The Macintosh

Bill O'Brien

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THE MACINTOSH

Bill O'Brien

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THE MACINTOSH
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♥ To Cynthia, for 10 years of love and support, sometimes when I didn't even have the sense to ask.

ACKNOWLEDGMENTS

Any book is a monumental undertaking. Although often only one person's name appears on it, it is usually a joint effort of many hands, many minds, and many talents. This book is no exception.

Without the kind assistance of Lisa Van Horn and Rick Jones of Apple Computer I would never have had access to information I needed. Without the support of the manufacturers whose products appear within these pages, you might well be reading just another rehash of the advertising literature.

I thank John Schnell, grafician (a latter-day form of optical magician) par excellence, for whispering my name to the folks at Hard/Soft Press. To my editors up there, there's very little I can say. After all, they've read it all. And my deepest appreciation goes to my copy editors there and at Bantam, who have unquestionably protected the more delicate portions of my anatomy on numerous occasions.

Finally, I'd like to express my thanks to Bob, Paul, and Peg, who have allowed me to bruise, bend, dent, and sometimes break my column deadline while I was involved with this book.

All told, I sometimes wonder what magnificent act I accomplished that entitled me to be associated with such a great group of people. If I ever find out, I'll let you know what it was.

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1 INTRODUCING MAC

It's sometimes difficult to remember that the large and ever-growing microcomputer business we see today was almost nonexistent less than a decade ago. In those days, if you wanted to do anything with a computer, you went down to the local college and cultivated a friend in the computer department who'd let you use a terminal connected to a large computer somewhere else in the building or somewhere else in the city. There was a certain thrill in eventually seeing the printer spit out big green-barred sheets of paper that actually contained the answer to your problem.

Graphics in those days were not much to get excited about. The best you could usually do was print out different alphabetic or numeric characters to produce shade effects that, held at arm's length, became a recognizable image. More often than not these were grayish renderings of Snoopy, the starship *Enterprise,* or, if the computer department was feeling risqué, perhaps a *Playboy* centerfold.

Since then, terminals have become sophisticated tools, and computers themselves have been refined to the point that they are now truly micro-sized. They can sit nicely on your desk or tuck under your arm for those short trips to the supermarket when you need to tally prices.

Ten years ago the arrival of Macintosh would have been treated as the product of some alien culture far advanced beyond our own. Its graphics capabilities might have driven the artistically inclined into frenzies of delight. Its talents for sound would make people wonder how a record player could be tucked inside the little box. And its diminutive size would have caused most people to doubt that it was a real computer.

The Anatomy of a Computer

Computers are simple. They're made up of only three basic components: hardware, software, and firmware. That may seem like a mouthful to you, but it's really easily digestible.

Hardware is the sum total of the electronic and mechanical parts the computer system is built from. It's the tangible stuff you can see and touch.

Open up a computer, and you'll see some printed circuit boards, some wires, and some electronic parts known as resistors and capacitors. They help manage the electricity coursing through the machine, but they're not the stars of the show. The leading roles are played by a few black rectangles known as *chips*. They contain thousands of electrical switches and connections that have been squeezed down into extremely compact size.

The most important of the chips is the *microprocessor*. It does the actual computing: it manipulates data. Two kinds of *memory* chips help it out. *RAM—random access memory*—stores information so that the microprocessor can use it. These chips don't change, but the information stored in them does. In fact, if you turn off the machine, the information disappears forever. If you like, you can think of RAM as the computer's workspace. The more of it there is, the more complicated the tasks the computer can perform.

Memory chips called *ROM* (pronounced "rahm")—*read only memory*—can't be changed. They store *firmware*—information that tells the computer how to handle its most primitive functions, such as what the machine should do when you turn it on or type your name on the keyboard. What's important about firmware is not how much there is, but what it does.

As a general rule, hardware and firmware are not easily changed. You may be able to make additions to it, if that has already been planned for in the design of the machine, but the fundamental hardware will remain what it is forever. And the limitations of the hardware ultimately limit what your computer can do. Think of it in vehicular terms: if you've got a bicycle, you won't be able to make it go 180 miles an hour no matter how hard you try.

Firmware is actually a special type of *software*. Software tells the computer what to do. It may be stored on a disk or a cassette tape, or you may even type it in, but software is simply a set of instructions that make your computer perform a particular task. When you run a program on the computer, you actually are using software. Software is what lets your computer play a game one minute and work on a complicated mathematical model the next. Back to our analogy: even if you've got a car that can go 400 miles per hour, it won't be able to get up to speed until you find a driver who's willing to go that fast. That driver is the software.

The hardware you choose is important because software is *machine-specific:* it will only run on the machine it was designed for. And software is what makes a computer perform its magic.

What makes Macintosh (and its Lisa sisters) special is the way Apple designed their hardware and firmware to make software easier to use. A piece of hardware called the *mouse* and the software that works with it make many operations with Mac simply a matter of pointing and clicking. The firmware and software that run Mac put fancy characters and pictures on the screen, adjust the volume, and even turn your computer into a game player or a simple four-function calculator without buying anything beyond the basic machine. To do many of the things that are second nature to Mac, other computers require fancy accessories—when and if they can be coerced into performing Mac-like stunts at all.

Software and Support

If a computer's going to help make you more productive in your daily life, it must run the software you need. And what the computer industry calls "support" —help when you need it—must be available. Without both, no computer is worth purchasing.

If a computer has been on the market for a long time, you can usually assume you'll have access to a large vault of software for it. Aside from the usual collection of games, there should be word-processing, database, numeric analysis, telecommunications, and graphics packages all out there waiting to be bundled up in your arms and taken home.

With a brand-new model like Macintosh, you usually have to wait a bit for the software to bloom. But at this writing at least one major software package is available for Mac in each important category, and that's just the tip of a very large iceberg. Literally dozens of software developers are creating programs for Mac, and new ones are being released virtually every week.

Furthermore, the software for a machine like Macintosh which introduces new technologies to the market can be more sophisticated than the generation of software that preceded it. The Mac, for example, offers graphics tools that far surpass those available with any previous reasonably priced microcomputer, and it's the first machine in its class to come packed with a mouse. You can bet programmers will be taking advantage of these features—and indeed, they've been doing so already.

As for support, Apple is in the forefront here, too. The company has been producing microcomputers since 1977—a very long time in this field—and is now the second-largest producer of them. With its full line of products ranging from the classic Apple // series to the innovative Lisa, the company is not likely to leave anyone high and dry.

What Every State-of-the-Art Computer Needs

If you were designing a computer from scratch, what would you give it? Since you might want to carry it around, it would be nice if it had a handle. That's not as obvious as it sounds. One major Japanese "portable" computer doesn't have one; it's possible they expect you to tuck it under your arm. And if you do decide to carry your computer around, it shouldn't weigh very much. Twenty pounds or less doesn't seem an unreasonable burden.

When it comes to keyboards, many computer companies go their own way and introduce supposed "improvements" that can drive good typists crazy. If you know how to type, you won't want to go through a long period of readjustment to a new keyboard. If you don't know how to type, you'll want to learn on something that's standard. Your computer's keyboard should employ the most familiar layout, the one used on the IBM Selectric, with a couple of modifications to account for the fact that it is indeed a computer.

But you're not a tremendous fan of keyboards anyhow. They're okay for typing in characters, but for graphics work and many other jobs they're a bother. You'll also give your computer a *mouse*—a simple mechanical device that rolls across your desktop and lets you "point" to things on the screen or even "drag" them around.

Memory Matters

Memory (RAM) is another important consideration. Computers think in 1's and 0's. Each one is called a *bit.* Put eight of them together and you've got a *byte,* which is a lot more useful. A byte is roughly equal to one character (letter, digit, or punctuation mark) in English, although there are times when a computer will use one byte—a single character—to represent a more complex instruction.

\KING A BYTE

One *byte* is equal to 8 *bits* of digital data. It's a
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TAKING A BYTE

One *byte* is equal to 8 *bits* of digital data. It's a useful entity because 8 bits suffice to code 256 different characters. That's enough to include all the upper- and lowercase letters of the alphabet, all the numbers from 0 to 9, and over 100 special symbols that can be used to control the computer. For most purposes, therefore, each byte corresponds to 1 character of memory.

Memory is expressed in kilobytes, or *K* for short. One kilobyte is equal to 1,024 bytes, though you can round it off to 1,000 for purposes of comparison. A computer with 16K of RAM, then, has a workspace of 16,000 characters—or roughly 12 double-spaced typed pages of material.

Not long ago, 16K was a common amount of memory supplied with a computer. Though that may seem like a lot at first glance, some rather simple software programs can be 8,000 or 9,000 bytes long. It's not uncommon for software to take 15,000 or 20,000 bytes and more. And data has to squeeze into RAM along with the software. There are ways to do this by swapping portions of programs and data into RAM from somewhere else (such as a disk drive), but such techniques slow down the software.

WHAT'S A KILO

Anyone who knows anything about the metric system knows that the prefix *kilo* means "thousands of." So why is a kilobyte 1,024 bytes?

Computer engineers count in *base two*, dealing in digital *bits*, each of which can be either a one or a zero. Rather than using a number system based on tens, where each column of digits represents a power of ten, computer engineers figure in powers of two. The golden number for the K of bytes, 1,024, just happens to be an even power of two (2^{10}). The engineers figured it was close enough to exactly one thousand to get away with calling it a *kilo*. If you're used to the metric system, look at it this way: you get an extra 24 bytes of memory with every K.

Though some fancy programs need more than 200K, the Apple // family has traditionally done just fine with 48K. You'll increase that to 128K to be on the safe side and allow memory expansion to 512K for those fancier programs when higher-capacity chips are available.

But you'll also do something sneaky. Older computers' 8-bit-at-a-time microprocessors could only look at 64K of information easily at any given moment, and the important information in their ROM chips took up part of that 64K no matter how much RAM was in the machine. You'll use a modern 16-bit-at-a-time chip that can access up to 16 *million* bytes. That way, you can add ROM with lots of special information and keep the RAM available for programs and data.

Seeing Your Ideas

The computer you're designing would be useless if you couldn't see what it did. The computer must be capable of displaying 80 columns of characters across a screen. That's the standard for a normal 8 1/2-inch-wide sheet of paper, and there's no reason to settle for less.

That was fine in the good old days, but there's no need to stop there. You'll design your screen so it can display a variety of built-in typefaces, or *fonts*—big, small, plain, and fancy—and crisply detailed graphics. In conjunction with the mouse, you'll be able to move everything virtually anywhere on the screen.

Storing What You've Done

There should also be some way to store your information when you turn the power off and everything in RAM suddenly disappears. What you need is at least one disk drive. Two would definitely be nicer, but that would add weight and bulk. You'll settle for one disk drive built into the computer, along with the ability to hook up another one when you settle down for hard work.

A brand-new state-of-the-art machine needs brand-new state-of-the-art software. Since you're not terribly worried about compatibility with the plain-Jane software that's already on the market, you'll bypass the industry-standard 5 1/4-inch disk drive. Instead, you'll go for the newer, smaller 3 1/2-inch models that forward-looking companies like Hewlett-Packard have endorsed and try to set a new standard of your own.

Hangin' on the Telephone

Although your computer will be as self-sufficient as possible, it shouldn't be forced to fend for itself. Communications facilities are essential so that your machine can talk with others. You should be able to connect it directly to another computer or let it communicate over the phone lines through a *modem*. That's a MOdulator-DEModulator, a piece of hardware designed to translate a computer's electronic signals into special audio tones that can be sent over the phone lines and translate the tones back into signals a computer can understand.

Modems are *serial* devices. They communicate with the world one bit at a time. To do that, they only need one wire for each direction, a ground wire to complete the circuit, and a couple more wires to do such things as detect that another computer is on the other end of the line.

If you want a modem, you'll need a *serial port* to hook it up to the computer.

That's simply a jack where the cable connects, along with the internal circuitry to make it work. Add the serial port to the specifications for your machine. While you're at it, make it a state-of-the-art serial port—one that can communicate at ultra-high speeds with devices like high-capacity hard-disk drives and will allow you to hook up your Mac with others in what's known as a *local network*, a collection of computers sharing such resources as printers.

Printing It Out

Computer printers are becoming more and more sophisticated. To get the most out of those fancy graphics you can put on the screen, you need to be able to send them to be printed on a piece of paper whenever you're so inclined. You'll want to be able to hook up a printer to turn what you see on the screen into *hardcopy*—paper output that even people without computers can read.

Printers often communicate with computers in *parallel* fashion. Unlike the 1-bit-at-a-time serial method, parallel communication deals with all 8 bits of each byte at the same time. To do that, you need eight separate wires to send and eight to receive, along with a ground wire and wires to tell each machine that a byte is being sent and wires to let the computer know when the printer is too busy at the moment to receive anything further. It's not hard to make a cable with all those wires, but the connector for it will be big and bulky, and the internal wiring is no picnic, either. It'll take up a lot of space in your machine.

Fortunately, many printers can work in serial mode, 1 bit at a time, just the way modems do. Solution: add a second serial port so you can hook up both at the same time.

Goodies

Since you'd rather let your computer adapt to the way people work rather than force people to work the machine's way, you'll provide a wide variety of customizable features at no extra cost. In fact, you'll make the whole computer work the way a desk does, with visible folders and files. You'll let folks personally design the way their desktops look, and you'll include the tools most find handy: a notepad, a clipboard, and an alarm clock.

Welcome to the Orchard

That's some goal you've set for yourself. Will you ever be able to find a computer that matches your specifications? Of course you will! You either have it in front of you or you're thinking of buying one. Why else would you be reading this book?

If you fall into the latter category, what are you waiting for? Apple's Macintosh meets most of the criteria for your ideal computer. And we haven't even begun to mention its dozens of other special features, such as built-in sound capabilities, and a very special approach toward the user. There are very few things you can't do with a Macintosh.

But if you're trembling at the awesome prospect of opening the box that houses your brand-new, untouched Macintosh, tremble no more. The Macintosh is a great and wondrous machine, but remember, it's only a tool. Without you, it won't do a darn thing. You are the driving force behind it. It doesn't have enough innate intelligence to know how to plug itself in—let alone turn itself on!

But together! Together, with your guiding hand and Macintosh's abilities, who's to set limits on what you can accomplish? A disk drive here, a printer there, and a modem for good measure, and the world is at your fingertips. Just sit back. In the following pages you'll learn how far a Macintosh can take you through the new electronic universe.

2 PLAYING THE SYSTEM

Packed inside the Macintosh box is one of the most exceptionally capable and well-equipped computers ever offered. But one visit to the computer store will convince you that well-endowed as it is, even a Macintosh can't stand alone. To do anything worth mentioning, it has to become the brains of a *computer system.*

There are enough accessories to plug in, shove in, and key in to your machine to keep you in the store for days and put you in the poorhouse for years. If you jump into computing without understanding the "system half" of your computer, you're likely to acquire a lot of equipment that's absolutely useless and miss out on a lot of good stuff you may really need. The trick to your personal survival in the home-computer revolution is to understand what a computer system is and know how it works.

Extending Mac's Influence

In the early days of computers, people often referred to the machines as "electronic brains." When you're considering a computer system, that's not a terrible analogy. Just as no brain can do anything of much use without the help of such items as arms and legs and eyes, no computer can do much of value without the help of such items as disks, printers, and modems.

True, Macintosh is filled with hardware power that can perform amazing feats. But the hardware devices that can be connected to it extend the system's outer edge. By itself Mac is just a box that changes numbers and words into different forms and displays them on the screen. But when you expand that basic box by connecting it to other devices, the system can *do* things—print mailing labels, newsletters, and books, even talk to other computers over telephone lines.

The best way to learn how such a computer system works is to examine its constituent parts, or *peripherals.* In this chapter we'll look at the hardware—the framework that gives Mac its potential—so you can better appreciate the possibilities locked inside your new computer.

Macintosh, fresh from the box.

The Brains of the Outfit and the Keys to the Kingdom

The heart of your computer system is Mac itself. You met the fundamental parts of its innards, its microprocessor, RAM, and ROM, in chapter 1. Mac is the central command center of the system.

Next to what's inside it, the most important part of Mac itself is its *keyboard.* You won't have much trouble finding it. With many computers, it's only through the keyboard that you can communicate to the computer system.

But Macintosh also lets you communicate by using a *mouse.* It doesn't have four legs: it's a mechanical device that you roll along a flat surface. A rubber ball inside rolls along with you and moves two sensors. The sensors key an optical device inside the mouse that sends signals back to the computer. A program can track the movement of the mouse and provide the computer with accurate information. The entire mechanism fits in the palm of your hand.

The mouse is essential to the operation of the Macintosh. It's a particularly useful tool for graphics programs, since it makes drawing on the screen a snap. But every piece of software written for Mac will rely on the mouse in some way. It's a powerful little critter.

Picture This: The Display

The keyboard and mouse are your way of communicating to your Macintosh. The display is Mac's way of communicating back. When you use the keyboard, the display will usually show you (or *echo*) every keystroke you type, and some sort of on-screen indicator will show you that the machine is responding to movements of the mouse. That's so that you can tell that the machine has received all your commands and understood them. The display may also give you other information: instructions, status reports, and the results of using a particular program.

Most computers require you to go out and buy some display device or use a special connector to hook up the machine to a TV set. Macintosh does things differently. Mac's high-resolution video display is built right into the machine itself.

There are plenty of advantages to this scheme. For one thing, it gets rid of an unsightly cable that would otherwise stick out the back of the machine. For another, it gives software designers the security of knowing exactly what kind of display the users of the machine will have. If you can see an ultra-fine detail on one Macintosh, you can see it on all of them. That simply isn't true with most other computers, which may be hooked up to any of a variety of displays ranging from super $1,000 color monitors to $69 black-and-white TV sets. The disadvantage, of course, is that Mac currently won't perform its magic in color.

That seems a small price to give up in exchange for a built-in screen and machine-to-machine consistency.

Printing Possibilities

The first additional item you'll want in your computer system is a *printer*. In fact, you need one, although you may not realize it right away. There is not one serious application (aside from some pretty serious games) that does not, at one time or another, require a printer.

A printer turns the electronic thoughts of the Macintosh into *hardcopy*—ink on paper. With hardcopy you can look at what you've done without churning electricity through your computer. You can look at one version of your work on the printed page while you compare it against the version on the screen. And you can rest assured that your work is safely out of the clutches of potential electronic malfunctions.

One important thing to remember when buying a printer for Macintosh is that it must be capable of *serial* communications. Mac simply can't communicate with any printer that works only in the parallel mode.

But there's a more important consideration. To be able to print out Mac's super graphics, a printer must have the right firmware built in, and the computer's software must be able to interact with it properly. At this writing only one printer fills the bill: Apple's own *Imagewriter.*

As Mac becomes more popular, however, it's reasonable to expect that printer manufacturers will introduce Mac-compatible machines. *Dot-matrix* printers like the Imagewriter are fast and cheap, and produce characters and graphics made up of tiny dots. With the high-resolution output from Mac, a compatible machine can produce output that's just short of, but not quite, typeset quality. As a group, *letter-quality,* or *daisy-wheel,* printers are slower and more expensive, but they work on the same principles as electronic typewriters and can produce text that's typewriter pretty.

But letter-quality printers do an extremely poor job of producing the kind of dazzling graphics and special fonts Mac is so good at. Furthermore, special software is needed to make such printers run properly with Mac; such software is not yet available, not even for Apple's own Daisy Wheel Printer, though it is likely to be in the future. But unless you're producing volumes of correspondence that must be indistinguishable from typewriter output, a letter-quality printer is probably not the best companion for Mac.

One alternative may be a *laser* printer. Until recently, such printers have been prohibitively expensive, but prices are beginning to drop. Laser printers work on a principle similar to Xeroxing and are capable of producing text and graphics with finer resolution than the best dot-matrix machines. They're also significantly quieter than either dot-matrix or letter-quality machines. Though laser printers are likely to cost upwards of $3,000 in the near future, their capabilities seem so perfectly mated to Mac that most observers expect Apple to introduce one before long.

Whatever printer you choose, be sure to investigate the availability of service. Printers have parts that do a lot of moving, and sooner or later some of those parts will break down. Convenient locations and procedures for servicing the equipment can help you get up and running in a hurry. Printers also have a voracious appetite for paper. When you do get your printer, be sure you also buy a sufficient amount of paper to keep it from going hungry for a while.

You'll find a more detailed exploration of printers in chapter 9.

Storing the Masses

A computer is only what a program makes it. Without the program (or software) a computer can do nothing. But how do you get a program into the computer? With Macintosh, there are two ways: typing programs manually from the keyboard, and using diskettes.

The first method has its difficulties. It's a one-way affair. Without something extra, you couldn't preserve your work or your high score when you or your cat or the power company hit the off switch. Entering programs by hand may seem simple, but when the program you want to enter is hundreds of lines long, trying to type those lines into the machine without making a mistake can be a shortcut to the funny farm.

The built-in disk drive to the rescue! The disk drive lets you buy prefabricated programs on *diskettes,* or *floppy disks,* and "read" them into your computer. But you can also use disks to store both programs that you write yourself and any other data that you need. Because they let you record and preserve massive quantities of programs, text, and data, disk drives are often called *mass-storage devices.*

A disk drive combines the best qualities of a tape recorder with the best qualities of a phonograph. Like tapes, a computer's floppy disks can be recorded, played back, and erased magnetically with utmost fidelity. Like records, floppy disks are "random access." Just as you can drop the needle down anywhere you want on a record, your computer can select data from anywhere on a floppy disk. And it can drop its "needle" (actually a moving magnetic head, like the magnetic head of a tape recorder) anywhere for any amount of time and then go on to the next selection.

Disk Basics

Until recently, most small computers used 5 1/4-inch floppy disks. That's beginning to change, and Macintosh is among the vanguard of machines equipped with the new 3 1/2-inch disk drive.

But that doesn't mean you can use a program or data from a 3 1/2-inch disk that happens to run on a different model of computer. Nearly all machines use a different electronic *format* to record data onto the magnetic surface of the disk.

The format is the particular way the recorded information is stored on the disk. In essence, each machine records data on a disk as if the disk were divided into separate concentric bands (called *tracks*), each of which is divided into a number of short lengths (called *sectors*). Different computers use different numbers of tracks and sectors even though they use the same kind of floppy disk. That's why disks *written* (recorded) on one brand of machine will not *read* (play) on another brand. Sometimes disks are incompatible between two different machines from the same company. Disks produced on and for Macintosh, for example, can be used on an Apple Lisa 2, but it doesn't always work the other way around.

Another Drive

You already know that Macintosh comes with one disk drive built in. That's fine. But it's probably not enough. That second drive the salesman may be recommending is definitely a purchase worth careful consideration.

When you absolutely need your machine to be portable, one drive will suffice. When you get it back to home base, though, you're likely to find working with just one drive an exercise in frustration. Most software will work with just one drive, but you may have to do a lot of disk swapping to help it. If you want to copy a disk for archival purposes (and you will), you'll become adept at performing the disk-drive shuffle—put the first disk in, then take it out, then put the second disk in, then do it all again and again. A second drive eliminates this nuisance. It's the same as with printers: you may not know yet that you need one, but you do, you do.

All disk drives may look tantalizingly similar, but you're probably going to have to use Apple's special add-on model with your Macintosh. If you're an experienced electronics tinkerer, you may be able to adapt a bare-bones 3 1/2-inch disk drive to work with Mac. But if you don't have DIN plugs in your soul, Apple's latest model makes it easy to add that second drive to your Mac. All you have to do is buy it, bring it home, and plug it in.

As an alternative, you may want to consider a high-capacity hard disk. You'll find more details about two high-performance models in chapter 17.

Not-So-Floppy Disks

In its infinite wisdom, Apple has included only one blank diskette with the machine, and if you follow our instructions later, you'll fill that one up in about two minutes. The only way you're going to get any information stored away is by using the disk drive, and you'll need diskettes to do it. Be sure to bring home a box of them when you buy your machine.

All floppy disks are not the same. Disk packages tell the tale in a confusion of terms: data densities (single and double), sorts of sectors (hard and soft), and numbers of sides (single and double). Actually, all disks are equal "at birth," since all the different varieties can be punched out of a single sheet of the same raw material. The difference is how the individual kinds of disks are tested. The greater the amount or *density* of the data to be recorded onto a floppy disk, the more stringent the test made on each disk, and the more disks rejected. Disks designed for greater recording densities are more expensive because more are rejected in testing. The same is true for the number of *sides*. Single-sided disks have magnetic material on both sides, but they are tested only on one side. Double-sided disks are tested on both sides, and that makes them more expensive.

Fortunately, things are beginning to become simpler. First, you need the right size disk: 3 1/2 inch. The reason's obvious—that's the only size that will fit into your drive. You probably won't buy 5 1/4- or 8-inch disks by accident, but watch out for the similar-sounding 3-inch disks, especially when ordering by mail. They just won't work.

At this writing, 3 1/2-inch disks come in only one density and sector format, so once you've found the right size, all you need to do is decide whether you want single-sided or double-sided disks. At this writing, Mac offers only single-sided disk drives, so you'll need the disks that match them. If you later upgrade to the expected double-sided drives, you'll need double-sided disks for them. If you buy disks with more certified sides than you need, you'll simply be paying for quality that you can't use.

To sum up: when buying disks for your Macintosh, ask for *3 1/2-inch, single-sided* diskettes unless you have the newer 800K double-sided drives.

The Line on Modems

Although there are hundreds of brands of computers and dozens of languages that they speak, enough standards exist that computers can talk among themselves and share information. The primary standard that will soon become extremely familiar to you is the American Standard Code for Information Interchange, nearly always abbreviated as "ASCII." Nearly all communication between computers is done using ASCII codes.

Many large databases (mostly mainframe computers with extremely large memories that are willing to share information with other machines for a price) can be connected to Macintosh through telephone lines. They provide a wide variety of information and services, from stock quotes to games, electronic mail, and shop-at-home services.

But connecting a computer to a telephone line is not as simple as just plugging it in. Ages ago, telephone lines were designed to carry voice signals, which are completely different from the data signals your computer is comfortable with. For computer signals to be sent over phone wires, the electronic bits of data must first be converted to voicelike frequencies and adapted to the special requirements of the telephone line. The computer on the receiving end must decode the voice signals back into computer language. The voice-encoding process is called *modulating,* and the decoding process is called *demodulating.* A device that can convert the signals in either direction, then, would logically be called a "modulator/demodulator," or *modem,* for short. It is!

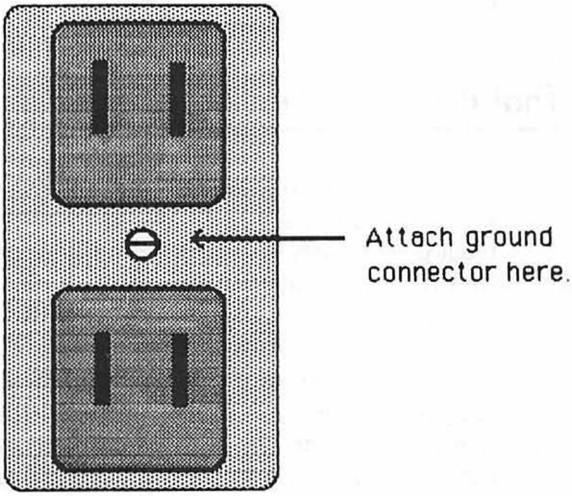
Most modems are expensive gadgets that sit under telephones and send information from one office of a company to another or let the user hook up to popular database services. They range in price from one hundred to thousands of dollars. More money usually buys more speed; premium-priced modems can usually send and receive data four times faster than lower-cost models—but only if another high-speed modem is on the other end of the line. More money may also buy more features: some modems can dial and answer the phone without benefit of a human.

With the proper cable you can plug a wide variety of "outboard" modems right into your Macintosh. Aside from speed and features, the major difference among modems is how you attach them to your phone line. Most modern modems use *direct connection* into the line via a standard "modular jack." Normally, that's the best way to make the connection, but if you're on the road, you may find yourself in a motel room whose phone is wired to the wall to discourage theft. In that case, you'll want a model with an *acoustic coupler,* two rubber cups that hold a standard telephone handset. It's less dependable than a direct-connect type, but in some situations it's the only answer.

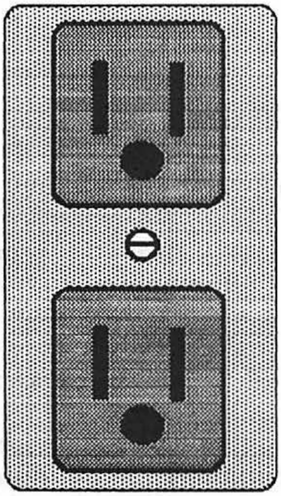
Electric Questions

The plug for Macintosh's power supply, like more and more plugs these days, has three prongs instead of the usual two. The two flat prongs allow the line voltage to enter the machine and return to the wall, completing the electrical path. The blunt, tubular prong is the ground connection. Under most normal conditions it routes stray electrical signals out and away from fragile computer electronics—as long as you don't prevent that from happening.

If you live or work somewhere that does not support the three-wire system, you should get a three-prong adapter. One side accepts a three-prong plug like the one on the power supply; the other gives you two prongs to plug into your wall outlet, along with a metal tab or a wire that takes the place of the third prong. If you want the adapter to do its job, be sure to connect the tab or wire to the center screw of the wall outlet plate. In theory, the metal housing of the outlet should be grounded and do the rest of the job.



Three-prong grounded outlet.



Two-prong ungrounded outlet.

Don't ignore the ground connection. If you do, stray and uncultured signals may find their way inside your Macintosh and be the cause of its premature demise.

Power outlets aren't the most exciting things in the world, but there are a few more things to remember about them. Try to avoid connecting your computer to an outlet shared by a refrigerator, blender, air conditioner, or similar appliance. Such equipment uses motors that generate a lot of electrical "noise" that can be transmitted over the power line in the form of large electrical *spikes,* momentary surges of voltage far beyond what Macintosh can tolerate. Lightning can do the same thing. It's a great way for your computer to venture beyond the land of the functional.

If you absolutely have to run your machine from an outlet with "dirty" electricity, all is not lost. You can invest in a *surge suppressor* or *line filter* that will sift out the electrical garbage before it reaches your machine. Such devices usually look for all the world like glorified extension cords, so installation is easy: plug your computer into one end and plug the other end into the wall. You can find surge suppressors at just about any reputable computer store. The salesman who's so eager to sell you the under-$100 device may just be doing you a favor.

You might also want to invest in a multi-outlet *power strip*. These fancy extension cords turn one grounded outlet into three or six, and often include a switch as well. Sooner or later you'll probably find yourself needing one. Some power strips have surge protectors built in.

That Powerless Feeling

If you live in an area where brownouts or power failures occur with regularity, you may find yourself losing data more often than you'd like. RAM, remember, requires electricity: when the power goes off, even for an instant, everything in your computer's memory is wiped out. If that happens to be a report you've been working on for hours, you will not shrug it off lightly.

A device called an *uninterruptible power supply,* or UPS for short, is designed to prevent such disasters. A UPS plugs into your wall outlet, and your equipment—computer, printer, modem, whatever—plugs right into it. The device contains batteries that automatically provide power when voltage drops below a preset level for longer than an infinitesimal fraction of a second—too short a time for your computer's memory to go blank.

Typically, a UPS will provide power only for a few minutes of continued operation during a blackout. But that should be enough time for you to finish up what you're doing, save everything to a disk, and shut off the equipment.

The key to using a UPS successfully is to pick one with the correct power rating to handle the equipment you want to protect. Mac itself is a lightweight in the electrical department, using only 60 watts—a little less than the average light bulb. A printer like the Imagewriter, however, may use 200 watts or more because of the motors that advance the paper and print head, and the power consumed during printing itself.

If you have a large-capacity fixed-disk system attached, you may need an additional 200 or 250 watts to accommodate it. A reasonable UPS, under those conditions, would be a 750-watt model. A smaller, 500-watt model might do, but your margin of error would be very narrow.

Again, your need for a UPS should be determined by the importance of the work you do (how miserable it would make you to lose some of it), and by the frequency of electrical disturbances in your area. If you're in an area where the power doesn't go out more than a couple of times a year and you train yourself to save your work to disk every few minutes, a UPS is probably an expensive and unnecessary luxury.

The Benjamin Franklin Syndrome

Another consideration for your Macintosh's well-being is the physical environment you place it in. A home or office with deep pile rugs may be a comfortable place for you to exist, but it can be disaster for a computer.

Rugs, woolen clothing, cloth-covered chairs, and dry weather often combine to produce static electricity. Those little blue sparks may be just an annoyance to you when you touch something, but on an electrical level they can produce several thousand volts. Fortunately, those static sparks are of an extremely low amperage, which is why they feel like pinpricks rather than the electric chair.

But those high-voltage, low-amp sparks can play havoc with your computer, causing it to forget what it's currently doing, blacking out the screen, or even permanently damaging internal components. And all of that can happen faster than you can blink your eye.

One solution is to arm yourself with an antistatic mat. These floor mats come in a variety of sizes and prices and, much like the three-to-two prong outlet adapters, have a wire that connects to the center screw of the wall outlet. As long as you make contact with the mat, your static charge goes harmlessly into the mat, down the wire, and straight to the ground instead of sparking to your computer.

If you see static sparks only some of the time, you probably won't want to invest a hundred or more dollars on an antistatic mat. Antistatic spray is a cheap and effective alternative. It's available in aerosol and pump-type sprayers that make it easy to keep your carpet from making you a static carrier.

If you do need one of these devices or you have to rearrange a few appliances, take care of it before you bring your computer home. When you plug in your Macintosh, you shouldn't have to worry about more than making it do what you want it to.

Care and Feeding

Mac doesn't require much maintenance, and in fact, there's not much you can do other than keep it clean and out of heavy traffic. But if you want to keep it in tip-top shape, you can observe certain guidelines and practices to increase its lifespan and keep it happy and working and looking like new for a very long time.

There's little doubt that giving a computer the specialized care it requires, and even going beyond what is merely necessary, will prolong the life of your sophisticated and expensive electronic investment. The key words in the common jargon of computerdom are "preventive maintenance."

The minimum you can do is the absolute minimum, nothing. Factory recommendations are minimal because the Mac's microelectronics (or any computers, for that matter) require no mechanical care or maintenance. There are virtually no moving parts to wear out.

Rather than slowly grinding down, modern solid-state electronics fail catastrophically. One moment they work, and the next moment nothing is left except your frustration. No matter what you do, there is a chance your Mac—or any computer—might suffer a catastrophic failure.

Fortunately for the space program and any other critical application that relies on microelectronics, such catastrophic failures are rare. After marginal components have been weeded out of any modern electronic device, you shouldn't expect a disaster more often than once in tens of thousands of hours of operation or years of normal use.

Burning It In

The first preventive thing to do is to try to prevent your Mac from failing *after* its warranty runs out. Rather than trying to extend its life by keeping your use of it to the minimum, push your Mac to its limits.

The "weeding out" of marginal components in any solid state device occurs during the first few hours of operation. If your Mac works after you first turn it on and perks happily along for the first few days, barring an outside cataclysm, your computer should cogitate for years without your lifting a finger except to massage the keyboard.

The logical thing to do once you hook up your brand new Macintosh is to pull the fledgling computer from its box, turn it on and leave it on for the next day or two. You can use the added "burn-in" time for familiarization, learning how to get along with your Mac, playing your favorite game, or just allowing the fledgling computer to hum along on its own.

Once the computer has proven itself, you can take added precautions that go beyond the factory's recommendations, to assure yourself that your Mac will remain in perfect shape.

A Happy Home

The mandatory care Mac requires is, in fact, nothing. But Mac is not entirely trouble-free. Although it requires no maintenance, it also requires that you do not abuse it. That means that you must give it a happy home in the type of atmosphere it likes, and take care of its particular needs.

In fact, Mac does have some moving parts and delicate electrical contacts—in its keyboard and mouse. Their big enemies are mostly airborne—dust and extreme humidity—but the contacts can also be tainted and fouled by more worldly problems, from grease to peanut butter and runaway coffee spills.

Mac's computer circuitry is likely to suffer ill effects only from its environment. The climate can be either too hot or too cold or too dry for it, or the machine can suffer when odd things happen to the power lines in your town.

The best advice in trying to give Mac a happy home is to be reasonable. You wouldn't put your clock radio in a sandbox or swimming pool. Don't use your computer there, either.

Maybe your thoughts aren't that absurd, but you might be considering a computer room in your dank basement or in your hot attic. Even though the computer doesn't complain about its surroundings, it still is a bit particular about them. Its internal circuitry is designed to work within a wide temperature range. Apple specifies that it was designed to work in an environment somewhere between 50° and 104° F (10° to 40° C), where the relative humidity is anywhere from 5 percent to 90 percent. This means you can use it practically anywhere.

Rather than treating Mac as a mindless machine, pretend that it is a sensitive and feeling good friend. Computers are generally happy to operate under any conditions of both temperature and humidity that humans would be happy with. That does not mean a computer needs the same perfect temperature that you might demand for absolute comfort. Rather, the best preventive measure is to avoid putting any computer in a hostile environment.

Too, you should give your Macintosh the same consideration that you would give an expensive machine or to valuable papers and documents. Just as a sugar-laden cup of coffee would be disastrous if spilled on the deed to your home or poured into your stereo receiver, Mac would likely succumb to such a drenching.

In other words, the table on which you set up your computer should be reserved for the computer alone. Keep your breakfast of overbrimming Coca-Cola and chocolate-covered doughnuts away unless the equipment is covered by flood insurance.

All liquids should be kept away from Mac, because its mouse and keyboard have contacts that can be easily gummed up by sugar pollution and ruined in other ways. In highly humid environments, for instance, contact corrosion will be accelerated.

Disk Drives

Although there is no standard recommended care for disk drives beyond proper protection, their proper operation can be safeguarded by regular care and preventive maintenance.

Don't go bananas forcing disk into the drives. You wouldn't slam your car door shut day in and day out without expecting it to break: Disk drives are a lot more fragile.

Disk drives work exactly like other magnetic recording machines and use "heads" to actually record and play back (write and read, in computerese) their signals to and from the disks. Just as with stereo tape recorders, disk drive heads can get dirty, causing damage to the signals they read and write.

With full-height drives, a cotton swab and some alchohol were useful for cleaning. You could insert them into the drive and get at the head. It's not recommended with Mac: The drive opening is too small.

Several companies manufacture head cleaning kits. The easiest to use are the ones that come with diskettes that contain absorbent fabric material instead of a recording medium. You simply apply a cleaning solution to the disk, insert the disk and give the drive a command that sends the head looking for data. As the moistened fabric spins, it cleans the head.

But don't go ape over cleaning the drive. Most of the drive cleaning kits are slightly abrasive. Each time you use it, you scrape away a little of the head. If you find yourself plagued by the need to clean your heads every two weeks, your own head may be what needs examining. Even under severe conditions, one cleaning a month would probably be more than enough. If you're starting to run into disk problems, of course, it's worth cleaning the heads to see if that clears up the problem. Otherwise cleaning the heads three or four times a year should be plenty.

Good Housekeeping

A clean computer is a happy computer. Dirt is the mortal enemy of any computer system. It cakes on printer mechanisms and causes them to slow down and bind up, and slowly grinds away like sandpaper at delicate disk drive parts. If your printer and disk drive are so layered with dust you need to hire an archeologist just to find them, you'll likely soon be searching out the warranty cards and inspecting the phone book for repair shops.

The best way to keep dust from becoming a problem is by developing a regular clean-up program for your Macintosh. As often as necessary (judged by running your finger over the equipment to see how much dust it collects), simply vacuum the danger away. Use the finest nozzle available to suck dirt from inside the disk drives, from between the keyboard keys and from within the printer.

Window cleaner is perfect for removing smudges and grime from Mac's display screen. Take care, however, if you plan on using any spray-type window cleaners. Rather than spraying to remove smudges, dampen a soft cloth with window cleaner and gently wipe off. For tougher dirt on the outer surfaces of your Mac, disk drive, printer or monitor, almost any household cleaner may be used. The tough plastic cases are immune to most everyday cleaning solvents.

Be wary of using any strong solvents that frost, glaze or melt plastics (like acetone or nail polish remover) to remove really stubborn smudges, however.

They can ruin the textured finishes of the outer plastic shell of the computer and peripherals and might even melt holes in them. If in doubt, dampen a cotton swab with the anticipated cleaning fluid and try the results on the back or bottom of the cabinets.

Your Macintosh is better off when it is protected from the dirt and dust around it. Not only will protecting a Mac from dirt and grime keep it looking like new, but it will also help prevent potential mechanical problems.

The best protection against dust is a dust cover. Because other members of the Apple family have proven to be so very popular, several types of dust covers are available commercially, both from dealers and by mail-order. While you're at it, consider a dust cover for your printer, too.

As the Apple manuals point out, if you treat your Macintosh with care and avoid physical abuse, you should have no problems whatsoever. However, it is possible to overheat your computer, especially since there are so many parts crammed into such a small space. The telltale sign is erratic performance—the memory devices inside are especially susceptible to heat buildup.

We'll discuss Mac's ventilation system in the next chapter. The key word is simply this: be very careful not to block any of the vents. This means you should never wedge the computer into a tight space where air can't circulate in and around the chassis. And although the case is solid, don't ever pile anything on top of your computer, ever if you're tight for space.

If you keep it cool and clean, you should enjoy near flawless performance for years to come. Apple has engineered a lot of computer into a small space, and its designers have used the company's many years of experience to craft a durable, virtually maintenance-free precision machine. With a little common sense and a dust cover you and your Macintosh should do quite well together.

3 THE ART OF UNCRATING MACINTOSHES

Okay. You've taken our advice and gone out and bought all the peripherals and accessories you need. Now what?

There are three ways to approach any new computer system. You can sit timidly looking at the unopened boxes. You can tear open the box on the floor and scatter everything around, Christmas-style. Or you can really think about what you're doing and plan the actions you're about to take. The last option is, of course, the most logical—but that's not always a point we humans take into consideration.

If you've already opened the box, step back for a moment and get a better perspective. If you've already opened the box and tossed everything around, step back cautiously. You might even consider sitting down.

In many ways a new computer resembles a new child. Until you get to know and understand it, it will spend a great deal of time complaining. The only way to calm it down is often to let it have its own way. You'll also have to give it a comfortable environment and some of the essentials it demands.

Where Do I Put It?

Macintosh is one tough cookie, but that doesn't mean it's indestructible. Computers aren't delicate flowers, but they are susceptible to environmental forces. A can of cola may cool you off, but dripped into the right (or wrong) place, it can stop Mac cold. So can other potential environmental nightmares. There are just too many possible situations like that for you not to decide on a permanent place for your Mac when it's home—a spot where the machine can be safe and you can use it comfortably.

Macintosh has three basic components: the main unit, which houses the video display, internal disk drive, power supply, main logic board or central processing unit, and the video electronics; the keyboard, which contrary to some rumors is often necessary for entering information; and, finally, the mouse.

The main unit itself has the smallest "footprint" (the amount of table space it requires) of any desktop computer currently produced. It will fit into a space just a little bit larger than a standard 8½" × 11" sheet of paper. Just move a magazine or a pile of paper you have lying around and you've got room for your Macintosh.

But you also need room for your keyboard. And then there's the mouse.

Running Room for the Mouse

Although it's the smallest major component of the Macintosh, the mouse needs some desktop space to get the most out of it. To use it, you simply roll it around on a flat surface. That causes an indicator, or *pointer,* on the screen to move correspondingly. Move the mouse left or right, and the indicator moves in the same direction. Forward with the mouse is up on the screen; backward is down. The further you move the mouse, the further you move the indicator. That, of course, means you need plenty of space on which to roll your rodent.

Well, not really. The mouse is designed so that you don't need to roll it 9 inches to make the pointer move across the 9-inch screen. When you bump into the keyboard or your telephone, you can simply pick up the mouse, bring it back to its starting point, and travel on in the same direction. This maneuver works fine, but having to perform it repeatedly negates some of the efficiency of working with the rodent. That's why it's a good idea to have at least some clear space for it.

The mouse also needs a flat horizontal surface to work on. Peanut-butter sandwiches and walls are not terribly good promenade areas for mice, since on less than ideal surfaces the ball inside will tend to creep away from its opening and back into the body. Don't be alarmed if that happens. Just level the mouse, and the ball will settle back into its "cradle," ready to run along with you again.

Finally, home base for your Macintosh will, more likely than not, mean room for a printer and an additional disk drive. To accommodate it all, you're likely to need a space that's about 30 inches wide by 24 inches deep. It'd be nice if that space wasn't subjected to extremes of heat and cold and useful if it had some electrical outlets handy. Once you've found that space, you can turn your attention to Macintosh itself.

Into and Out of the Box

Once you've opened the carton, you'll notice some smaller containers inside. These are your "goodies" boxes. Without them your Macintosh will make a nice piece of furniture, but little else.

One of the boxes holds the keyboard. Another has the mouse. A third contains the all-important system diskette, the *Guided Tour,* the manuals, and a few other handy items. The big thing in the box is Macintosh itself.

Lift the machine out of the box, carefully separating it from its Styrofoam cradle. Take the plastic off and just admire your new acquisition for a moment.

Fifteen years ago the computing power in your hand would have filled half the room you're standing in. Ten years ago it would have taken up three times the space it does now. Seven years ago it would have been 20 percent larger and weighed and cost more than twice as much. And today no other computer offers as much innovation right out of the box.

Enough gee whiz. Let's see what it can do.

Breathing Exercises

Like most machines, Macintosh works best in a comfortable environment. Since it's a tool for human beings, it's designed to work best in climates humans find appealing. If you put Mac in a hostile situation, it will not labor at its peak efficiency, nor will it survive as long as you'd like it to.

Once you've selected the spot your Macintosh is going to inhabit, consider this: just about anything using electricity will generate heat. And since that heat can cause problems for delicate electronic circuitry, it has to be removed somehow. Using a fan is one way to do it, but fans make noise, take up space, and have been known to fail. The folks at Apple don't much care for fans: no Apple computer has ever had one built in.

Instead, in keeping with its lifelong tradition, Apple maintains Mac at a comfortable internal temperature by relying on a ventilation system called *convection cooling.* It takes advantage of the facts that warm air tends to rise, cold air tends to sink, and a vacuum won't remain a vacuum for long.

Look along the top of the Macintosh main unit. You'll see two rows of air vents, one on either side. They also run a short way down the back and even under the handle. Through these, heated air exits from inside the computer. Along each of the sides at the bottom of the machine, you'll see another row of vents. This is where cold air enters.

As Macintosh operates, the hardware heats up. The air inside starts to get warm and rises. Finding the holes in the top of the machine, it escapes out into the world. And as the air vacates the premises, it tends to leave a vacuum behind in the space it occupied.

The vacuum needs to be filled. Since the upper vents are busy letting air out, the vacuum entices the cooler air in through the bottom vents and fills itself. But the cool air doesn't stay that way for long. As it starts to heat up, the cycle begins all over again.

That cycle will continue forever, unless you do something to stop it—and you'd be wise not to. For the system to work correctly it needs both sets of vents. So even though space around your desk may be at a premium and even though the top of Macintosh looks like an excellent place to put papers or a book while you're working with the machine—don't do it. And though the space at either side of the computer seems tailor-made for spare pencils, pens, and paper clips, don't put them there. If you break the cooling cycle, you'll eventually break your Mac.

Drama aside, convection is a very efficient method of cooling. It's totally silent and requires no extra equipment to work correctly. All it demands is that you keep that air flowing.

The World at Your Fingertips

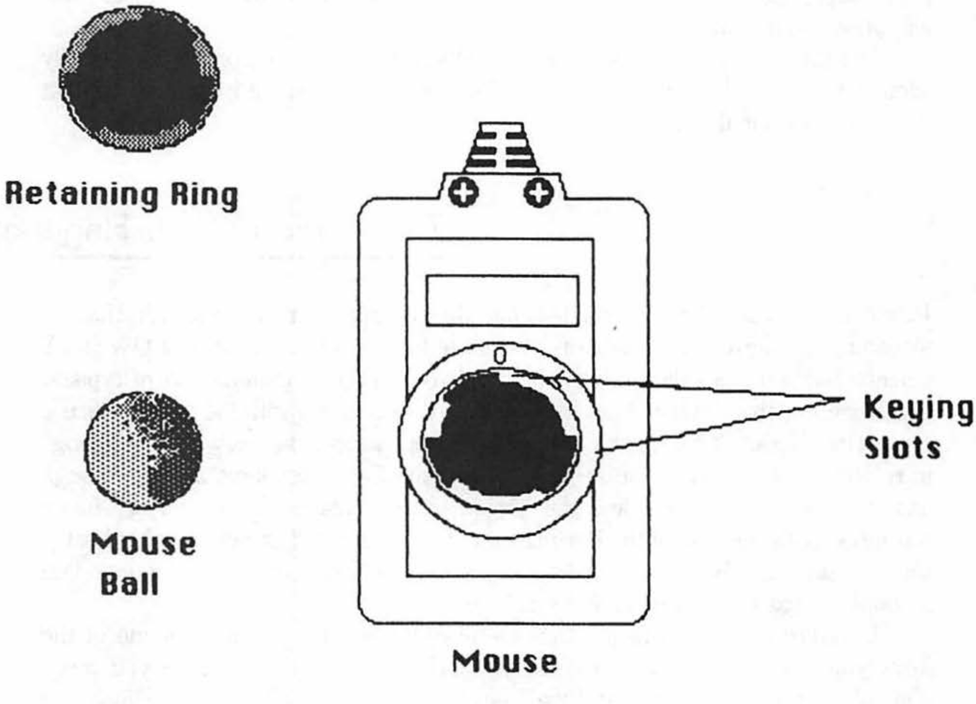
Reach in the carton again and fish out the keyboard. You'll discover that its alphanumeric (letters and numbers) keys are laid out in the traditional QWERTY pattern (sometimes called the Sholes design) familiar to generations of typists. Furthermore, this keyboard has been designed to conform with the basic Selectric typewriter layout. That means the quote-and-apostrophe key is where it belongs in relation to the rest of the keys, the Shift and Caps Lock keys are big enough and in their usual places, and that Apple hasn't engaged in any major "funny business" with the rest of the key placement. It's not totally a Selectric keyboard, though, since the Return key lacks a vertical extension in order to accommodate a couple of extra punctuation keys Selectrics lack.

If you're not an old hand at computers (and even if you are), some of the keys you see may be unfamiliar to you. They're designed to give you more control over your machine, and we'll discuss them in detail later on. But if you *are* a long-time computer user, you may miss keys with such charmingly romantic names as "control," "escape," and "home." With Macintosh and its all-important mouse, they've gone the way of the buggy whip. We'll save the particulars for later.

Good Mousekeeping

The mouse is the other major item you'll find in the box. If through some mishap or quirk of jealous fates your mouse has arrived in pieces, you probably don't have as terrible a problem as it might appear. If the pieces you see are specifically the mouse housing, a small rubber ball, and a black plastic circle with a hole in the middle, you're definitely in luck.

The mouse was designed, in fact, to come apart for cleaning. If you look at the bottom of the mouse, you'll see two engraved letters, *O* and *L*, conveniently standing for "Open" and "Lock."



If the mouse has by chance gone to pieces on you, hold the mouse bottom up, with the cable away from you. Slip the ball inside. Now look at the side of the plastic ring without the ridges—the side that goes into the mouse. See the flanges (or tabs) sticking out? If you put the biggest flange toward the bottom, it looks a little like a Mickey Mouse silhouette with two ears and a nose. As you view it from the bottom, the ear flange and its accompanying mini-flange lines up with the recession on the right side of the mouse.

You can also look for a very small flat spot near the outer edge of the ribbed side of the plastic ring—the side that would face the desk as you used the mouse. If you line this up with the *O* on the mouse, the ring will slip into the mouse body.

Either way, once the ring is in place, rotate it to the right toward the *L* until you hear a muffled click that tells you it's really locked in. Don't force things, but do make sure you go far enough; otherwise you'll have a ball—in your lap. When you've done it right, the flat spot will appear opposite the *L*.

To disassemble the mouse for cleaning, just reverse these procedures. You can use cotton swabs dampened with alcohol or tape-cleaning solution, but *only* on the three small rollers inside the mouse's shell. Keep the solvents well away from the rest of the mouse and from the rest of Mac. For the mouse housing and Mac's plastic parts, you can sparingly apply a household cleaner to a cloth and wipe, but don't spray. Window-cleaning solution used the same way will work on the screen; again, don't spray. Finally, don't *ever, ever* use anything but a lint-free cloth and plain water to clean the mouse's rubber ball. Melted rubber does not roll smoothly along a tabletop.

HOW THE MOUSE WORKS

If you tip the mouse over on its back, you'll see a small hard-rubber ball through a circular hole. When the mouse is rightside up, gravity makes the ball protrude through that hole. As the mouse moves across a desk or table, the ball rotates.

Three rollers inside the mouse's case are in contact with the ball as it rotates. One of these, a large silver affair, looks very much like a tiny roller-skate wheel. It's used to equalize the tension on the ball. The two small black rollers actually do the work of tracking the mouse. Both rotate around shafts that turn small circular vanes which in turn transmit motion to an optical sensor still deeper inside.

As the mouse makes its merry way across your desk, the ball spins, rotating the rollers. The sensors read the roller motion from the vanes and send the information back to Macintosh for interpretation.

Display and How to See It

When you look at a Macintosh head-on, the most prominent feature on the computer is the video display. With the machine off, it's not terribly impressive.

But one thing about the display is worth knowing even before you turn on the machine: if it doesn't light up, chances are excellent that someone's been fiddling with the brightness control—the little knob just below the left side of the ledge below the screen.

Driving Your Disks

Aside from the display, Mac's most noticeable feature is the disk-drive slot just below and to the right of the screen.

Disks can hold the information you've created, or the programs and instructions that make Macintosh perform its tricks. They slip right into the slot in the front of the machine, and they're very different from what's been considered normal on small computers.

Until very recently, only two sizes of disks were distributed with computers: 8 inch or 5 1/4 inch. The disk itself was a round Mylar sheet covered with magnetic material much like the coating of audio tapes and encased in two pieces of stiff but bendable plastic. It's because of their flexibility that they're called "floppy" disks.

For years these were fine, since computers only came in two sizes: large and slightly less large. But a machine the size of Macintosh called for new technology.

Officially, Macintosh's internal 3 1/2-inch disk drive is capable of storing 400K bytes (400,000 characters or about 150 single-spaced pages) per disk. At present, Mac's disk drives are single sided: they use only one side of a disk to store and retrieve information. A double-sided drive, which can store twice as much information on each disk, would fit in the Macintosh case, but shortages and technical problems led Apple to introduce the machine with the simpler single-sided variety. IBM did the same thing with 5 1/4-inch drives when it introduced its original Personal Computer; now even the PC*jr* comes with a double-sided drive.

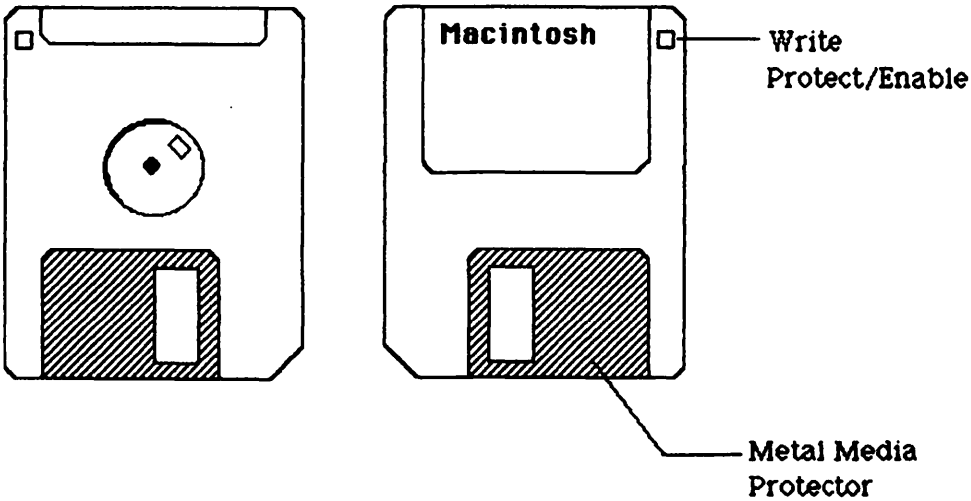
But the IBM PC can help give you another indication of how tightly information is packed onto one little MacDisk. The IBM storage maximum is 360K bytes per disk—and that's a *double-sided* disk. When double-sided disks are available for Mac, they'll store a whopping 800K.

Apart from size, the major difference between Macintosh disks and those commonly found on other computers is the hard plastic shell that encases the disk material. This extra protection allows you to treat them in ways you would never consider with old-style diskettes.

If you wanted to carry or mail a regular disk, you'd have to put some stiff cardboard on both sides to keep it from bending. With Mac's 3 1/2-inch version, you can just stick it in an envelope or stuff it in your wallet, pocket, or purse. For portability, Mac disks win hands down.

Built-in Protection

Functionally, all disks are the same: they store information and make it available for later retrieval. One major difference with the new 3 1/2-inch disks is the way they protect the actual disk media, both when in use and not.



Rear (or bottom) and front (or top) views of a Macintosh disk.

On the back of the disk, behind the small square hole in the upper right corner, is a small red tab that you can slide up or down with a prying motion. If that red square is *not* visible through the hole in the front, the Macintosh absolutely cannot write anything onto the disk or erase anything from it, either accidentally or on purpose. But Mac is more than welcome to read information from it. When the red tab is visible, on the other hand, you have full access to the disk. The square is a kind of "red flag" that lets you know that the disk has the potential to be altered.

The 5 1/4-inch disks have "write-enable notches" cut into one side. A piece of gummed foil tape over the notch protects the disk from alteration, and the absence of tape allows full access. Needless to say, only the most sentimental of fools would miss dealing with the older technology's foil stickum.

Armor Casing

When you put a disk into a drive, the computer clamps the center hub and spins the electronic medium inside. In this way the drive's heads can get information from it (*read* from it) or put information onto it (*write* to it) by moving back and forth perpendicular to the direction of the spin.

With a 5 1/4-inch disk, a lozenge-shaped opening in the case gives the disk drive's magnetic heads (and less-desirable human fingers) access to the disk medium. But how does a Macintosh manage to get information to or from the apparently impenetrable MacDisk shell? The only visible parts of a MacDisk are the plastic disk case itself and a strip of metal running across the bottom. Neither is an acceptable storage medium.

But that metal strip is the real key to the disk: it's a door. When the disk is inserted into the drive, a mechanism in Macintosh engages this door through a little notch on the side and slides it open, exposing the disk medium itself. When the disk isn't in the drive, the door springs back to become a protector, preventing stray fingers from touching the surface and destroying the information.

If your curiosity is getting the better of you and you want to open the door to make sure everything's on the up and up, fine. Grab a disk—preferably a blank one.

The side of the disk with the circular metal hub showing is the bottom. If you can see the hub, turn the disk over. Now, holding the disk case by its edges in your right hand, with the metal door at your left, gently place the thumb and forefinger of your left hand on the larger section of the metal protector, one finger to each side. With the utmost of care, slowly slide the metal door toward you. If it doesn't want to move, don't force it unless you're a big spender and you don't mind throwing away the $5 or so a new disk will cost you.

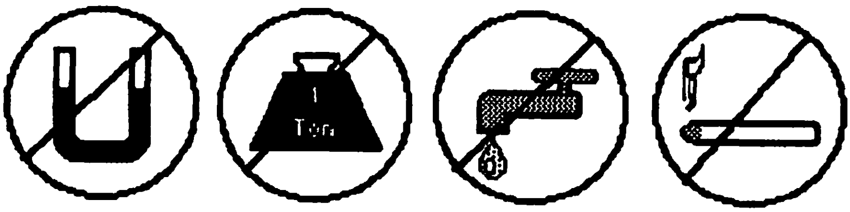
When you're fully satisfied that there is something in there (and don't touch that something unless you want it to die), let the door *slide* back to its original position. Don't let it snap back. Hopefully your curiosity will not get the better of you again.

Disk Labels

You're likely to find that the most difficult part of working with your disks is putting the identifying labels on straight. If you've ever rolled a cigarette, you'll find that your skill comes in handy when you have to wrap the tail end of the label over and around the top of the disk. The trick is to get it lined up perfectly in the recess on the front; do it carefully, and all should go well.

Once the label is on, there is a secondary benefit from the hard plastic case that encloses your disk. With ordinary diskettes, the hard point of a writing implement can harm the disk's surface through the label and the soft outer jacket. With MacDisks, you don't have to worry.

Disk Care



Which is not to say there are no precautions you should take. Even Mac's armor-clad disks remain susceptible to environmental depredations. Just because the disks are so handy, don't be tempted to treat them with less respect than they deserve.

Magnetism

Magnetism tends to erase the contents of the magnetic-sensitive disk media. You'll find that if you leave your disks lying around near that powerful speaker system you're so proud of, the magnetism from the coils may slowly eradicate all the information they contain.

Other sources of magnetism and electrical fields may not be so obvious. Television sets, magnetized screwdrivers and scissors, and even the bell in your telephone could have harmful effects on your Mac's disks, so as a precaution, don't leave them near such potentially dangerous devices.

Heat and Pressure

Disks can also be adversely affected by heat, so you really shouldn't leave them lying on a radiator or on the dashboard of your car. We've already warned you about leaving anything on top of your Mac—disks included.

Though the disk's hard case is difficult to bend, it can be warped by constant pressure. If you rest something sufficiently heavy on top, you can permanently warp the case. This will, of course, render the disk and all the data on it unusable.

Flotsam and Jetsam

Almost everything possible has been done to protect the actual disk surface from the outside world. Almost everything. If you look at the back, near the hub area, you'll see that there is one breach. Dust, large particulate matter, smoke particles, liquids, and anything else small enough can enter your disk through that opening. If you're wise, you'll be careful with errant sodas, cigarettes, and other sources of possible destruction.

Building the Better Disk Tool

One final note about disks before we continue our tour. Take a close look at the disk-drive entrance. When you place a disk in there, the machine swallows it whole. There's no need to have anything hanging out because the mechanism ejects it when the time is right.

Of course, with today's high technology nothing is ever supposed to go wrong. But if it does, and your disk doesn't come sliding out of that slot, don't try to reach in and yank it out. You'd probably destroy the drive itself in the process.

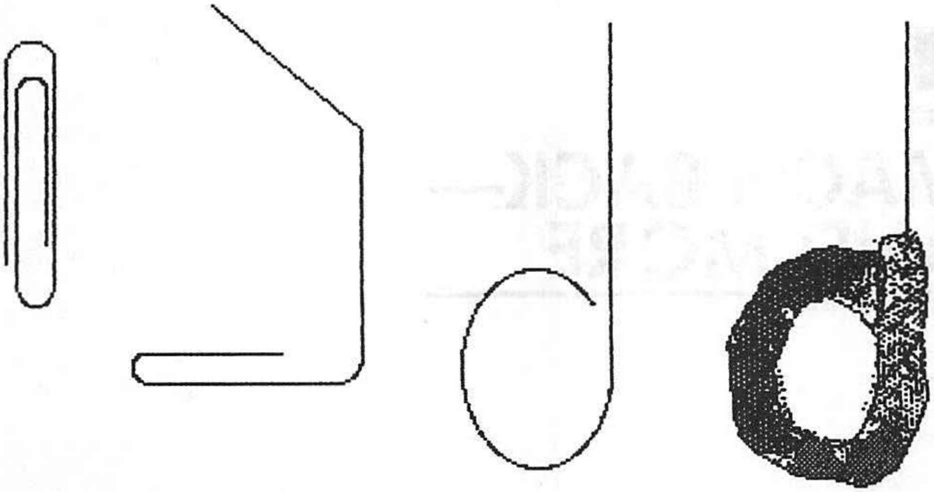
Apple recommends several procedures to eject a recalcitrant disk from a stubborn disk drive. You'll be seeing them later. Unfortunately, they all presume that Macintosh will, in some way, cooperate with your attempts. What happens if the computer is dead in the water?

With no cooperation from Mac, you might be forced to watch your disk accompany you to the repair center still snug inside the machine—where a local service person just might treat it and all 400K of its bytes with less than the utmost in gentility.

Creating MacTool

The alternative approach is a bit more physical than a technologically oriented society might appreciate, but it does work. You'll need only a medium-sized paper clip and perhaps a pair of pliers to bend it with.

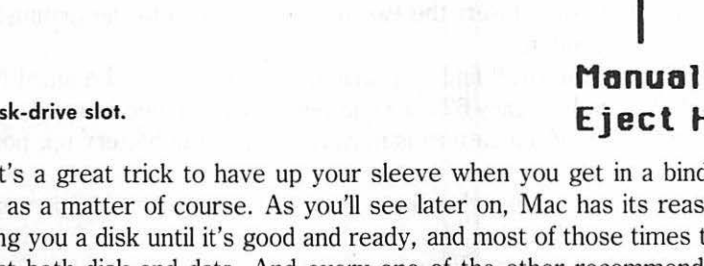
Unbend one end of the clip until you have a straight length about an inch long. That'll do the trick, but if you want to get serious about it, you can unbend the rest, then rebend it into a circle just big enough for your index finger to fit into. Cover the loop you've just made with black electrical tape so it won't slip, and you'll have a tool worthy of a professional. Less aesthetic designs will work, too.



Evolution of paper clip into MacTool.

Using MacTool

Note the hole at the lower right of the disk drive entranceway. It's a hole that goes all the way through the case into the machine. On the inside of that hole is a small bar that will manually eject the disk from the drive when pressure is exerted against it. If you insert MacTool into this hole and push firmly, the disk will indeed disengage itself from the drive.



The disk-drive slot.

It's a great trick to have up your sleeve when you get in a bind, but don't use it as a matter of course. As you'll see later on, Mac has its reasons for not handing you a disk until it's good and ready, and most of those times the reasons protect both disk and data. And every one of the other recommended ways of retrieving a disk is really wiser than the brute-force method. But sometimes . . .

4

MAC'S BACK—AND MORE

Swivel your Macintosh around. Other than the mandatory electrical and FCC notices, there are really no labels to be seen. They've all been replaced by pictures. But what do they all mean?

The Battery Compartment

Along the indented part of the right-hand side, as you view Mac from the rear, you'll see three distinct sections. At the top is the compartment for the battery that powers Mac's clock when the machine's not connected. Mac has a clock and timer built in as standard equipment. It's an "optional extra" on most other computers.

Although the picture of the battery may make you think it's a penlight (size AA) model, it's not. To open the compartment, just press down lightly on the small tab protruding from the top of the cover and swing it down, as if there were a hinge at the bottom. Once the top of the cover is free of the case, just lift it away. To put it back, insert the two bottom prongs into the mating holes and swing the top up and in.

In the compartment you'll find a special 4.5 volt battery and a small notice that tells you to buy an Eveready 523 or equivalent when you need a replacement. The proper orientation of the battery is negative side of the battery up, positive side down.

But other than for curiosity's sake, there's no real reason to open up the battery compartment when you first get Macintosh. The battery power will probably last about two years. If you notice that the clock isn't keeping the correct time, you'll know it's probably time to change the battery.

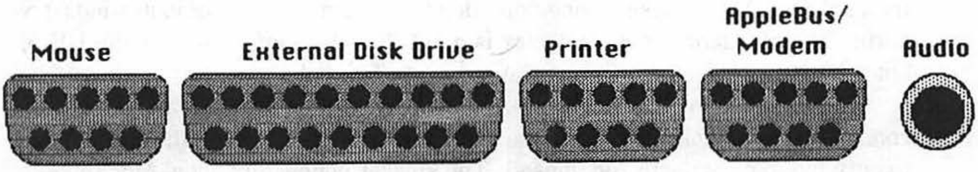
The Most Important Things

Below the battery compartment is the on/off switch. It doesn't say *on* or *off*—hardly any of them do anymore. Instead, it's just 1/0 or I/O, depending on your translation. Most likely it's a gesture to the 1's and 0's of binary notation you shouldn't have to worry about, but perhaps it's an obscure reference to input and output. Either way, with *0* or *O* side in, the computer's off; with the *1* or *I* side in, it's on.

The recessed bottom section of that strip, at the right, includes the three-prong connector that mates with Mac's power cord.

The Mac Connection

Which visually brings us to the row of connectors along the bottom. Although Mac is an exceptionally self-sufficient machine, it can't do everything all by itself. Sooner or later it's going to need to communicate with the world outside its case. The way Mac makes all its links with the outside world is through the connectors on the rear panel.



Back panel connection ports.

The Audio Connector

The picture of a musical note above the first socket on your right as you face the back panel gives you a big clue about what it does. It's the external audio output.

Macintosh's electronic circuitry includes a fancy chip that lets the machine produce what's known as "four-voice" sound, which means it's capable of playing four separate tones at once and, with the help of a little software magic, can fool you into thinking it's capable of human speech. There's a speaker built into Mac, but it's not exactly what anybody would call hi-fi. There's also a volume control, and you'll be meeting up with it soon; looking for it anywhere on the machine is an exercise in futility.

The audio outlet lets you route Mac's sounds to an external speaker or stereo system. The plug that fits in it is called an audio mini-plug. If you're inclined to add an external speaker, you might want to consider one that has an integral amplifier, like Radio Shack's model 32-2031. It's not very expensive and uses either four C-size batteries or a transformer that plugs into a wall outlet. Sticking with the batteries will help you avoid picking up any hum through the speaker.

Purists might consider connecting Mac's audio to a stereo system. A Y-connector can route signals from the audio outlet to two jacks at once. Plug the jacks into the Aux port of the stereo, and sound (albeit mono) will emerge from both stereo speakers.

Serial Ports

The two connectors to the left of the audio jack are known as nine-pin D-connectors. Both send and receive information via *serial* signals—one bit at a time instead of one byte at a time, as described in chapter 1.

Both serial ports use what folks in the know call DB-9 female connectors. The *D* comes from the shape (if you look at it sideways) and the *9* comes from the nine holes (leading to as many as nine wires) in the connector. Like so many things about Mac, these connectors don't conform to the computer-industry norm. The standard serial connector is a DB-25—the same shape as the DB-9, but a lot larger, since it accommodates twenty-five holes.

Is this a horrible oversight on Apple's part? Not really. The bigger DB-25 connectors is a holdover from the past; nowadays, most of the wires in a twenty-five-pin connector go unused. The smaller connectors allow Mac to keep its svelte figure, and Apple can supply you with cables to hook up modems and the only printer Mac currently supports, the Imagewriter.

The Modem Port

The modem port is the one with the picture of a phone handset above it. The port doubles as an outlet for AppleBus—a way of linking other devices to Mac without opening up the machine and fooling around inside. It's designed that way because mere mortals are not supposed to fool around inside Mac.

Apple itself will be using this connector for its networking system—a way of letting computers communicate among themselves and share less-demanded resources such as printers and high-capacity hard-disk drives capable of storing millions of characters. Those same disk drives and such high-tech marvels as videodisk players and music synthesizers can also be controlled directly through this port, which is capable of data communication at rather awesome rates. Multiple devices can be connected by *daisy-chaining* them—plugging each one in sequence into a connector on the previous device. The possibilities are immense.

The Printer Port

To the left of the modem port, beneath the stylized image of a printer, is the printer connector—another pathway for serial signals. But printing is a special thing in the Macintosh world.

To most computers (and usually Mac is no exception), each character (letter, number, punctuation mark, or special computer control command) is represented by a single byte. Since one byte can have a value from 0 to 255, a byte can represent 256 different characters.

Computers match the values with the characters by using a scheme called the *ASCII code*. ASCII (pronounced as-key) stands for American Standard Code for Information Interchange. As the name suggests, the code for each character has been standardized in the computer world. A lowercase *a* is ASCII 97; an uppercase *A* is ASCII 65.

To get a character to appear on a piece of paper, most computers simply send the ASCII code of that character to a printer. The printer, upon receiving the code, simply prints the character that the ASCII code represents. Mac rarely does things that way.

Mac sends information to the printer at 9600 baud (960 characters per second). That's quite fast for computer-to-printer communication. On many other computers the transmission speed is normally 1200 baud (120 characters per second), primarily because most printers can't go any faster.

The reason for the high-speed Mac-to-printer communication isn't because the Imagewriter is faster than similar printers; it's not. But because of its special design, it handles the characters that appear on the screen as though they were graphic images. In fact, everything the printer does is handled as a graphic image.

Such information is many more times dense than normal ASCII characters. With a regular computer and printer, the computer sends the ASCII character, and the printer prints a preselected pattern of dots in the shape of that character. But Mac can produce lots of typefaces in a variety of sizes, to say nothing of pictures of every possible description. Instead of limiting the printer to a few preselected characters in dot patterns that it "knows," Macintosh takes over the chore of telling the printer precisely where it wants *each dot* to be placed.

Since Mac tells the printer exactly where to put each dot, it takes far more information to produce a Mac character than one from the normal garden-variety printing process. A single character from the Macintosh screen might take sixteen different codes or more to find its way to paper. That's why high-speed communication with the printer is absolutely essential.

0 NUL	1 SOH	2 STX	3 ETX ENTER	4 EOT	5 ENQ	6 ACK	7 BEL	8 BS	9 HT	10 LF	11 VT	12 FF
13 CR	14 SO	15 SI	16 DLE	17 DC1	18 DC2	19 DC3	20 DC4	21 NAK	22 SYN	23 ETB	24 CAN	25 EM
26 SUB	27 ESC CLEAR	28 FS ◀	29 GS ▶	30 RS ▲	31 US ▼	32 SP	33 !	34 "	35 #	36 $	37 %	38 &
39 '	40 (	41)	42 *	43 +	44 ,	45 -	46 .	47 /	48 0	49 1	50 2	51 3
52 4	53 5	54 6	55 7	56 8	57 9	58 :	59 ;	60 <	61 =	62 >	63 ?	64 @
65 A	66 B	67 C	68 D	69 E	70 F	71 G	72 H	73 I	74 J	75 K	76 L	77 M
78 N	79 O	80 P	81 Q	82 R	83 S	84 T	85 U	86 V	87 W	88 X	89 Y	90 Z
91 [	92 \	93]	94 ^	95 _	96 `	97 a	98 b	99 c	100 d	101 e	102 f	103 g
104 h	105 i	106 j	107 k	108 l	109 m	110 n	111 o	112 p	113 q	114 r	115 s	116 t
117 u	118 v	119 w	120 x	121 y	122 z	123 {	124 |	125 }	126 ~	127 DEL		

Standard ASCII codes.

128 Ä	129 Å	130 Ç	131 É	132 Ñ	133 Ö	134 Ü	135 á	136 à	137 â	138 ä	139 ã	140 å
141 ç	142 é	143 è	144 ê	145 ë	146 í	147 ì	148 î	149 ï	150 ñ	151 ó	152 ò	153 ô
154 ö	155 õ	156 ú	157 ù	158 û	159 ü	160 †	161 °	162 ¢	163 £	164 §	165 •	166 ¶
167 ß	168 ®	169 ©	170 ™	171 ´	172 ¨	173 ≠	174 Æ	175 Ø	176 ∞	177 ±	178 ≤	179 ≥
180 ¥	181 µ	182 ∂	183 Σ	184 Π	185 π	186 ∫	187 ª	188 º	189 Ω	190 æ	191 ø	192 ¿
193 ¡	194 ¬	195 √	196 ƒ	197 ≈	198 Δ	199 «	200 »	201 …	202 ␣	203 À	204 Ã	205 Õ
206 Œ	207 œ	208 –	209 —	210 "	211 "	212 '	213 '	214 ÷	215 ◊	216 ÿ	217	218
219	220	221	222	223	224	225	226	227	228	229	230	231
232	233	234	235	236	237	238	239	240	241	242	243	244
245	246	247	248	249	250	251	252	253	254	255		

Extended ASCII codes. (Codes above 216 are reserved for future use.)

Another Disk Drive

Directly to the left of the printer port, beneath an image that looks suspiciously like the disk-drive slot on the front of the machine, is a DB-19 female connector—a D-shaped connector with nineteen holes. It's the external disk-drive connector.

Any additional Apple 3 1/2-inch disk drive, whether the original 400K model or an upgraded 800K unit, will sport a cable that connects to this port. Only one drive can be connected here, and only a 3 1/2-inch drive at that. Hard disks and other exotic devices must be connected through the AppleBus modem port, and no daisy-chaining or fancy connecting is permitted at the disk-drive connector.

The Mouse Connector

Immediately to its left, the last in the row, is the mouse connector. It's also a DB-9 type jack, and the cable from the mouse plugs right in.

Security

As technology becomes more and more available, it also becomes more desirable. Not everyone, though, is willing to pay hard cash for a piece of technology—or at least not full price.

In many offices, typewriters are firmly bolted down to their desks. Even though typewriters can weigh 30 pounds, they are frequent objects of midnight removal. Computers often suffer the same fate. Although their weight and the collection of additional parts connected to them might make them a less than ideal object of casual purloinment, they often find themselves in unfamiliar surroundings—not always by choice.

Macintosh's low weight unfortunately makes it an ideal candidate for the famous five-finger discount. Apple is not unaware of the problem.

MacChain

The small rectangular recess at the left side of the rear of the machine has a picture of a chain beside it. There's a similar opening at the rear of the keyboard.

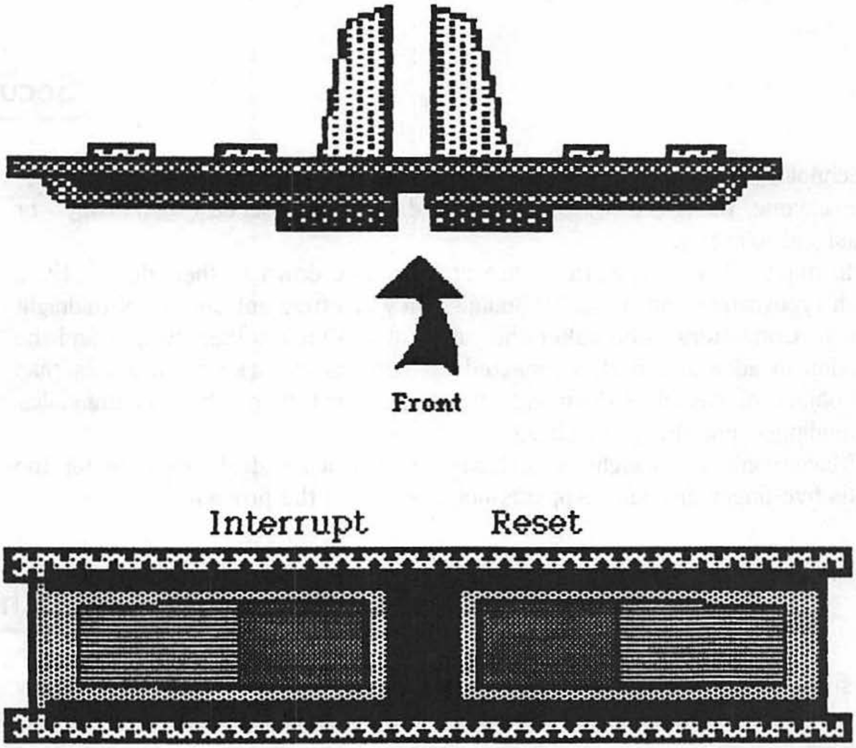
Your Apple dealer can equip you with the Macintosh Security Accessory

Kit, which includes inserts for these slots. They snap firmly and snugly into place, leaving eyebolts protruding from the back of the computer and keyboard.

Through these bolts goes a tough stranded-wire cable that you can loop around a desk leg or something even sturdier and then lock into place with an oversized cowling. In theory, it will help insure that your Mac will be there when you return, but a good pair of wire cutters may play hob with that theory. And in some areas, an additional chain will be needed to bolt the desk to the floor as well.

Not Just for Programmers

You may also be curious about a mysterious small gray plastic item included with the other MacStuff. Depending on how you hold it, it may look vaguely like a plastic model of an old two-masted schooner. The giveaway that it's actually a part of the high-tech Mac system are the words "Interrupt" and "Reset" embossed on what is actually the top.



The Programmer's Tool: top and front views.

Apple's official name for this small marvel is the *Programmer's Tool.* In theory, a packing sheet contains the instructions for installing it. If, for some unexplained reason, you don't have this sheet and the information is missing (as has been known to happen when dealers put machines through their predelivery paces), all you've got to work with is the picture in the manual. And the text in the manual doesn't tell you what the device does. In fact, the manual strongly suggests you simply put the exotic device away somewhere where it can't harm you.

But that little hunk of plastic is not as dangerous as it sounds. And it can come in handy even for "the rest of us" who don't happen to be programmers.

Computus Interruptus

Whether from a furious attack of bad software or a burst of static electricity or just ignorance about what should come next (a human programmer forgot to tell it), there are times when your Macintosh may just sit and glare back at you for no discernible reason. Nothing you normally do will have any effect at all. For all practical purposes, your machine has entered the Twilight Zone.

There is always one ultimate way of regaining your control. You can turn the machine off and then on again. That will wipe out everything that's in your machine's RAM memory (which usually includes some important document you're working on).

It's absolutely a last resort. It puts a strain on all the components and shortens their life span. Wouldn't it be nice to have some other way of breaking Mac's trance?

The two words engraved on the Programmer's Tool—Interrupt and Reset—refer to two similar but distinct functions that most computers can perform at the touch of a button. They're used to break out of just such infuriating jams. Mac doesn't give you a button for these functions; it gives you the Programmer's Tool instead.

An Interrupt does just what you'd expect. It interrupts whatever's going on and brings the machine back to whatever it was doing before it got stuck. On earlier computers this rarely caused a problem. If you were working with a BASIC program, for example, an interrupt command would simply take you back to a place where you could examine the program again. But as you'll soon see, Mac has several different levels of operation. At some of the lower ones, an interrupt may make it lose track of what it's doing.

Reset, on the other hand, is an alternative to turning off the computer. It wipes memory completely clean. The machine forgets everything you've told it and anything you were doing; it returns to the same state as if you'd just turned the power on.

Interrupting Macintosh can be helpful if you get stuck in the middle of a program that refuses to let you interact with it. A jolt of static can also freeze up your Macintosh, in which case, Reset may be your only alternative short of turning the power off and on.

If you need some incentive for installing the switch, be aware that you can also use it to eject a disk that doesn't respond to the "official" methods. Pressing Reset duplicates Mac's power-on conditions. Holding down the mouse button and pressing Reset accomplishes the same thing as holding down the button and turning the machine off and then on again, but without electrical strain on its internal components. Either way, your disk will come zipping out of the drive, but the Reset method saves wear and tear on your machine.

Keep in mind, however, that the Reset and Interrupt functions are *not* to be used indiscriminately. If you don't know what you're doing, the odds are good that you'll do some damage to the information on whatever disk is in the machine as well as what you're working with in RAM. But the same thing may happen if you simply turn the computer off. So be patient in time of trouble. And if all else fails . . .

Installing the Switch

You may as well install the switch in the machine. Having it there doesn't mean you *must* use it. And (unlike the Reset buttons on many older machines) it's well out of the way, so you're not likely to give it an accidental tap.

