
		DBF (Aston-Tate dBase format)	_____
		WordStar	_____
		Display Write (IBM DCA format)	_____
		Other?	_____
	On the Mac side ...	ASCII (no line-feeds)	_____
		MacWrite	_____
		MultiPlan or SYLK	_____
		Jazz or Lotus WKS	_____
		Excel (translates SYLK, WKS itself)	_____
		Other?	_____
	Can the product cut and paste between two "live" programs?		_____
	Is the documentation clear and comprehensive?		_____

Shopping List for IBM to Macintosh Conversion Programs (cont.)

Background	How long has it been on the market?	_____
	How many versions have there been? (the more the better)	_____
	What is the current version number?	_____
	How are upgrades handled? From company or dealer?	_____
	Is there any charge for upgrades?	_____
	Do you know anyone who uses it?	_____

Shopping List for File Recovery Tools

Program Details	Size, in bytes	_____
	Distribution: Public domain, shareware, or commercial?	_____
	Cost	_____
Features: Disk Recovery	Can the program verify disks?	_____
	Can it copy disks?	_____
	Can it format disks?	_____
	Will it let you view and edit a disk's boot blocks?	_____
	Can it write the standard boot blocks on a disk?	_____
	Will it clean up bad sectors by writing empty sectors over them?	_____
Features: File Recovery	Can it verify files?	_____
	Can it copy files?	_____
	Can it show all files including invisible files?	_____
	Will it let you view and edit a file's signature?	_____
	Can it erase a file?	_____
	Can it "unerase" (recover) a single specified file?	_____
	Can it recover all deleted files on a disk?	_____
Background	How long has it been on the market?	_____
	How many versions have there been? (the more the better)	_____
	What is the current version number?	_____
	How are upgrades handled? From company or dealer?	_____
	Is there any charge for upgrades?	_____
	Do you know anyone who uses it?	_____

Shopping List for Troubleshooting Text Editors

Program Details	Size, in bytes	_____
	Distribution: Public domain, shareware, or commercial?	_____
	Cost	_____
Features	Can it read text-only documents from any program?	_____
	What is the maximum size document the program can handle?	_____
	Does it allow multiple documents to be open at once?	_____
	Can it display invisible characters (like tabs and returns)?	_____
	Can it find and change (search and replace)?	_____
	Can it find and change globally (all instances)?	_____
	Can it use invisible characters in find and change?	_____
	Does it report the number of changes in a global change?	_____
	Can its resulting files be read by other word processors?	_____
	Can it print on both the ImageWriter and LaserWriter?	_____
Background	How long has it been on the market?	_____
	How many versions have there been? (the more the better)	_____
	What is the current version number?	_____
	How are upgrades handled? From company or dealer?	_____
	Is there any charge for upgrades?	_____
	Do you know anyone who uses it?	_____

APPENDIX B

Sources

Public Domain and Shareware Programs

The old saying, "You get what you pay for" rarely applies in the world of software. Programs costing hundreds of dollars can be real gems—or bug-ridden nightmares. Programs costing little or nothing run the same gamut, from treasures to trash. So it's definitely worthwhile to be aware of the resources available to you on the lower end of the financial scale: public domain programs and shareware.

Public domain programs are those donated to the public by their authors. As such, they can be legally copied and freely distributed. People who write public domain software do so for a variety of incentives—often for the simple pleasure of seeing their work widely used, or to test out an idea to be used in a commercial program later.

Shareware is a distant cousin of public domain software, although some users treat the two as identical twins. Shareware authors release their work *commercially* under the honor system: programs are freely copied and distributed through the same channels as public domain software, to save marketing costs, but payment terms are explained at the start of each program. Generally, this consists of a full-screen

message asking you to send a fee to the author if you like and use the program, and to destroy it if you don't wish to pay.

Fees for shareware are always very reasonable, ranging from $5 to a top of about $40. In most cases, sending in your fee gets you additional documentation, support, and upgrades. It's only common sense to support the system and send in your fee for any program you like. Most authors will continue to write good programs only if they can be compensated for their time. Without your support, the only software available will be through expensive commercial vendors.

Listed on the following pages are the public domain and shareware programs that we've recommended or otherwise featured in this book, plus a few other related programs you may want to try. Both public domain software and shareware are available through CompuServe's MAUG (Micronetworked Apple Users' Group) and through major user groups. A list of user groups appears later in this appendix.

Each listing includes:

Program Name
Author
Address
Payment Terms

512K Copy
Micro Analyst, Inc.
P.O. Box 15003
Austin, TX 78761
Free

ASCII
Bob Perez
None given
Free

Big Ben
Riccardo Ettore
None given
Free

Calendar
None given
None given
Free

Configure MockTerminal
Donald Brown
CE Software, 801 73rd St.
Des Moines, IA 50312
Free with MockPackage

Convert DA
Donald Brown
CE Software, 801 73rd St.
Des Moines, IA 50312
Free with MockPackage

CrashSaver
Alan Dail
DailSoft, PO Box 2861
Newport News, VA 23602
Free

Cray3 Calculator
Desktop CAD, Inc.
607 Rosemont Plaza
Rosemont, PA 19010-1526
Shareware, $19.95 for license

DAFile
Ken Winograd
2039 Country Club Dr.
Manchester, NH 03102
$5–$10 suggested donation

DAMover (original)
Donald Brown
CE Software, 801 73rd St.
Des Moines, IA 50312
Shareware, $15 for license

DASampler
Kevin Hardman
106 Bryan Rd.
Garner, NC 27529
$10 shareware

Desk Accessory Sampler
Thomas Newton
None given
Free

Diddler
Scott Watson
The FreeSoft Company
10828 Lacklink
St. Louis, MO 63114
Free

DiskCat
Craig Vaughan
Software Sorcery Inc.
8375 Leesburg Pike
Suite 427D
Vienna, VA 22180
None

DiskInfo
David Dunham
Maitreya Design
PO Box 1480
Goleta, CA 93116
$10 suggested donation

Extras
Bob Luce
324 East Shaw
Fresno, CA 93710
$10 licensing fee

FEdit
John Mitchell
Suite 122
939 E. El Camino Real
Sunnyvale, CA 94087
$30 suggested

FKEY Installer
Dreams of The Phoenix
PO Box 10273
Jacksonville, FL
32247
Free, for non-commercial use

Mass Initializer
Frederic Anderson
None given
Free

MassCopier
CE Software
CE Software, 801 73rd St.
Des Moines, IA 50312
$15 suggested

MDS Edit
Bill Duvall
Consulair Corp.
Free

MenuEdit
Andy Hertzfeld
Apple Computer
20525 Mariani Ave.
Cupertino, CA 95014
Free