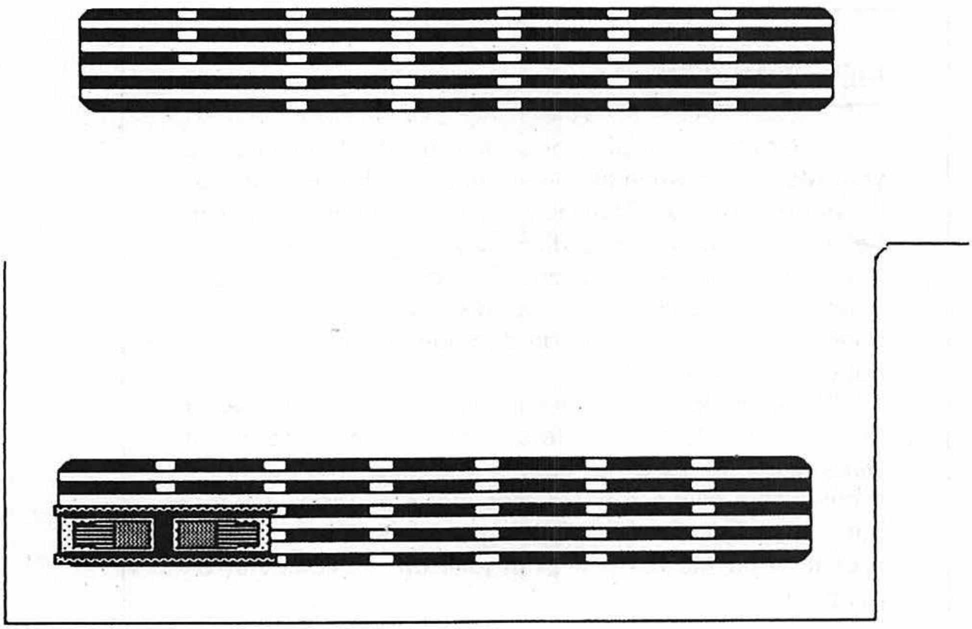
Gently turn Mac over on its side, so that the bottom left side of the machine (as seen from the front), is facing up and the screen is facing to your right. Five rows of cold air intake vents, running from the front to the back of the machine, should be staring up at you. Five and a half perpendicular reinforcing strips are indented behind them. The half strip is near the back of the computer and is the key to the riddle.

Near the second row of vents from the bottom, toward the back of the machine, you'll see two round, dark circles. If you peer down inside them, you'll discover they look a lot like switches, probably because they are.

Now look at the Programmer's Tool. It's simply a plastic base with two other plastic pieces attached to it. Press gently on those two pieces, and you'll discover that they'll move. They're what's known in technical circles as *actuators,* and they happen to be about as long as the distance from the vents to the switches.

There are also two rows of guides on the plastic base. Both the guides and the actuators are thin enough to fit in through the holes in the vents.

The actuator arms slip into the second row of vents from the bottom. The guides snap in place against the sides of the vents and hold the switch firmly through the bottom and third rows. If our description and illustration don't convince you, check out the picture on page 127 of the manual that comes with Mac.



Left side view of Mac: lower ventilation slots without and with Programmer's Tool installed.

Several thoughts may pass through your mind as you're installing the switch: "I am definitely going to break this little piece of plastic. . . . Why am I doing this, I'm never going to use it. . . . What kind of idiot am I going to look like if I have to go back to the dealer and get another one of these?" Ignore those fleeting waves of pessimism! Christopher Columbus had similar thoughts. So did Arnold Sweizer. Columbus persevered.

It will take a little jiggling and some mental coercion, but the part of the switch closest to Mac's case should soon be flush with it. If it's not flush, it's not right. Once you've got it in position, you can set Macintosh upright again and carry on.

Some Final Reminders

Now that you know where everything goes, it's time to hook it all up and turn on the machine. Before you start, make sure that Mac's power switch is in the *off* position. In fact, if you're using a power strip, don't even plug it into the wall outlet yet. And if it has its own on/off switch, make sure it's in the off position. Connecting peripherals to your Macintosh is a simple, painless procedure that's nearly impossible to do wrong—*if you follow two elementary rules:*

NEVER, NEVER . . .

1. Never, *never* plug or unplug anything attached to your Macintosh when the power to either the computer or the peripheral is on! That includes any cable or peripheral. Better still, make sure everything is unplugged before making or breaking connections. Disobeying this rule can result in a dead computer. Accidentally crossed connections or surges of power can damage the sensitive internal circuitry of your Mac.

2. *Never* force a connector into a jack. If it doesn't fit, rotate it or turn it upside-down to match its mate. If it *still* doesn't fit, it's either bent or was designed not to fit. Many of the connectors for Macintosh may look similar, but they're not identical. Forcing a cable can result in a broken connector or a broken jack on the computer or peripheral.

Turn the computer around so that the back faces you when working with the rear connectors. It may seem easier just to reach back from the front of the machine and feel around with your hand for the right connector, but that's a good way to cause yourself trouble.

Connecting the Mouse

The huge connector on the "tail" of the mouse has finger screws to hold it in place on the back panel. Insert it evenly into the leftmost D-connector on the back of Macintosh. Don't force the issue: if it doesn't seem to fit, chances are you've got it upside-down.

Be sure to tighten the screws. Mice waggle their tails a lot, and a loose connection can bring them to an untimely end.

Connecting the External Disk Drive

If you have an external disk drive, now's the time to plug it into the big nineteen-pin D-connector next to the mouse port. Again, if it doesn't go in smoothly, you've probably got it upside-down.

Connecting a Printer

If you've purchased the Imagewriter printer, take a moment and look at the cable that came with it. The part that you're particularly interested in is the larger connector: the DB-25 type (the one without the thumbscrews) that hooks up to the printer. If there are no pins along the bottom row, the odds are very good that you have one of the older cables. It won't work with all of the software you might use because it's missing pin 20, which some software (but not what's supplied with Mac) requires to function properly with the printer.

If that's the case, go back to your dealer and request a later model. There shouldn't be any problem. The fault is known to Apple, and dealers have been instructed to remedy it. Assuming you have the correct cable on hand, you may proceed.

First, make sure the printer power switch is off and that the printer is not plugged in. To attach a printer cable, you'll need a small, flat-blade screwdriver to secure its plug into the printer. Turn the screws in firmly but don't overtighten them. Then insert the other end into the third connector from the left on the back of Mac. Tighten the thumbscrews just as you did for the mouse.

Why bother with the screws? If you decide to "adjust" Mac's position, and the cable isn't fastened securely, you can loosen it or even pull it out entirely. The electrical short-circuit that may result can destroy the connector—and more.

Connecting to the AppleBus/Modem Port

A modem, hard disk, or other device is next. Be sure it's turned off and unplugged. Again, don't force anything. Modem cables aren't standard. If you borrow one from a friend whose computer isn't a Mac, you'll probably find yourself going to an Apple dealer in search of a cable that will fit your Macintosh.

Once you do have the proper cable, simply orient it properly, plug in into the port, and tighten the screws if there are any.

Connecting an Audio Plug

Not much mystery here. Just push the plug into the connector as far as it will go.

Connecting the Power

As you've seen, the power cord plugs into the recess just below the wavy line beneath the on/off switch. There aren't any provisions for screws this time, so be sure you push it in as far as it will go. If it doesn't want to go in, you've probably got it upside-down.

Connecting the Keyboard

Now turn Mac face forward and locate the keyboard and its cord. That cord looks a lot like a coiled modular telephone cable that would normally run from the handset into the phone or from the phone into the wall jack. But don't be misled: Apple warns that its keyboard cable and telephone cables are not swappable items. If you disassemble your computer to tote it around, be sure not to get confused, especially if you've got a modem along, too.

And remember this: for all its intelligence, Macintosh cannot tell whether or not the keyboard is connected. In fact, it doesn't seem to care at all. If suddenly you notice that although you're typing away at the keyboard, nothing much is happening on the screen, make sure you check the keyboard connection at both ends before you panic and drag your machine to the computer shop.

Beneath the small overhang at Mac's front right edge you'll find a modular jack that looks an awful lot like the ones telephones use. You'll find a similar one at the back left of the keyboard, just below its ledge. It's right next to the hole for the security connector.

Pick up the cable. Each end terminates in an identical modular plug. It doesn't matter which end plugs into which jack. Just make sure you hear the "click" at each end that tells you it's secured in place.

Almost There

Once you have all of the accessories connected to Mac, make sure *all* their switches (and Mac's, too) are in the off position and plug the power cords into your power strip or wall outlet. Plug Mac in while you're at it. If you are using a power strip and it has its own on/off switch, now is the time to turn it on. But don't turn anything else on yet. The next few steps are very important, so read them carefully.

All electrical appliances—computers and computer equipment included—send some voltage back into the electrical line when they're turned on. Some equipment, like your computer, is more sensitive to this than others. Even though you've taken pains to ground your equipment properly, it's a good idea to get into the habit of turning things on in the correct order to prevent any mishaps.

Always turn printers on first. They tend to put a lot of electrical "garbage" into the power line when they start up, and you don't want any of it to affect Macintosh.

Next, turn on any modem you have. This is not as critical as the printer. You may find yourself in the middle of doing something and realize you want to use the modem. If such is the case, you don't have to shut Mac off and go through the whole power-up sequence again. But if you know in advance that you will be using it during your session with Mac, now's the time to turn it on.

Power up any other devices next; if they include an external disk with its own power, that one should go on last. It wouldn't be good for a high-capacity disk drive to misinterpret stray electrical signals and wipe itself clean of information.

Finally, with everything else connected correctly and turned on in the proper sequence, reach behind the left side of Macintosh and flip its power to the on position. Away we go!

CONNECTION CHECKLIST

1. Unplug computer and peripherals.
2. Make all connections.
3. Make sure computer and peripherals are switched *off.*
4. Plug in computer and peripherals.

TURN-ON CHECKLIST

1. Turn on printer.
2. Turn on modem and other peripherals.
3. Turn on externally powered disk drives.
4. Turn on Macintosh.

TURN-OFF CHECKLIST

1. Save program or text in computer's memory to disk.
2. Eject all disks from disk drives.
3. Turn off computer.
4. Turn off externally powered disk drives.
5. Turn off modem and other peripherals.
6. Turn off printer.

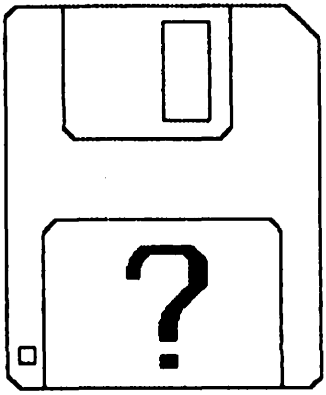
5

POWER UP!

The first signal Mac will give you when you throw the switch is a little chime tone. A second or two later you should see an image staring back at you from the screen. You can adjust the intensity of that image with the brightness control knob.

As you'll remember from the grand tour, the knob is beneath the left-hand side of the front ledge, below the Apple emblem and above the sunburst molded into the case. Even if you don't see an image on your screen after turning Mac on, you should be able to remedy the situation by rotating the brightness-control dial. Try various intensity settings and see what suits you best.

Don't make the image any brighter than the room light requires. Not only will it be easier on your eyes; it'll also protect your display. An unchanging high-intensity image left for too long on a cathode-ray-tube screen can actually burn into the screen, never to be removed. To guard against this, turn the brightness down if you leave the Mac running alone for an extended period of time. Just don't forget to turn it off when you're done. Lacking a power-on indicator, Mac's only signal to you that it's working is a picture on the screen.



If you do have a picture on your screen, it should look like the one pictured here—the "inquiring disk." If it doesn't (assuming there's no disk in any drive), or if no image came up at all and you can't get a picture on the screen no matter what you do, turn Mac off for a few seconds and then back on again. If the problem persists, it's time to contact your dealer.

Here Come the Icons!

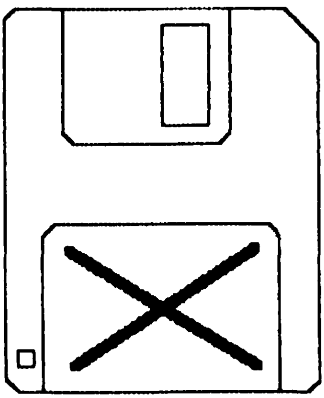
The image portrays a Mac disk with a question mark flashing in the spot where the label would be. Because there's no disk in the drive, Mac doesn't know what you want it to do. It's waiting for instructions. Mac can wait a minute while we cover an important point of protocol.

The picture on the screen is your first introduction to the new visual-communication approach that is at the heart of the Macintosh and its ease of use. The messages other computers use are often cryptic. If you looked at your screen and saw the words "BDOS Error on B: Select" (a message still current on many machines), would you have any idea what it was trying to tell you? Probably not, unless you happen to be highly conversant with computer jargon.

Since more and more "regular" people are getting their hands on computers, manufacturers are trying to simplify the interaction between human and machine. The trend is toward messages printed in plain English phrases. Macintosh will give you plain-English messages now and then.

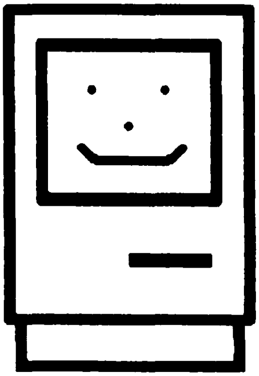
But with Mac, *icons* are the key. An icon is a pictorial image. Macintosh uses icons either alone or in conjunection with text to represent objects and concepts, summarize situations, ask for further information—in short, to communicate with the user.

The icon you're looking at on your screen, the disk with the flashing question mark, represents a simple statement: "Where are my instructions? What do you want me to do?"

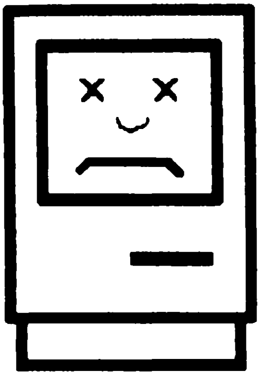


If you were now to insert a disk that Mac didn't like—one without the information it needs to start itself up—the next visual message might not be so neutral. The disk icon replaces the question mark with a bold X emblazoned across its label area. "I can't use that disk," Mac is saying in a highly graphic way. And it will spit the disk out of the drive at you.

Mac's Many Faces



If you give Mac a disk it can use to start itself up, the icon will change to a smiling Macintosh face. This lets you know that Mac has found the appropriate information it needs to continue. Once Mac gets it all digested, you'll be rewarded by seeing your screen light up with what you were looking for.

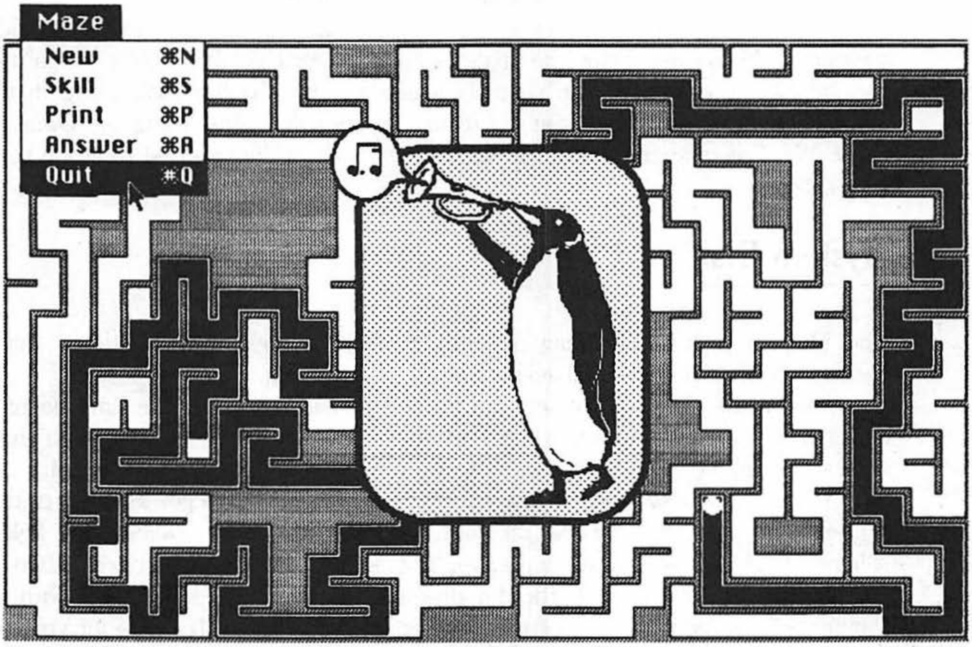


Of course, you might have inserted the correct disk, but a damaged one. Something could be wrong with it physically or magnetically. If you insert a disk that Mac can accept but can't read correctly, or sometimes one that's fine but just doesn't happen to have the information it needs to get started, Mac will respond quite differently. Its displeasure could not be clearer if it yelled "Ouch." Once again, it will spit out the disk.

The Guided Tour

Packed in the very top of the original Mac carton is a white plastic box with an aesthetic "MacTisse" Apple on it. It contains the manual, some registration forms, a cassette tape, and a few Macintosh disks.

One of them, labeled *A Guided Tour,* is Apple's own introduction to Macintosh. It works interactively with the cassette tape marked "Guided Tour." You listen to the tape, and it tells you exactly when to start the disk activity so that they are synchronized. Most of it is a free-running demonstration that's an excellent introduction to the preliminaries of MacThings. It contains some clever graphics, sound, and animation, and even includes some hands-on mouse practice, culminating in a maze game that can get downright devilish, if not impossible, at the higher levels.



Guided Tour Amazing Maze game screen, shown with pull-down menu options and reward for solving the maze.

It's also *very* laid back. Pick a nice afternoon when you have nothing to do, when you feel a little tense at the world and need to unwind. Then play the "Guided Tour" tape.

But one warning—the disk of the original version of the *Guided Tour* is *not* compatible with any other Mac disk. Although this situation should be corrected by now, you'd do well to take the following precautions.

The problem is that if you use another disk right after going through the old version of the *Guided Tour,* the chances are good that you'll severely rough up the innards of your Mac and possibly a disk or two. Rather than doing that, simply shut Mac off before you try to use another disk after using the *Guided Tour.* We'd recommend doing that with any version of the tour just to be on the safe side.

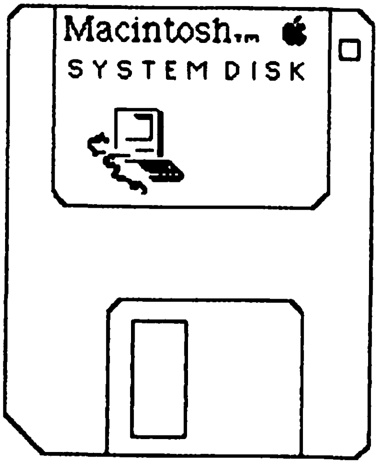
The System Disk

The Macintosh is still waiting patiently for you to give it instructions; that flashing question mark is still asking you to put in a disk.

Among the disks, you'll see one labeled *System Disk.* For the time being, consider it the most important thing in your computer's life. Treat it with the utmost reverence. Handle it with care. It is the key to operating Macintosh.

The *System Disk* holds all the information Mac needs to get itself started. Without this disk (or one like it) your computer would be useless. To help safeguard the disk against accidents, you're going to take one further precaution.

In chapter 3 we looked at a Mac disk and met the small square hole with a sliding piece of red plastic called the write enable/protect tab. It's time for you to put it to work.



The Startup Disk

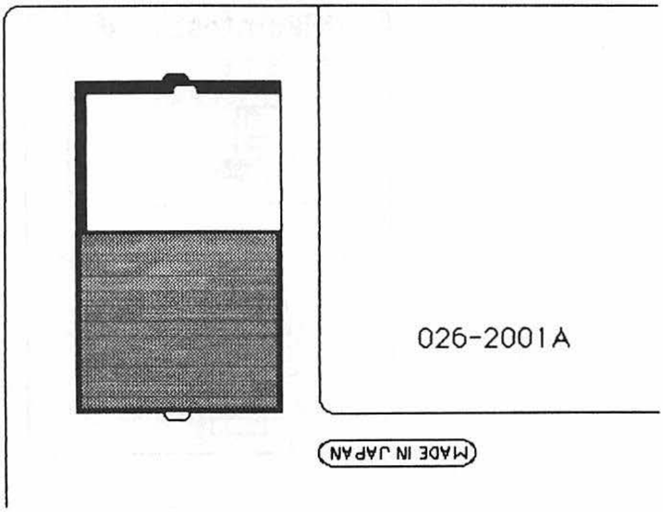
Hold the disk with its label facing up and the metal media protector toward your body. In the upper right-hand corner of the disk is the tab hole. If the red tab is *not* visible through the hole, the disk can*not* be altered. As long as you can't see the red tab, Macintosh won't be able to change the information on the disk.

If you *can* see the red tab, turn the disk over. You'll see an enlarged square hole and the full tab. The tab can be moved up and down in its slot. If your nails aren't long enough to catch the edge of the tab, you can insert a sharp pen point into one of the small round holes and use it as a lever. The goal for now is to slide the red tab as far toward the top of the disk as its slot will allow it to go. You've got it right when you see *no* red through the hole in front.

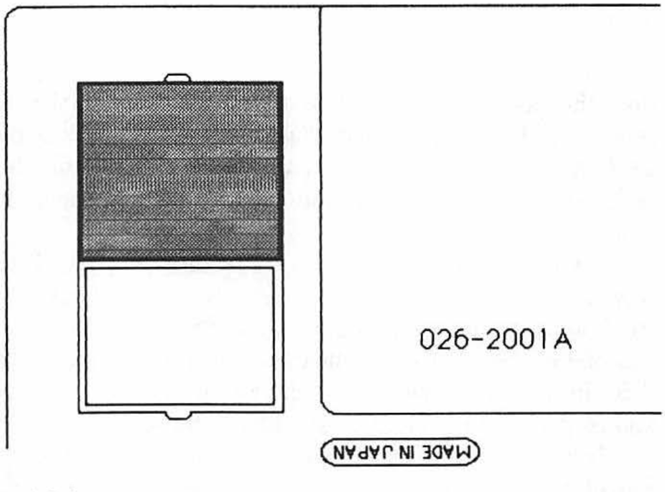
Now that your disk is write-protected, you're ready to insert it into Mac. Swivel it around in your hand so the label once again faces up. This time you want to point the metal protector in Mac's direction. There's even an arrow engraved on the disk's case to help you figure it out.

Line up the disk with Mac's disk-drive slot and slowly slip it in. Don't force it, just ease it in gently. At the last half inch or so, use your thumb to finish the action by pushing at the wider part of the slot at the right. Don't push hard; if you've got to force it, you've either put the wrong end of the disk in first or you've put it in upside-down. When the disk's almost all the way in, the mechanism inside Mac will take over and guide it in the small distance further it must travel.

Write Protect/ Enable Tab in the "Enable" Position



Write Protect/ Enable Tab in the "Protect" Position



Detail: rear (or bottom) of disk.

Booting Up

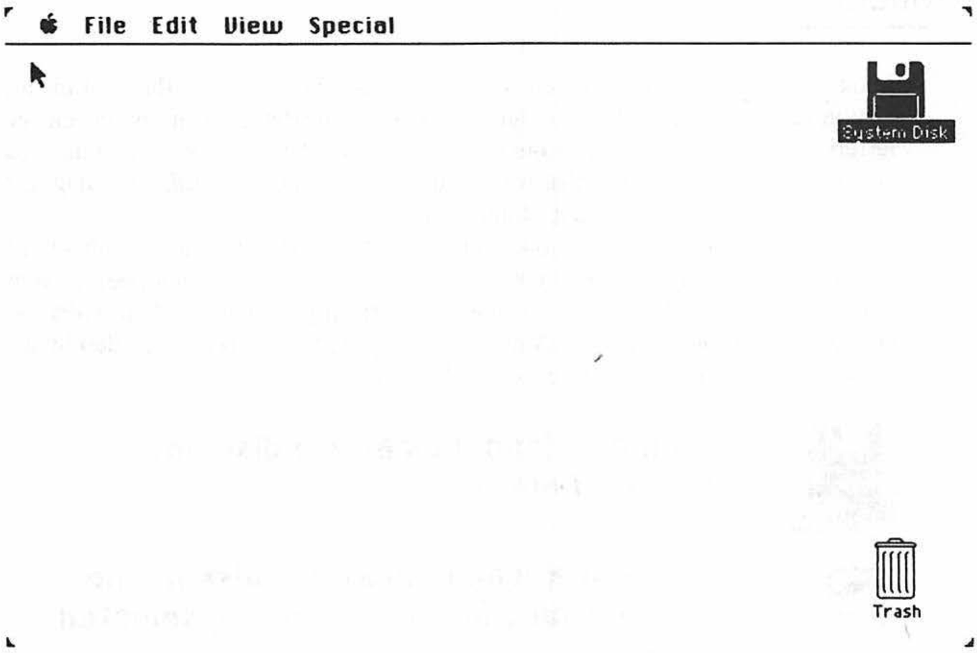
You'll hear a low and muffled thud as the disk slips into place. Once the disk is inside, the computer moves aside the metal media protector door and starts to read the disk's contents. If you listen closely, you'll hear a quiet "whooshing" sound as the inner, circular portion of the disk spins in the drive.

Starting up Macintosh (or any computer) is called *booting.* The origins of the word go back to the older days of computers when starting one up was no easy task. The computer was considered to be "pulling itself up by its bootstraps." At first it was known as "bootstrap loading," but computer jargoneers quickly shortened the term.

The image on the screen changes to reflect the Mac's new condition. The disk icon is replaced by one that looks much like Macintosh. Painted on its tiny screen is a smiling face. Mac has found the disk's information palatable.

As the disk drive turns, Mac reads the information stored on the disk. In a few seconds, things will begin to happen. Gone is the smiling Mac, temporarily replaced by the message "Welcome to Macintosh." Shortly, the screen will clear and then fill up with many new things.

What appears on your Mac henceforth may not be absolutely identical to what's presented here, but it should be quite close. We mention this only so that those whose machines have been updated, or those who are working with disks other than the ones fresh from the box, don't become hysterical. Close is good enough; if you see *nothing* on your screen, that's not acceptable.



The Desktop Environment

The broad gray expanse, your work area, represents one of the key concepts upon which Macintosh was built. You can consider it to be as close to an electronic desk as is possible on a computer. Mac offers you a complete work environment.

Think of your office, or your workplace at home. What do you need to get down to work? A surface to work on. Your work—documents, records, whatever—and a place to keep it. Writing utensils. A clock. A calculator. Maybe a distraction for those times when you're stumped and need a break to clear your mind.

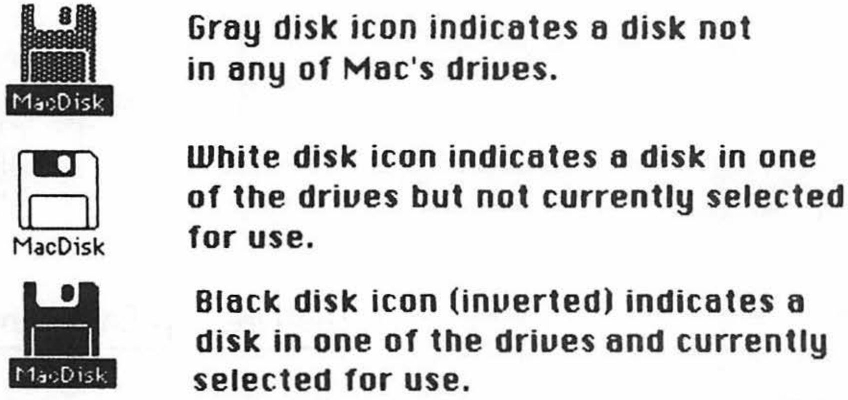
Well, Macintosh gives you all those things and more besides. You know what the desk space is: you're looking at it. How about a file cabinet? That's easy. It's the *System Disk,* or any disk you place in the drive. As you become more familiar with disks, you'll see them as one-drawer file cabinets. You'll organize them in terms of applications, creating new ones as you need them.

How about a wastebasket? It's there, too, at the lower right-hand corner of your screen.

Iconology

Look at the icon of the disk you've just inserted. Mac displays the icon of this disk in reverse. It may look as though it's black-on-white, but if you check the lettering at the bottom, you'll discover it's really white-on-black. Anytime you see something displayed in this way, you know it's been *selected.* Selecting lets you work with a particular unit of information.

Anytime you see a disk icon, you'll instantly be able to tell a lot about the disk to which it refers: whether it's currently active, whether it's been in your machine lately, and whether or not it's currently in one of Mac's drives. (Remember: using a second disk drive is both possible and recommended by us, so don't be surprised by references to drives plural.)



Disk icons and what they represent.

A disk whose information can be used immediately will be represented by a "selected" (mostly black) icon. A disk that's available in one of the drives but not currently selected for use will be depicted in white. And if you've been swapping disks in and out of the machine during the current work session, Mac will remember which ones it's seen (up to about four) and display them with gray icons. If you ask Mac to use a disk that's pictured in gray, and therefore not in a drive, Mac will ask you to put that disk back into the machine. In fact, it will remain oblivious to all other commands until you do.

But how do you ask Mac to do something? That's where the mouse comes in.

The Mouse and the Pointer

The small black arrow on your screen, an icon known as the *pointer,* is part of the work area and, when guided by the mouse, an extension of your hand. Try it out. Just move the mouse along your real desktop. Notice how the pointer moves around on Mac's electronic desk. In all your work with Mac, the mouse will be your obedient servant, moving the pointer wherever you desire. The mouse-and-pointer team performs four basic actions.

Moving

Action number one is just called *moving.* Whenever you simply propel the mouse, and therefore the pointer, across your real and electronic desks, you're moving them.

Clicking

You *click* the mouse anytime you press and release its button. The name comes from the sound the button makes as you use it. Clicking serves many valuable purposes. To make an icon active, for example, you simply move the pointer onto it and then click the mouse.

Try moving the pointer onto the Trash icon and clicking—just one click, please. Voilà! The Trash turns black (selected) and the disk icon, no longer selected, turns white. Go back to the disk icon and click once to restore the original condition.

You'll soon become familiar with two other varieties of clicking. *Double-clicking* involves clicking the mouse button twice in rapid succession. It's the way you actually get to use the contents of various icons.

Shift-clicking means holding down the Shift key on the keyboard while you click the mouse button. As we'll soon see, it's used for a variety of special purposes.

Pressing

The third mouse movement is called *pressing.* Pressing is the first half of clicking, but you don't immediately release the button. Usually, you'll press the mouse button when the pointer is resting on top of an icon and you plan to perform the fourth action: *dragging.*

Dragging

If you press the mouse button when the pointer is on an icon and then move the mouse, the icon will move along, too, following the pointer as it makes its way across the screen. You literally *drag* the icon along until you release the mouse button.

Position the pointer over the disk icon and press down on the mouse button. Now drag the disk icon to the middle of the screen and release the button. You've just rearranged your electronic desktop! But for now, please put the disk icon back. You should be able to guess how to do it.

What's Inside the Desk

Be sure the System Disk icon is selected—mostly black. Then move the pointer (don't hold down that button!) to the *home* position, the upper left-hand corner of the screen. It's a good place to start: right next to it is all the action. The *menu bar* is the stripe across the top of the screen where you can see the solid apple icon and four words: *File, Edit, View,* and *Special.*

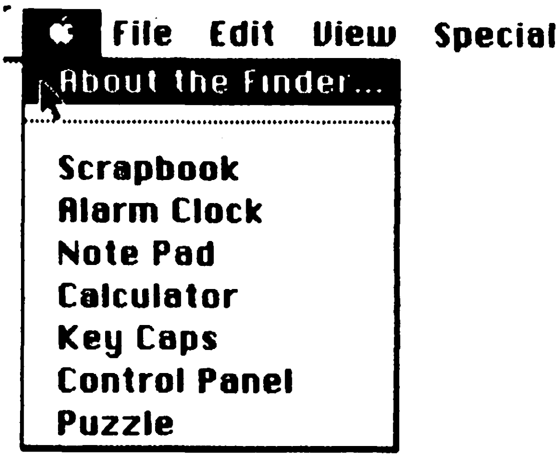
These words (and the apple icon) give you a not-so-subtle hint of what's behind them. To find out what they represent, all you need to do is use the mouse.

Pull-Down Menus

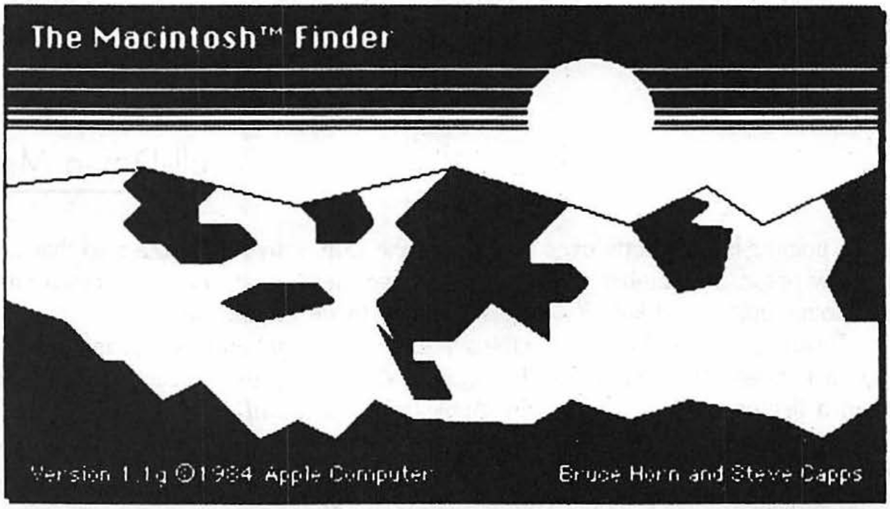
If the pointer isn't directly over the solid apple icon, move the mouse so that it is. Now press. Remember, *pressing* the mouse means that you press down on the mouse button and *hold it down.* Try not to move the mouse.

If something just flashed onto the screen for an instant and then disappeared, you clicked instead of pressing. Try again. When you press correctly, you pull down a list of options. That's why Apple calls them *pull-down menus.* If you release the mouse button, the menu disappears again—just like snapping a window shade. Try it and see for yourself. Then press the mouse so that the menu is displayed once more. You have work to do.

The apple icon houses the menu choices for the Macintosh "extras." You can see the list of them on your screen. For now, you're concerned about just the top entry—the one that reads *About the Finder.*



Drag the pointer down with the mouse until it's over those words. When you've done it right, they'll appear in reverse. As with the disk icons, this means that you've selected that option. Now release the mouse button. You should see a bucolic mountain scene. If you don't, chances are the disk icon isn't selected, or you've dragged too far.



The Finder

All computers need software to control the way they get material in and out of the machine. At one point, such software was traditionally called DOS, short for disk operating system. DOS was responsible for routing things to and from the disk drives and keeping track of the information in the computer and on the disks.

Macintosh's ROM (read only memory), as we've seen, is a special kind of memory that's permanent and can't be changed except by actually swapping chips. The firmware programmed into it contains some of the functions that a DOS would need to keep everything running smoothly—but not all of them. The rest of the DOS-like functions are kept on your *System Disk*, in software called, unsurprisingly, the *system*. Part of that system is known as Finder. When you boot the disk, some of the system (all of Finder) loads into Mac's RAM memory.

How come it's not all in ROM? One good reason is that keeping a portion on disk allows it to be repaired or updated as the need arises. Since Apple has already released three versions of the Finder to incorporate improvements, you'll be glad they've chosen to do things this way. Changing the system or the Finder is simply a matter of inserting a new disk instead of tearing down the machine and inserting new chips.

The Finder Revisions

As we mentioned, the original *Guided Tour* disk could cause trouble if you put a different disk in the drive after you finished it. The reason is that the original Finder, which came on that disk, had some serious problems. If you have that early disk, you must shut the system off to wipe out Mac's memory of the defective Finder.

The original release version of Finder (version 1.0) supplied with Mac's *System Disk* also had a few problems, leading to some unpleasant events and minor disasters. Apple corrected those problems shortly after Mac's release and distributed a new version of Finder, along with new versions of two of its programs: *MacWrite* and *MacPaint*.

You should make sure you have the current version. At this writing, it's version 1.1g. All you have to do is pull down the Apple menu and select About the Finder—which is what you should have just done.

You probably don't have anything lower than version 1.1g, but if you do, return to your dealer and explain the situation. He or she should be able to update your disks for you. Apple offers the update free to dealers, but that doesn't necessarily mean you won't have to pay your purveyor a nominal amount for performing the update on your disks.

Assuming you have the right version, you'll want to get rid of the information that's wasting space on your desktop. Just click. It's as simple as that. The Finder information will disappear.

QuickDraw

You've just seen QuickDraw at work. Like part of System, it is firmware that resides in ROM. First it erased every little dot in the display. Then it did some speedy visual magic and repainted everything back to its original appearance. And it did it fast.

This marvelous piece of craftsmanship is the result of long hours of tedious cauldron stirring by a visual wizard named Bill Atkinson, who also wrote *MacPaint*. Since Mac's display is computed and drawn dot by dot every time it changes, you can appreciate the aptness of QuickDraw's name.

Safety First

You took great pains to make sure that the *System Disk* you put into Mac was write-protected. You safeguarded it from accidental changes.

But even that's not enough. Disk drives have been known to go on the fritz. Though they're supposed to know better than to change even an iota of information on a write-protected disk, all bets are off if they're not working properly.

And other problems can affect the integrity of the information on your disk. If you leave it where your strong-jawed Norwegian elkhound can investigate it, even the tough plastic case might not last long. And that (at least in our view) is why Apple generously supplied you with one whole blank disk.

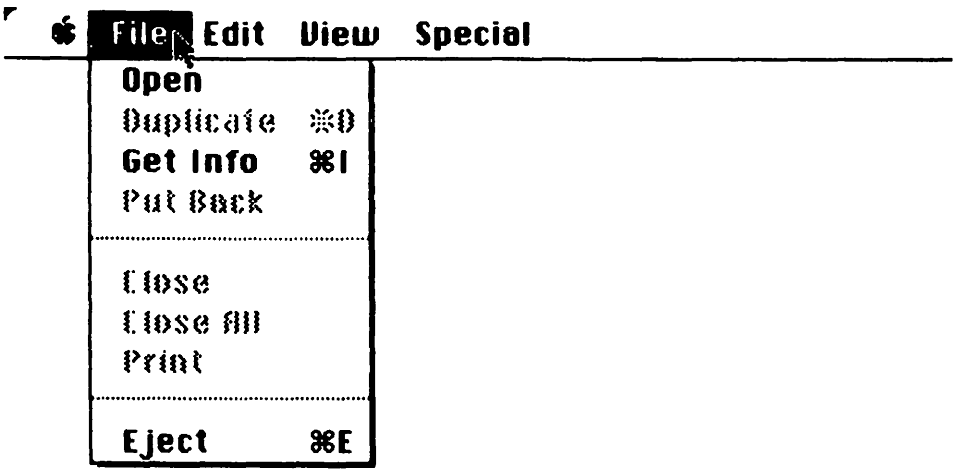
You're going to spend the next few moments making a *backup* of the *System Disk*—an identical copy. In a later chapter you'll discover another way to do it more easily. Doing it our way first won't take a whole lot more time, but it will give you some valuable exposure to Mac's in-depth use of icons.

If you have only the internal disk drive, you'll be doing the kind of manual labor computers are supposed to help eliminate. You'll be asked to switch disks back and forth about seven times. If you have an external disk drive attached to Mac's disk expansion connector, life will be much easier.

Ejecting Your Disk

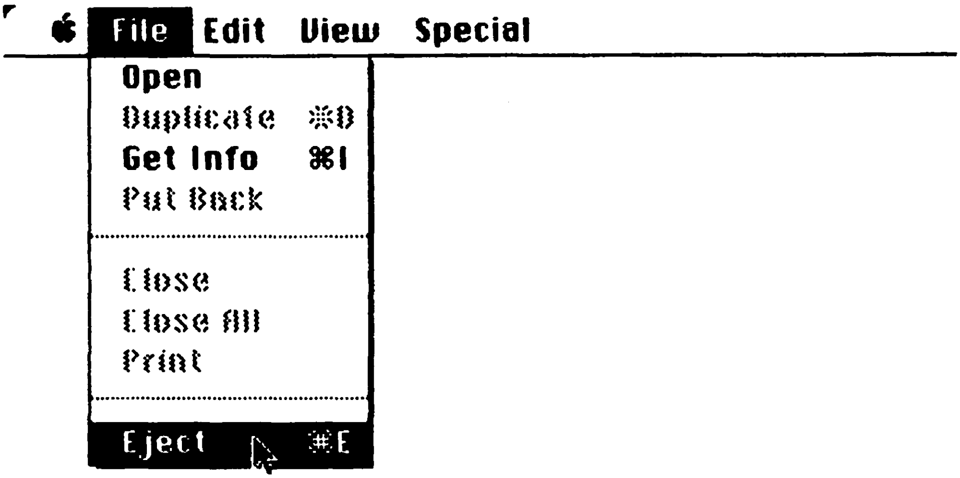
If the System Disk icon is not selected—that is, if it doesn't appear mostly in black on your screen—move the mouse until the pointer is resting on top of it and click.

Once the disk appears in black, move the mouse up to the menu bar until the pointer rests on the word *File*. Then press. The pull-down menu you see explains all the things you can do with the selected disk icon. But note that your File menu choices come in two varieties.



The options in black, *Open, Get Info,* and *Eject,* are the valid ones from which you can choose. The other ones, in a sort of gray squiggly typeface, are unavailable at the moment. Want proof? Still pressing, drag the pointer down the list. You'll discover that the only options that turn to white-on-black type are the three valid ones. They're the only ones you can select.

For the time being, ignore everything but Eject. As the name suggests, it's one of the ways to get a disk out of Mac's drive. In fact, it's one of the few officially approved ways. And you're going to use it.



Drag down to the word Eject. When you see it change to reverse, release the mouse. In a few seconds you'll hear a sound like a Polaroid camera spitting out a picture. It's actually the disk-drive mechanism getting ready to pop the disk out at you. Shortly thereafter the disk itself will partially emerge from inside Mac. Use your fingers to pull it the rest of the way out.

Take the blank, unlabeled disk Apple supplied. Make sure that it's write-*enabled*—that the red tab *is* visible through the hole in the upper right-hand corner—and insert it in Mac's drive. Once Mac has gobbled up this new disk, it will try to read information. But it won't find any. Disks come blank—with no magnetic signals on them whatsoever.

Unfortunately, computers need *some* signals on a disk to serve as guide-posts when they read and write information. Putting those signals on a disk is known as *formatting* in most of the computer world, *initializing* in the Apple portion of it. As far as Mac's concerned, a disk is totally useless unless it finds the proper signals on it. But Mac is not without resources. There are definitely times when it can take care of itself, as you may notice from the message it's showing you. Mac can wait a minute while we introduce an important new concept.

MacWatchdog

Computers have their own ways of doing things. To get them to do what you want them to, you must cooperate with them. Some use terse, unclear messages and give you no warning when you might be about to do something potentially disastrous. Not Mac.

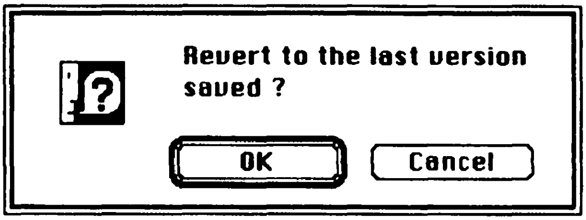
Suppose you were working on something and decided to stop. You should *not* just turn off the computer. First of all, if you hadn't saved your work to disk, you'd lose it forever. And even if you had saved your work, turning off the computer might well do something unpleasant to another bit of information you had tucked away in another corner of the machine and forgotten.

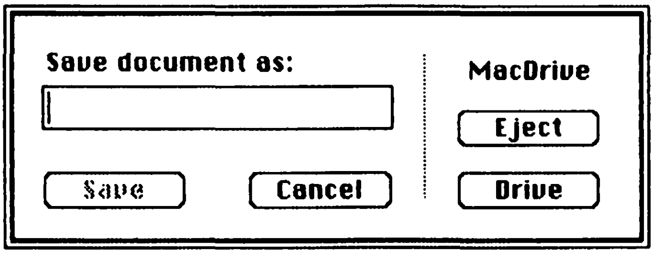
> MacRule Number One: Never turn off or reset the machine with a disk in the drive unless there is absolutely nothing else you can do.

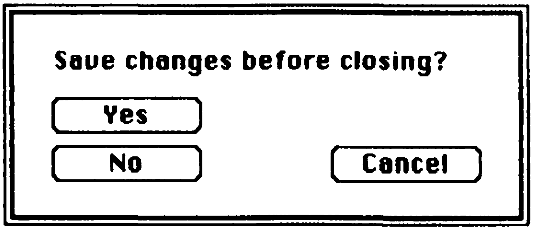
Macintosh won't be able to stop you from doing something stupid if you reach for the Reset button or the off switch. And normally Mac is a good watchdog. It double-checks with you anytime you try to do something that it isn't sure you mean, especially if it's something that could alter or delete your work—but it can't check if you fool it by turning off the machine or hitting the Programmer's Tool.

Dialog Boxes

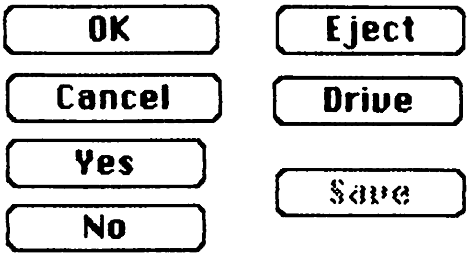
When you tell Mac you're ready to quit, and in many other situations, Mac displays *dialog boxes* to request that you confirm a command or supply additional information. These literally are boxes that appear on the screen, overlaying whatever else is currently going on. The dialog boxes do not erase the material beneath them, but just temporarily lie on top of it.







You might be asked simply to confirm your request, supply a name, or give a yes/no answer. In some cases, Mac might make a suggestion about what it feels you should do. It does this by preselecting one of the choices it gives you. In addition, dialog boxes usually offer you the option to cancel your original request.

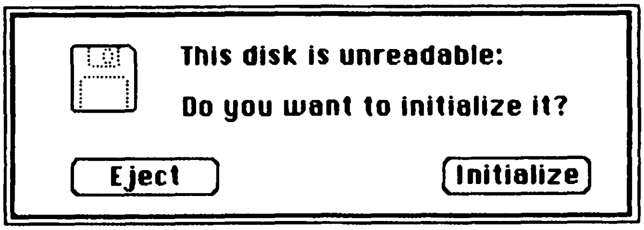


In fact, all of the possible choices appearing in the dialog boxes have their own little *option buttons*. Even on this level, Mac is looking out for your benefit. It's by clicking the option buttons that you make many of the choices affecting the dialog box.

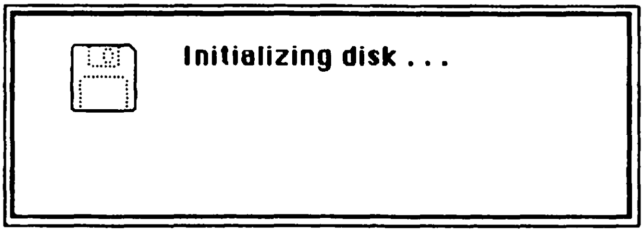
Sometimes a dialog box may contain a choice that's not germane to the current issue. As you've just seen on the pull-down menus, Mac shows the currently available options in solid black and any invalid options in gray. Once you've supplied the information needed to make a gray option valid, it too will then be displayed in black.

Preparing a New Disk

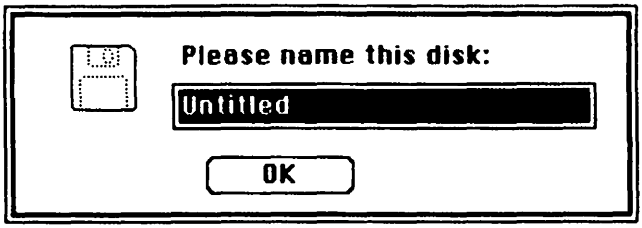
You're given two choices here, just in case you slipped in the wrong disk by accident. Though it might not sound possible from the term, it's possible to initialize a disk that's already been in use. Since initializing *destroys every bit of data on a disk,* it's not something to be taken lightly. But since you know you've got the blank disk in the drive, drag over to the *Initialize* box and click it.



Mac will start initializing the disk. In doing this, it marks every section with special information, clearing away anything it doesn't understand. It also reserves one part of the disk to hold the names of everything you put on the disk. That particular section is called the *directory*. As Mac is doing all this, it displays a message box that lets you know what it's up to. The process takes about a minute.



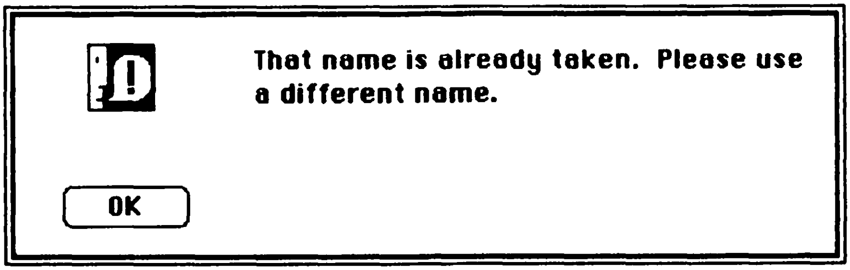
When it's done, another message box will appear, asking you to enter a name for the new disk. Mac is telling you that the new disk it just finished initializing is "Untitled" as of yet. The word "Untitled" appears in reverse because it's subject to change.



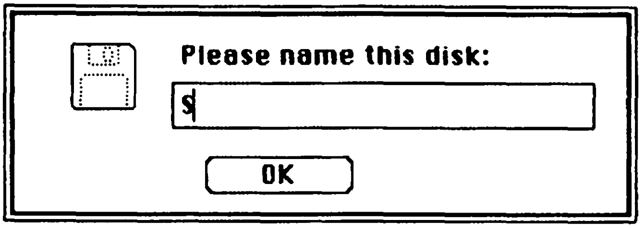
If you wanted to, you could leave this disk called "Untitled," but you should give it a name. Macintosh remembers details about each disk you use, and names help it (and you) keep them straight.

Naming Your Disk

Although you can call it anything you want, you should take some care in selecting a name for your disk. You don't want to have two disks with the same name. That situation can potentially confuse Mac. If you try to give the disk the same name as one Mac has already seen this session, you'll be asked to pick another name.



But since this is a copy of your *System Disk,* and descriptive names are usually best, why not call it *System Master*? Using the keyboard, type the first *S* in System. Notice that the inverted word disappears, replaced by your letter and a flashing vertical line.



This is called the *insertion point,* and it's only the first of many times that you'll see it. Mac uses it as a marker and a prompt. The insertion point tells you that Mac expects you to use the keyboard and indicates where the next letter will appear when you do.

Finish entering the new disk's name. If you make a mistake while you're typing, use the Backspace key to delete the errors and retype whatever you remove. When you're done, move to the word *OK* and click it. Provided that the name you selected is not a duplicate of one it has already seen at this session, Mac will accept the name you've given the disk. On your screen the original disk icon should revert to a gray shade—indicating that it is both inactive and not in any drive—while the new disk now appears in black.

Dragging for a Copy

That's only the first part of making the backup copy. Right now all you have is an initialized disk (utterly empty except for the formatting information and its name) and the original *System Disk*.

Disk Hierarchy

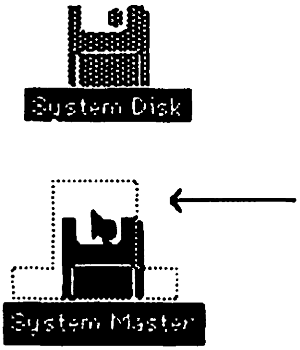
Original Disk - This is the disk originally supplied by Apple or the software manufacturer. After copying it, you should store it in an extremely safe place. You will use it again only in an emergency.

Master Copy - This is the first copy you make of the Original Disk. You will need it to make a Working Copy and additional copies as needed.

Working Copy - This is the disk you use every day. If it's damaged, you can make a new copy from the Master Copy or, if that too is damaged, from the Original Disk.

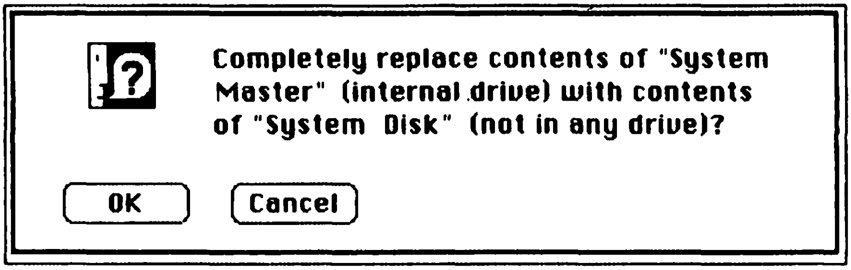
Your screen shows two disk icons, representing the two disks Macintosh knows about. With the mouse, move the pointer over to the System Disk icon and press. Just press: don't let go of the mouse button yet.

The System Disk icon reverts to a darker shade of gray. That indicates that although it is not present in any of Mac's drives, you have selected it for some function. Now start to drag the mouse. Do you see how the outline of the icon follows along with the pointer? You've captured it by pressing without releasing the mouse button as you moved—a practical demonstration of dragging.



Outline of System Disk dragged with the mouse.

Keep dragging the mouse until the outline you've captured is over the System Master icon and the arrow itself is over the image. You'll know when this happens because the Master icon will reverse. When it does, you can finally release the mouse button.



If you've done everything correctly, a dialogue box will appear on the screen pointing out that what you are about to do will wipe out every single thing on the new disk and asking you to confirm your request. Notice that Mac really does know which disk is in the internal drive and which isn't. Go ahead and click OK.

The Monotony of Individualism

Because it's able to store 400K of information on a single disk, Macintosh, unlike some computers, can adequately perform many applications with only the internal drive. However, some tasks like backing up disks or copying files are definitely easier done with two drives. Unfortunately, you're about to find out all about that.

For what will seem like the rest of your life, but actually will amount to less than three minutes, you'll be asked to switch disks in and out of the internal drive as Mac needs them. At the top of your screen you'll see a countdown of how many files remain to be copied, so you will have a sense of progress being made.

It will take about seven disk swaps before the backup is completed. Macintosh will prompt you through it with each disk's name. On some computers, inserting the wrong disk at the wrong time can cause serious problems. But if you make a mistake now, Mac will remind you which disk it asked for and continue the copying process only when the correct disk is in the drive. Away you go.

When the prompt changes, you've successfully copied the entire contents of your original *System Disk* onto a new disk that you initialized. In the process, you've mastered the four basic mouse-works: moving, clicking, pressing, and dragging. That's quite an accomplishment.

Labeling the Disk

Now you have the challenge of putting the label on the disk. The trick, as we've noted already, is to align the front of the label (the ruled part) in the engraved outline on the front of the disk case. Then bring the label over and onto the back of the case with your thumbs with a wrapping motion.

Put the original somewhere safe. You shouldn't ever need to use it again. The disk you've just created is, as you told Mac, your *System Master,* which is what you should write on its label. Get in the habit of putting the disk's official name on it. Occasionally Mac will demand a disk, asking for it by name, and it will do absolutely nothing until you comply with its request. There's nothing more frustrating than having to insert your entire collection of disks into Mac one by one until it finally accepts the one it wants. If you label your disks consistently, you'll be able to find them in a flash.

You'll use this *System Master* to make any additional copies you need. And you'll need at least one additional copy—your working copy, the disk you use from day to day. But you won't create it just yet. We'll save that for the next chapter, where, now that you've protected yourself against disaster, you'll begin exploring.

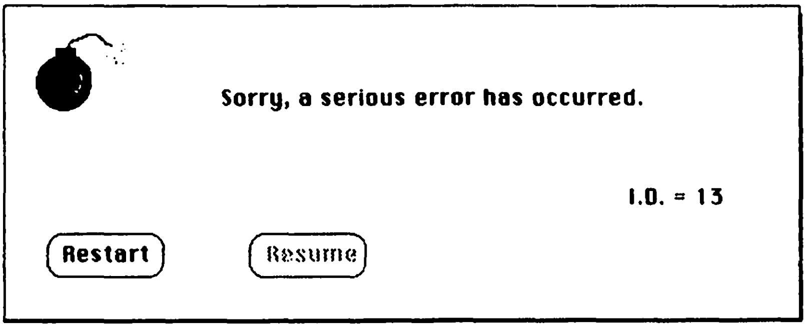
6
BOMBS, TOOLS, AND FUN

It's time for a fresh start. If you have a disk in your Mac right now, no matter which one, make sure it's showing in reverse to indicate that it's selected. Then make your way to the File option on the menu bar. Press and drag to Eject. When you get there, release the mouse button. As you've seen before, your disk should zip out of the drive.

The Programmer's Tool Revisited

With no disks in Mac's drive and therefore no chance for problems, you can feel free to experiment a little with the Programmer's Tool. If you haven't installed it yet, go back and reread the instructions in chapter 4 so you don't miss out on all the fun.

The Programmer's Tool has two switches, as you'll recall, marked Reset and Interrupt. Reach your hand around to the left side of Mac and press the switch furthest to the rear—the Interrupt switch.



A Bomb Box. The actual error number will depend on what caused the problem, but Apple does not supply information to enable users to decode these numbers.

Bomb and Alert Boxes

It's a *bomb box*! You've forced it to appear. You interrupted Mac doing nothing at all and confused it into an aggressive response.

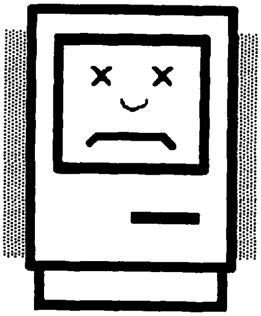
Mac offers two kinds of alerts: a warning and an exclamation of disaster. The one on your screen at the moment is the latter. In truly abominable situations, you will see an appropriate symbol—a bomb with a lit fuse. It will usually be accompanied by the words, "Sorry, a serious error has occurred." Translation: something has drastically confused Mac's controlling software and the machine simply can't recover.

Under such conditions your choices are limited. One option is Resume, which, as a general rule, you should try before going to the full-blown Restart solution. Unfortunately, as in the current situation, Resume is not always a valid option. In such cases, there's only one choice, Restart, which is the equivalent of Mac reaching a little hand out and pressing the Programmer's Tool's Reset switch.

Should you attempt something Mac considers questionable or potentially dangerous, you'll see an *alert box*. It will usually include an exclamation point or an asterisk to catch your attention. The alert box will also include option buttons like its dialog cousins, but they will usually be confined to either OK or Cancel. Mac really doesn't want you to do anything you'll regret.

Reset

For now, it's time to investigate the Reset switch, the one closer to the front of the machine. Give it a poke. You'll hear Mac's answering tone and see the icon of the disk with the question mark, precisely as if you'd just turned the machine on. But don't stop now. Reach back again and press Interrupt, the switch at the back, one more time.

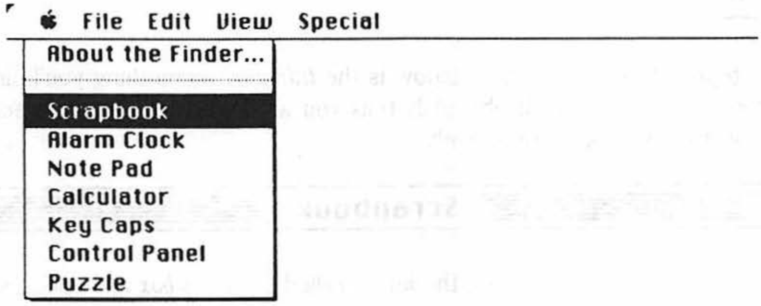


FOODOOF

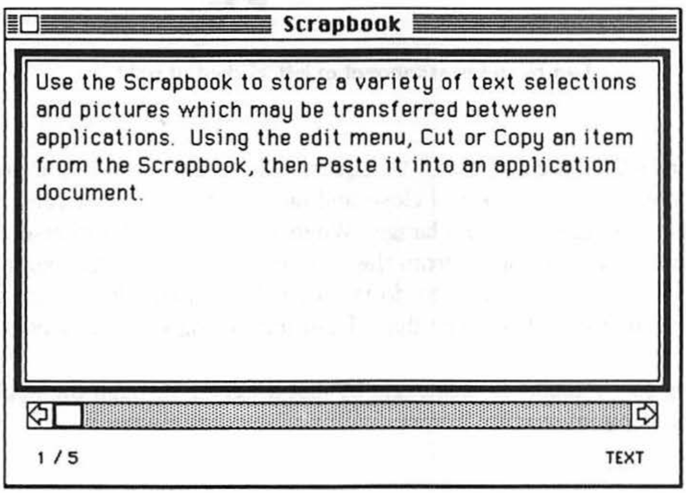
Since, in effect, you've interrupted the machine doing less than nothing, the icon you see is your now-even-more-confused Mac's way of grimacing and bearing it.

Under the Apple

But enough! Reach back and reset Mac. When the question mark appears, insert your *System Master* Disk and let Mac boot. When the screen fills with the desktop, move the pointer over to the solid apple icon of the menu bar and press.



You've seen About the Finder, so you can skip that. Move down one more row to *Scrapbook*. Just continue to press the mouse while you drag down to the word "Scrapbook." When it appears in reverse, you'll know that you've selected it and can release the mouse button.



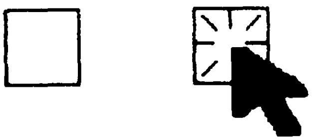
You've just opened your first *window.* As we'll soon see, windows encompass a wide variety of items. But, you protest, you've never before seen a desk with a window on top of it.

Just get used to it. The term "window" for this sort of thing came into vogue in computer circles before the "desktop" metaphor. If you wanted to be truly consistent, you could simply think of a window as a "layer" of "stuff" on your desk. Right now, you've got one layer there—a valuable desk accessory called the Scrapbook that you can use for storing and transferring frequently used pieces of text or drawings. At the moment it looks suspiciously like a piece of note paper. But you'll soon discover it actually does have some rather windowlike properties.

Title Bar

The topmost section of this window is the *title bar*—something you'll find on top of most Mac windows. It obviously tells you what's on the screen directly below it, but it does a lot more as well.

The small square box on the left is called the *close box* and appears on most Mac windows. As obviously handy as the Scrapbook might be, you won't want it around forever.



Two close boxes: normal at left, clicked at right.

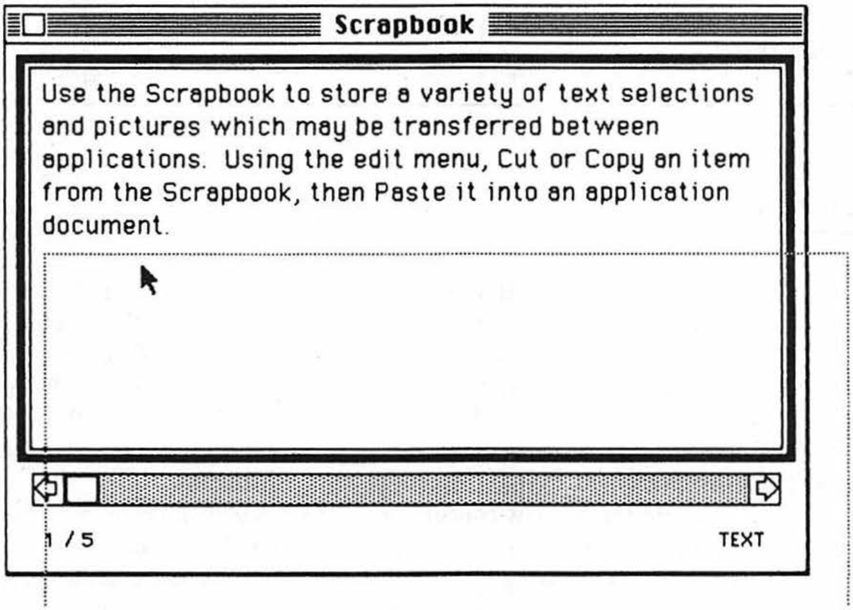
There's the magic of that little square. Move the pointer to it and click the mouse, and the Scrapbook will close and disappear from the screen. If you just press, you can see the box change. When you release the mouse button, the whole window will disappear from the screen. But if you change your mind after you've pressed, all you have to do is move the pointer off the box before you release the mouse button. Try that. Then try closing the Scrapbook by clicking the box.

Bring the Scrapbook back again by just dragging through the apple menu to it and releasing, as you did before.

Doing the Window Drag

Suppose you didn't want the Scrapbook to block your view of what was behind it, but you still wanted to keep it around?

Mac emulates a desktop. If something's in your way on your desk, you just move it. Same with Mac.



Moving the Scrapbook window.

Move the pointer up to the striped section of the title bar (just keep away from the close box!) and press and drag. A dotted outline of the Scrapbook window will move along with you.

Whenever you stop dragging and release the mouse button, QuickDraw (the screen-handling firmware in ROM) erases the window from its present position, redraws it where you've stopped, and restores to view whatever the Scrapbook was covering.

You can even move it almost off the screen (but not all the way). Perhaps you just want the title bar to show so you can move the Scrapbook back again. That's fine. You can put it anywhere you want, anyplace you feel is most convenient.

In moving around, notice that the pointer won't go off the screen. If you want to move the Scrapbook window almost all the way off the left end of the screen and then change your mind and decide to move it almost all the way off the right, you'll have to do it in two steps by repositioning the pointer.

MacRule Number Two: If you press the mouse button and you suddenly change your mind about what you've done, there's always one sure way out. Don't let go of the mouse button; continue to press it and drag the pointer into the menu bar at the top of the screen. If you release while the pointer is in the menu bar, the entire screen will be restored to the condition it was in immediately before you pressed.

Scroll Bars

Position the Scrapbook so that you can see its bottom section. You'll notice a shaded bar with arrows at both ends right below the frame. That's the *scroll bar.* Sometimes one of Mac's windows won't be able to display all of its contents at once. An image or some text may just be too big to fit in the space allowed on the screen for it. No problem—Mac will allow you to scan, or scroll, through the different sections that make up the whole by using a scroll bar like the one at the bottom of the Scrapbook.

This is where the window concept begins to make itself necessary. Assuming you've got a lot of information to store, you're not always going to be able to fit it all onto your screen. What you can do is pretend it's all on a scroll and move the scroll so that the material you want to look at appears in the window.

Horizontal and vertical scroll bars.

Things can get even more complicated: a window may have *two* scroll bars, one at the bottom and one along the right edge. The arrows at the ends of the bar indicate the direction in which you will be scrolling. But even if a window has scroll bars, there may not be anything beyond what you can see in the viewing area. It's usually simple to tell. If indeed what you see is all you've got in a given direction, the scroll bar for that direction will appear in plain white; if you ain't seen everything yet, the scroll bar will be shaded—like the one for the Scrapbook.

You'll also notice the *scroll box,* a small square box within the scroll bar. It indicates the position of the area currently displayed in relation to the total information available in a given window. If the box is near the left end of the bar, for example, that means there's more information to the right.

The Scrapbook, however, is a special case. It's divided into pages, but it pretends that those pages are linked to each other as a horizontal scroll. Still, it's a handy place to practice.

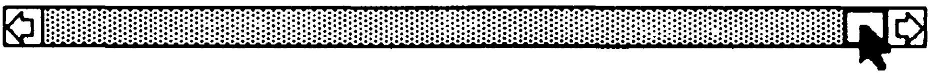
Scrolling

There are three ways to use a scroll bar to shift your view. One is to move the pointer to one of the scroll bar arrows and simply click. If you want to see more of what's on the right, move to the right arrow and click it.

There are two ways to think of what happens when you do this. One is that the "window" theoretically moves to the right, exposing what's there. But since the window doesn't physically move at all, most people tend to think of hitting the right arrow as simply moving the information to the left so that it can be viewed in the window. Either way, hitting the right arrow tells Mac, "Let me see what's just outside the window to the right."

Try clicking the right arrow of the Scrapbook's scroll bar. You'll see the scroll box jump along to the right along the bar. As we mentioned, the Scrapbook is stored in page format, so you'll also see the inscription "2 / 5" appear just below the left end of the scroll bar. The number to the left of the slash tells you what page you're currently looking at. The number on the right of the slash tells you the total number of pages in use.

Depending on which version of the Finder you have, you'll also see a fish, a Macintosh computer, some other piece of artwork that Apple has seen fit to supply, or nothing at all. If you press the mouse button while the pointer is on the scroll bar arrows, the scrolling will continue until you release the button.



Scroll bar with pointer on scroll box.

A second way to scroll is to move the pointer into the patterned section of the scroll bar, and click. That will jump the scroll box toward the pointer, and the window will obligingly follow suit. In some cases, this will be the same as using the scroll arrows, since the actual amount of the jump is predetermined. For the Scrapbook, the increment for such a jump is one page, just as it is for the arrows. Note that pressing doesn't allow a continuous move here.

In an application like *MacWrite,* Apple's word processor for Macintosh, a click of the arrow may move you only a fraction of a line of type, while the patterned area increment would usually be one windowful.

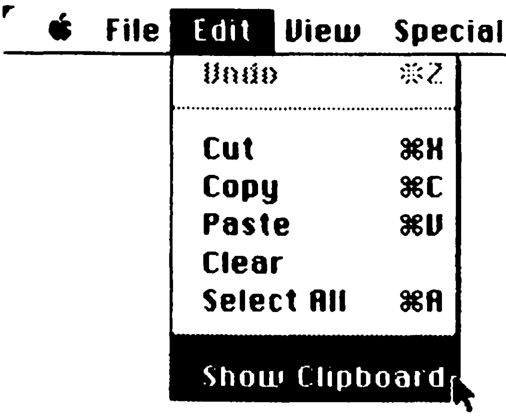
The third way of moving around inside a window is by dragging the scroll box itself to exactly where you want it to go. If you move to the scroll box and press when the pointer is inside it, you'll drag a dotted outline of the box with you (just as you did with the Scrapbook window itself) as long as you keep the pointer inside the scroll bar. When you release the mouse button, the image will shift an appropriate distance in the direction you chose. Again, the page format of the Scrapbook prevents the scroll box from resting at many intermediate positions—the Scrapbook won't let you look "in between the pages." Most scroll boxes, however, can be positioned anywhere at all within the scroll bar.

If the scroll box is resting against either of the two scroll arrows, then the window is displaying as much of the image as there is on that side. If the scroll box is against the right arrow, you're seeing the right side of the image. No further movement in that direction is possible.

Try all three methods until you get the hang of them. Then go up to the menu bar again. You're about to discover the Clipboard.

The Clipboard

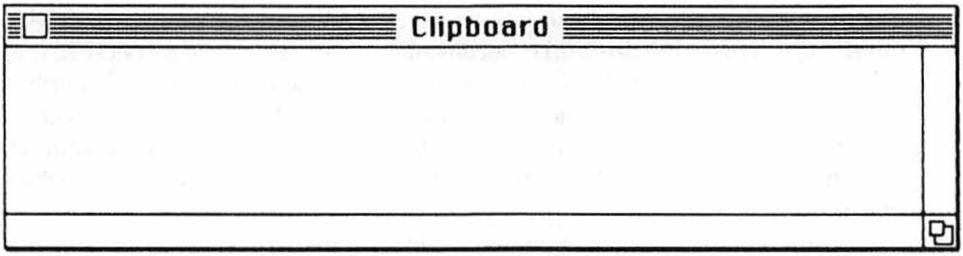
When in the course of human endeavor you find an item you consider worth hanging on to for a while, what do you normally do with it? Mac doesn't have a



shoebox, but it does offer you a *Clipboard.* It's a handy place for storing things in transition. It's also the way you put things of your own into the Scrapbook.

Move to the Edit option on the menu bar and press, bringing out a new pull-down menu. At the bottom of the menu is an unusual choice—*Show Clipboard.* Drag down to it, and when it shows in reverse, release the mouse button. At the very bottom of the screen, another window opens, partially obscuring the Scrapbook. It's showing you Macintosh's Clipboard.

Note the two scroll bars (horizontal and vertical) at the bottom and right. They're white, so they're not functional at the moment: you're seeing all there is to see in the Clipboard. In fact, even the arrows are missing from these particular scroll bars: the Clipboard is another special exception and doesn't let you scroll in either direction, so these scroll bars are actually ringers. But what's that strange icon of two boxes way down in the lower right-hand corner?

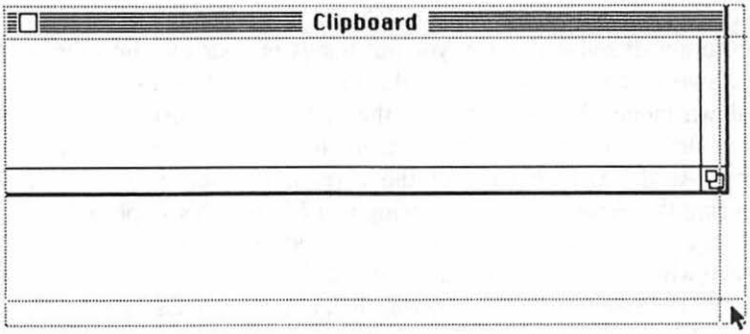


Size Box

That is the *size box.* It lets you increase the size of the window to which it applies. All you have to do is drag it to where you want the lower right-hand corner of the window to be. When you release the mouse button, the box will be redrawn to the new size, though Mac won't let you make it so tiny as to be absolutely unusable. Try dragging the size box to make the Clipboard just slightly smaller.

If you try to expand the Clipboard, you'll run into a problem we've already mentioned: the pointer simply won't move past the edge of the screen. Solution: as you did earlier with the Scrapbook, move to the title bar, then drag the Clipboard up toward the top of the screen. Give yourself a reasonable amount of room at the bottom, but don't obscure the Scrapbook's title bar. Then move over to the size box icon and drag it down and to the right. The size box gives complete elasticity.

You've now seen two different ways to alter the viewing area of Macintosh's display windows. The Scrapbook used scroll bars to shift the image inside a fixed



Using the size box to expand the Clipboard window.

viewing area. This extends the size of the document you can view, since you are not bounded by limitations of screen size.

The Clipboard uses a size box to increase the dimensions of the viewing area, but it limits the size of the document you can see to the physical size of Mac's screen. That's the largest size you can make the Clipboard itself, which is why the scroll bars are "fakes." And its lack of scroll bars can cause problems when you use the Clipboard, because it may well contain more text or graphics than it will let you see. The same goes for each page of the Scrapbook, which has no vertical scroll bars.

Many windows, however, include scroll bars *and* size bars. They offer you incredible flexibility in displaying your documents.

Active or Inactive?

Now notice something interesting about the two windows you see before you. Ever since you originally opened the Clipboard, its title bar has been decked out with the racy horizontal stripes that the Scrapbook used to sport. And the Scrapbook is also missing a close box. What happened?

The answer is simple. The horizontal stripes and close box can appear on only one window at a time. That window is called the *active window,* and it's always at the top of the pile of windows on the desk. Move the pointer back to the Scrapbook and click.

Voilà! The Scrapbook is now the active window, and it moves to the top of the pile. How do you make the Clipboard active again? Move the pointer back to any part of the Clipboard and click. The racing stripes return.

No matter how many items you have on your desk, you can make any one of them active merely by moving the pointer to it and clicking it. That's one good reason to keep your desk neat. If something is totally buried so that you can't see it, you'll have to move or close what's on top of it before you can make it active.

How the Clipboard Works

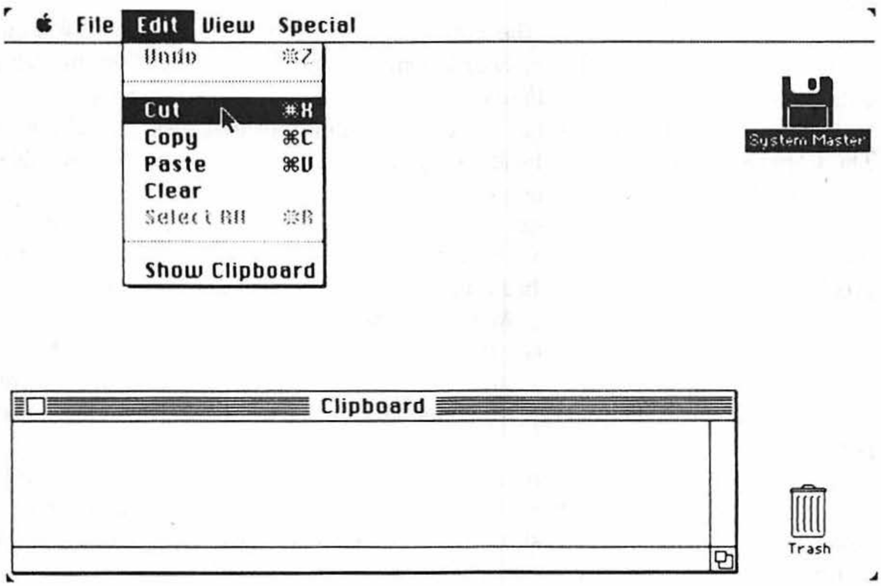
The Clipboard represents an area of Mac's RAM memory where you control what gets moved in and out. RAM is changeable, and you get to decide what goes into and out of this part of it.

While working with Mac, you may need to transfer sections of documents or images from one window to another or within the same window. This capability is called *cutting and pasting.*

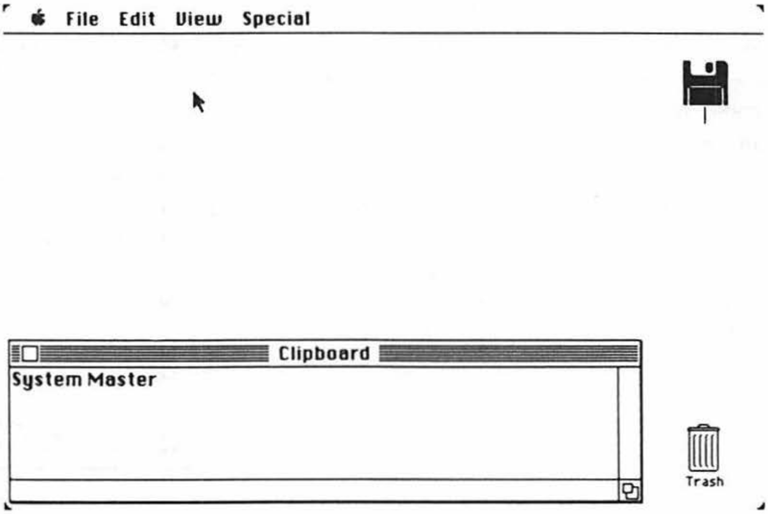
On many computers this function is only valid within the document you're currently working on. On others, you can transfer material between different documents, but it may take some technological gymnastics or special "windowing" programs, particularly if you're trying to merge text and graphics. But because Mac essentially treats all information as graphics, it considers all documents intrinsically compatible and is quite willing to swap information among them. And that's where the Clipboard comes in.

Using the Clipboard

First close the Scrapbook. Click it so that the close box appears. Then click the close box. Now the Clipboard should be the active window, as indicated by the stripes in the title box. Finally, make sure the current disk is selected—appearing in black.



Now you're ready to do some cutting and pasting. Move to the Edit menu, then press and drag to the word *Cut*. If you can guess what the results will be, you're probably psychic. Release the mouse button.



If you look closely, you'll discover your disk no longer has a name. Instead, the insertion point is now blinking from beneath the icon, and the name is now sitting in the corner of the Clipboard. You've successfully cut the available material and transferred it.

If you're wondering why the entire icon wasn't transferred as well, since everything was selected, the answer is simple. The icon of your system disk is both physical and conceptual. In one sense, it's only the screen representation of your disk, but it also represents the entire contents of that disk, a real object. The Clipboard, however, can handle only words, letters, pictures, and suchlike. Real objects are a little too much for it.

Your disk's name, however, is a collection of letters, so it's fair game for the Clipboard. Which is why it found its way there. But that leaves you with a problem. Your disk no longer has a name. All it has is an insertion point.

Since we're demonstrating Mac's cut-and-paste capabilities, the solution is to return to the Edit menu. Once there, press and drag down to *Paste*. This will Paste back what you have cut out. Releasing as the word inverts will restore your disk's name. When you Paste something, it begins at the current insertion point.

The Clipboard area, however, hasn't been cleared. This is an important feature of the Clipboard. What you put in there stays in there until you put something else in or until you shut Mac off. That's how Mac gives you the ability to transfer things so easily.

Completing the Picture

If you're a sharp observer, you'll notice that while the disk icon itself is inverted, the name is not, and the insertion point is still visible. Although you have pasted the name back onto the icon, Mac has not yet accepted it. To get it to, you'll have to perform one more act.

With the original version of Finder (1.0), if you wanted to confirm the name you'd pasted, you'd need to move off on the desktop somewhere and click—a strange ritual, since it neither selected nor confirmed anything. The name was accepted by default because you'd clicked elsewhere.

It's still possible to do things that way, but there's also another way. It involves using the keyboard. Simply press either the Enter or Return key. At this level of Mac's operation, they're interchangeable and signify your acceptance. If you need to name something using the keyboard or you need to make a choice and Mac suggests, by emphasizing it, the positive, you can register your agreement with either of these two keys.

There are exceptions to this general rule. Some of the programs you use may interpret the character generated by the Enter key differently from that of the Return key. Usually, if this is the case, you'll be specifically asked to use whichever key the program feels is appropriate.

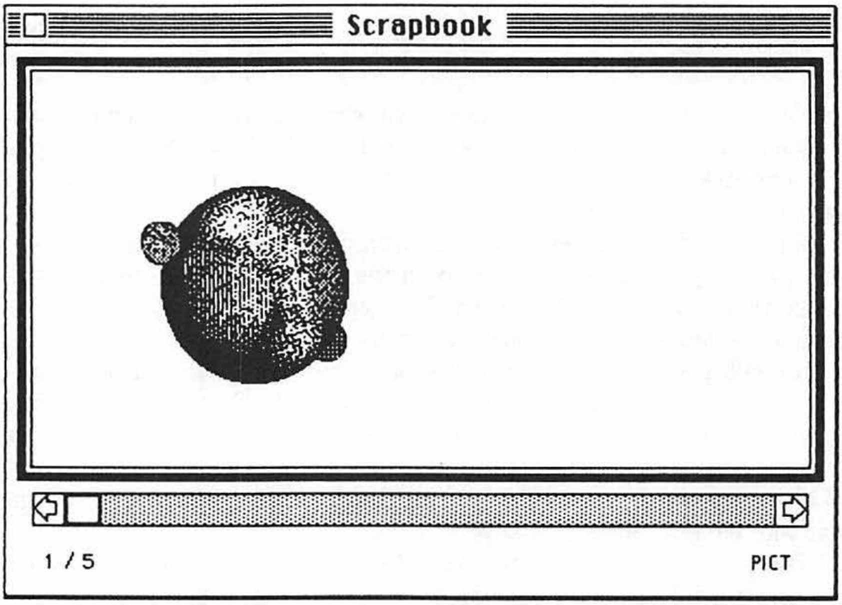
Back to the Scrapbook

Now that you've got something in the Clipboard, you can investigate the Scrapbook a bit further. Move up to the close box in the Clipboard's title bar and put it away. It doesn't need to be visible to be used.

Go back up to the solid apple menu and pull it down, selecting Scrapbook. Once again: what that means is move to the apple icon, press the mouse, drag it to the word Scrapbook, and release when the word inverts. If nothing else, mouse-isms are much more compact than their English counterparts.

As we've already discussed, some Scrapbooks accompanying the *System Disk* already have things in them: pictures of fish, space invaders, Macintosh computers, who knows what else. If you've explored already, you've seen what's in yours. The important thing is that the Scrapbook is a file stored *on your disk*. It can hold quite a few pages of text or pictures, and it can be different for each disk you use. The Clipboard, on the other hand, is in Mac's RAM. Its contents disappear every time you turn off or reset Mac.. The Clipboard's function is to give you a *temporary* storage area for cutting and pasting.

You're going to add the contents of the Clipboard to your Scrapbook. Move to the scroll arrow and click until you're at the last page. This isn't a necessity. If you're at the beginning or somewhere in the middle when you add to the



Scrapbook, the image you add will be inserted at that page, and whatever else is beyond it will be bumped up one page number. To put the contents of the Clipboard in the Scrapbook, just move up to the Edit menu and select Paste. It may take a second, or less, but the Clipboard image will soon appear.

The other piece of useful information is at the bottom right, below the scroll bar. It tells you what type of image the current Scrapbook page contains. If you look there, you'll see that Mac has correctly identified this item as TEXT. The other label you're likely to see is PICT, which tells you that it's a graphic image.

Taking from the Scrapbook

You can keep adding things, but the Scrapbook was meant to work in both directions. It's a permanent version of the Clipboard. Removing things is simple, and you even get two different ways of doing it.

If you move up to Edit once more and pull down the menu, you'll notice the words *Cut, Copy, Paste,* and *Clear.* You've already used Cut and Paste. Cut removes the selected item from its original position and places it in the Clipboard. Paste duplicates the Clipboard contents onto the selected item (or, in some cases, area).

So extend the logic. Copy *duplicates* the selected item (subject to the rules of objects and images discussed earlier for Cut) and places it into the Clipboard.

Clear, on the other hand, *removes* the selected item without putting it anywhere else. It's as though you'd erased it.

All four functions work on the currently selected item. Right now, that's the Scrapbook page you're looking at. If you Copy a page of the Scrapbook, you simply duplicate it into the Clipboard without deleting it from the Scrapbook. Cutting it removes that page from the Scrapbook (decreasing the number of Scrapbook pages), and places it into the Clipboard. Clearing is done when you have a Scrapbook image you no longer need. It performs the same function as cutting, but the image doesn't go anywhere else—except maybe to image heaven. It's gone. And if you Paste right now, you put the Clipboard's current contents into your Scrapbook.

Old Scrapbooks

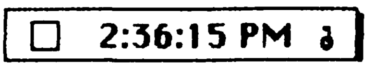
No one says you ever have to discard anything from your Scrapbook. The problem is that it tends to take up an increasing amount of disk space as you keep adding more pages to it. Like a real scrapbook, it can become so large that it's unwieldy.

The ideal solution is to keep more than one Scrapbook—one per disk, each containing the various images you'll eventually use. Since the Scrapbook is a disk file, that's a simple chore you'll discover how to perform in the next chapter. For the time being, just keep in mind that it's the option we recommend.

If you'd like to practice transferring items in and out of the Scrapbook and the Clipboard, go right ahead. Even if you make a few mistakes (like losing that valuable fish forever), you can always go back and recopy whatever you lose from the original *System Disk*—just one more reason you should back up every disk you own.

The Alarm Clock

It's time to see what other surprises await in the shade of the apple. Move to the apple icon, press, drag, and release when *Alarm Clock* inverts. The small display is the time as noted by Mac's built-in clock. Many computers will respond to a request for the time; few keep a running display as Mac does.

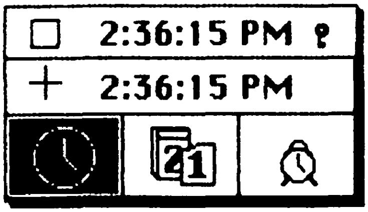


Unlike the other windows you've seen, this one has no title or scroll bars, and no size box. The little box you do see is the close box—but don't use it yet.

The lack of all the usual features isn't grievous. Move the mouse so the tip of the pointer just overlays any of the portion of the clock display other than the close box. Press and drag. The clock will follow you. It can be repositioned even without a title bar.

But clocks have an inherent problem. They don't always show the correct time. Some Macs have been delivered with the calendar totally wrong (1904 seems a good year to some), while others have clocks that have been set to the Greenwich of computerdom, Cupertino time. In either case, if Mac's clock and your watch don't agree, Mac's the one you'll probably want to reset.

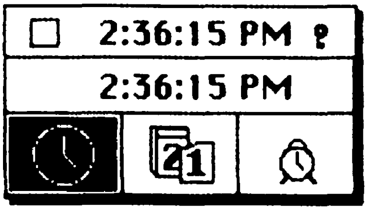
To your chagrin, you might notice that there are no winders or stems for you to reach out and twist. But there is an icon, a small flag (it looks a bit like a musical note) on the right side of the clock display. Click it: after all, that's what it's there for.



The Clock Unfolds

Most clocks nowadays offer a variety of functions. Mac follows this trend. Procedures for setting the time, date, and alarm (from left to right) are all at your disposal. The clock, calendar, and alarm clock icons give you control over them.

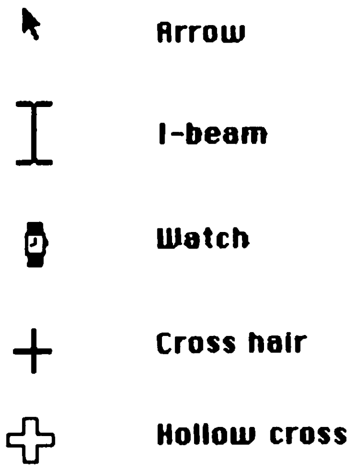
If the time is incorrect, move to the circular clock icon on the left side and click it. The icon inverts, and the center row of the expanded display changes to display the time. But so far there's no clue about how to make it change.



Bring the pointer into the central area of the clock display, which is the editing area. Immediately the pointer's aspect will change from the arrow to a cross-hair shape. This is your indication that some changes are possible. And though the clock doesn't say so, it's now time for a brief digression.

The Pointer Shapes

Suddenly you realize that your friend the pointer is more than just an arrow that travels around the screen when you move the mouse. It may also appear in different guises to give you various kinds of information.

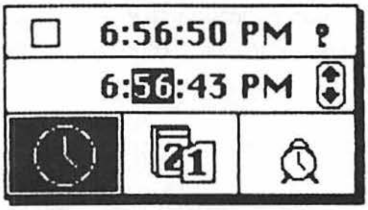


Some of the possible pointer shapes.

Unless you've been asleep at the switch, you've already seen the pointer in costume as the little watch that tells you Mac is at work and you'll have to be patient. As you spend more time with Mac you may come to dread the sight of that watch icon. Fortunately most of the waiting periods it heralds will be short. And when it appears for a long time, at least you'll know that Mac hasn't frozen up and locked you out. Most of the other incarnations of the pointer are reserved for its work within specific applications, such as this one.

Setting the Clock

Within the time field there are four possible areas to modify: the hour, the minute, the second, and the relative time period (AM or PM). Choose the area you want to change. Move the cross-hair pointer on top of the numbers or letters and click. The display changes yet again.

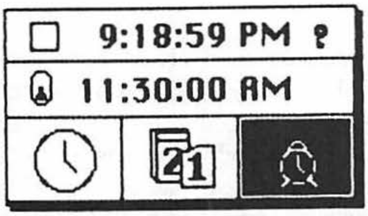


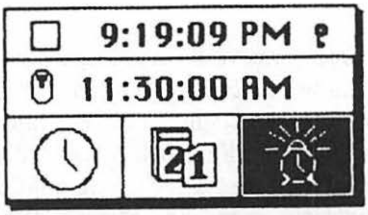
The cross hair is still there, but now the section of the time you've chosen to modify has inverted. And at the right of the editing area there's a button icon with two arrows in it. One arrow points up, the other down. You can increase the selected value with the up arrow or decrease it with the down arrow. In the case of AM/PM, using either arrow simply toggles between the two.

There are two ways to change the value. You can click the appropriate arrow, in which case the value will change by a quantity of one each time you click. Or you can press, in which case the value you've selected will start to increase or decrease in a big hurry until you release the mouse. The selection will cycle through to its highest or lowest value and then begin again.

Once you've set the time, move back to the inverted clock icon. When you click it, the new time will be in effect. Because there will always be a delay between the time you finish the setting chores and the time you get over to click the clock icon, it's always wise to leave yourself a small lead. Set the time ahead a little and wait until it catches up before you click the clock icon.

The date follows roughly the same procedure. You click each of the three date values and change it with the up and down arrows.





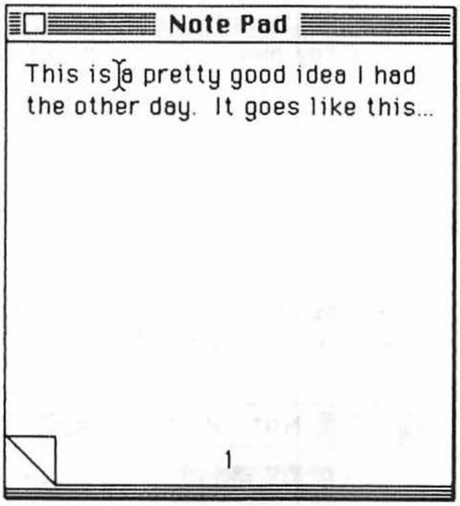
The alarm adds one more chore. Since you can turn an alarm both on and off, you use the icon on the left side of the editing box. It's another of Mac's buttons.

With the *T* in the button upside-down toward the bottom, the alarm will not sound. When it's rightside up and near the top, your alarm is ready to go. All you need to do to change it is click it. Note that the alarm clock icon also changes, adding little radiating alarm waves from its top when the alarm is set. You set the time for the alarm exactly as you set the clock time.

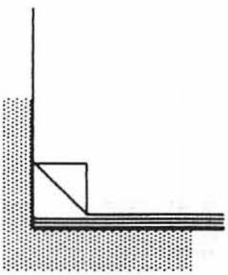
And what happens when it does go off? Mac's chime tone sounds once and the apple icon flashes. That's it. The icon keeps flashing until you call up the alarm again. If you see the apple in the upper left-hand corner of your screen turn white for no apparent reason, drag out the clock.

The Note Pad

How many times have you been doing something and come up with a brilliant idea totally unrelated to what you were working on? How many times have you stuck it on a scrap of paper that later disappeared?



Mac won't give you real paper, but it will give you a place to turn that mental note into something that won't disappear until you make it disappear. Move to the apple icon, press, drag down to *Note Pad,* and release. There's your space. As you move the pointer into it, you'll see it change into its *I-beam* shape. There's also an insertion point blinking away. That's a dead giveaway. You're in a text area.



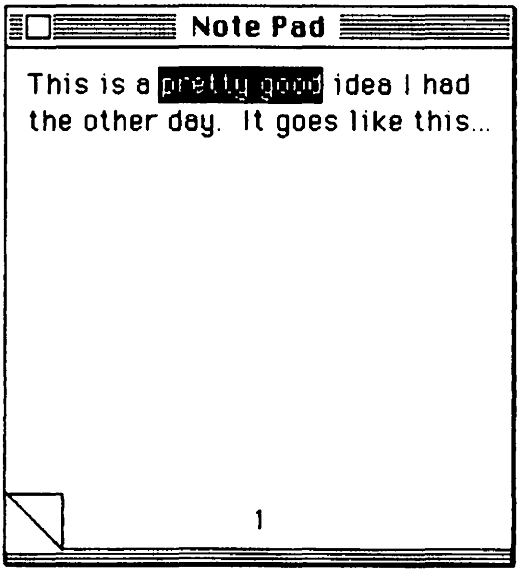
Clicking the upturned dog-ear will flip you to the next "page" on the Note Pad. Clicking the lower left corner moves you back one page. Try clicking your way to page 3 and do some typing.

You don't need to use the Return key until you finish a paragraph. Mac takes care of such paltry details as wrapping words around to the next line when your typing exuberance would leave you with a part of a word at the right-hand margin.

Now move the I-beam into your text, and click. The insertion point magically moves to the spot where you moved the pointer—very handy if you want to insert a letter, a word, or even a sentence. If you click outside the body of text, the insertion point will appear at the end of your text. If you fill up a page of the Note Pad (which happens a bit earlier than you may expect), Mac will beep at you. You can either click to a new page (you get eight in all), or delete some of the current material by moving the insertion point if necessary and using the Backspace key.

Editing Tricks

Or you can use a little editing magic. Perhaps that memo you wrote didn't exactly state the full potential of your idea. It happens. Mac will help you deal with the situation.



Note Pad with selected (inverted) text.

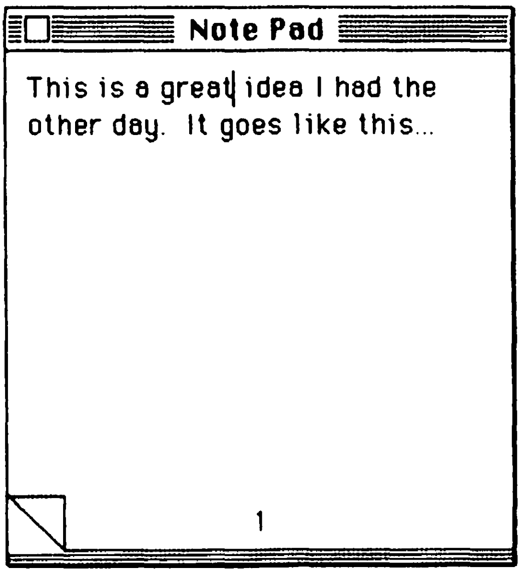
One of Mac's pull-down menus is titled Edit. You've used some of the features in there, but you also know that you have to select what you want the options to act upon. The Note Pad itself is a selected object, but, as you've seen, objects don't readily respond to editing functions. You'll need to select a section or sections of the text.

Try this. Move up to the beginning of the first word you want to replace. Press and drag through all the words you want to change. As you're doing that, the words you're dragging through will invert. When all the words you want to change have inverted, release the mouse button.

Now that you've selected the text, there are several things you might do. You could move up to the Edit menu and drag to Clear. It's a viable action with any selected image. That would remove the words. Mac would rearrange the remainder so it looked all right and would leave the insertion point at the spot where you had started. You could then insert new text until the page filled up again.

You could also drag to Cut. That would remove the unwanted words, and it would put them in the Clipboard in case you changed your mind and wanted them back later on.

But if those choices sound like too much work, you can take a shortcut. If you simply press the Backspace key, you'll delete the selected text just as surely as if you'd chosen Clear from the Edit menu. It's fast and simple.



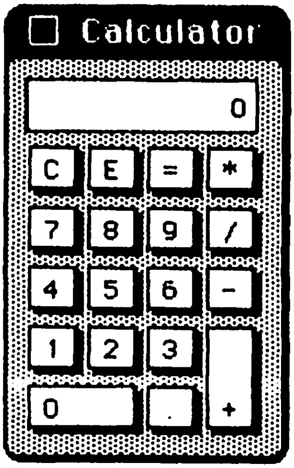
Note Pad after insertion of new text.

But computers are machines of convenience, and Mac is more convenient than many. You don't even have to hit the Backspace key. With the text selection inverted, you can just start typing. Macintosh will erase the selected portion of your text and replace it with the words you're entering. It handles the operation just as if you'd used one of the previous methods first.

What if you suddenly realize that you've accidentally deleted the very words you meant to save? If you've Cut them, of course, you can retrieve them from the Clipboard simply by Pasting them back again. But all is not lost if you used one of the other methods. Simply go back up to the Edit menu and select Undo. Your deleted text will be restored even if you've gotten rid of it with Clear or Backspace—*unless* you've moved the insertion point and typed in another character *or* you've changed or closed the window. Try it!

Calculator

In the middle of that letter describing how many hours you worked, you find your fingers coming up as you figure the total amount owed you. You go fishing in your desk for the calculator.



Macintosh understands. That's why, along with the other desk accessories stored under the apple pull-down menu, there is also a calculator. By now the routine should be familiar to you. Move, press, drag, and when the word *Calculator* inverts, release.

The Calculator has only a tiny title bar, but you can use it for dragging around as long as you're careful not to accidentally click the close box in the upper left-hand corner. No racing stripes here: you can tell the Calculator is selected when the lettering in it is in white on a black background.

It's a very simple four-function machine, and it works. You can use the keyboard to enter whatever digit you need, but the calculator buttons are arranged closely enough that you can click them with the mouse.

The " + " and "–" are easy. They're the traditional symbols used for addition and subtraction, respectively. But that's where paths start to diverge between Mac's calculator and one you might buy in a store.

Different Keystrokes

A calculator's key for multiplication usually bears a striking resemblance to the letter X. On a calculator you would find the answer to a simple multiplication problem like 2 times 3 by pressing four keys: 2 × 3 = . Mac's calculator, conforming to computer convention, uses the asterisk (*) for multiplication. To do the same problem on Mac, you'd use the mouse or keyboard to click the following Calculator keys: 2 * 3 = .

Division also presents a challenge. The traditional mathematical symbol is ÷. Mac and other computers use the slash (/) to represent division. A problem like 6 divided by 2 would be done by clicking 6 / 2 = .

The E button is used to produce exponential numbers. If you've used a scientific calculator, that term may be familiar to you; if not, its explanation is simple.

A number like 60000 could be entered into Mac's Calculator by clicking the 6 and then clicking the 0 four times. Mac and many other computers understand a shortcut to this and other large numbers that are simple "powers," or multiples, of 10.

The number 60000, for example, can be expressed as 6 * 10000 or 6 * 10^4. Written in exponential notation, 10^4 is 1E4. So 60000, or 6 * 1E4, can be condensed to 6E4. You could enter that number with less mouse movement by clicking 6, E, and 4.

The key marked C is fairly common. It's the Mac Calculator's clear button, and it's used the same way here as it is on a physical calculator: to remove totals entered in error or no longer wanted. When used, it erases *all* the Calculator work done up to that point.

Don't mistake it for a Clear Entry function, though, which allows you to erase your last entry. For some infuriating reason, the Mac Calculator doesn't have one. This means that you had better be extremely careful entering your numbers if you are planning a long calculation. The Backspace key doesn't work with the Calculator, either: one erroneous entry of any sort, and you will be forced to start all over again from the beginning.

Of course, when you do have the answer you want, you might jot it down somewhere so you won't forget it. Once you close the Calculator, the number is gone forever unless you go through the math again.

But Mac has that avenue covered as well. If you move up to the Edit menu and select Copy (or Cut), the value shown in the Calculator's rectangular display area will be stored in the Clipboard. You can then use Paste to put it where you want it.

If the thought now occurs to you that you could use the Edit menu's Clear function to clear the Calculator, you're correct. But the C button on the Calculator is infinitely easier.

The Key Caps

Many computer books begin with a guided tour of the keyboard. Mac is so "mousified" that such a tour seems unnecessary. But there is far more to Mac's keyboard than meets the eye. If you doubt it, take mouse in hand, move to the apple icon, and select *Key Caps*. Mac reproduces a copy of the keyboard right there on the screen.

All along you've been seeing Mac displays that offer more than they initially appear to. The Key Caps display will offer some surprises in a moment. But first a word about keyboards in general.

Keyboards

A keyboard is nothing more than a collection of switches arranged in rows and columns. If there were no writing on the key caps, each key could be identified uniquely by its row and column position. And since most computers don't have eyes, that's the way they do identify each key.

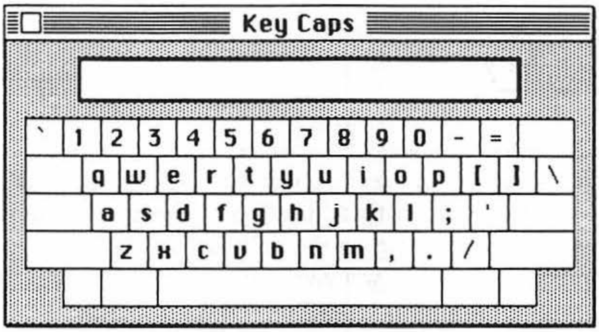
When you press a key, Mac determines which row and column the key is in. Let's say you hit the key labeled A. That one's in the third row, second column.

Stored away in the computer's ROM firmware is a table that translates the row-and-column information into ASCII codes. Mac looks the A key up and discovers that its value is 97—ASCII code for a lowercase, or unshifted, *a*. More firmware and software instructions tell Mac to print that character to the screen and how it should look. All this occurs between the time you press the key and you see the letter or number appear on the screen.

Mac's keyboard is a little more special than most. A separate computer chip in the keyboard itself takes care of interpretation up to the ASCII code level, thereby reducing the computer's work and making the whole operation a little faster.

ASCII and Mac Keys

Now follow along with the Key Caps as your guide.

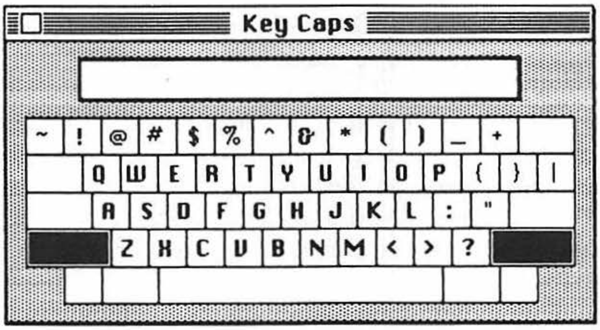


As you see it in front of you, your keyboard is set to display all the lowercase versions of the letters of the alphabet, the numbers 0 through 9, and the symbols ‘, -, =, [,], \, /, ’, as well as the comma, period, and semicolon.

Even though the legends on the alphabetic keys themselves indicate capital letters, these and other ASCII combinations are not possible without also pressing another key called a *modifier*. The Mac keyboard contains four different modifier keys (two of which are duplicated on opposite sides of the keyboard). By holding one down, you modify the ASCII code generated by the normal alphanumeric (letter, number, and punctuation) keys.

The Shift Keys

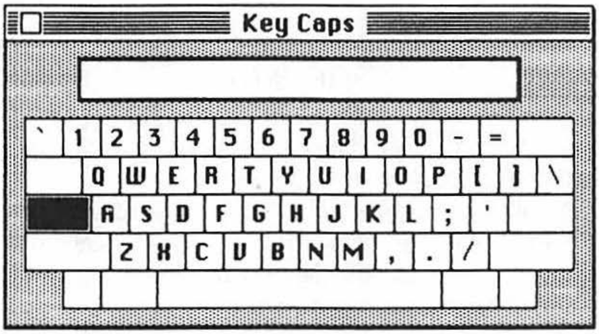
The Shift keys on either side of the fourth keyboard row make all the alphabetic keys produce uppercase letters. In addition, holding down the Shift key makes keys with dual legends produce the characters on the upper parts of the keys.



If you hold down Shift and press the exclamation point/numeral 1 key, the keyboard will send the exclamation point. Without the Shift key it sends the numeral 1. Hold down either Shift key and watch Key Caps show you what you'll get from the rest of the keyboard.

The Caps Lock Key

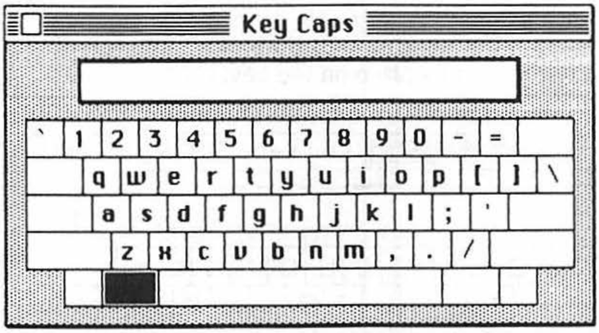
As its name implies, the Caps Lock modifies the keyboard codes to produce the capital letters displayed on the alphabetic key legends. But unlike the typewriter key with a similar name, that's all it affects. The dual-legend keys continue to produce the characters shown on the bottoms. But as Key Caps can show you, holding down either Shift key will give you access to the characters on the upper portions of the dual-legend keys even when the Caps Lock key is engaged.



Caps Lock actually locks into position, either off (in the up position) or on (down). To use it, press down until you hear the click. Pressing it again releases the lock and restores the alphabetic keys to their normal lowercase output.

The Command Key

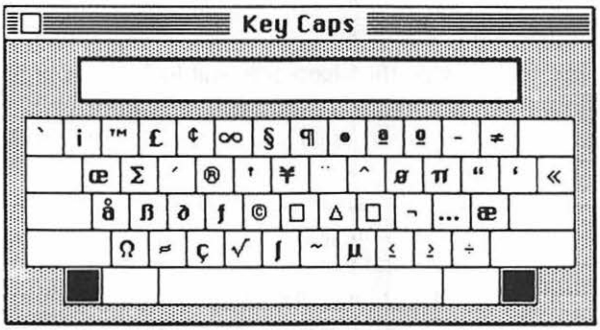
The third modifier is called the Command key on Macintosh and the Control key on most other computers. Apple has labeled it only with the symbol ⌘. Used in combination with some of the other keys, the Command key produces the ASCII codes with a value less than 32. Such codes are *control codes* used to perform functions rather than represent printable letters or symbols. Other keys can generate these codes, too. For example, the Return key produces ASCII code 13, the Tab key gives ASCII 9, and the Backspace is ASCII code 8. These codes, obviously, don't produce printable characters; instead they control movement on the screen.



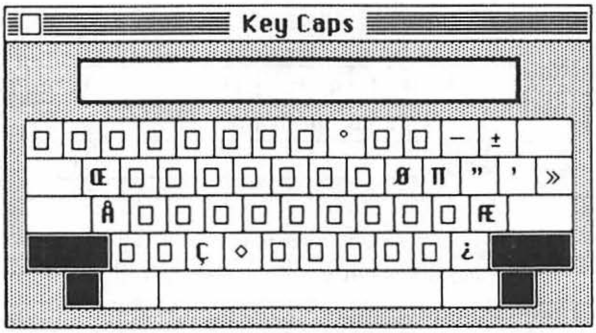
Command-I, for instance, sends an ASCII value of 9 to Mac, just as the Tab key does. Command-H is equivalent to the Backspace key. But some software, including Key Caps, cleverly traps such keystrokes harmlessly. That's why if you press the Command key while Key Caps is displayed, you'll see no change in the display, and if you try to type while you hold it down, nothing will happen.

The Option Keys

With these three modifiers coupled with the unmodified keys, you can generate each of the 127 ASCII codes accepted as standard. All told, though, there are 256 possible codes (0 through 255). Of the remaining ASCII codes, Apple uses ASCII characters 128 through 217 as special characters for Mac. In some cases they're letters from an international character set, like Ñ, or diphthongs like AE, or just symbols like the trademark sign. That's why you have a fourth modifier.



It appears as a pair of keys located on either side of the bottom row of the keyboard and called the Option keys. Hold either one down, and Key Caps will display what they give you when you hit the other keys. Note, by the way, that the Option and Shift keys can be held down at the same time to offer an even greater variety of characters. But if no character has been defined for a particular ASCII code, as often happens with those with ASCII values 128 or greater, you'll see a square box in its place on the keyboard.



Type and Paste

It's easy to remember the standard codes. They're on the keyboard in front of you. Suppose, though, in some text you were writing, you wanted to include the trademark symbol ™. You'd know that you must use the Option key to get to that particular group of codes, but what other key produces the actual symbol?

Just drag out the Key Caps. They're available even when you're working on a document. As you've seen, if you hold down any of the modifier keys, the keyboard display will change to reflect the modified characters. And the answer's easy to find: ™ is produced with the Option and numeral 2 keys.

If you'd like to see what the characters will look like side by side, you can use the mouse to click letters and make them appear in the Key Caps display area—where a blinking insertion point clues you that you're looking at a text area.

Archaic as it sounds, you can even use the keyboard. As with the Note Pad, you can move the insertion point by moving the pointer in the display area and clicking the I-beam. And you can select characters to Cut or Copy them to the Clipboard. If you type more characters than the display has room for, they'll disappear off the right of the screen. You can get them back, though. Just move the I-beam and click to move the insertion point, then perform some deletions as you did with the Note Pad.

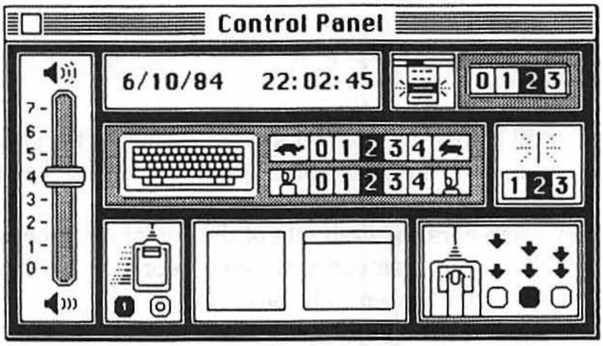
One final note: the special characters you see in Key Caps may not match precisely with what you get in certain fonts—the various typefaces Mac can produce. In such cases, you'll just have to experiment.

The Control Panel

Until recently, computers were rather unforgiving creatures, not easily adaptable to personal human preferences. People would complain that the cursor (which on Mac is often the insertion point) blinked too fast or too slow. The sound coming from the speaker was too soft or too loud. A key repeated too quickly or too slowly when held down.

Often such comments were all directed toward the same computer. Computer engineers usually chose a middle ground somewhere between the ridiculous and the sublime and hoped for the best. But humans have their own ideas about what they prefer.

The Mac engineers were a little smarter than most. Realizing the nonuniform nature of personkind, they have left room and opportunity for real people to modify some of those things real people tend to worry about. The instrument used to perform these modifications is called the Control Panel. It, too, is available beneath the apple icon. Select it now.

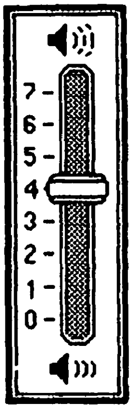


The Volume Control

If you have your Mac connected to an amplifier and external speaker, you may well want the deep resonance of sound surrounding you. When you prefer serenity, you can always twirl the amplifier's volume control down a few notches.

But Mac itself has no external volume control, and if you route its audio into a garden-variety speaker or listen to it straight from the box, you seem to have no way to adjust the volume. Or you would have no way, if someone hadn't thought of including a software-based slide switch for it on the Control Panel.

Take mouse in hand and move to the image of the rectangular slide. When the pointer (cross hair again) is resting on it, press. If you drag it up, toward the

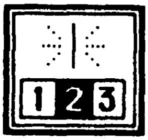


7, the speaker volume will increase. Dragging it down will decrease the volume until, at the 0 setting, the speaker is turned off entirely. Just to help you with your decision, the speaker will sound off each time you change the volume level to let you know just how far you've gone.

The Insertion Point

Even with the small amount of text work you've done up to now, you've had a chance to see and use the insertion point. That little vertical line flashed, if you recall.

On ordinary computers the flash rate of the cursor often becomes a subject of controversy. And it's guaranteed that some people would have complained about it on Mac if it didn't happen to be adjustable.



When you receive your Mac, the flash rate of the insertion point will probably be set at 2. It's a nice even speed, very middle-of-the-road. If you find it to be too slow or too fast, just drag out the Control Panel. Its range is adjustable for three rates, 3 being the fastest and 1 the slowest.

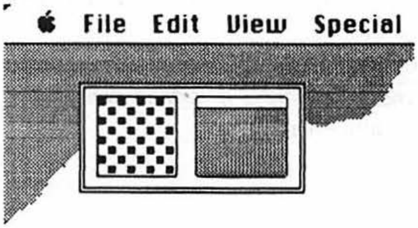
A word of advice, though. The original version of the *Guided Tour* required that the flash rate be set to 2. If you changed it and reset it before taking the tour, strange and not so wonderful things would happen.

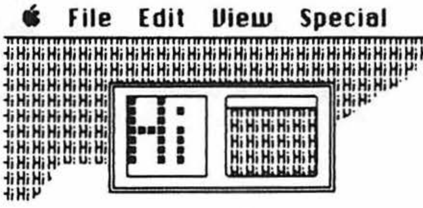
Any program that needs a specific rate for the insertion point should tell you so. But if you've adjusted the rate for your own personal preference and you find that strange things are happening during a program that made no such request, you might try resetting the flash rate to 2 before you assume the worst.

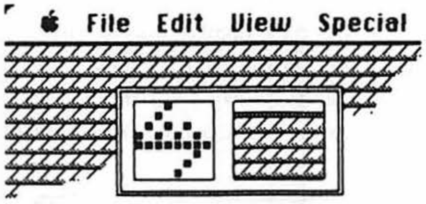
The Desktop

It's a very expensive proposition to buy a desk, have it delivered, and then discover you don't really like it. It would be nice if you could peel off the desktop's walnut veneer and discover teak beneath it or, with another simple peel or two, rosewood or mahogany.

Macintosh offers you that kind of latitude. Your screen's desktop is filled with a pattern: nothing special, just a solid gray area. For some, that's a bit bland to look at. You might prefer solid white, or you might be partial to a checkerboard pattern.

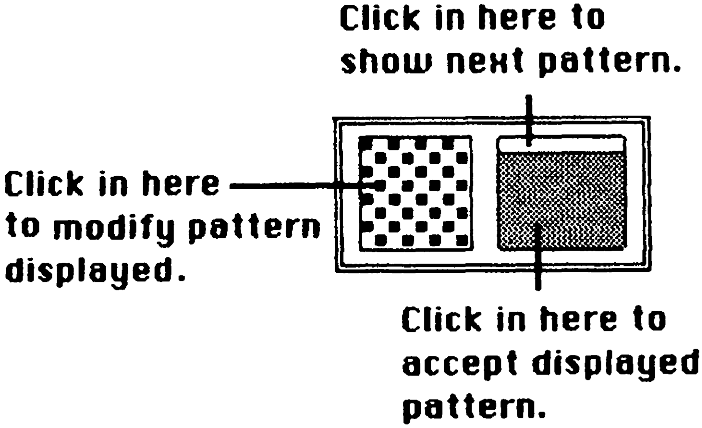






If that's the case, all you have to do is move to the pattern display in the middle of the bottom row of the Control Panel and change it. The right-hand box of the two-box display lets you preview a whole range of styles. By clicking in the thin rectangular section at the top of that little box, you can make a huge selection of patterns pass before your eyes.

But if you're set on a pattern of your own, just move to the left-hand box. There you'll find an enlarged view of the "dots" (actually tiny square blocks) that build up each pattern. Clicking over an individual dot changes it: if you click over a black dot, it turns white ("erasing" it), and vice versa.

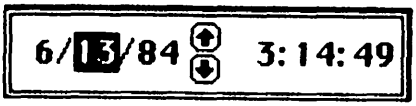


You can extend the action: pressing a given dot gives you a "palette" of the opposite color to "paint" with. If you press a black dot, you can drag white all around the box until you release the mouse button. Pressing a white dot gives you black to play with. Meanwhile, the right-hand box keeps up with you to give you a preview of what your desktop will look like.

When you're satisfied with either a preexisting pattern or one of your own design, click the patterned section of the right-hand box, and Mac will accept your choice. The desktop pattern will change immediately.

Dates and Times

The Control Panel's time and date display may seem rather redundant—they're exactly the same as the ones on the Alarm Clock—but Europeans and generals may prefer it. Here the time is displayed in military twenty-four-hour-clock fashion. At 8:00 P.M., the correct time would be 20:00:00.



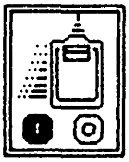
Changing either the date or the time works much as it does with the Alarm Clock. Move to the section you want to change and click it. An up/down arrow then appears, and you simply click it to increase or decrease the value you've selected. When you're done, clicking in any other section of the Control Panel will set the date and time you chose.

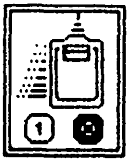
The only drawback is that you can't set the alarm from here. But for those occasions when Standard time turns to Daylight Saving time and you don't want to fiddle with the entire alarm display, it's more than adequate to do the job.

Mouse Movement

They call it a mouse, not a Ferrari. Its goal is not always to move the pointer from one side of the screen to the other in the shortest elapsed time. With most of the moving and dragging routines you've used so far, speed is definitely useful. But as you get involved with certain sophisticated procedures such as the drawing routines in *MacPaint,* you may prefer accuracy to zippiness.

Apple has devised a way to select between the two. The section of the Control Panel that displays a mouse with no hand and finger attached allows you to modify the way Mac interprets its movements.





As delivered, the 1 button will usually be selected as the appropriate mouse speed. When you move the mouse at low speeds, the pointer follows at a constant rate. But when you speed up the mouse movement, the pointer kicks into high gear and adds its own zip to help you zoom across the screen.

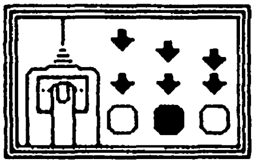
By clicking the 0 button you disable the high-gear feature. You can still move the mouse at high speeds, but the pointer will always move at the same rate relative to the motion of the mouse. It's a very useful feature for detail work in graphics programs.

Double-Click Speed

As long as we're talking about the mouse, you may as well try something we've mentioned but haven't practiced yet: double-clicking. Go up to the apple, open the Note Pad, and find some text. Pick a word, any word, and move the I-beam over any part of it. Click twice in rapid succession. You've just selected that word, as indicated by the way it changes to reverse.

If the word didn't change, the succession probably wasn't rapid enough. To prove it, move the I-beam to another word and try two slow clicks. With the first click, the insertion point moves; at the second, it stays put. Now try two *quick* clicks: the word should be selected.

Mac has to be able to discriminate between two clicks in rapid succession and two plain clicks in a row. As you can see, the controversy centers around the exact meaning of the word "rapid." For some it's best described as click-click. For others of a more sedate nature, it might well be click, click. And then there are those who dwell in the torpid depths of semiconsciousness. Click. Click.



Fortunately, no matter which category you fall into, Apple has tried to accommodate your individual style. Click anywhere on the Control Panel to make it the active window again. The "other" mouse display on the Control Panel, the one with the rodent perched beneath the poised finger, is your key to adjusting the double click. The distance separating each pair of arrows indicates the maximum wait Mac will accept between the first and second click and still assume you meant to double-click. The further apart the arrows, the longer Mac will give you to complete the second in the series.

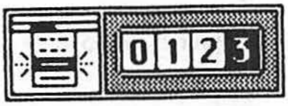
The middle choice is the one Mac starts you out with, and it's not as long a duration as you might think. Until you get used to double-clicking, you may want to use the longest delay, but later on you may find the time interval so long, relatively, that it causes problems when you intend two separate clicks. And the short delay may be a little more than you can master when you're starting out. Try them and see; the Control Panel's always there to do your bidding.

The Neon Effect

The display near the upper right-hand corner of the Control Panel may baffle you—a strange set of lines and arrows and options ranging from 0 to 3. Look closer: those lines and arrows are a graphic representation of a familiar friend, the pull-down menu.

You may not have noticed, but whenever you move up to the menu bar, press one of the menu choices, and select an option from the pull-down menu, that option flashes just before it goes into effect. It's like a little neon display.

Unbelievable as it seems, Mac actually lets you control how many times the option will flash before it takes effect. Click 0 and there will be no flashing



whatsoever. Clicking 3, on the other hand, will make the option you've selected flash three times.

You can try out the various effects simply by clicking the numbers and then calling up an option from the apple menu. The most obvious point is this: the longer the option flashes, the longer it will take before you can start doing what you want to do. If you're an impatient type, you'll probably have it set to 0 within a day or two.

Keyboard Repeat

Mac's keyboard offers a feature IBM calls "Typematic" and the rest of the world knows simply as *repeat.* When you press a key, it will keep repeating its function until you release it.

Two separate time delays are involved. First, Mac must decide that you're really holding a key down and want it to repeat rather than just pressing it to get a single character. Then Mac must decide how quickly to repeat the character.

The top row of the Control Panel's keyboard display selects the repeat speed for a key pressed and held. The folks at Apple don't seem to have read the old fable all the way through to the end: clicking toward the turtle decreases the repeat speed (0 defeating repeat entirely), while clicking toward the rabbit turbocharges it.

The bottom row of the display modifies the time it takes before Mac begins to repeat after you press and hold the key. If you click toward the left-hand finger, it will take Mac longer to decide you want to repeat (0 again defeating the feature). If you click toward the finger holding the key down, you progressively shorten the lag between down and repeat.

You can give the settings a rudimentary trial by changing them and holding down a key. Mac's chime tone will begin repeating rapidly or slowly depending on what you've chosen. The default settings your Mac arrives with are usually around the middle values. They're reasonable. Try them full forward if you like, check the chimes, and if you like what you hear, test the results in the Note Pad. But don't be surprised if you have to back the setting down before it becomes comfortable.

Repeating a Warning

Mac doesn't do things in exactly the same way as other computers. And that concept goes a bit deeper than just the way things look.

When you use the Control Panel and reset its features, Mac acts on them immediately, storing everything but the desktop pattern in the RAM area of the clock chip. This makes it impervious to harm as long as a working battery is in the machine.

The desktop pattern is temporarily stored in memory and changed on the screen, but if you want to use it after you turn Mac off and on again, it must be saved to your disk. Mac doesn't necessarily do this immediately. When you change information about icon positions, window sizes, and the like, Mac doesn't store this information on the disk until it's good and ready. Typically, that might not be until you run an application or eject a disk.

If you use MacTool or reset the machine or you turn it off before ejecting the disk with the option available from the File menu, there's no telling which, if any, changes you've made will still be there the next time.

That may seem insignificant when all you're thinking about is the Control Panel settings, but soon you'll be doing fancy and useful things with files and folders and other important items. They follow the same rules. It's no trifling matter when all of the work you've done goes down the drain because you've neglected to follow Mac's official procedures.

So even though Apple likes to think of Mac as an "appliance," don't treat its on/off switch as if it were attached to an iron or a blender. *Always* eject all disks before turning off or resetting your Mac. Otherwise your disks and the information on them may just get scorched or pureed.

The Puzzle

If you didn't have a healthy respect for Mac's engineering before, you should by now. Most computers just put things in front of you and force you to take them as they are. Mac lets you work *your* way. But it also lets you play.

Move back to the apple icon once more to drag out the Puzzle. It's nothing stupendous. It's been around for years in various forms and has recently been spotted dangling at the end of key chains.

Solving it is simple. All you have to do is rearrange the numbers into

ascending order. To move the numbered "tiles," just click a numbered tile in the same row or column as the shaded "empty space." The tiles will "slide," and the space you clicked will become the empty one. The method allows you to move up to three tiles at one click.

When you finally get the tiles in the right order (the empty space must finish in the lower right-hand corner), the Puzzle will flash and Mac's tone will sound.

To try another one, go back to the apple icon and drag it out again. Every time you do, the numbers are scrambled, with the new Puzzle replacing the old. You can interrupt the Puzzle in mid-game by making another window active, but once you hit the Puzzle's close box, or drag out a new Puzzle, the old one vanishes for good.

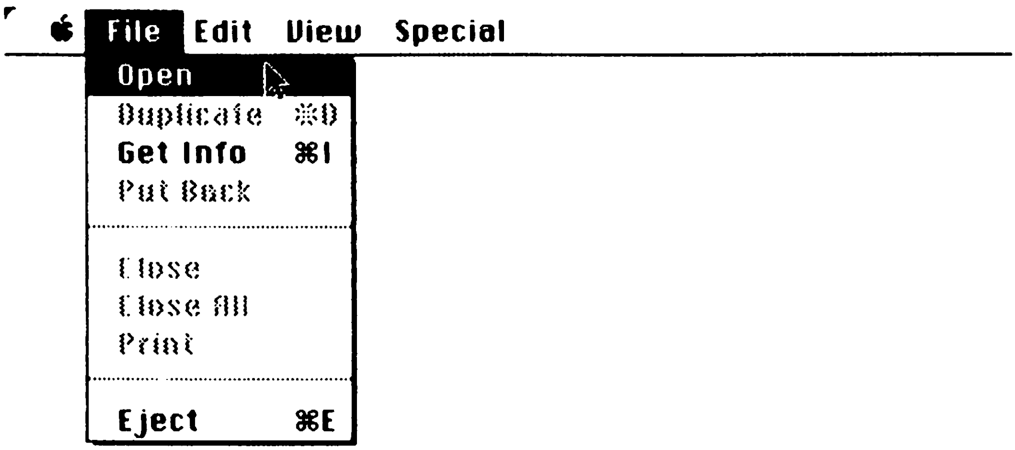
7

AROUND DESK AND DISK

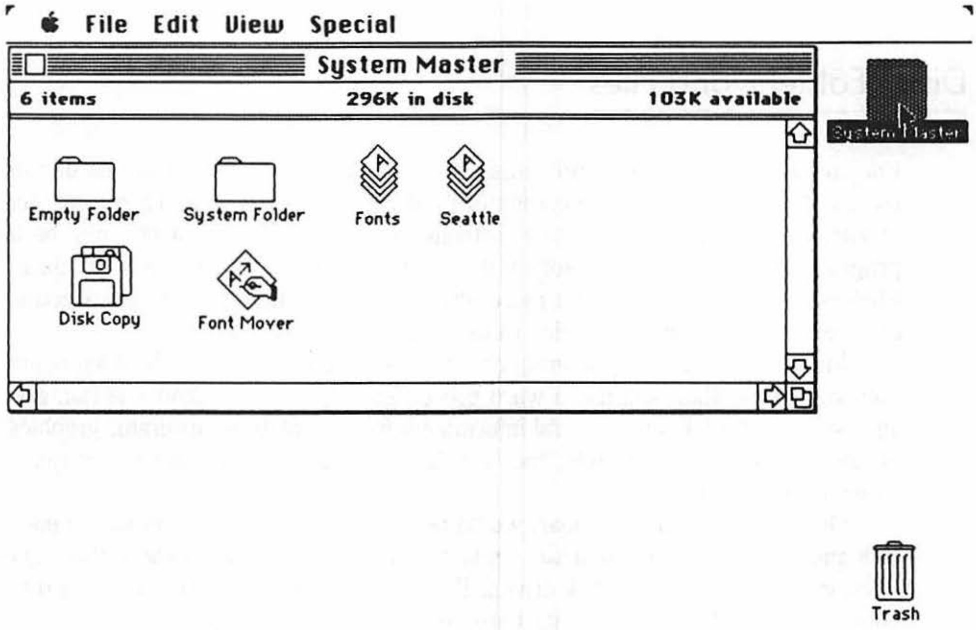
The opening scene Macintosh displays whenever you boot a disk may be tranquil, but there's a lot more beneath the surface than meets the eye. As we discussed in the last chapter, the disk icon in the upper right-hand corner is an object. As such, it may have contents. You've waited a good long while. It's time to open it up and see what's inside.

Opening an Icon

If you're using only the internal drive, the *startup disk* (the one used to boot Macintosh) always appears selected at the outset. Mac presumes you're going to do something to it or with it and shortens the process you'd go through by one step. Once selected, there are two ways to open it.



One way to do it is to pull down the File menu, drag to *Open*, and release when it inverts. But there's an easier way: simply move to the disk icon itself and double-click it. Even if the disk icon—or any other icon—*isn't* selected, those two clicks in rapid succession will open it.



The System Mast

The window itself won't present any surprises. It has a title bar, close box, scroll bars, and a size box. It's an amalgamation of every feature you've seen so far. And then some: just below the title bar you'll see the disk's vital statistics. It shows the number of individual things you have on the disk, the amount of room they occupy (expressed in thousands of bytes), and the amount of space you have remaining on the disk for additional material.

The individual things, at the moment, are represented by icons. Two are folders: the *System Folder* and the *Empty Folder*. One is a double-disk icon called *Disk Copy*. Then there are a strange hand-and-paper image labeled *Font Mover* and two stacks of paper labeled *Fonts* and *Seattle*. The letter *A* appears on each of these icons—a subtle hint, as you'll see, that they're related to each other—and to Font Mover.

There's no guarantee that the contents of your disk will be the same. The *System Disk* Apple originally supplied with Macintosh didn't include Fonts, Seattle, or Disk Copy. Disks upgraded by dealers may include, among other things, a program called *Disk Utility* which, in the hands of the novice, offers virtually unlimited potential for ruining a disk; if you've got it and you aren't *very* savvy about the workings of computers, we suggest transferring it to a disk that you don't use regularly or ever.

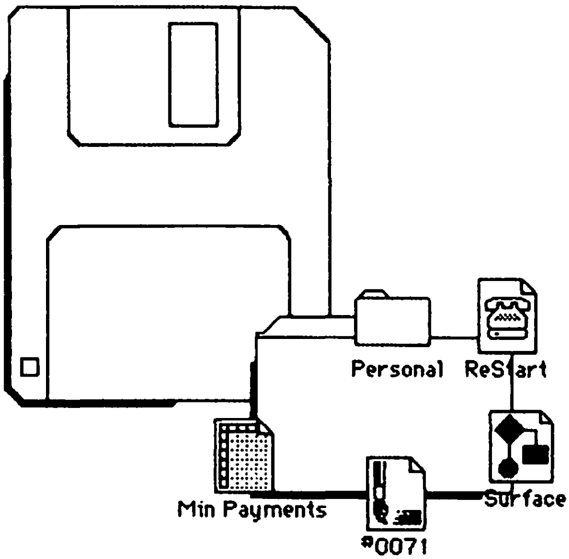
The windows shown in our examples, therefore, may well be inconsistent with what you see on your screen. However, all *System Disks* will definitely have at least two things in common: the Empty Folder and the System Folder.

Disks, Folders, and Files

Each of the icons you see represents a *file* or a *folder.* A file is simply one unit of collected information. Since a computer program can be considered a special unit of information—special because it actually "does something"—a file may be a program. Or it may be some sort of document: a story, a picture, or a database. Folders can be single files. But more often, you'll use them to store a collection of other files and folders in order to keep your disk organized.

Most information can be grouped into categories. There are the documents you work with when you use a word processor; those arising from the numeric analysis of spreadsheets; general information from a database program; graphics documents; and so on. All told, they can fill up a disk's display window and cause a confusing panorama.

One way to keep them apart would be to store only one type of file on each disk and use it as the need arises. In fact, you're highly likely to adopt this very strategy with Mac's 400K disk drives. But when the disk capacity is increased to 800K or you add a large-capacity hard disk, it becomes impractical.

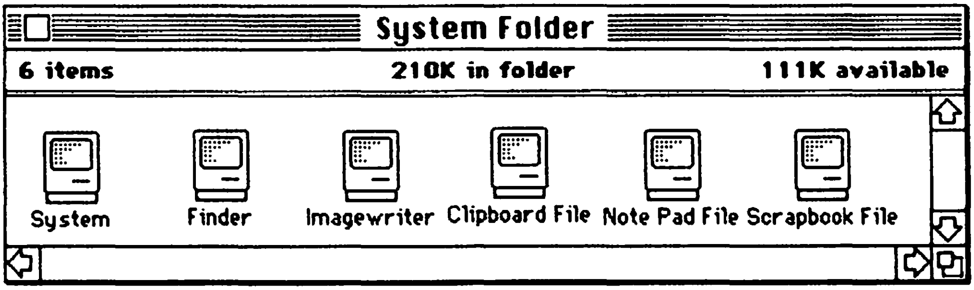


Another solution is to store the various files according to the groups they belong in. That's the reason for folders. You can store related files in one folder of their own, avoiding confusion. As mentioned earlier, you can even keep other folders in a folder.

For example, you might keep all your text files in a folder called Text. It could contain folders called Personal, Business, Love, or whatever descriptive titles seemed appropriate. They, in turn, would hold individual document files relevant to the folder's subject.

The System Folder

Let's have a look inside the System Folder. Move to it and double-click. Another display window opens, complete with the same sort of information as the first. It's full of little Macs.



The little Macs actually represent files. In this case, as the name of the folder implies, they're files used exclusively by Mac for its internal operations. No other programs are associated with them.

At least four should be familiar to you by now. The Scrapbook file and Note Pad file are disk files where Mac keeps the respective information. While you are using the Clipboard, Mac keeps its contents in a temporary file in RAM memory, but at least with current versions of Finder, Mac never saves Clipboard contents to disk: they're gone when you turn off the machine. In a future upgrade of Finder, you may well find a more permanent Clipboard; the potential is there.

The Imagewriter File

The file labeled *Imagewriter* is a special case. Mac's display works totally with graphics, and printers need complicated sets of instructions to print graphics. The Imagewriter file contains those instructions, but as you might expect, they work only with the Imagewriter printer. In the future, similar files should be available to send Mac screens to other printers.

The System File

You've already met the Finder, so that leaves one more: the System file. Whereas the Finder mainly controls disk procedures and arrangement, the System file provides the instructions Mac needs to keep its own thoughts (and yours) from getting confused.

System has more, too, including the system messages you see in the alert and dialog boxes and the Control Panel and other desktop accessories you saw under the apple icon. Because of this, Mac needs frequent access to the System files, which is why you'll want to have two disk drives or work primarily with disks that include these files.

One advantage of making this information available on disk is that it lets Apple develop foreign-language versions of Mac in a hurry. It also means that program developers can rely on consistent formats for error messages. And it means that should Apple decide to upgrade the desk accessories or anything else in the System Folder, all you'll need is a new disk.

There are other advantages as well. As we've seen, the keyboard is partially defined by its own electronics and partially by Mac itself. The table that translates the codes the keyboard sends to Mac resides in the System file, which gives developers a large degree of flexibility when they need to change the keyboard layout. That's a bonus for foreign keyboards (which tend to be designed somewhat differently from ours), but it can come in handy in the good old U.S.A., too.

Sholes vs. Dvorak

Almost all the keyboards Americans use follow a general design that dates back to the early days of the typewriter. This QWERTY layout, known as the "Sholes" keyboard for the man who invented it, was implemented because early typewriters could not keep up with typical typing speeds. It was designed to slow the typist down and prevent the machines from jamming. It worked, too. By placing the most frequently used keys in odd places, typewriter manufacturers no longer had to worry about disgruntled customers. But computers don't use mechanical keyboards anymore, so the jamming problem no longer exists.

Even before the computer age, a gentleman named Dvorak tried to remedy the situation. He studied the most frequently used letters and designed a keyboard, known as the Dvorak layout, that placed them in positions more likely to produce speed and accuracy.

Trying to change something that's been ground into the typing populace since preelectronic times is very difficult. Until recently, the Dvorak layout had very poor footing. Only in the last year has its design gained in popularity. Apple has even gone so far as to provide it as an easily accessible built-in option on the Apple //c. Although it may not become *the* standard, it's developing enough interest to warrant serious consideration.

This being the case, it's nice to discover that Mac's keyboard is composed of *soft keys* that are electronically redefinable. By modifying the translation table in System, any keyboard design is possible, including foreign and scientific schemes. By keeping the various system files on disk under different names, it would even be possible to alternate between two or more designs. So if Dvorak or something even better takes off, Mac is ready.

Fonts of All Wisdom

Many of the programs you'll be using will allow you to assign different typefaces, or fonts, to the characters you see on the screen. Font *styles* can modify those fonts with boldfacing, shadows, italics, and other special effects.

Chicago plain, 12 pt.
Chicago bold, 12 pt.

Athens outline, 18 pt.

Athens italic, 18 pt.

Seattle underline, 10 pt.

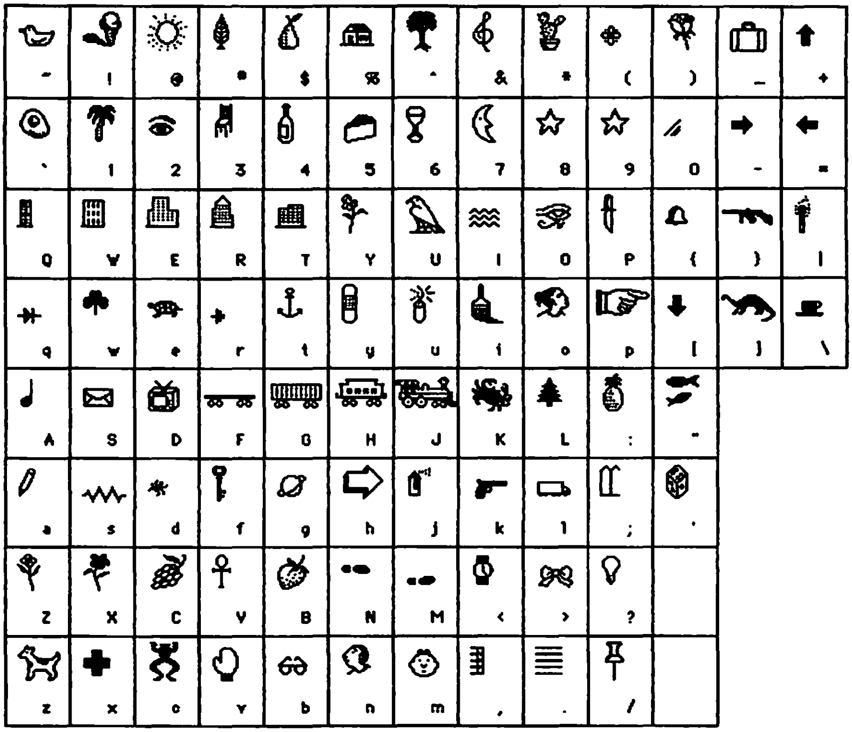
Los Angeles shadow, 24 pt.

When you first take Mac home, the temptation to play with all of those different fonts is irresistible. There has never been a computer that let you do it as simply or easily.

If you put $20.00 in a brown bag next to Macintosh, I'll remove San Francisco. Don't call the cops!

the Font Mover

But as your experience increases, you'll find that you really have no need for many of them. Some of them, like the font called San Francisco, are just not necessary for anything except perhaps ransom notes.



Font Cairo

Others, like Cairo, are suited primarily for graphics applications. And if you're not going to use them, you'll want to put them out of the way—for a very good reason.

When the original *System Disk* was released, its System file contained *all* Mac's fonts. They added 130,485 bytes to the space System needed on your disk, leaving very little room for much else. With the new release (1.1g), almost 56,000 bytes of font information were removed from System and placed in a separate file called *Fonts*. A second Fonts file, called Seattle, holds a special font that's needed by an application called *Multiplan*.

When you're working with an application, whether it be *Multiplan* or *MacWrite*, you can't use a font unless it's part of the System file. Just having it on a disk in a Fonts file doesn't count. The utility called Font Mover is what lets you move fonts to and from the System file as you need them.

But you may be doing a lot of moving *from*. Fonts have an uncanny way of absorbing disk space at an alarming rate. The Fonts file is 55,505 bytes long, the Seattle file is 9,062, and the fonts in use take up 74,630 in the System file. Taken together, they eat up 139,197 bytes of precious disk space—more than a third of the disk. To gain more of that space—you will soon discover how precious it really is—you can remove both the Fonts and Seattle files and some of the unnecessary fonts in the System file. Then you can even remove the Font Mover application and pick up an extra 12,800 bytes of disk space.

Taking fonts from the System file is a relatively easy procedure, and it is totally reversible as long as you're reasonably careful. And you're going to do it in a minute or two. But first, you need a little information.

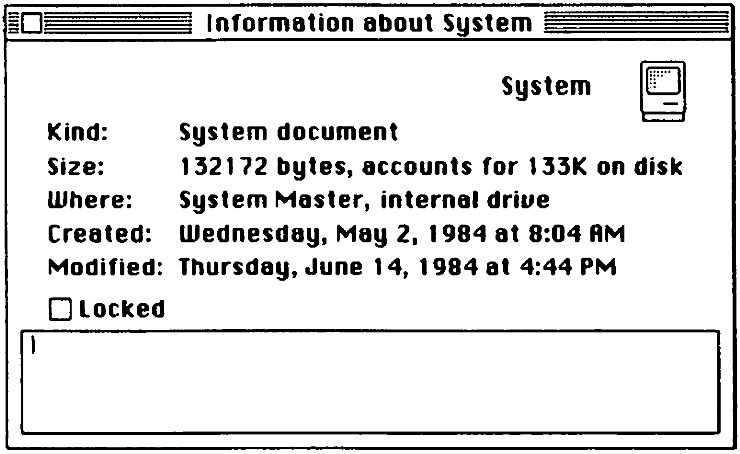
Make sure the System Folder is the active window and the System file is selected. If it isn't, just move over and click it. Once that's done, move up to File on the menu bar, press it open, and drag until the words *Get Info* are highlighted. Then release the mouse button.

Getting Info

The new window capsulizes all of the information Mac has about the item you selected—in this case, System. It tells you what its name is and what its icon looks like. You can see when it was created and when it was last modified or copied. You also can confirm that it exists on your System Master disk in the internal drive.

For what you're about to do, it's important that you notice the size of the file. In this case it's 132,172 bytes; your own file may not match, but it should still be sizable. That file alone occupies almost one-third of your total available disk space—quite a load indeed.

Two things may pique your curiosity. One is the small box with the word



Locked beside it. The other is the open expanse at the bottom of the display with the blinking insertion point inside it.

The mere presence of that insertion point tells you something about that open space. It's a text area, or more correctly, a memo area. Mac will let you record comments or observations there. You might later, for instance, enter the names of the fonts you've removed from System. The notes will be stored on the disk (and can be changed whenever you see fit), so you'll be able to Get Info about what's special about your modified version of System whenever you like.

Just above the display's memo area you'll notice the box beside the word Locked is empty. This is the file's *status box.* It's a software equivalent of the disk's write protect/enable tab.

As it appears now, you can tell that the System file is unlocked and can be modified and copied. Were you to move the pointer to that box and click, you'd place an "X" inside it, effectively preventing the file from being modified—much the way write-protecting a disk protects the disk. One difference, though: locking a file also prevents it from being copied, except (as we'll see later) with Disk Copy. Since you are going to make some changes to the file, make sure it's not locked.

If you'd like to label this file now, just start typing. Mac will automatically direct your keyboard activity into the memo area. When you're done, close the Get Info window and the System Folder window.

The Empty Folder

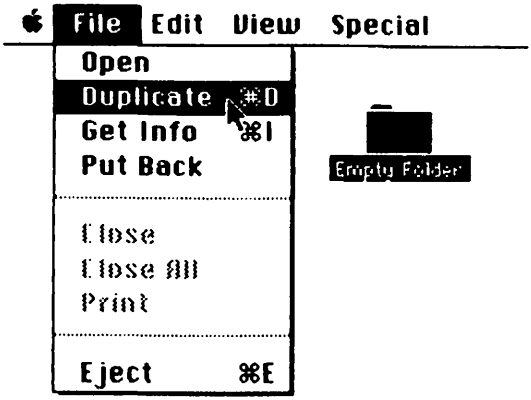
Now that you've cleaned up the desktop a little, let's see what's available. Of primary interest are two things. One is a program called Font Mover; the other is a folder labeled Empty Folder. The former is the one you'll be using to modify the System file. But why would Mac keep an empty folder on its desk? (If you don't believe it's really empty, move to it and double-click. Once your curiosity has been satisfied, close the window.)

The answer is simple. Because Mac is the Felix Unger of the computer world, it strives for order and neatness. It knows that when you want to put something somewhere, you may want a folder to put it into. To do that, it provides you with an empty one.

Almost. Mac actually expects you to make a copy of the empty folder so there will always be a spare lying around. You may as well give it a try.

Duplicating a Folder

First select the Empty Folder by moving to it and clicking. Then move to File on the menu bar and drag to *Duplicate*. Release the mouse and sit back.



True to its unspoken promise, Mac has duplicated the folder, presenting you with another to use. Notice that the words "Copy of" were appended to the front of the folder's name. That's one of Mac's little peccadillos. Were you now to duplicate the copy you just made, the new folder would be called "Copy of Copy of Empty Folder." If you kept on duplicating, Mac would stick "Copy of" on the front of each successive copy you made: "Copy of Copy of Copy of Empty Folder" can get a bit unwieldy.

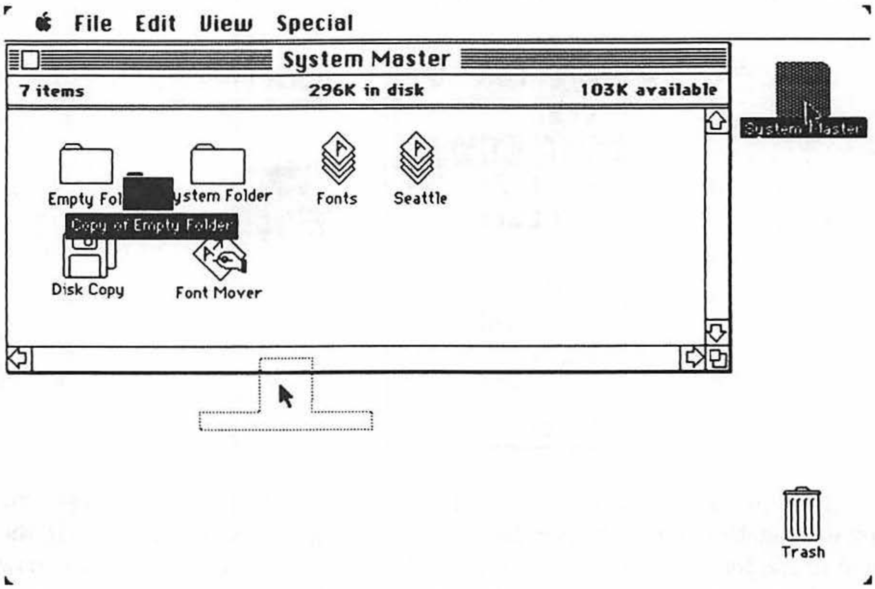
Note, by the way, that Mac places the duplicate folder to the right of the original and slightly below it on the desktop. If your original folder, icon, or whatever is close to the bottom of the window, you may not be able to see the duplicate. Your only visual cue that the duplication has occurred is that the original folder will revert to an unselected state.

Should that happen to you, just use the size box to increase the dimensions of the window. Your new "Copy of" should be visible, and you can drag it wherever you find it convenient. But always make sure you don't let one icon hide another. Allowing that to happen can lead to confusion and potential trouble.

Duplicate should be used frugally. It's designed for creating different versions of the same document on one disk; it does *not* copy to a different disk. As a general rule, use the Duplicate option only on the Empty Folder or on a document you want an *extra* copy of, not on a document you want to transfer to another disk.

Changing a Folder's Name

You've made that Copy of Empty Folder to hold some font information. It's time to change that folder's name to reflect its function.



Dragging a folder from a window onto the desktop itself.

Move up to the Copy of the Empty Folder and press when the pointer is resting on it. Drag it right out the window and onto the desk itself. It's another way of avoiding overlap problems.

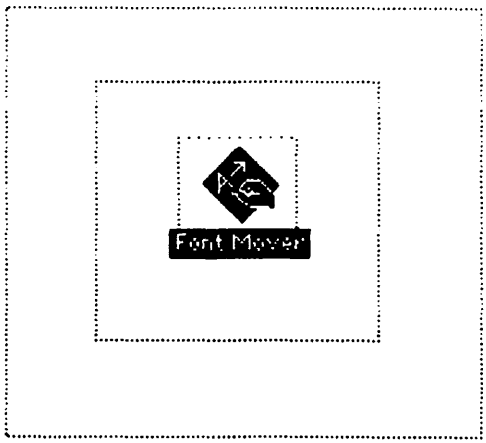
You could just start typing the new name. Let's use "Font Folder." As soon as you type the first capital F, the old name will disappear, and you'll see the insertion point. As you type, the name will neatly center itself. But there's another way that will save your typing fingers. To try it, you'll first need to hold down the Backspace key to erase all the letters you've typed. When the only thing you see below the folder is the insertion point, hit the Return key. The old name will magically reappear.

Now for some typing magic. Move to the first character in the folder's name, the *C* in *Copy*. As soon as the I-beam appears, press and slowly drag (the letters will invert) until you've just cleared the *y* in *Empty*. You may overshoot it or do some strange things before you get it right. If you do, just move the mouse back before you release the button or, if you've already released the button, go back to the *C* and start over.

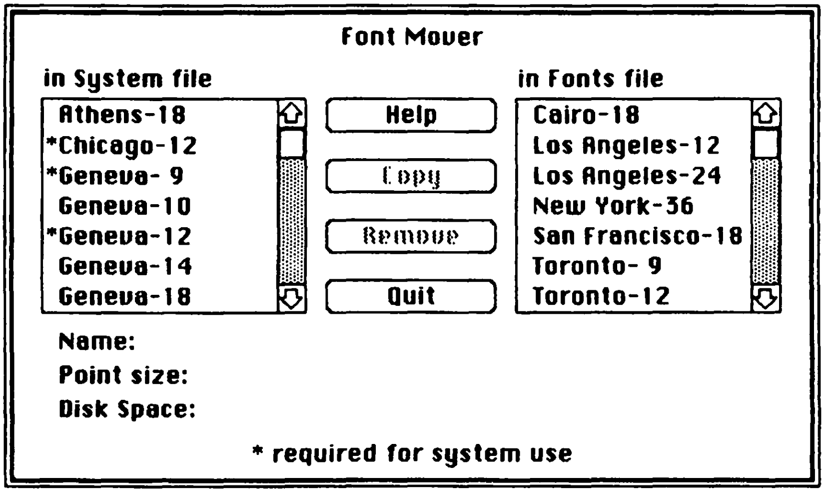
When you release the button, the insertion point will appear. Now, as you did with the Note Pad, just start typing. The selected text will disappear, and all you'll have to type is the word *Font*. When you're done, press the Return key or click on the desktop, and Mac will accept the folder's new name.

The Font Mover

Now turn your attention to the icon labeled Font Mover. This particular icon represents a program. You could click it and then move up to File, dragging until you reached the word *Open*. When you released the mouse there, you'd start the program running.



But by now you already know an easier way. Just move the pointer until it rests on top of the Font Mover icon and double-click. You'll see little square strobes as Mac goes to the disk, retrieves the program, and begins to run it. In a moment the screen will clear. In another moment, you'll see the Font Mover in action.



On the left side of the display are the fonts currently in the System file. On the right are those in the file labeled Fonts. Whenever you use Font Mover, the program looks at the disk for a file called Fonts—the default name used for the Mac file containing any additional character fonts. If Font Mover doesn't find such a file, the right side of the display will be blank.

When you move a font from the System file, it will either be added to an existing Fonts file or, if such a file is not already on the disk, to a new file with that name. You could later change the name of that file as you saw fit, just as Apple did with Seattle. After that, if you wanted to work with the new Fonts file, you could double-click the file itself instead of Font Mover.

What all that means, in practical terms, is that if you want to create a special file with a few particular fonts in them, it will require more than one step. First you have to make sure all the fonts for that file are already in System (and use Font Mover to bring them in from a Fonts file if they're not). If there's a Fonts file on the disk already, you'll have to copy it to another disk and discard it from the current disk. Then you'll be able to move the fonts to a new Fonts file, and remove them from the System file. Finally, you'll rename the new Fonts file. Fortunately, it's not something you'll need to do very often.

Font Types

You'll notice that some of the fonts are preceded by asterisks. As the legend at the bottom of the window explains, those fonts are "reserved for system use." You'll be able to *copy* them from the System file to another file (though we can't imagine why you'd want to), but you can't *remove* them to help System slim down.

Mac needs them. The Font Mover menu, for instance, uses Chicago-12 for the text, and Geneva-12 sees heavy use elsewhere. Were you to remove them, or either of the other two special fonts, havoc would result. The four files that Mac requires total 9,852 bytes.

The numbers alongside the font names are their various sizes. They express the height of the capital letters using a measurement called the *point*—a printer's unit of height generally agreed to be 1/72 of an inch. A font listed as 9 point will therefore be approximately ⅛ of an inch high, while one listed as 12 point will stand ⅙ of an inch tall. A 72-point font, of course, is 1 inch high.

Don't mistake *point* for the word *pitch*, which you may know about from typewriters. The pitch of a given font determines the *width* of each character and refers to the number of them that will fit into 1 inch of horizontal space. Typical pitches are 10, 12, and 16.7, which produce, across an 8 ½-inch sheet of paper, 80, 96, and 132 columns of characters with ¼-inch margins.

For printing to the screen with some applications (most notably *MacPaint*), Mac will do an excellent job with any font it has in the System file, in any of the sizes it has available. If the size you want doesn't exist, like a 14-pt. (short for point) Chicago, Mac will do its best to create it, using the closest size it does have as a pattern. It does a good job in some cases and a passable one in most others. Fortunately, you can see how good a job it's doing right in front of your nose.

If you direct Mac to send characters to the Imagewriter, a different rule of thumb applies. As with the screen, Mac will do a good job with any size it has in the System file. However, it will achieve better print quality if it also has the same font in twice the size you selected.

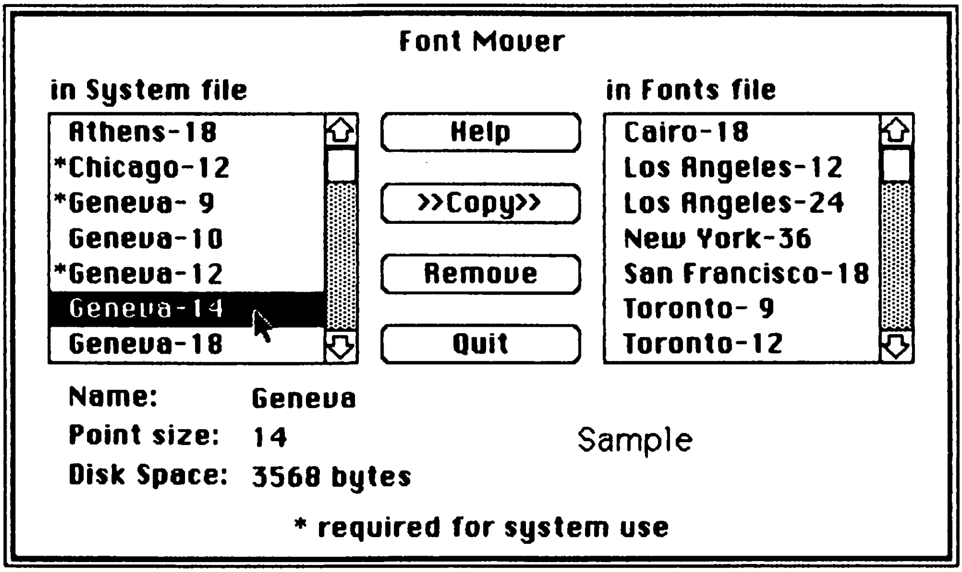
For instance, if you want to print a 12-pt. New York, you'll get a good reproduction if you've got the 12-pt. version in the System file, but an excellent reproduction if Mac has a 24-pt. New York to scale down for the printer. Printing sizes not in the System file must be created by Mac and are passable at best.

Most of the material you print will probably look best in 10- (or 9 where 10 is unavailable) and 12-pt. sizes. For your use, therefore, you'll need the original

10- (or 9) and 12-pt. versions of any of the fonts you want. Wherever possible, the complementary 18-, 20-, and 24-pt. sizes, which will give you optimum reproduction quality on the Imagewriter, are also desirable.

Fontology

Now it's time to sample the fonts to see which ones suit you and which ones don't. Try Geneva-14. Click it. The pointer doesn't need to be on top of the name; the same horizontal line will do.



The font's name inverts to show that it's been selected, and some "greater than" signs appear on each side of the word Copy. It now reads ">>Copy>>." Mac is showing you the direction in which a copy of this particular font would go. Since it's on the "in System file" side of the display, you can only copy it over to the "in Fonts file."

The bottom of the display has also altered. It's become an information source. Mac has listed the name, size, and the amount of disk space this particular font occupies. Further toward the right, the word *Sample* is written using the actual font and size you've selected.

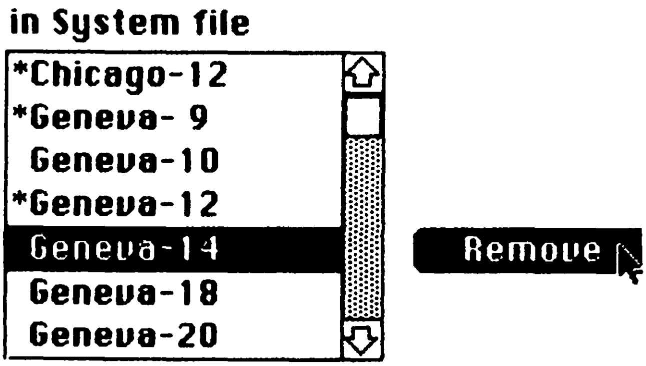
Learn some more about fonts. Use the scroll bars to look through both lists, clicking as you go to see the samples appear on your screen. Cairo, Mac's pictorial font, may be particularly amusing, San Francisco rather appalling. When you've seen enough, get ready for action.

Removing the Fonts

There are two ways to remove a font from the System file. The first is to Copy it, which will place a duplicate in either the existing or new Fonts file. Once this duplicate has been made, you can then Remove it. Or you can just Remove it. But don't take that option lightly.

Mac doesn't wait for you to confirm your choice. If you click Remove, the font is gone. Just like that. If you don't have another copy to replace it, it's gone forever. Well, not forever. You can always find it on the original *System Disk* you've tucked away for archival purposes. Or you can bend the ear of a sympathetic dealer.

So >>Copy>> should usually be your first choice. When you click it, nothing will happen for a second. Then the nefarious wristwatch will appear, and shortly thereafter a copy of the font's name will move to the right side of the display, either in alphabetic order among the others or on its own. On the left side, your original font choice will remain inverted. Then you can safely Remove it. And be sure to. Otherwise, you just have a bloated Fonts file and won't have accomplished the System file's intended weight-loss program.

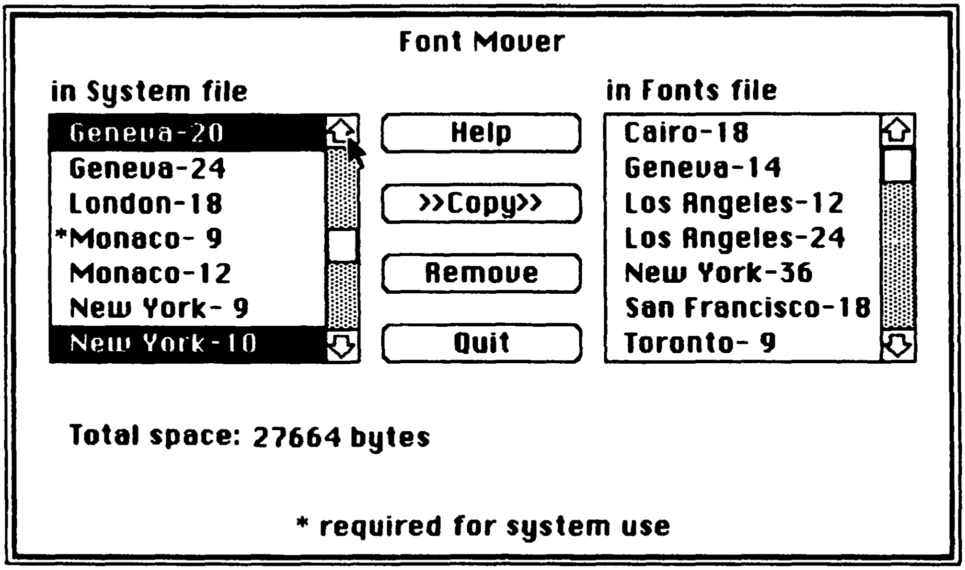


You may want to take notes as you go along, so that you can keep track of what you've done. But you'll have to use paper and some writing implement: as the lack of any options on the menu bar signifies, there's no way to get at Mac's Note Pad while you're using Font Mover.

Now actually use it. Get rid of the fonts you like least, keeping the various printing size requirements in mind as you do. You can drag through names to select more than one at a time. But what if the fonts you want to copy aren't next to each other?

Shift-Clicking

It's time you learned about Shift-clicking. Select a single font by clicking it. Now move to a second. This time, hold down either Shift key before you click. The first font you selected will remain inverted and the second, and any succeeding fonts, will invert as well. The technique is called Shift-clicking. It's a way to select more than one separated item.



Note that when you choose more than one font at a time, the bottom of the Font Mover display won't attempt to print samples. Instead, it will give you a cumulative total of the disk space occupied by the fonts you've selected.

If you run into any problems and don't happen to have this book handy, use the Help button at the top of the display. It covers many of the points you've just read and makes a good refresher.

If you make a mistake in transferring a font from the System to the Fonts file, just copy it back in the other direction. When you click a font in the Fonts file, you'll notice that the arrows on the Copy button change direction.

When you've got the two files the way you want them, it's time to use the Quit button. Quit stops and exits from the Font Mover program. It also initiates the actual font swaps; until now, they've just been theoretical.

Depending on how many fonts you've moved, it can take from about fifteen seconds to more than a minute for Mac to rearrange the System file and transfer the selected materials to the new Fonts file. A dialog box will appear, telling you about it.

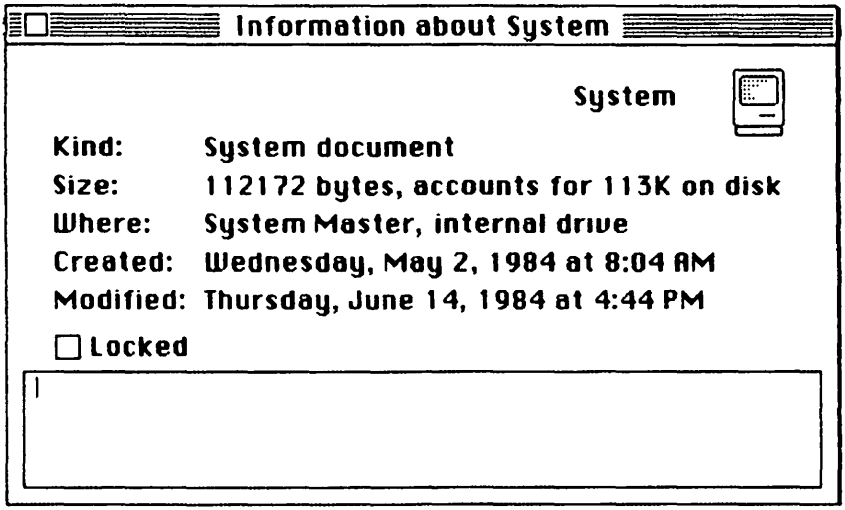
A Mild Warning

You might see another dialog box. It will, in very perfunctory language, tell you that Mac does not have enough memory to accommodate the transfers and removals you've asked for. This should happen with the same frequency as the appearance of the Loch Ness monster: unexpectedly, but at rare intervals.

It's most likely to happen when you leave a huge image in the Clipboard, keep lots of things open on your desktop, and in general overload poor Mac's brain. If you do see such a message, you'll have to do your font work all over again. If your desk is a mess, neaten it up before proceeding. If not and you're planning to move a lot of fonts, break the process up into two or more steps.

Checking the System

Once the Font Mover has done its work, open the System Folder again and select the System file. Move up to File and drag out Get Info, just as you did before.



Depending on how many fonts you actually removed, you should notice anything from a small to a significant difference in the size of the file. You might want to note in the memo area which fonts are left, or which ones you've removed. When you're done, close the Get Info box, select Fonts, Get Info on it, and add whatever notes you find appropriate.