MiniDos
None given
None given
Free

MockChart
Donald Brown
CE Software, 801 73rd St.
Des Moines, IA 50312
$25 licensing fee

MockPrint
Donald Brown
CE Software, 801 73rd St.
Des Moines, IA 50312
$25 licensing fee for MockWrite, MockPrint, and MockTerminal

MockTerminal
Donald Brown
CE Software, 801 73rd St.
Des Moines, IA 50312
$25 licensing fee for MockWrite, MockPrint, and MockTerminal

MockWrite
Donald Brown
CE Software, 801 73rd St.
Des Moines, IA 50312
$25 licensing fee for MockWrite, MockPrint and MockTerminal

Multi-Scrap
None given
None given
Free

New Key Caps
Apple Computer
20525 Mariani Ave.
Cupertino, CA 95014
Free

Other...
Loftus E. Becker Jr.
41 Whitney Street
Hartford, CT 06105
$10 shareware

PRAM2
Ken Winograd
2039 Country Club Dr.
Manchester, NH 03102
$10 if you like it

RamStart
George Nelson
201 Main St.
Medway, MA 02053
Free

Red Ryder
Scott Watson
The FreeSoft Company
10828 Lacklink
St. Louis, MO 63114
$40 licensing fee, vol. discounts

ResEdit
Steve Capps, G. Pope, R. Sebok
Apple Computer
Free

SkipFinder
Darin Adler
2765 Marl Oak Drive
Highland Park, IL 60035
Send what you think it's worth

Word Count
Léo
None given
Free

In Chapter 8, we also recommended one piece of IBM PC software, which can be obtained from any IBM PC user group, or at this address:

PC-Talk
Andrew Fluegelman
Freeware, PO Box 862
Tiburon, CA 94920
Shareware, $35

Commercial Products

Throughout this book, we refer to dozens of commercial products. Some are recommended; others are mentioned because they illustrate a point, either negative or positive! Because you may want to find out more about products we've mentioned, we're including source information here. Please make your own judgments based on evaluation criteria throughout the book as to whether any of these products fit your needs.

Each listing includes:

Product Name...LIST price as of January 1986
Category
Company Name
Address

Chapter 2

TurboCharger...$95
Cache system
Nevins Microsystems, Inc.
210 Fifth Avenue
New York, NY 10010

Switcher Construction Set...$20
Multi-application program
Apple Computer, Inc.
20525 Mariani Ave.
Cupertino, CA 95014

Chapter 3

SideKick...$84.95
Desk Accessory collection
Borland International
4585 Scotts Valley Drive
Scotts Valley, CA 95066

MacSpell + ...$99.00
Spelling Checker DA
Creighton Development, Inc.
16 Hughes, Suite C-106
Irvine, CA 92714

QuickWord...$59.00
"Abbreviation expander" DA
EnterSet, Inc.
410 Townsend St.
San Francisco, CA 94107

HP12C Financial Calculator ...$39.95
Calculator DA
Dreams of the Phoenix
PO Box 10273
Jacksonville, FL 32247

ClickOn Worksheet...$79.95
Spreadsheet DA
T/Maker Graphics
2115 Landings Drive
Mountain View, CA 94043

Chapter 4

Manhattan Font ...$39.95
font, from Mac the Knife Vol II
Miles Computing, Inc.
21018 Osborne St. Bldg. #5
Canoga Park, CA 91304

Chapter 5

Copy II Mac, Copy II Hard Disk, MacTools...bundled, $40
Backup and File Recovery Tools
Central Point Software, Inc.
9700 SW Capitol Hwy. #100
Portland, OR 97219

Chapter 6 (Each company offers several products. Addresses only.)

RAM Upgrades

BeckTech
41 Tunnel Road
Claremont Hotel
Berkeley, CA 94705

Levco Enterprises
6160 Lusk Blvd., Suite C-203
San Diego, CA 92121

MassTech Development Labs, Inc.
773 Boston Rd.
Groton, MA 01450

Hard Disk Drives

General Computer Co. (Hyperdrive)
215 First St.
Cambridge, MA 02142

IOMEGA Corp. (Bernoulli Box)
1821 West 4000 South
Salt Lake City, UT 84125

LoDOWN
PO Box 5146
Pleasanton, CA 94566

Paradise Systems, Inc.
217 East Grand Ave.
S. San Francisco, CA 94080

Personal Computer Peripherals Corp. (MacBottom)
6204 Benjamin Road
Tampa, FL 33614

SuperMac Technology
1901 Old Middlefield Way
Mountain View, CA 94040

Chapter 7

PostScript
Page Description Language
Adobe Systems Inc.
1870 Embarcadero Rd. #100
Palo Alto, CA 94303

LaserWriter...$5999.00
Laser printer
Apple Computer, Inc.
20525 Mariani Ave.
Cupertino, CA 95014

Mouse Glide
Commerce, CA

MousTrak
Mill Valley, CA

A+ Optical Mouse...$99.00
Optical tracking mouse
Mouse Systems Corp.
2336H Walsh Ave.
Santa Clara, CA 95051

MacTurbo Touch...$129.00
Track-ball mouse replacement
Assimilation Inc.
485 Alberto Way
Los Gatos, CA 95030

Visual Control System...$199.00
Headset mouse replacement
Personics
2352 Main St. Bldg. 2
Concord, MA 01742

MacTablet...$395-$549
Summagraphics
777 State Street Ext.
Fairfield, CT 06430

MacVision...$399
Koala Technologies Corp.
3100 Patrick Henry Drive
Santa Clara, CA 95052-8100

ThunderScan...$229.00
Digitizer
ThunderWare, Inc.
21 Orinda Way
Orinda, CA 94563

Chapter 8

MacLink...$155.00
Complete PC to Mac transfer/ translate package
Dataviz Incorporated
16 Winfield Street
East Norwalk, CT 06855

MacCharlie...$1612.00 (2 drives, 640K)
PC compatible with transfer capabilities
Dayna Communications, Inc.
50 S. Main St., Suite 530
Salt Lake City, UT 84144

User Groups

(Courtesy of George Voltz of the Boston Computer Society.)