Moving Files and Folders

If you hadn't removed any fonts and only transferred them, there would be no change in the System file's size. In fact, you would be in worse straits than before. You'd then have a file full of fonts in addition to the System file occupying space on your disk.

Even if you did remove the fonts, your predicament hasn't really changed. While the System file has been reduced, the size of the newly created Fonts file is equal to what was removed. Your net increase in disk space is zero. The only way to reclaim the disk space is to get rid of the Fonts file.

Of course, you don't really want to throw it away. Had that been your actual intention, you could have just saved yourself all the trouble and simply removed the fonts in the first place.

How about putting them somewhere else? How about making a Fonts disk that will get rid of the mostly useless Seattle file while you're at it?

Filling the Fonts Folder

Let's stop and think about what the entire process will require. You want to transfer the Fonts and Seattle files to another disk. Since you'll be using that disk whenever you want to work with fonts again, you may as well transfer the Font Mover, too. Every little bit of space helps.

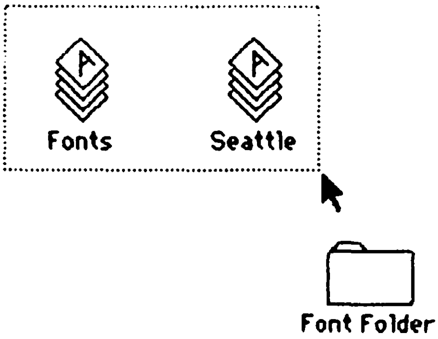
There are lots of ways to do this, but let's start by shifting a few things around. First you're going to take the Font Mover, Fonts, and Seattle files and place them inside the Font Folder you made. In the real world such an operation requires that you open the folder first. And in the Mac world you *can* open the folder first, just as you opened the System Folder. All you'd then do is drag the relevant icons from one window to the other.

But Mac is something of a mind reader in these matters and is willing to let you put one thing inside another (if it's possible) just by placing one icon on top of the other. In this case, all you really need to do is place the file icon on top of the folder icon, and Mac will put it inside.

You could just move to the icons involved, pressing and dragging each one of them individually, but by now you're sophisticated enough to move all three at once. Obviously, you'll need to get them all into a simultaneously selected state. And to do that, you could go to the first icon, click it, and then Shift-click the other two. But, as Mac keeps letting us say, there's an easier way.

Selecting Multiple Icons

The key to this one is that the icons you're selecting must be vertically or horizontally adjacent. Two that qualify are the Seattle and Fonts icons. Picture them as forming a square or rectangle. Then move the pointer to one corner of your imaginary four-sided figure, press and drag (diagonally is fastest) to the opposite corner.



As you do this, a "real" dotted rectangle will appear on the screen, growing as the pointer moves. When you've encompassed all of the icons you want to select (in this case Seattle and Fonts), release the mouse. Everything inside the dotted box will invert. It's as easy as that.

But you want to select Font Mover, too. Go ahead and Shift-click it. Now you've got all three icons selected. What remains is to move them.

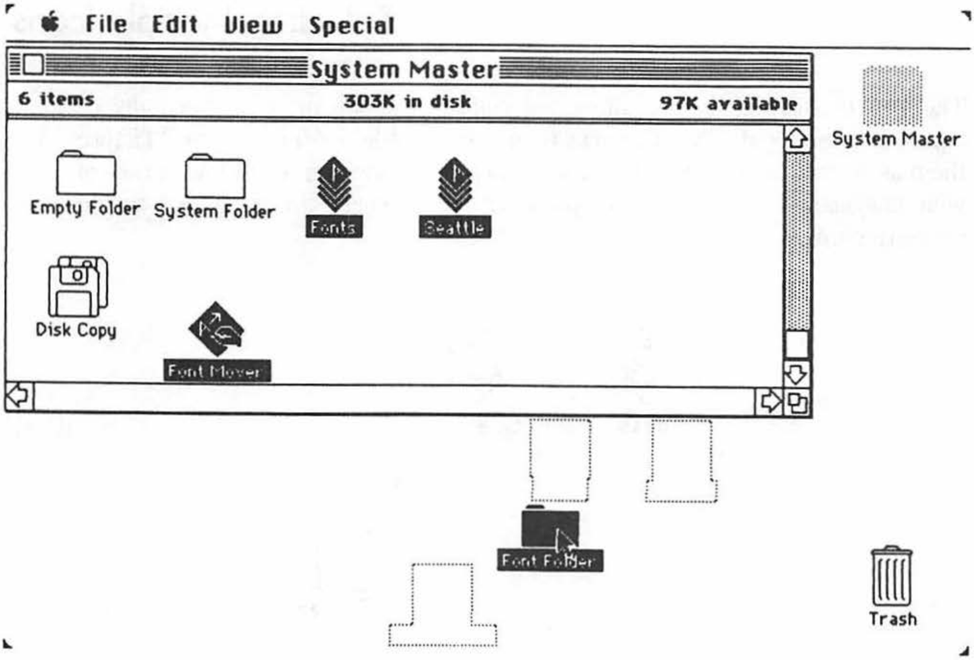
The Multiplied Drag

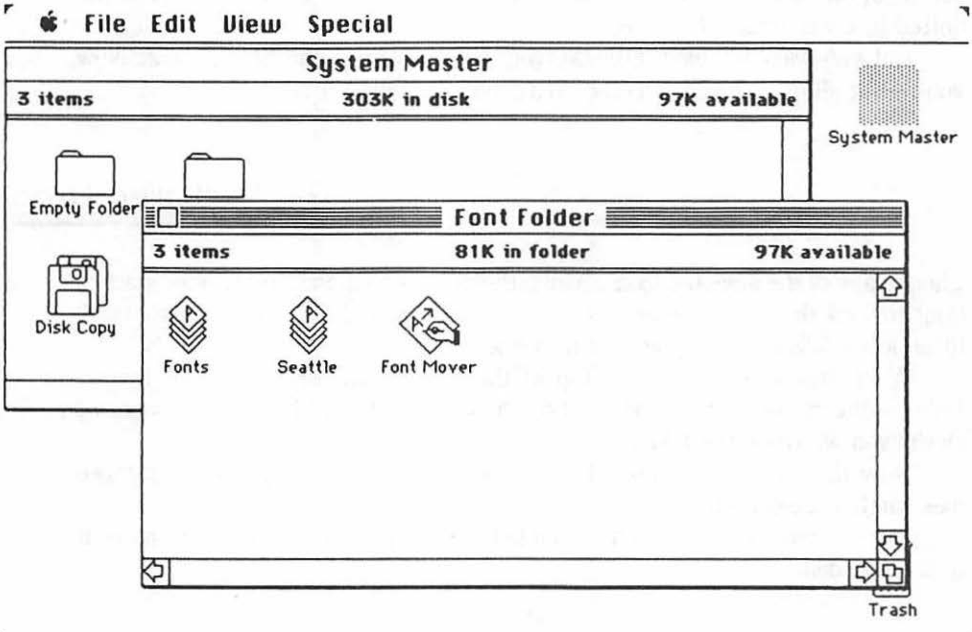
Choose any of the selected icons. Move the pointer to it and press. Now start to drag toward the Font Folder. As you do, you'll see the dotted outlines of all three icons following the pointer's movement.

When the pointer rests on top of the folder icon, the folder will invert. Release the mouse button and all three file icons will vanish from the window, swallowed whole by the folder.

Now double-click the Font Folder. When it opens, you'll see your three files safely tucked inside.

You've created a folder and stored things in it. All that remains is to move it to another disk.


File Edit View Special
System Master
6 items
303K in disk
97K available
System Master
Empty Folder
System Folder
Fonts
Seattle
Disk Copy
Font Mover
Font Folder
Trash


File Edit View Special
System Master
3 items
303K in disk
97K available
System Master
Empty Folder
Disk Copy
Font Folder
3 items
81K in folder
97K available
Fonts
Seattle
Font Mover
Trash

Data Disks vs. System Disks

Disks can be divided into two major categories. You've already seen the first: a system, or boot, disk. Any disk with the System and Finder files on it can be used to boot the computer. Your original *System Disk* and the copy made of it are examples.

Click the System Folder and Get Info about it. You'll see that it occupies 208,000 bytes—more than half of a 400K disk. That's wasteful. And avoiding that waste is the reason for data disks.

They begin life just like any other disks, but they don't include the system files, and you can't use them to start Mac. But they have one big benefit: copious room for information.

Clearing Up the Environment

Close the Info box. Now make sure the Font Folder is on the desktop itself, and *not* in the disk's window. It doesn't matter exactly where you put it; just make sure it's out of the display window and on the desktop itself. Drag it if you have to.

Then move up to the close box on the disk's display window and close it. Your desktop should now be clear, with the exception of the Font Folder, the Trash Bin, and the inverted disk icon. Move up to File, drag its menu out, and Eject the disk unless you have an external drive.

Now you need a blank disk. If you ignored the advice in the early part of this book and didn't buy any, or you're fresh out, go beg, borrow, or buy one. Be sure it's *not* write-protected: you should be able to see the red tab from the front. Insert it in the drive.

If you have an external drive, you can use it instead. If a disk is already inside, you can eject it by selecting its icon and performing the same Eject procedure. Put the blank disk in when the space is available.

You'll get the standard message that this new disk is unreadable. Tell Mac you want to initialize it by clicking the appropriate button. When it's done, call it Fonts Disk.

Moving the Folder

Here's the scene. Your desktop is now bare but for the Font Folder icon. On the right is the icon for your System Master, appropriately gray to signify its absence from the drive (unless you're using an external unit as well). Also, there is the icon for the new Fonts Disk, suitably black, indicating that it's selected.

Move to, press, and drag the Font Folder icon. Take it up to the icon of the Fonts Disk, in the same general way you originally put the fonts files into the folder. When the pointer comes into contact with the Fonts Disk icon and it inverts, release the mouse button.

Just as when you copied the *System Disk*, you'll be shown how many files remain to be copied. If all you're using is the internal drive, you'll also be prompted to swap the System Master and Fonts Disk periodically as the need arises.

The odds are good that by the time you're done, you'll have the System Master disk in the internal drive. If, for some strange reason, the System Master is not in the internal drive, eject the current resident and insert the System Master.

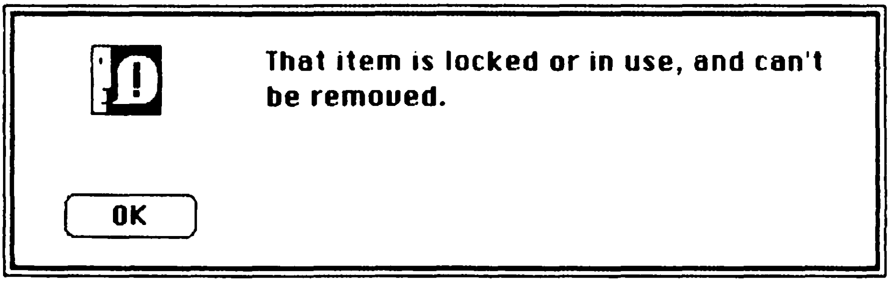
Now double-click the System Master's icon. Its window will appear.

The Trash Icon

You've copied the files. They are safely tucked away on a separate disk. Then why do you get this sinking feeling that nothing has really changed? It's probably because nothing really has. Right there on your desktop is the Font Folder. You copied it, but you didn't remove it. You still don't have any more disk space than you had before.

You've seen that Trash Can lurking in the lower right-hand corner of your desktop. Now you're going to get a chance to use it.

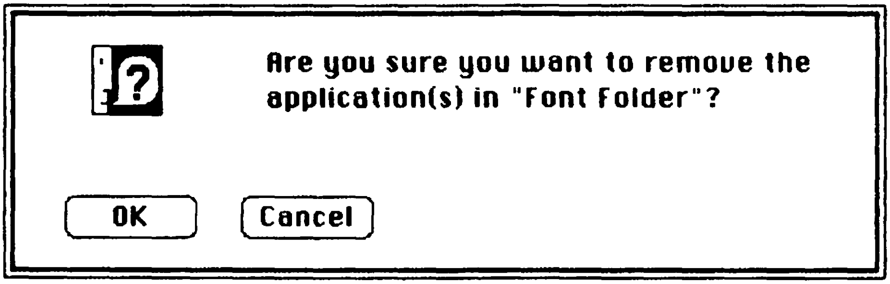
You can't crumple the folder and try for a shot from five feet out, but you can drag the Font Folder over to the Trash Can. Do it. You may have to do a little sliding around, but when the Trash icon inverts, you know you're in the right place to release the button.



Surprise! If your Font Mover comes the way ours did, a dialog box will inform you that you can't toss that folder out after all. It stays right where it was.

What's wrong? Double-click the Font Folder open. Then select Font Mover (careful: one click only if you don't want a long wait) and Get Info from the File menu. There's the problem. Font Mover is locked. Unlock it by clicking the Lock box.

Close the Get Info box and the Font Mover window. Then drag the Font Folder to the Trash. Once again, release the mouse button when the Trash icon inverts.



The folder icon jumps back to its original position. Immediately an alert box appears on the screen, asking you to confirm that you really want to throw away Font Folder. Anytime you try to discard something Mac considers important, it will ask you to confirm your decision.

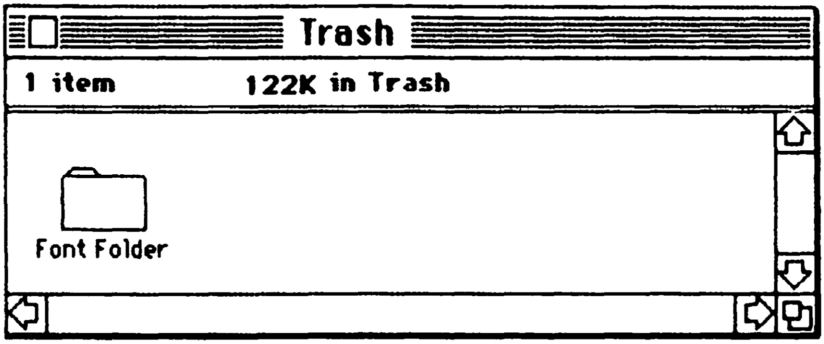
Look up at the disk-space information. All of the actions you've taken up to this point have been for the sake of increasing that number. With your eyes firmly fixed on it, release the mouse. Click the "OK" button.

Although you apparently disposed of the folder, the available disk space hasn't changed. Why should it? If you take a folder off your desk and drop it into a real wastebasket, does it disappear?

Neither does the folder you just dropped into Mac's Trash. It's no more gone than the contents of your wastebasket. Therefore, the quantity of space it occupied is still being used. That's why there's no change in available space. But that can be remedied.

What's in the Trash?

Move the pointer to the Trash icon and douhle-click. It shouldn't be surprising that its window opens—to reveal the Font Folder sitting in the Trash. Had you been in error when you threw the folder away, you could now recover it.

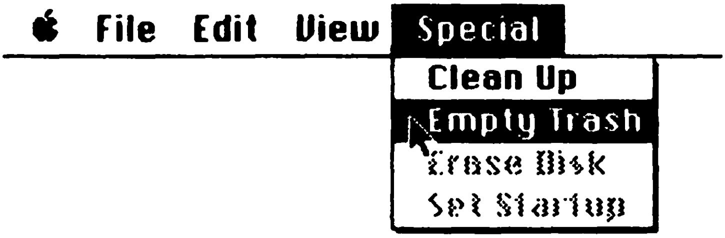


You'd simply move to the folder and drag it out of the Trash. All that would be needed would be for you to open the Trash display, move to the folder you mistakenly discarded, and drag it out of the Trash.

Watch out, though. Don't depend on being able to retrieve things you've mistakenly discarded. It simply won't always be possible. Mac is very efficient and tidy. It doesn't leave things lying around forever, as we'll soon discuss further. If you need an analogy, pretend a janitor roves around now and then and empties the trash without your asking.

Emptying the Trash

But this time you really do want to throw the folder away, and the janitor hasn't come around yet. You're just going to have to do the job yourself. Move the pointer up to the menu bar and drag out the *Special* menu. Drag down to the second choice, *Empty Trash.* Release the mouse to empty the can.



First, the Font Folder disappears from the Trash. It's now gone for real, irretrievably. Next, the disk window changes. The space-available notation finally reflects the new disk space.

Trashorama

As we noted, Mac often performs its own janitorial duties. When you eject a disk or call up an application like the Font Mover, Mac dumps its own Trash. By doing this housekeeping on its own, it keeps as much memory available as possible.

Moral: if you ever make a mistake in what you throw out, don't wait. *Immediately* open the Trash icon and put the material back on the desktop. Waiting may give Mac the opportunity to empty the Trash on its own. And once it's gone, it's gone for good.

Be aware too that until the Trash is emptied, Mac treats whatever's in there as still existing. If you try to name another icon with the same name as something in the Trash, you'll be told that the name is already in use. If you happen to put a copy of an icon into the Trash without emptying it and then try to copy the original again, Mac will append "Copy of Copy of" to the new icon's name. As far as it's concerned, the first "Copy of," while it sits in the Trash and before it is emptied, must still be accounted for.

Trashing a Disk

You'll notice that, at the moment, Mac knows about two disks: the System Master and Fonts Disk. It tells you this by showing their icons on the screen. Now you're going to remove one of the disk icons. The easy way to do it would seem to be to throw away the one you don't want. Try it.

Close the Trash window. Move up to the System Master icon and drag it all the way down the side of the screen, past the Fonts Disk icon, until the Trash Can inverts. As you saw earlier, that's how you discard material. When you release the mouse, the icon should vanish.

But it doesn't! The outline of the icon travels right back to where it came from. Mac rejected your attempt at transplanting the icon into the Trash.

There are three things you can't throw away. The first is the image of the *startup disk*—the disk that was used to start the machine, whose icon will usually appear in the upper right-hand corner. Mac needs the information on this disk to operate. Without it, Mac would become hopelessly confused. Refusing your request to trash the disk is one of the ways Mac keeps you from harming yourself.

Even if you eject the System Master disk, you cannot throw the icon away. Should you try, Mac will bring up a dialog box politely spelling out the rule about startup disks and the Trash.

If you were currently using one of the programs on a disk, you couldn't throw that disk away either. Mac echoes that sentiment with a dialog box.

Although you almost have complete control of your computer, there is still some information that Mac reserves for itself.

As we've seen, you can't throw away a locked file until you unlock it. That goes for anything on a write-protected disk, sometimes including the icon of the disk itself. Since Mac can't write on the disk, it can't go in and erase the file you want to discard.

You can, however, rid yourself of the Fonts Disk icon once you've ejected it. In fact, if you have no further use for any disk you've ejected, it makes sense to deposit it in a suitable receptacle.

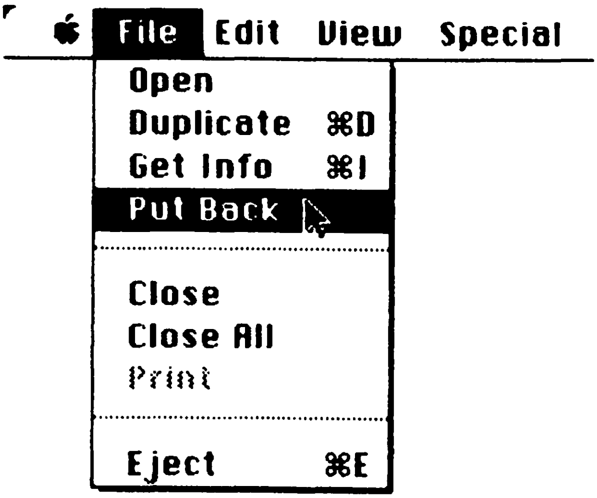
When you discard a disk icon, unlike a file or folder icon, it disappears instantly from the Trash. There's no way to retrieve it short of reinserting the disk. Move to the Fonts Disk icon. Press and drag it into the Trash Can. When the icon disappears, open the Trash and check for yourself. No more Fonts Disk.

MacHeap, or Why Use the Trash?

Mac must keep track of everything you put on its desk. This includes not only the different display windows, but also all the disk icons and the various contents of their directories.

To do this, it uses a small portion of its RAM memory as its own internal notebook, constantly crossing off old items and adding new ones as you do. Apple calls this area the *Heap*.

It wasn't designed to be overpoweringly large. Taking Mac's current 128K memory into account, Apple estimated a comfortable size for it and fixed its



boundaries. Some programs you'll be running may give you the option of intruding on some of the Heap area if you need more memory. Others may do it on the sly.

In either case, it will affect the performance of your desktop items. It's wise, therefore, for you to keep Mac's desk neat. That means you should close any folders, windows, or icons you're done with, and discard unneeded disk icons.

As we've seen, sometimes you'll want to take a folder out of a window and put it on the desk itself. When you're done, you should move it back. But if that seems boring, you can let Mac do it for you. Take the Empty Folder and put it on the desktop, making sure it remains selected. Now go up to the File menu and drag to Put Back. Voilà! Mac puts the file back neatly in its proper window.

Mac keeps disk-icon information in the Heap, too. By keeping the environment free of unwanted icons, you give Mac less to remember and more free memory space to work with. With less to worry about, Mac is less likely to surprise you with dialog boxes you might prefer not to see.

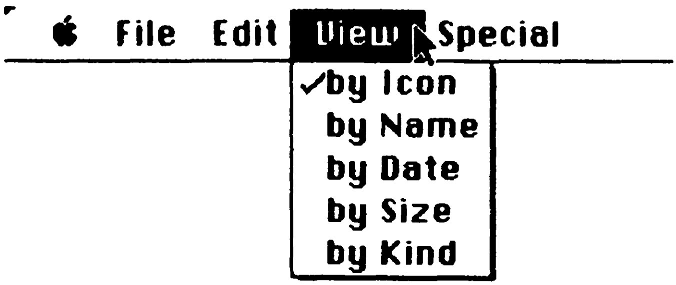
8

FILES, FOLDERS, AND SPECIAL TRICKS

Now that you're familiar with the idea behind icons, it's time to learn some other ways of dealing with your desktop. Mac is willing to let you transform those icons into a wealth of information.

The View Menu

When you want detailed information about an icon, you use Get Info. It's extremely informative, but it only works one file at a time, and it takes an awful lot of moving and clicking. What if you want quick information on a whole disk or folder's worth of files? That's where the *View* pull-down menu comes in.

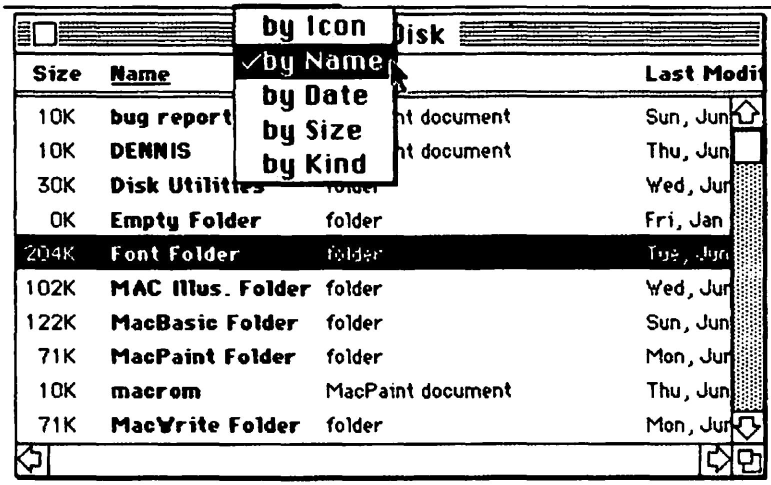


Open the System Master icon with a double click. You see icons representing the files on the disk. Now move the pointer up to View on the menu bar. Pull down the menu and wait a moment. The options under View allow you a variety of ways to peek at the files on your disk.

Currently, a small check mark rests beside the words *by Icon*—the view you have now. Drag down one line of the option list until *by Name* is inverted and release the mouse button. The icons disappear.

By Name

The new display is radically different from what you've seen on Mac, but it's more or less typical of the "directory" information provided by other computers. It is a statistical listing of every file on your disk. It's ordered, as you selected, by name—in alphabetically ascending order. And the word *Name* in the heading is underlined so you can tell. (File sizes in our examples total to more than 400K through use of a high-capacity hard disk.)



ASCII Order and MacOrder

Files may be saved with names that are either upper- or lowercase letters or any combination of the two (including numbers). When sorting (alphabetizing) that list, you would expect A before B, B before C, and so on. Life isn't that simple in the world of ASCII.

Albacore
Antithesis
Gregorian
Tuna Fish
Zoroastrian
aardwolf
babbitt

What Mac does *not* do: a list alphabetized in ASCII order.

Because each character is interpreted from its ASCII code, computers usually sort alphabetical lists by ascending ASCII values. If you check the ASCII chart in chapter 4 you'll see that in the ASCII world, numbers come first, followed by capital letters, then lowercase letters. A typical computer list, arranged in ascending order, would follow this scheme literally. A file name beginning with a lowercase *a* would come after the last one beginning with *Z*.

In its View by Name listings, Mac follows human, not ASCII, conventions. A *B* is a *B*, whether capital or lowercase. Therefore, with this View option, a file named "bug report" will be found near another called "Bomb Image" without the need to scroll to the end of the list.

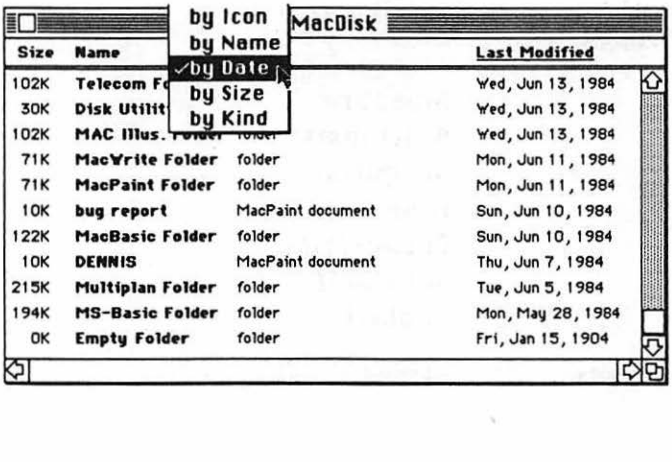
What You and View Can Do

With any of the options in View, the directory entries behave very much like icons. You can click and thus select them, shift-click to select more than one, or drag through a section of the directory to select a bunch. You can Get Info or Duplicate the ones that are selected.

But if you want to move them around, change their names, or trash them, you'll have to go back to the icon display. You can scroll the directory, and you can move the window around the screen, but otherwise you can consider each entry anchored to the screen unless it's in icon form.

By Date

The third option on the View menu is *by Dâte.* Try it. When the display reappears, the phrase *Last Modified* is underlined. Mac shows you the most recently modified files at the top of the list, the oldest at the bottom.



This listing can be extremely important. Mac automatically "date stamps" every document you create. When you work and rework a document, saving interim versions, you'll automatically know which version you worked on last. If you have multiple pieces of correspondence to the Jones Company and a reply refers to "Your letter of July 12, 1984," you can find your letter in a flash by using the View by Date option and scrolling down the list.

You'll also want to back up your documents, making archival copies of them on a disk separate from the one you work on. You should do it at least once a day, but you won't want to bother recopying files you've already backed up. With the View by Date option, it's easy to compare two directories and find out which files or folders need to be duplicated.

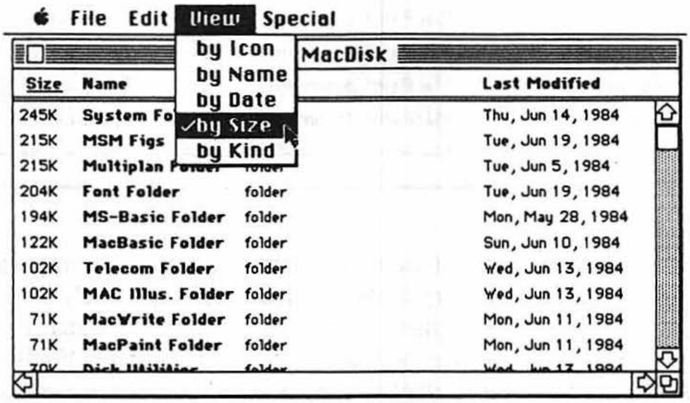
By Size

In the last chapter you took great pains to increase the amount of free space on your disk. As you've seen, Mac temporarily appropriates some of the disk space for the Clipboard. With other applications, like *MacWrite,* Mac may temporarily save a copy of a document you want to print. Needless to say, if it doesn't have enough disk space to do the save, Mac has no compunctions about aborting your print operation.

Modifications to the way objects are treated on the desktop require disk updates. Just placing something in a folder is a change that Mac has to record on your disk. Opening a window requires a disk update.

Using Finder 1.0, 80K of available disk space was about as low as you could go before you would run into problems. Version 1.1g seems to be less critical, but getting down below about 39K of free space has been known to exceed its tolerance level.

The results of insufficient disk space may not be catastrophic. Most likely,



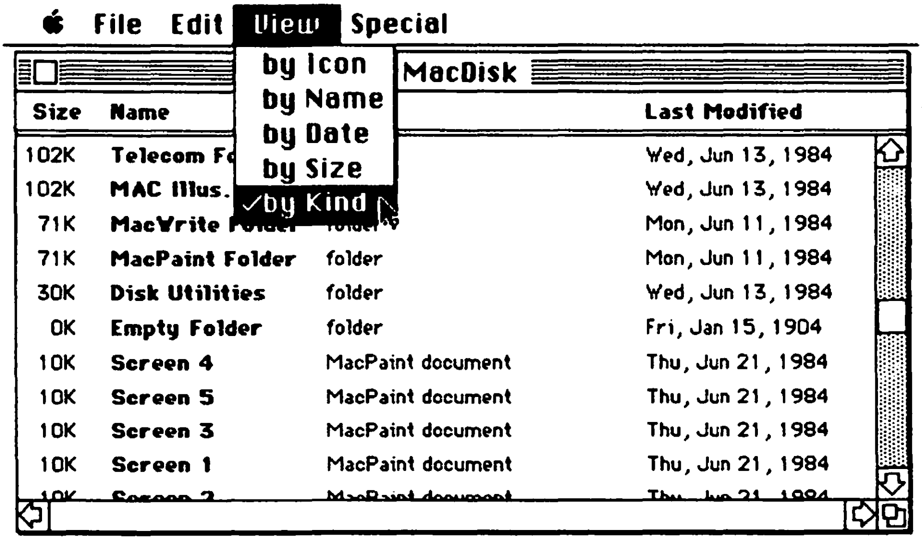
you won't destroy a disk's data (though it is a vague possibility). But when it gets low on room, Mac may well preserve the contents of your disk while it makes the folders you create to segregate your information disappear.

The next time you use the disk, all the files are dumped on the desktop, and you are left with the unpleasant task of recreating the folders they were in. With Finder 1.0 this was a frequent occurrence. The update to version 1.1g seems to have made the problem significantly rarer.

When you're considering file removal, it's handy to know which files are hogging the disk. The *by Size* option displays all of your disk files or folders, beginning with the largest (and often the most likely candidate for removal). The last file listed is usually the Empty Folder, since it takes up 0K of room.

By Kind

Last on the list of View options is *by Kind.* Superficially, this may seem only marginally helpful. But, as with many of Mac's functions, there is far more to it than appears on the surface.



From a utilitarian point of view, it's quite nice to be able to pinpoint something by its type. The name of a file or folder might not really give you a hint about its true contents. Something called "The Moon," for instance, might be a *MacPaint* rendition of our neighboring orb. It could also be a *MacWrite* treatise on the subject, or even a *Multiplan* statistical analysis of the surface features.

When you first created it, of course, you knew that. Two years later, it may not be so obvious.

If you know you're looking for a *MacPaint* document, it's nice to be able to sort by Kind and be able to look through the section of the directory that shows you all files of the type you're looking for. Unfortunately, Mac doesn't seem to list the files in any particular order within the by-Kind scheme, and doesn't even list the types in alphabetic order. Always scroll through the window if you don't see your file where you might expect it with this option.

Application Files and Document Files

At the simplest level, you'll see only three types of icons on your screen: folders, application files, and document files. You already know that folders can hold files and other folders. What's the difference between application files and document files?

An application performs a function. In general, it will use other files, rather than being used itself. Applications include Font Mover, Disk Copy, *MacWrite*, *MacPaint*, MS-BASIC, and other programming languages. What they all have in common is that they *do* something.

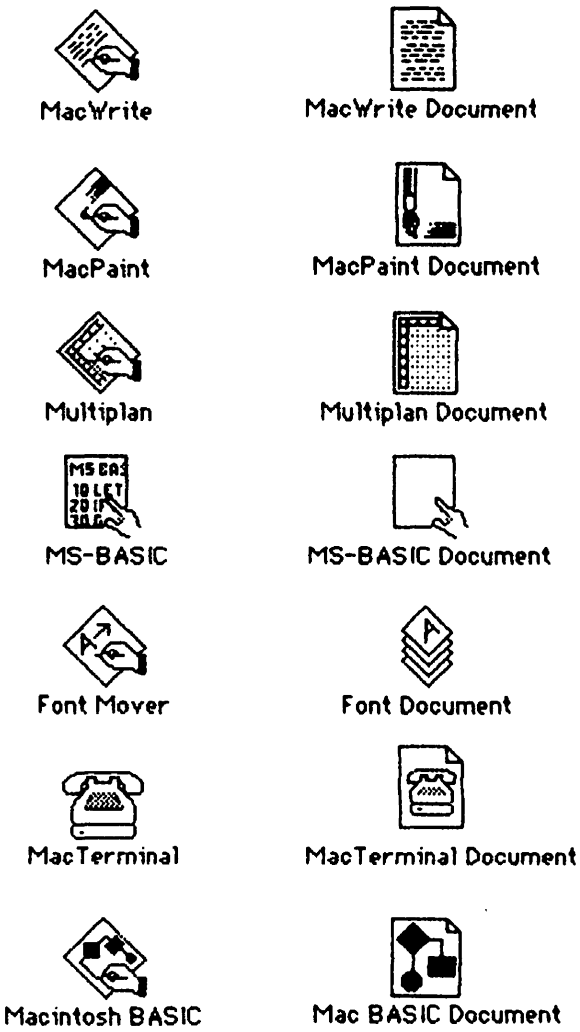
Document files, also known as data files, supply information to applications. That information might be a list of names, a form letter, or a picture. They are created with the help of an application. There are Font Mover documents, *MacWrite* documents, and *MacPaint* documents, to name but a few.

The Icon Types

Each application has its own icon. More important, the documents it generates bear a related icon that's both distinct and easily identifiable. By looking through a display of icons, you can quickly determine what mix of Macintosh BASIC, MS-BASIC, *MacTerminal*, *MacWrite*, and/or *MacPaint* documents and applications exists in a disk or folder. As more Mac applications are developed, more distinctive icons will undoubtedly follow.

And the applications themselves gain from this arrangement. When asked for a directory of a given disk, *MacWrite* will only recognize and report on *MacWrite* documents. No matter what else the disk contains, *MacWrite* ignores it. It knows that the other icons are not the results of its own work.

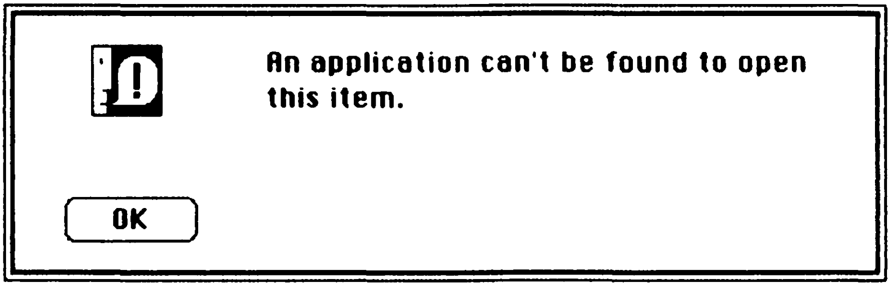
The file itself is what provides the clue. Each time an application saves your document to disk, it also saves some identifying information of its own. Attached to the front of your document, and therefore called the *header*, is the description of where it came from.



Some applications icons and their corresponding document icons.

When you open a disk icon, Mac reads the header information from all the files and displays their appropriate icons. When you open a program, the application reads all the headers, but displays only those that match its criteria.

Better still, because a file is strictly associated with the application that produced it, you don't need to use the application first. If you move to the file in question and double-click it, Mac will read its header and then look for the application that produced it. Finding the application, Mac runs it and then loads your file. But if Mac can't find the required application, it will so inform you and then return you to the desktop.



Filing Exceptions

But there are some exceptions. A text file, like a *MacWrite* document, can be read and processed by one of Mac's languages such as BASIC or Pascal. Programs such as *MacTerminal* and *Multiplan* can be coaxed into producing documents into a text format usable by *MacWrite.*

But no program currently available for Mac has any idea of the restrictions built into another program. Each is aware of itself alone. Therefore, when you use one program to create a file that can be handled by another, you must be aware of certain rules and restrictions. The most common limitation is size. Expressed in text format, the files produced by some programs may simply be too large to fit into the limitations imposed by another.

Macintosh and Memory

Mac comes with 128K bytes of RAM—random access memory. Of that, 22K is dedicated to its video display. Another 16K is used for the Heap. That leaves only 90K for Mac programs to work with. And Mac programs occupy their own portions of memory. For excample, *MacWrite* is 53K long, and *MacPaint* is 60K.

A program can manipulate data only while the data is in RAM. Therefore, the amount of memory left after the program is loaded in affects the amount of data the program can manipulate at any given moment. Some programs, like *MacWrite,* are limited to working only with material that will fit into that leftover memory. Others can use bigger files by automatically swapping data in and out of RAM, storing and retrieving it from temporary disk files.

Another limitation on exchange of information between programs is the way they store their information. For example, a text file 6K long when it leaves *Multiplan* can wind up as a 21K *MacWrite* file. The rule is to exercise the greatest possible care when transferring material between applications.

Turnkey Systems

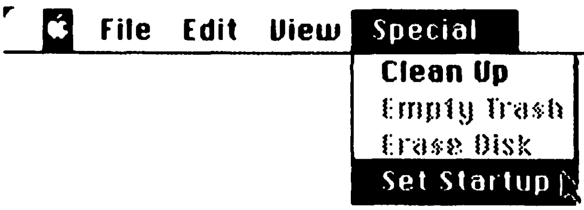
The ideal computer may well be one in which the person using the machine needs to know nothing more than the job he or she is trying to do. Whether it's updating a simple computerized name-and-address file or performing complex cost accounting, the job, and not the computer, is ultimately what's most important.

Normally, the machine forces you to go through a series of preliminary steps to get a program up and running. A *turnkey system* is designed to allow you to insert the correct disk, turn the computer on (i.e., "turn the key"), and be greeted by the program you want to use. The computer handles the preliminaries like loading and running the program so that you don't have to bother.

Naturally, Apple has adopted a similar procedure for Macintosh. Although it wasn't available until the 1.1g version of the Finder, you can create your own turnkey system.

Set Startup

The key to the procedure is available from the *Set Startup* option under the Special menu. But before you can tell Mac to create a turnkey system, you must first select the item you want it to run when you turn it on.



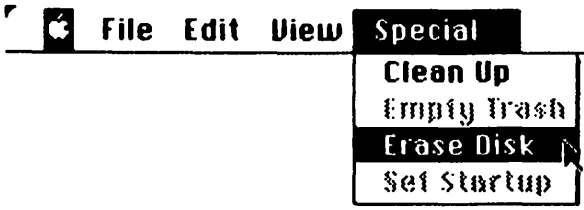
On a system disk with no important applications, there is very little to choose from. Mac already has its own default file, the Finder. Whenever you boot the system, that's the first file it goes to and the one it runs. You could Set Startup to send you to the Font Mover or Disk Copy every time you turn on or reset the machine with that system disk in the drive, but you probably wouldn't want to.

On a disk with applications programs and files, the choice is yours. Because each file has its own header information, you may select either a program or a file as the startup file. It's easy: you click the icon, move up to Special, and drag out Set Startup. Provided it's a system disk—one with the system files on it—the program or file you select will automatically start running every time you boot Mac with that disk. You'll notice that you won't be able to select Set Startup unless a program or file it can use is currently selected. And when you do select it, Mac will offer you one final chance to confirm your choice or change your mind.

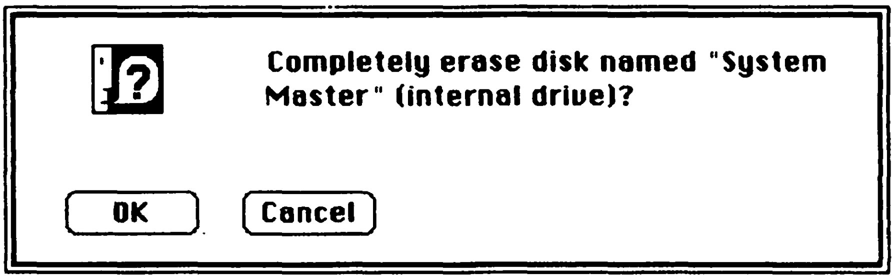
Two minor points about Set Startup remain. If you choose a nonprogram file as the startup icon, be sure the program associated with that file is also on the disk. Otherwise, Mac won't be able to open that file, and you'll start your day with a dialog box so informing you. And you can change the startup file or program at will; if you want the disk to start at the system level, simply set Finder as the startup file, thereby canceling the turnkey nature of the disk.

Erase Disk

One of the most self-destructive options Mac offers can also be found under the Special menu. It's *Erase Disk.* The function wipes out every single scrap of information on your disk.



Since you might accidentally skid right by Empty Trash and release the mouse button with Erase Disk selected, Mac keeps you a couple of steps away from the brink of disaster. First, the Erase Disk option is active only if a disk icon is currently selected.



Second, Mac gives you a chance to rescind the order. Before it actually erases the disk, it will present you with a dialog box asking you to confirm your destructive tendencies. Unless you're serious about erasing that disk, move gingerly to the Cancel button and click it.

Clean Up

The one option we haven't covered on the Special menu is strictly for the fastidious. After you've dragged a mess of folders and files around your desktop, you can use *Clean Up* to put them back into neat rows and columns, or whatever semblance of order Mac considers reasonable. Sometimes Mac will do a great job of straightening things out; occasionally you'll get a rather idiosyncratic rearrangement with odd holes and gaps. Move some icons around, try this option, and watch Mac do its stuff!

Mouseless Commands

If you're observant, you've repeatedly noticed one item we haven't yet mentioned. Adjacent to many of the pull-down menu options is a small symbol and a letter of the alphabet. The symbol is the same as the one that appears on Mac's Command key.

Duplicate	⌘D
Get Info	⌘I
Eject	⌘E
Undo	⌘Z
Cut	⌘X
Copy	⌘C
Paste	⌘V
Select All	⌘A

System-level options with Command-and-letter-key counterparts.

Moving and dragging for everything you do can become monotonous. The mouse steps involved in ejecting a disk are a good example. First you move to the disk icon, click it, then move to the File option of the menu bar, press, drag down to Eject, and release. Skilled hands can do that quickly, but knowledgeable hands can do it even faster.

The letter beside the command symbol on the Eject line of the File option is *E*. Once a disk icon is selected, you can eject it with no further movement of the mouse. Just hold down the Command key and press the *E* key—capital or lowercase doesn't matter. Release both keys. The File option in the menu bar will invert to show you that you've selected something from its menu, and soon the selected disk will eject.

Any of the menu options that include a Command-and-letter-key alternate will respond in the same way. Just as when you use the mouse, trying to perform an invalid option, one appearing in gray, will have no effect.

When you use particular applications, the pull-down menus will change, and the function of Command keystrokes will, too. Some applications will offer more Command-key options; others will offer less. As you use Mac and its applications on a frequent or regular basis, you'll learn the ones that save the most time, and you'll become less dependent on the mouse to perform simple functions. The electronic rodent will remain a useful tool, but you'll use it for the things it's best at.

Some Final Considerations on Folders

Much of the material you'll be handling will be safely tucked in folders. Mac's *System Disk* arrives with the system files in just such a folder. But the system files will work just as well if they are scattered about the desktop or in some other folder. They needn't be anywhere in particular as long as they're on the disk. Still, the folder system is a handy way to keep things organized.

As we've seen, from the system level you must open a folder to peek inside it. Unfortunately, this holds true *only* at the system level. To a program, any file of its type is available, whether or not it is in an open folder. In using *MacPaint* for the illustrations in this book, original scenes were kept in a folder called "MAC Illus.," while the edited versions went to one called "Mac Figs." In the disk window, the two folders remained separate entities. Not so when using *MacPaint*, however. There the directory produced a list of *all MacPaint* documents on the disk, ignoring the integrity of the folders.

Alas, no application currently available supports such integrity. When you save a newly created document, you'll find it in the disk window wherever Mac decides to put it. You can't specify a particular folder as its destination, so when you're done with the application and have returned to the desktop, you must resort to the press-and-drag routine to place it where it belongs. It's a particular nuisance with a hard disk containing dozens of files and folders.

The situation is very surprising, considering Apple's implementation of a more precise system on the Apple /// in 1981 with SOS (Sophisticated Operating System) and, more recently, on the Apple //e, with ProDOS (Professional Disk Operating System). Perhaps when Apple hooks up its own hard disks to Mac, the problem will be rectified.

Disk Copy

The only application you've used so far is the Font Mover. It's time for another. You've already seen the icon for it, the one labeled Disk Copy that looks like two Mac disks, one on top of the other.

You made your first backup copy the long way, by dragging the original disk's icon onto another disk icon and, unless you had an external disk drive, going through muscular torture as Mac asked you to swap the two again and again. When Mac was first released, that was the only way to copy a disk. With the update of Finder, Apple has added a bonus: the invaluable Disk Copy program.

With a two-drive system, no disk swapping is involved in the icon-to-icon method. The process of duplicating disks proceeds quite smoothly on its own, from one drive to another, without bothering to involve you or your extremities. The Disk Copy program was designed to reduce frustration for those Mac users who have only the internal drive available.

The full-screen introduction to Disk Copy explains that, in order to reduce the number of disk swaps needed, it will use as much of Mac's memory as it can. It also gives you the option of canceling the operation if you've invoked it by mistake.

Disk Copy assumes (not always correctly) that the disk currently in the internal drive is not the one you want to copy. It ejects that disk and asks you to insert the correct one. Look carefully at the screen as this happens. It's one of the few times you'll ever see Mac with a blank expression on its face.

Disk Copy is not joking when it says it's going to use *all* the memory it can. To reduce your labor, it copies approximately 100K of your disk in each of four phases. To acquire the memory to perform such a task it steals almost all the memory used by Mac's display, reserving just one line at the bottom for messages.

Even if you didn't know that the program uses the screen memory, the fact that something odd happens won't escape your notice. During the copy process, Mac's screen shimmers and shakes with squiggles, lines, dots, and blots as every possible byte of memory is crammed with the disk information.

You don't even need to initialize a blank disk before you use it; Disk Copy does it for you. During each of the four phases, Mac first reads the information, then ejects the original disk and asks you to insert the destination disk. It writes the information to the destination disk and verifies that it has correctly written the material it has read. At any time during the exchange you are given the option of canceling the process; if you accept this option, the new disk will be unusable until it's initialized again. Once the whole process is done, Mac will proudly present you with the finished copy and ask if you want to do another.

Having played around with Mac, you've made significant alterations to the exact copy of the original *System Disk* that your master copy is supposed to be. It's time to remedy that situation.

Retrieve the original Apple-supplied disk from the safety of your family vault. *Make sure that it's write-protected:* you shouldn't be able to see the red tab through the front. Always take this precaution with any disk you're copying from. It will protect the disk if you somehow get it confused with the one you're copying to.

You'll be duplicating the original disk onto your System Master. Despite the present state of its contents, it's already labeled correctly, and Mac disks don't give up their labels very easily. Since the disk is already initialized, Disk Copy will ask if you really want to erase the present contents of the disk. In this case (presuming you have used the correct disk) click OK. Perform the eight required swaps as instructed. When you're finished, put the original *System Disk* back in the vault for good.

Accept Disk Copy's offer to make another copy. Write-protect the System Master and find another blank disk. Then go through the copy process again. When it's through, put the System Master somewhere safe, preferably in a location closer to hand than the original *System Disk.* Put a label on the new disk. Call it System—Working. Then politely decline Disk Copy's offer of additional help and insert System—Working in the drive. Select it and give it the new name.

On Clones and Naming Names

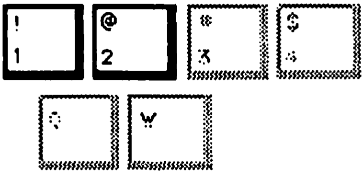
Disk Copy is an excellent utility, and in theory it makes a clone of the source disk. But as with real clones, the single thing that differs between the original and the copy is the date of their creation. This one fact is significant enough to cause you some problems.

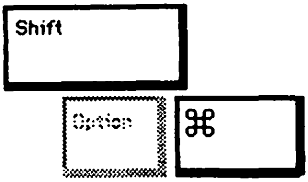
Mac recognizes the difference in creation dates as a difference between the two disks, so you can't substitute one for the other in the middle of an operation. Mac will prompt you to insert the correct disk even if the clone is identical in all other aspects. Which brings up the matter of names.

As we've noted, when you find yourself in a swap situation where Mac is asking for a disk, you must insert the disk it wants or it will ask you again. And again. And again. That's why we caution again, and again, and again: give each disk a unique name, and be sure to write it on the label.

The Last Word on Disk Ejection

So far, you've learned a few ways to get a disk out of Mac: pressing Command-E; pressing and dragging to Eject; and using MacTool. As long as we're talking about ejecting disks, you may as well learn a few other alternatives.





They all require a modicum of manual dexterity. First, press down and hold the ⌘ and Shift keys. You can then eject a disk in the internal drive by pressing the numeral 1 key or in the external drive by pressing the numeral 2 key.

At the basic desktop level of Mac operations, this method is the same as using the File menu and Eject option, or pressing Command-E. However, when you're in the middle of an application, it's equivalent to using MacTool; all warnings associated with that procedure are in effect.

If you get into a horrendous system hangup, you're unlikely to be able to get your disk out of the drive without shutting off the machine. How do you manage it? Answer: while holding down the mouse button, press the Reset switch. If all else fails, flip Mac's power switch off while still holding the mouse button, wait a few seconds, and then turn the power on again. If that doesn't work, the final possibility is brute force with MacTool.

Remember: you can only be assured that Mac will correctly update a disk if you use either Command-E or the Eject menu options. Any of the other variations may well get your disk out, but they may not record new folders or empty the Trash of discarded items, and they might well play utter havoc with your disk. Use them in the order in which they were described in the preceding paragraphs, and use the unofficial ones only as a last resort.

The Mystique of the Startup Icon

The startup disk is very important to Mac because it assumes that's where it must find the system files it needs to operate. When it needs information from the System file for alternate fonts or other working information, Mac must have access to it. That's why you can't throw the startup disk's icon away.

But Mac will eagerly embrace any other disk with system files. If, in the course of operation, you insert another disk containing all the standard system documents and call up an application from it, Mac will replace the original startup icon with the icon of the new disk. If you have only one drive, Mac may demand that you make a few swaps between old disk and new to let Mac put the original startup disk in order, making sure all changes have been properly recorded.

Updating Your Disks

As Apple produces new and improved versions of the Finder and System, the updates will be made available to you. But what about all those disks you already have with the old Finder and System on them? You can update those yourself.

Just drag the icons for the Finder, System, and any printer files (like Imagewriter) from the new disk onto the old one. Mac will ask you if you want to replace objects with the same name. You should click Yes. The old versions will be obliterated by the new.

You needn't transfer a new Scrapbook or Note Pad to the old disk, and you probably won't want to, since they'll wipe out the ones you already have on that disk. But be sure to transfer the new System and printer files as well as the Finder. They all work together to supply Mac with the vital information it needs to operate.

Transferring the new System, Finder, and printer files may be absolutely essential for certain applications. If a font an application needs is not in the System file, the menu bar may look odd. If an icon design for a new application has not been described in an older System file, the icon may appear in a strange form or not appear at all.

Be aware that changing system files is likely to alter the font contents and desktop pattern you've set up. All system files are *not* created equal. If you changed either the desk pattern or the fonts in your previous System file, you'll probably need to go back and do it again.

Be sure not to use different versions of the Finder and System at any single work session. As you've seen, Mac will replace the startup icon with any new system it finds. This can cause Mac potential confusion and create big trouble. The difficulties involved in using a normal disk immediately after taking the original version of the *Guided Tour* stem from this very problem. As major upgrades of the Finder and System arrive, similar difficulties could occur.

The solution is to make sure you upgrade all your bootable disks when you begin working with a new System. If certain applications are incompatible with a future version, you may have to prepare two versions of other applications disks to work in conjunction with them—one for each version of the Finder and System. If so, label carefully and watch out at swapping time.

9 IMAGEWRITING

We said it in the beginning of this book, and we'll say it again: sooner or later, you're going to need a printer. When you want to show the information on your screen to someone else, you can ask people to come over and look, or you can hook your hand into Mac's handle and do the traveling yourself. But it's a whole lot easier to produce hardcopy: an ink-on-paper representation of what you see on your screen.

Since the only printer that currently works with Macintosh is Apple's Imagewriter (and, at this writing, *not* the wide-carriage model), it's a pretty safe bet that it's the one you'll buy if you haven't bought it already.

Where to Put the Printer?

Before you start to unpack it, and maybe even before you buy it, consider where you're going to put it. The Mac-to-Imagewriter cable is only 6 feet long, so that's one constraint. Take into account any necessary twists, bends, dips, or diversions in the cable's route that might further shorten the distance.

Another consideration is the physical size of the printer. Although it can't handle paper wider than standard 9 ½-inch perforated forms, the printer itself is 15.7 inches wide. You'll need another 11.3 inches for its depth, front to back.

Although the printer itself is only 5.3 inches high, allow it about an arm's length of air rights. You'll need to feed paper into it, and occasionally you'll want to watch while it's printing. Trying to squeeze your head into a tiny space above the printer can be less than pleasant.

The Paper Dilemma

At this point most people assume they've finally found the ideal spot for a printer. Shortly after this point most people discover the error of their ways. The one consideration that always seems to slip through the cracks is paper.

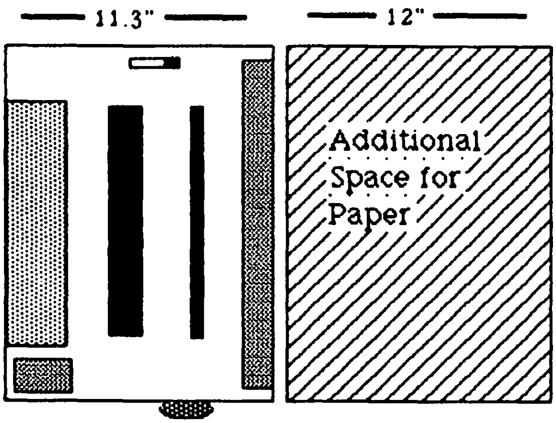
If single sheets of paper are all you ever use, perhaps you have found the ideal place for the printer. The Imagewriter will accept single sheets of paper whose size is a maximum 8 ½ × 11 inches. But don't think for a moment that you'll limit yourself to single sheets. It just won't happen.

The Imagewriter is equipped with a paper-feeding device called a "forms tractor." Its sprockets fit through the holes in perforated continuous-forms paper (also known as fanfold paper) that most commonly comes in a continuous sheet 9 ½ inches wide. A ½-inch strip on each side is perforated and removable; by removing these strips and tearing the paper at the horizontal perforations that conveniently appear every 11 inches, you end up with standard 8 ½ × 11-inch sheets. You'll discover the beauty of the scheme the minute you need to print two pages in a row and you realize continuous forms let you walk away from the printer while it does your bidding.

Where to Put the Paper?

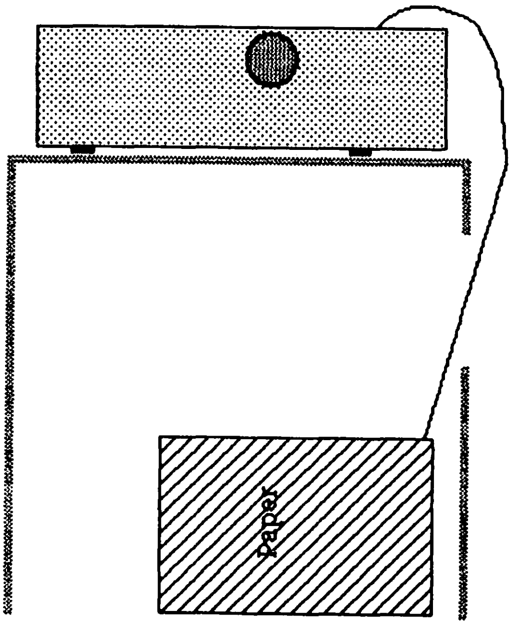
Aside from having to remove the perfs, the main drawback with fanfold paper is that you need a place to put it. The Imagewriter accepts fanfold from the top, at the rear, so that paper feeding into the machine must enter from the back.

One method is to simply lay the paper behind the printer. That's not as simple as it sounds. For one thing, it means you'll need an additional foot or so of space behind the printer.



There's another problem, too. The paper has to have somewhere to go as it exits the printer. Since the natural movement of the printer sends the paper out the top and toward the rear, the paper exiting the machine will begin to stack up on top of the paper trying to enter the machine. This can cause very interesting jams and tears.

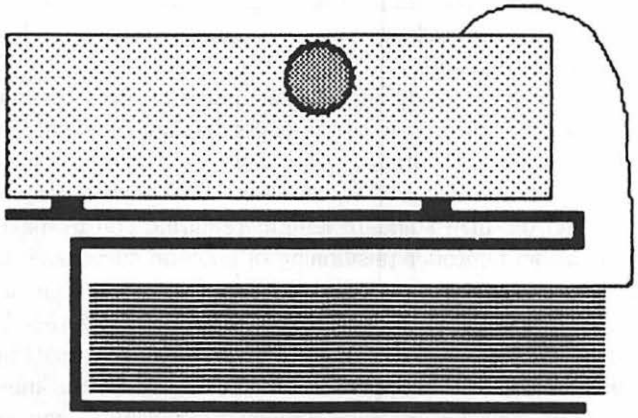
If you wait until a couple of sheets come out the top, you can bend them forward and aim them toward the front of the machine. But unless you've got an awful lot of shelf space in front of the printer, you're soon going to find a large heap of paper on the floor.



A better way around the problem is to use a small table or a backless section of desk. Set the printer at the very back of the table or desktop and slip the box of paper on the floor underneath. The paper emerging from the printer can be aimed either toward the front of the table or, with care, behind the incoming sheets.

The Last: Stands

Printer stands offer a more expensive but potentially more rewarding solution. They come in a variety of sizes and shapes, from free-standing wood or steel tables to small S-shaped Lucite devices that sit beneath the printer and on top of a desk. The floor models tend to be expensive, but fancy ones have such refinements as provisions for catching the output neatly as it comes from the printer.



Although the more common desk stands are extremely compact, they usually add about 8 inches to the overall printer height. Their main drawback is that they rarely provide room for more than two hundred sheets of paper. That restriction won't matter if you're just doing an occasional page or so; if you crank out lots of copies, replacing the stack can become annoying.

Perspectives on Paper

When you enter the world of computers, you soon discover that paper takes on a new meaning. There is no such thing as "plain" paper. There are green bar paper, white paper, hi-perf, 20 lb., 15 lb., tipped-on stock, and a plethora of preprinted and custom-designed forms. There are even envelopes in a variety of sizes.

Normal noncomputer paper that you'd consider using for stationery is at least 20 lb. (pound) weight. The paper's weight affects its stiffness and opacity. For most computer applications, 20 lb. is fine. If you're mailing most of your computer output or you primarily print rough drafts that you never mark up with writing implements, the slightly cheaper 15 lb. paper may fill the bill.

Standard forms present one problem: after the perforations are ripped from the sheets, the ragged edges that are left look and feel ugly. That doesn't matter for drafts, but it's somewhat unprofessional for correspondence. Paper makers have come up with a variety of solutions.

Hi-perf paper, sold under a variety of names like Magicperf, uses finer perforations and more of them. When the sprocket holes are removed and the sheets are separated (the process is called *bursting*), the resulting page, although still not single-sheet perfect, is acceptable for many situations.

Tipped-on sheets are even fancier. Normal unperforated sheets are fastened lightly to a perforated fanfold backing. To burst the sheets, you simply peel them away from the backing. Since the adhesive is paraffin based, it leaves little or no mark on the paper.

This arrangement is handy and elegant, but it can be expensive. The additional backing paper involved can lead to paper-feeding problems; in fact, getting tipped-on to work with the Imagewriter can be an exercise in sheer futility. Furthermore, the bottom of one sheet often overlaps another, so the printer may see it as shorter than standard length, requiring you to make complicated adjustments to avoid improper positioning of copy on successive pages. Before you invest in tipped-on, try ten or fifteen sample sheets in your printer.

Most high-quality paper is available as preprinted letterhead. For a hefty fee, the supplier will imprint your name on the paper and matching envelopes (which can also be supplied in tipped-on form, though their thickness often gives printers fits). But considering Mac's graphics capabilities, you may prefer to design your own letterhead with *MacPaint/MacWrite* and let the Imagewriter take care of it.

Multiple Copies

If you need multiple copies of your output and don't have access to a duplicating machine, you can simply print two "originals": repetitive processes are precisely what computers do best. But if you consistently need copies of your work, consider multi-part computer paper.

One variety contains normal sheets (four-part is usually the maximum) interleaved with carbon paper. The thickness can cause printer-feed problems. Carbonless forms use special paper that contains its own carbon on the rear side of the page or works with chemicals impregnated in the paper.

Apple suggests that four-part forms are the maximum the Imagewriter can handle. Although the type is not specified, the maximum recommended thickness of 0.011 inches suggests that carbonless paper would be advisable except in situations where only two copies are needed.

Imagewriter Beginnings

If your dealer hasn't unpacked your Imagewriter and tested it for you, avoid grief by following the "Printer Unpacking Instructions" that should come with the machine. Because printers include rather delicate mechanisms, they come stuffed with protective hunks of cardboard and plastic that are not meant to be there when the printer is turned on. We'd love to tell you exactly where they are and what they look like, but printer manufacturers have an uncanny way of "improving" their packing materials. Follow the unpacking guide *carefully* to make sure you've got all the unnecessary stuff out. It's usually below the covers, which you'll be removing in a moment.

One thing that probably *won't* come in the printer box is the cable that connects it to Mac. Your dealer should supply that cable. Be sure it's the right one: some cables lack a connector and can cause problems. You'll find the details in chapter 4.

As explained there, connecting the Imagewriter to Mac is simple. Make sure both printer and Mac are disconnected from electrical power. Then plug the larger twenty-five-pin D-connector into the jack at the left rear of the printer (as you face it from behind) and tighten the retaining screws. Plug the nine-pin connector into Mac's printer port (and nowhere else!) and tighten the thumbscrews. Finally, insert the power connector into the socket at the right rear of the printer. But don't plug the machines in just yet.

The Ribbon

The Imagewriter uses a nylon ribbon impregnated with ink and encased in a hard plastic cartridge. One nice thing about it is that replacements aren't hard to find. That's because the Imagewriter itself is built around the mechanical parts of a very popular printer—the C. Itoh 8510 Prowriter. This printer has previously surfaced as itself, as the NEC 8023, and as the Apple DMP, to name a few. And they all use the same ribbon.

Inserting the ribbon cartridge is simple. First remove the two covers that would otherwise get in your way: the *carrier cover*, a flat piece of cream-colored plastic with a clear ribbed flip-up plastic sheet attached; and the *paper cover*, the smaller cream-colored piece that covers the top rear of the printer. Just pull up and slightly forward; they'll come right off.

Look down at the Imagewriter. Your goal is to get the ribbon snugly onto the shiny metal *ribbon carrier* right behind the black-ribbed *print head*. Things will be easier if the carrier is toward the middle of the machine; if it's toward one side or the other, simply slide it left or right. Just be sure you *never* do this when the printer's power is on. Incidentally, if you're trying this on a new machine and the print-head-and-carrier assembly won't budge, it's a safe bet you still haven't removed the shipping retainers we mentioned earlier. If so, remove them now and look over that unpacking checklist one more time to make sure you haven't missed anything else.

Take a look at the ribbon cartridge. If there's any excess slack in the ribbon, turn the knob on top of the cartridge clockwise to tighten it. Take a look at the bottom of the cartridge. The two conical protrusions are designed to fit into cutouts in the carrier. Now put the cartridge rightside up again. The two slight protrusions on either side are designed to be held by the plastic spring clips on the sides of the carrier.

Now that you know where everything should go, it's time to do it. Make sure the *roller shaft*—the metal rod with three rubber rollers on it—is pushed up against the big round rubber *platen*. Begin by sloping the left side of the cartridge down first. Press the cartridge housing gently against the left spring clip as you lower the right side into place. Make sure that the ribbon falls between the plastic ribbon guide on the print head and the metal guide plate near the platen. You may have to give the ribbon a little slack by gently pulling a small amount from the left side of the cartridge.

As you push the right side of the ribbon down, it should click into place. If you have difficulty, don't force things. Just continue pressing down as you turn the ribbon advance knob on the top of the cartridge clockwise.

Check again to make sure the ribbon is in the proper place between the plastic guide and the metal one near the platen. Pull up slightly on the cartridge to make sure the spring clips are holding it securely. Once the cartridge is in place, give the ribbon advance knob a couple of clockwise turns to take up any slack. Do this even if you think there isn't any. There's usually slack inside the cartridge, and rotating the knob after installation will provide the proper tension.

To remove a ribbon, simply push one of the plastic spring clips to one side. The ribbon should pop up, and you'll be able to lift it out the rest of the way.

If it all sounds complicated, you'll find it becomes simple the second or third time you do it. You may even become expert at the fabled one-handed ribbon snap.

If you've already got paper in the machine, drop the covers back into place; if not, read on.

Loading Form-feed Paper

Inserting form-feed paper is a bit of a chore, but you'll get the hang of it soon enough. Begin by making sure both covers are off.

Next, check the *release lever* at the left side of the machine. Set it to the friction (forward) position. It's marked by two circles with a line going through them. The pin-feed setting is actually to the rear, beside the icon with the circle that has little bumps sticking out of it, but the friction setting will help you load the printer.

Adjusting the Tractors

Now you need to find some *real* little bumps, otherwise known as the tractor sprockets. They're located beneath the *paper clamps*—the two slotted pieces of black plastic atop the two black plastic *tractors* just behind the platen. The clamps pivot on hinges at the outside edge of the tractor and arch upward and away from the center of the machine. Stick a finger under each paper-clamp tab (the tabs face the center of the printer) and lever each one open.

The first time you do this, you'll probably need to adjust the tractor width. Just behind each paper clamp, you'll see a tractor-release lever. They pivot up and down. With the lever down, the tractor will not slide along the mounting bar. Lifting up the lever lets you move the tractor horizontally.

The most important tractor is the left one. Although it can move, you'll usually set it once and use it as the reference edge for the various widths of paper the Imagewriter can handle.

To start, if it's pretty well over to the left side of the printer already, you can leave it in that position. If it isn't, release its locking lever, move it as far to the left as possible, and press the locking lever down.

Lay the front edge of the fanfold sheet on the tractor assembly so that the first two sprocket holes along the left edge line up with the sprockets in the left tractor. Now check the right tractor. If the first two sprocket holes won't align with it precisely, lift up the locking lever, and adjust the tractor. Once both edges of the paper mesh with their respective sprockets, lock the right tractor in place.

Threading It In

Now that the alignment is done, you can thread the continuous sheet up to the back of the printer. Before you insert it into the tractor assembly, check again to make sure the release lever on the top left-hand side is toward the front of the printer. This will apply pressure to the platen and assist you in the initial phase of the feeding process.

Place the paper in the tractor assembly, making sure it lies across evenly and that the same number of sprocket holes are engaged on each side. When that's done, swing the paper clamps down and click them firmly into place.

The roller shaft in front of the platen helps to maintain tension on the paper as it exits. For loading, it should be out of the way. Pull it forward on both sides.

Using your fingers to guide the paper down and into the machine (which is why you have neither plugged the power cord in nor turned the printer on), turn the platen knob on the right side to feed the paper into the printer. Turn slowly, making sure the paper is coming up and around the platen and not going backward where it shouldn't.

When you see it emerge from the front and it sticks out about ¼ inch above the print head, stop turning the handle. Push both ends of the roller shaft back against the paper to press it against the platen. Then check the paper against the red rings on the roller shaft. Those rings indicate the area of the paper that will actually be printed.

Once more to the paper clamps! Release the right clamp and adjust it so that the paper is reasonably taut between the sprockets. Then move the paper-release lever at the front left to pin-feed (back) position.

Check one final item while the covers are off: the white paper thickness adjustment lever hidden under the right side of the Imagewriter's case. Moving the lever toward the front of the printer accommodates thicker paper or multi-part forms by moving the print head away from the platen. In normal use, the lever should be set all the way toward the back of the printer.

Next, replace the covers—back cover first. Just remember that the rear over goes *over* the paper going into the printer, and *under* the paper coming out of it. The front cover's easy—just be sure the paper comes through the large opening in the front, and not the slot formed by the matching openings in the two covers. Use the platen knob to roll the paper up so that the perforations between the first and the second sheet line up with the top of the print head. You'll discover that you have utterly wasted the first sheet of paper, but that's one of the unavoidable drawbacks of continuous-form.

Inserting Single Sheets

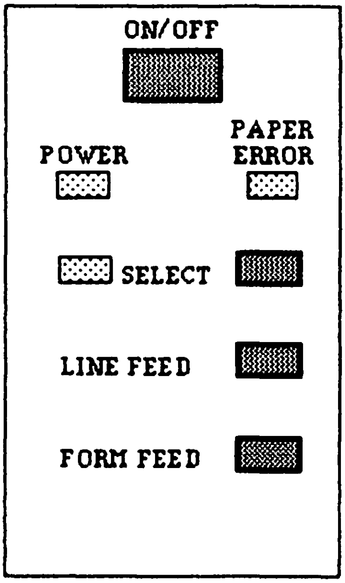
You can use Mac with single sheets of paper, just like a typewriter, but getting that paper aligned in the Imagewriter isn't typewriter-swift. At least you won't have to remove any covers.

Make sure both covers are on the machine. Then turn the printer's power on and off to move the print head out of the way. (We know, we know. We told you not to plug in the printer yet. Wait to try this part until you've got your Imagewriter connected to the outlet.) Set the release lever to the pin-feed (rear) position. Open the clear plastic lid. Pull both ends of the roller shaft forward.

Now push the single sheet of paper down through the slot and around the platen. Use the red rings on the roller shaft to help you line up the paper. When you've got the paper where you want it, push both ends of the roller shaft shut. Then pull the release lever forward to the friction position. You can use the platen knob at the right to adjust the paper's vertical position before you turn the printer on.

The Control Panel

Before you plug the power cord into either the wall outlet or the Imagewriter, familiarize yourself with the control panel on the top at the right. It includes four pushbutton switches.



The largest in the group is the on/off switch. Once depressed, it stays down and the printer will have power. Press again, and it pops up to turn the printer off. Always make sure it's in the up (off) position before you plug your printer in or turn Mac on.

Just below it are a pair of LEDs (light-emitting diodes). The green one at the left lights when the printer has power. The red one on the right goes on to indicate that the printer is out of paper.

Directly below them are the green *select* LED and the select button to its immediate right. When the LED is on, the printer is ready to receive information. When the light is off, the printer is *off-line*—unreceptive to Mac's attempts at printing. The select button has only one position: each time you press it, it changes the status of the printer from selected to deselected and vice versa.

The *line-feed* and *form-feed* buttons are used for forms handling. Pressing them advances the paper one line of type and one full 11-inch page, respectively. The printer must be in the deselected mode for either of them to function. If you attempt to use either of these two while the printer is selected, nothing will happen.

Taking a Snapshot

Now that you have the printer and Mac properly joined together, how about a trial run? You won't need to do anything more than turn the Imagewriter and the Macintosh on, in that order. Make sure that there's ribbon and paper in the printer and that it's selected.

If you give Mac a bootable disk, you'll soon be greeted by the desktop. It's not a very pretty picture, but for your first printing exercise it will do. First lock the Caps Lock key down, so that it's on. Now press and hold the Shift and Command keys and, with another finger, press the *4* key. As soon as you release them, your Imagewriter will start churning away. You've taken a *snapshot* of Mac's entire screen.

That's only one type of snapshot. If the disk's window isn't displayed, double-click the disk icon to bring it out. Printing the entire Mac screen may not be what you want. At times you might only need a printed copy of the active window. That's also within your control.

Momentarily depress the Caps Lock key so it clicks up and off. Now if you use the Command-Shift-4 key sequence, the only thing that will print is the active window. Try it!

That's by no means the only way you can print with the Imagewriter, of course. When you get to the applications sections, you'll learn all about some other important methods.

About the Imagewriter

The Imagewriter belongs to a general category of printers called *impact printers* and is further classified as *dot matrix.* Rather than having a single print element for each character, the print head is composed of individual wires that impact the paper through a cloth ribbon. It can create a character 8 dots high and up to 7 dots wide when used with a typical computer, such as Apple // models.

Fortunately for Mac's graphic nature, the Imagewriter can be controlled far more fully. It can produce up to 160 horizontal dots per inch and line spacings as small as $1/144$ inch. But it takes special software to do it: the kind of software in Mac's Imagewriter file.

There are few standards among printers. Some impact printers cannot print with the type of resolution Mac requires. Others that have the capability may require different instructions to achieve it. That's why you can't plug just any printer into Mac's serial port and expect results.

The Concept of Printing

In theory, you can use another printer under certain circumstances. But the Macintosh program you use must be able to print in what Mac calls *draft* quality. For the present, that's *all* you'll be able to use with the other printer. Mac's special fonts and dazzling graphics will be utterly unavailable.

To print in draft mode, Mac ignores its graphic nature and instead transmits just the ASCII code to the printer. The printer must rely on its own internal character set for printing. Many printers currently available do have excellent character sets of their own. But so far, none is equipped to do more than print Mac's output character-by-character—and getting one cabled properly and running consistently may well require wizardry and sweat.

But Apple itself hasn't yet captured the magic. The company markets a letter-quality daisy-wheel printer (manufactured by Qume) under its own aegis. Since *MacWrite* supports draft-quality output, it's reasonable to assume that this will be the first alternative officially supported by Apple, but this is only an assumption. Even after quite some time on the market, Apple's Lisa computer, Mac's older sister, is still tied solely to the Imagewriter. And daisy-wheel printers are slow and clumsy when it comes to graphics.

For the present, trying to use a printer other than the Imagewriter would exclude you from the world of Mac graphics. Most of the illustrations in this book were done on the Mac with the Imagewriter printer (using some tricks you'll find out about when you get to *MacPaint*). They wouldn't have been possible using any other printer currently available.

The Future of Hardcopy

There's no crystal ball icon in Mac's System file, but we'll open one up anyway. Printers are changing, and Mac's advanced design is a perfect mate for the new technologies they employ.

Ink-jet printers get images on paper by shooting jets of ink at the paper through extremely small nozzles in the print head. *Laser printers* use lasers to lay down an image by scanning across a metallic drum, and then a process similar to xerography does the rest. Both processes are significantly quieter than current printers, because the loudest impact is the sound of droplets of ink hitting a piece of paper.

Both types can be controlled on a dot-by-dot basis with even greater precision than most current impact printers. Because their technology allows such precise control over the placement of dots, the physical appearance of the letters and numbers can be vastly more pleasing than what current impact printers are capable of.

The price of ink-jet printers has dropped below $1,000 in the past year and looks to drop further still. The cost of laser printers, although still above $3,000, is a third of what it was just a couple of years ago. Apple has hinted that it is looking closely at laser-printing technology. Hopes are that advancements and competition will make both types practical for a machine like the Mac before the end of 1984.

One Final Word

If you've taken a close look at the manual that comes with the Imagewriter, much of it may seem like incomprehensible gibberish. The information in the back of the manual is primarily for people who have computers less sophisticated than the Mac, and for programmers who want to make the printer do its tricks.

That manual gives you an inkling of what the computer world was like in the days Before Macintosh. Back then (and even now, if you want to hook up your printer to a less sophisticated computer than Mac), you might well have had to worry about DIP switches and escape codes and data byte length and other such nonsense. The folks who designed the Mac have already read and understood that stuff, so you don't have to.

10
MACPAINTING

Most people couldn't care less about computer hardware. Interesting as the stuff may be to the high priesthood, the general public rarely gets excited about chips, keyboards, disk drives, or mice. It's what you can do with them that captures the public fancy, and software is what makes doing things possible.

It's safe to say that hundreds of thousands of people have bought a particular computer simply because a particular program would run on it. One reason the Apple // series stole a march on its competitors was that for a very long time it was the only machine that could run *VisiCalc*, the original electronic spreadsheet. Lotus *1-2-3*, the best-selling "integrated" software package, moved thousands of IBM Personal Computers off the shelves. For Mac, the pivotal program is unquestionably the dazzling *MacPaint*, which gives Mac unrivaled graphics capabilities.

The Atkinson Connection

MacPaint comes directly from the desktop of Bill Atkinson, who will undoubtedly be remembered as the father of Macintosh graphics. You can hardly forget him: his picture adorns some of the *MacPaint* dialog boxes. Atkinson has been with the company a little less than forever. He wrote Apple's original version of the programming language Pascal and created the QuickDraw package for Macintosh.

QuickDraw originally saw life as an application Atkinson wrote for Apple's Lisa. Mac, alas, has less memory than its older sister, so the Mac version of QuickDraw had to be totally reworked.

The Lisa version was written in Pascal, which is relatively simple for the programmer to work in. But programs written in Pascal can end up being rather large and rather slow. Mac's version had to be written in 68000 assembly language, which is very fast, very compact, and very difficult to write. A language like Pascal looks vaguely like English even to the uninitiated; assembly language, in which the programmer is working one step away from the most primitive level of the computer, tends to look like secret code.

Atkinson's QuickDraw program solved the problem of getting text and graphics to Mac's screen and changing them fast. Once QuickDraw was in place, the rest was "easy"—to develop an application that could take advantage of it. Enter *MacPaint.*

Getting Started

Apple has distributed *MacPaint* in a variety of ways. Originally it was included on one disk with *MacWrite* and all the system files. Since that left very little room on the disk for the pictures users would create, that setup often sent operations grinding to a halt.

Along with the first update to the Finder, many dealers distributed updates for *MacWrite* and *MacPaint* on a single disk as before. However, some supplied their customers with *Write* and *Paint* on two separate boot disks.

If you've already got *MacPaint* on a separate disk with the System and Finder files on it, bully for you. All you have to do is use Disk Copy (for a one-drive Mac) or the icon-overlay method to make a master and a working copy of that disk. You can skip over the next section.

But if you've got a disk with both *MacWrite* and *MacPaint* on it, it's time to make yourself a *MacPaint-only* disk. Considering what you know already, it'll be a snap.

Making a *MacPaint* Disk

The problem at hand is to transfer the system files and *MacPaint* to another disk. As always, it's a good idea to clear nonvital material from the desktop. If you really have no intention of using some of the disks or windows or folders you've left there, you should close them, put them away, or trash their icons. Keeping the Heap as empty as possible is to your ultimate advantage.

No matter which disk is currently in the internal drive, eject it. During the ejection, Mac writes information to the disk concerning its state of being at the time. It will remember which windows were open, their size, and their relative position on the screen. Even if you don't return to that disk during this session, the next time you use it, its windows will reappear as you left them.

It's time to reach for another blank Mac disk. They go fast. It won't be long before you're ready for a second box, unless you're the gambling type who refuses to make archival copies of anything.

Insert the blank disk in the drive (the external drive if you have it) and go through the initialization process. Call the disk "Paint Master"—"MacPaint" alone won't work, since that name is already taken by the application itself. When it's done, eject the disk and insert the *MacWrite/MacPaint* original, making sure it's write-protected. If you have two drives, leave the new disk in the external drive, and insert the *MacWrite/MacPaint* disk in the internal unit.

Open the *Write/Paint* disk icon. Then click the System Folder and Shift-click *MacPaint* (or vice versa). With both icons inverted, drag them to the icon of the Paint Master disk you just created and release. If you have two drives, your new disk will be ready after a short while. If you have only one, you'll do a lot of disk swapping before you're through. You may even have to insert your startup disk to complete the process. If so, Mac will advise you.

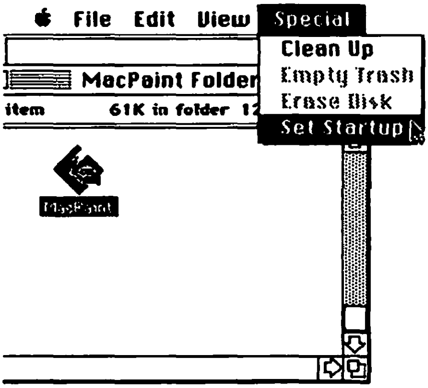
If you end up with a system disk in the drive, open it and see if it includes Disk Copy. If not, eject it and find one that does. Use Disk Copy to make a copy of Paint Master. When you're through, label it Paint—Working. Then put the original *MacPaint/MacWrite* disk and the new Paint Master in the proverbial safe place. If you're sensibly paranoid, you'll put them in two *different* places.

It might be a good time to also make a data disk or two to store the masterpieces you'll soon be turning out. Just eject whatever's in the drive, insert a blank disk, and initialize and name it. You might want to call it "MacArt 1."

Setting Startup

MacPaint should come with an advisory label: "Warning. The Artist General Has Determined That Using *MacPaint* Can Be Dangerous to Your Social Life." Once beyond the initial unfamiliarity, you're likely to find it so simple and so much fun to use that you'll be unwilling to quit.

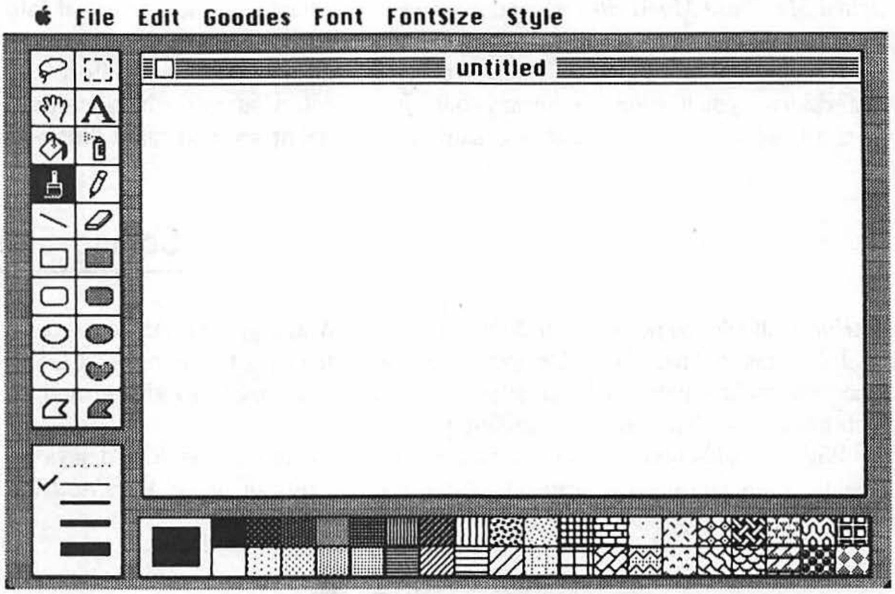
With an addiction of that magnitude, there should be as few delays as possible when you get the urge. To avoid them, why not make *MacPaint* the startup file?