ALASKA

Anchorage Macintosh User Group (AMUG)
200 W. 34th Ave., Suite 202
Anchorage, AK 99503
Coordinator Nevin McClintook
(904)561-4732

ALABAMA

Huntsville Macintosh Users Group
815 Esslinger Road
Huntsville, AL 35802
Coordinator Kline Dupuy
(205)876-9484

Apple MUG
PO Box 20241
Montgomery, AL 36116

ARIZONA

MacExplorers
10007 W. Meadowbrook
Phoenix, AZ 85039
Coordinator Steve LeClair
(602)932-5300

Macinteract
2040-67 S. Longmore
Mesa, AZ 85202
Coordinator Dana Hoc

Mesa Mac Group
Mesa Computer Mart
1153 E. Main Street
Mesa, AZ 85203
Coordinator John Colbeck

Arizona Macintosh Users Group
16427 East Campbell
Gilbert, AZ 85234
Coordinator David Beginski
(602)926-2080

AMUG
PO Box 28120
Tempe, AZ 85282

CALIFORNIA

UCLA Macintosh Users Group
UCLA Graduate School of Education
Los Angeles, CA 90024
Coordinator Phil Ender
(213)825-1944

Los Angeles Macintosh Group(LAMG)
12021 Wilshire Blvd, Suite 349
Los Angeles, CA 90025
Coordinator David Sanders
(213)278-LAMG

Lisa Club of LA
854 N. Croft Avenue
Los Angeles, CA 90069
Coordinator Max Dommartin

Mac Buddhist LA
854 N. Croft Avenue
Los Angeles, CA 90069
Coordinator Allan Badiner

Northrop Macintosh Users Group
Northrop 4550/82
1 Northrop Avenue
Hawthorne, CA 90250
Coordinator Charles E. Shipp
(213)970-6300

Xochiquetzaltzin Memorial Macintosh User Group
1537 A Princeton Street
Santa Monica, CA 90404

MACBUG
13800 Biola Avenue
La Mirada, CA 90639
Coordinator Richard O. Rigsby
(213)944-0351

Logic Tree Mac UG
10512 Los Vagueros Circle
Los Alamitos, CA 90720
Coordinator Ralph Cooper
(714)952-4122

Logic Tree Mac Users Group
3560 Bluebell
Seal Beach, CA 90740
Coordinator Dr. Richard

MAC-HACers
H.E.S.E.A. Macintosh User Group
ATTN: Bud Grove
21111 Dolores #146
Carson, CA 90745
Coordinator Bud Grove
(213)606-2212

Cal State Univ. Long Beach
CSULB MUG
2625 Gondar
Long Beach, CA 90815
Coordinator Brian Russell

San Gabriel Valley Mac Users Group (SGVMUG)
PO Box 792
Sierra Madre, CA 91024
Coordinator Bill Viahos
(818)796-5042

JPL Mac User Group
4800 Oak Grove MS 183-701
Pasadena, CA 91109
Coordinator Godfrey Digiorgi
(818)354-0496

Conejo-Ventura Macintosh User's Group (CVMUG)
PO Box 7118
Thousand Oaks, CA 91359
Coordinator Dick Miller
(805)499-2824

Transaction Technology, Inc.
Macintosh Users Group
1945 Berkshire Drive
Thousand Oaks, CA 91362
Coordinator Grif Boyce

The Mac Valley Users Group
PO Box 4297
Burbank, CA 91503
Coordinator Ruth Steven
(818)848-1277

Dick Grove School of Music UG
12754 Ventura Blvd
Studio City, CA 91604
Coordinator Mike Julian
(818)985-0905

Mac-Mania
The Macintosh Users Group of the Inland Empire
963 Nottingham Drive
Corona, CA 91720
Coordinator Walt Wogee
(714)874-9826

Soley MUG of Cal Poly
1419 Thackery Avenue
West Colvina, CA 91791
Coordinator David Robinson

San Diego Mac Users Group
San Diego Computer Society
PO Box 12561
La Jolla, CA 92037
Coordinator Diane Kelley
(619)566-3939

North County Computer Club
PO Box 4442
Oceanside, CA 92054
Coordinator Rainer Mueller
(619)967-9100

MacDesert Connection
PO Box 2714
Palm Springs, CA 92263
Coordinator Melinda Barlow
(619)320-4003

Mac Desert User's Group
36935 Hayward Avenue
Barstow, CA 92311
Coordinator Lyle Jones

Empire Macintosh User Group
33418 Rosemond
Yucaipa, CA 92399
Coordinator Jack D. Walker
(714)794-1151

Mac Users Group
U of CA Riverside
290 W. Big Springs Road, Apt #W
Riverside, CA 92507
Coordinator Arnold B. W. Heng
(714)684-7249

HFEA Macintosh Users Group
1901 W. Malvern Avenue
Fullerton, CA 92635
Coordinator Alice Forhan
(714)441-6784

MacBeach User Group
PO Box 2178
Huntington Beach, CA 92647
Coordinator Taylor Barcroft
(714)842-0518

McDonnell Douglas Astronautics
5301 Bolsa Avenue
Huntington Beach, CA 92647
Coordinator Jerry Hamilton
(714)896-1128

Apple MUG
208 Hospital Circle #202
Westminister, CA 92683

Mac Orange
PO Box 1830
Santa Ana, CA 92702
Coordinator Robert Ameeti
(714)542-9753

Mac Computer Society
18195 Santa Joanana
Fountain Valley, CA 92708
Coordinator Dick Hatten-Sec.

Realtors Mac User Group
18023 Sky Park Circle F-2
Irvine, CA 92714
Coordinator Dan Starkey
(714)261-1930

Ventura County Macintosh Club (VMAC)
1413-D South Victoria Avenue
Ventura, CA 93003
Coordinator Brian Jay Wu
(805)499-2824

South Coast Macintosh Users Group
PO Box 2035
Goleta, CA 93118
Coordinator Morris Herman
(805)975-5511

Macadamia
90 W. Highway 246
Buellton, CA 93427
Coordinator Andrew Bang
(805)688-5773

Club Mac of Monterey
PO Box 222988
Carmel, CA 93922
Coordinator Gabreal Franklin
(408)625-0333

The Macintosh User Group
394-B Ricketts Road
Monterey, CA 93940

Bay Area MacForum
c/o Alan L. Smerican
2535 Somerset Drive
Belmont, CA 94002
Coordinator Alan L. Smerican
(415)595-3674

Mid-Peninsula Macintosh Group
1720 Ralston Ave
Burlington, CA 94010
Coordinator Wendy McArdle
(415)342-3473

Peninsula Lisa Users Group
c/o Joan Dickey, DIQ DOC
PO Box 626
Moss Beach, CA 94038
Coordinator Joan Dickey
(415)728-5462

OMNI MUG
548 S. Fairoaks #1
Sunnyvale, CA 94086
Coordinator Dan Shafer

Bank of America
Mac User Group
315 Montgomery Street, 12th Floor
San Francisco, CA 94105
Coordinator Frank Azee

Pacific Bell MUG
370 Third St., Rm 753A
San Francisco, CA 94107
Coordinator Bob Antoon
(415)542-4820

Show Page Macintosh Users Grup
2040 Polk St., Suite 340
San Francisco, CA 94109
Coordinator Shep Tamler
(415)621-8808

Mac West
1077 Vallejo Street
San Francisco, CA 94133
Coordinator Betsey Radford
(415)432-9713

Stanford Macintosh Users Group (SMUG)
205 Tresidder Union
Stanford, CA 94305
Coordinator John Mark Agosta
(415)497-1496

M O U S E
2198 Vista Luna
Fairfield, CA 94533
Coordinator David Wollrich
(415)974-0276

East Bay Macintosh User Group
c/o Pinole Library
2935 Pinole Valley Road
Pinole, CA 94564
Coordinator Steve Cisler
(415)653-5849

Mills College MUG
5000 Macarthur Blvd
Oakland, CA 94613
Coordinator Carol Lennox
(415)430-2167

East Bay Macintosh Users Group (EBMUG)
PO Box 7816
Berkeley, CA 94707
Coordinator (415)621-8808

Berkley Macintosh Users Group (BMUG)
1442A Walnut Street, Suite #153
Berkeley, CA 94709
Coordinator Reese M. Jones
(415)849-9114

Macs of Marin Users M O M
23 Pleasant Lane
San Rafael, CA 94901
Coordinator Steven Salzman
(415)459-5707

North Coast Mac User's Group
503 Marylyn Circle
Petaluma, CA 94952
Coordinator Keith Eggel
(707)763-1124

The Association of Apple 32 Users (A32)
PO Box 634
Santa Clara, CA 95052
Coordinator Ken Silverman
(408)262-6660

Santa Cruz Macintosh Users Group
740 Front St, POB 1428
Santa Cruz, CA 95060
Coordinator Jim McCaig

Sequoia Macintosh Users Groups (SMUG)
Jack Turner
PO Box 4715
Arcata, CA 95521
Coordinator Bob Plank
(707)822-3578

Auburn Macintosh Users Group
11517 F Avenue
Auburn, CA 95603
Coordinator Lee Hinde
(916)888-7433

Davis Macintosh User's Group
University of California
#140 Memorial Union
Davis, CA 95616

MacNexus
PO Box 163058
Sacramento, CA 95816
Coordinator Gail
(916)446-2411

Sacramento Macintosh Users Group
PO Box 60908
Sacramento, CA 95860

COLORADO

Boulder Macintosh Meeting
6727 Lakeview Drive
Boulder, CO 80303
Coordinator Ed Glassgow
(303)494-7186

Macintosh Users Group
University of Colorado
3161 Madison, #Q212
Boulder, CO 80303
Coordinator Daniel Paul

Northern Colorado Macintosh Users Group
1217 S. Bryan Avenue
Ft. Collins, CO 80521
Coordinator Steve Frawley
(303)482-2744

Greely Outpost Club Mac
1955 23rd Avenue
Greely, CO 80631
Coordinator Jay Johnson
(303)356-4085

Silicon Mountain Macintosh Users' Group
c/o Tom Arneberg
2457 Sunnywood Avenue
Woodland Park, CO 80863
Coordinator Tom Arneberg
(303)596-9256

MUGIT
Box 112
Telluride, CO 81435
Coordinator Judi Kiernan

Macintosh Users Group
Box 1146
Basalt, CO 81621
Coordinator Alex Matheson

CONNECTICUT

Connecticut Macintosh Connection Users Group (CMC)
Box 270
Hartford, CT 06141

U Conn Macintosh User's Group
c/o Dept of Molewlar & Cell B
U-YY Univ of Conn
Storrs, CT 06268
Coordinator Thomas M. Terry
(203)486-4255

Southern Connecticut Mac User Group
269 Thames Street
Groton, CT 06340
Coordinator Paul Flickner

MacForth Users Group
3081 Westville Station
New Haven, CT 06515
Coordinator Ward McFarland
(203)777-5618

Yale Macintosh Users Group (YMUG)
Box 20A, Yale Station
New Haven, CT 06520
Coordinator Philip Rubin
(203)776-9120

Apple MUGS
345 Main Street
Norwalk, CT 06851

Apple MUGS
7 Old Wagon Road
Wilton, CT 06897
Coordinator J.E. Coutre

DELAWARE

Macintosh Users of Delaware (MUD)
c/o Sandy Cuccia
PO Box 161
Rockland, DE 19732
Coordinator Larry
(302)656-1884

FLORIDA

North Florida Macintosh Users Group (NFMUG)
c/o ACCESS Jackson
PO Box 10286
Jacksonville, FL 32247
Coordinator Christopher Allen
(904)396-6952

Playground MUG
924 Holbrook Circle
Fort Walton Beach, FL 32548
Coordinator Elizabeth Schattner
(904)862-4908

O-Mac
3716 Ridgemont Road
Orlando, FL 32808
Coordinator Richard Herbst
(305)299-0021

Macintosh Meeting & Drinking Society (MAC MAD)
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(617)367-8080

Recommended Macintosh Magazines and Newsletters

A+ Magazine
Ziff-Davis Publishing Co.
One Park Avenue
New York, NY 10016
($24.97 for 12 issues)

Berkeley Macintosh Users' Group Newsletter
1442A Walnut St., Suite 153
Berkeley, CA 94709
($15.00 membership)

Boston Computer Society Macintosh Newsletter
1 Center Plaza
Boston, MA 02108
($35.00 membership)

Club Mac Newsletter
735 Walnut
Boulder, CO 80302
($35.00 membership)

Icon Review
PO Box 2566
Monterey, CA 93942
($2.50 per issue)

MACazine
Icon Concepts, Inc.
PO Box 1936
Athens, TX 75751

MacInTouch
PO Box 786
Framingham, MA 01701
($48.00 per year)

MacUser
25 West 39th St.
New York, NY 10018
($23.00 for 12 issues)

MacWorld
555 DeHaro Street
San Francisco, CA 94107
($30.00 for 12 issues)

APPENDIX C

Technical Reference

Desk Accessory Sizes

Desk Accessory	Size (in bytes)
Alarmclock	4008 bytes
CalendarBook	1772 bytes (requires additional calendar file on disk)
Calculator+	5862 bytes
Chooser	7598 bytes
Control Panel	7951 bytes
DAfile	8280 bytes
DiskInfo	14012 bytes
Extras	7308 bytes
MiniDOS	2879 bytes
MockTerminal	8872 bytes (requires external configuring program)
Multi-Scrap	4209 bytes
New Key Caps	1861 bytes
QuickWord (512K version)	13849 bytes
SkipFinder	6566 bytes
Word Count	4091 bytes

ASCII Codes for Keys and Key Combinations: A Reference for Use in Editing Fonts

Codes below 32 not used for characters.