Make sure Paint—Working is in the drive. Open it, click the *MacPaint* icon, then drag out the Set Startup option from the Special menu. You'll get a chance to change your mind, but don't. If you do change your mind later on, you can specify Finder as the startup file, thereby canceling your choice of *MacPaint*. Click OK.

Starting *MacPaint*

To get under way, either double-click the *MacPaint* icon or, if you'd like to see it start all by itself, eject the disk, then reset the computer, and then reinsert the disk. Either way, you'll see a very different picture in a few seconds.

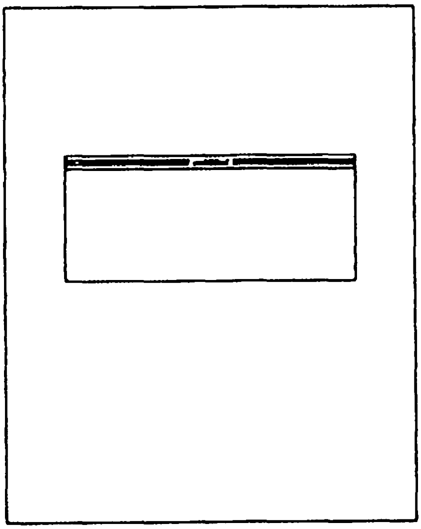


The *MacPaint* screen represents a collaboration of a multitude of components, most of which you've already seen before, but not exactly in this form. Let's explore them.

At the top is the menu bar. Although three of the pull-down menu choices have the same names as their system menu bar counterparts, only the options under the apple icon remain identical. The rest relate to specific *MacPaint* features. If you feel like taking a sneak preview, go ahead and pull down those menus. Just don't make any selections yet.

A little further down from that is a title bar labeled "untitled." Mac supplies this as the default name for your *MacPaint* document. When you save it to disk, you'll be given the chance to change the name to something more apropos. As usual, there's a close box on the left of the title bar.

The white expanse beneath the title bar is your actual drawing area. Don't be disappointed by its size. You're only seeing the amount of space Mac can display in the screen area it has available. There's lots more where that came from. The actual drawing area is roughly equivalent to an 8½ × 11-inch sheet of paper. By shifting the visible space around, you can use it all.

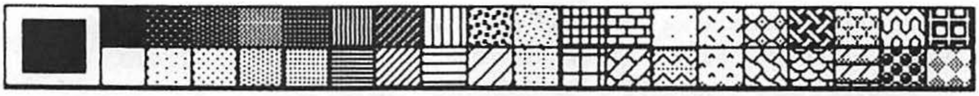


***MacPaint*'s drawing area in relation to a full *MacPaint* page. The drawing area can be moved to work on any portion of the page.**

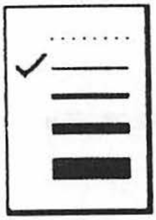
Note that the drawing area lacks scroll bars, the more common method of shifting your view. Instead, you'll use one of *MacPaint*'s own tools, which will give you even greater freedom of motion. We'll discuss it shortly.

Patterns and Lines

Below the painting area are two rows of swatches. They represent patterns you can use to fill or paint the shapes you draw. The larger box to the left shows which pattern is currently selected. If none look appropriate, you can select the one that's closest to what you want and edit it just like the desktop on the Control Panel. To bring a magnified version of the pattern into the *MacPaint* window for customization purposes, simply double-click the large swatch box.



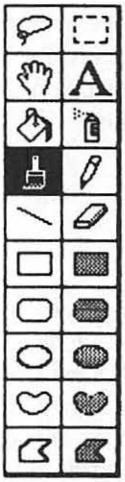
Immediately to the left of the swatch display is a box containing five lines and a check mark. Selecting the lines in this box regulates the thickness of the lines you draw, and the check mark appears beside the currently selected option. *MacPaint*'s default is the narrowest solid line. The dotted line, as you'll soon discover, has special uses of its own.



The Icons and the Pointer

Move the pointer down from the menu bar into the blank window. It will turn into a little black dot. True to its chameleonic nature, the pointer is trying to be of assistance.

Look to the left of the blank window at the two rows of icons extending to the top of the screen. These are the tools you'll be using to create your masterpieces. Notice that the paintbrush is inverted.

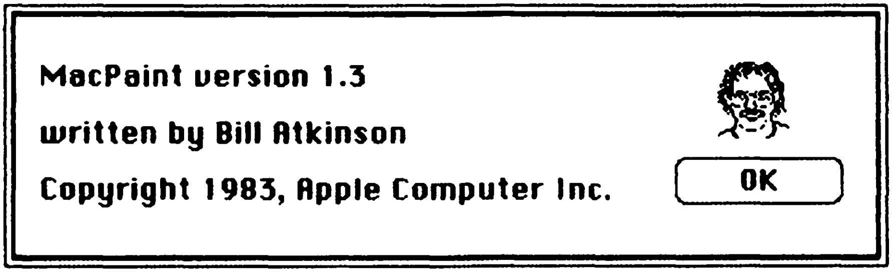


When *MacPaint* first loads, the default tool it selects is the *brush.* The pointer assumes the shape of a paintbrush tip to let you use it. It's still the pointer, though, as you can see by moving it out of the painting area.

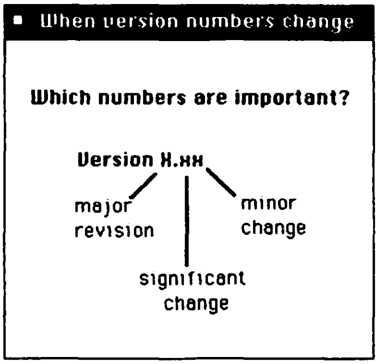
The Version

Before you begin using *MacPaint,* you should make sure you have the correct version. New features are often added to software; when this happens, the manufacturer releases another version of it that includes the revisions.

Pull down the apple menu. Where you once found About the Finder, you now see *About MacPaint.* That particular section of the apple pull-down menu is the only option that changes, and that's why it's segregated from the rest by a line. Each application includes an appropriate *About*. . .



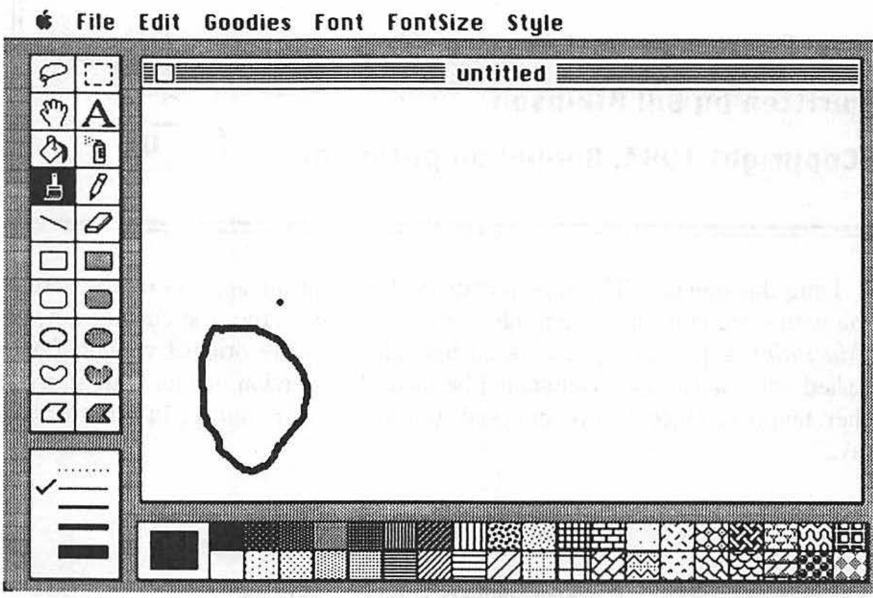
Drag this one out. The sage portrait of Bill Atkinson appears on the screen along with even more important information. At press time, the current version of *MacPaint* is 1.3. It represents an upgrade from the original version Apple supplied with Macintosh. You should be using this version or one with an even higher number. Once you've checked it, click the OK button to put the box away.



If you've got an earlier version than 1.3, you should get the upgrade from your dealer. The first revision, from 1.0 to 1.3, was offered at no charge by Apple. Future revisions may or may not cost money. In the past, Apple has been very generous about providing software updates, and charges, when required, have been low. Dealers may elect to add a fee for the time involved in performing the upgrade, but any such fee should be low—better yet, nonexistent.

The First Doodle

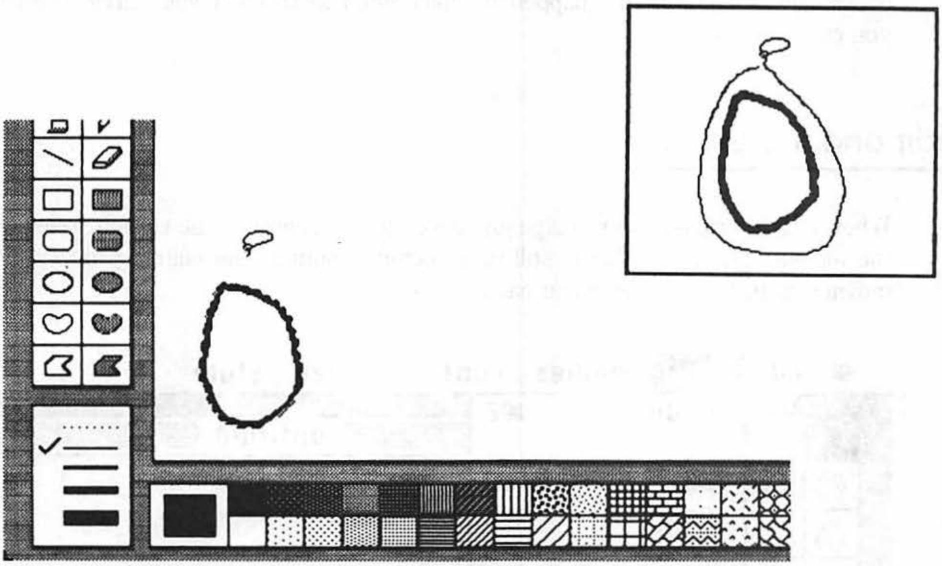
Let's put an image on *Paint*'s "canvas." (We'll generally skip the "Mac" part from now on.) Since *Paint* has selected the paintbrush, let's take it up on that suggestion. Move the brush somewhere near the lower left-hand corner of the screen. Press the mouse and draw a circle. When you've completed it, release the mouse. Beautiful! Well, sort of . . .



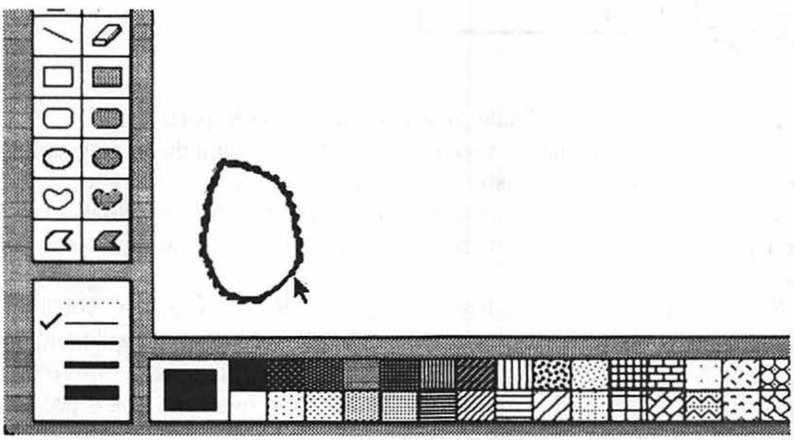
The Lasso

The two tools on top of the collection are used for editing what you've done. The one in the upper left-hand corner is called the *lasso.* Move up to the lasso and click to select it. Now bring the pointer back into the display area. It's now in the form of the lasso.

It works like—well, a lasso. Bring the pointer to a point outside the circle you drew and press. Start to drag around the circle. Notice that the lasso leaves a trail behind it to mark where it's been. Encircle the figure, stopping at the point where you began, and release the mouse button.



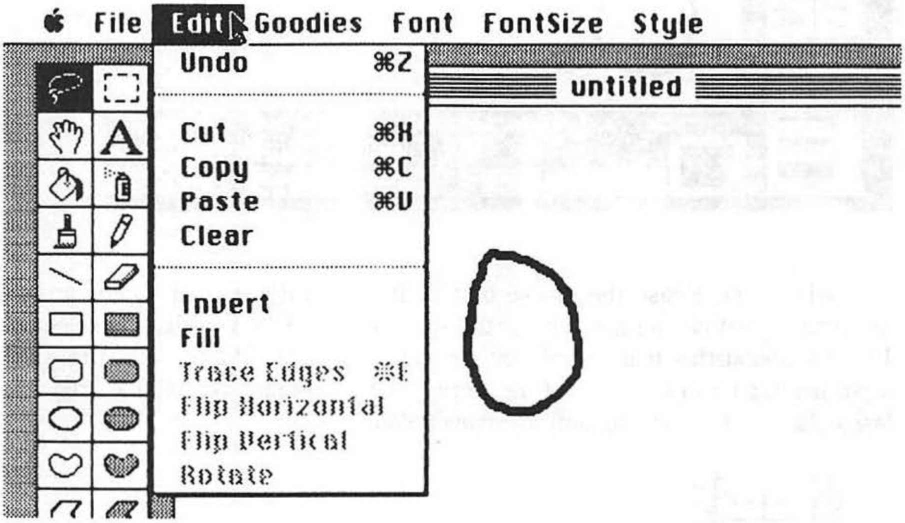
When you release the mouse button, the lasso draws itself tightly around the figure—just like a rope. The image shimmers to show you that it's selected. Its own boundaries mark what you can think of as an *editing area.* Bring the lasso pointer up to the edge of the form. When you enter the editing area, the lasso changes back to the familiar arrow pointer-shape.



You can now easily move the figure. With the arrow visible, press and drag. Your painted circle should follow as you move the mouse. If it doesn't and the circle stops shimmering, you pressed when the pointer was in the lasso shape. *Paint* assumed you wanted to define another editing area and abandons the one previously defined. If that happened, you'll need to reselect your circle before you can move it.

Edit and the Lasso

When you've dragged your image just about to the center of the screen, release the mouse. The circle should still be selected. Continue the editing process by moving up to Edit on the menu bar and press.



The pull-down menu should look familiar to you in part. Undo, Cut, Copy, Paste, and Clear are old hat to you at this point. The immediate information they impart is that the Clipboard also exists in the *MacPaint* environment.

Invert is new. Drag down and release when it is selected. What was a black circle with a white center is now reversed. Invert it a second time to put it back the way it was.

Fill is another option you haven't seen yet. If you drag to it, you'll fill your circle with the current pattern, which is currently black—which will blend in with your shape's border to produce a rather unappealing black blob. Move down to the pattern swatches and click when the pointer is over one you'd prefer. The larger block on the left changes as well.

Move back up to Edit, and Fill with this new pattern. As long as the shape is still selected, there should be no problem. Don't like what you just did? Move back up to Edit, drag down to Undo, and release. Not only has the circle been restored to its original form, it's also been jumped back to its original position. All the changes made since it was first selected were removed.

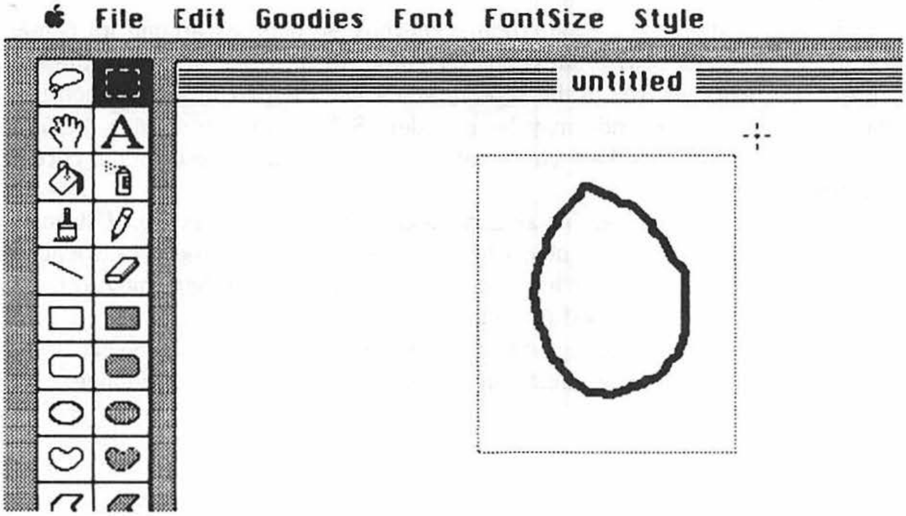
Undo is a very useful option. If you remove something by accident or extend a line or a shape into a region where you didn't want it to go, you can Undo it. Just make sure that Undo is the very next thing you do. You can even Undo an Undo. Try it—then Undo the Undo of the Undo.

Remember, there's a difference between Fill and Invert. The former uses the currently selected pattern to fill the defined editing area. The latter checks each dot in the editing area, changing the white to black and black to white. When using Invert, keep in mind that everything in the area, including the patterns, is composed of black and white dots.

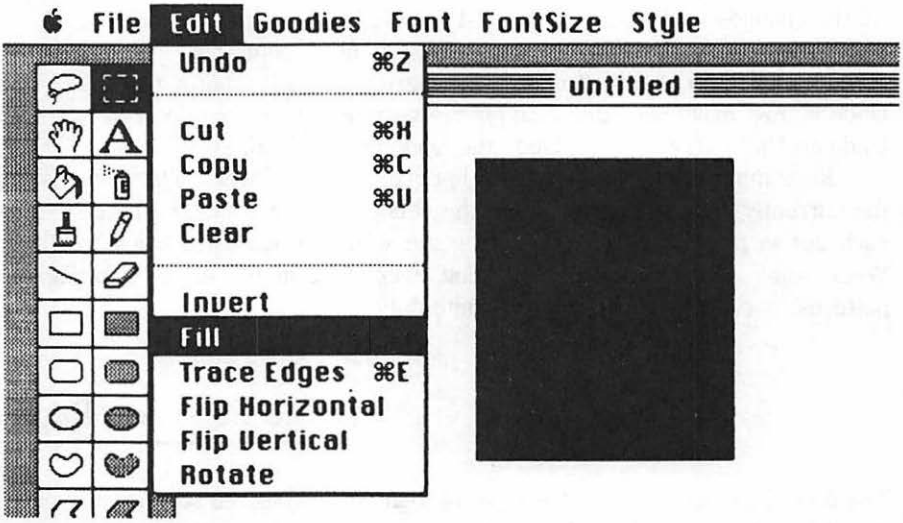
The Selection Rectangle

The dotted-line icon next to the lasso is what Apple calls the *selection rectangle,* and its function is similar. The difference is that rather than defining something by its own natural boundaries, the selection rectangle lets you create a rectangular editing area around the object.

Select it and give it a try. The pointer will change shape to a sort of broken cross hair. To surround your circle, press at one corner of the imaginary rectangle and drag to the other. It's just like selecting multiple icons on the system level.



Edit may give you some surprising results. Try Invert: you'll discover it works on the entire editing area. Your object inverts, and so does the entire area within the selection rectangle.



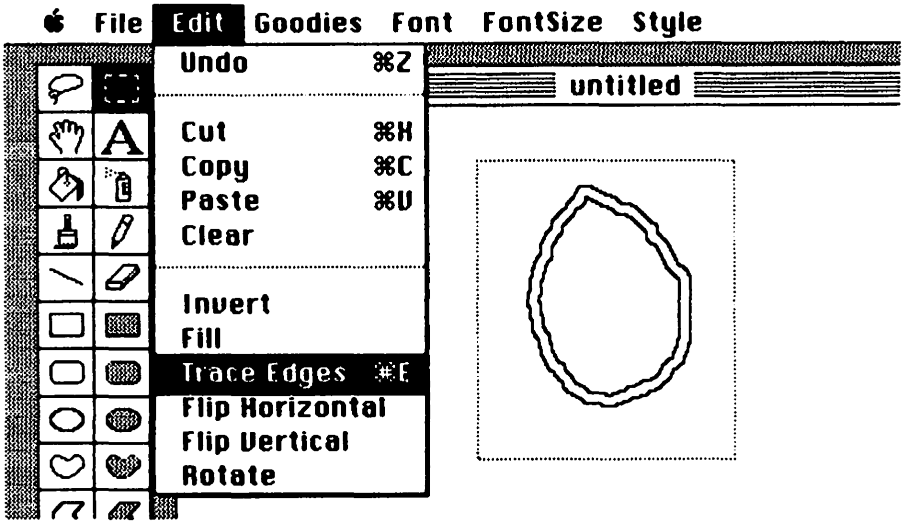
Undo that and try Fill. Weird! The entire rectangular area fills with the selected pattern, leaving no trace of what was originally there. Undo time, unless a black rectangle is your idea of heaven.

But the selection rectangle offers some tricks the lasso doesn't. It makes four more options available from the Edit menu. *Flip Horizontal* and *Flip Vertical* are rather obvious. They simply pivot the entire box around its horizontal axis. Try and then Undo to get the idea.

Rotate, on the other hand, rotates the box 90 degrees around its center point in a counterclockwise direction. Watch out for this one: if part of the box goes off the working area of the screen, you'll lose the part of your design that you can't see. A fast Undo may be in order. Still missing in version 1.3 is a selectable rotate, more like a twist feature, which might prove useful in certain circumstances.

Trace Edges, also available as Command-E, offers an interesting, if strange, option. Using it on a selected object hollows the solid areas of the object, leaving only the edges in black. Once again, try and Undo. (If you're beginning to reach for Command-Z to Undo, good for you.)

Try using the Trace Edges command repeatedly to enlarge an object. Used on the proper drawing, the effect can be eerie. Undo before you continue.



Moving Around

Dragging the selection rectangle works the same way as with the lasso. Mark off the box, put the pointer inside (making sure it changes back to an arrow), then press and drag. The whole will follow along.

Sometimes you'll want to move an object precisely on the vertical or horizontal axis. That's almost impossible freehand: desk irregularities and the jittering of your mouse hand are real impediments. The answer is to press and hold either Shift key before you start dragging.

If you start dragging horizontally, then the box or object will only move in a straight line to the left or right. To change the axis to up and down, you must release the mouse button and press again, and drag vertically. Now the only possible movement will be vertical, no matter how hard you try to deviate. To restore full movement, just release the Shift key and the mouse button. In *MacPaint* terminology, dragging an object while pressing the Shift key is called *constraint.* It works with both the lasso and the selection rectangle.

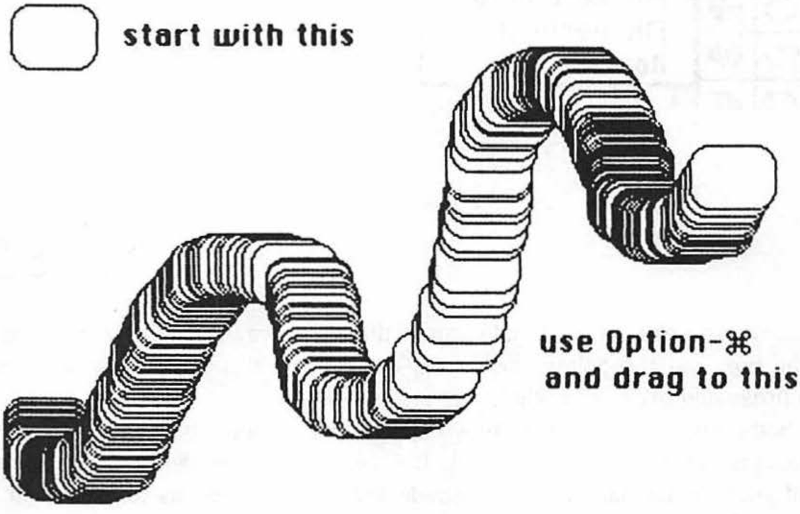
Adding More Keys

What if you *double-click* the selection rectangle? *Paint* will automatically enclose the entire viewing area in the selection rectangle. It's especially useful for copying the whole area. Double-clicking the lasso doesn't do anything special.

Unlike the one at the system level, *MacPaint*'s File menu offers no *Duplicate* option. There's really no need for it; selecting an object with either the lasso or the selection rectangle lets you duplicate it easily.

One way is to select the object and drag Copy from the File menu. That puts a copy of the object in the Clipboard. Paste will put the copy on the screen, and it will appear selected so you can move it around if you'd like. But Paste decides where to put the object, generally smack dab in the middle of the screen, which is not necessarily where you'll want it.

The shortcut is to select the item and then place the pointer within the selected area as if you were about to move it. Then press either Option key on the keyboard, and, while holding it down, drag the object away. The original object or rectangle will stay put, and a copy will follow the pointer as you drag.



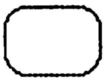
A variation on this will produce an infinite number of copies along the path you drag. Rather than pressing just the Option key, press the Command key as well. While holding them both down, drag the object. As you do, you'll leave a trail of identical copies behind you; how far apart they appear depends on how fast you drag and which line width has been chosen at the lower left. The method works beautifully with the lasso; with the selection rectangle, the results may seem a little strange.

Sizing

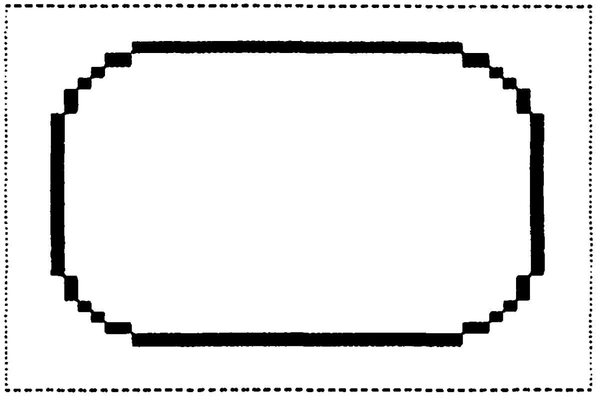
You may want to draw a big object and then scale it down to use in a smaller size. There are several ways to attack the situation.

One is to enclose the object in the selection rectangle, then hold down the Command key. Bring the pointer up to one side or corner of the box, press, and drag. As you do, the opposite side or corner will stay put while the section you're dragging follows you, thereby stretching or contracting everything within, depending on which way you drag.

Dragging a corner diagonally will retain most of the proportion of the box within. You can vary height and width independently of each other simply by dragging at either a side or the top or bottom, making for some very lopsided images. But if you do drag primarily in one direction, you may have to release the mouse button and the Command key before you can drag in the other; at times this process will seem to have a built-in constraint.



original size



expanded with Selection Rectangle

There's still another way. First select and Copy the object into the Clipboard. Then use the selection rectangle to cover an empty area with the new dimensions you'd like for the image. Then just move up to Edit and Paste the object from the Clipboard. It will reappear, proportioned to the new dimensions of the box you described. Since it is selected when it appears, you can modify it to a finer degree by using the Command-drag procedure.

Squeezing into Tight Places

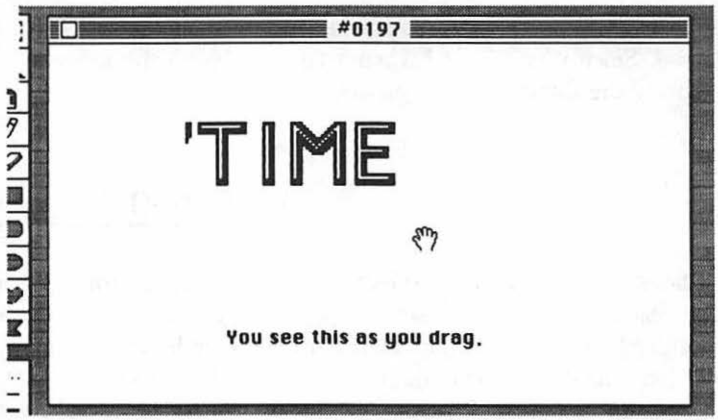
Sooner or later you may want to select one object from a group. It's easy as long as the objects aren't too close together. If they are, using the selection rectangle probably won't work, and even the lasso may be tricky.

If you don't need the extra editing features of the selection rectangle, the lasso may still be able to help you. If there's a relatively straight space, no matter how narrow, between the object you want to select and its nearest neighbor, you're definitely in luck.

Select the lasso and move to an open area directly above the corridor between the two objects. Press and drag around the object you want to select. When you arrive at a point opposite the one where you started, release the mouse button. *Paint* will join the lasso's two open ends automatically, using the straightest line possible. It's a much easier procedure than trying to squeeze the lasso manually between two closely spaced objects.

The Hand

With a working area much larger than its viewing area and no scroll bars or size box to view it, doing things with *Paint* might be rather frustrating were it not for the *hand*. Select the hand and bring it roughly into the center of the viewing area. Using your circle (by now done and undone many times) as a reference point, press and drag to the left. Although the circle appears to move with you, actually the entire page is moving beneath the view screen. Drag all the way to the edge. If the circle disappears, don't worry about it. You'll find it again in a moment.

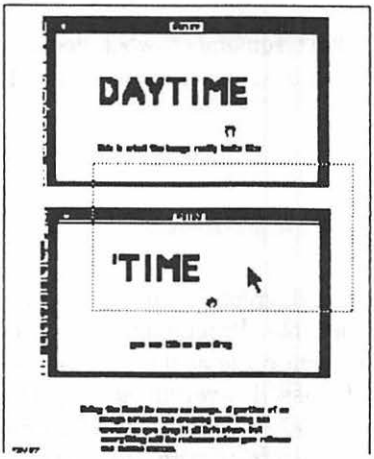


What happens if you do "lose" something outside the viewing area? The obvious answer is that you use the hand to move it back into view.

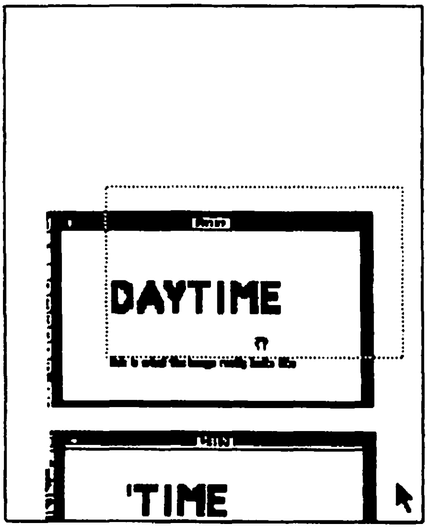
But the material outside the viewing area is not immediately visible as you move the document. You won't know what you're going to see until you stop dragging. In some instances it can be a hit-or-miss proposition.

The way to get around that small impediment is to double-click the hand icon. It allows you to view the entire page on a smaller scale, and displays the position of the current viewing window relative to the page. It will also give you another way to move around.

While looking at the entire page, simply move *inside* the dotted rectangle that defines the viewing area. Then press and drag. When you've placed the viewing area in the position you want relative to the page as a whole, just click the OK button.



But there's more. Working in the viewing area, you may not have the entire image positioned correctly. You can adjust individual objects within the viewing area, but the image as a whole is stuck where it is. Fortunately, you can adjust this as well from the page display. Just press and drag anywhere *outside* the boundaries of the viewing area. You'll be able to shift the entire image relative to the page.



When you've got both the viewing area and the image orientation positioned as you want them, click the OK button to lock your position and return you to *Paint*'s display. If you aren't satisfied with your changes, just click Cancel and they'll be disregarded.

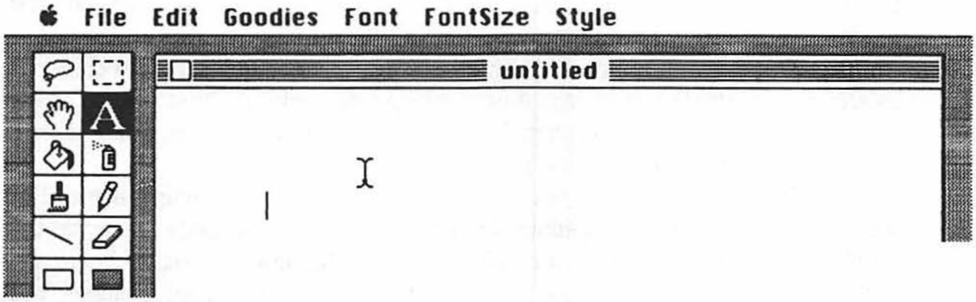
Incidentally, if you don't remember what double-clicking the hand does, you'll find the same function available from the Show Page option beneath the Goodies menu.

Adding Text

On most computers text and graphics are treated as two separate, distinct entities, essentially incompatible. Programmers have found clever solutions to the problem, but most of them come at the expense of either the words or the pictures. But as we've discussed, everything is graphics to Mac, so it treats "text" letters, numbers, and other symbols produced from the keyboard just the same as any images you might create with *MacPaint.*

To add text to your *Paint* document, just click the letter *A* in the icon display. When the pointer is back in the viewing area it will change to the

I-beam. If you click again, an insertion point will appear on the screen and you can begin entering your text.

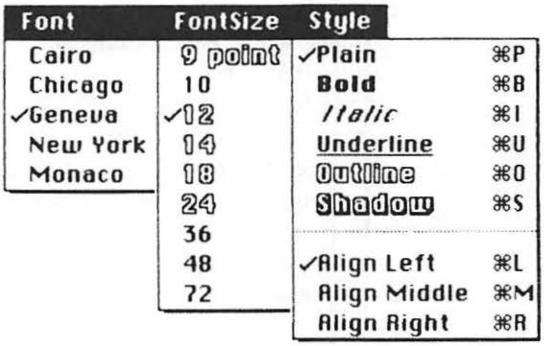


Anything you type will appear on the screen. If you make a mistake, you can fix it with the Backspace key. But unlike the Note Pad, *Paint* does not support word wrap. When you come to the edge of the viewing area, you must use the Return key to advance to the next line. If you want to continue further on the same line, you can use the hand to shift the viewing area.

All text is subject to the same editing features as any other graphic image. You can use the normal Cut and Paste procedures, and you can rotate and flip text for mirror effects. Even if you were limited to a single type style, this feature would be useful.

Fancy Type

But although *Paint* always defaults to a 12-pt. Geneva plain font when you begin, three of the menu bar items, *Font, FontSize,* and *Style,* allow you to change that. Pull 'em down and explore.



The FontSize menu uses hollow characters to display sizes that exist in the System file for the currently selected font; *Paint* must create the sizes displayed in solid characters. *Paint* will produce the best character display if the font is in the System file. When it must create it, the characters will appear "stepped" and ragged.

Keep in mind that from the moment you click the insertion point into existence until the time you click it or anything else again, the text is in an active state. If during that time you change either the font, size, or style, you'll change the characteristics of everything you've just typed.

That's terrific when you just want to try things out for size and shape. But when you want to alter succeeding characters, it can be a nuisance. To avoid the problem, move the I-beam to the point you want the new material to begin and click. This will establish a new active text area. The menu-bar changes you select will now apply to any material you type before clicking again. Note that once you've clicked, there is *no* easy way to change the font, size, or style of the text already on your screen.

More than one style may be selected at once. For each item you want, you must pull down the menu, select, and then let the menu roll up again, which is one reason every option on the menu is available via the Option-and-letter-key method. The check marks show you what's current.

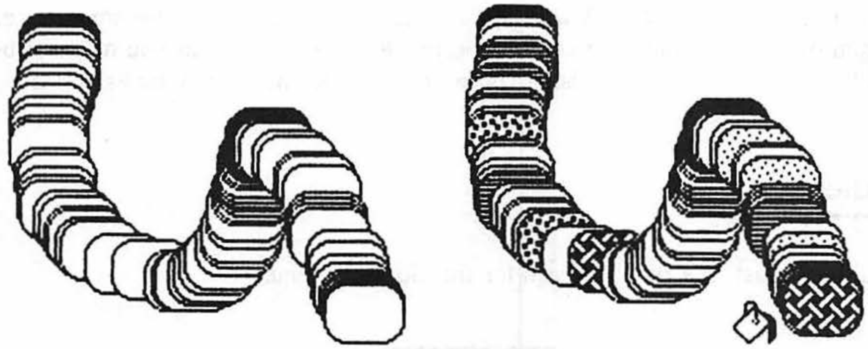
The alignment options refer to your original insertion point. Left puts all the text to the right of that point; Right puts all the text to the left; Center centers the text around that spot. The Style menu, incidentally, gives you quite a few Command key alternatives to using the menu options, just as Edit does.

Pouring It On

As you saw earlier, you can use Fill from the Edit menu to "color" an object. But you won't always want an entire area filled in. You may have an intricate image, parts of which need to be inlaid with different patterns. Trying to do that with the lasso or selection rectangle would be very difficult.

The easier way to get around that is to use the *paint can.* By selecting (or designing) the appropriate pattern from the swatches, you can fill any area by moving the dripping tip of the paint into it and clicking.

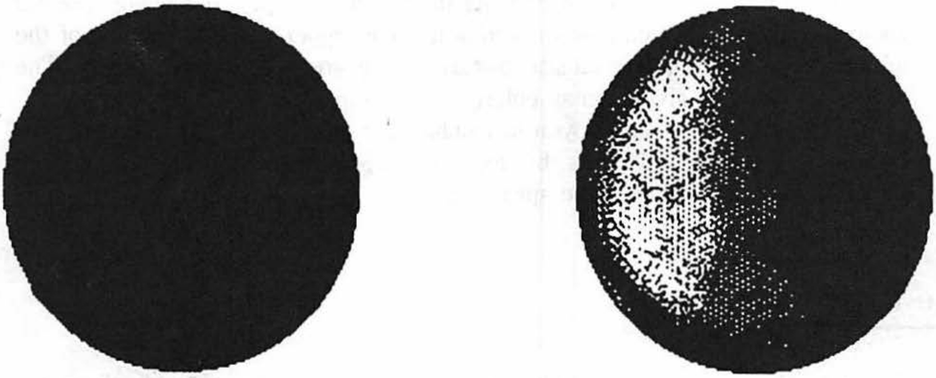
Some caution should be observed. The paint flows until it reaches a boundary, like a line. If there is even the slightest break in an otherwise solid border, the paint will seep out and begin to cover *everything* until it finds a totally bounded area. Fortunately, if you immediately Undo the act, all will be restored to the original condition. Beware: it's possible to paint an entire viewing area utterly by accident.



The paint can fills a bounded area with the currently selected pattern. If clicked in the position shown, the paint can would fill the entire window *outside* the images.

Macintosh Graffiti

Spray paint cans have been the curse of blank walls and subway cars since a suitable propellant was first pumped into an otherwise innocent can of paint. In *MacPaint*'s environment, clicking the *spray can* icon can be both a boon and a curse.



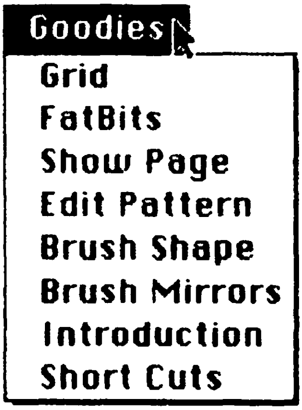
Left: circle filled with paint can. Right: circle highlighted with spray can.

The spray can lets you lay down the currently selected pattern in gradual doses, using its dotted-circle pointer. To produce the pattern in full, you'll need to make several passes over the same area.

As with a real spray can, accuracy can become a problem as paint shoots out the icon's broad pointer. A well-defined edge, for instance, can become blurred from overspray. Undo can correct the problem, of course, but you may not be able to get the kind of precision you want no matter how many times you try.

Goodies: FatBits

All is not lost. It's time to reach for the Goodies menu.



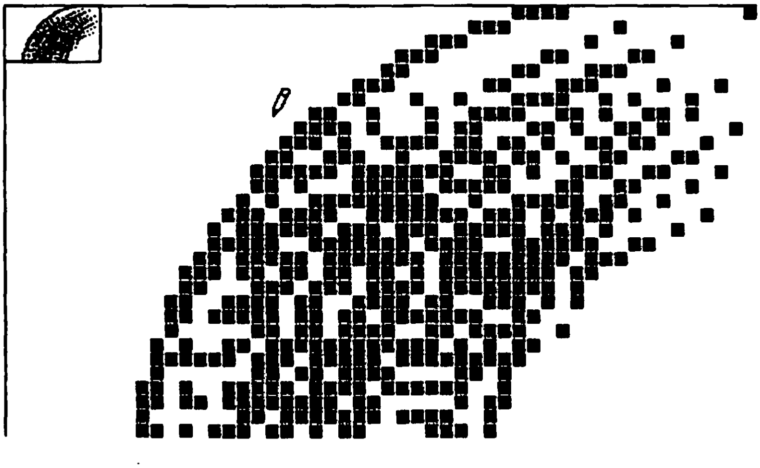
The option you want is *FatBits*. As the menu rolls up, the viewing area will zoom in on the area you last worked with. The upper left-hand corner of the window gives you an original-size picture of the area you're working on. The rest of the window gives you an enlarged, close-up view.

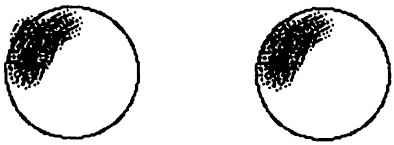
Since the spray can got you in trouble, put it down; as with all the other icons, it can be used in FatBits, but for now the *pencil* is more appropriate. Click its icon, the one just below the spray can.

The Pencil

The pencil, incidentally, is another way to get into FatBits. Double-clicking it takes you directly to the screen you see before you.

When you press and drag with the pencil icon, what happens depends on where you start. If you press while the icon is over a black square, that square will turn white, and as long as you continue to drag, so will every square it passes over. You can use it this way to get rid of any stray spots of paint that the spray can (or any other tool or procedure) deposited on your document.





Original sphere with overspray. Overspray removed with FatBits.

Pressing and dragging from a white square turns that and any squares the pencil passes over to black. As before, once the action is initiated, it continues in that mode until you release the mouse button. It's precisely the same scheme you learned when you practiced changing the desktop pattern.

If you need to change the color of a single dot at a time, clicking it will do the trick. To see the effect on the normal-size version of your artwork, check the little inset in the upper left-hand corner. It changes with every modification you make to the FatBits image.

Moving in FatBits

If you need to move around, you can use the hand here just as you do in the main viewing window. In fact, when you use the pencil in FatBits, you can use the hand without bothering to click its icon. Just hold down an Option key. When you do, the pencil icon will turn into the hand icon and you can press and drag the FatBits display. This trick *only* works while you're in FatBits.

Leaving FatBits

If you don't want to stay in FatBits, you have four ways to exit. One is to simply double-click the pencil icon. Just as it can get you here, it can get you back.

You can move up to Goodies, drag down FatBits, and release. Or you can click the inset area in the upper left-hand corner. Either way, you'll find yourself back where you started, but with a corrected image.

The fourth way is handy for slipping into and out of FatBits in a hurry. Sometimes when modifying an image on such large scale you can lose sight of the big picture. But if you are using the pencil, all you have to do is press the Command key and click. It will toggle you in and out of the zoomed and normal viewing areas.

Lost in the Fat

Even though you have an image in your viewing area, you may be greeted by a blank space or something more or less unrecognizable when you move into FatBits. If that happens, return to the normal viewing area and, using the pencil, place a small dot adjacent to the area you want to work on. Since FatBits always enlarges the last section you worked on, this will key FatBits into the marked area. When you return to the zoomed image you can erase the marker dot and continue with what you wanted to do.

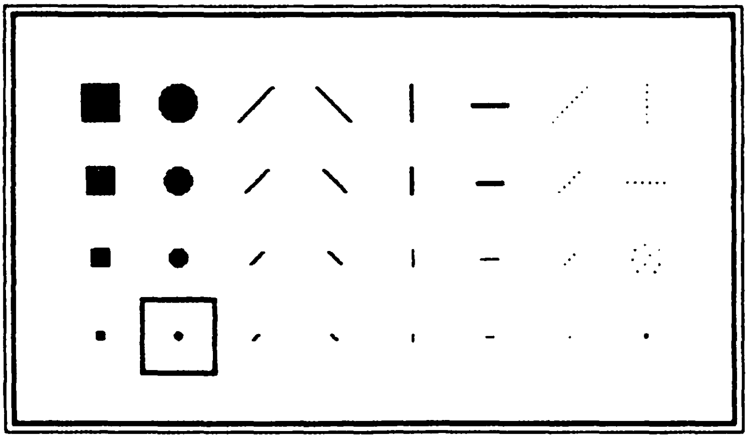
Cure for the Jitters

The combination of hand, mouse, and desktop do not make for the steadiest freehand drawing, particularly with the pencil. To assist in easing the jitters, you might want to drag out the Control Panel and temporarily reset the mouse's sensitivity to 0. This should slow things down enough to give you a fighting chance.

The Paintbrush

You've already used the paintbrush, so you know it works. You may not know that it also paints in the pattern you've currently selected or that you can choose among a variety of brush sizes and shapes. But what else would you expect?

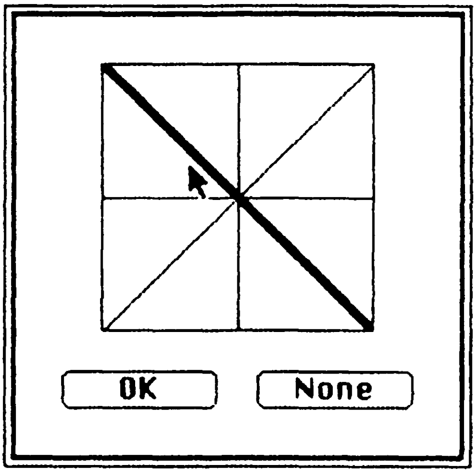
You could take the option called Brush Shape to see your choices. But there's another way. Simply move to the paintbrush icon and double-click.



There are eight different brush styles, each in four different sizes. That's a total of thirty-two different brushes you can use. The one currently in effect is enclosed in a square. Just move to the one you want, and click. You'll return to *Paint* automatically. If you don't want to change brushes, just click the one that's already selected.

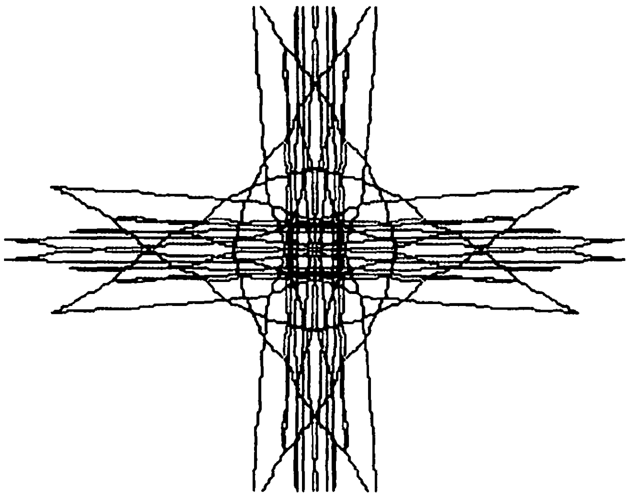
Brush Mirrors

The Goodies menu offers a way of multiplying the effects of your labor. Drag out the *Brush Mirrors* option from the Goodies menu.



The box that appears may seem a little odd. Clicking any of the four lines adds a brush that will mirror yours as if it were reflected in a line drawn across the screen in that direction. You can tell an additional brush has been chosen, because its line will double in width. You can click more than one; if you click one by accident, clicking it again will remove it. Clicking the "None" button will cancel all your choices; "OK" accepts them.

To use the Brush Mirrors, just press and drag to get your normal brush. You'll discover the extra brush or brushes you selected precisely mimicking your motions. When you're done it might be wise to go back and deselect all of the mirrors with the "None" button.



A drawing created with simultaneous use of vertical and horizontal Brush Mirrors.

The Rule

The diagonal-line icon is called the *rule.* Since left to their own devices most human beings can't draw truly straight lines, *Paint* will draw them for you.

The rule uses a cross hair as its pointer, and unlike the tools you've seen so far, uses the line box at the lower left to control the line width. Press where you want the line to begin, then drag the pointer. As you do, the line will emerge from the point you pressed, pivoting from it to the position of the cross hair. When you reach the spot you've chosen for the end of the line, release the mouse button. Lines that are even slightly diagonal will appear jagged, but the rule guarantees that you'll have the straightest line possible between the points you've chosen. If you need pure horizontals or verticals, you'll know you've got them when you can see no trace of the "jaggies."

The Eraser

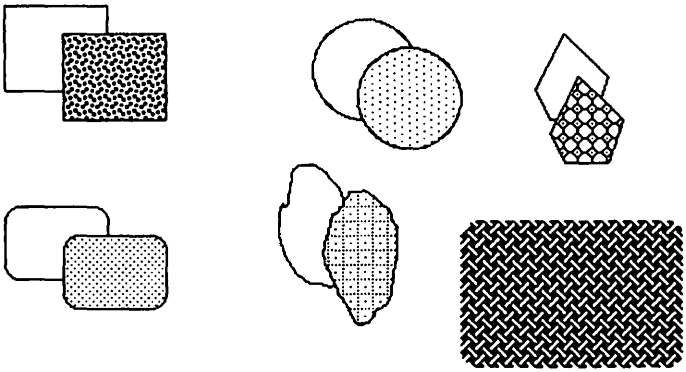
Now that you've thoroughly marked up the document area and have absolutely no place more to play on, it's time you met the *eraser.* Just like a blackboard eraser, this *Paint* tool will wipe away any section of the screen you drag it over.

If you want to erase the entire viewing area, just double-click the eraser icon. In case you double-click by accident, Undo immediately to restore the damage.

Shapes

Paint provides you with three predefined shapes: the rectangle, the round-cornered rectangle, and the oval. To use one, all you do is select it, move the pointer to where you want the shape to begin, press, and drag diagonally to the corner where you want the shape to end. Holding down the Shift key while using these shapes will produce squares, rounded-corner squares, and circles. They offer more variety than you might think: with adroit stretching and clever spray can work, the oval, for example, can end up representing an ellipse or even a sphere.

The last two icons in the group are freehand shapes. The kidneylike icon is a continuous-line implement like the pencil, but unlike the pencil, it produces lines in the currently selected width. The angled-box icon is similar to the rule, but differs in that releasing the mouse button does not end the line it creates but instead allows you to continue that line. It takes a double-click to get the line to quit following you around. Using the Shift key with this icon limits you to horizontal, vertical and 45° diagonal lines.

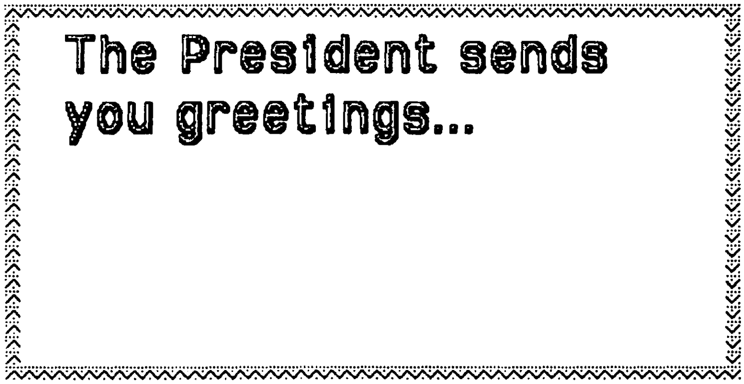


Images created with *MacPaint's* shape tools.

If you select one of these five icons from the left-hand column, all you'll get is shapes and lines. If you choose from the right-hand column, any fully bounded shape you produce will be automatically filled in with the current pattern. If you produce a shape that's not fully bounded, the tools will automatically close the open side before filling things in. And the filled shapes can also use the dotted line you've ignored for so long. With it, any shape you draw will leave only the pattern; no boundary or border line will appear.

Fancy Borders

Paint's shape icons can produce lines of varying thicknesses, but they're normally solid black. By holding down the Option key while dragging out a hollow shape, you'll produce the lines in the currently selected width, but those lines will be drawn with the currently selected pattern. Using the feature with the filled icons more or less duplicates the function of the dotted line.



Border created by holding down Option key in conjunction with shape tools.

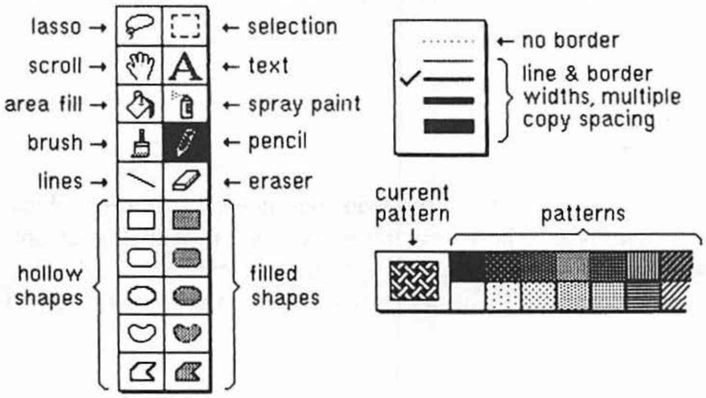
The Grid

At some point you might want to put some images you've drawn into vertical or horizontal alignment. Without a tool, the odds would be very much against you. More often than not, a difference of one dot up or down won't be apparent while you're squinting at the screen and trying to drag something into place. The instant you release the mouse, you'll probably realize you have to try again.

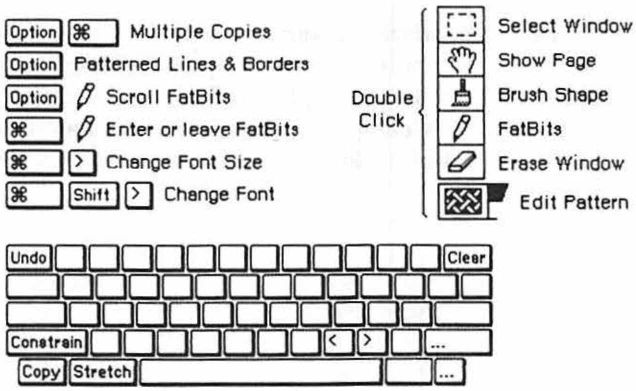
Some limited help is available from the Grid option under the Goodies menu. By selecting it, you restrict some of the pointer's mobility during editing operations, in effect keeping it from going "just anywhere." Unfortunately, the option does not produce a visible grid, which might be more helpful in some circumstances. However, the restrictions do help when you try to move two objects accurately, since the pointer will "jump over" some of the positions it might normally rest on.

MacHelp!

MacPaint isn't entirely without mercy in presenting all of these variations of movement and design to you. In case you forget, you can call up the *Introduction* and *Short Cuts* screens from the Goodies menu.



Introduction



Short Cuts

Most of the material on them should be familiar to you by now, with two possible exceptions. Holding down the Command key and the Shift key while you press the > key simply changes the font you're using. It just goes to the next one in order on the list. Using the Command-Shift combination with the < simply backs up to the previous font.

Using Command alone with the two characters works the same way on the font size: > increases it one step; < decreases it. When you get to the top or bottom of either list, trying to go any further simply produces no results.

In conjunction with the Command-letter-key options available from the Style menu, it's a quick way of zooming through the font and sizing choices to see which one looks best. The time to use it is once you've typed something in, *before* you click to move the insertion point. Once you've got it the way you want it, you can click to accept it. The next text you enter will appear in the same font and size you've selected unless you change the selections first.

The File Menu

Now that you know what the tools do, one question remains. What do you do with your MacTisse? The File menu is the place to find all your options. Pull it down and have a look. Since you're already working on something, you can't create a new document or open one that exists on disk, so those options appear in gray.

Close

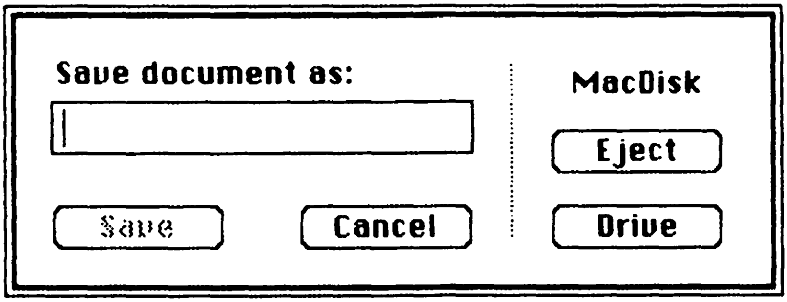
You can Close the document, which, as with any window, is the same as clicking its close box. Whichever method you choose, if you've changed the document since the last time you saved it, a dialog box will ask you if you would like to save it first. If you've just messed up something you didn't want to mess with, you don't. But if you don't want to lose what you've just worked on, you still may want to choose Cancel.

Save

Saving from the Close option works the same way as saving with the Save option: unless your document is untitled, *Paint* will use its current name to save it. Furthermore, it assumes that whatever disk *MacPaint* was on is the disk you wish to use for the save. In other words, this form of save wipes out any previous document already existing on disk under the same name. Most likely, that's your most recent version of the document, and you may well want to keep that intact.

Save As . . .

Save As . . . is much safer and much more versatile. It will let you eject the current disk, change the document's name, or specify a different drive if you have one. The *Drive* button will not appear if the internal drive is the only one connected. And you won't be able to switch to a drive that has no disk in it. But if you do change to a different drive, the Eject button will affect it.



From Save As, you may choose to eject the disk and put in a data disk on which to save your document. It's a good practice, since it keeps your working disk free and avoids out-of-room problems. When Mac's done saving, it'll let you put the *MacPaint* disk back.

Save As . . . also demands that you confirm your request if you ask to save a file under the same name as one that's already on the disk. That gives you one last chance to rename your file if you want to protect your previous version.

Escaping from Mistakes

If you've always wanted a second chance, then *Revert* is for you. It presumes that you are working on a document in stages, which means that before you make a major addition or change, you save a copy of the document in its current form. That's an excellent idea, since Undo undoes only the last minor thing you did.

Revert is like a super Undo. It lets you discard the current document and reload the last saved version. Just in case you release the mouse at the wrong point, *Paint* produces a dialog box that asks you to verify your intention. But be warned: if there is no previous version of your document, you'll find yourself greeted by a blank screen.

Printing

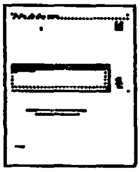
Print Draft is a new option added to version 1.3 of *MacPaint.* Both it and its companion *Print Final* are ways of getting your document out of Macintosh and onto your printer.

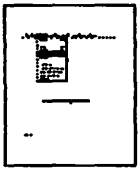
Printing *MacPaint* documents with regularity is an excellent way to exhaust the ribbon on the Imagewriter. The printing is very dense because of patterns and solids. Just printing the illustrations for this book took eight ribbons for both draft and final copies.

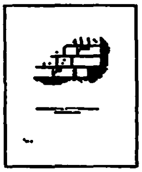
Print Draft produces a good reproduction. Although the solids will not print as solid as they might, this option extends ribbon life considerably. Print Final gives a reproduction as faithful as possible to the density of the screen images. A relatively short ribbon life is the trade-off such precision exacts.

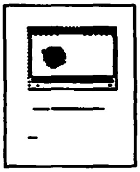
The third option for printing, *Print Catalog,* won't be terribly useful until you've developed some *MacPaint* documents. The icon display at the system level and the list of files you see when you Open gives you some information on your documents, but when you fill up a disk with them, you may find their names aren't enough to let you remember what they look like.

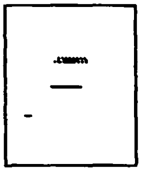
Print Catalog will print miniature versions of the documents as they exist on the current disk. It prints twenty-five pagelike boxes on each sheet of paper. Beneath each box is the name of the document, and inside each box is a re-creation of the document's contents. Although the image it produces on each of the pseudo-pages isn't exactly high quality, it's usually enough to give you a general idea of what the image represents.


*0076


*0077


*0078


*0079


*0080

If you have a sizable bunch to print, and you change your mind at some point after the printing has started, you can stop the operation. Just hold down the Command key and press the period key. The printing will stop and you'll return to *Paint*'s working area.

More Printing Tricks

It would be nice to believe that every re-creation of a Macintosh screen used in this book was painstakingly copied from the original by hand. Copied from the original, yes; by hand. . . . Are you kidding? We used a variation of the "snapshot" printer function described in chapter 9 to help make that kind of labor obsolete.

There, we used the Command-Shift and numeral 4 key combination to send a snapshot of the current active window to the printer. By locking the Caps Lock key into the *on* position and using the same key sequence, we could also send a snapshot of the *entire* screen to the printer.

What if you want to play with the snapshot? There's no better place for that than in a graphics environment like *MacPaint*. Macintosh can accommodate you there as well. You can take a snapshot of the entire screen and save it as a *MacPaint* document simply by pressing the Shift, Command, and numeral 3 keys. Here the Caps Lock doesn't matter, because you can't save just the window.

This snapshot will appear as a normal *Paint* file whose icon bears the name "Screen," followed by a number from 0 to 9. Macintosh will allow you ten of them.

Try saving what you're looking at. Press and hold the Shift and Command keys and then depress the 3 key. Your drive will hum for a few seconds. If it's the first time you've tried it, look for a file called "Screen 0" when you use *Paint*'s Open option or when you return to the desktop.

There are two things you should be aware of. The snapshot is saved to the current priority disk. In most cases, that will be the *MacPaint* system disk you've made. This means you'll need room to store it in. If you run out of room, you'll get an alert box telling you so.

The other "problem" will not be as immediately evident. If you already have ten screens on the disk and you try the Shift-Command-3 sequence, Mac will beep at you. And that's all it will do. You'll have no other notice that the snapshot failed.

Remember, any snapshot you use to send the screen image to the disk becomes a *MacPaint* document, which means you can edit it with *MacPaint*. If you're the prankish sort who draws spectacles and mustaches on prints of the Mona Lisa (or the Apple Lisa, for that matter), you can save Bill Atkinson's portrait and then . . . give him a three-piece suit?

Quitting

The *Quit* option is similar to Close in that it lets you save your document via the save method if you've changed it. As with Close, you may well want to cancel your request and perform a Save As first. When you finally do Quit, you'll find yourself back at the system level of your disk.

Before you leave *Paint,* you might perform a small ritual. If you've been using the Clipboard, you may have left something sizable in there. It's occupying Mac's Heap. If you know you won't need it later, get rid of it.

Using the selection rectangle, outline a small blank area—the smaller, the better. Then Copy it into the Clipboard. Doing that will free up the bulk of memory the old image occupied. Of course, if that old image is something you want to transfer to another document, just leave well enough alone.

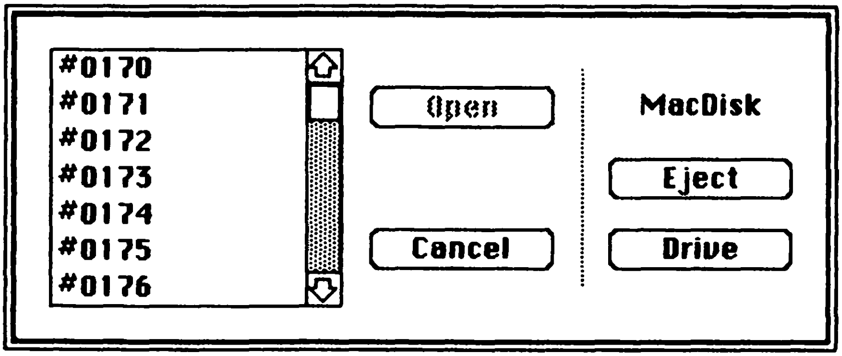
Starting Over

Of course, you don't have to quit *MacPaint.* From the File menu you can just close the document you're working on and start a new one. This, of course, means that you've opened up the world of *New* and *Open.* . . .

Once you've closed a document, the viewing area disappears, and the background pattern fills its space. At that point you have very little choice as to what you can do next.

The New option isn't hard to figure. It's what you use when you start a brand-new document. New gives the document the name "untitled" until the first time you save it.

Open lets you work on a document that's already available on disk. And it gives you a directory of every *MacPaint* document currently on the disk. If the directory is large, you can scroll through it with the scroll bar.



All you need to do to open a file is click it and then click the Open button—or simply double-click the file. If you need to retrieve a file from a different disk, simply Eject and insert it, and its directory will appear for your use. If a different drive is available, the appropriate button will appear for your convenience.

Back from Disaster

What happens if you've been working on an intricate document over a period of several hours and suddenly the power fails or a power surge locks Mac, preventing you from further activity? If you haven't been saving versions of your document as you went along, it might seem reasonable to suggest that all your work is lost. Fortunately, that's not the case.

As you work and move around in your document, *MacPaint* saves sections of it in two temporary files called *Paint1* and *Paint2*. When you finally save your document, these files are erased, but it helps explain why free disk space is so important when using *MacPaint*.

If you exit *MacPaint* in any other way than by using the Quit option and your document has not been saved, these files are left intact. Kiss Mac on its forehead for that one.

The next time you run *MacPaint*, upon finding the files Paint1 and Paint2 on your disk, *MacPaint* automatically uses the information in them in an attempt to reconstruct the document it knows was interrupted. It has not kept track of the old name of the document, but instead supplies the appropriate temporary name "Rescue."

This doesn't mean that *all* of your document will be restored. It may not. In fact, if you haven't been moving the viewing area around, none of it may be there. But if you have done some scrolling, and sometimes even if you haven't, the odds are very good that a major portion of your document can actually be recovered. It's not something to look forward to—just something to be aware of for those times when Murphy's laws apply to your artistic endeavors.

11

MACWRITING

Typewriters were technological marvels of their day, allowing anyone with nimble fingers to put words on paper at far greater speeds than with a pen or pencil. Once engineers harnessed electric motors to the keyboard, typewriters became fixtures on virtually every desk in America.

But typewriters had several important drawbacks. Until IBM pioneered a typewriter that could correct mistakes, most typewritten pages were littered with strikeovers, typos, and clumsy erasures. Worse, writers who wanted to revise their work faced the prospect of retyping the entire document just to fix a few words and phrases on each page.

What's a Word Processor?

Word processors have changed all that. They've made it possible for every writer to write the way he or she thinks. Very few of us can write off the tops of our heads in perfectly structured, impeccably groomed, freely flowing paragraphs. But with a word processor, it's easy to get your ideas onto the "page" and refine both the content and style before you print out a single word. You can concentrate on *writing* without having to worry whether you're close to the margin or in danger of typing on the bottom line of the page.

In addition, word processors offer many tricks unheard of a decade or so ago. If you aren't the world's greatest speller, you can run a program that will detect your errors and even suggest changes. If you're often stymied because you can't find the precise word to convey your thoughts, you can consult an electronic thesaurus and choose from a slate of synonyms. And if your business requires repetitive typing that requires a degree of customization—contracts, customer-service letters, sales proposals, and the like—your word processor can do the lion's share of the work.

Some of the really fancy tricks leave typewriters far behind. If you've just typed a five-hundred-page book about John Jones and you decide to change the hero's name to Randolph Ruskin, the word processor can search for every occurrence of the former name, change it to the new one, and then reformat the manuscript to account for the longer name.

The Benefits of Computerization

When you move up from typing to word processing, you don't lose any typewriter functions. But you gain many powerful new ones that will make writing as close to effortless as it can be.

Normally, on a typewriter you must either manually return the carriage to the left side or hit a carriage-return button when you come to the end of each line of text. On a computer you keep typing. The word-processing program keeps track of the margins automatically. Only at the ends of paragraphs do you need to hit the Return key.

Simple editing and error correction can be handled in a variety of ways. If, while you're typing, you notice you've entered something incorrectly, you'll usually have several options. You can backspace the error away or delete the incorrect word or words and insert new ones.

Inserting also works very well when you've forgotten something and don't notice till a few words or lines later. If you make a change that adds a word to a line or a line to a page, the word-processing software readjusts the rest of the text in the paragraph and can reformat the entire document at the touch of a key.

Best of all, you can cut and paste your writing virtually automatically. If you find that a paragraph or a page really belongs somewhere else in the document, there isn't much a typewriter can do for you. On your computer you mark the beginning and end of what you want to transfer, then tell the computer where to move it. At the press of a button, the entire section is transferred and your document is reformatted to accommodate the changes.

With a word processor you can reset margins and indents quickly and easily. You can highlight certain areas and play down others. You can deliver a gorgeous, error-free, crisply typed copy each time, and as many *original* copies as you want—without the necessity of retyping every one of them the conventional way.

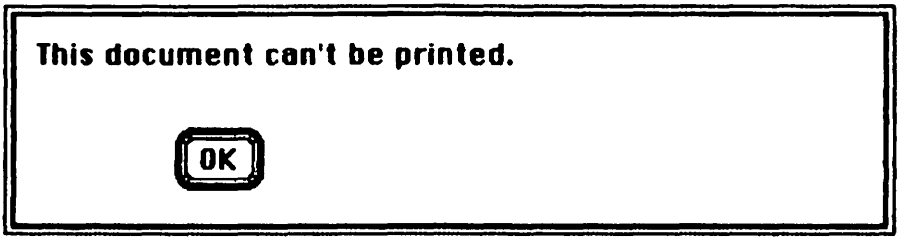
Word Processing with *MacWrite*

MacWrite is the first word-processing program available for Macintosh, and it offers features that even expensive single-purpose "stand-alone" word processors can't match. No other word processor currently available gives you the range of typefaces, sizes, and styles that Mac makes routine. No other word processor lets you put complicated art right in the middle of your document with such consummate ease.

Although *MacWrite* will do everything many people will ever need, it's not right for everyone. It is, though, a perfect introduction to the joys of word processing with the Mac. Every word-processing software program has different capabilities and "feel." If *MacWrite* lacks features you need, or you somehow don't quite get along with it, check out such new programs as Microsoft's *Word* that will be appearing for Mac.

Freeing *MacWrite*

MacWrite is a glutton for disk space. Before it prints a document, *MacWrite* saves a copy to disk. Having enough room for that copy is absolutely essential. Without it (or if your disk is write-protected), you will not be allowed to print the file.



MacWrite uses one blanket message to cover the situation. You can assume that if you see it, the problem is a locked or filled disk.

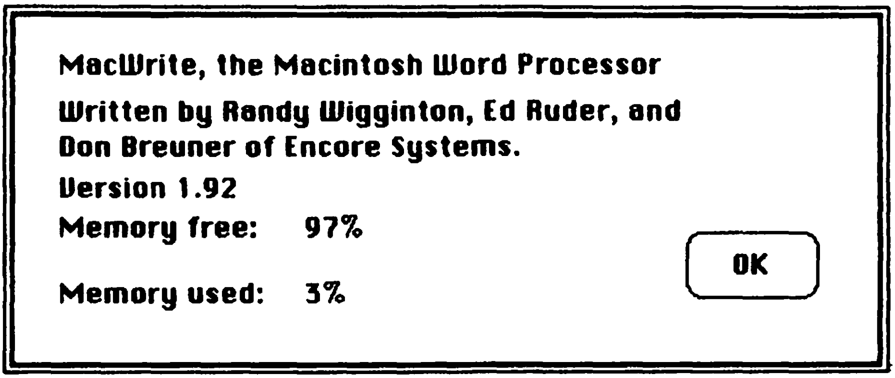
Just as you did with *MacPaint*, it's advisable that you create separate *MacWrite* program and data disks. The copying procedure is the same. Ideally you want one working disk (and backup) with the system files and *MacWrite* on it, and a data disk (and backup) for your finished documents.

After you've made your working copies and data disks, eject whatever's in the drive, reset or turn off the machine, and boot up with the Write–Working disk. Open the disk and click the *MacWrite* icon. If you want to Set Startup so that this disk will start with *MacWrite* when you use it to boot the system, now's an excellent time to do it.

Starting *MacWrite*

Double-click the *MacWrite* icon and you'll be greeted by the opening screen. Again you'll see an unfamiliar mèlange of images and icons. But as usual, there's at last one friendly section: the menu bar.

As with *MacPaint,* the first thing you should do is check the version number. Like *MacPaint, MacWrite* went through an update when the new Finder was issued. Press and drag the apple menu to About MacWrite. Version 1.92 is current at the time of this writing. If your version is the same or higher, you're all right. If it isn't, see your local dealer for an update.



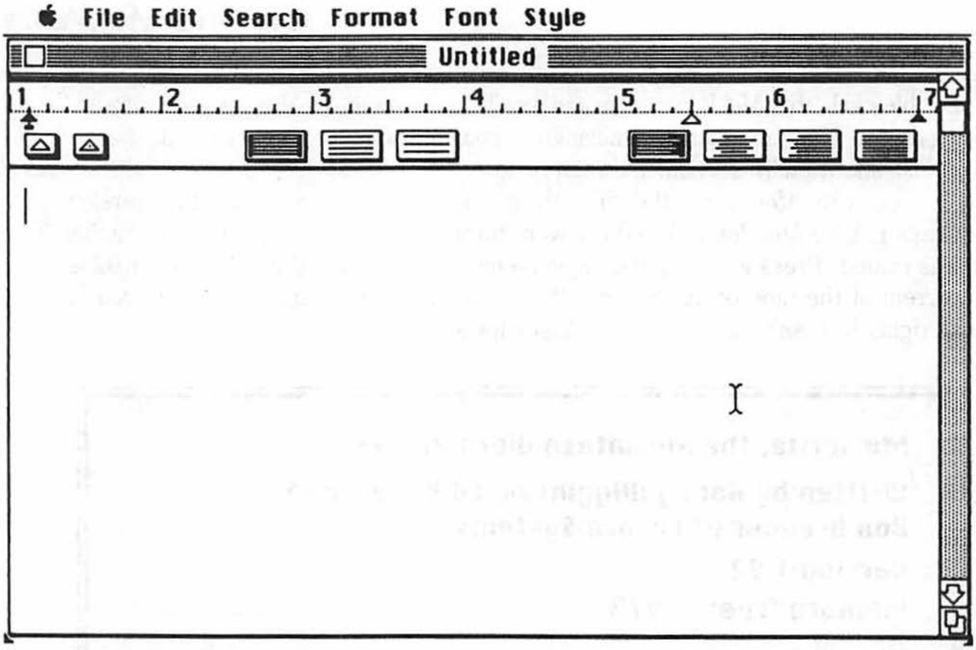
While you're here, note the remarks about memory both free and used. As you work with *MacWrite,* such information can become extremely important, since unpredictable and even disastrous things can occur if you manage to fill up memory. Now that you know where to find about it, close the box.

You're ready to tackle the *MacWrite* opening screen. There's an insertion point showing, so you know you could just begin to type and your letters would appear on the screen. But hold off just a bit.

The *MacWrite* Environment

For all its ties to Macintosh and the computer age, you set up *MacWrite* more or less just as you would a regular typewriter. If you can remember that ancient instrument, it requires you to set things like tabs, margins, and line spacing. *MacWrite*'s *ruler* is your aid in getting them set correctly.

The ruler between the *MacWrite* title bar and the blank text area currently displays the default values you begin with. They're all modifiable. Let's see how they work.



Paper

Since Mac emulates a paper environment, let's consider the working definition of a *MacWrite* page. The standard size sheet of paper in the United States, typically called *letter* size, is 8 ½ × 11 inches. *Legal* size is also 8 ½ inches wide, but it's 14 inches long. Although wider paper exists, the standard Imagewriter won't accept it. And *MacWrite* was designed with that printer in mind.

Because Mac is an international machine, *MacWrite* can also handle the two paper sizes that are most common outside the United States. One is 8 ¼ × 11 ⅔, a European standard; the other is 8 ¼ × 12, an international standard.

Width

The ruler at the top of the text area is marked in ⅛-inch divisions. It begins on the left side of the screen at the 1-inch mark and ends on the right side at 7⅛ inches. Immediately you know that *Write* has reserved 1 inch on the left side of the page and 1⅜ inches on the right. These would *seem* to be the minimum widths for the side margins.

Let's do a little investigating. You're about to discover some things most *Write* users have never seen. Press the window's title bar and drag it slightly to the right. As you'll discover, there's nothing to the left of the window, and there's no size box at the bottom left to expand it further. Correct conclusion: a 1-inch margin at the left is indeed the minimum.

Now press the rightmost part of the title bar, and drag the window to the left. As you'll see, at the right-hand edge there's a scroll bar and a size box. If you now press and drag that size box to the right, you'll discover that you can actually expand the window rightward. It will go as far as the 8 ¼-inch mark before you'll have to quit. Does that mean you can type that far to the right?

Yes and no. You can type that far, but the Imagewriter won't print out anything that sticks out past the 8-inch mark. Moral: it's safe to consider a ½-inch margin on the right the minimum for this version of *Write.*

Unless you like typing blind, this "extra" area is not much good while you're entering your text, though. We'll discuss how to use it later. For now, move the size box back so that the ruler just shows the 7 ⅛-inch mark, and then move the window back to the right so that you can just see the 1-inch mark at the left end of the ruler and the scroll bar at the right.

Type 'n' Hide

Now go ahead and type something. Anything. Don't quit until you've filled three lines or so. As you type, one thing you'll notice is that, as with the Note Pad, word wrap is in effect. You needn't hit the Return key at the end of every line. Another thing you'll discover is that the moment your fingers start to tickle the keys, the pointer disappears. *Write* hides it, since while you're typing, the insertion point keeps track of where you are.

But the pointer is just hidden, not removed. Since many *Write* operations involve the mouse, all you have to do is move the mouse, however slightly, to make the pointer reappear. It will stay on the screen until you next press a key.

Editing

Most of the editing features *MacWrite* uses are already familiar to you, but you may not realize it. If you drag out the Edit menu, you'll see that the options are hardly different from the other times you've seen that menu.

All the options work on *selected* sections of text. Think back to your work with Note Pad. You moved the insertion point simply by putting the I-beam somewhere and clicking. But you selected text by double-clicking an individual word (which does *not* include the spaces at either side of it) or by pressing and dragging through your text in either direction. Once the text was selected, you could Cut or Copy it to the Clipboard. You could erase the selected portions of text by pressing the Backspace key, or you could replace the selected text just by typing new material.

Here, the procedures are precisely the same, with one added benefit. If you want to select a section of text that extends beyond the window, *MacWrite* will automatically scroll the document for you as you drag to the top or bottom and keep pressing. It makes selecting large areas much easier.

Material you Paste from the Clipboard will appear at the current insertion point. But watch out: if you've got text selected when you Paste, the Pasted material *replaces* the selected material. It can happen accidentally if you're not careful. Performing an Undo *immediately* is the only way to restore the lost material. Until you get the hang of things, remember: Command-Z or Undo Typing undoes everything you did since you last clicked the pointer—even the last Undo.

A couple of more tips about Undoing your work. If you begin typing and change your mind, Undo Typing (or Command-Z) will get rid of everything you've typed since you last moved the insertion point with the mouse. You can Undo that Undo if you Undo it immediately. And if you change your mind about material you've deleted one character at a time with the Backspace key, hold down the Command key and press the Backspace key again. That Command-Backspace combination will restore the material you've deleted, one character at a time.

More Selections

The other thing selecting text lets you do is change its font, style, and size. As in *MacPaint,* you can see which ones are currently in effect by observing the check marks in the Font and Style menus. If you want to change a particular portion of text, simply select it and make the requisite changes in the Font and Style menus. The text you've selected will instantly change to conform. Remember to establish the insertion point by clicking before you start typing again; otherwise, the new characters you type will replace the ones you've just styled (unless you Undo the problem).

When you do start typing again, your new characters will appear in the font and style you've just selected. If that's not what you want, go back to the menus and change things. Make sure the insertion point appears before you do this; any text still selected when you make the change will change, too.

Write starts out in 12-pt. Geneva plain text every time you begin. If you know you're going to want to use something different for your document, make the necessary changes before you begin, thereby avoiding a time-consuming save-and-change process.

Ups and Downs

You've already met most of the Font and Style options in *MacPaint* and the Font Mover, but it's worth taking a few minutes to try them out here. Two new features were added to this version of MacWrite: *Superscript* and *Subscript.*

May I have 10^3 grams of $C_{20}H_{22}N_8O_5$

They can come in handy when working with footnotes, chemical symbols, and, in conjunction with Mac's extended character set (remember Key Caps?), in mathematical or chemical equations.

To access them, you can use either the Style menu or the Command key plus the appropriate letter key. For superscripts it's Command-H, which may be easier to remember if you think of it as "high." Subscripts use Command-L for "low."

When you want type to appear in its normal place, simply reselect the item from the menu or use the Command-key option again. As with most Style enhancements, these are *toggles;* choosing one selects it, and choosing it again restores the situation to the way it was.

Try playing around with selecting and editing till you're comfortable with the processes. Then you'll be ready for the next editing tools: search and replace.

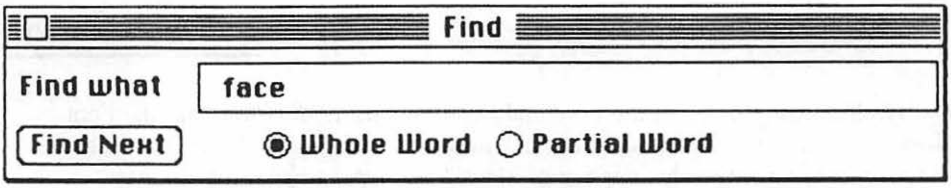
Search

Move to the *Search* menu and pull it down. You'll see that the two options are *Find . . .* and *Change. . . .* Say you've reached the end of your document. You suddenly realize you may have overused the word "face." You want to see exactly how many times you used it, and where.

The first thing to remember about Find is that it works only forward from the current insertion point. If you're at the end of your document, it won't work at all. So the sensible thing to do in this case is use the scroll bar to move to the beginning of your text.

Now you're ready to select the Find option from the Search menu. Before you even fill in *Find what,* you'll notice that you have two options available: *Whole Word* and *Partial Word.*

Finding whole words means Write will look only for exact matches. It expects to find a space or punctuation mark before the *f* and after the *e.* That's its working definition of a whole word. A partial word search, on the other hand,

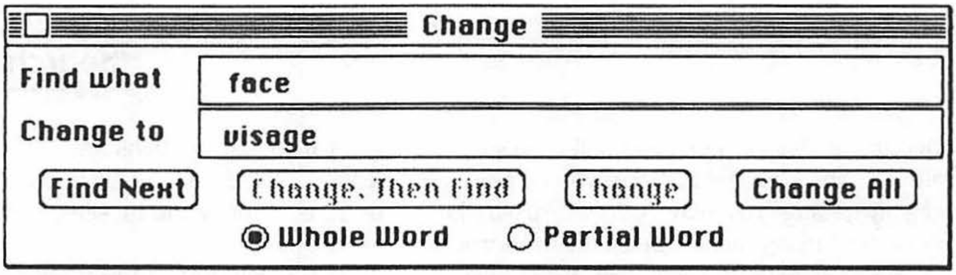


would also match the words "facelift," "boldface," or "facetious." It makes a big difference.