32	(spacebar)	48	Ø	64	Shift 2 (@)
33	Shift 1 (!)	49	1	65	A
34	Shift ' (")	5Ø	2	66	B
35	Shift 3 (#)	51	3	67	C
36	Shift 4 ($)	52	4	68	D
37	Shift 5 (%)	53	5	69	E
38	Shift 7 (&)	54	6	7Ø	F
39	(apostrophe)	55	7	71	G
4Ø	Shift 9 (()	56	8	72	H
41	Shift Ø ())	57	9	73	I
42	Shift 8 (*)	58	Shift ; (:)	74	J
43	Shift = (+)	59	;	75	K
44	, (comma)	6Ø	Shift , (<)	76	L
45	- (hyphen)	61	=	77	M
46	. (period)	62	Shift . (>)	78	N
47	/	63	Shift / (?)	79	O

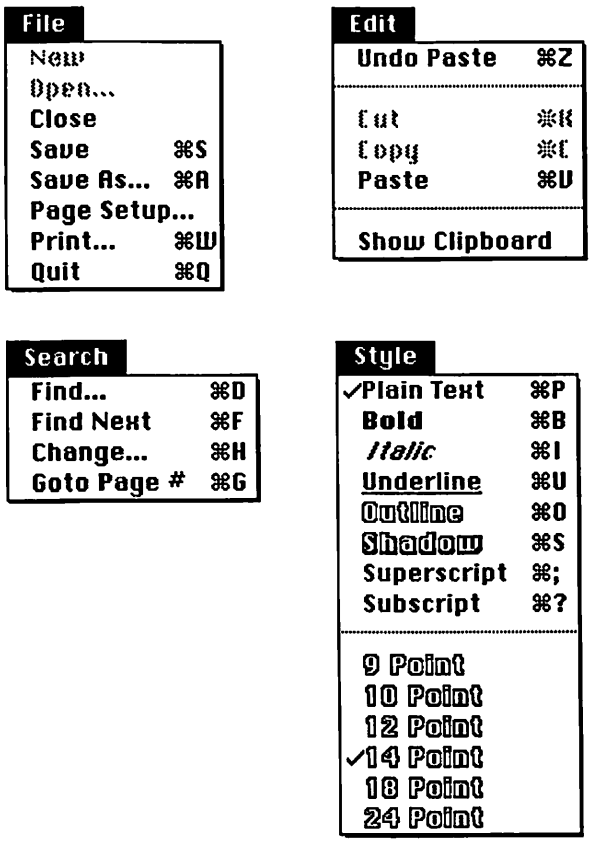
80	P	102	f	124	Shift \
81	Q	103	g	125	Shift]
82	R	104	h	126	Shift `
83	S	105	i	127	(unknown)
84	T	106	j	128	Option u Shift a
85	U	107	k	129	Shift Option a
86	V	108	l	130	Shift Option c
87	W	109	m	131	Option e Shift e
88	X	110	n	132	Option n Shift n
89	Y	111	o	133	Option u Shift o
90	Z	112	p	134	Option u Shift u
91	[	113	q	135	Option e a
92	\	114	r	136	Option ` a
93	]	115	s	137	Option i a
94	Option i	116	t	138	Option u a
95	Shift -	117	u	139	Option n a
96	`	118	v	140	Option a
97	a	119	w	141	Option c
98	b	120	x	142	Option e e
99	c	121	y	143	Option ` e
100	d	122	z	144	Option i e
101	e	123	Shift [	145	Option u e

146	Option e i	167	Option s	189	Option z
147	Option ` i	168	Option r	190	Option '
148	Option i i	169	Option g	191	Option o
149	Option u i	170	Option 2	192	Shift Option /
150	Option n n	171	Option e	193	Option 1 (one)
151	Option e o	172	Option u	194	Option l (ell)
152	Option ` o	173	Option =	195	Option v
153	Option i o	174	Shift Option '	196	Option f
154	Option u o	175	Shift Option o	197	Option x
155	Option n o	176	Option 5	198	Option j
156	Option ` u	177	Shift Option =	199	Option \
157	Option e u	178	Option ,	200	Shift Option \
158	Option i u	179	Option .	201	Option ;
159	Option u u	180	Option y	202	Option spacebar
160	Option t	181	Option m	203	Option ` Shift a
161	Shift Option 8	182	Option d	204	Option n Shift a
162	Option 4	183	Option w	205	Option n Shift o
163	Option 3	184	Shift Option p	206	Shift Option q
164	Option 6	185	Option p	207	Option q
165	Option 8	186	Option b	208	Option -
166	Option 7	187	Option 9	209	Shift Option -
		188	Option 0	210	Option [

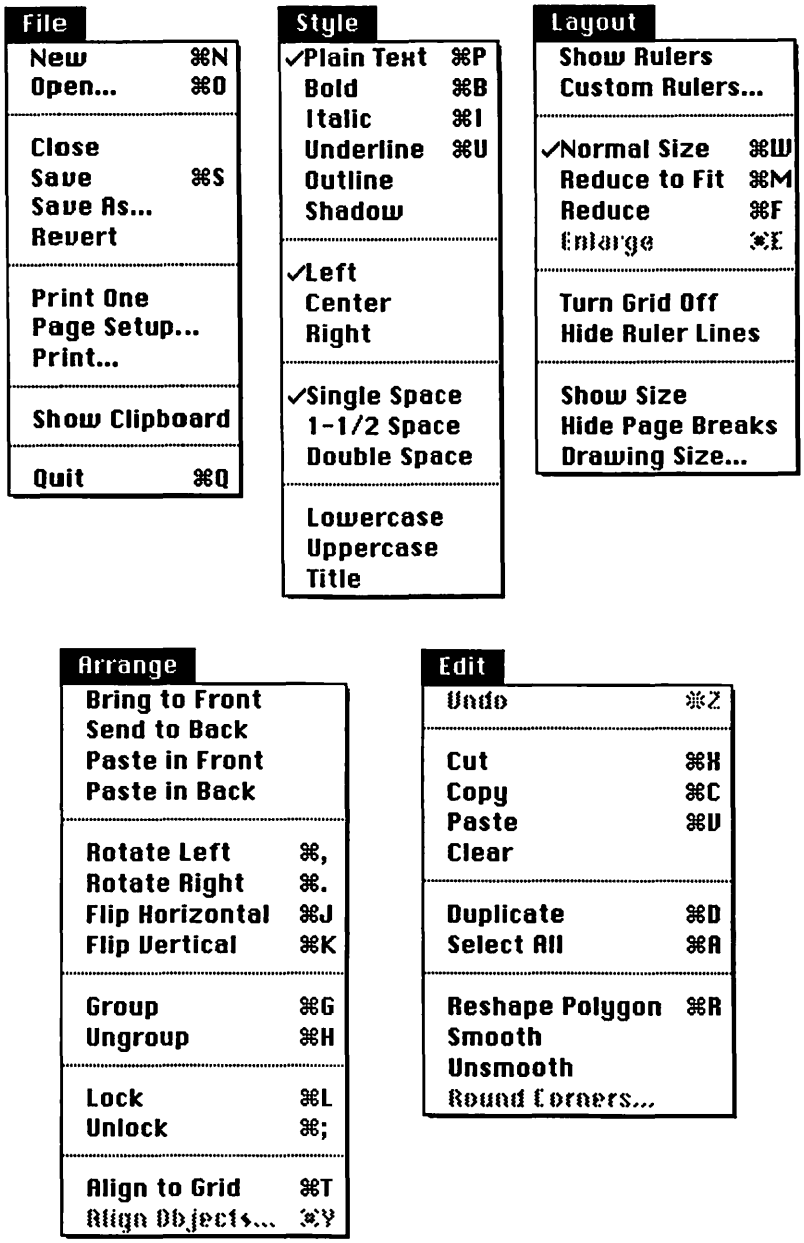
211	Shift Option [	226	Shift Option ø	241	Shift Option ı
212	Option]	227	Shift Option w	242	Shift Option ;
213	Shift Option]	228	Shift Option e	243	Shift Option z
214	Option /	229	Shift Option r	244	Shift Option x
215	Shift Option v	230	Shift Option t	245	Shift Option b
216	Option u y	231	Shift Option y	246	Shift Option n
217	Shift Option `	232	Shift Option u	247	Shift Option m
218	Shift Option 1	233	Shift Option i	248	Shift Option ,
219	Shift Option 2	234	Shift Option s	249	Shift Option .
220	Shift Option 3	235	Shift Option d	250	Option h
221	Shift Option 4	236	Shift Option f	251	Option k
222	Shift Option 5	237	Shift Option g	252	(unknown)
223	Shift Option 6	238	Shift Option h	253	(unknown)
224	Shift Option 7	239	Shift Option j	254	(unknown)
225	Shift Option 9	240	Shift Option k	255	(unknown)

Examples of Suggested Keyboard Equivalents

These are our suggestions for keyboard equivalents in MacWrite. They use the positional approach in conjunction with a single central mnemonic key.



The following keyboard equivalents are in MacDraw. This particular layout was designed by Tim Johnson, a professional architect who uses Draw as his primary drafting device. When you try it, pay attention to the physical setup and how your fingers need to move to get at certain characters.


File
New ⌘N
Open... ⌘O
Close
Save ⌘S
Save As...
Revert
Print One
Page Setup...
Print...
Show Clipboard
Quit ⌘Q
Style
✓Plain Text ⌘P
Bold ⌘B
Italic ⌘I
Underline ⌘U
Outline
Shadow
✓Left
Center
Right
✓Single Space
1-1/2 Space
Double Space
Lowercase
Uppercase
Title
Layout
Show Rulers
Custom Rulers...
✓Normal Size ⌘W
Reduce to Fit ⌘M
Reduce ⌘F
Enlarge ⌘E
Turn Grid Off
Hide Ruler Lines
Show Size
Hide Page Breaks
Drawing Size...
Arrange
Bring to Front
Send to Back
Paste in Front
Paste in Back
Rotate Left ⌘,
Rotate Right ⌘.
Flip Horizontal ⌘J
Flip Vertical ⌘K
Group ⌘G
Ungroup ⌘H
Lock ⌘L
Unlock ⌘;
Align to Grid ⌘T
Align Objects... ⌘Y
Edit
Undo ⌘Z
Cut ⌘X
Copy ⌘C
Paste ⌘V
Clear
Duplicate ⌘D
Select All ⌘A
Reshape Polygon ⌘R
Smooth
Unsmooth
Round Corners...

IBM Reference for Macintosh Users

If you're transferring files from an IBM PC to a Macintosh or back again (see Chapter 8), you'll need some knowledge of IBM's operating system and keyboard. This appendix summarizes the most basic information you may need, by relating it to familiar Macintosh procedures.

Keyboard Correspondences

If you're using both the Mac and the PC, it's useful to know some important keyboard correspondences:

Procedure	Macintosh	IBM
move the cursor	mouse, scroll bars (and cursor keys, Mac Plus)	cursor keys
quick access to common tasks	pull-down menus, command keys	function keys
use for key combinations	Option and Command	Ctrl and Alt
"dump" screen to printer	Command-Shift-Caps Lock-4	Shift/PrtSc
halt current procedure	Command-.	Escape
reboot computer	Shut Down Command; Reset switch	Ctrl-Alt-Del

Disk Drives

Macintosh diskettes must be ejected by program commands or through:

Command-Shift-1	to eject the internal drive's disk
Command-Shift-2	to eject the external drive's disk

PC diskettes can be removed from a drive at any time. Keep in mind, though, on both machines, that removing a disk in the middle of some procedures can cause data loss.

The Operating System

The Finder is visually oriented; the Mac's reputation as an icon-driven machine stems largely from the Finder's graphic representation of disks and files. The IBM, on the other hand, is controlled through a command-driven, text-oriented system called MS-DOS. Here are some comparisons:

Procedure	Macintosh	IBM
copy a file from one drive to another	drag the icon of REPORT to the other disk	type **copy a:report b:**
delete a file	drag the icon of REPORT to the Trash Can	type **erase report**
rename a file	select the icon of REPORT type the word letter	type **ren report letter**

Syntax—typing the exact words in the exact order—is very important in MS-DOS. You'll have to retype a command if even the smallest typographical error is made. Following is an alphabetical listing of most MS-DOS procedures, including a brief description of each command's purpose and a comparison to any related Macintosh System/Finder procedures. It should aid the IBM user in upgrading to the Macintosh, as well as help the Macintosh user who must occasionally use MS-DOS.

Dictionary of MS-DOS Commands

Assign—Lets you trick DOS into thinking one drive is really another drive. Assign is commonly used to fool software that insists on a certain drive for something. (Like early floppy programs that insist data be on drive B.) No Macintosh equivalent.

Attrib—Lets you lock a file, protecting it from deletion or modification. Closely corresponds on the Mac to selecting Get Info in the Finder, then clicking Lock.

Backup—Lets you back up a hard disk onto sequential floppies, even if individual files are larger than can fit on one diskette. Also allows you to do incremental backups. As of this writing, the Mac has no official equivalent, although several hard disk vendors have come out with their own backup utilities.

Batch Files—Let you build procedures, or programs, from sequences of DOS commands. PC batch files are most commonly used for hard disk management commands that tell the PC how to access information in other directories, and for startup files that set hardware parameters and automatically invoke programs. The Mac, with no equivalent to batch files, handles startup customization through parameter RAM (memory that saves your settings) and Set Startup; its hierarchical file system can find information in other directories more readily than the PC.