You tell *Write* what word you want to find by typing it in the box that follows Find what. *Write* begins its search after you press the Return key. If you want to find another occurrence of the word (or words—you can search for a phrase), you can either press the Return key again or click the Find Next button, which isn't available until you've used Find at least once on your document.

Change

Before something can be changed, it must be found. So Search's Change option shares some of the components of the Find option. Most noticeable are the Find Next button and the options for whole or partial words. In fact, if you press Return after entering just the Find-what value, Change will do just a find and nothing more. Subsequent use of the Return key will produce further finds.



There are two ways to get down to Change to. The first is to move the pointer to that text area and click. An insertion point will appear. If you don't care to exercise your mouse-arm, you can do the same thing by pressing the Tab key.

Replacement Warnings

A note of caution: the option buttons do very different things. You use the first, Find Next, if the current occurrence is not one you want to change, and you want to go on and find another. The second button lets you change the current occurrence and *then* look for the next. The third changes the current occurrence and quits. In all of these options, incidentally, you can Change a word to nothing, also known as deleting it, simply by typing nothing in the Change-to box before you command the Change.

The fourth, *Change All,* is a two-edged sword. This causes an *automatic global* search and replace. Let's see how disastrous that can be.

If you search for "face" and replace with "visage" with the Whole Word option, "face" would be changed to "visage" *throughout your entire document.* This is the one time the Search functions work without regard to the position of the insertion point. Sometimes this might be all right. But "face to face" would be changed to "visage to visage," which may not be what you had in mind.

Furthermore, the Find portion of Change will find all occurrences of "face," whether capitalized or not. Unfortunately, it inserts the replacement word exactly as you typed it, meaning any capitalized occurrence of "Face," as at the beginning of a sentence, will be changed to a plain, all-lowercase "visage."

Worse, with the Partial Word option, "boldface" would now be "boldvisage," followed shortly by "intervisage" nee "interface." That's why *Write* warns you that Change All is not Undoable and gives you a chance to cancel it. When you do use it, it may be worth going through the entire document with Find, looking for the replacement words you just entered. That way, you can check to see if any undue damage has occurred.

Find and Change remember the last values you've entered until you open a new document. If you use either one and it doesn't seem to be producing results, chances are it's found something hidden from view beneath the Find or Change window. Use the window's title bar to drag it out of the way. Finally, you can quit Find or Change either by clicking the close box or by clicking the text.

Ruler

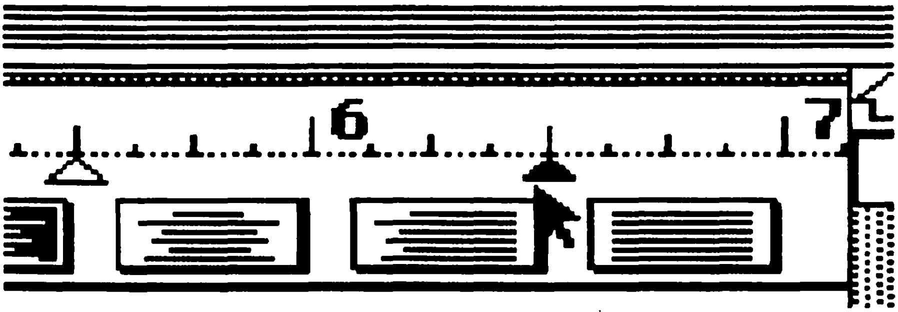
Time to format the text you've been fooling around with. Scrutiny of the ruler between the title bar and the text area will reveal some small black triangles (there's a white one, too, but ignore it for the time being). You use them to set the typing margins, just as you would on a typewriter. They're called the *margin markers.*

As you can see, *Write*'s default settings are a left margin of 1⅛ inch and a right margin of 1½ inches (8½ minus 7), making your typing area 5⅞ inches. You can reset the margins to the full width of the visible page and gain the extra ¼ inch if you wish, or you can make them wider if the need calls for it. You can set the margin a couple of notches past the 8-inch mark on the right, but as we discussed earlier, there's not much point in bothering: that mark is the rightmost limit of what you'll be able to print.

You can reset the margins anytime you like. All you need to do is move up to the triangles and drag them. If you'd like to see what the printed document will look like as you type, do it before you start. Or you can just begin typing and worry about the settings later. They can be adjusted at anytime and affect all the text that follows them, up to the end of the document or the next ruler.

Setting Margins

Take the mouse in hand and move it into the text area, where you'll see the I-beam. Then move toward the ruler area. As you cross from the text to the ruler, the pointer will change into its more familiar arrow shape.



Let's move the right margin marker. Once the pointer is on it, just press and drag until you reach the 6½-inch mark on the ruler. This will give you a 2-inch right margin. Watch your text as you release: it will magically re-form itself to the new margin.

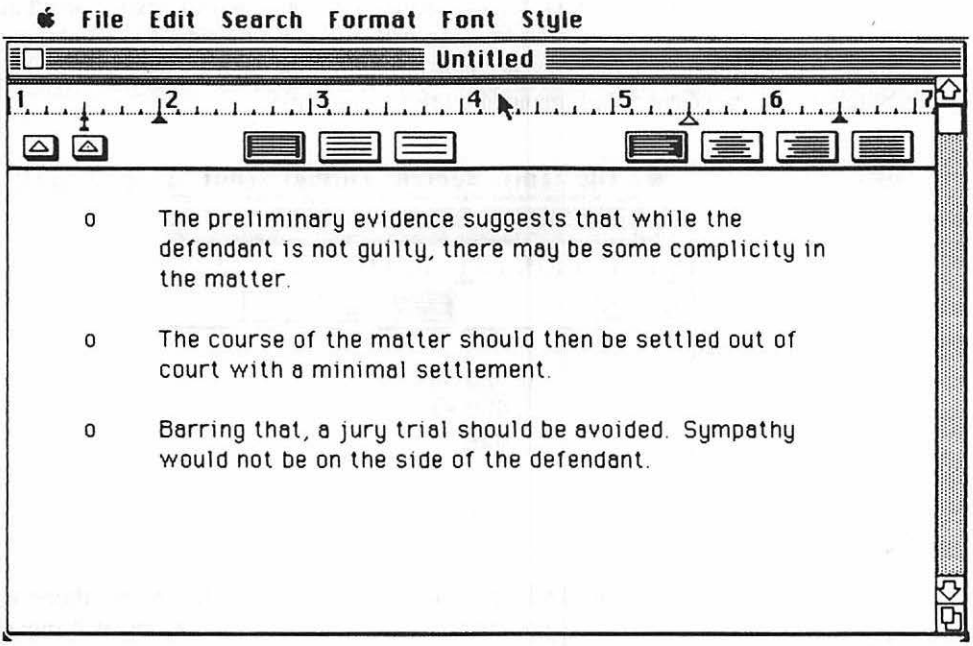
The left margin is a bit odd. The triangle appears to have a stem and a base, looking vaguely like a Christmas tree. The first few times you attempt it, you'll find that it's somewhat difficult to move the margin marker without moving the base as well. Actually, the base part is the visible portion of an icon hiding on top of the margin marker. It, too, has a function, and it's called the *indentation marker.*

If you try to drag both, the indentation marker will move first. The way to move the margin marker is to press the mouse button only when the tip of the pointer just barely touches the margin marker's right corner. Once you've got it, drag it to the 2-inch mark on the ruler. Again, you'll discover the text scooting around to fit the change.

If you happen to catch the indentation marker, don't worry about it. Drag it out to the 1½-inch gradation. Either way, you want to end up with the left margin marker at 2 inches and the indentation marker at 1½ inches.

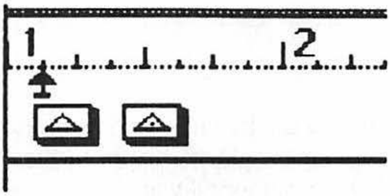
Indentation

What's the distinction between the two left-hand markers? The way your text is now formatted on the screen should give you a clue. The left-hand margin marker sets the official left margin for all your text—*except* the first line of each paragraph, which is controlled by the indentation marker. By setting it properly, you'll no longer have to hit the Tab key at the beginning of each paragraph—or, if you're doing an outline, you'll be able to do "outdenting" with ease. Here we've "outdented" the circular "bullets."



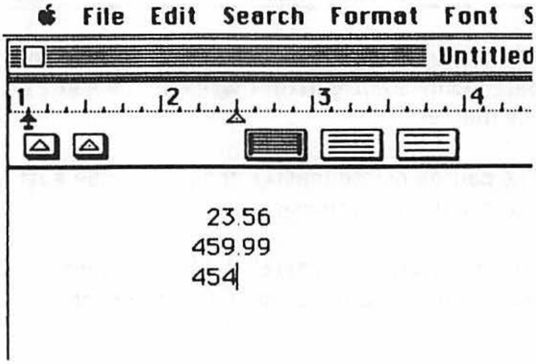
Tabs Plain and Tabs Decimal

Mac has a Tab key, just like a typewriter. Naturally, *Write* allows you to set multiple tab stops. One tab is already set. It's the white (or hollow) triangle at the 5 ½-inch line on the ruler.



How do you set more? Look at the two triangular icons at the lower left-hand corner of the ruler. They're actually a supply of tabs, stacked one on top of the other, so you can take as many as you need. As you may have guessed, you set them by dragging them to the spot you want.

The hollow triangle icon creates a normal tab stop, used to begin a word at a defined place on the page. The tab icon with the period inside it is something most typewriters don't offer—a *decimal* tab stop. It's used to make sure that numbers can be aligned with minimal work on your part.

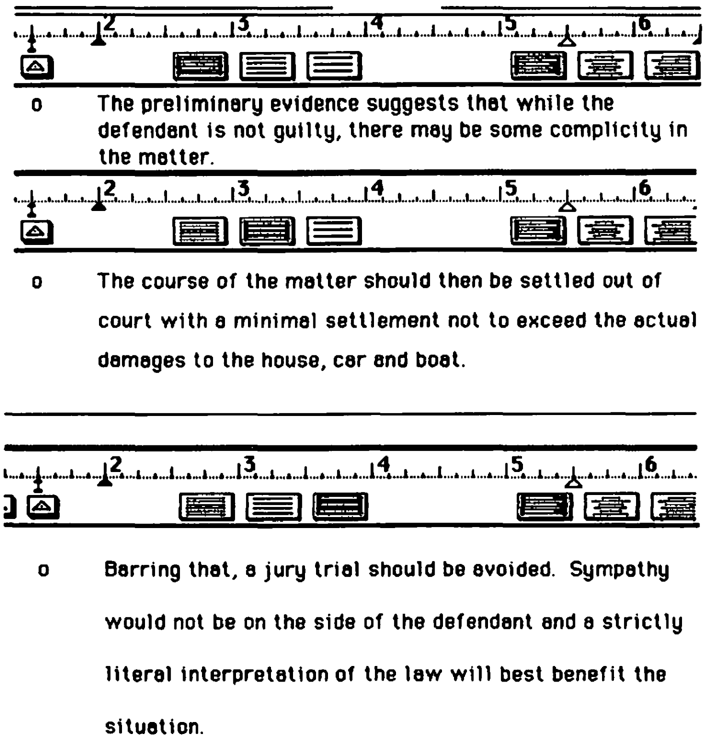


Once you set the decimal tab position, you press the Tab key to get there as you'd normally do. But when you start typing, numbers (or letters) will move left until (or unless) you insert a decimal point (or period). The decimal point will be aligned with the position of the tab stop. From then on, whatever you type (most likely the decimal portion of a number) will move to the right as it would normally do.

Be aware that you cannot move the margin markers past a tab marker. If you leave the tab at 5½ inches, no matter how hard you try, you won't be able to drag the right or left margin markers past that point. You can't set tabs to the left of the current left margin. If no tabs are set at all, the Tab key will behave as if there are ten tab stops in each inch. Finally, you can set both tab stops and margins at the marked gradations or any point halfway in between them, giving you precision down to 1⁄16 inch.

Line Spacing

The lined-box icons in the ruler are set apart in two distinct groups. The collection of three toward the center of the ruler controls the line spacing. *Write*'s default, the leftmost of these three, is single spacing. The other two are one and one-half and double spacing, respectively. To change them, just click the one you want. As before, all text that follows the ruler to the end of the document or the next ruler will be affected.



***MacWrite* text, in (top to bottom) single, one-and-a-half, and double line spacing, reflecting selection among three central icons in ruler.**

Line Spacing and You

The default font *MacWrite* uses is 12-pt. Geneva plain. Using single line spacing, you'll be able to squeeze forty-seven printed lines on each page, leaving margins of about ¼ inch at the top and bottom of the sheet.

One and a half line spacing, with that same font, will get you thirty-one printed lines; double spacing brings it to twenty-three lines per page. This arrangement may cause some problems.

The standard for most forms and documents is a line depth of six lines per inch (lpi). That works out to sixty-six available lines per page. Margins, while not really standardized, are usually set to leave 1 inch of white space at top and bottom—or a total of twelve lines. That leaves fifty-four lines available with single spacing. As you can see, *Write* cannot duplicate that condition with its 12-pt. fonts. They print at 5 lpi, which puts you at odds with the majority of the world.

The standard for manuscripts, theses, and the like is double spacing. With it, a page averages twenty-six lines. Again, *Write* cannot reproduce this with its 12-pt. fonts. It will only produce twenty-three lines, and that's without 1-inch margins at top and bottom.

With the new release of the Finder, and on succeeding system disks, Apple has supplied 10-pt. versions of some of their fonts. They give you the 6 lpi you need for compatibility.

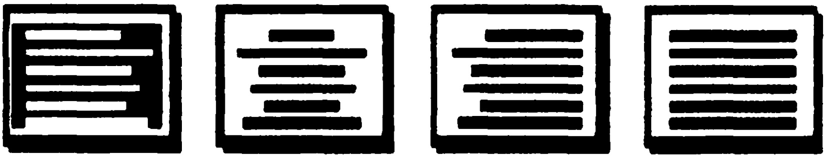
Height vs. Width

Although you may solve the line-height problem by switching to 10 pt., you'll also discover that you're fitting a lot more text into each line, since the two sizes both retain the font's inherent height-to-width proportions. And in our opinion, 10 pt. just doesn't look as good on the Imagewriter as 12 pt. does. The smaller face tends to look crowded or lost in all the white space around it.

Unless you must maintain a 6-lpi line height, our solution is to use a 12-pt. font and one and one-half line spacing. One-inch top and bottom margins will give you the requisite number of lines per page.

Justification

Before you discover how to set the top and bottom margins, the last group of lined-box icons needs some attention. They affect (and resemble) your document's *justification*—its alignment relative to the right and left margins. Aside from customized justification, where the text is used to form rough pictures (for example, a document about the liberty bell where the text is aligned to look like an outline of the bell itself), there are four major types of justification: left, right, center, and full.



The pages of this book are examples of *full justification,* available from the rightmost justification icon. This means that the first letter of each line begins at the left margin, and the last letter ends at the right margin. By adjusting the space between each letter and each word, the text is made to form neat rectangles on the page.

With *left justification* (or *ragged right*), available from the leftmost icon, the first letter of each line is aligned with the left margin, but the last letter ends wherever it naturally fits, provided it doesn't extend past the right margin. Most manuscripts are done with left justification, since the extra spacing in full justification can cause problems for editors and typesetters.

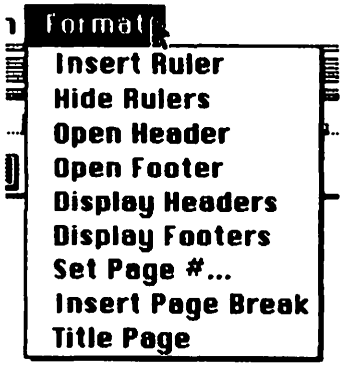
With *right justification,* available from the third icon from the left, each line of text is shifted to the right until the last letter of the line is aligned with the right margin. No regard is given to the position of the first character. The effect is slightly off and most commonly used on a two-page spread to complement left justification on the facing page.

With *center justification,* available from the second icon from the left, each line of text is centered between the margins, producing both ragged right and ragged left appearance. It's used most often for headings, a line or two at a time.

To select a particular style of justification, simply move to the appropriate box and click. As with the line spacing and other ruler options, it affects all following text to the end of the document or the next ruler.

Special Features: More Rulers

We've mentioned "the next ruler," but we haven't shown you how to use one. First use the pointer to place the insertion point where you want to apply your new format. Then drag out the Format menu and release at the *Insert Ruler* option. The new ruler will appear, and you can change whatever features you want.



Try putting it at the end of your test document. The only constraint you'll be faced with is in moving the insertion point. *MacWrite* does not allow you to move it beyond the last character you've typed. If you want to put it on a new line, press the Return key first.

Many people prefer to see the page on the screen as it will appear on the printer. There are obvious limits to this, since most computers are limited to displaying only twenty-four or twenty-five lines of type. But certainly the printer will not be including the rulers when it gets around to putting your document on paper.

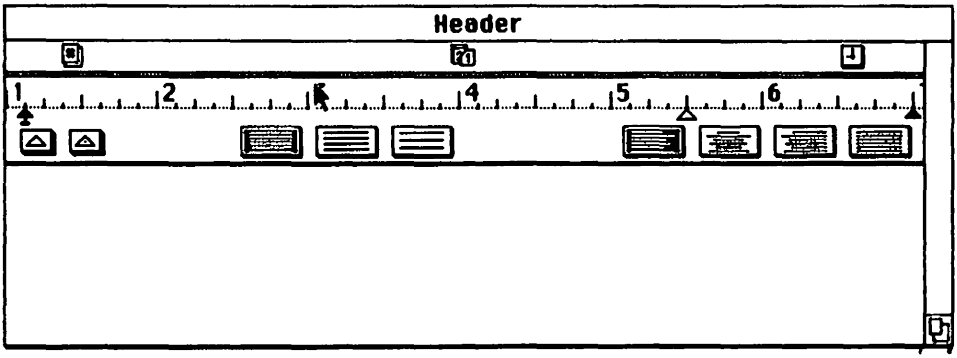
If you're bothered by the sight of the rulers in your document, you can remove them from the display (but not from the document) by selecting the *Hide Rulers* option from the Format menu. Once you've done that, all the rulers in your document will disappear and the option itself will change to *Show Rulers.* They still affect your text in whatever way you've asked them to, but they no longer disrupt the visual continuity of the document.

Incidentally, now's a good time to mention the easiest way of getting text into the part of the paper that extends beyond the window. First, enter the text. When you're through, drag the window's title bar to the left and then yank the size box to the right. Finally, add a ruler or adjust a current ruler to the wider margin you desire (but not past the 8-inch mark). Even though you won't be able to see all of it at once, your text will re-form itself to the new wider margins.

Top and Bottom

Headers and *footers* are lines of text that appear at either the top (header) or the bottom (footer) of every page of your document. For a manuscript, a header might be the title of the work and the author's name. The footer might contain some descriptive comment and the page number.

Don't confuse the term *footer* with *footnote*. Footers appear repetitively at the bottom of each page of the document. They don't change from page to page. A footnote, on the other hand, is an annotation or reference for a specific word or phrase in the text of the document. Footnotes generally appear at the bottom of the page that contains the material they refer to, but they differ from page to page as they are needed. Unlike some word processors, *MacWrite* does not offer any automatic way of handling footnotes so that they appear on the same page as the references to them.



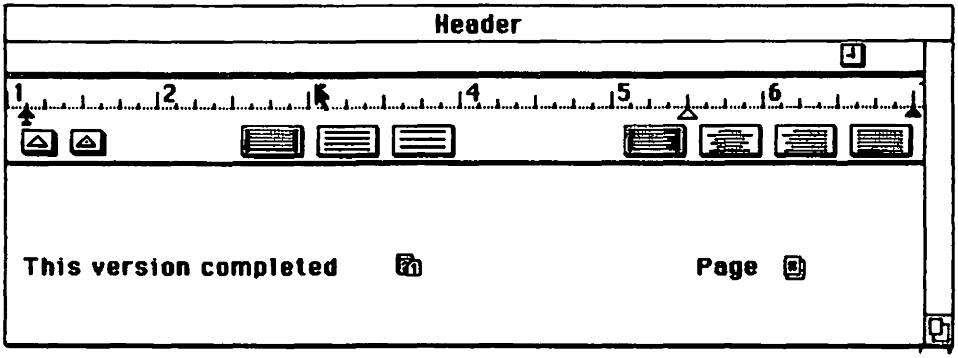
The header display looks very much like a smaller version of the *MacWrite* text area. It is. Beneath the ruler, which may also be set just as the others you've seen, you have room to enter up to seven lines of text, one line of text and six carriage returns, or any combination equaling seven lines.

Don't exceed that limit, though. And if you do go as far as seven lines, don't press the Return key at the end of the seventh line. That puts you on the eighth line, one over the limit, and you'll be officially scolded for your transgression. If you create a long header, you'll probably have to expand the header window to see all of it.

You don't need to put anything at all in the header and footer areas. But if you want to change the top and bottom margins of your printed page, you can use blank lines to adjust the amount of space you want. Five blank lines, created by pressing the Return key in the header or footer area, will give you a margin of approximately 1 inch.

Icons in the Header and Footer

Three icons inhabit the upper regions of the header and footer areas. The # icon stands for the current page number. The calendar and clock icons resemble the ones in the alarm clock display.



In their initial positions above the ruler, they have no effect on the way headers or footers print out. But if you drag them into the text area, they will display, respectively, the current page number, the current date, and the time at printout. Just move to the one you want, press, and drag it down below the ruler.

You can add any textual comment you'd like. Using something like "This version completed" followed by the date icon will give you a good reminder of which copy of your document you're looking at. Or you might use the word "Page" followed by the # icon so that people reading the work will know that what they're looking at is really the page number.

As with text in the header, you can select these icons and apply a particular font and/or style to them. But there's a problem. For some reason unknown to us, these icons take on the character font, style, and size of the first letter in the header or footer. If you begin with New York bold 18 pt. and want the page number to appear in some other font parameters, it will be almost impossible.

"Almost" means that you'll need to trick *MacWrite* into doing it your way. Place the insertion point just to the left of the first letter in the header or footer. Now drag out the font characteristics you want the time, page number, or date to have from the Font, Format, and Style menus. Press the spacebar.

This will insert a space of the style you've selected as the first character in the header or footer display and coordinate the icon printing to it. You can adjust all the rest of the text to anything else you choose.

Header and Footer Options

From the Format menu, two options are available when dealing with either headers or footers. We'll just discuss headers here; footers work exactly the same way.

In addition to letting you create a new header, dragging to *Open Header* will allow you to edit one you've already established. When you're done with any or all of the enhancements, click its close box, and it will disappear. A few seconds later it will reappear at its respective position in the document (top or bottom) on every page that has writing on it.

To see the results of your work, use the scroll arrows on the right side of the display. *MacWrite* marks the end of a page with a dotted line running all the way across the text area. Your footer will appear just above it and, if there's text on the next page, your header will appear below it.

Once you've opened a header, dealt with it, and placed it in your document,. *Display Headers* will change to *Remove Headers.* This option affects your entire document, not just the section you're looking at.

The header, which has appeared at the top of every page of your document, no longer displays. It is not erased; it will appear when you print the document. At the same time, Remove Headers reverts to Display Headers. As you might imagine, to restore the header, you simply drag to this option. *Write* will put it back on every page.

One place where headers and footers may prove awkward and distracting is the opening page of the document. The Format menu contains an option called *Title Page* to handle this. Selecting it will remove headers or footers from the first page of your document. This only works on the first page; if you want to have two pages (say a cover page and a title page) without headers, you'll have to produce one of them as a separate document. You can tell Title Page is active by looking for a check mark beside it in the menu or by making sure the header or footer display is on and examining the page itself.

Page Breaks

Sometimes a list, table, or chart will start on one page and end up spilling over onto the next page. It should be one complete block of text, and you really don't want to break it up.

The way to start it on its own page is to move to the beginning of the table and click to move the insertion point there. Then move to the Format menu, press, drag to *Insert Page Break,* and release. *Write* will insert a forced page break, complete with horizontal line, at that point.

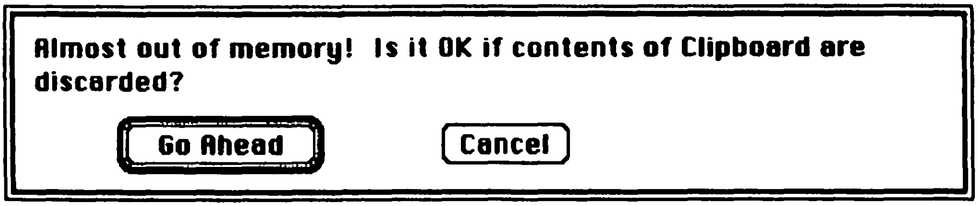
What's a forced page break? When *Write* sees this invisible marker in your text, it will push the rest of the current sheet of paper out of the printer, just as if it had filled it with text and come to the end of the page naturally. Whatever follows the marker will begin at the normal starting point for the next page.

MacWrite Limitations

Some word processors handle your document partially in memory and partially on disk. As you create more than what will fit into the computer's memory and go on, information is automatically transferred from disk to RAM or RAM to disk as the need arises. Using this scheme, a document as large as the available disk space can be created, regardless of the computer's internal memory capacity.

MacWrite, however, must keep your entire document in memory. Its documentation claims you can fit about ten single-spaced pages into memory with a 128K Mac. That's only partially correct.

Depending on how much text you have on each page, the maximum may well be seven single-spaced pages or so. As you near the limit, *Write* will warn you and ask your permission to continue, pointing out that you'll have to do without the Paste and Undo features. The reason you'll lose those features is that if you say it's okay to go on, *Write* will simply discard the contents of the Clipboard and shut it down. It does this to reclaim as much memory for itself as it can. At this point, you would be very wise to refuse *Write*'s request, back up a little, send the contents of the last partial page to the Clipboard, save your document with Save As, and start off your new document by Pasting the contents of the Clipboard.



But what if you plunge blithely ahead? A special problem shows up when you actually run out of room. *Write* will explain that to you and allow you to save the document to disk. But what happens if you run out of room before you reach the end of a page? Page fragments aren't particularly pleasing. The obvious solution, as before, is to cut the odd bit into the Clipboard, save the remainder, open a new document, Paste the fragment into it, and start where you left off.

But the obvious solution won't work, since *Write* has taken over the Clipboard space. You can't Cut or Copy anything into it. You'll simply have to retype the fragment of the last page at the beginning of the next section of the document. You can delete the fragment, but you may as well leave it in the document, so you can retype it from the printed copy.

The easy way around both these problems? Check the About MacWrite option now and then to make sure you've still got plenty of free space.

Getting around the Rough Edges

If you know you're going to be doing a long document (longer than seven pages, no matter what the spacing), set up your headers and footers before you do anything else. As you complete the header, drag through the area as if you were going to edit it. The entire header or footer will invert. Select Copy from the Edit menu. When you release the mouse button, the contents of your header or footer will be copied into the Clipboard. Now move to the apple icon and drag out the Scrapbook. Paste the Clipboard contents into it. You now have a "permanent" copy of the header.

Close the Scrapbook and repeat the process for the footer. Finally, go through the process one more time for the ruler. Select it, Copy it, Paste it into the Scrapbook, and return. Then you can begin the body of your document.

When you get to the end of about page seven, move up to the File menu and drag to Save As. It works almost exactly the same way as it does in *MacPaint*—with an extra option, *Text Only,* that you can ignore for now. One of Mac's strongest points is that the fundamentals work consistently. When you've learned something once, you won't have to learn it again.

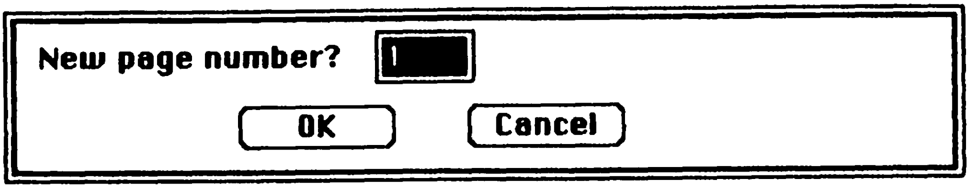
After saving the document, click its close box, move to File, and drag to New. This opens a new document with the name "Untitled." It also wipes out the contents of the header and footer, as well as all of your ruler settings, which is why you've saved them all in the Scrapbook.

Now simply move everything from the Scrapbook into the second part of your document. Get the Scrapbook out, Copy the header from it into the Clipboard, Close the Scrapbook, select Open Header, Paste the Clipboard contents into the Header window, and your header is restored. Do likewise for the footer and the ruler (which gets Pasted right below the first ruler). Once you're familiar with *MacWrite* and confident of yourself, you'll find you can do it all in a minute or so. And if the document runs to three sections or more, you'll find your header, footer, and ruler information waiting for you in the Scrapbook each time you open a document.

Keeping Continuity

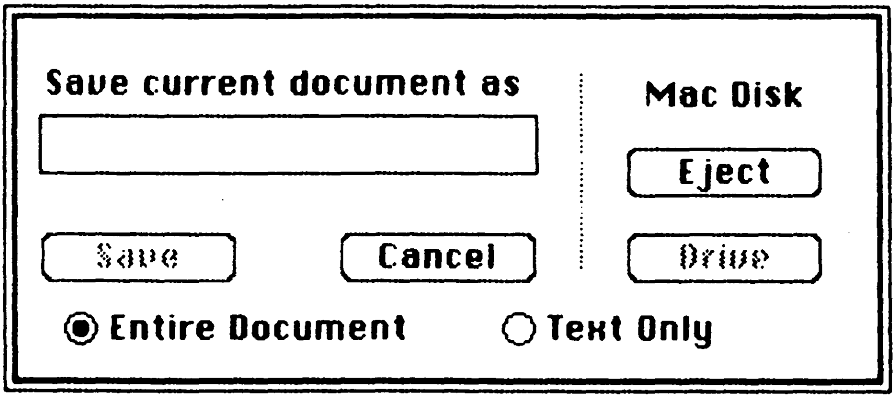
That leaves only one gap in the continuity of the document. *Write* always begins on page one. You, however, have just put seven pages away and are now starting on page eight.

Move to the Format menu and select *Set Page #. . . .* A dialog box will ask you for the beginning page number for your document and propose number one. Instead, you tell it eight, or whatever the actual page should be. If you've set up the footer to note the page number, it will be displayed correctly per your request.



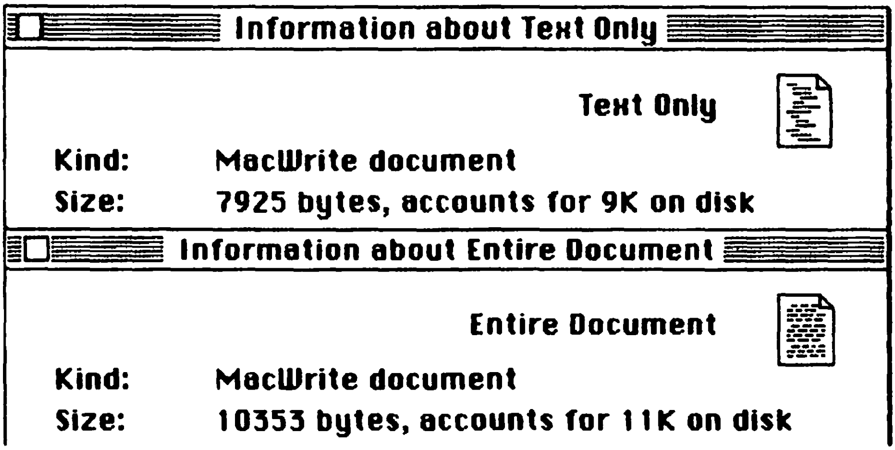
A Note on Saving

When you select Save As from the File menu, you'll be given two choices at the very bottom of the box. The leftmost, *Entire Document,* which is *MacWrite*'s default, saves your *MacWrite* document with all header and format information intact. The other, *Text Only,* strips off all this additional information and saves just the individual "plain vanilla" characters.



The icons for Text Only documents look different from standard *MacWrite* documents, and the difference isn't just icon deep. Text Only documents also occupy less room. But that's not their real advantage.

As you'll see in chapter 14, text files are the easiest things to send over the phone. It's especially true if the computer you're transmitting to is not another Mac. By saving your document as Text Only, you can transmit it to a word processor or a computerized bulletin board many miles away. But remember: the next time you load a document that's been saved as Text Only, none of the formatting, font, header, and similar information will be available; you'll see everything in 12-pt. Geneva plain text.



Portions of Get Info boxes for the same document Saved As Text Only (above) and Entire Document (above). Icons (in upper right-hand corner of each box) differ, as do sizes.

Scrapbook Follies

The Scrapbook can come in handy for text you use repeatedly, or for text you want to remove from a current document but you're not entirely sure you want to get rid of forever. Just Cut or Copy it from the document, then open up the Scrapbook, Paste it in from the Clipboard, and close the Scrapbook to get back to work. Henceforth, when you need that hunk of text (or text and picture), you'll be able to open up the Scrapbook, Copy to the Clipboard, and bring it into whatever you're working on.

Incidentally, you may find yourself wanting to put a longer section of text into the Clipboard or Scrapbook than you'll be able to see in their nonscrollable windows. That's perfectly okay as long as Mac has enough memory room to accomplish the task. If not, you'll be notified. Just remember that when you transfer the image back to the document, you'll get all of it—not just the portion that shows up in the window.

Adding Pictures

And at last you'll add pictures to your text! You probably have one of Apple's own creations handy in the Scrapbook. If not, go create one in *MacPaint,* Copy it into the Clipboard, and come back. If it's in the Scrapbook, drag that out and Copy the image into the Clipboard, where any picture you transfer must reside.

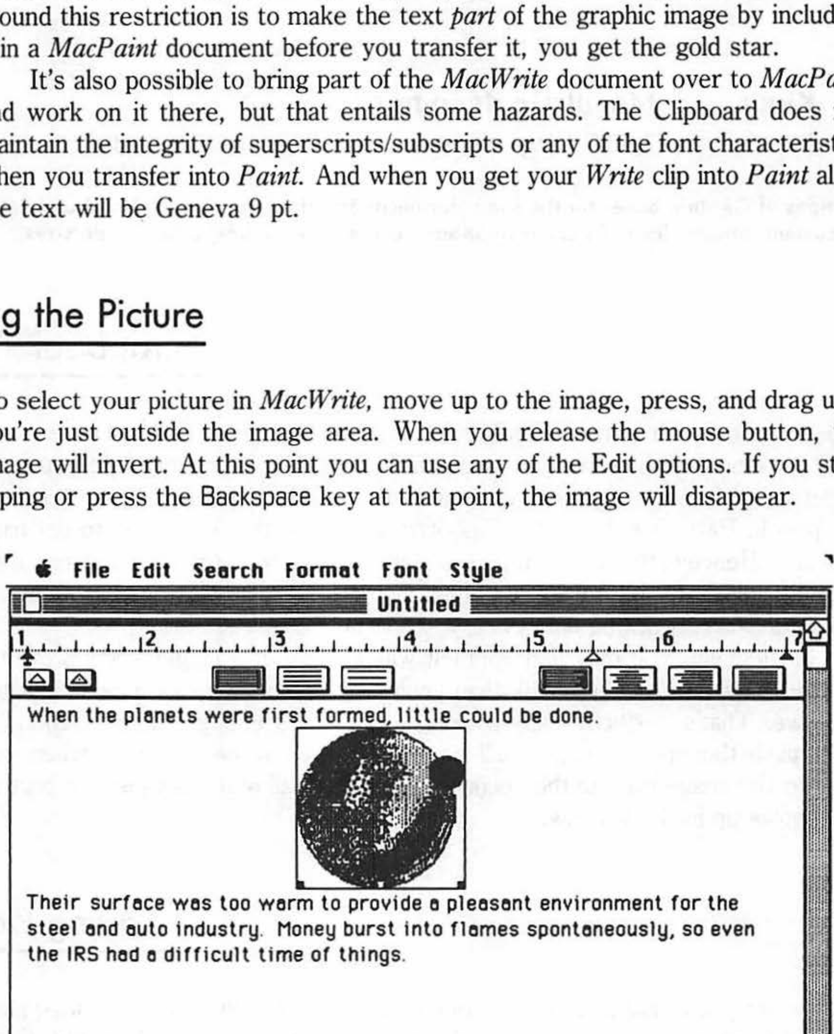
Once there's an image in the Clipboard, pick a spot in your document where you'd like it to appear. Click the pointer to place the insertion at that spot. Then move to the Edit menu and drag to Paste.

When you release, the picture in the Clipboard will appear in your document. However, despite the inviting picture in the Macintosh owner's manual, *MacWrite* cannot put text on the same lines occupied by a graphic image. Try to put the insertion point into one of these lines, and you'll discover it won't get there. You'll also notice that any text that might have turned up on the lines in question is now located beneath the image. If you guessed that the slightly awkward way around this restriction is to make the text *part* of the graphic image by including it in a *MacPaint* document before you transfer it, you get the gold star.

It's also possible to bring part of the *MacWrite* document over to *MacPaint* and work on it there, but that entails some hazards. The Clipboard does not maintain the integrity of superscripts/subscripts or any of the font characteristics when you transfer into *Paint.* And when you get your *Write* clip into *Paint* all of the text will be Geneva 9 pt.

Editing the Picture

To select your picture in *MacWrite,* move up to the image, press, and drag until you're just outside the image area. When you release the mouse button, the image will invert. At this point you can use any of the Edit options. If you start typing or press the Backspace key at that point, the image will disappear.



If you simply click the image, it suddenly becomes encased in a box with tiny solid boxes at the bottom corners and bottom center. If you carefully bring the pointer to either side of the editing box and press, you can drag the image to the right or left as needed. If you press when the pointer is touching one of the small solid boxes, you can actually stretch the image diagonally to the left or right or straight down (up isn't possible). The words below are simply pushed down.

The File Options

The File menu is similar to *MacPaint*'s, with one exception and a couple of variations. One variation is Save As. It offers you the options of saving either your entire document or just the text.

Page Setup

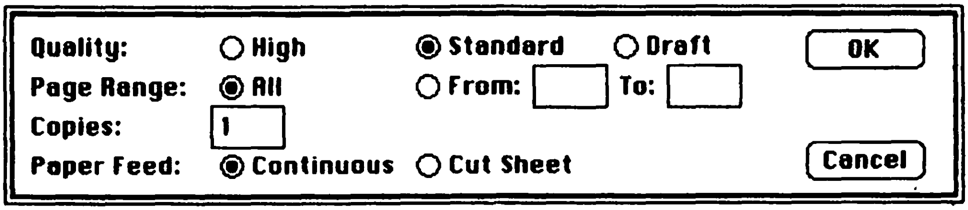
Page Setup is the totally new choice. Drag that option from the File menu. The four options under *Paper* are the ones we mentioned earlier in the chapter. The *Orientation* choices, however, probably seem a bit obscure.

Tall is the normal page orientation. Your text appears normally across the 8½-inch dimension of the page. *Tall Adjusted* provides the same orientation, but should be used if you've included pictures in your text. The option assures that the pictures are printed to the correct proportions, but the text it produces will look fatter than normal. Experiment: you may find you like it that way.

Wide rotates the printing 90 degrees so that you print sideways—across the 11-inch length of the page. No physical paper movement is involved. The output mimics the Tall Adjusted mode to keep pictures in perspective. As we keep saying, *MacWrite* controls the Imagewriter on a dot-by-dot basis. By doing things that way, almost anything is possible.

Print

Rather than including two print options under File as *MacPaint* does, *MacWrite* provides a separate dialog box for the additional options you have available. *Don't* hit the Return key until you've made the selections you want. That accepts the whole box just as surely as clicking the OK button.



If you click the circle next to *High*, you'll get a very intense black output. To do this, *Write* directs the Imagewriter to make four passes for each line of type. *Standard*-quality output uses two passes for every line, which produces a black, but not intense black, print.

Draft sends a straight ASCII interpretation of the characters in your document and lets the Imagewriter's built-in character sets—no special character fonts or styles, no pictures at all—take over. It's not pretty, and it's exceptionally quirky about spacing, but it's very fast. Draft mode is unavailable for Wide Page Setups.

If you're feeling depressed and need some humor, print a document that has a header and use the Draft-quality option. The header isn't printed until the entire page is completed, and then the paper is rolled back until the print head is in the correct position. Weird. Also slow.

Keep those fingers off the Return key when setting Page Range! You move between the two text areas by clicking them or using the Tab key. Hitting the Return key simply starts the printing process, which is probably not yet what you intended.

Another warning: for its own internal purposes, *Write* always thinks of the first page of your document as page one, no matter what you've specified the displayed number should be with Set Page #. If you ask *Write* to perform a special function such as printing only specified pages of your current document, you've got to calculate the real page numbers in terms of what *Write* understands, not as you've set them. If your document begins on page 233 and you want to print pages 235 through 237, the correct setting for Page Range is From: 3 To: 5.

Page Range numbers are inclusive; the "To:" page will be printed. If you leave "From:" and/or "To:" blank, *Write* prints from the beginning and/or to the end of the document.

The last two choices, *Copies* and *Paper Feed,* are simple. You can print multiple copies of your document either continuously on fanfold paper or on individual sheets. With the multiple-copy option, you get the whole document in one fell swoop, then another copy, and then another, rather than multiple copies of each page at a time. It saves you from having a monumental collating job later on.

Preferably, when making multiple copies of a large document, you'll use the *Continuous* setting. With the *Cut Sheet* option, *Write* stops after every page to let you load the next sheet of paper. It also stops before the first page, just to make sure.

A Hint to Print By

When you want to print a document that occupies more than one file, the usual *MacWrite* procedures may be cumbersome. Let's say you've created six sections. You'd have to load the first of them into *MacWrite,* print it, close it, and then load the next, going through the process again. Not only are repetitive operations boring, but they're also prone to mistakes.

There's a better way. Exit the program entirely. Once back at Mac's desktop, select the icons for all of the sections of your document either by Shift-clicking them or dragging through them. When you've got them all inverted, move up to Macintosh's File menu (not *MacWrite*'s) and drag to Print.

Be careful when selecting from the options presented to you. You'll only be given one chance to select them, and the ones you choose will apply to *every* document you print. Any Page Range you set, for example, will apply newly to each of the documents you've selected.

As with *MacPaint, MacWrite* will then load and print all the selected documents one after another. Although they may not be printed in the order you wrote them, the individual header, footer, and pagination information is stored with each section of the document. If you've done everything correctly, so will *MacWrite.* All you'll have to do is put the pages in the proper order when they're done.

Quit and Rescue

Our primary recommendations about quitting *MacWrite* are the same as we gave for *MacPaint.* Get in the habit of using Save As first so that you can keep the old version of your document if you're so inclined. And get in the habit of saving to a data disk so that you don't run into maddening disk-full problems on your working disk.

And get in the habit of saving *often* as you work. *MacWrite* has no rescue function. If the power goes out or static causes trouble or you run into some bizarre software bug (and we've met a couple), you'll lose everything you've done since you last saved your work to disk.

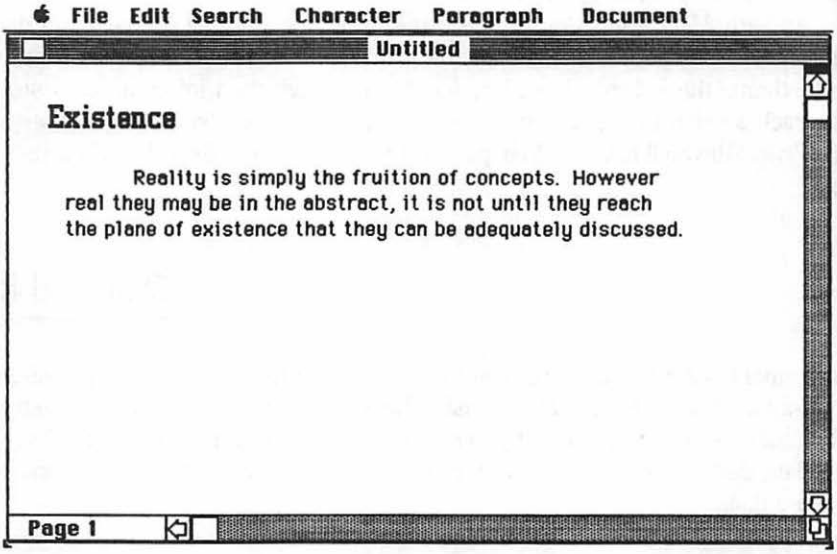
A Last Word

MacWrite offers fonts and graphics unavailable from any other word processor currently on the market. That's its long suit. But don't approach it as though it were a comprehensive, large-scale word processor. It's not. The search-and-replace function is rudimentary at best, the limits on document size are a real handicap, and using it to manipulate large blocks of text can be cumbersome and unwieldy.

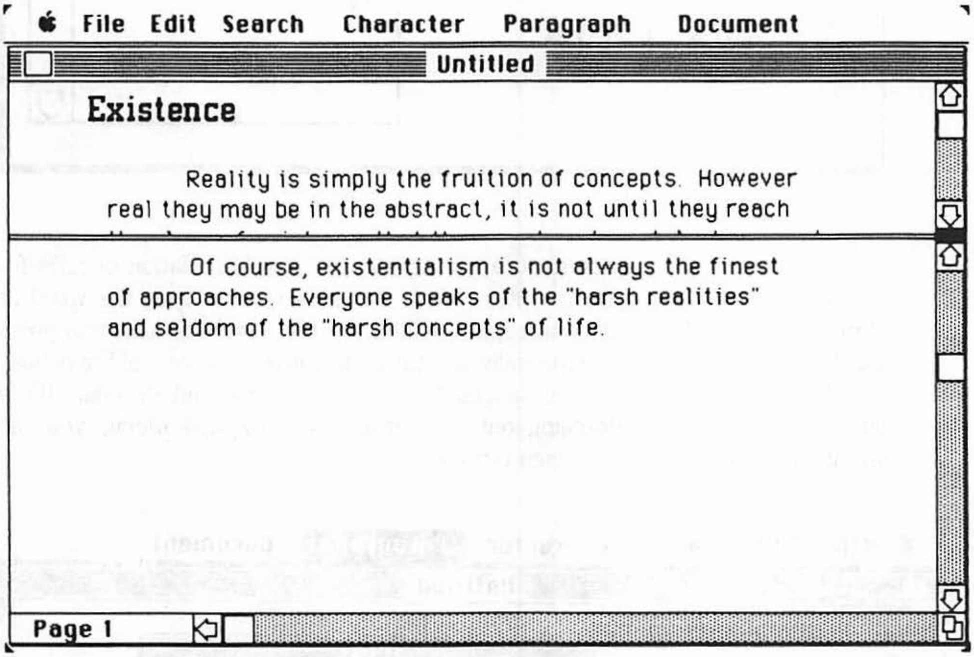
But as a light-duty word processor with fancy tastes in graphics and fonts, it's unequaled. If you have use for its strengths, you may come to overlook its weaknesses. If not, look elsewhere for a heavy-duty word-crunching tool.

Microsoft *Word*

There is another contender for word-processing rights on Macintosh. It's called *Word,* and it's from Microsoft. This program originated on the IBM PC, in a somewhat different format; its transfer to Mac is not yet complete at this writing.



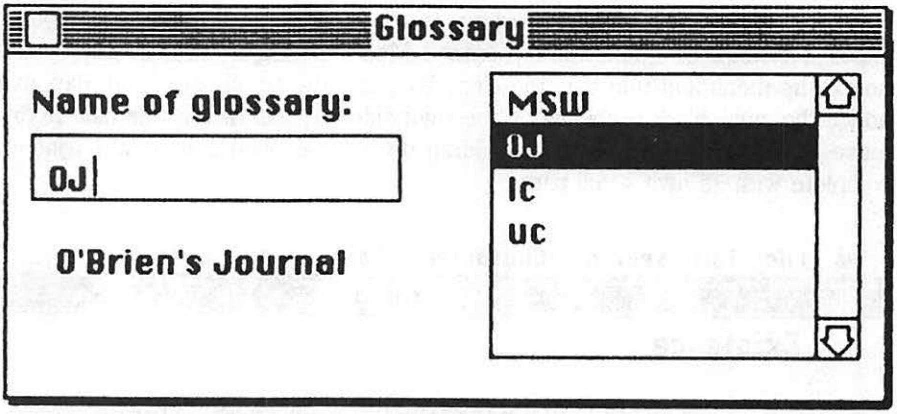
Word's entry screen will look very familiar to you. For all practical appearances it is another open window onto a Mac application. Immediately, you'll notice the menu and title bar, the close box, and the scroll bars. You may also notice the small black rectangle on the right side, just below the title bar. If you move to this rectangle, press, and drag down, you open a duplicate window complete with its own scroll bars.



The purpose behind it is simple. While you are typing page nine, you may not remember the reference you made to something on page two or three. With *MacWrite* your only recourse was to scroll back to the beginning of the document, check it, and then scroll back again.

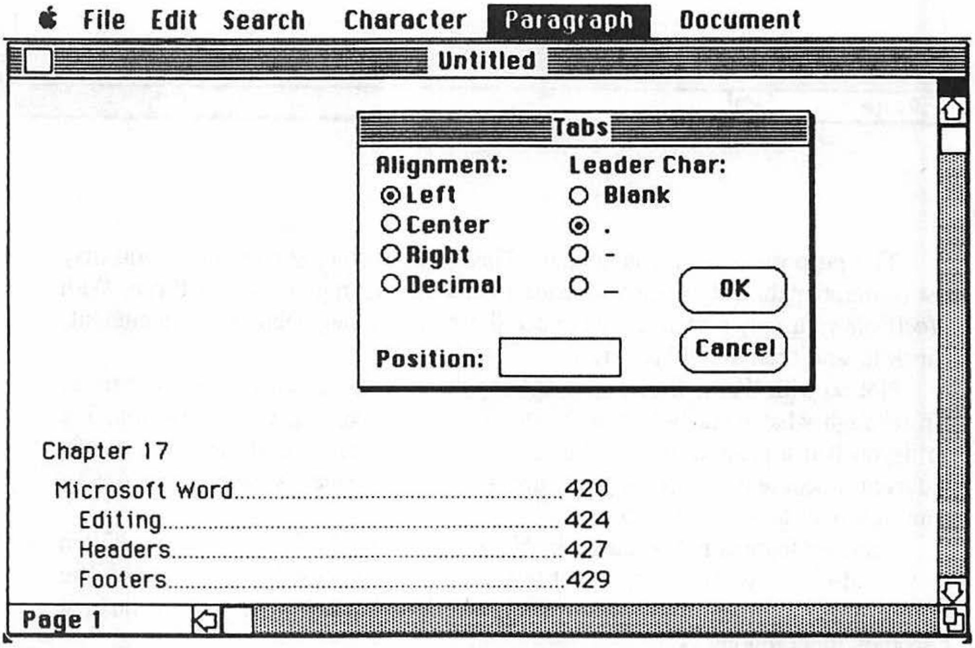
Not so with *Word.* If you open the top window you can use its scroll bars to flip through what went before without leaving your current typing position. It's as if you had a printed copy at hand. The window can also show you a totally different document, such as your notes on a particular subject. Up to four windows may be open at once.

Another feature not available in *MacWrite* is *Word*'s *Glossary* option. Often you'll find that you are typing repetitive words or phrases, like *Macintosh.* The first or second time, it may not be such a bother, but by the twentieth time, it becomes monotonous.



Using *Word*'s Glossary feature, you can create an abbreviation or alias for the actual words you want to enter. When it comes time to type the word or phrase, you merely enter its surrogate, hold down the Command key, and press the Backspace. *Word* will automatically substitute the full text for your abbreviation.

MacWrite gives you two choices for tabbing: normal and decimal. *Word* offers even more. By dragging out *Tabs* from its *Paragraph* menu, you can specify several things about each tab you set.



Left, Center, or *Right* position your characters at the appropriate spot relative to the tab you've set. The "leader" characters you select fill any intervening spaces between your present print position and the new cursor position after the tab—an effective format for numeric or columnar presentations.

Using the Keyboard

Microsoft has provided a more extensive keyboard interface for *Word* than Apple did with *MacWrite.* More features can be commanded from the keyboard without the distraction of reaching to pull down a menu.

The key choice often seems illogical for a particular function, and even where the *MacWrite* commands are duplicated, you must hold down the Shift key along with the Command key. In *MacWrite* a superscript is begun using Command-H. Its *Word* counterpart is Command-Shift- = . With *MacWrite* you can turn off Style enhancements and switch to plain text using Command-P. Switching to plain text with *Word* means pressing the Command, Shift, and spacebar keys. *Word*'s logic is difficult to fathom, but perhaps it will be modified before the final release version.

Text Handling

The preliminary version of *Word* appears to offer powerful text-formatting capabilities. Its paragraph formats allow for customization of indents, outdents, and line spacing within the paragraph as well as before and after it. You can, for instance, have double line spacing within your text and triple line spacing between paragraphs. With the exception of the interparagraph spacing and triple-spacing features, these capabilities are also available from *MacWrite*'s ruler.

But *Word* adds special page-formatting capabilities, allowing you to automatically print page numbers in Roman numerals, or with sequential letters, as well as adjust alternate margins for book-style presentation. *Word* also offers a "merge-print" feature that lets you crank out customized documents by automatically inserting names and addresses into form letters.

Two key advantages of *Word* have to do with document size. *Word* allows documents to be as wide as 15 inches, thus adding support for the wide-carriage Imagewriter. The program also automatically swaps text in and out of RAM to and from the disk as needed, so the length of a document is limited only by disk capacity. This feature alone may be invaluable for professional writers. *Word* also offers automatic footnoting capabilities useful to academics. In short, it can do virtually everything *MacWrite* can do—and then some. But at this writing, it suffers from one grievous flaw: it's unavailable.

If all you're going to be doing is turning out letters and short reports, you may never need most of the features *Word* has to offer, and you may not want to bother learning how to use a program of its complexity. But if you're cranking out reams of text, you're likely to tire quickly of compromising with *MacWrite*. Other word-processing programs are likely to be along soon. Don't be slickered into picking one that's not right for you, but remember this: *any* word-processing program will beat your old typewriter hands down.

12 MACNUMBERS

Since their basic design requires them to manipulate data in numeric form, computers are incredibly efficient number crunchers. They can instantly handle calculations that would take hours or even days for humans to compute by hand.

Of course, some problems remain simple enough to relegate to a plain pocket calculator. Adding up a few columns of numbers, for example, is no big deal. But what if you had a column of 255 numbers and then had to create a separate column increasing each of the numbers by 10 percent? What if you had to do that for 50 or 60 successive columns?

What If?

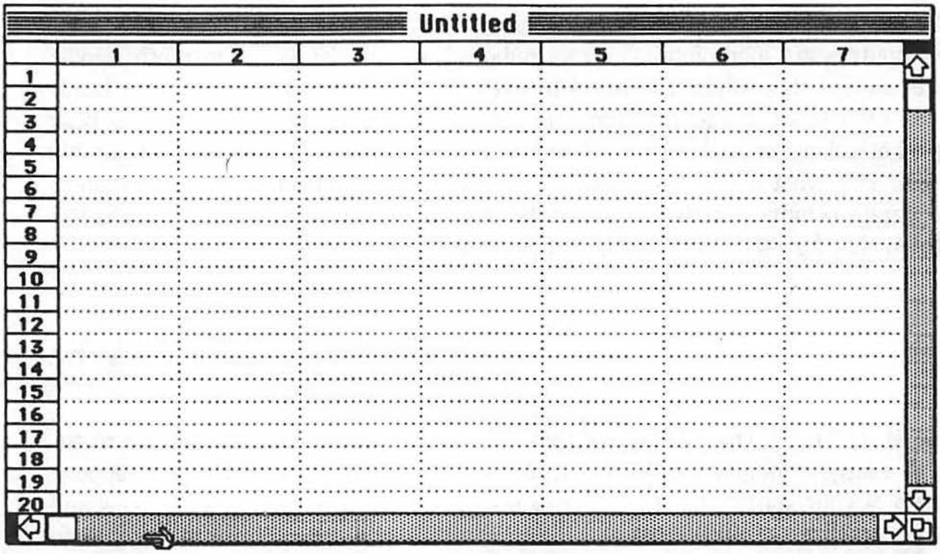
What if? That's what *spreadsheets* are all about. Given a fully charged calculator and a large enough sheet of paper, anyone can do columnar math. But suppose each of your starting columns represents the quarterly income of a company and each entry is the total sales figure for an individual product. What would you do if you were told to make up a projected income statement showing quarterly activity for the next ten years based on a 7 percent quarterly increase in sales across the board? And then how would you perform the same projection showing a third-quarter loss of 3 percent each year, followed by one that factors in the cost of goods, which is assumed to increase by 6 percent each year, and rearranges the product list in descending order of sales dollars? And then what if a single number in the document changed to reflect revised data?

Your calculator would explode, you'd be paying plenty of visits to the optometrist, and you'd be ordering pencils by the carload. That's why one of the biggest booms in computer sales was spurred on when *VisiCalc* introduced spreadsheet applications for the Apple //.

Spreadsheets

Computerized spreadsheets resemble the time-honored green ledger sheets with which you may be familiar. The individual boxes are called *cells,* and the structure as a whole is called a *matrix.* The simplicity of the arrangement is most evident when you need to refer to any one of the cells. To do that, you simply choose a column number from across the top and a row number from along the side. There's only one cell where the specified column and row intersect; there can be no confusion over which cell you mean.

Filling the cells on a manual sheet means writing in numbers and headings and performing calculations as you go along. On a computer the machine does all the number-crunching work; all you have to supply is the formulas the computer needs to do its calculating.



The easiest way to approach an electronic spreadsheet is to see one in action. The only one currently available for Macintosh is from Microsoft Corporation and is called *Multiplan.* It uses a matrix 63 columns wide by 255 rows deep and leaves about 41,000 bytes of memory open for you to work in.

Multiplan

Just as you did with the *Paint* and *Write* disk, you should make a copy of the *Multiplan* original disk with the System and Finder files on it. Unfortunately, you will notice a problem when you try to use it.

Microsoft believes that it must protect itself against unauthorized copying and distribution of *Multiplan*. Although you can make as many copies of the original disk as you like, you can't use any of them unless you also have used the original at the current work session.

When you use *Multiplan* from the original disk, it places a special code in a protected area of memory. When you try to use *Multiplan*, the program checks to make sure this code is there; if not, it will ask you to insert the original disk. After you've loaded the program from the original disk once and the code is inserted into the proper spot, you can (and should) use a copy of the disk.

A typical procedure might be to turn the machine on, insert the original disk, double-click *Multiplan* and, after it's loaded into Macintosh, drag Quit from the File menu. That will put you back on the desktop. As long as you don't turn the computer off, you can (and should) eject the original disk and do any further *Multiplan* work from a copy.

While you're at it, make a data disk, too. If you only have an internal drive, you'll be wise not to save files on the *Multiplan* disk. The *Multiplan* and System files take up more than 320K, leaving you only 79K of room for the documents you create. Saving your work only to data disks will help you avoid full-disk problems.

Multiplan and the Three Fonts

Multiplan was designed to work with the two Seattle fonts. The 10-pt. version is what it uses on the screen and the 20 pt. is what it uses to assure you of a good quality printout. To be usable, they have to be a part of the System file on your *Multiplan* disk.

You can use the Font Mover to find out if they're in that System file. If not, you can use the Font Mover to move them in. While you're at it, you can use the Font Mover to move out *all* the other fonts you can and free up a lot of disk space. Seattle is the only font *Multiplan* knows how to use.

With one exception. If *Multiplan* doesn't find the Seattles, it will default to 9-pt. Geneva—a font that will always be in the System file, since the Font Mover can't move it out. It's a nice precaution that lets *Multiplan* have a screen display no matter what.

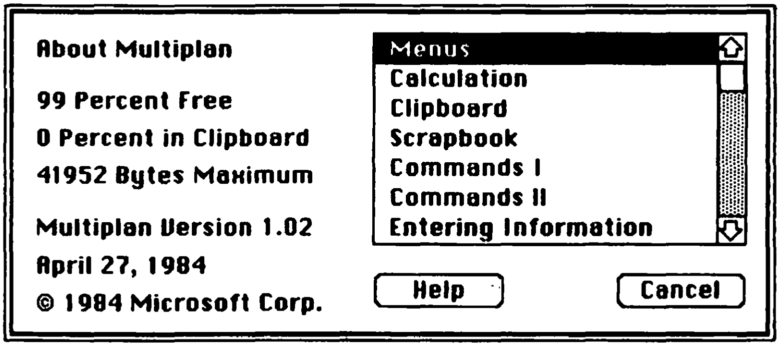
With the smaller Geneva font, you'll get a wider display—more columns of information on the screen at once. But fonts in the 9-pt. range are small and not exactly easy on the eyes. And the output from the printer with them leaves much to be desired.

If you have the Seattles, you can see what Geneva looks like by removing the Seattles from the System file to a file of their own, using the method discussed in chapter 7. It doesn't harm the information in the spreadsheet. And you can always move them back if you prefer them.

Getting Started

Double-click the *Multiplan* disk icon. You'll see the familiar System and Empty Folders along with the *Multiplan* icon and an icon with a question mark superimposed on it, bearing the name "Multiplan Help." For now, open the *Multiplan* icon itself.

It seems as though all the software originally released with Macintosh has been back in the shop for repairs. *Multiplan,* too, has undergone a revision since its initial release.



Drag down About Multiplan to check the version. At this writing, the current version number is 1.02. If you are still working with version 1.00, see your dealer or contact Microsoft about a free upgrade. The original version included some rather horrendous program bugs and was quickly withdrawn from the market; the new, improved release was distributed free to those owners of the original version who sent in their warranty/license registration cards.

At this writing, about 70 percent of those who purchased the original *Multiplan* had not returned the card packed with the software, so upgrades started very slowly. This situation should make you realize the importance of those little cards. There's no other way for the company to find you. If you don't return the warranty/registration card, you guarantee that you won't get any direct notification about problems and solutions.

Help!

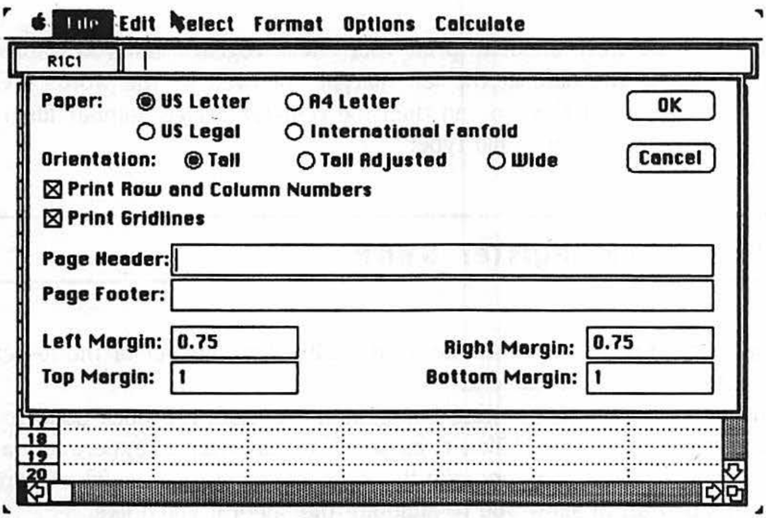
Had you originally double-clicked the *Multiplan* Help icon, you would be exactly where you are now. Microsoft has incorporated help screens into About Multiplan, and it's available to you at all times. You'll notice quite a few topics displayed, and you can see more by using the scroll bar. To select the topic, click it and then click the Help button. Once inside a help screen, you'll be able to page back and forward to the others by clicking the Next and Previous buttons. When you're done, click the Cancel button to return to the *Multiplan* spreadsheet.

What's in the Window

By now, many of the items on the *Multiplan* entry screen should be familiar to you. The menu bar contains a few more menus than the programs you've already seen, although the Apple and File menus are practically identical to those in *MacWrite*.

Page Setup

The only differences appear in the Page Setup and Print options. Page Setup's first three lines of options are exactly the same as *MacWrite*'s. The rest are new ones.



With an *X* in the Print Row and Column Numbers box, *Multiplan* prints these reference numbers on the final document. With no *X* there, *Multiplan* omits them. The Gridlines option works the same way. The dotted grid lines that outline each cell on the screen may be included on your printout at your option. *X* prints them, no *X* omits them.

Headers and footers are simpler than they are in *MacWrite.* There are no pull-down options for them here, and you're only allowed one line for each. Just enter the information in the appropriate boxes.

Since there are no margin, date, or page number icons available in the header and footer boxes, you might think you're at *Multiplan*'s mercy about how your header or footer is printed. Not so. You can specify the format for your header or footer by including an ampersand and a single-letter format command.

Multiplan Format Commands

&L	Align Characters at Left Margin
&C	Center Characters
&R	Align Characters at Right Margin
&P	Print the Page Number
&D	Print The Date
&T	Print The Current Time

Suppose you were about to print your check register and you wanted the header to include the date at the left margin, followed by the words "-Check Register-" centered at the top and then the register's page number flush right (at the right margin). You would type:

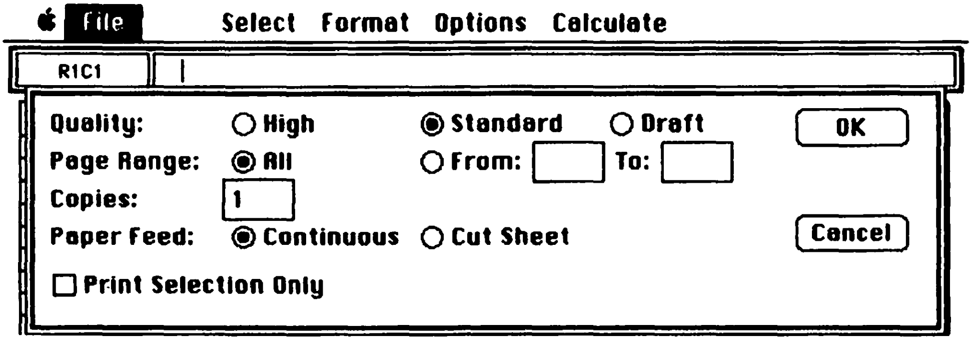
```
&L&D&C-Check Register-&R&P
```

Such format instructions can be used in either the header or the footer and help to personalize the document.

The unfamiliar margin-setting boxes at the bottom are duck soup to use. Just enter the numbers you'd like, in inches. You may want to experiment a little with different settings, but generally the default settings are useful and provide enough of a margin to allow you to annotate the sheet if you'd like.

Print

Under the Print option, the only item that's new is *Print Selection Only*. With *Multiplan* you can select an area of your spreadsheet by the usual method of dragging through it. If you want to print only a limited section of your spreadsheet, select it and click this box at print time.



Unless you choose Print Selection Only, *Multiplan* prints by pages. With a sheet up to 63 columns wide by 255 rows deep, how does the program define pages?

Multiplan uses the margins set in Page Setup to define sections of the sheet as pages, and shows you where the pages will break by substituting dashed lines on the screen for the normal dotted ones. If you change the margins, the boundaries will reflect the difference.

But which pages are which? With a large sheet, pages can extend off to the right and down below. When you specify a page range, which is number one and which is the last?

First, it's important to realize that *Multiplan* only deals with "active" pages—pages that contain something in at least one cell. If the page has nothing but empty cells, *Multiplan* disregards it.

Physical Page	**As many cells as will fit into an 8 1/2 X 11 inch area after deducting the margin dimensions you've specified.**
Active Page	**A physical page which has at least one cell in use.**

Then *Multiplan* uses a standard set of rules. The physical page in the upper left-hand corner of the sheet, if active, is page one. The next physical and active page directly below the first becomes page two. *Multiplan* goes all the way down the sheet, then starts over at the top, one page further toward the right. It repeats the procedure until it reaches the last physical page in the lower right-hand corner of the spreadsheet. Since it doesn't count blank pages, you shouldn't either when you're printing a range rather than "All."

The Command Area

But before you print anything, you'll want to do some work. Close any print boxes and take a look at the *Multiplan* command area just below the menu bar. The small box at the left shows you your current position on the spreadsheet. For a new document, it should show *R1C1*—Row 1 and Column 1. The longer box in the command area includes an insertion point, so you can tell it's available for entering text.

The Spreadsheet

Beneath the command area is the spreadsheet itself. It extends beyond and below the visible window. You can tour it by placing the pointer on the scroll arrows. When you do, you'll discover the pointer looking suspiciously like a hand. It's just one of eight different pointer shapes *Multiplan* uses.

In the menu bar, it's the typical slanted-arrow shape. In the spreadsheet area, it's a thick, hollow cross hair. In the scroll areas, it looks like a hand folded into a fist with just the index finger extended to the left. In the title bar, it's a thin cross hair with arrow points at the ends of each of the four lines. In the command area, it's an I-beam.

The pointer's sixth and seventh costumes are produced with the assistance of the Shift key. If you press Shift while the pointer is in the numbered area for the columns, it will change into a small image of two *Multiplan* cells with an arrow sticking out to the right. If it's in the row number area when you press Shift, it will change into a similar icon with an arrow sticking out of it straight down.

Adding Blanks

These last two icons indicate that an additional function is available. You use them to insert a blank row or column into the spreadsheet. If you move into the column numbers, hold down the Shift key, see the icon appear, and then click, the contents of all columns to the right of, and including, the one where the pointer sits will be shifted one column to the right. This will leave you with an empty column below the pointer. When you perform the same trick in the row numbers, the rows shift down to leave you with a vacant row.

Although the literature says that the process is an insert, there must be somewhere to send the other rows and columns. But the *Multiplan* sheet is finite. It ends horizontally at column 63 and vertically at row 255. If there is anything in any cell in either row 255 or column 63, the preceding columns or rows are as good as glued into place. You'll be able to go through all of the motions of "inserting," but nothing will happen. If you'd like to really confound yourself, forget you put something in cell R255C63. That's the very last cell in the sheet and effectively blocks both column and row "inserts."

Removing Rows and Columns

If you find you've inserted a row or column in an aesthetically displeasing place, you can remove it in a jiffy. Move to the column or row number of the offending element and click. The entire line of cells will invert, both in the visible screen area and beyond. Then move up to Edit, drag to Cut, and release. It will vanish to the Clipboard.

Moving Around

There are lots of ways to jump about in the spreadsheet area. You can use the scroll bars to shift whole sections right or left, up or down—often the swiftest method for advancing beyond the visible area.

To work with a cell, you can move to it and click. It will invert, indicating that you can use it. But mousing around short distances is often cumbersome. For moving within the visible area of the spreadsheet, you can also use the keyboard.

The Tab key moves the pointer one cell to the right, and the Return key moves it one cell down. To go left or up, you hold down the Shift key and then the Tab or Return key. Likewise, if you have Mac's numeric keypad, you can advance from cell to cell by using its arrow keys. The direction they point is the direction they move the pointer.

Filling Cells

Putting anything into a cell is only a matter of typing at the keyboard. *Multiplan* automatically treats cells with letters in them as text and those with numbers as numeric values. That leaves only formulas to contend with.

Something as simple as 1 + 1 is a formula. But since it contains one character that's not a number, *Multiplan* would treat it as text. To enter a formula, you start by pressing the *equal sign* (=), cueing *Multiplan* that it must *evaluate* what comes next, and not accept it literally.

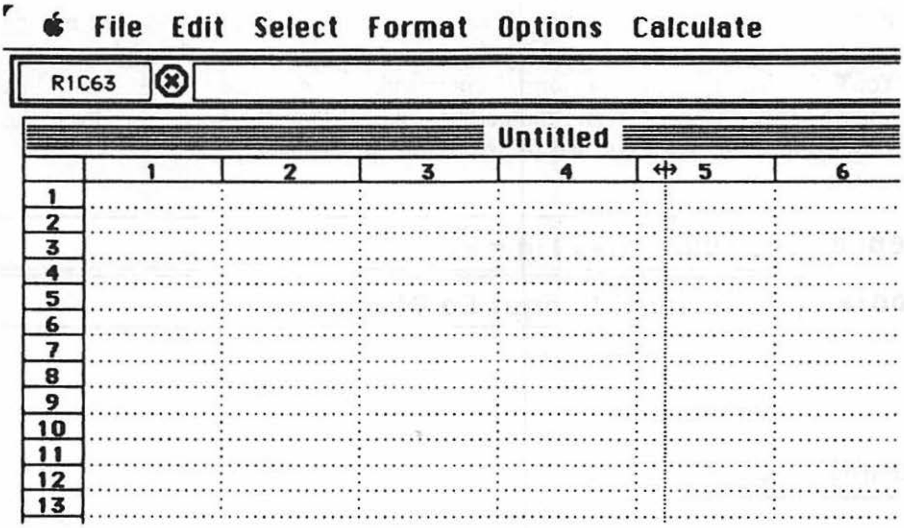
Widening Cells

There will be times when a cell won't be wide enough to hold the value you want to put there. With text material, *Multiplan* will overlap the writing into the cell to the right, as long as there's nothing in it. As long as it stays empty, you'll see the additional material. If the cell to the right has something in it, you'll see only as much of the text of the left-hand cell as will fit. It's all still there; you just can't see it.

Numbers and the results of formulas, on the other hand, do cause problems. If they don't fit in the space available for them, and you've specified that they be displayed in a particular format (with dollar signs, for example, or commas to mark the thousands), all you'll see is a cell filled with #'s to let you know you'll need to make that column wider. Otherwise *Multiplan* will display the number in exponential (or *scientific*) notation (with the letter *E* representing the term "times ten to the power of").

Widening Columns

To widen columns, *Multiplan* lets you use Mac's mouse and the eighth pointer shape. Move to the numbered area at the top of the spreadsheet, and then to a line that separates any two columns. As the pointer reaches this line, it changes. It becomes a solid line itself, with an arrow protruding from each side.



If you press and drag while it's in that form, you can increase or decrease the width of the column to its left. You'll see just the outline following you at first, but when you release the mouse button, the sheet will readjust itself.

A Sample Spreadsheet

The next course of action is to give *Multiplan* a try. You're going to follow that terrible example we began with, but to a somewhat smaller degree. You'll create a sales-analysis sheet for the National Widget Company, covering five products for four quarters. The first-quarter sales column will contain actual figures we'll supply. The other three will be "What ifs" showing a sales increase of 4 percent per quarter.

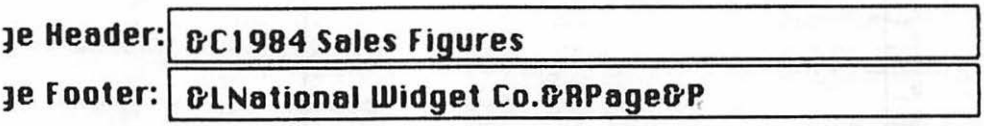
Before starting out, it's useful to think about what the sheet will look like. Just because you'll be doing it on a computer doesn't mean you shouldn't apply the same forethought you would if you had a pencil and an eraser.

Entering a Header

First you'll need to identify the document. You can put a title on the sheet itself, or you can use the headers and footers. We'll demonstrate the latter option, so drag out Page Setup from the File menu.

For the header you'll want to center the title, which will say "1984 Sales

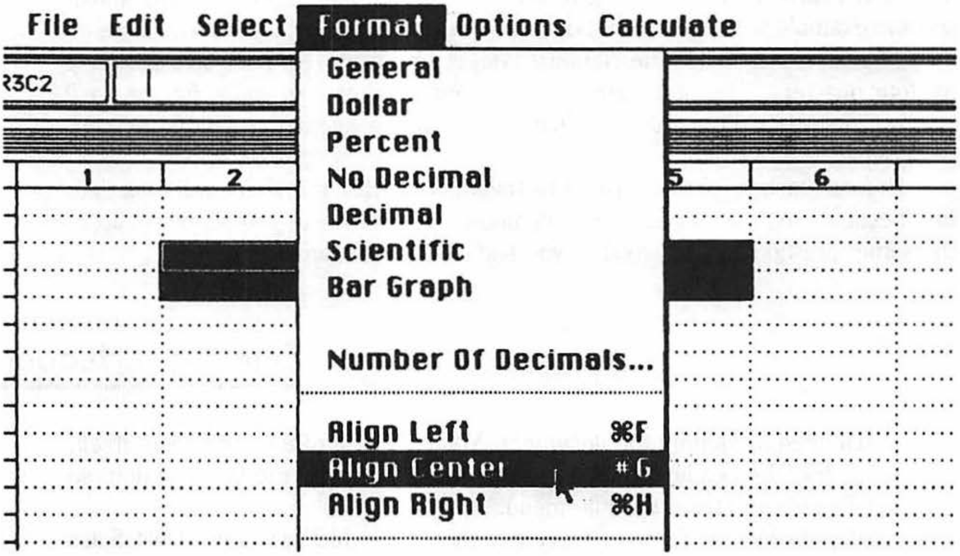
Figures." In the footer you'll set "National Widget Co." against the left margin and the word "Page," followed by the page number, against the right margin. You'll do that by using the format commands we discussed earlier, so when you're done, the header and footer lines should look the way they do in the illustration. If so, click OK and return to the spreadsheet.



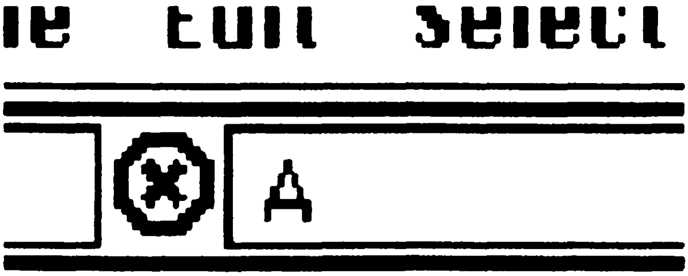
Entering and Centering

You should leave some space at the top, say one row, just for looks. And you'll need to use the left-hand column to list the products. Now you're going to label the four columns for the quarterly results. To make things pretty, you can center them in each column.

Move the pointer to cell R2C2 and press. Drag through to cell R3C5 and release. All the cells in your path should invert. Once done, move to the Format menu and drag down to *Align Center.* Release when that option inverts.



Notice that even though a *block* of cells is inverted, only the one you started in, R2C2, is fully outlined in white. *Multiplan* considers it to be the first place anything you do at the keyboard will happen.



Type the word "Actual." The command area and the cell both display each letter as you type it. But the command area has undergone a change. Between the position box and the command line itself there is now an octagon with an *X* in it. That's called the *cancel box.*

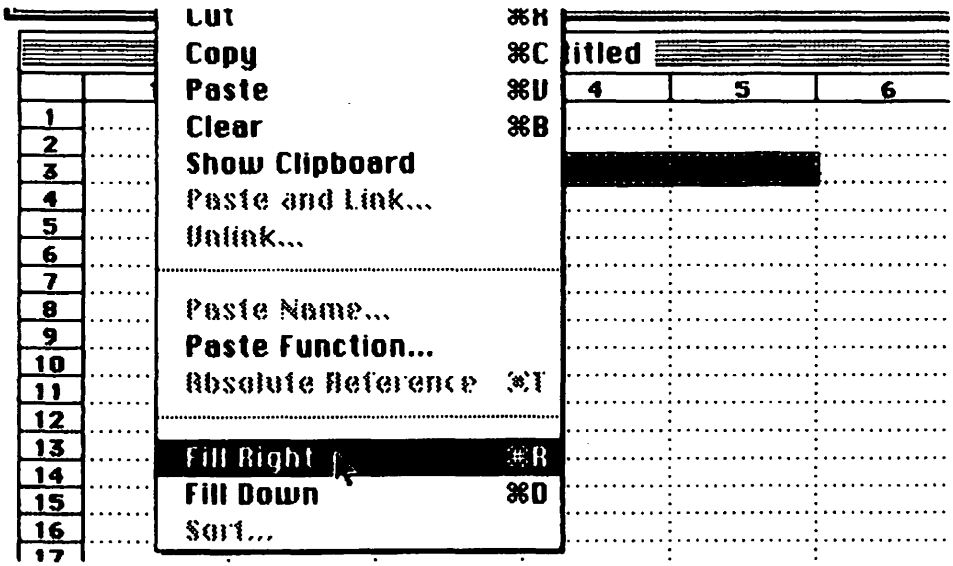
If you make a mistake in your typing, you can use the Backspace key to do corrections. But if you've mauled the entry so badly that it's easier to start over again, you can move the pointer to the cancel box and click. The command line will clear. If you do it by accident, you can Undo it.

Assuming you get through "Actual" with no problems, press the Return key. The word is centered in the cell and the cell immediately below it becomes active. In this one, R3C2, put the words "1st Quarter," but this time when you're done, press the Tab key. Instead of shifting down, you've moved to the right. Fill the three adjoining cells with "2nd Quarter," "3rd Quarter," and "4th Quarter," pressing the Tab key as you finish each one.

Hold down the Shift key and press Return once to go up a row and then press Tab three times to move left to cell R2C3. You can let go of the Shift after you type the *P* in "Projected." Don't press any key when you're done with that word; just let it sit there.

Filling

There's a funny thing about the word "Projected." You have to fill two more cells with the same word, and that's an awful lot of typing to do. Try moving the pointer to R2C3, then press and drag to R2C5. With that block defined, move to the Edit menu and drag down to *Fill Right.*



It's a handy option, as is its partner *Fill Down.* Release the mouse button, and you'll fill the two additional cells with the contents of the first. It's a shortcut to Cutting and Pasting.

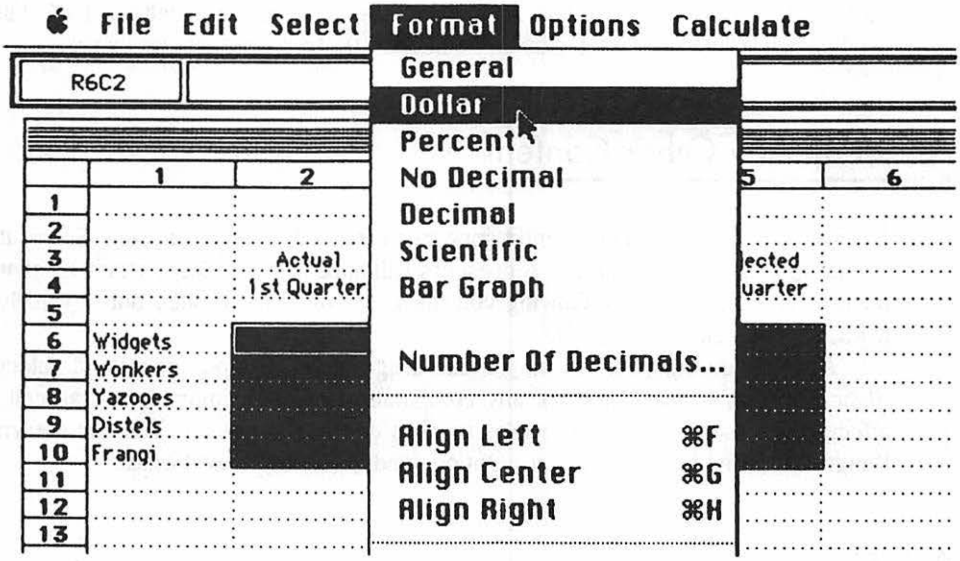
Beginning at R6C1 and using the Return key after each item down to R10C1, enter the words "Widgets," "Wonkers," "Yazooes," "Distels," and "Frangi" in the first column. These are your products.

Dollar Sense

All that remains is the price information for the first quarter. The common bond among all the sales figures is that they are dollar amounts, best expressed with dollar signs and decimal points. Bring the pointer up to R6C2, press, drag to R10C5, and release the mouse button. This block includes all the cells that will contain dollar amounts.

Move up to the Format menu, drag to *Dollar,* and release. All the selected cells will automatically be formatted in dollar-and-cents notation with a leading dollar sign.

The last simple chore is entering the actual amounts for the first quarter. Beginning at R6C2 and using the Return key, enter the numbers 1543, 4355, 2457, 7432, and 12343. That should take you down to R10C2.



Entering Formulas

All the relevant facts are now on your spreadsheet. Time for a little crunching. You're ready to enter our assumptions, in the form of formulas. The assumption here is that the sales for each product will increase by 4 percent per quarter.

In *Multiplan,* as in life, almost everything's relative. The one absolute reference *Multiplan* understands is the currently selected cell. Let's say it's R6C3, which is where you'll be making the first of the assumptions about the product "Widgets." Give it a click.

The information you want to work with, the original amount, is in cell R6C2. But you must refer to it relative to your current position. Relative to R6C3, R6C2 is on the same row, but one column to the left. Leftward motion is considered negative. Using *Multiplan*'s notation to describe the location of R6C2 relative to R6C3, you could write it as RC[−1]. This is simply *Multiplan*ese for "the same row" (R), "one column to the left" (C[−1]). You definitely need the square brackets around the −1.

There are two ways to put that notation into R6C3, but before you try either, make sure that's the selected cell and then press the equal sign. You've got to tell *Multiplan* that you're about to enter a formula.

If you need the keyboard practice, you could enter RC[−1], but if you'd rather practice with the mouse, move to R6C2 and click. Since you've hit the equal sign, *Multiplan* will look at the cell you clicked and automatically insert its reference location into the cell you're working with.

All that remains is for you to add the additional component of the equation so that it reads RC[- 1]*1.04. Multiplying the contents of a cell by 1.04 will produce the original number plus an additional .04 to represent the increase.

A Cell by Any Other Content

Even though the formula currently appears in the cell, when you press Return it will disappear, and the value it represents will appear in its place. Don't let that mislead you. *Multiplan* is showing you the *result* of your formula, but internally it knows this cell as a formula.

Anytime during your work, you can drag out the Options menu and select *Show Formulas.* The results of any computation will be removed, and all cells affected will then show the formulas used to derive the results. You can return things to normal by going back to Options and selecting *Show Values.*

Polishing It Off

You're done when you press the Return key. Well, not totally done, but all that remains is merely a formality. You don't have to go to each of the cells and rewrite the formula you just entered. You can use the Edit menu instead.

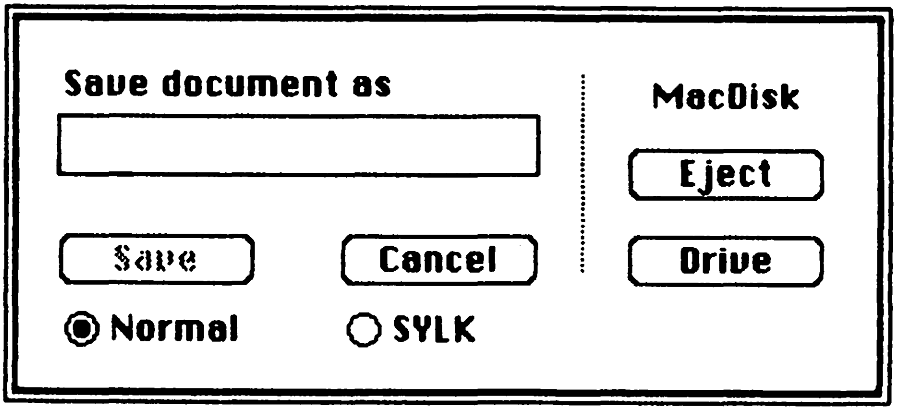
Press at R6C3 and drag down to R10C3. The cells will invert. Now move to Edit, drag to Fill Down, and release. *Multiplan* will fill the selected cells with your formula, using the relative reference in each case. Each cell in column three will now look to a cell in the same row but one column to the left to produce its result.

Of course you've figured out that your next move is to press at R6C3 and drag through to R10C5. Once you've created that block, return to Edit and release at Fill Right. That puts your formula in all the selected cells. The same relative computation applies.

Saving

This time you're really finished. The sheet you planned is complete, and all that's left is to print it or save it. Since it has no name ("Untitled" doesn't count), drag File to Save As. Give the file a name, and if you want to send it to a data disk, specify or eject. It works the same way as *MacWrite* and *MacPaint.*

But there's one exception. When you Save As, you'll be given the option of storing the document in the standard Multiplan format or in a *SYLK* format. The standard format is a special one used by *Multiplan* to save information in a



compressed format that uses as little disk space as possible. The SYLK format, which stands for *SYmbolic LinK,* is an ASCII representation of your spreadsheet.

The easiest way to describe the difference between the two is to imagine the disk as a sheet of paper. If the contents of your spreadsheet were written in *standard* format, you would not be able to read it. It would look like senseless gibberish.

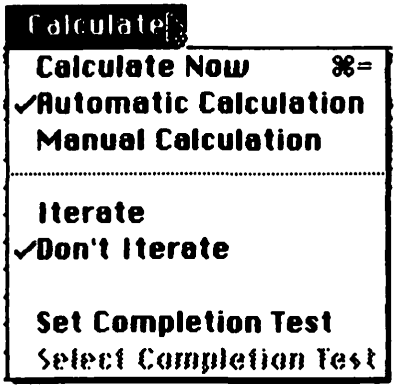
While the SYLK version might not look like much, you would be able to see plainly the column and row notations, the formats like dollar signs, and the formulas and values you entered. It would be in English.

Using this format can greatly simplify things if, for instance, you want to transmit the contents of your spreadsheet over the phone lines to a computer that doesn't happen to be a Macintosh. Using the instructions in the *Multiplan* manual, you can also create SYLK files from your own programs and have *Multiplan* read them.

The drawback is that SYLK documents require much more space than those saved under the standard format, and take much longer to load. Worse, if you have a spreadsheet already on a disk in standard format and there's only a small amount of room remaining, trying to save it as a SYLK document will produce a disk-error warning box telling you your disk is full. You'll need to eject the disk and try it on another with more available space.

A Calculating Affair

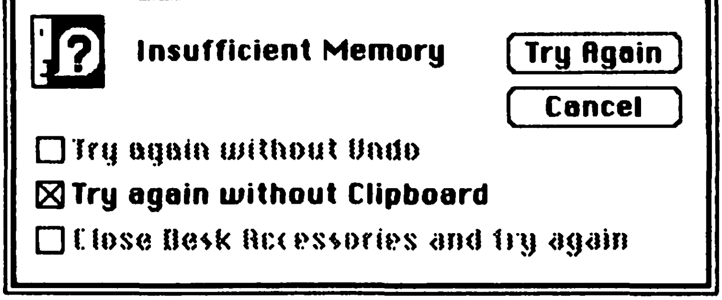
All the calculations on your spreadsheet are done automatically as you enter or modify the contents of each cell. On a small sheet, like the one you've created here, that's of little consequence. However, if your document occupies several pages, recalculating all of your formulas every time you make an entry can be frustrating. It takes time, and the longer and more complex the document, the more time it will take.



If you'd like to change that, the tools are available to you. Move to the *Calculate* menu and drag to *Manual Calculation.* Once you've done that, *Multiplan* will only make new calculations when you move to this menu and drag to *Calculate Now* or press the Command and equal-sign keys simultaneously. You can always reset calculation to automatic at any time. Now and then it's a good idea to check which mode you're in to avoid errors.

Load Problems

If you save a fairly large document, you could end up with a problem the next time you try to load it back into *Multiplan.* The problem is the Clipboard. A large amount of material in the Clipboard may make it impossible to get a big document back into *Multiplan.*



If this happens, the program will give you the opportunity to try it again without the Clipboard. *Multiplan* will discard the Clipboard's contents and attempt to reload your document correctly. Should this fail, try leaving *Multiplan* entirely and double-clicking the icon of the document itself. This "back-door" approach will generally get the results you're trying for.

Summary

To cover each and every one of *Multiplan*'s features would require about 170 pages of text. Coincidentally, that happens to be the size of *Multiplan*'s manual. It's a very good guide and is divided into both *use* and *reference* sections. It's where you'll learn about built-in functions like *SUM, AVERAGE, IF, MAX,* and *MIN,* just to name a few.

But once you begin using *Multiplan,* you'll probably need to reach for the manual only on rare occasions. The help screens available from the About Multiplan option under the Apple give you pages of information at the click of a mouse. Get acquainted with what's on them, and you'll soon know exactly where to look for answers to your questions. With all this help available, you may be surprised at what you and your spreadsheet can accomplish together.

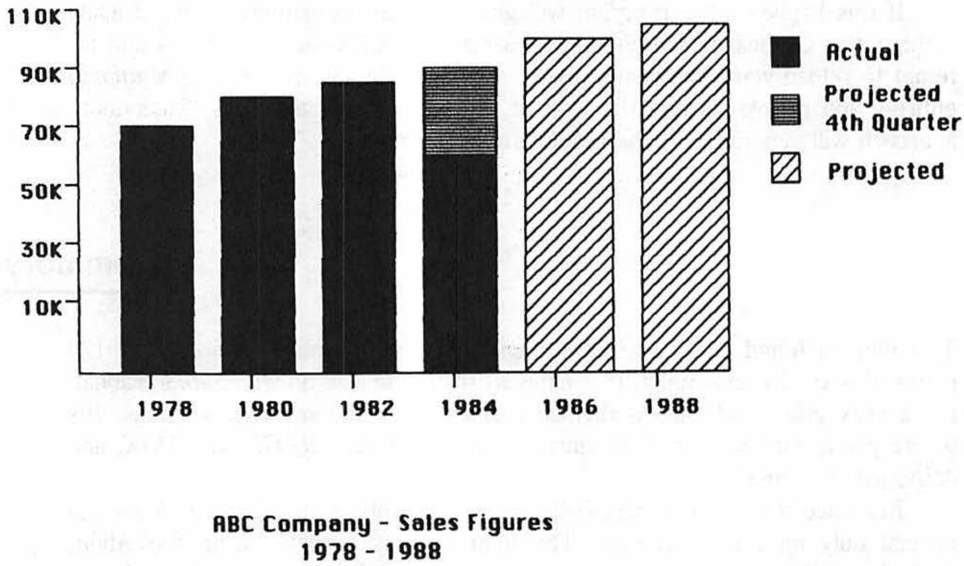
Microsoft *Chart*

Numbers are excellent for showing quantitative results. However, a chart can be useful for comparative purposes. Microsoft is currently working on another way to look at numbers: it's called Microsoft *Chart.* Even though published references to and examples from this program go back about six months, Microsoft has still not fine-tuned it enough for release at this writing.

Certain types of graphs and charts have been traditionally popular in business circles. *Chart* can produce most of them: bar charts, column charts, line charts, pie charts, scatter charts, and combination charts.

Just drawing a simple chart with very few pieces of information is fairly easy. (In fact, since we don't have a copy of *Chart,* we did our chart with *MacPaint.*) The difficult part arrives when you must compile statistics from charted information and add that to the graph. This is where Microsoft *Chart* can come in very handy.

For one thing, *Chart* can read information from *Multiplan* files, freeing you from the drudgery of entering the data points on your own. The dedicated chartist can even link *Multiplan* and *Chart* documents so that updates on one are done to the other automatically. This, of course, will mean that both the *Chart*



and *Multiplan* applications and linked data documents must either occupy the same disk or you must be prepared to swap some disks on a single-drive Mac.

Chart is capable of handling up to 63 data points on any one type of chart or 120 total points in a graph combining more than one. Once the main pieces of data have been entered, you can calculate median, average, and standard deviation automatically and plot them against the original graph.

One thing to remember about charting is that the more complicated the chart becomes, the longer it will take to produce it. Even the IBM PC, which can be pumped up to 640K, can be agonizingly slow when multiple chart formats are created. And once you start to reformat *Chart* information on-screen, the continual disk referencing it does will undoubtedly slow things down even more.

Chart is likely to be an excellent product when it finally arrives. For the time being, if your charting needs are simple, *MacPaint* should do the job.

13

DATAMAC AND THINKMAC

Managing information is one thing people tend to do badly and computers can do very well indeed. Consider the memos, reports, and correspondence piled up on your desk as information. Cram it all into your computer, and it becomes *data.* Accounting, inventory, mailing-list, and payroll information are all, in their own ways, collections of data.

The file that you create when you enter related information into your computer is called a *database.* A mailing list, for example, is a simple database that consists of "self-contained" elements called *records.* In a mailing list of sales contacts, each record would logically contain a name, title, address, and telephone number, and probably such additional information as the contact's special interests or date of last purchase. Each category into which information is pigeonholed—name, address, special interest, and so on—is called a *field* of the record.

The true beauty of a database comes not from the simple gathering of information into one place, but rather from the ability to manipulate and extract that information in many different ways. Such powers depend on the software program you use to create your database. It's the program's features that allow you to create reports, analyze trends, or sort data in useful ways. With a mailing-list database, for instance, the software might give you the ability to see all customers in the eastern region whose orders for the first quarter of 1984 totaled more than $5,000. But now we're into the realm of *data management.*

Database Management

Information-handling programs running on microcomputers like Macintosh are generally termed *data-management* software or *database-management systems*—DBMSs for short. These programs are used to gather data and enhance it with organizational capabilities that allow you to produce a variety of reports from the raw data.

Don't let the terms of the database world frighten you. Whether you realize it or not, you've been involved with data management from the time you were very young. If you ever owned a collection of baseball cards and separated the ones you traded from the ones you flipped, or kept your aggies in one pocket and your puries in another, you've been involved with the management of objects. Think of your baseball cards and marbles as pieces of data, to be organized, manipulated, and sorted.

Database Terminology

Field	**One unit of entered information. It could be a name, phone number, or any other piece of information.**
Field name	**A description of what you expect the field to contain. It might be the word CITY.**
Form or Screen	**The collection of fields and field names as they appear on the screen. It's much like a paper form.**
Record	**The collection of facts resulting from a filled-in form or screen.**
File	**The collection of all information from all records in your database.**

Entering Data

Certain features are common to all DBMS programs. All offer *form creation*—a way of designing the screen to serve as a sort of fill-in-the-blank form. Without this capability, there would be no way to define exactly what information you wanted to enter. You must be allowed to name fields—the general subject categories such as name or street address—in as descriptive a way as possible.

That benefits you as well as anyone else who may use your database; you may find that you run into trouble later if you give your fields short, cryptic names.

The form-creation routine in your DBMS may also give you the option of using a shorter version of a field's name, sometimes called an *alias.* Using an alias gives you a shortcut when you design a report or need to refer to a field from within the program. Typing multiple references to a thirty- or thirty-five-character field can be tedious.

Data types and *masks* can also be important. In its simplest form, a data type simply indicates whether your field will contain alphabetic or numeric information, so that you don't enter letters where figures should be. A data mask goes even further and lets you define which characters within the individual field should be numbers, which should be letters, whether the letters should be uppercase only, lowercase only, or a mixture of both; where decimal points occur; and what other characters, such as $, *, or #, are or are not allowed.

In addition to data masks, *display masks* can be very useful in a DBMS system. A display mask allows you to automatically garnish the information with commas, dollar signs, leading or trailing zeros, or format negative numbers in special ways.

Default values are often incorporated into better DBMS programs. A default is a constant value that the program will automatically insert into a field—for example, the same value that was entered previously. When information repeats, using defaults can save keyboarding time. But there must be a provision in the program to override the default when the value must change.

Calculated fields can be very important and are usually included in higher-level programs. You do not enter any information into a calculated field. Rather, the program looks at the data in two or more fields that you've specified. It then derives the calculated value by using the fields according to rules you've given it to use, much the way a spreadsheet does. *Derived fields* may also be the result of calculating the value of one field against a predetermined value you supply—say, the state tax rate.

Screen Handling

Finally, there is the matter of *screen handling.* It makes sense that you would want the physical representation of your database—the entry screen, or *template,* where the user keys in the data—to look appealing. There are three basic approaches to the issue.

The first is simply to let the program handle the design of the screen. With this approach, you cannot affect what the entry screen looks like at all, because the program displays fields and their names in whatever fashion it believes fits best on the screen. The only thing you can generally be assured of is that the fields will follow in the order you created them, first to last.

The second approach is called *screen painting,* which may well be the method best suited to Macintosh. In screen painting the program places the fields (as you've defined them) up on the screen one at a time. You then may select and move each one to the position you feel is most appropriate. A variation is found in some programs that allows you to define the fields right on the entry screen exactly where you want them to appear.

The third approach to aesthetic form handling is called *programming:* as each field is defined you are asked to specify its position in terms of a column and row number. Most computers respond to this because they use a screen setup that's actually a matrix 80 characters wide by 24 or 25 rows high.

While it can be extremely helpful in duplicating paper forms, this particular method may not become popular on Macintosh, whose graphics approach to text allows characters to begin at any of the 512 horizontal or 342 vertical dot positions on the screen. A Mac program would need to expend a significant effort just keeping track of available dot positions and avoiding overlapping characters.

Reporting

The data-management aspect of a DBMS is generally carried on in what's known as the report section of the program. Some programs integrate this feature with the data-collection part in one package; others require you to purchase separate *modules* to generate the reports you need. That can be an inconvenience, but in theory you won't have to pay for features you'll never use.

Reporting features vary. The most basic program will produce linear reports, in which the values in the fields you want it to report on are printed across the page in one line. There is no possibility of variation in this format.

However, even the simplest program will usually provide you with limited statistics about the information you're reporting on. At minimum, you should be able to get a sum of data in each numeric field and a count of the number of text entries.

With the better report generators, you'll find total flexibility of output. These programs allow you to put field values next to each other, side by side, or at specified intervals along the page. You can also have the program skip lines or begin on a new page whenever a specified value changes.

The Relational DBMS

When you want to compare more than one data file, you must use a *relational* DBMS. None have yet appeared for Mac, but you can bet they will.

We saw earlier that a mailing list is a simple database, but what if you wanted to analyze several mailing lists at once? One list might contain the names and addresses of everyone who contributed to your candidate's campaign. Another list might include information about those who pledged but didn't contribute.

For the Iowa primary you want to take the names of Iowans from both files and send them a solicitation for funds. A relational DBMS will let you define a separate file and fill it with information from other data files, based on the criteria you specify.

Another feature of a relational DBMS is that it can use the information from one entry screen to add to or update several data files. In your contributors file, for example, the entries might affect that file itself while also adding information to another file listing possible volunteers. The relationships among files can be quite complex, forming the basis of detailed demographic reports.

Think before You Start

It's extremely important to analyze your data-management requirements before you begin actually defining the form you'll use. While most database-management-systems programs will allow you to modify the form after you've entered data into it, such modifications can sometimes produce unexpected results. Some, for example, require that you retain the old field names in the modified file. If you want to change one for the sake of clarity, you may be out of luck.

That's why forethought is so essential. For example, in creating a file of information about comic books, you'd need fields to hold the title, publisher, volume number, issue, date, and purchase price. You'd have to establish a maximum character length for each field. If you were sure no individual book would ever cost more than $9999.99, for example, you could make do with a maximum of seven characters for the price field (counting the decimal point, not counting the dollar sign). A field with fewer characters wouldn't suffice; a field with more would waste valuable memory. The lengths of the title and publisher fields could be determined by looking through your collection for the longest value and perhaps adding a couple of characters to be on the safe side.

The key to successful data-management techniques is this type of forethought. Rough it out on a sheet of paper first and try various values for accuracy of the form. If they work, then take it to the computer.

1stBASE

Once upon a time there was a data-management program called *NPL*. It was very good. It was also very expensive, but only if you thought about initial cost and not about results. DeskTop Software Corporation, the people who make *NPL*, are modifying it for Macintosh, and it should be ready soon.

But *NPL* is a very comprehensive program and contains many features that a lot of people simply don't need. And even with Mac it will be rather complicated to use. Looking at it that way, DeskTop Software thought it best to offer another program as well. This newcomer would have fewer features and would sport a lower price tag. It would be aimed at those people who just needed to get to first base with data management. Amazingly enough, they called it *1stBASE*.

A Frustrated Word about Copy Protection

So far, Apple's own software for Mac can be copied, but most third-party products can't. The debate over the usefulness of copy-protecting software has gone on for some time and there's no end in sight.

The manufacturers argue that such procedures protect their investment from unauthorized distribution. But the people who buy the software protest that they should be able to copy a disk to protect themselves in the event that the original disk is damaged or destroyed. Both sides have valid points.

Historically, copy-protected programs on the Apple // series gave rise to a new cottage software industry: companies that produce software to override copy protection and duplicate copy-protected disks in spite of themselves. Every time protection schemes got more sophisticated, so did protection-breaking schemes. It was hoped that such childishness could have been avoided on a machine with the integrity of Macintosh. Apparently not.

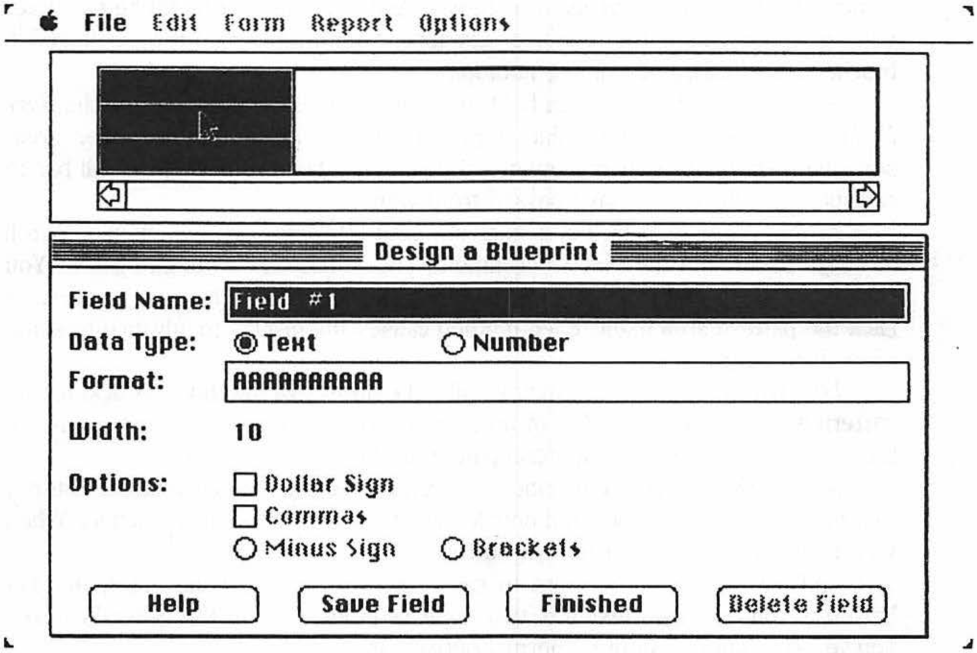
In theory, as Mac's system files are updated, you can update copy-protected disks by copying the System Folder to them. In practice, maybe not. Each piece of copy-protected software discussed in this book was updated with a special version of Finder 1.1g that allowed the use of a large-capacity hard disk. After the update, not one of the updated copy-protected disks could be used to boot Mac.

These disks were always rejected; the X-disk icon appeared on the screen. The disks were, however, fully usable when another disk was inserted to boot the computer. It is a petty, but constant, annoyance. If history runs true, it won't be long before something like *MacCopy* emerges and the endless cycle begins here, too.

Getting to First Base

Don't bother making a backup of the *1stBASE* disk. It's copy-protected in a big way. The original disk must be in one of the drives whenever you want to use it or you'll be requested to put it there.

The File menu is where you begin *1stBASE*. Rather than calling it a *form* or a *screen,* the group of fields you'll define to accept your information is called a *blueprint,* but it performs the typical function of defining a data-entry form.



There are two distinct regions in the window that appear when you drag the File menu to *Design a Blueprint.* The lower region is where you specify the information for an individual field. The upper region contains the statistics for the fields you've already defined.

Designing the Blueprint

1stBASE permits defining two types of data: text and numbers. For text fields the only option that exists is to define their width. This is done by adding to or subtracting from the number of *A*'s in the *Format* box. The number associated with the width will change accordingly. Text entries can be a maximum of fifty characters.

Numbers are another matter. They are defined in terms of numeric positions before and after the decimal point. A number defined as 9999.99 (the nines are used to define the numeric places, and are not interpreted literally) in the Format box will show a width of 4.2 in the *Width* box—four places defined before the decimal point, two after it. *1stBASE* supports up to seventeen-digit precision.

You can also specify whether the actual numbers you enter as data should be displayed with a dollar sign and/or commas. And if the number might be negative, you can specify that either a minus sign appear before it or that it be enclosed in brackets (also called accounting notation).

As you finish defining each field (up to fifty are allowed), you click the *Save Field* box. The field name, data type, and width appear in the upper area, scrolling to the left as their number exceeds four. You can use the scroll bar to redisplay any fields that have passed from view.

Now is the time to pick at a small nit. Up to this moment, whenever a scroll bar has appeared in the Mac environment, you've had three ways to use it. You could click the scroll arrows, drag the scroll box that is in the pattern area, or click the pattern area itself. Each method causes the display to advance to some predefined degree.

1stBASE's scroll bars employ only the first two methods. Clicking the pattern area does nothing. It's of no great consequence, but it is an example of the discontinuity that's already creeping into Mac's environment.

Anytime before you're through, you can go back and modify a field's criteria. Just move to the upper box and double-click the field you want to change. When you're all done, click the *Finished* button.

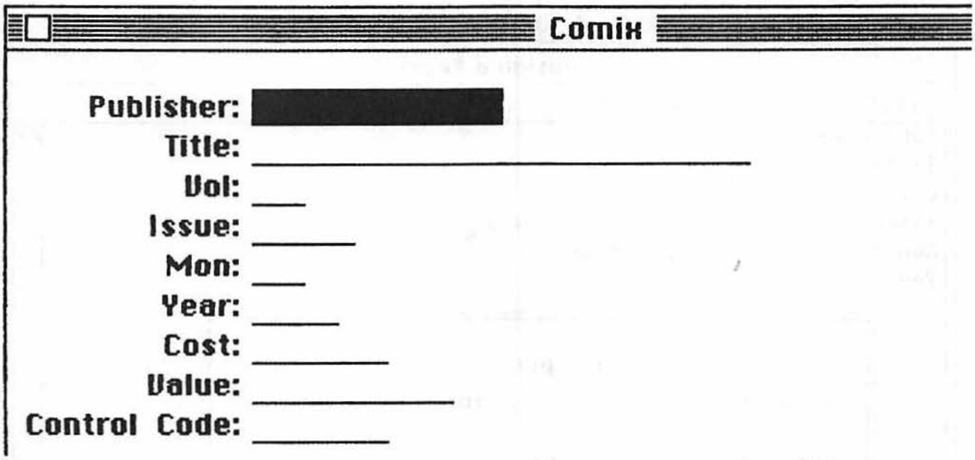
You'll be asked if you want to save the work you've done. Click the *Yes* button if you do. The next box that appears is identical to the *Save As* boxes you've seen before. All of its normal options are supported.

Entering Data

Once your field information is saved, *1stBASE* automatically creates the screen form and places you in the entry mode. The first field is highlighted and you may begin typing in your data.

The material you're entering is essentially text, so if you find that you've made a mistake, you can correct it with any of Mac's usual editing techniques. You should also be aware of some shortcuts.

The Return key advances you from field to field. The combination of the Shift and Backspace keys moves you back one field and selects it for editing. It inverts



as if you had dragged through it with the mouse. *1stBASE* does not support the arrow keys on the numeric keypad.

The Return key, however, cannot be used to advance beyond the current record. You are in a continuous loop with each one. To start a new record, either drag to *Add Records* under the *Form* menu or press the Shift and Return keys simultaneously.

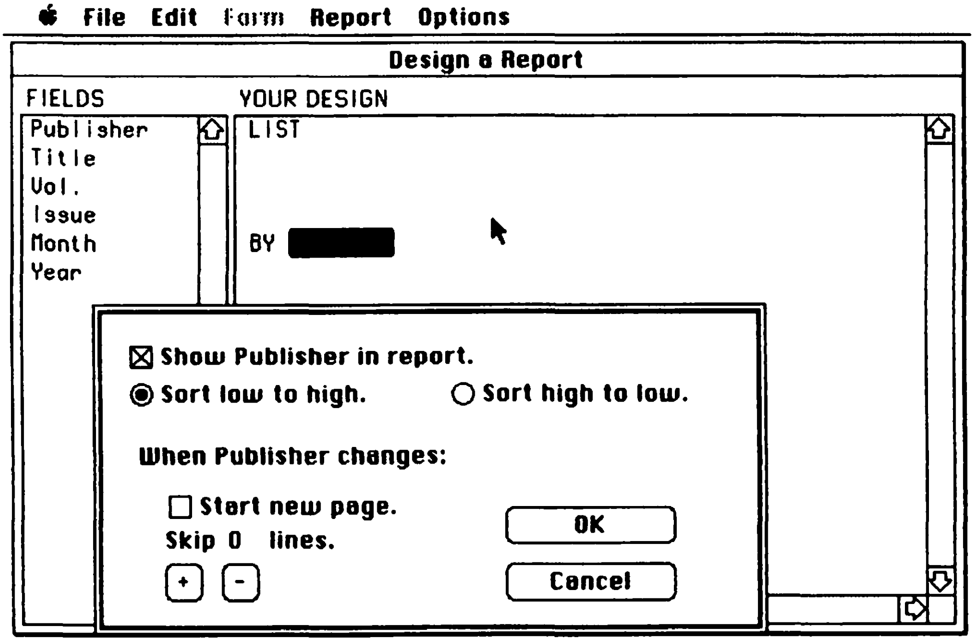
1stBASE does not support default values. But if you haven't yet placed any information into a field, you can copy the value entered into that field for the last record. Just press the Tab key. This is another place where forethought will come in handy. To take the fullest advantage of this feature you should organize your items so that they're entered in as many groups with similar field values as possible.

Preparing to Print

1stBASE allows you some flexibility in designing printed reports. The *Design Report* option under the *Report* menu produces a dual display. One lists all your field names; the other is the report specification. To select the fields you want to print out, simply click them from the list into a selected area in the specification display.

Selecting a field and then dragging to *Under* from the *Options* menu will start that field and succeeding fields on a new line. You can also choose up to ten fields as the criteria by which your report will be sorted.

You may also elect to print only those records that contain a specified value in a specified field. To do that, move to the Report menu and drag to *Select Records If. . . .* You'll be asked to choose the field and then the search value.



Printing—and After

This is where *1stBASE* begins to lose its composure. After you've defined your report, you drag *Do It* from the Report menu. Your report is printed to the screen. Then and only then you can send the report to the printer.

1stBASE will print a maximum of eighty-five characters across the page. No attempt was made to use a smaller type style to allow more characters, and there are no provisions in this version for sending special characters to the Imagewriter to put it into any of its own condensed modes.

When you save your report, you are not saving the criteria you just established. Rather, you're saving the *results* of the report as they appear on the screen or printer. The problem with this is that as soon as you enter one additional item into your database, that report may no longer be valid.

To account for additional entries, you must go back and recreate the whole report. You cannot save your selection or sorting criteria. In fact, if you notice an error or want to make an addition to your report specification, you must start all over again.

In this particular area, *1stBASE* is definitely off base. Information is dynamic by nature; it is always changing. The designers of *1stBASE* should have recognized that the ability to alter the information in a report is a fundamental need of anyone who is likely to use the program.

Data Handling

1stBASE does excel, however, in handling raw data. To speed the data-entry process, you may create data files on two Macs so that two people can enter information simultaneously. When they're done, you can append the data from one to the other. Likewise, if you have two data files with dissimilar information and one field in each is exactly the same (same field name and data), you can join them together. The resulting file will contain all of the fields in the original two.

You can even create a separate data file containing only part of the information from an existing one. To do that, use the *Produce a New Data File* option from the Report menu. You must then go through a field-selection process much the way you do when you design a report. The new data file is created from the list of fields you choose. It's a useful feature of a useful, but not industrial-strength, program.

pfs:File and *pfs:Report*

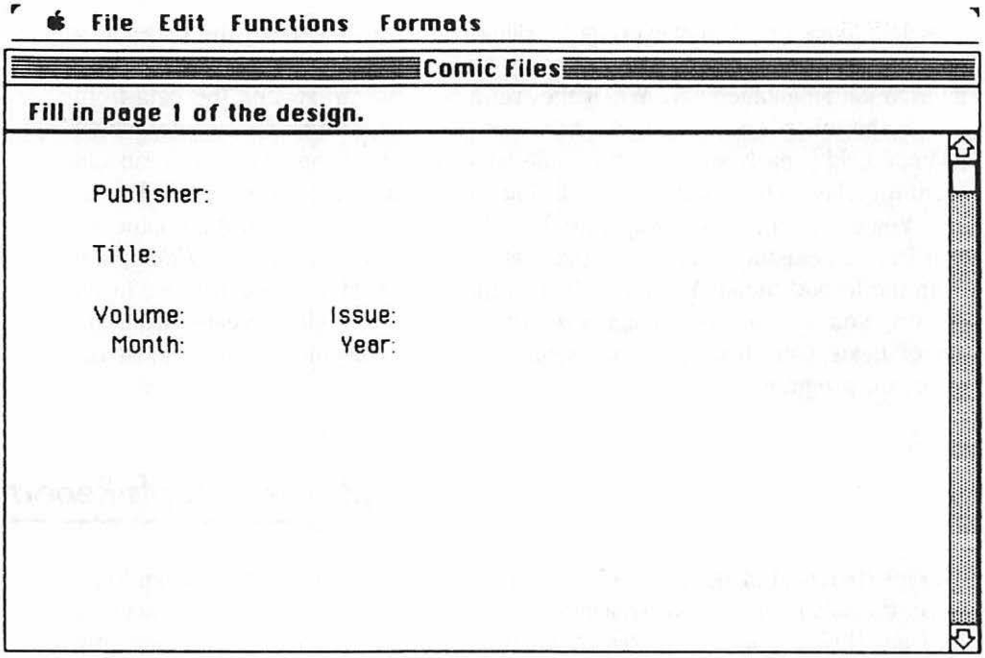
The *pfs* (personal filing system) family of data-management products from Software Publishing has been available for about four years. Today, it includes *pfs:File, Write, Graph,* and *Report.* Of the four, *File* and *Report* are currently available for the Macintosh. The former is the data-collection module and has very limited reporting procedures. The latter is a report generator. The two programs may be purchased separately.

When you buy the programs, you receive two disks, the original and a backup copy. Of all the software that we looked at, the *pfs* programs were the only ones that came with a backup disk at no charge. That's comforting, since they're both copy-protected with a vengeance. Literally. According to the manufacturer, if you try to copy one of these disks, you'll obliterate it. We didn't test the claim.

pfs:File uses a variation of the screen-painting technique when you design a form. The whole display becomes a candidate for a field name. You position one by clicking at the desired location to put the insertion point at the spot. You can either enter the field name from the keyboard, or, if you Cut it into the Clipboard from another location, Paste it back.

There are no field definitions per se. Rather, all entries are treated as text until you reach *pfs:Report.* Field lengths are allocated as you create the form. You don't specify them; *File* calculates them for you.

You end a field name with a colon (:). A space after the colon is reserved to separate the field name from the data you enter. The field's length becomes the number of blank spaces between that space and the next character you enter on the screen.



Since *File* keeps an index of your records based on the first field in the database, it's a good idea to make that field the item you'll be searching for most frequently. If you use it later to search for information, the program can go instantly to your document. Otherwise it must peek at every record to find the one you want.

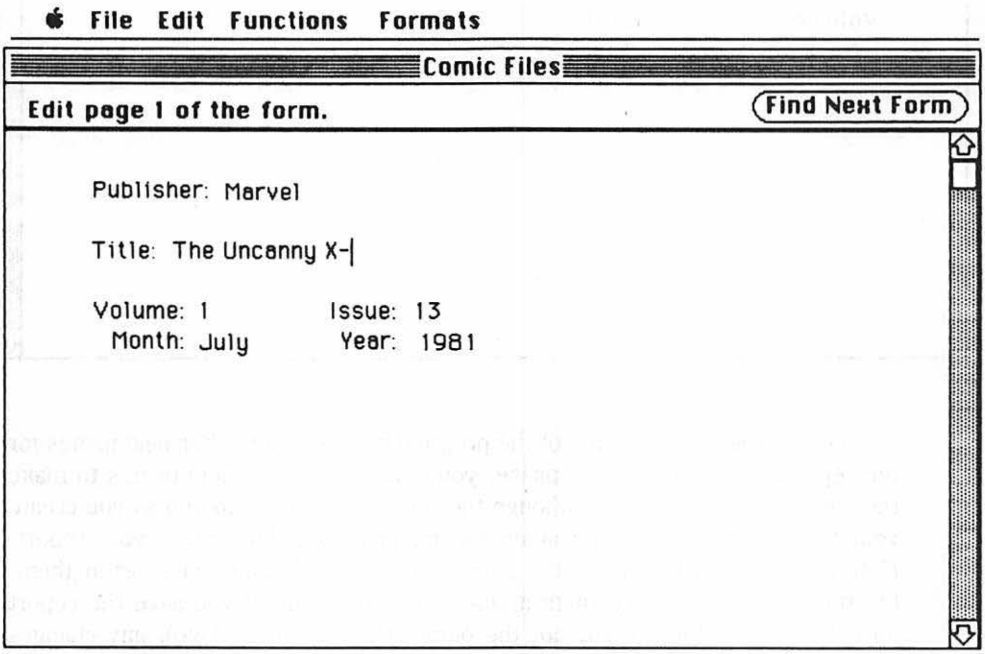
Each page of your form may contain as many as one hundred fields, and you may use additional pages—up to thirty-one. If you click the scroll arrow, the next page is displayed, and you can start creating additional fields.

Entry, Recall, and Editing

Once you've created your form, you return to it to enter information. For the most part, it's a very straightforward process. The only notable difference from other DBMS programs is that *pfs:File* uses the Tab key and not the Return key to advance you from field to field.

Your options for recalling information are almost unlimited. You can retrieve records by asking for an exact match to the field data you supply, or by including two periods either before or after the field value. If you use the latter technique, you'll retrieve records that contain the specified field information, but may also contain more than that information. In either case, you can choose information from more than one field to be used as the search criteria.

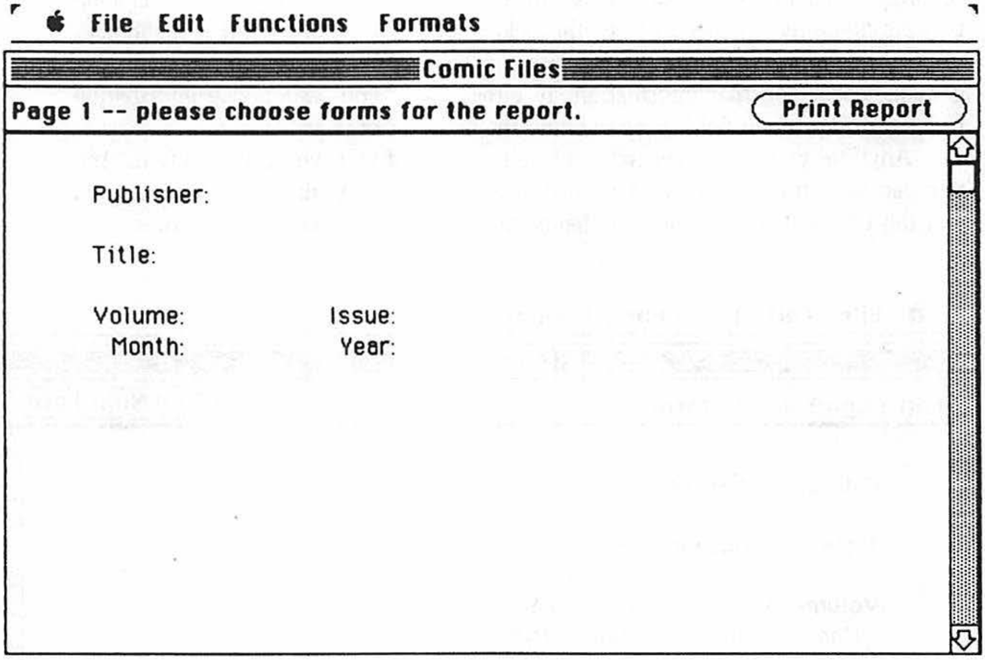
Anytime you have a record displayed in front of you, you can modify it. And you can search and retrieve a record as a precursor to editing it. To edit, you just tab to the field you want to change and make the necessary revisions.



Reports

pfs:File can create simple, nonstatistical reports. That means mainly linear reports, although you may also produce mailing labels by appending an *X* to the field names. This instructs *File* to skip a line after the information has been printed. You select records for printing the same way as you would for a search.

But that's about it. *Report* is what you need for anything even vaguely sophisticated. Statistical reports from *Report* can include a count, an average, or a sum of the field values. You can skip lines after a specified field value changes and select page breaks as well.



One of the nicer features of the program is its ability to alter field names for the report. Often, in the *File* phase, you may use lengthy field names to make them easier to understand. Although this may be a comfort to you as you create your fields, a fifty-character column heading can wreak havoc with your report. *Report* allows you to modify the names you've used. You can shorten them, lengthen them, or change them in any way you see fit. If you save the report format (and it is the format, not the output that you must save), any changes you make will also be saved.

One of the most utilitarian features of printing is the ability to incorporate printer control characters. Although the Imagewriter can only handle 8½-inch-wide paper, its three condensed modes allow you to cram more characters into a document than you'd normally expect by decreasing the width of the letters. Readability can suffer at 16.7 characters to the inch, but when you need it, that capability can be a godsend.

Some Comparisons

pfs:File offers more flexible screen creation; *1stBASE* allows you to limit data to numeric or alphabetic. *1stBASE* limits you to a twelve-character file name; the only limit in *File* is the room on the screen. *pfs:Report* does not save the data with each report; instead it saves the report format and re-creates the report each time you ask for it. This will cost you some time when you repeat reports, but your report will not be out of date as soon as a new piece of data is entered; with *1stBASE* it will.

The *pfs* series is marketed as a replacement for a Rolodex. It's somewhat more than that, but is still a light- to medium-duty data-management tool like *1stBASE*. Both work well if you don't try to push them beyond their means.

ThinkTank

ThinkTank is not really a DBMS. Living Videotext, its manufacturer, says it's really an idea processor. The first one, in fact. It just may be.

Again, forget the usual backup procedures. *ThinkTank* is copy-protected. You will not only need the original disk for it to work, but you must also be sure that that disk is in the internal drive (and only the internal drive). Any other move but this will be rebuked.

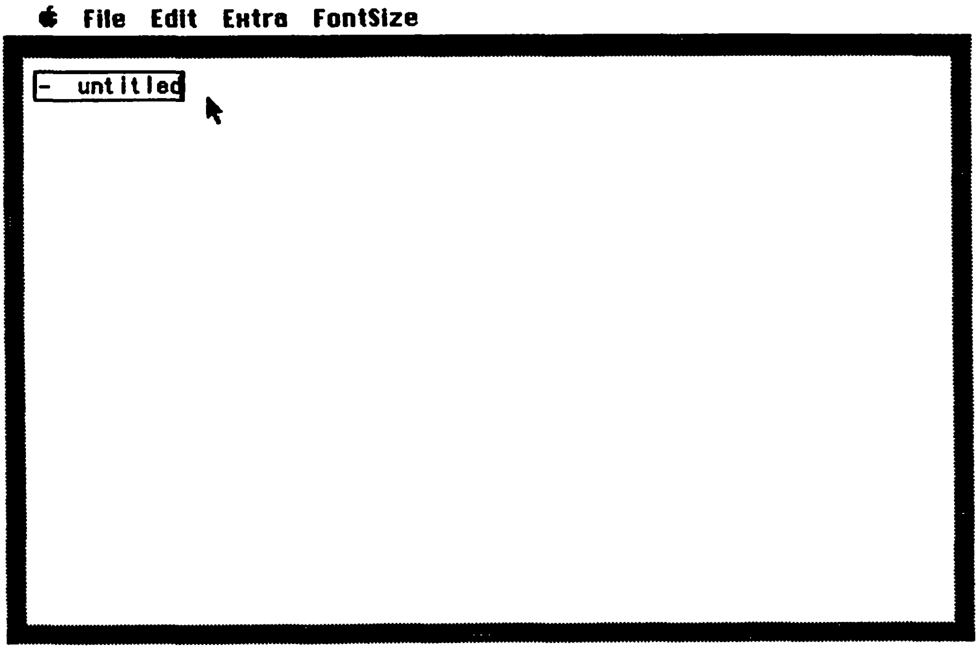
ThinkTank comes with a dearth of features. Aside from the standard menu choices of File and Edit (which are duplicates of their Mac versions), there are only two additional menus.

Under *Extra* the options are *Search, Sort,* and *Status*. The last option is a duplicate of About ThinkTank under the Apple icon, so there are really only two options. *FontSize* merely offers you a choice between the 9- and 12-point sizes of the fixed font it uses.

How much can you do with only two options and a nearly blank screen? If you need to prepare an outline or an organizational table, or just jot down notes to yourself in a potentially structured environment, you can do a lot. That's what *ThinkTank* is all about.

The *ThinkTank* Environment

ThinkTank's appearance is a radical departure from the standard Mac environment. Instead of using a display window, it uses the whole screen. When you run the program, the only comment that appears is the word "untitled," preceded by a minus sign, and this is on the screen itself, not in a title bar.



That single word does have significance, though. It's called the *summit* headline. With *ThinkTank* you'll be creating an outline, and conceptually, the summit is the topic from which the outline will build. The minus sign in front of the word indicates that there is no further information on the sheet.

Both word and minus sign are enclosed in a box, another *ThinkTank* departure from normal Macintosh procedures. The box is used instead of the inverted format to show that the section is selected.

When you first run the program or Open a new document from the *File* menu, this introductory screen is what you'll see. The insertion point will be at the end of the box. Since the entire written line is selected, you cannot go in and reselect another segment, though you can position the pointer, and therefore the insertion point, anywhere on the line. You should use the Backspace key to erase the word "untitled" and prepare *ThinkTank* for your own topic; other common Mac text procedures won't work. And you can't erase the minus sign.

Down from the Summit

Entering your own summit headline is just a matter of typing. Suppose you decide to start a chapter outline. You enter the chapter number, a title, and then press Return. Immediately, the original minus sign changes to a plus sign. The minus sign now appears on the line below your new heading, indented from the left margin. The insertion point flashes to its right.

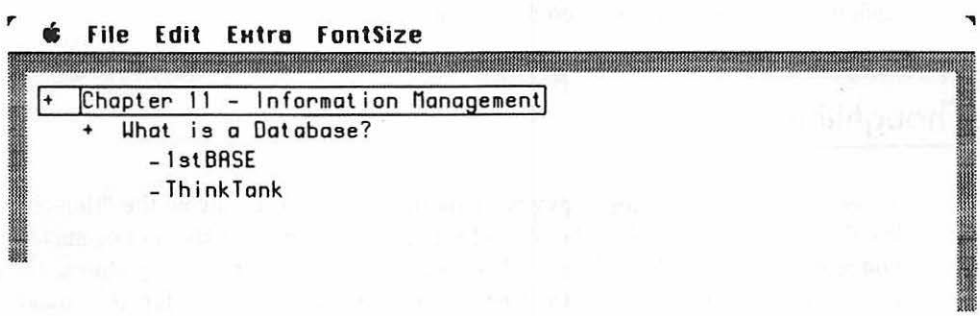
Don't worry about it. Just enter the first subhead for your chapter (or the next related thought if you are creating an outline). Press Return when you're done. Another minus sign appears directly below the one above, and the insertion point flashes beside it.

You could continue to enter subheads like that until you run out of memory, but what if you have an associated thought subordinate to one of those subheads? If it was on the same visual level as the rest, you wouldn't realize it was a tertiary (third-level) thought. Before you add anything to the line with the second minus sign, you may want to indent it further.

Indenting

Indenting isn't done via any of the menu functions. Rather, move the pointer to the line in question and press. A box will appear around the minus sign to show that you've selected it. Drag to your right. As you're doing it, nothing will happen. This lack of a visual clue is probably the most damaging aspect of *ThinkTank*'s departure from Mac's standard operating procedures.

You may be tempted to stop because you see no visual result, but don't. Continue to drag the pointer, which now looks like a fat pencil, about a half inch to the right. How far you go isn't important as long as you get somewhat to the right of the left margin of the line above. When you're there, release the mouse button.



Two things should happen. The minus sign on the line you're working with should move right to a new indentation point, and the minus sign on the line above should change to a plus sign, again indicating that there is subordinate material to the subhead.

That's the function of the plus and minus signs. The former indicates that there are additional subheads subordinate to it, while the latter indicates that there are none. But why bother when you can plainly see that for yourself on the screen?

The Plot Unfolds

Move to the summit headline, your main topic at the top of the "page." Double-click it. It may seem as though you've erased material, but you didn't. Everything just "folded" up under the main headline. Your only indication that anything more exists is the plus sign.

Double-click again. Only the indented subhead preceded by the plus sign unfolds. You've released one level of subordinate headings. That's the strategy behind double-clicking them. At each level, if there is a plus, you can display the comments pertinent to it by double-clicking.

By dragging, you can change a comment's position in a list or modify its level of subordination. You have complete freedom to design your own outline or pattern your thoughts, according to their various levels of importance.

Anytime you want to add another level, just drag to the right. If you want to change a level, drag right or left. You can move an entire section of subheads, as well as sort them into alphabetic order. From the Extra menu you can even search through a long document for a particular word or phrase. The only thing you can't do is put anything else on the same level as the summit headline.

You'll notice that there aren't any scroll bars in evidence. That doesn't mean that you can't create a document larger than the screen. *ThinkTank* doesn't use scroll bars. As your idea line increases in length, the screen automatically scrolls up to give you more room. To see what exists out of sight, all you have to do is move to the gray border at the top or bottom of the "page" and click it. Your document will scroll accordingly.

Thoughtlines

ThinkTank's manual is top-heavy with information about modifying the "thoughtlines" you can create. While the manual is punctuated with a plethora of examples, you may not realize that when it talks about thoughtlines, it's simply stating the procedure you must follow to create a new outline. Except for this minor problem, *ThinkTank* is an incredibly simple program to use. Complete mastery of it shouldn't take you very long at all.

ThinkTank has been available for other computers for about a year, and many of its principles have found their way into even fancier software. Those who like a structured approach to thought wouldn't think of being without it.

14
MACTALKING

Many experienced computer users' modems and microcomputers have almost become substitutes for normal telephones. You can use your computer to communicate with other users, order merchandise, leave messages for friends who are asleep or away on business, send documents across the country, have your hardware problems solved for free by experts, fill up disk after disk with free software, or even phone in your work rather than commute each day on the freeway or subway.

That's really not as farfetched as it sounds. There are many resources available to computer owners who can invest in a few hundred dollars' worth of equipment. In this chapter we'll examine the hard and the soft of communicating with Mac's help.

Bulletin Boards for Machines

Several years ago a clever computer user who felt it was wasteful to have his system sit idle while he slept and worked wrote a software package that let others call his computer and leave messages on it when he wasn't using it. The computer essentially became a bulletin board. In recent years these computer bulletin board systems (CBBS) have proliferated, and there are literally thousands of these spread all over the nation. They've recently began to specialize—there are computer bulletin boards for beginners, hackers, doctors, single people, and other special-interest groups, plus dozens for each specific machine on the market.

Several very large companies entered the field, and for a fee, now offer many of the services users can get at no charge from the many national amateur bulletin boards. These giant companies, led by The Source and CompuServe, also offer news, stock prices, airline schedules, electronic mail, and other services they think people can't live without, all for a stiff hourly fee. The one real advantage to these big national networks is that users with wildly different systems can communicate with each other. Someone with a Mac can find himself or herself chatting with a computer whiz typing away on a giant mainframe computer halfway across the country.

Even more potentially exciting are the many databases springing up. These can give you the resources of a vast electronic library at your fingertips. You can avoid the lines at the local library and look up facts on everything from obscure legal cases to tropical diseases to who starred in old movies. At some point in the not too distant future, services such as these may even replace libraries (or at least the libraries will be available to your computer).

But you can't do any of that unless you have the correct equipment. Right now you're partway home—you have Mac. The only other things you need are a modem, a cable, and software.

Modems

You can't do phone communications without a modem. It's the device that transfers Mac's 1's and 0's into tones, sends the tones, receives them from the other computer, and translates them back into 1's and 0's which Mac will understand.

Mac connected to Apple's direct-connect modem (beneath phone).

The two basic types are acoustic and direct-connect. Apple offers two of the latter type: a 300-baud-only version, and one that will work at 1200 baud as well.

A direct-connect modem attaches directly to the phone system with a simple modular plug and cable. An acoustic modem, on the other hand, uses two rubber cups into which the handset of a phone is placed.

Which is better? That depends. In some environments, like hotel rooms when you're on the road, you may not have access to the modular phone jack a direct-connect modem requires. But acoustic modems are far more sensitive to background noise. In addition, they won't work with many modern phones, whose handsets won't fit correctly into the round acoustic cups.

Where circumstances permit, the direct-connect type is usually preferable. Many offer features like automatic answering and dialing, which can greatly speed up communications. If you are able to use a direct-connect type, make sure the program you select supports its features and command structure. The most common command protocol is that used by the Hayes Smartmodem line. Many other models are compatible, but well-designed software should allow you to work with other types.

Mac	Modem	
1	1	(Frame Ground)
3	7	(Signal Ground)
5	2	(Transmit Data)
6	20	(DTR)
7	8	(CTS <- DCD)
9	3	(Receive Data)

Pin connections for Mac-to-non-Apple-modem cable. Useful only if you need to create your own cable.

No matter which type of modem you do finally purchase, make sure you also acquire the correct connecting cable for Mac. The usual variety, with a twenty-five-pin D-type male connector on both ends, won't work. Period.

If you don't buy an Apple modem, you'll almost certainly need a nine-pin D-type male to twenty-five-pin D-type male connector correctly wired for Mac's serial port. If you're using either Apple modem, you'll need a cable with a nine-pin D-type male connector on both ends. Both types should be available from your Apple dealer and should become more widely available as Mac's popularity grows. If you're handy with a soldering iron, you can make one yourself.

If you use a direct-connect modem, an invaluable accessory is a modular Y-connector. Available from just about any Radio Shack outlet, it turns a single modular jack into two, so that you can plug your modem and your phone into the same jack at the same time.

If you have "call-waiting," watch out! The signal that lets you know you have a second incoming call will often disconnect modem communications. If you do a lot of work with the modem, you may want to get rid of "call-waiting" on the line you use for telecommunications.

Once you've selected the modem, you have to hook it up to your Mac and find good software to make running it easy. *MacTerminal* and other programs can handle all the details for you.

MacTerminal

Apple's own communications program for Macintosh is called *MacTerminal.* Its name incorporates the term originated in the olden days of computing, when a video display and keyboard used for communications had no computing capabilities, but was simply a device for transmitting characters.

MacTerminal makes it easy for you to get your computer on-line with the rest of the world. But knowing a few communications basics will make using the program even easier.

Parameters

Sending digital information over the lines designed for voices isn't exactly a picnic. Modems convert the computer's data into tones and translate those tones back into digital data. Unfortunately, there are a lot of different ways to send that data; the trick is getting both ends of the computer "conversation" to agree on the transmission procedures. A single discrepancy in the way the two machines regard the transmission may lead to nothing but gibberish.

Duplex and Echo

Duplex is one issue. When a computer speaks, its information generally travels out the modem port to the other computer. But if you're typing, you'd also like to send your information one other place: your screen. Mac will generally send incoming information to the screen for your edification; outgoing data is another matter.

With *half duplex,* Mac simply sends its own information out the modem port. But another option, called *full duplex,* has the receiving computer send back each character as it arrives, thereby confirming that the character actually arrived safely.

You can instantly see one possible problem with full duplex. If both computers send back what they receive, the first character sent by either one will bounce back and forth between the two endlessly. That suggests that only one of the computers be set for full-duplex operation. When your Mac is talking to a big mainframe computer, the mainframe usually runs in full-duplex mode, while Mac stays in half duplex. When two microcomputers are chatting between themselves, both usually operate at half duplex. Neither sends back the character it receives.

What actually happens on the screen when you type is handled by a feature called *echo.* With echo on, everything you type is echoed to the screen. That's fine for half-duplex transmissions; in fact, if you're in half duplex with echo off, you'll be typing blind. But if the remote computer is in full-duplex mode and you've got echo on, you'll see double: first what you type, and then the copy of the character as it returns to you. Solution: turn echo off for full-duplex communication.

Some programs will give you a choice of duplex types and echo modes. Some will only allow you to modify one or the other. In general, if you're only permitted to change the duplex setting, you're probably just affecting the echo.

Word Length

As discussed earlier in the book, every ASCII character can be expressed in terms of a unique 8-bit binary number—a group of 8 digits, each either a 1 or a 0. In serial communication, universally used in telecommunications (and in Mac's case, for talking to devices such as printers), each of these digits is sent one at a time, one after the other.

When it talks to the Imagewriter, Mac usually uses all 8 bits of each ASCII character. When it's using the modem port, Mac can be restricted to send only 7 bits. The reason? Only the ASCII characters from 0 to 127 are common to all computers; in binary, numbers from 0 to 127 can be represented using only the first 7 bits. You may think of the choice between 8- and 7-bit characters as "character length," but in the terminology of the telecommunications world, it's known as the *word length.* Which one to use depends on what you're sending and the requirements of the computer you're talking to.

In general, if you're sending anything other than pure text, be it a program, a picture, or even text that includes font information, particularly between Macs, 8 bits is what you need to transfer all the information. If you're just sending ASCII characters around to other computers, 7 bits will do fine, though 8 bits is likely to work, too.

Parity

Since the phone lines can garble what you send, some transmissions use a rudimentary error-correction scheme called *parity checking.* The bits that make up each character are sent along with an additional binary digit that's added to make the number of binary 1's in the whole come out either odd or even.

If you specify *even* parity for your transmission, and the actual character sent has an odd number of 1's in its binary representation, the sending computer makes the eighth bit a 1 to even them out. Likewise, if it already had an even number, the eighth bit would be 0. For *odd* parity the exact opposite would occur. The receiving computer checks to make sure it's getting only odd or even bytes.

The Rule of Tens

Any more bits? Often extra start and stop bits go out to alert the receiving computer to the beginning and end of each character. But usually the maximum number of binary digits most software can handle is 10 per character. Which means that some compromises must be made.

Many computers require 1 start bit and 1 stop bit. That leaves 8 more bits available for the actual character. If the receiving computer wants to see an 8-bit character, then you can't use parity. If it doesn't, then you can.

So as it turns out, the two most popular settings are 8 data bits, no parity, and 7 data bits, even parity. Odd parity works just as well, but for some reason even seems to be more popular.

Protocol

Another potential communications problem is *protocol*—the way either computer tells the other to wait when it's busy. Choices include *ETX/ACK, XON/XOFF, hardware handshaking,* and *Xmodem.*

The first two send an ASCII control code to signal whether the computer is available or busy. Hardware handshaking monitors one of the lines on the RS-232 port to determine the same thing. Xmodem is a special error-correcting protocol that sends information in blocks and makes sure they've been received properly before proceeding.

If you're asked to choose among them, you'll need to know which the remote system can handle and how to set your system similarly. In many cases you may end up using no protocol, both computers more or less assuming everything's going fine at the other end.

All Eight

When data is transmitted from one computer to the other, the information is usually in ASCII format. That is, each character can be represented as an ASCII code from 0 to 127. These types of files are called *text* files. As we've seen, sending them with 7-bit word length works well with them.

But some word-processing programs use special characters above ASCII 127; the files *MacPaint* and *MacWrite* produce do. Computer programs virtually always do. And data and programs may be stored on disk in a compressed manner called *binary format,* in which a single character, called a token, may stand for a whole word. All 256 ASCII codes are needed to transfer these types of files successfully, so 8-bit transmission is mandatory. That leaves you shy for a parity bit to check accuracy.

And, truth to tell, parity checking is a hit-or-miss method at best, likely to catch only half the possible errors in your transmission. That may be okay for a short text file, where any errors are likely to be instantly evident. For a program file, in which a single misplaced byte that can spell doom is almost certain to go unnoticed, it's just not good enough.

To surmount this difficulty, many programs will use their own proprietary checking system. The problem is that both computers must be running the same program for the checking system to work. That's not terribly likely.

Fortunately, the Xmodem (or "Christensen") error-checking protocol has become something of a standard for 8-bit data transmission. It assures error-free transmissions, and many programs include it, whether they offer their own method or not. Look to see if the program you finally select supports this protocol. You're likely to find it extremely valuable.

Speed

The final parameter that will poke its nose out at you is called *baud rate.* It's the speed at which you communicate, and can be thought of roughly as bits per second; to the more logical characters per second, you divide by ten. The two most common speeds for modem transmissions nowadays are 300 and 1200 baud. Below 300 baud is much too slow for the average person's patience, while speeds above 1200 baud may sometimes be beyond the tolerance of the phone lines.

You can bypass the frailties of the phone system by directly connecting Mac to another computer without the intervening modems. This technique is called *hard wiring* because there is no intermediary device between the two but the cable. With this method, you'll have a choice of using any speed the software supports, often up to and beyond a blazing 9600 baud.

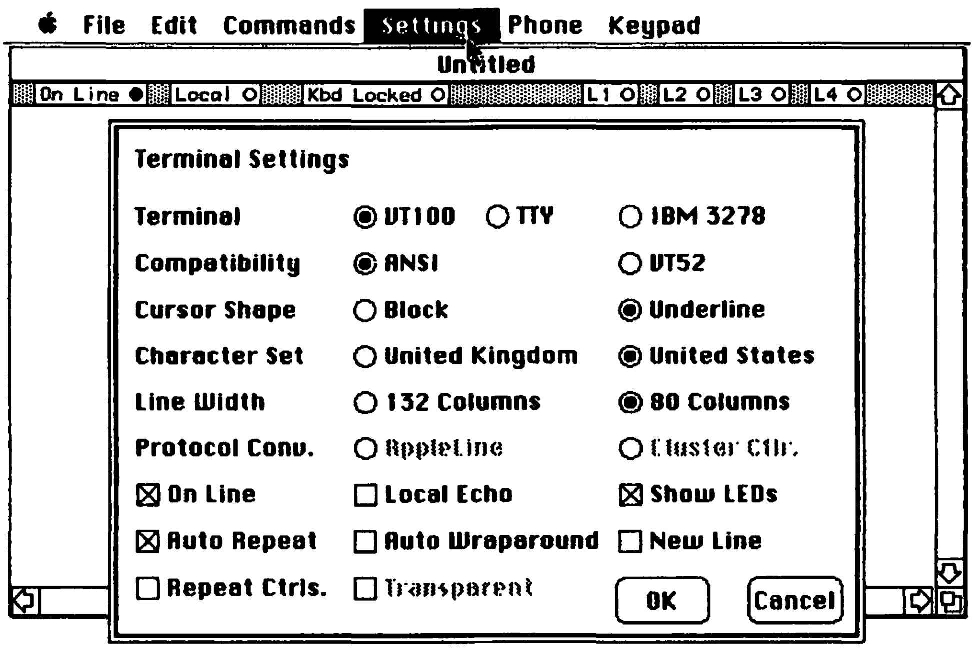
No matter how you communicate, via modem or hard wire, the rules are the same. When it comes to speed, both devices must match.

Terminal Emulation

The function of a terminal is to act as a medium between you and a computer you want to communicate with. When you use your computer to perform that function, it's emulating a terminal.

But your computer is a far more proficient device. Not only can it communicate, it can store and retrieve data on disk—including data you wish to send to or receive from another computer. A good terminal-emulation program like *MacTerminal* is designed to take advantage of your computer's "smarts."

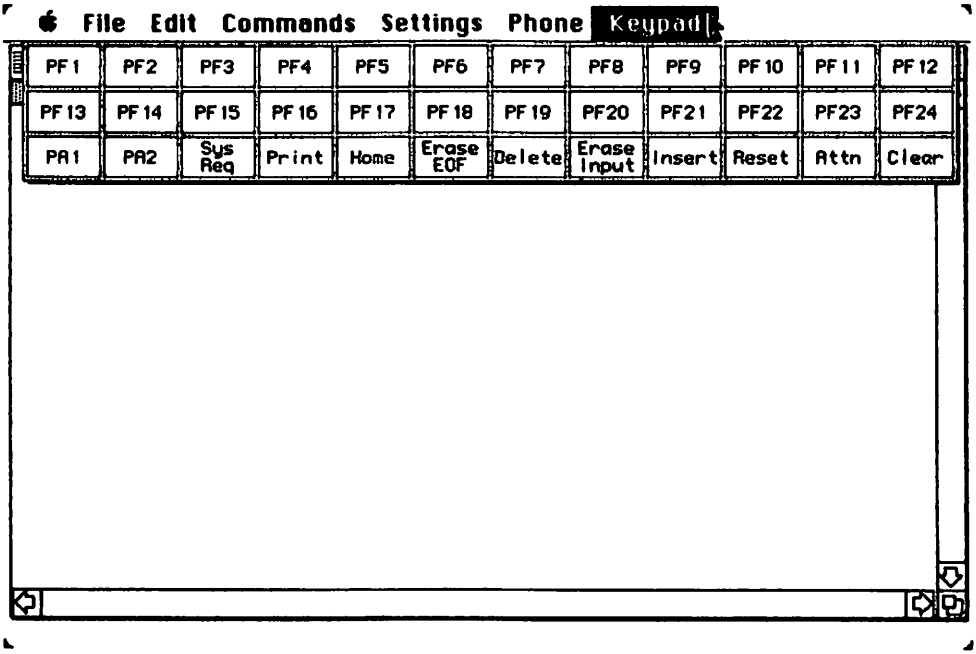
Using *MacTerminal,* you can make your Macintosh look like a popular terminal called a DEC VT-100. You can also make it appear as a "plain vanilla" device called a TTY terminal (which is what you're most likely to be using). And,



if you go as far as to purchase a Cluster Controller or AppleLine intermediary unit, you can even communicate directly with IBM mainframe computers, which will think Mac's really an IBM 3278 terminal. If you need both a Mac and a 3278 terminal, buying the Macintosh may be the better option.

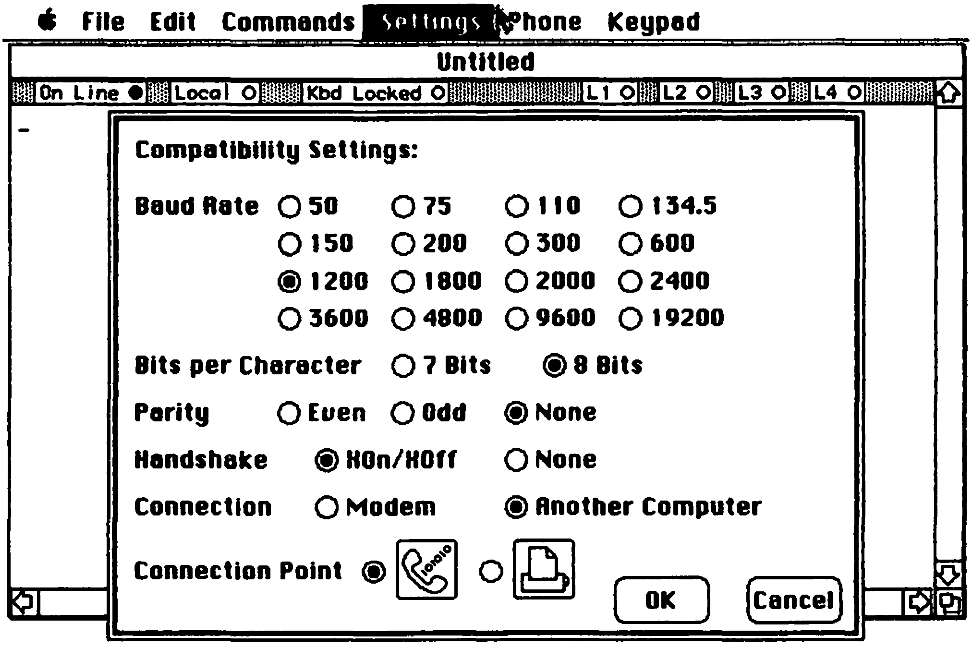
Chances are that if you're just starting out, you're not likely to be using Mac for mainframe emulation. But if you want to get an idea of what *MacTerminal* can do, take a gander at this feature.

If you're ever seen an IBM 3278 terminal, you know that it has quite a few special keys on it that are not accounted for on Mac. At least not physically. *MacTerminal* has a pull-down Keypad display that duplicates those missing on Mac. To use it, just click the appropriate key as needed.



Score one for Mac's versatility. This ability to accurately emulate popular terminals is very valuable. Without that capability, cursor controls used by the "host" computer to position information at specified places on the screen would be ignored or misinterpreted, having potentially disastrous effects.

MacTerminal gives you a wide range of settings to accommodate many different environments, including Mac to Mac or Mac to "other" computer, using either modem or hard-wired methods. You can even use the printer port for communication, but Apple doesn't recommend it.



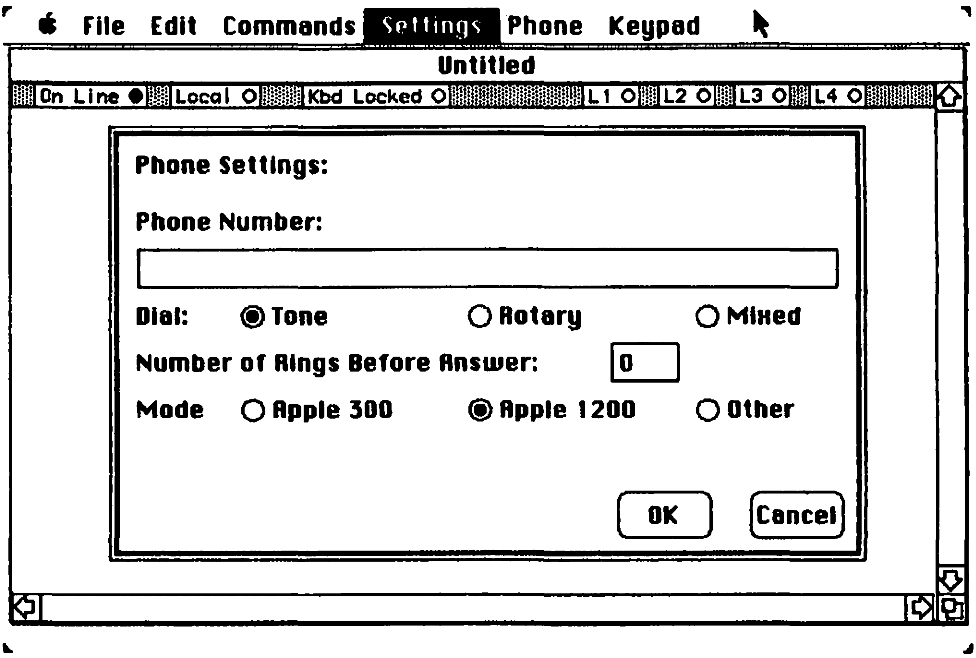
Automatic Dialing

Since Apple's modems, as well as many others, can automatically dial a number for you, there should be a way for you to supply *MacTerminal* with the number. The place to do it is the *Phone* option under the *Settings* menu.

MacTerminal is somewhat biased in its approach to modems, figuring you will remain a loyal Apple customer in your hardware purchases. Fortunately, Apple's modems use the same basic commands as the Hayes Smartmodem, and so do a variety of modems from other manufacturers. Unless yours is one of the rare oddballs, all you'll have to worry about is whether it's 300 or 1200 baud.

The modem may dial your phone with tone, pulse, or a mixture of both. The last option is extremely useful. With it, you can call a long-distance service like Sprint or MCI on a pulse-only phone line, and, once connected, send the appropriate password and phone number with the tone signals such services require.

If your modem is capable of answering your phone, you can set the number of rings it will wait until picking up the line. Especially if you're Y-connected, this gives you the opportunity to make a running dive for the phone before Mac answers. Setting the value the 0 cancels the automatic answer function.



Keeping It in Order

Once you've entered your number and made the appropriate selections, move up to the File menu and Save As. *MacTerminal* will store the phone number and parameter information so you won't have to enter it again. Use an appropriate name. For instance, if you're communicating with CompuServe and you set *MacTerminal* for the 7 data bits, 1 stop bit, and even parity it needs, you could save the configuration as "CompuServe."

Settings for other services can be similarly named. When it comes time to use one of them, just double-click the one you want from the desktop. *MacTerminal* will be called in automatically, the appropriate baud-rate, terminal-emulation, and data-length settings will be applied, and Mac will dial the phone for you. Or you can simply Open the file from within *MacTerminal.*

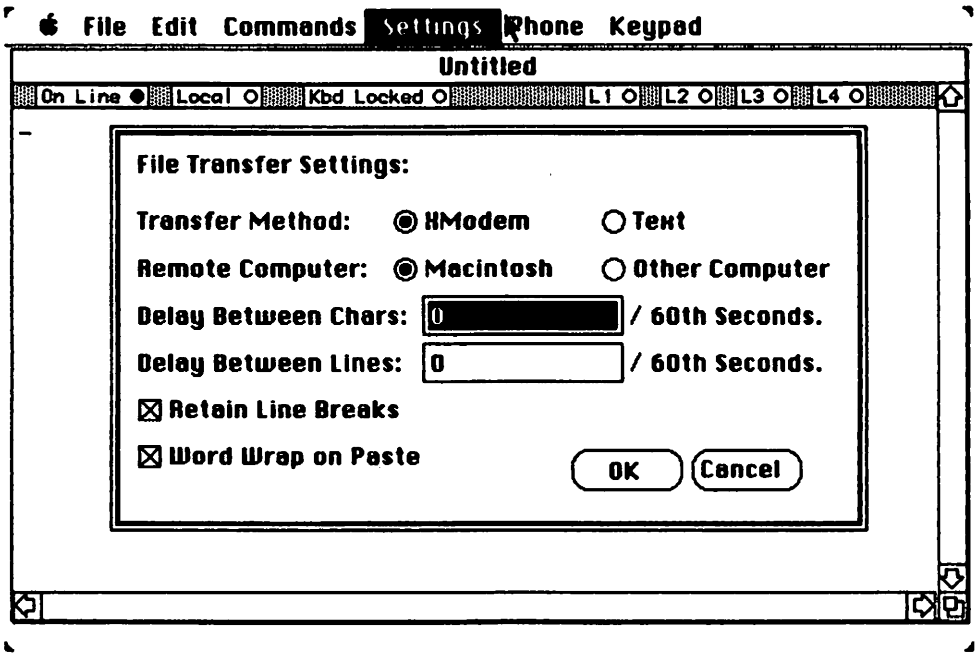
Operations

The final testing for *MacTerminal* is currently underway at this writing, so we'll be rather brief about how it works. As usual, all the features mentioned are available from the menu bar. The window has two full scroll bars as well. Once you've selected the correct parameters from the Settings menu—most of them are under the *Compatibility* option—communicating is a snap.

Data Transfer

But the most important thing in microcomputer communications may well be a program's ability to capture and transmit information to and from disks. *MacTerminal* has full capabilities in this area, although some of its procedures may seem strange.

From the Settings menu, drag to *File Transfer*. . . . This is the option you choose when you want to send or receive information directly to or from disk.



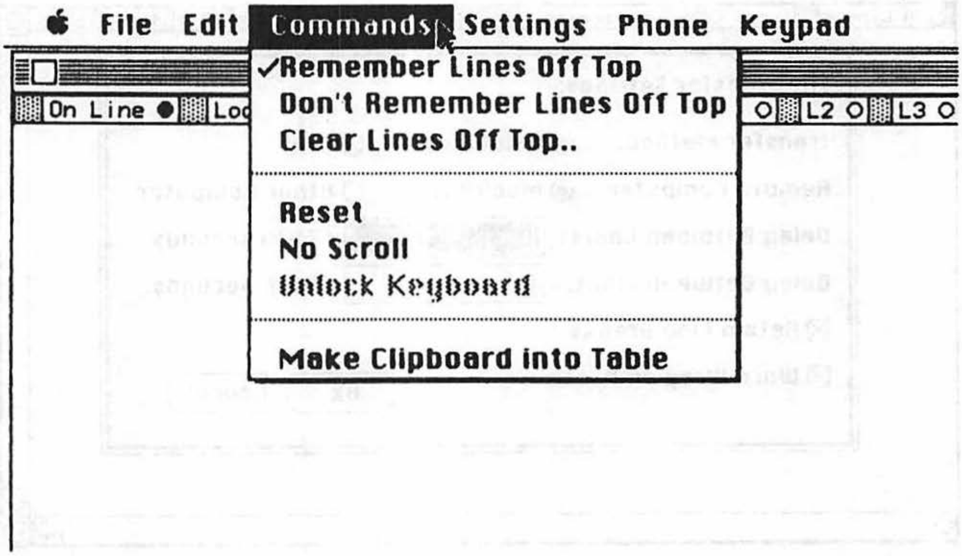
The options box which appears covers most of the settings you'll need. Both Xmodem and normal transfer protocols are supported. So is the issue of whether you're communicating with another Macintosh (which, it's assumed, is also using *MacTerminal*).

The optional setting for delays between lines and characters can be helpful when sending information to some rather sluggish mainframe computer services or to computers that save and print information to the screen simultaneously. When Mac does a file transfer, it does not print the data to the screen. Binary data would be hazardous to its display's health if it did.

Once you've selected the correct settings (or if you've already saved them), you can send or receive information simply by moving to the File menu and dragging out Send or Receive. When sending, you'll be shown a current directory and asked to pick a file name from it. Receiving lets you pick a file name to save to.

Recalling the Past

Sometimes it may be helpful to save what you see on your screen during a communications session. Here *MacTerminal* has a few tricks up its scroll bar.



Three options in the *Commands* menu are the keys. They are *Remember Lines Off Top, Don't Remember Lines Off Top,* and *Clear Lines Off Top. MacTerminal*'s default is to capture all the words that scroll off the top of the screen. They're not saved in memory, but in a temporary disk file, so under filled-disk conditions, *Terminal* will automatically select the Don't . . . option. If you keep dragging the former, and that latter keeps showing up, that's almost certainly why. Clear out some room on the disk and try again.

As long as Mac's recording the lines as they scroll off the top, you can always recover the information. When your conversation is over, use the scroll bars to bring the information back into view and drag through it, just as you would with a *MacWrite* document. Then Cut or Copy it into the Clipboard. If it's tabular information for an application like *Multiplan,* use *Make Clipboard into Table* from the Commands menu. Once in the Clipboard, it can be Pasted into any appropriate Mac document.

A Freebie

MacTerminal is a good program, and in its final production form should prove to be extremely versatile. But terminal programs have a tendency to age quickly. Someone is always developing another with just a *few* more features.

You may first want to try a program called *MacTEP.* It's stored in a database on the CompuServe Information Service. The database belongs to MAUG, the *Micronet Apple User's Group,* an independent group of Apple users with their own CompuServe bulletin board. The program's author, Dennis Brothers, a frequent contributor to the MAUG bulletin board, has revised the program twice already in response to user feedback. It's free except for the time it takes to download it to Mac. There's just one teensy problem: you need communications software to get it. Best advice: find a friend or dealer who's got it (or convince 'em to get it), and make a copy.

MAUG is a prime source of MAC information, and its system operators (called sysops) and members are very helpful people. As with most information services, CompuServe costs a small fee to join and more money for every minute you use the service. But if you budget your time and know where to look (like the XA4 database and sections 4 and 5 of the MAUG bulletin board), you can acquire a wealth of data and share your own discoveries.

Typical Features Found on Many Telecommunications Services (The Source, CompuServe, Dow Jones, etc.)

Database Services

Restaurant and Hotel Information
Airline Schedules and Fares
Historical Financial Quotes

Bulletin Boards

Apple User Groups
Special-Interest Groups
Classified Advertising
Personal Interaction

Mainframe Programming Languages

BASIC
Pascal
FORTRAN
COBOL

News Services

UPI, Reuters
Dow Jones Stock Quotes (10-minute delay)
Shop-at-Home Services
On-Line Encyclopedias
Games
Electronic Mail

Terms Used in Telecommunications

Download	The act of transferring files or programs to a remote system.
Full Duplex	Characters typed at the keyboard are received by the remote computer and transmitted back to you, showing up on the screen. If echo is on and the remote system is full duplex, all characters you type will appear twice.
Half Duplex	Characters typed at the keyboard are not echoed to the screen by the remote computer. To display characters you type, you may have to turn echo on.
On-line	Being actually in communication, where what you type is received on the other end and vice versa. Also may simply refer to being connected to another computer system.
Off-line	Also called local mode. Words typed at the keyboard are only interpreted locally (not sent to the remote computer). Also may refer to being disconnected from another computer system.
Telecommunications	Using computers to communicate over the phone lines.
Terminal	A noncomputerized device consisting of a keyboard, a screen, and sufficient electronics to operate them and a serial port. Most communications programs allow your computer to look like at least one of a variety of these while retaining its own ability to perform disk functions, which terminals lack.
Upload	The act of transferring files or programs from a remote system.

15

MACLANGUAGES

Computer programs are simply exceptionally specific instructions that guide the machine through a specific task. In the early days of computers, programming meant dealing with the machine in the only thing it truly understood: binary 1's and 0's. This level of communication, known as *machine language,* was dandy as far as the computers were concerned. Humans, however, found it less than satisfactory.

The next step up is *assembly language,* allowing the use of such memorable "mnemonic" commands as JMP, LDA, and NOP. Though not as difficult to use as machine language, it's by no means simple. Doing something like printing the word "hello" on the screen might well take a page of instructions. *Every* step must be specified individually, and that can take a lot of programming time.

Nonetheless, assembly is still in use today, since it can speed program execution and allows full control over every function of the computer. Assembly code can be extremely lean, containing only what it absolutely needs. There are experts who, to this day, claim assembly language is the purest form of computer instruction.

But over the years, *higher-level* languages like BASIC, Pascal, FORTH, COBOL, and FORTRAN were developed to make programming easier. Higher-level languages resemble English much more than assembly language. They have built-in functions that let the programmer do things like printing characters to the screen with brief, simple statements. Like human languages, each higher-level language has its own *syntax*—the words, symbols, punctuation marks, and arrangement thereof that it considers meaningful. Most are offered in a variety of *dialects*—minor modifications and improvements developed in response to programmers' needs. Nonetheless, programs written in higher-level languages are relatively easy to adapt to a wide variety of machines and are much easier to understand than assembly-language code.

The Two Flavors of Language

The most fundamental difference among computer languages is the way the computer works with programs written in them. They can basically be divided into two categories: *interpreted* and *compiled.*

At their most basic level, computers still understand only 1's and 0's. Before the machine can use a program written in anything other than machine language, that program has to be converted to the specific instructions the machine understands. Depending on the language, that translating is done by a special computer program—either an interpreter or a compiler.