ChDir (CD)—Lets you move to another directory in the MS-DOS hierarchical file system. ChDir corresponds to double-clicking another folder on the Mac's HFS. The major difference is that, in MS-DOS, it's easy to go down to subsequent levels of a file system, but you must go back to the top (root) and come down again to backtrack. Macintosh HFS permits even easier movement back up the directory system than down.

ChkDsk—ChkDsk analyzes what's on your disk, and gives you a status report of disk and memory resources. It also fixes errors in the directory or File Allocation Table. An independent disk utility would be needed to do this sort of task on the Mac.

CLS—CLS stands for CLear Screen; it erases the screen of all DOS commands. The Macintosh has no equivalent, since operating system commands are never typed on that machine.

COMP—COMP compares an original file with a copy, to make sure the two are identical. There's no equivalent to COMP on the Mac, to make sure you have made an accurate copy.

COPY—The copy procedure is much simplified by the Mac's visual approach, where the icon of one file is dragged to the disk where its copy should be placed. There are other differences, too. If you copy a file to another directory on the same disk, Mac *moves* the file, erasing the original, while IBM *copies* it, leaving the original intact. In copying groups of related files, you can make extended selections or use a folder on the Macintosh, while on the IBM you would use wildcard characters, but only if filenames are similar. Note that

when you copy an entire disk on the Mac by dragging one disk's icon over onto another, you are accomplishing the equivalent of COPY *.* in MS-DOS. This means you are copying, file by file, all the files on the disk.

Del, Erase—These commands both remove a file from your directory; they correspond to dragging a file into the Trash on the Mac. You get a little more leeway on salvaging it with the Mac (until the trash is emptied)). With both machines, unerase utilities (Norton Utilities on the PC, MacTools on the Macintosh) can often recover a recently erased file.

Dir—Lists the files in any disk or directory. The View choice from the Finder is equivalent, but more powerful because it allows so many options.

Diskcomp—Compares a disk with a copy of itself, to make sure both are identical. No equivalent on the Mac.

Diskcopy—Copies an entire disk, track by track. When the Macintosh copies a disk, it copies file by file (see Copy *.* above). The file by file approach results in better performance on the new copy, but is usually slower. Some utility programs like Mass Coppier and 512K Copy use the track by track equivalent of DISKCOPY.

Format—Format prepares blank disks for use. Mac's format comes into play automatically whenever you insert an unformatted disk, or is invoked by the Erase Disk Command in the Special menu of the Finder. DOS also allows a one-step procedure (format/s) that formats and adds the system files to a disk in one step; this is not available on the Mac.

Label—The DOS label command lets you electronically name any disk. Obviously this is done in Mac without a command—you just type the name under the disk icon.

MkDir (MD)—Lets you create a new directory in the hierarchical file system. In the Mac's HFS, this corresponds closely to the New Folder option in the File menu of the Finder. On Mac hard disks using partitions, MkDir is roughly similar to creating a new partition or volume.

Path—Path lets you specify other directories DOS should search in, if it can't find the program it needs in the current directory. Mac's hierarchical file system automatically looks in all your directories for a needed program file; no special commmand is necessary. On most partitioned hard disks, the Macintosh will automatically Path to any mounted disk or partition: for instance, if you open a document from the Finder, Mac will look on all mounted disks until it finds the application that opens that document. There's usually no way to path to unmounted parts of a hard disk on the Mac.

Print—Lets you print a text file directly from DOS. Similar to choosing Print from the Finder's File menu. The Macintosh actually opens the necessary application, while the DOS command does not require the use of any application.

Rename—As it implies, lets you change the name of any file. On the Mac, no command is necessary; if you want a new name, just select the file, and type away.

Restore—Used with Backup, to restore information to the hard disk. No direct equivalent on the Mac at this writing, except in independently released backup programs.

RmDir (RD)—Lets you delete an empty directory in the hierarchical file system. On the Mac, you can do this by dragging a folder to the Trash. The main difference is that, as a safety feature, the PC allows only EMPTY directories to be deleted; the Mac lets you destroy directories (folders) with files in them.

Tree—Lets you see the structure of all your directories, and the location of all files. Apple's HFS had no equivalent at its introduction; hopefully, this gap will quickly be filled by Apple or by an independent utility.

Type—Immediately displays the contents of an ASCII (text) file on the screen. In MS-DOS, this is the easiest way to peek into a file and make sure it's what you want, without having to open the file in an application. There is no direct equivalent on the Mac.

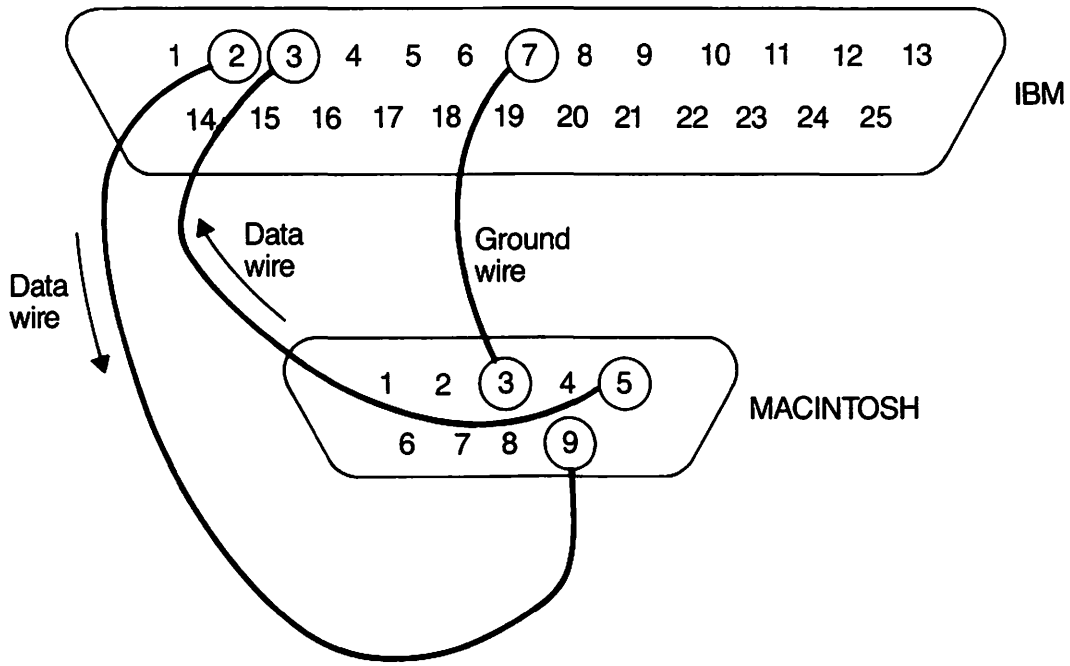
Manual and Automatic Transmissions: A Philosophical Digression

The procedures listed in this section point out some of the obvious differences between the Mac and the IBM PC. The two machines also have very different personalities. Using a PC is a lot like driving a manual transmission. You can get very frustrated when you're first learning. But once you've mastered it, you'll discover special features that let you cruise along in automatic when you want—features like wildcards and batch files.

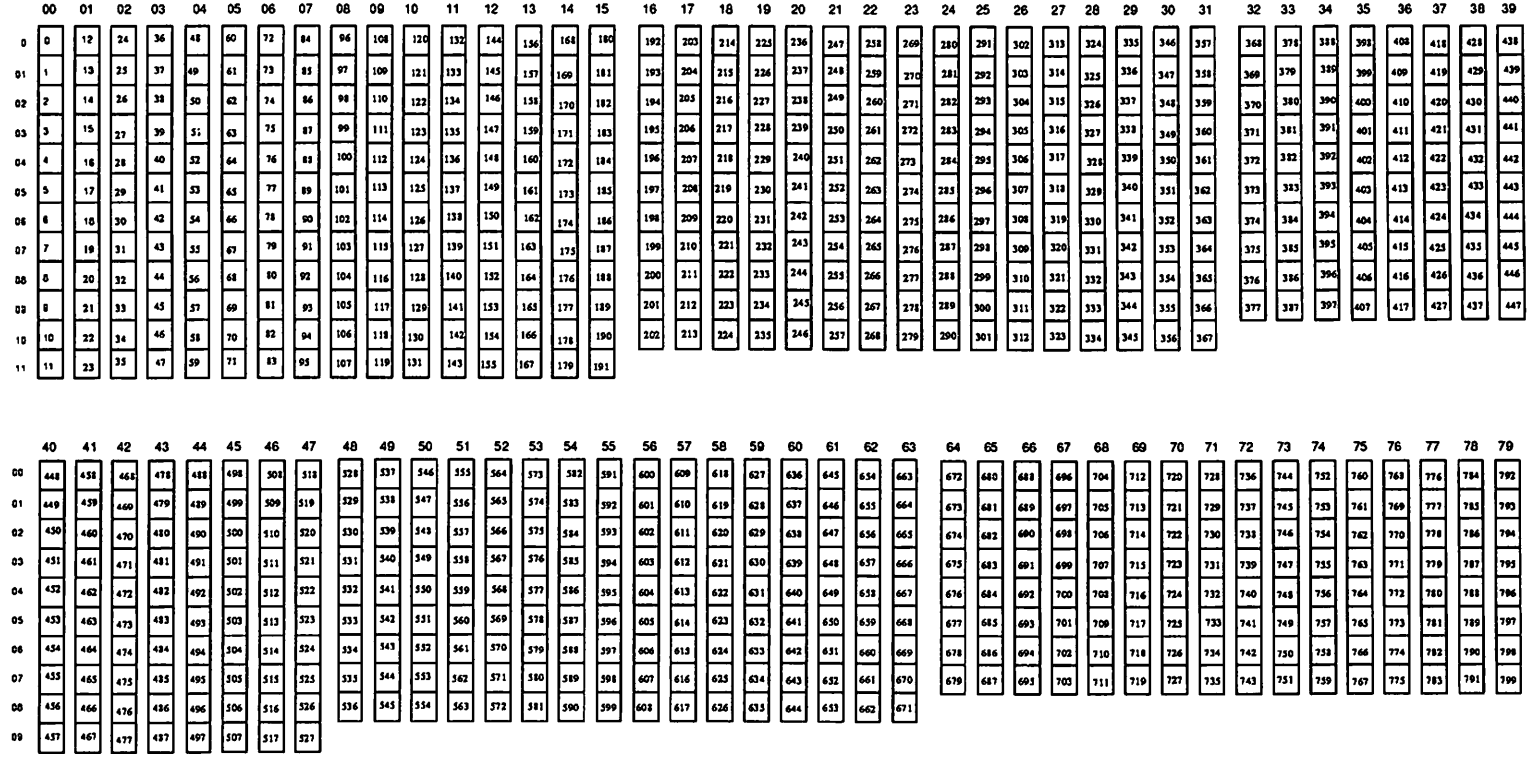
Using the Macintosh, at first, is like driving an automatic transmission: it's much easier to learn, to be up and going immediately. If you've never driven anything but an automatic, you probably shudder at the thought of using only a stick shift. You like having the car make routine decisions for you, about what should be done when. As you get more experienced, though, you pick up special features—like command-key equivalents—that let you shift your own gears when you're trying to accelerate smoothly.

Both the Finder and MS-DOS have a manual (user initiated) component and an automatic (system initiated) component. The difficulty for Macintosh users adjusting to the PC is that some of the more difficult parts of MS-DOS must be learned first. Be prepared for a good bit of mental adjustment, and refer to this appendix, and you should be able to find your way around the PC enough to share information productively between the two machines.

IBM to Macintosh Direct Connection Cable Pinouts



Sector Map from FEdit with Numbers



INDEX

HAYDEN Macintosh Library BOOKS

The Macintosh™ Advisor

Essential Techniques for Experienced Users

Learn advanced methods for making Macintosh hardware and software work to their fullest capabilities with *The Macintosh Advisor.* This book provides techniques, tips, and advice on how to shortcut some of the Macintosh's more elementary procedures and enable you to use your machine more productively.

If you've ever had to hassle with frequent switching of disks and long waiting periods for programs to load, *The Macintosh Advisor* will help you increase the speed with which you perform normal operations by gaining a better understanding of the Finder, RAM disks, cache programs, utility programs, and memory management. It teaches you to customize the Macintosh environment to your work style by choosing desk accessories, adding your own command keys, and altering screen displays by editing resources. It also examines powerful hardware options such as hard disks, RAM upgrades, and the Imagewriter, and discusses how to optimize their usage.

The Macintosh Advisor helps you to solve personal computing problems that you may encounter on the Macintosh. It clearly explains troubleshooting procedures so you can isolate the problems and solve them quickly using your own Macintosh hardware and software. This easy-to-use reference book includes multiple indexing for quick access and an appendix containing common error messages.

About the Authors...

Active members of the Boston Computer Society, Cynthia Harriman and Bencion Calica have combined their expertise to write this insightful book on using the Macintosh.

Cynthia heads a microcomputer consulting and training firm and is the author of computer-based training pro- . She has also ed several articles for *Lotus* ... *nfoWorld Magazine* as a ... Board.

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