With an interpreted language, the interpreter translates your program into computer-understandable code "on the fly" while your program is running. The problem, as you might imagine, is that the overall speed of your program is slowed by the fact that the computer has to do "two things at once"—interpreting your program and doing what that program was meant to do. Since computers work fast, the drop in speed may not always be noticeable to humans; for some types of programs, it can be intolerable. With Mac, which unlike most computers currently on the market does not offer a "built-in" language, it's particularly important to remember this: to run any interpreted program, the users need the interpreter for the language it was written in.

With a compiled language, all the work of translating a program into computer-usable terms is finished before the program can be run, so the computer can concentrate solely on the tasks the program demands of it. When you've finished writing your program, you use a *compiler* to change it into more or less final form that looks to the computer very much as if you'd actually written the program in machine language.

Some compiled languages require using something called a *linker* to make sure the program loads properly into the computer. Some require a *run-time package,* a bunch of mini-programs to do things like writing text to the screen that your program may require.

Although rarely as quick as a program written in assembly language, a compiled program can be three to ten times faster than an interpreted program performing the same function. One drawback is that you may have to have a copy of the run-time package on the disk with the program. Another is that the multistep process required to compile programs slows down program development. With an interpreted language, if a bug rears its ugly head, you can simply stop the program and fix it. When you fiddle around with it to correct the problem, you can run it immediately to see if your fix actually works. With a compiled language, you have to exit the program, load a text editor to work with and fix your code, and then go back through the multipart compilation process. If there's something wrong, you have to go through the whole thing all over again.

None of the four languages we'll discuss in this chapter is truly compiled, but at least one, as you'll see, may allow for the possibility of compilation. Since the Mac is one computer you can use without knowing a single word of any programming language, we won't provide an introduction to programming here. Intead, we'll concentrate on the differences among the languages currently available for Mac so that you can decide which, if any, suits your needs.

MS-BASIC

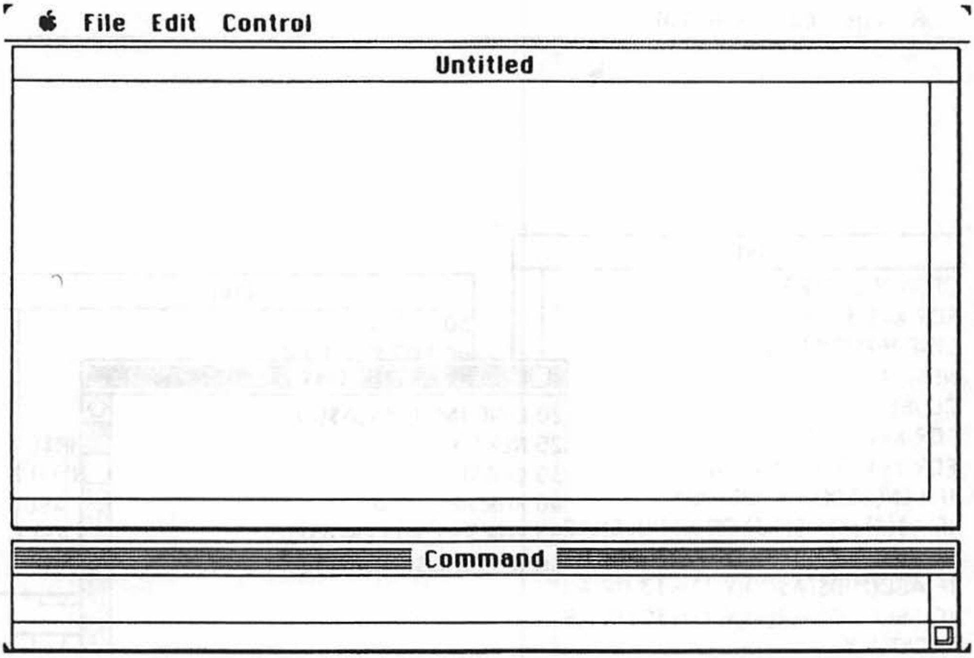
Microsoft Corporation has supplied more versions of BASIC, by far the most popular interpreted language, to more microcomputer manufacturers than anyone else. Somewhat modified dialects have been standard on the Apple // series for years, on the IBM PC since its introduction, and on just about any computer whose name you'd recognize. The version released for the Macintosh is rather straightforward, its only whistles and bells being the support of a few of the graphics routines in QuickDraw.

If you had a few more pairs of hands, you could use your fingers to count all the books on the myriad dialects, ramifications, and possibilities of Microsoft BASIC (MS-BASIC), so it would be senseless to try to cover that same ground here. Instead, we'll examine its specific implementation on Macintosh and those features distinctive enough to merit attention.

BASIC Basics

The MS-BASIC disk is wonderfully copyable. As usual, you should immediately make at least one backup and one working copy (by now you know enough to include the system files), along with a couple of document disks. Call 'em data disks if you like; we've changed the terminology because you may be using them to store both the programs you write and the data they may create or use. On the other hand, you may prefer to segregate your programs and data; that's okay, too.

When you double-click its icon, you'll find that MS-BASIC gives you two main display environments: the *command window,* located along the bottom of the screen, and the *output window* which dominates the remainder of the screen. But there's a third, somewhat transient environment called the *list window,* and it's one of the most criticized features of MS-BASIC's implementation on Mac.

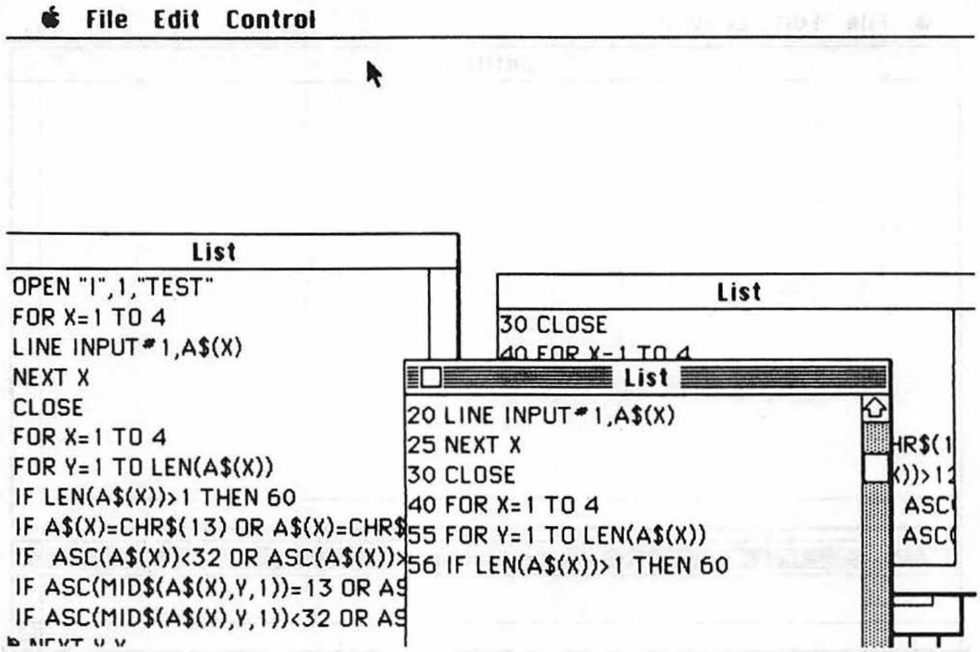


List Windows

As you write a program, each line you enter moves from the command window to the output window when you press the Return key. Each legal line of MS-BASIC code consists of a line number followed by a statement. MS-BASIC saves only the numbered lines, which is how it determines what, out of all the myriad things you might type at the keyboard, is actually contained in the program. You can see the program lines in their proper order by using the command *LIST*, which automatically creates a list window.

If your program is too long to fit in the list window (and if it does anything useful, it will be), you can use the scroll arrows or adjust its physical dimensions with the size box in the lower right-hand corner. If the list window is active, you can click any line in it and it will hop into the command box, where you can edit it.

But when you do click a line in the list window, the command window automatically becomes active. The next thing you're likely to do is type something in the command window. Unfortunately, as soon as you press Return while in the command window, the output window becomes active to receive the



MS-BASIC's list windows. Each can display a different part of the program.

information. When the output window becomes active, it may well overlay the list window, obscuring it from view. The solution is simple: you type LIST again.

Well, it's not quite that simple. The LIST command doesn't retrieve the old list window, which remains hidden somewhere under the output window. Rather, it creates a *new* list window—up to a maximum of three.

Seems silly, but it's not. If you have a program that doesn't fit into just one list window, you can use all three to display as much as you can, and juggle them and yank them around the screen. The appropriate statement is LIST xx, in which xx is the number of the line where you want the list window to begin. The actual LIST command, or any other, incidentally, need not be in uppercase. MS-BASIC automatically converts from lowercase.

Window Cleaning

Since they have the same components as the desktop display windows—title bar, scroll bars, and size box—you can correctly assume that any of the three MS-BASIC windows may be moved or manipulated in the same manner. This means that if you're not interested in seeing your program run as you write it, you can move the output window off to the side or bottom and work with just the command and list windows. The list windows are automatically updated with new lines of code as you enter them. They're even inserted into the existing program in correct numeric order.

Quick on the Draw

As you keep hearing, it's QuickDraw that is actually handling all of the screen routines on Macintosh. Inside the section of ROM with the QuickDraw code are separate routines for all of its functions. MS-BASIC will let you use forty-one of the QuickDraw procedures.

Some of these procedures require that you include a value. For instance, Call MoveTo (X,Y) (similar to the LOCATE function in some versions of MS-BASIC and HTAB and VTAB in Applesoft) wants to know the X (horizontal) and Y (vertical) coordinates of the new location you're planning to move to. In this situation it's just a matter of supplying two integer values, with X from 0 to 511 and Y in the range 0 to 341. The coordinate values begin at the upper left-hand corner of the screen with 0, 0.

To draw a rectangle at the spot, things get a little more complicated. The QuickDraw procedure for that act is called FrameRect, and to use it you must supply four values. But you just can't insert them.

Instead, they must be in an array, a construction that conceptually resembles a row or column of *Multiplan* cells. In the case of the rectangle, there are only four cells. The values in the array must be the top, left, bottom, and right coordinates of the rectangle, in that order.

```
10 DIM RECTANGLE%(3)
20 FOR N = 0 TO 3
30 READ RECTANGLE%(N)
40 NEXT N
50 DATA 20,20,110,150
60 CALL FRAMERECT(VARPTR(RECTANGLE%(0)))
```

An MS-BASIC program to draw a rectangle on the screen.

The first thing you do is define the DIMension of the array so MS-BASIC knows that it's there. You don't really need to define an array that has fewer than 10 cells, but it's good practice. Since you need integer values, you place a

% at the end of the array's name (which you can call RECTANGLE) and in parentheses explain how many cells are in it. Because all arrays begin with cell 0, a 4-cell (officially they're called *elements*) array needs 3 as the largest dimension.

Counting and Filling

A *FOR . . . NEXT* loop is next. In it, you choose a variable and a starting and ending value. For each of the values, you increment the variable, do something, then go on to the next one, until you finish with the ending value. To fill your array for the rectangle, you need to start at 0 and go up to 3.

Your purpose is to fill the empty elements in your array. You can use two complementary MS-BASIC statements called *READ* and *DATA*. You put the word DATA in a BASIC line and follow it with the values you want to read, separating each with a comma. Somewhere else in the program you use a line with the word READ in it, followed by the variables you want filled with the values in the DATA statement.

In your rectangle program, the value of N in the FOR . . . NEXT statement begins at 0. The first time through the loop you are trying to read a value into RECTANGLE%(0) (since N equals 0). The first value in the DATA statement is 20, so RECTANGLE%(0) will be assigned that value. NEXT increments the value of N by one; READ gets the next value from the DATA statement and assigns it to the next element in the array. The process continues until all 4 elements are filled. Now the array can be used with the QuickDraw routine.

Drawing

But FrameRect doesn't want you to feed it the 4 values individually. Rather, it wants to know where the first one is. Then it will get the rest on its own. What's needed is a *VAR*iable *P*oin*T*e*R* that will indicate the first element in the RECTANGLE% array.

MS-BASIC has just the function for you. It's called VARPTR, and its job is to provide a pointer for the first element of an array you name. You tell it what the first element is, and VARPTR interprets the rest.

By *CALL*ing the procedure, BASIC goes into the QuickDraw section of ROM and performs whatever instructions your program finds under FrameRect. When it's done with the last instruction, which should complete the rectangle, BASIC jumps your program out of QuickDraw and sends it back to the BASIC level.

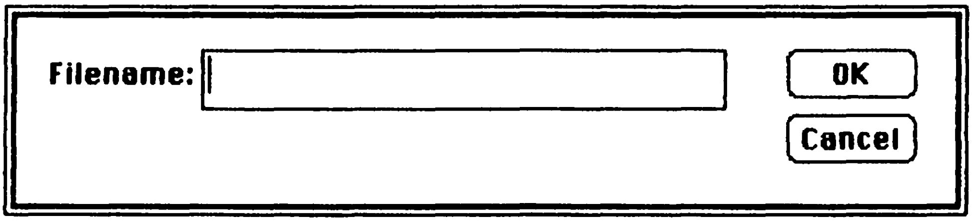
This construction, *VARPTR(arrayname%(firstelement)),* is the basis for using many of the QuickDraw routines MS-BASIC supports. The number of elements needed in any array may differ with the QuickDraw procedure you use.

MS-BASIC Overview

The Macintosh rendition of MS-BASIC is fairly standard. With the exception of the QuickDraw procedures, you could literally modem a program from Mac to any other computer running MS-BASIC and expect the program to work. At most, the changes you'd need would be minor.

But there are some glaring omissions from this version of MS-BASIC. There is no programmable way to control the size of the output window once you're in BASIC. If you double-click a BASIC program from the desktop, you enter BASIC with an output window as large as the screen, but except by using the mouse on the size box, there's no other way.

Loading or saving a program doesn't work the usual Mac way. MS-BASIC does not support the typical Mac Open and Save As menu options. Using Load doesn't give you the current directory of MS-BASIC programs on the disk. You can get a directory listing by typing *FILES* in the command window, but if you have quite a few programs, the list will scroll off the top of the output window unless you're quick with the Command-S key combination, BASIC's "stop scrolling" command.



Neither loading nor saving gives you Eject or Drive option buttons. To direct a program to or retrieve a program from a disk other than the current disk, you must use the other disk's name as part of the program's name. If the disk was called "Bill's Disk," you'd use the awkward syntax *Bill's Disk: programname* to get it there. That, of course, means that you must remember the name of the disk.

Although Mac has tremendous built-in sound capabilities, MS-BASIC gives no commands to tap its four-voice synthesizer (which can even produce speech). Considering the trouble Microsoft took in *Multiplan* to add additional features to accommodate Macintosh, their failure to support sound capabilities or more than a fraction of QuickDraw procedures is disappointing. The program editing procedures are also cumbersome, particularly when compared with those implemented on the IBM PC.

Still, an experienced MS-BASIC programmer can move over to Macintosh with complete confidence. Perhaps the tradeoffs made for instant programming ability will bear fruit in the long run. And it's possible that future updates will tap more of Mac's talents.

Pascal

Pascal is named after the seventeenth-century French philosopher and mathematician, Blaise Pascal, inventor of the first calculating machine. At its introduction, the language was heralded as the savior of programming on microcomputers. Anything that existed before it was supposed to become immediately outdated and fade insignificantly into the past. It didn't quite live up to the expectations many had for it.

For one thing, it wasn't supposed to. Pascal was originally designed as a teaching language, designed to *force* programmers to write in a structured, easy-to-fix programming style. BASIC, the primary microcomputer language, was as far removed from that concept as possible. Experts said you *should* write well-ordered and easy-to-understand BASIC programs, but there was no need to do it if something quick and dirty did the job. Pascal traded in the *should* and substituted *must.* Unfortunately, not everyone was ready to make the trade.

Don't let that lead you into thinking no one uses Pascal. Many people do. The operating systems for the Apple /// and Mac's older sister Lisa were originally written in Pascal. Many versions of *pfs:File* and *pfs:Report* are done in Pascal. It is a viable language. The problem that initially befell it was that no one bothered to mention that it was not simple to learn.

When it became available for the Apple //, owners ran out in droves to buy it. For the next six months, many spent hours and days trying to learn it. Quite a few finally settled for creative ways to use the Pascal program editor as a word processor.

If you need a yardstick against which to judge your own Pascal-ability, try this:

> A repeat statement contains an expression that controls the repeated execution of a sequence of statements contained within the repeat-environment.

That's not a difficult sentence to understand, but if you had to read it more than once to fully comprehend what it *meant,* you may not want to jump headlong into Pascal. That quote is from the Macintosh Pascal manual.

But Pascal is still an extremely popular language in the world of education. It's the only language that's accepted for advanced placement credit in computer science by the Educational Testing Service. And if you must learn Pascal, there's nowhere better to do it than on Mac.

The reason is simple. Mac Pascal (like other Apple Pascals) is a rarity in the computer world: an *interpreted* Pascal. That means you can devote your time to writing and debugging your programs, not waiting for your computer to compile them.

One Tough Language

Caution! In its present form, the disks included with Macintosh Pascal are copy-protected—a real oddity, coming from Apple. Worse, the documentation strongly suggests you may damage the contents of the original disks if you even *try* to copy them.

Luckily, you get two disks: the original and a backup copy. You are strongly urged not to experiment unless you're willing to live with just one while the other is replaced, most likely for a fee. We certainly didn't.

Dissecting a Pascal Program

Perhaps the easiest way to get a handle on Pascal is to back into it by studying how one of its programs works. By dissecting its various components, you may get a better feel for the language. This program comes directly from Apple:

All Pascal programs begin by stating the program's name—here *MakePlanet2*. It's a good habit to get into.

Next comes the declarations section. Here all constants and variables must be declared. In Pascal if you haven't declared it, you can't use it.

The body of the program starts with the *begin* statement. Beneath it, you place all the Pascal commands. In this case, the first four directly access QuickDraw routines in Mac's ROM. As with the routines you saw in our MS-BASIC program, they often need operating parameters; supplying them here is simpler than it is in BASIC.

Next comes the equivalent of a BASIC *FOR . . . NEXT* loop. In Pascal it's actually a *FOR . . . TO . . . DO* loop, followed by another *begin* statement, the instructions you want performed, and then an *end* statement that refers to the activity within the loop.

The rest of the program follows, leading to the final *end* statement. The way Pascal can tell that this is truly the end is that a period follows it—like the end of a sentence.

```
program MakePlanet2;
  const
    Top = 10;
    Left = 10;
    Bottom = 290;
    Right = 290;
    Middle = 150;
    numLines = 20;
  var
    counter : integer;
begin
  PenMode(patCopy);
  PenSize(2, 2);
  FrameOval(Top, Left, Bottom, Right);
  PenSize(1, 1);
  for counter := 1 to numLines do
    begin
      FrameOval(Top, Left + 10 * counter, Bottom, Right - 10 * counter);
      FrameOval(Top + 10 * counter, Left, Bottom - 10 * counter, Right);
    end;
  MoveTo(Left, Middle);
  LineTo(Right, Middle);
  MoveTo(Middle, Top);
  LineTo(Middle, Bottom)
end.
```

Macintosh Pascal program *MakePlanet2*: first version, courtesy of Apple Computer.

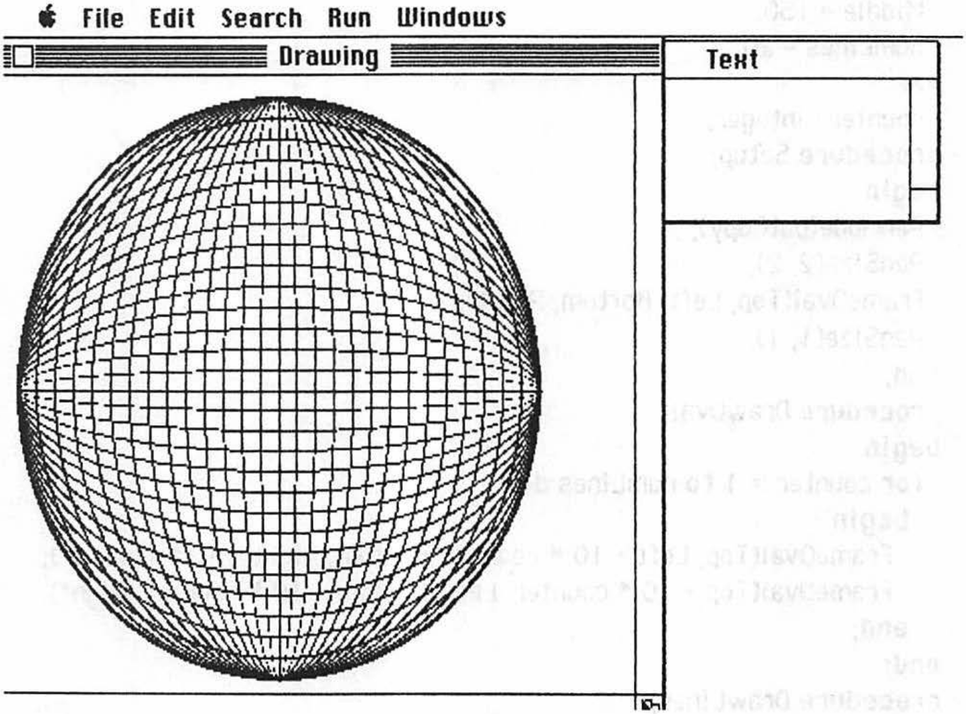
Pascal's Procedures

Another section can be included prior to the main *begin* statement. It's called the *procedures* section. *Procedures* are subsections of the program. A procedure might include instructions necessary to perform one particular function which needs to be repeated at intervals throughout the program, or it may be the routine that draws your introductory screen. In any case, the instructions in a procedure are called from the program, the same general way you'd call a subroutine in MS-BASIC. Each procedure must have its own unique name, since there must be some way to refer to it, and each procedure will have its own *begin* and *end* statements.

```
program MakePlanet2;
 const
  Top = 10;
  Left = 10;
  Bottom = 290;
  Right = 290;
  Middle = 150;
  numLines = 20;
 var
  counter : integer;
 procedure Setup;
 begin
  PenMode(patCopy);
  PenSize(2, 2);
  FrameOval(Top, Left, Bottom, Right);
  PenSize(1, 1);
 end;
 procedure DrawOval;
 begin
  for counter := 1 to numLines do
   begin
    FrameOval(Top, Left + 10 * counter, Bottom, Right - 10 * counter);
    FrameOval(Top + 10 * counter, Left, Bottom - 10 * counter, Right);
   end;
 end;
 procedure DrawLines;
 begin
  MoveTo(Left, Middle);
  LineTo(Right, Middle);
  MoveTo(Middle, Top);
  LineTo(Middle, Bottom)
 end;
begin
 Setup;
 DrawOval;
 DrawLines;
end.
```

***MakePlanet2* revised to show use of procedures.**

We've rewritten MakePlanet2 to show how it could be done using procedures. Intrinsically, it would be the same program, but instead of having it run through all of the steps in a command section, the command section actually calls in the procedures by name. The procedures themselves look like mini-programs, and in fact, that's what they are.



The output of *MakePlanet2*.

The benefit of working with procedures is that they can be called in at any time during the program or incorporated in another previously defined procedure. In fact, the tail end of the program could be rewritten with yet another procedure.

```
program MakePlanet2;
 const
  Top = 10;
  Left = 10;
  Bottom = 290;
  Right = 290;
```

```
  Middle = 150;
  numLines = 20;
 var
  counter : integer;
 procedure Setup;
 begin
  PenMode(patCopy);
  PenSize(2, 2);
  FrameOval(Top, Left, Bottom, Right);
  PenSize(1, 1);
 end;
 procedure DrawOval;
 begin
  for counter := 1 to numLines do
   begin
    FrameOval(Top, Left + 10 * counter, Bottom, Right - 10 * counter);
    FrameOval(Top + 10 * counter, Left, Bottom - 10 * counter, Right);
   end;
 end;
 procedure DrawLines;
 begin
  MoveTo(Left, Middle);
  LineTo(Right, Middle);
  MoveTo(Middle, Top);
  LineTo(Middle, Bottom)
 end;
 procedure Do_it;
 begin
  Setup;
  DrawOval;
  DrawLines;
 end;
begin
 Do_it;
end.
```

***MakePlanet2* revised to show even greater use of procedures.**

In this version, you put the entire program into three procedures, write a fourth procedure which calls the first three, and then call the fourth from the program. You can use this technique to build a library of procedures for the things you do most often and then call them up. The underline character in the procedure *Do it* is a valid character and is often used to separate words in a variable name when they don't read well together.

Saving

The usual Save and Save As methods can be found under the File menu. What's more important is that since the programming window consists of text, any of it can be edited. That's significant when you want to correct a mistake, but it works just as well if you want to store a procedure separately.

Just Select it, Cut or Copy it into the Clipboard, open a new Pascal document, Paste it in, and save it. An easier approach, of course, would be to Paste the ones you'll use often into the Scrapbook. Doing it that way makes it simpler to recall them when you're working on a program.

Pondering Macintosh Pascal

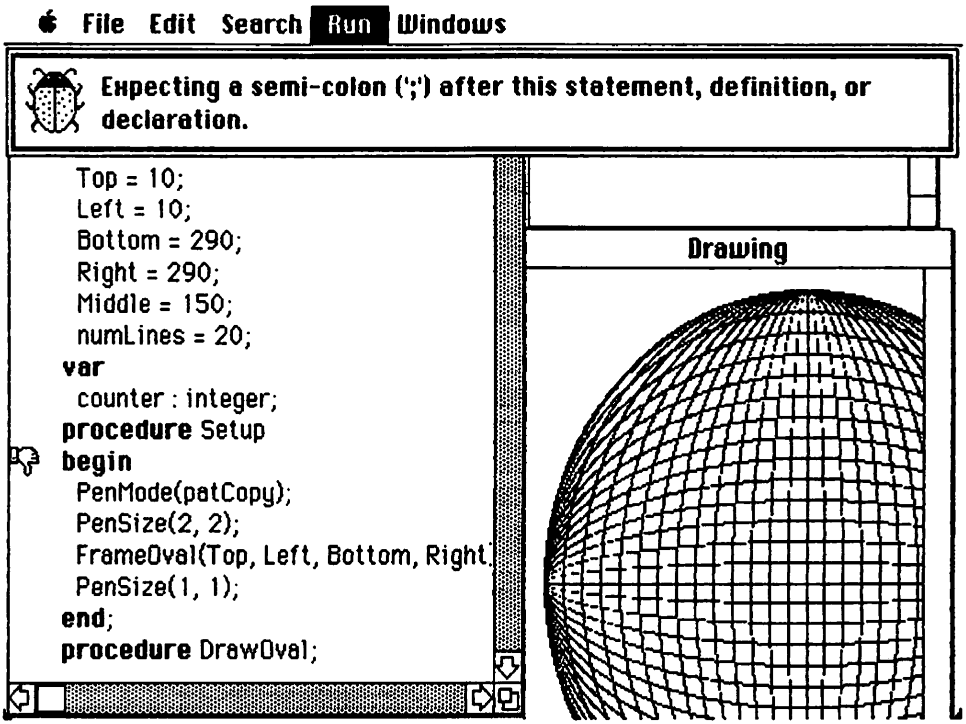
Pascal forces you to write with structure in mind. It's very easy to read. As you write the program, the correct indentation levels are supplied automatically. And this Pascal, though interpreted, is fast. Its program editor, however, is not nearly as good as *MacWrite*.

The one part of learning Pascal that seems to be most difficult for the novice concerns using the semicolon. In general, it's necessary whenever you come to the end of a subthought. Once you acquire some expertise, you'll actually get a "feel" for them.

The best rule of thumb is: when in doubt, use one. Typical exceptions can be seen in our program examples. If you do get it wrong, you'll be told as much by a *bug box* at the top of the screen. When you return to the program, you'll see a *thumbs down* icon on the line below the one that caused the problem. It may seem a trifle too cute, but it makes fixing your errors extremely easy.

The only other problem that may assail you is not so easily solved. Apple provides a Pascal user's manual and a Pascal reference manual. The first manual will tell you everything you need to know about all Mac's pull-down menus and how they can be used in Pascal programs. The second manual explains how the Pascal code you write will affect Mac and the QuickDraw routines.

But currently there's no Pascal tutorial—a manual that would lead you by the hand, step by step, through the process of creating a program. If you



A crystal-clear error message from Macintosh Pascal. The missing semicolon belongs at the end of the procedure declaration just above the "thumbs-down" marker in the program listing.

haven't done any programming, that's really what you need. By the time this book appears, someone may have already produced it.

Unless you're an accomplished Pascal programmer, invest in a Pascal book or two or perhaps a course at your local institute for higher learning before you spring for Macintosh Pascal. But if you know Pascal's for you, you'll find this version first-rate.

Macintosh BASIC

Traditionally, Apple has supplied its own version of BASIC for all its computers. Originally it was something called Integer BASIC. Then came Applesoft, a version of MS-BASIC modified for the Apple // environment. But all the previous versions of BASIC looked pretty much like the versions everybody knew and loved.

Macintosh BASIC is a strange new variant. Some of its commands are the same as in more familiar versions, but its format is totally different. In fact, in syntax and performance, it vaguely resembles Pascal. At this writing, Macintosh BASIC is still under construction. Many of the commands it uses are incomplete. Even so, what's there so far looks impressive.

Its disk is copyable, so make a working copy and a document disk before you start. Never use original disks unless someone forces you to be that stupid.

Programming in Mac BASIC

Our program example is a Mac BASIC version of MakePlanet2, the Pascal example you saw a little earlier. If you notice, Mac BASIC simplifies some of the steps you need.

The most notable difference between Mac BASIC and more common dialects may well be that, like Pascal, it requires no line numbers. You may use them for reference, if you like, but the programs will run fine without 'em.

```
top = 10
left = 10
bottom = 190
right = 190
middle = 100
numlines = 10
set penmode 9
set pensize 2,2
frame oval top, left; bottom, right
set pensize 1,1
for counter = 1 to numlines
frame oval top, left+10*counter;bottom, right - 10*counter
frame oval top+10*counter,left;bottom-10*counter,right
next counter
plot left,middle;right,middle
plot middle,top;middle,bottom
```

The *MakePlanet2* program written in Mac BASIC.

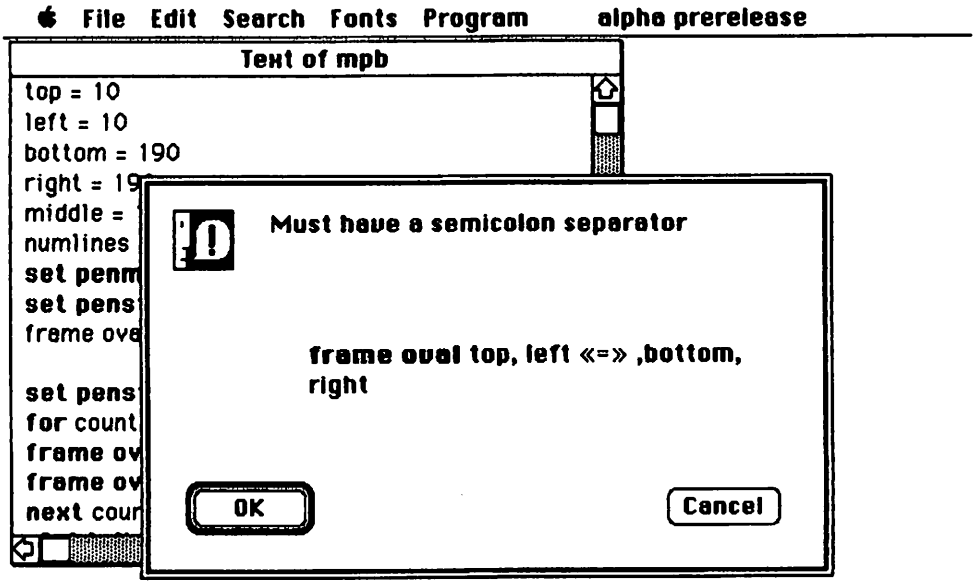
No program name is needed, although one can be used. Just make the first line *PROGRAM name.* You don't need to predefine variables, but you may want to. Whenever you use a variable, BASIC goes to the beginning of the program and looks through it until it finds the variable's first appearance. Because of this, it's best to define variables early in the program.

Defining the *penmode* and *pensize* requires the use of the word *set.* And *frame* is now a verb on its own which can have *oval* as its object, as well as *rect* and *roundrect.* They're still QuickDraw calls, but they may seem a trifle less obvious. Notice how the boundary parameters are stated. The semicolon separating the coordinates for the upper left corner from those of the lower right corner *must* be used.

A major difference from MS-BASIC is in the Mac BASIC FOR . . . NEXT statement. In most versions of MS-BASIC the variable following NEXT may be omitted if the omission doesn't cause an ambiguous situation. For instance, if you had a FOR . . . NEXT loop within a FOR . . . NEXT loop, omitting the variable associated with either NEXT could cause confusion.

Mac BASIC doesn't want you to take any chances. You *must* include the variable, as we did in our sample program. If you don't, you'll be told that you've made a mistake.

Unlike most (but not all) other dialects of BASIC, Mac BASIC parses program lines interactively. Most BASICs allow you to enter program lines that are utterly illegal in BASIC's syntax—and you don't find out about your mistake until you run the program.



An error message from Mac BASIC. The line won't be accepted until its syntax is corrected.

Mac BASIC scans every program line when you press Return after entering it. First, it determines whether what you've entered is a valid Mac BASIC instruction.

If not, an error box appears, explaining what Mac BASIC believes is wrong and where in the line it thinks the error is. But if the line is legal, Mac BASIC accepts it, boldfacing any BASIC commands or special words you've used in it. Everything else is left in the normal text style. If you're the sort who doesn't enjoy stopping to fix mistakes, Mac BASIC will let you turn off the interactive error checking with an option available under the *Program* pull-down menu.

Drawing Lines

In the original Pascal version of MakePlanet2, the last four lines of the program were used to draw two lines. First, the graphics pen was MOVEd TO a position on the screen, then a line was DRAWn TO a new location. Mac BASIC does this a little less blatantly.

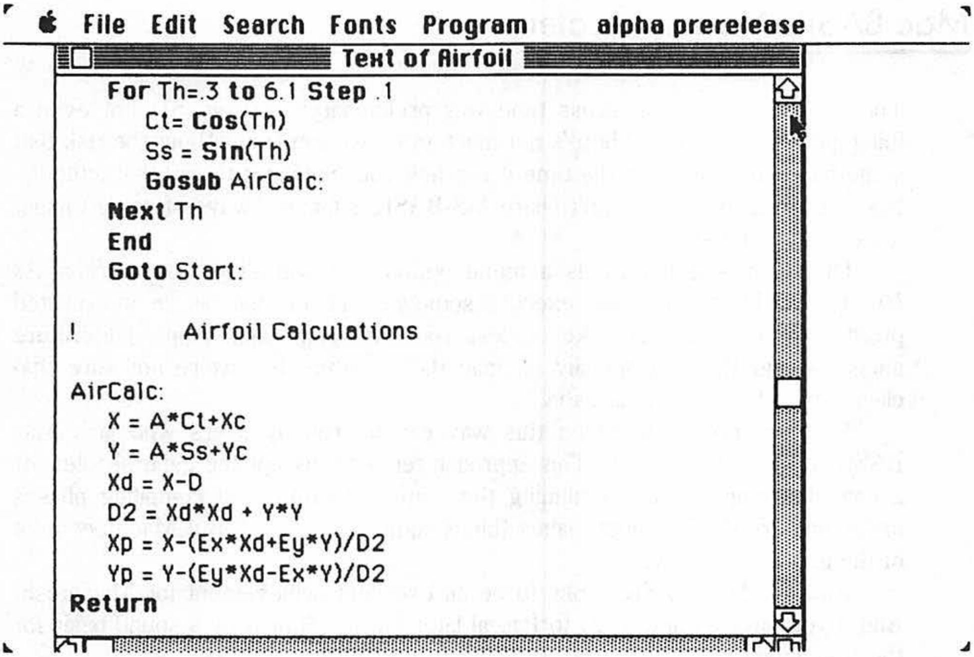
The *plot* command, used with only one set of coordinates, places the graphics pen down at the location and draws a dot. Adding a semicolon and another set of coordinates extends that dot to the new location. The extension of a dot between two points produces, of course, a line. Four programming steps in Pascal become two in Mac BASIC.

Procedures

Instead of using procedures, BASIC programs can use a routine called GOSUB . . . RETURN. Some destination is specified immediately after the GOSUB. At the end of this procedural subroutine you include a RETURN command, which sends the program back to the next statement after GOSUB.

In MS-BASIC if you use GOSUB, you must follow it with a line number, the only means available to reference any other section of the program. In Mac BASIC you can follow it with a *label* that refers to another section of the program which has the same name as the label does.

If you want to keep things *very* close to Pascal, you can put all the labeled sections of your program at the beginning and precede them with a GOTO statement so the program begins further down. GOTO is a one-way jump, much like GOSUB, but with no inherent RETURN. You've got to use another GOTO to get back where you came from, or the program keeps going down the list from the point you jumped to.



Concatenation

There are quite a few more features that are different from a "standard" rendition of BASIC, but the one that may confound old-line BASIC programs more than the others is the way in which Mac BASIC joins two character strings.

In MS-BASIC once you assign values to two string variables (character variables denoted by a dollar sign), say A$="GOOD" and B$="DAY", you can define a third variable, C$ as C$ = A$ + B$. If you look at C$ after doing that, you'll find it equals "GOODDAY". The process is called concatenation. Try that in Mac BASIC and you get an error message explaining that you can't add strings, only numbers.

Mac BASIC interprets the plus sign as a numeric operator and *only* as a numeric operator. If you want to add two strings together, you use the ampersand (&), which has always been referred to as the *and sign,* anyway. To do what we'd like in our little example, C$ = A$ & B$ would be the correct format.

Mac BASIC Now and Later

The release available at press time was preliminary: version .51, not even a full implementation yet. There's not much more we can say without the risk that something will change by the time it reaches you. Suffice it to say that although this version of BASIC doesn't share MS-BASIC's familiar ways of doing things, it's excellent nonetheless.

One promised feature is a menu option that will allow you to *Save As Binary*. In this form it will execute somewhat faster than as an interpreted program and it will also take up less room on your disk. Apple's literature suggests that this will actually compile the program, but we're not sure that claim isn't a bit overenthusiastic.

Whether programs saved this way can be run by users who lack Mac BASIC remains to be seen. This approach tends to disrupt the general rules for a compiled language by combining the editing, testing, and compiling phases under one "roof." It almost makes things sound "too easy." But Mac does a lot of things the easy way.

All told, Mac BASIC looks to be an excellent achievement for Macintosh. And if you have a mind to go to Pascal later on, it will provide a sound basis for the transition.

MacFORTH

MacFORTH, from Creative Solutions, has been going through changes over the last few months. It's currently available in three versions, depending on the level of complexity you need.

FORTH was originally developed to run a mechanized telescope at an observatory. It's excellent for process control, but its partisans think it's good for almost everything but curing warts. In its primary state it exists as groups of *primitives*—extremely simple program statements, performing simple functions.

You increase their complexity by building a FORTH *vocabulary*. To do that, you create a new word, defining it as the combination of the functions of two or more existing primitives. You can also create a new word from new words you've already defined.

Most of the people involved in FORTH will tell you that it is an excellent language. If they're honest, they'll also tell you that because of the way you create programs and the fact that it uses a form of math called *reverse Polish notation*, it isn't for the novice programmer.

If you do take the time and trouble to learn it, you'll find that it is very fast for an interpreted language. And there's very little that other languages can do that FORTH can't. In a sense, you customize it to suit your needs.

Summing Up

Any of these languages may serve your programming needs. The Microsoft version of BASIC will be especially helpful if you have already done some BASIC programming. The real winners, though, are the Mac versions of BASIC and Pascal. They are better-than-average releases, especially considering that Pascal (and perhaps Mac BASIC) will allow you to tap Mac's built-in sound synthesizers. With these languages and the releases that are certain to arrive in the future, programmers will be able to develop applications tailor-made to take advantage of Mac's special features.

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MACFUN

Just about every computer installation in the world, even the most staid and serious, includes at least one game. Computers are just natural vehicles for games. Aside from the computer's wonderful power to manipulate data fast, it can use its graphics and sound capabilities to make a game exciting and stimulating. And somehow playing against a computer brings out the old competitive urge. When you play a good computer game, you often experience the discomforting feeling that your opponent—a mere machine—is better than you are.

In many games that's the cold, hard truth, since you simply cannot process information as fast as the computer can. You can challenge it, but you won't ever prove your superiority. You won't often win, but you can try. You can even beg the computer to go easy on you.

Four amusement programs are available for Mac right now. Others will be on the way, but all four trailblazers deserve notice.

The Witness

Infocom doesn't play games, at least not when it's designing them. The company's most famous series is *Zork, the Underground Empire,* a very successful adventure-type game that will soon be available for Mac. For now, you might try a Macintosh adaptation of another Infocom game called *The Witness.* The scenario looks like this:

Obituary notice in the *Santa Ana Register,* Sunday, January 30, 1938: Virginia Clayton. Beloved wife of Freeman, beloved sister of Beth and Katherine Clayton. Survived by her daughter Monica. Died of gunshot wounds at Valley General Hospital. Private services will be held Monday at the Chapel on the Mount in Cabeza Plana.

It's eight o'clock. Los Angeles is a town full of riddles. You're standing at the foot of the driveway leading to the Linder estate. On the ground in front of you is a book of matches. You stoop down and pick it up. It may be a clue, and a good detective never passes up a clue. Old Man Linder asked you to come up because of a threatening note he received. It may have something to do with the Clayton woman.

In the next twelve hours you'll be called upon to use your most canny skills. You'll be lied to, ridiculed as a two-bit shamus, and even led on a merry chase of red herrings. But before those twelve hours are up, you'd better find out who has murder on the brain. You might even earn yourself a reputation.

Edit Commands Font

driveway entrance Time: 8:00 pm

Somewhere near Los Angeles. A cold Friday evening in February 1938. In this climate, cold is anywhere below about fifty degrees. Storm clouds are swimming across the sky, their bottoms glowing faintly from the city lights in the distance. A search light pans slowly under the clouds, heralding another film premiere. The air seems expectant, waiting for the rain to begin, like a cat waiting for the ineffable moment to ambush.

The taxi has just dropped you off at the entrance to the Linders' driveway. The driver didn't seem to like venturing into this maze of twisty streets any more than you did. But the house windows are full of light, and radio music drifts toward you. Your favorite pistol, a snub-nosed Colt .32, is snug in its holster. You just picked up a match book off the curb. It might come in handy. Good thing you looked up the police file on Mrs. Linder's death. Her suicide note and the newspaper story told you all you know about the family. The long week is finished, except for this appointment. But why does an ominous feeling grip you?
MORE

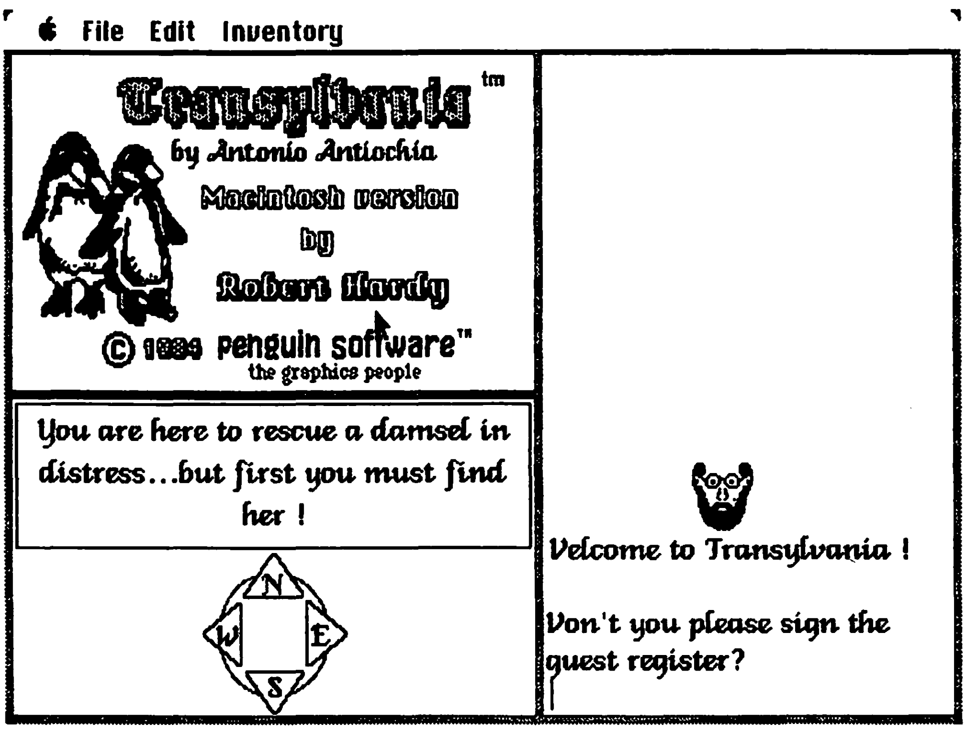
That's the premise with which you begin *The Witness*. Your mission is to solve the case and make an arrest before eight A.M. the next morning by asking questions and finding clues. *The Witness* is a text game; there are no graphics other than those that you conjure up in your own mind, so you must really keep your wits about you.

To play *The Witness* you use complete English sentences to interact with the computer. All landscapes, whether interior or exterior, are described on the screen, and it's imperative to remember how to find your way around. You can draw a map, or you can print out your commands and the screen responses on your printer.

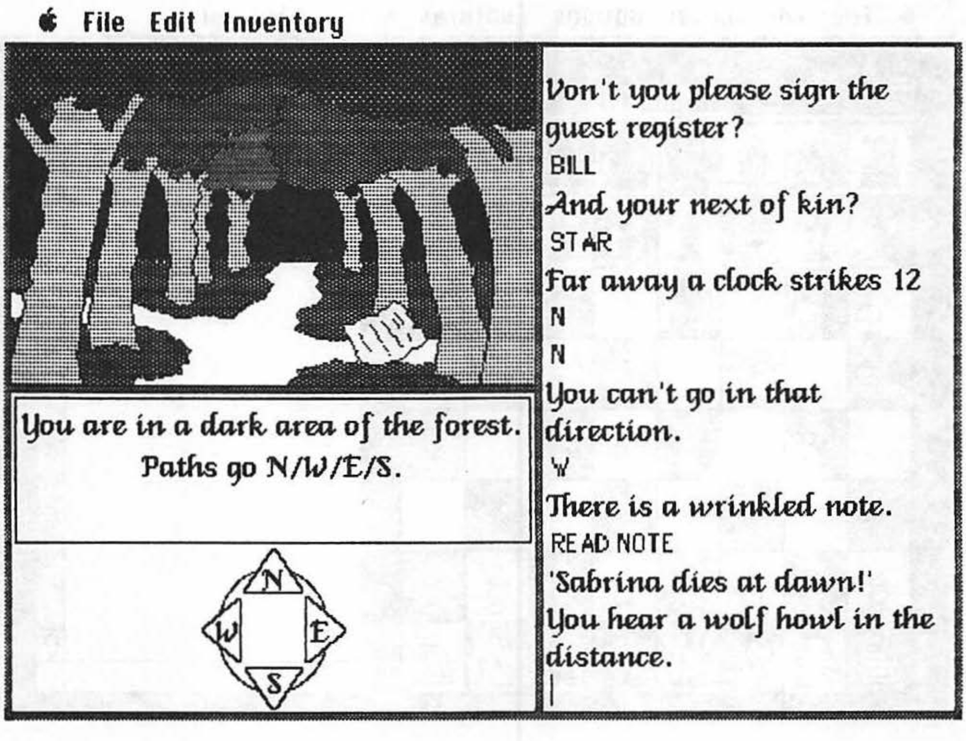
Infocom is noted for the relatively large vocabulary of its games and their ability to "understand" fairly complex sentences. This one is no exception. It's enjoyable and entertaining, not to mention baffling. Two clues, which are easy to miss in the lavish collection of booklets, newspaper pages, and physical clues that accompanies the game, may help you out. One: when you see ***More*** at the bottom of the screen, press the spacebar. Two: absolutely, positively take a seat if someone offers you one. "Hours of enjoyment" is not just hyperbole with Infocom's games; you're not likely to solve this one in less than a real day, and probably not even then.

Transylvania

While *The Witness* falls into the category of strategy games, *Transylvania* is more of a fantasy—a game in which you play a role and use your character to act out an impossible adventure. Most fantasies are designed to be highly descriptive and full of graphics. As you can see from the screen shots, this one's got terrific pictures and an elegant type font.



If you've ever wondered what John Carradine did in his spare time, you might speculate that he spent some of it in the land of *Transylvania.* It's a place that still sports vampires, werewolves, and a host of other creatures thought long gone since Universal and Hammer gave up on the horror film. But Penguin Software has resurrected the ghouls and goblins for a last-ditch attempt to keep you from your goal. To "win" at *Transylvania,* you must rescue the beloved Sabrina before dawn.

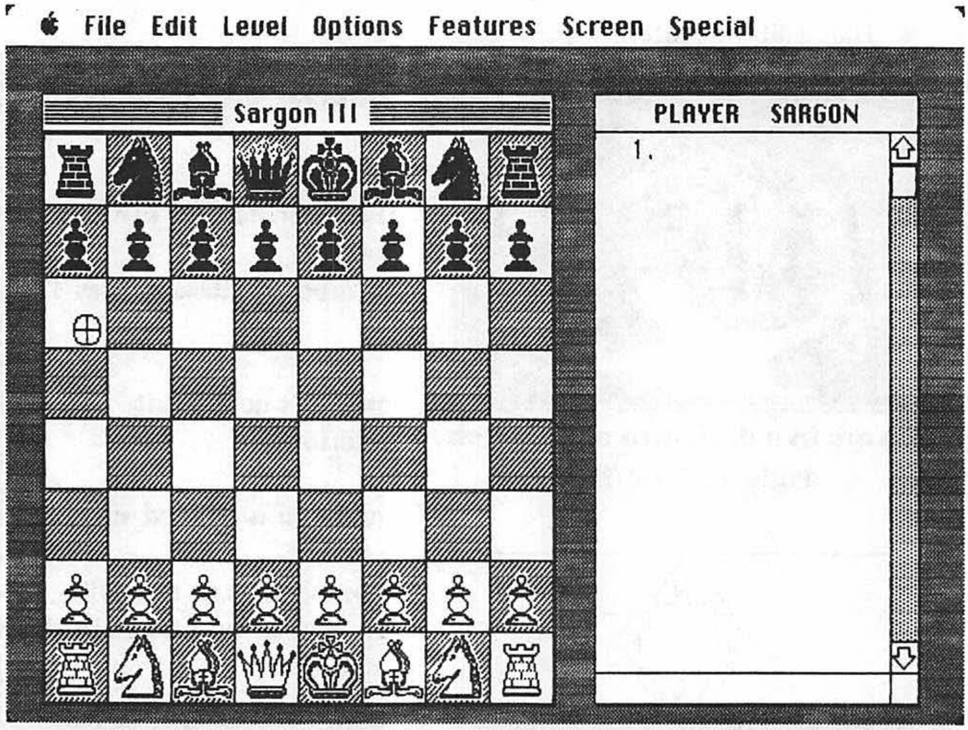


Sabrina's been kidnapped. Only the great specter itself knows what fiendish things will happen to her before she's put to death at the rise of the newborn sun.

You'll find yourself wandering about the countryside, gathering up helpful items as you go. You'll be relentlessly hounded by the wolf that walks on two legs. If you're not on your guard, you'll wind up as a late snack. It's a constant struggle in the land of Transylvania, and only those with cunning survive.

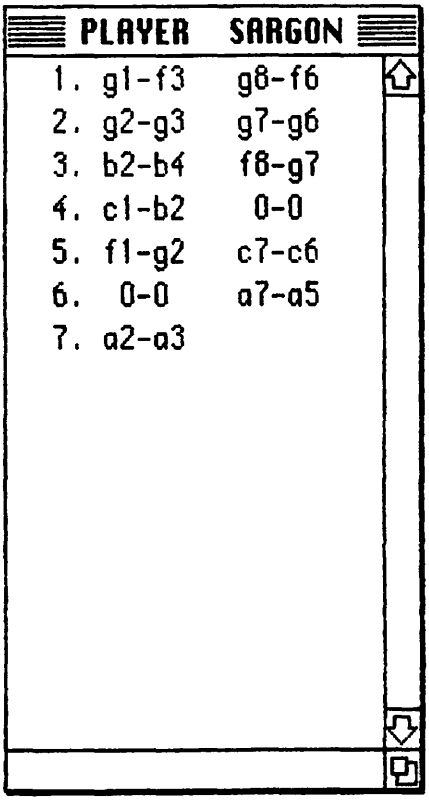
Sargon III

From the largest mainframe to the smallest microcomputer, one of the few games that's been common to virtually all computers is chess. It's the primal match of wits between a person and a computer. *Sargon III* is an excellent computer chess game from Hayden Software.



Designers Kathe and Dan Spracklen have produced versions of *Sargon* for the Apple // series and for IBM PCs. Now the electronic wizardry of this much-acclaimed program is available for the Macintosh. And it's even better than before.

All the features that made *Sargon III* excellent on other computers are as good as ever on Mac's version of the program. You can switch sides, save games, set up opening games, even take back a move if you're quick. Here, all these options and more are hiding in the pull-down menus.

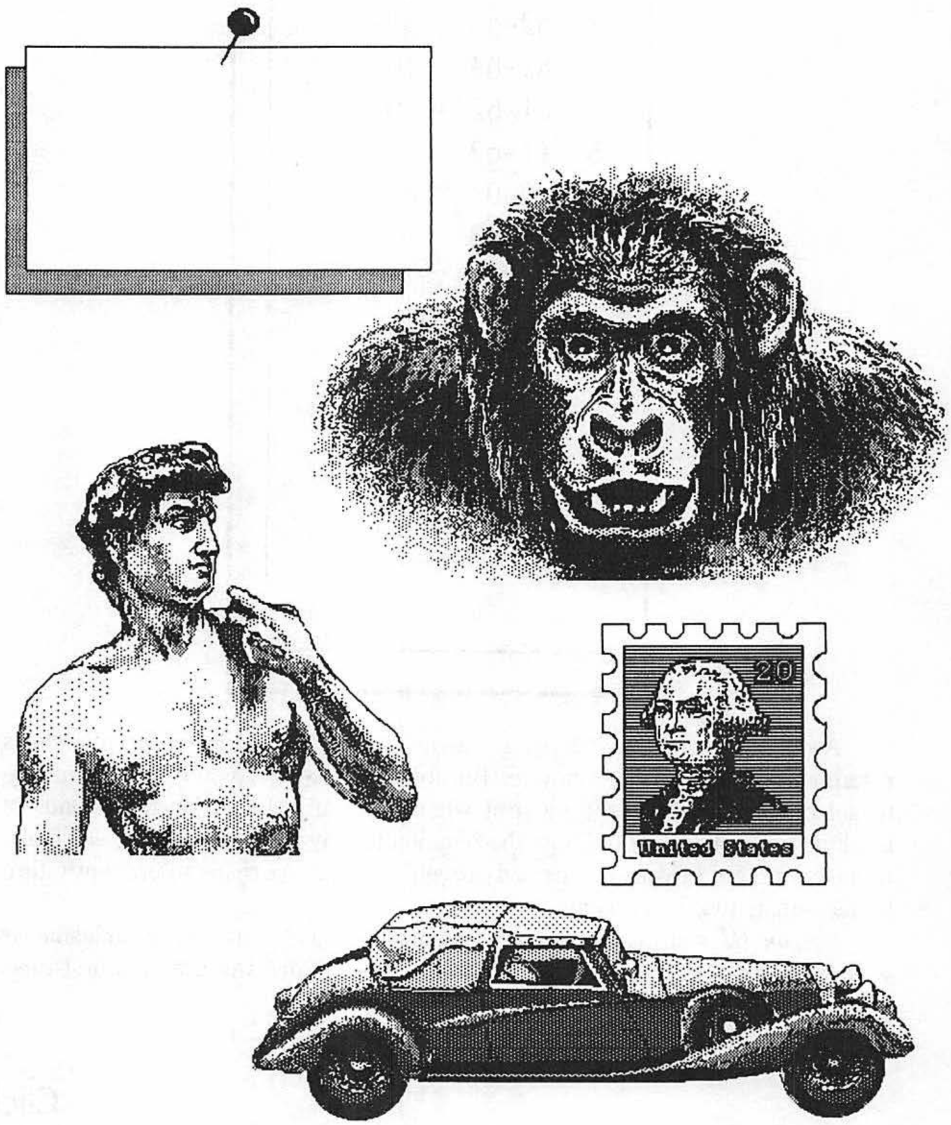


As in past versions of *Sargon,* moves can be tracked in the cryptic chess references that can baffle a novice. But for the first-time, you can use a mouse to select a chess piece and move it wherever you'd like within the bounds of legality. You don't need to know the notation to play the game. And if you'd like to have a record of your moves and *Sargon*'s replies—perhaps to prevent future losses—that, too, is an option.

Sargon III sports an enlarged opening book and a masterful endgame as well. And the graphics are great. It bodes well for Mac's future as a first-class game machine.

ClickArt

The final offering is technically not a game, but it can be amusing to play with nonetheless. *ClickArt,* from T/Maker, is a computerized variation of "clip art," the predrawn, copyright-free images that graphic artists can literally "clip" from a book. The *ClickArt* disk comes with twenty-eight *MacPaint* screens, each with one or more pictures, including borders, arrows, a gorilla, and a statue of *David* sans fig leaf. Thematic unity is not exactly a strong point.



These pictures could be useful for brightening up a newsletter, but *how* useful is another question. The images are definitely cute, but it's difficult to imagine where many of them would fit in. When was the last time you needed a picture of Michelangelo's *David*? Accommodating everyone's graphics needs with a motley collection of standardized images is definitely a problem. And as with all art on Mac, diagonal edges can take on a jagged look because of the printer's resolution limitations.

As more specialized collections are added to the *ClickArt* library, perhaps it will reach a larger market. But it's going to be a very personal call as to whether the initial offerings are worth the $49.95 purchase price.

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HARDWARE HELP

By itself, Mac is pretty much a self-contained machine. If you purchase it along with the Imagewriter, you're ready to go as soon as you make the connections and plug things in. But there are definitely a few items that may make your life with Mac easier.

Drive Number Two

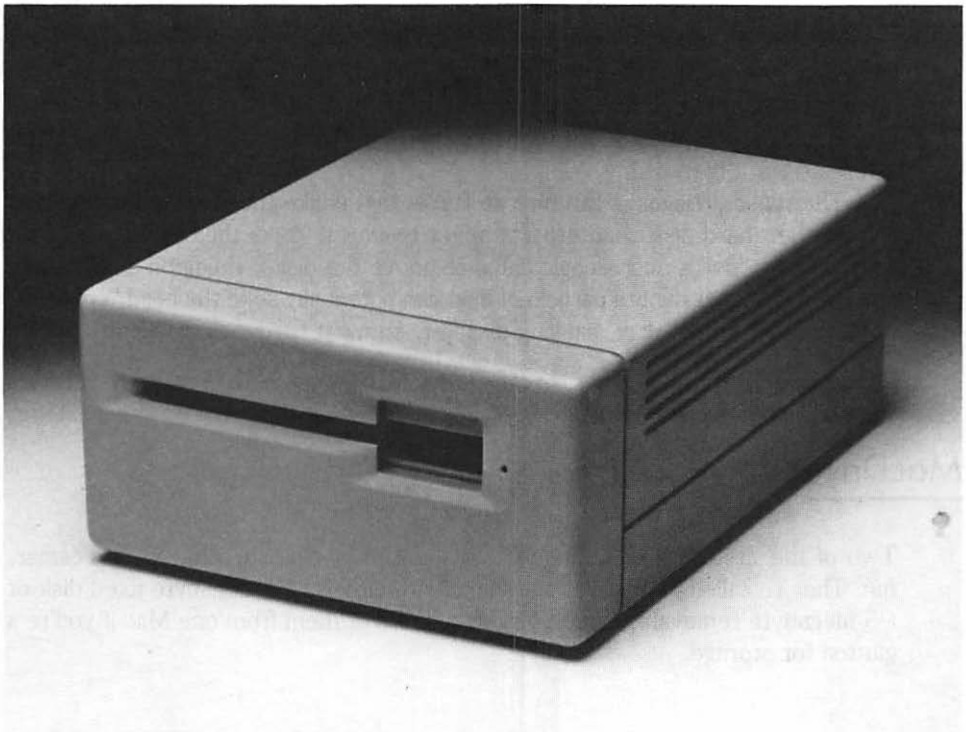
If you're just going to fool around with Macintosh, and give it absolutely no serious work to do, the internal disk drive will work fine for you. But if you intend to get down to business, being without a second drive is a definite handicap.

With the second drive, you may not be able to do more, but you'll do it with a lot less effort and frustration. When copying disks or even files with only one drive, you get involved in a disk-swapping procedure that may seem endless. With two drives, you simply drag the icon of a disk in the internal drive to the icon of a disk in the external drive, sit back, and relax while the process takes care of itself.

It's also far easier to use data disks when your application and system files are at Mac's beck and call in the internal drive and the data in the outboard model. To save a file, you aren't forced to perform the eject-and-replace two-step.

So far, the only external floppy-disk drive that works with Mac is the one Apple supplies. Since it's fully compatible with everything Mac does, all you have to do is bring it home and plug it in. It works just like the internal drive, getting all of its power from Macintosh. You can even use it instead of the internal drive to boot Macintosh.

Sounds simple. We recommend it. But here's a wrinkle: double-sided models loom on the horizon—a horizon that, at this writing, seems about one year away. Traditionally, upgrading a disk drive from single sided to double sided has



The Macintosh external disk drive.

essentially meant turning the original into a decorative doorstop or planter or simply selling it. The single-sided drive isn't likely to become obsolete, but since Mac won't support two external floppy-disk drives, the one you buy first is likely to be with you for a long time. Tough decision.

Hard Disks

Another external storage device can be even more useful. It's called a *hard-disk drive,* but in actuality it's usually a collection of rigid platters that can hold a veritable treasure trove of data. The smallest in terms of capacity can generally hold 5 megabytes (more than 5 million bytes) or roughly 12.5 times more than Mac's 3½-inch floppy disk. From there, storage capacities can range to 40 megabytes and beyond. If you've got a database that exceeds the capacity of a single floppy, it may be your only choice.

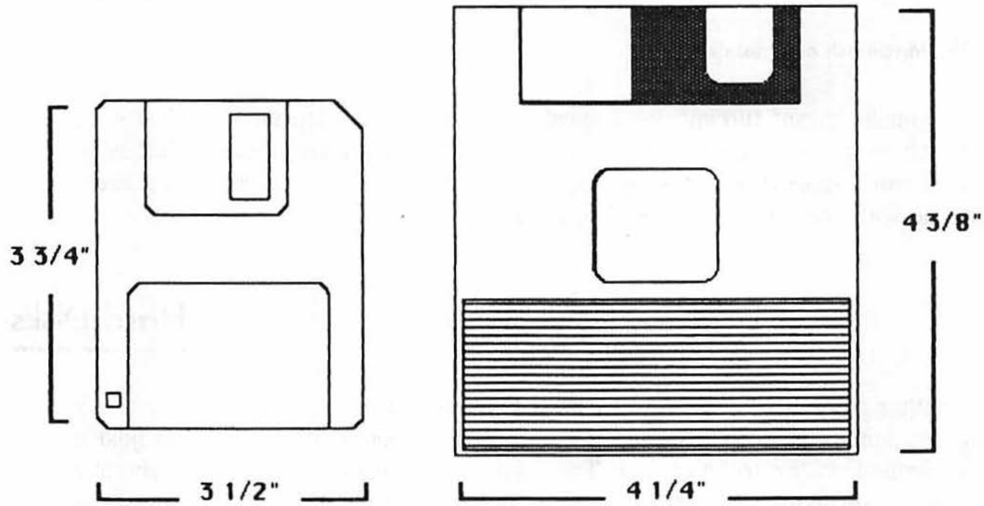
Amazingly, a hard-disk drive takes up little more space than a common floppy-disk drive, and disks themselves are often only 5 inches in diameter.

They can accommodate such a large volume of material because of their design. Several rigid disks are stacked one on top of the other, with intervening spaces where the read/write heads (one for each side of each surface) move across the media. The disks turn much faster than floppies, so they can transfer data like lightning. If you've ever grown impatient waiting for a program to load, you're a candidate for a hard disk.

The reason the disks can turn so fast is that unlike the heads on floppy-disk drives, their hard-disk counterparts never touch the disks themselves. Instead, they actually "fly" a microscopic distance above the disks, riding on a cushion of air. Even the most minute particle of dust can potentially send the head "crashing" to the surface of the disk, causing disaster, so most hard-disk drives are sealed against the environment.

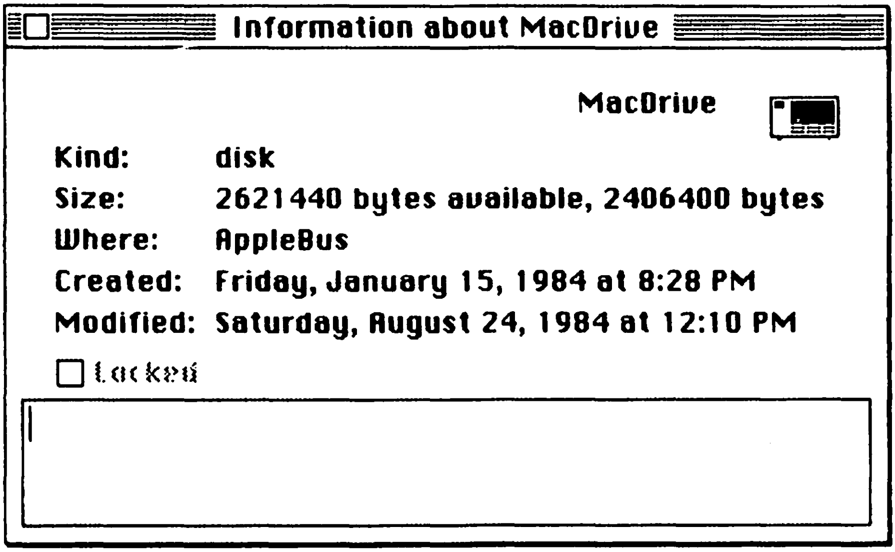
MacDrive

Two of the first hard-disk models available for Macintosh come from Tecmar, Inc. They're called MacDrive, and come with either a 10-megabyte fixed disk or a 5-megabyte removable disk. You can run two of them from one Mac if you're a glutton for storage.



Comparative sizes of Macintosh floppy disk and Tecmar removable hard disk cartridge.

The removable model is an absolute wonder. The cartridge containing the fixed media is not much larger than one of Mac's 3½-inch disks. It will fit comfortably in a jacket pocket or a briefcase or purse. It's totally portable, meaning that you can transport all of your documents to a MacDrive attached to another Mac at another location simply by carrying the cartridge there. If you happen to fill up a 5 megabyte cartridge, you can purchase another for about $120. Or you can simply copy your noncurrent information to floppies and erase it from the hard disk.



But you won't need to do that in any hurry. You can probably fit all your current documents on it and still have a lot of room to spare. You can also keep your applications on it so that they're all available anytime you choose. On one disk you can store all the applications and all the data you're ever likely to need.

You could, that is, if it weren't for copy protection. Programs that use the same procedure as *Multiplan* alleviate the problem somewhat. They can be copied to a hard disk, and as long as the original application disk has been run once, the copy on the hard disk can be used thereafter. Those that use other schemes must be run from the original disk; at least your data can be saved to the hard disk.

The Inside Story

MacDrive is not just a simple disk housing with a motor and a connecting cable. Beneath its Mac-colored metal skin lurks a full-blown 68000-series microprocessor system controlling the whole works, plus a built-in power supply and cooling fan. For $1,995, it's an impressive package.

The speed gains with this system are impressive. Loading *MacWrite* from one of Mac's standard disks (designated as the *priority disk*—one that has System files on it and whose icon replaces that of the original startup disk) takes about thirty-one seconds. Under the same conditions, with MacDrive as the priority disk, the load time is about 14 seconds. That's a 55 percent improvement, and it's delightful. In fact, after using the hard disk for a while, switching back to Mac's standard variety is unbearable.

The equipment is durable, too. In the four weeks of virtually continuous twenty-four-hour-a-day service we put it through, it performed flawlessly.

Connection

MacDrive connects via the modem port, also known as the AppleBus port. The AppleBus system allows other devices to communicate intelligently with Mac at incredible speeds, far beyond the typical 1200 baud used by the fast modems. It's through the AppleBus connection that soon you'll be able to have many Macs sharing information. But how can you connect anything else (like a modem) when MacDrive is hooked up there?

Answer: an additional nine-pin D-type connector on the back of MacDrive. It's an extension of Mac's modem port and allows you to connect other devices. Hopefully those devices will extend this "daisy-chaining" concept, though a modem, by necessity, will be the last device on line.

Incidentally, the only problem we encountered with MacDrive resulted from not fastening the cable securely to Mac's connector. Be sure to heed our words of warning about securely screwing stuff to Mac.

To use MacDrive, you must use a specially modified Finder file supplied by Tecmar. This *must* be on the startup disk and the disk that becomes the priority disk.

Directory Shortages

Unfortunately, just having a large-capacity hard disk doesn't mean all your problems are solved. In its current releases Mac can't really handle all of the documents you can fit on a hard disk.

The directory information for any disk, no matter what its type, is contained in a system document called Desktop hidden on the disk. When you place the disk's icon on Mac's desktop, the information from this document loads into Mac and is stored there.

But the space available to hold this information is finite. The end comes at about 170 to 180 documents. If the total number of individual documents (folders included) in all the disk icons on Mac's desktop exceeds that number, odd things happen.

If you attempt to insert another disk previously unseen by Mac, and therefore add more directory entries, Mac will firmly but politely tell you that there is not enough room to add it. Even if you eject a disk, you'll have to trash its icon before anything positive happens, and it won't unless the trashed disk contained a significant number of documents.

Often the only way out of the dilemma is to power down and boot the system with a disk containing the special System and Finder files and nothing else. The hard disk must be powered up and on-line at boot time. When everything's settled down, copy as many documents from the hard disk as will fit onto the new boot disk. Trash the hard-disk versions, and power down.

Repeat the process until you've reduced the document count enough to allow more icons on the desktop. Even after that, it's best not to keep more than two additional disk icons (not counting the one for hard disk) on the desk. When you eject a disk you won't be using again, trash its icon. Keep your desk orderly.

The Edge of Respectability

The other problem you may face occurs when MacDrive becomes the priority disk. With the 128K Mac and the special Finder for MacDrive, everything is working right on the edge of respectability. If MacDrive supplants the startup disk and you try to eject it (as far as Mac's concerned; the actual fixed disk stays put) you may be told that there is not enough memory to eject the disk.

Although you'll probably be advised to trash a dimmed icon and try again, it usually won't help. If you want to successfully eject the hard-disk cartridge, use an application from a disk that has a valid System and Finder file on it. It'll take the place of MacDrive as the priority disk. Once the MacDrive icon has been dethroned from the top position, you'll be able to use the normal ejection process on it, though you'll probably be told there isn't enough memory to retain the icon on the desktop.

Of course, at any point you can press the white button on the front of MacDrive, pull down the disk-slot cover, and remove the disk. But remember: this is similar to using any of Mac's emergency eject procedures. Unless you use the ⌘-E or Eject menu option, any changes to the disk may not be saved.

Big Files for Little

In an attempt to prevent you from running out of directory space long before you run out of disk space, Tecmar has assigned a very large minimum size to each document. Whenever you save something to the hard disk, it will occupy at least 10K bytes of space—more, naturally, if necessary.

But this means that a *MacWrite* document that says only "Hello, Mom" will take up as much space as one that contains the Gettysburg Address. It's not necessarily a good solution, but it was one way to physically limit the number of documents. MacDrive will not hold more than 500 documents. But it won't be able to hold even that many until the amount of Mac's memory used to hold the directory contents is increased. For that, we'll have to wait until the Finder is upgraded to solve the problem.

MacDisk

The other hard disk for Mac comes from Davong, a company that has made a name for itself building products for the IBM PC. Physically, it's about one-third larger than the Tecmar unit, although it weighs only about two-thirds as much.

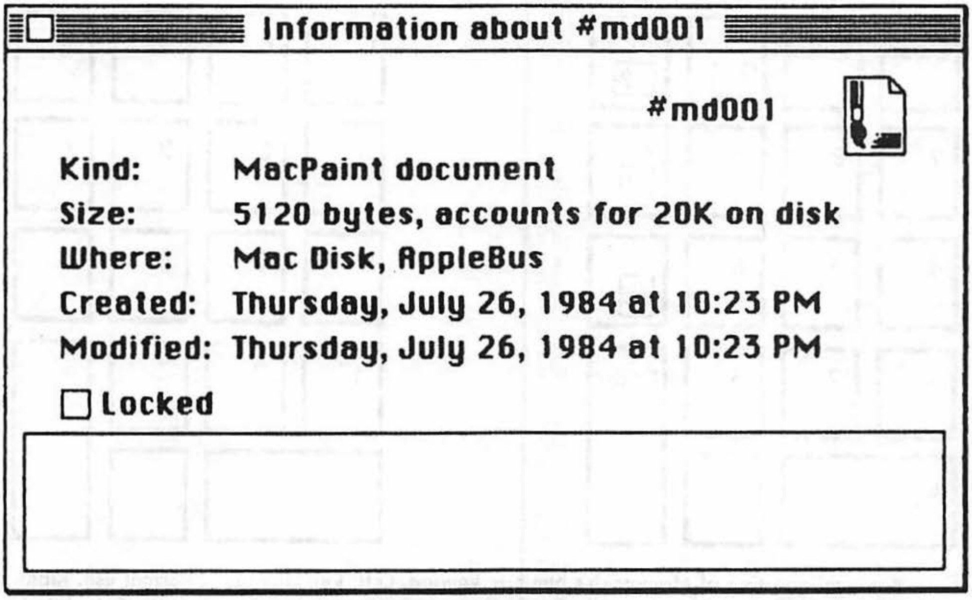
There are some internal differences as well. Davong uses an Intel 8088 microprocessor to control MacDisk, and the smallest version available stores 10 megabytes of information. The disk is nonremovable, and in its current form there is no continuation of AppleBus on the drive's back panel, which can cause problems if you intend to use a modem or anything else that needs a serial port.

Davong is working on two solutions. The first is the physical addition of a port extension to the back panel. The other pivots around the ability to use either the standard AppleBus connector (the modem port) or the printer port to connect it. The current MacDisk user's manual mentions the possibility, but at present the disk *must* use the modem port.

Davong's entry does perform. It is even faster than the Tecmar removable hard disk. From double click to usable window, *MacWrite* loads in 6.78 seconds, about twice as fast as with Tecmar. It even feels fast. Copying documents to the hard-disk drive is like a trip down the back stretch at Daytona in a well-tuned Lola. It just keeps moving.

However, there are still some problems on the Macintosh side of things. Mac's inability to handle a multitude of documents causes the same difficulties for Davong as for Tecmar. Davong, though, attempts to control the number of directory entries by using a 20K minimum file size.

The "Hello, Mom" *MacWrite* file occupies twice as much space on the Davong drive as it does on the Tecmar 5-meg removable. It's depressing to see many megabytes of available disk space and not be able to use most of it. Clearly both



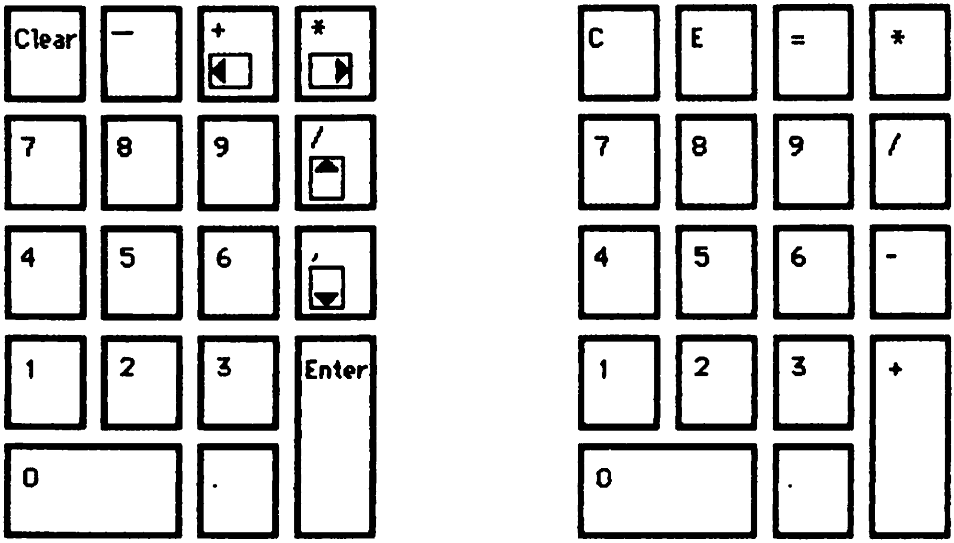
Get Info report on a *MacPaint* document stored on Davong's MacDisk. Note actual size of document versus amount of space it occupies on disk.

companies foresee their disks in large-document applications such as databases rather than in handling large numbers of documents.

The Keypad

Apple itself currently makes one other piece of hardware for Mac—the eighteen-key numeric keypad. It's hardly essential, but it's a useful tool for people who use Mac to crunch numbers all day. Along with the numbers, it has the standard numeric operators (+ , −, *, /), an Enter key similar to that on the main keyboard, a comma, a period (or decimal point), and a key labeled Clear. The function of the Clear key is strictly up to the application you're using. The actual ASCII code it produces is 27, the same value normally produced by an Escape key on other computers.

For those who are growing weary of the mouse or would just like to have an alternative every once and a while, the numeric keypad includes arrow keys that control movement on the screen—*if* the application you're using understands them. *Multiplan,* for one, can use the arrow keys. Few other programs have taken the time and patience to realize that they are there.



Key configuration of Macintosh's numeric keypad. Left: key legends in normal use. Right: when used with the Calculator, the keys are interpreted as though they were the Calculator's keypad.

When you connect your keypad, turn off Mac's power first. The keypad plugs directly to Mac's keyboard connector, and then the main keyboard plugs into a connector on the keypad. The result is somewhat cumbersome, but it works.

Maccessories

Accessories for Mac are beginning to sprout up everywhere you turn. They range from swivel stands through surge protectors, bar-code readers, and a plethora of modems, some of which even include old-fashioned voice-transmission telephones. One of the most useful may be MacChain, described in chapter 4.

Carrying Cases

About half a dozen companies, including Apple, market travel bags for Mac. Some are soft sided with thick foam padding on the interior; others are hard-shell shipping cases. Any one of them will stuff your Mac, its keyboard, and mouse into a neat little package; if you've got an external disk drive or you're thinking about getting one, make sure it will fit, too.

Mac's definitely portable, but it's not something you'll want to tote around with any regularity. Twenty-one pounds sounds light, and it is—for the first 100 feet.

Disks

Apple's single-sided 3½-inch disks work fine for Mac. But you may not always be near an Apple dealer, and other brands of disk are fully compatible. Indeed, they may well come off the same production lines. Those commonly available right now include:

BASF Qualimetric, 3.5" Micro FlexyDisk Single Side
BROWN DISC MFG., INC., 3.5" MicroFloppy Disc Single Side
HEWLETT-PACKARD Auto Shutter Single-Sided Micro Flexible Disk
MEMOREX M1HD-80 Micro Flex Disk
SONY Auto Shutter Single-Sided Micro Floppydisk
SONY Single-Sided Micro Floppydisk

As you can see, the manufacturers are still tied to the words "flexy" and "floppy," even though they now apply only to the naked medium hidden inside the case. Perhaps some more enterprising firm will call the little things "Hardcases."

One difference among the disks is the color of their cases. Current color schemes run from Apple's beige to Memorex's black, with shades of blue from Sony and Hewlett-Packard. For those with decorative instincts, red and yellow should be available soon.

Remember: the disks you need are 3½ inches. Don't even entertain the thought that 3-inch disks (which may appear the same to some unwitting salesperson) or any other size will work in your Mac. In case you're wondering, double-sided disks *will* work; but unless you've got double-sided drives (and some say not even then), you'll be paying a premium price for something neither you nor your disk drives will ever use.

18

TROUBLESHOOTING: RECOVERING FROM A MAC ATTACK

Sometimes things just don't go right. No matter what you do you see a Sad Mac sticking its tongue at you from the middle of the screen, or you pull down Open and discover the ten-thousand word article you finished at three A.M. yesterday is nowhere to be found.

Your first urge may be to get a hammer to gently persuade Mac to get back in line with your wishes. Often, however, a cooler head can prevail. Most of the problems that your Mac suffers will be caused by minor slips of your fingers or forgotten routines, like following the correct turn-on sequence. Just retrace your steps, and you probably will find that a minor foul-up on your part led to a supposed major failure on the part of your computer.

If not, your second urge might be to cart your Mac out to the repair shop for an intensive therapy session with a technician. Since you can tote Mac around by its handle, that solution is even more attractive than it might be with some desktop behemoth. But before you rush to your dealer with your Mac in one hand and fistfuls of cash in the other, you might want to check some of the solutions in this chapter.

Is It Hardware or Software?

Sometimes your mistakes or omissions can be subtle, illogical, unreasonable, and obscure. Your first job is always to determine where the problem lies. Is it in the hardware or in the software? If you wrote the problem that crashes your system, you're likely to be able to fix it. If you inserted a connector only halfway, it won't take a technician to push it in that extra ¼ inch. But you have to know what's wrong in order to do something about it. Obviously, then, the first thing to do whenever you run into a problem with your computer is to determine whether it's a "hard" or "soft" error.

Whenever something seems to have gone wrong with your program, think about what you might have done wrong and try to retrace your steps. With many software programs, hitting the proper key or clicking the mouse button in the proper place is likely to get you out of trouble. But if nothing else seems to work, your first step should always be to try an interrupt with the back end of the Programmer's Tool. You may lose some of your work, but you're likely to be back at some level Mac understands—even if it's a dreaded bomb box. If that happens, you've probably run into a software problem. Breathe a sigh of relief; if the problem's in a program you've written, prepare to spend a while trying to find it.

Sometimes a program takes control and even ignores an interrupt. Next step: try a full reset with the front button on the Programmer's Tool. It'll wipe out everything in Mac's memory, including all your data, and it may lose you some disk files, but sometimes it's the only way out. If the computer starts up properly, you'll be back in business. If the problem's in one of your own programs, try to avoid running it until you dope out the difficulty.

If all else fails, the radical test is to switch off your Mac, wait about five seconds, and then turn it back on. You should soon hear the tone and see the "inquiring-disk" icon or, if a system disk is in the drive, the usual startup messages. If you don't, you may well have a hardware problem.

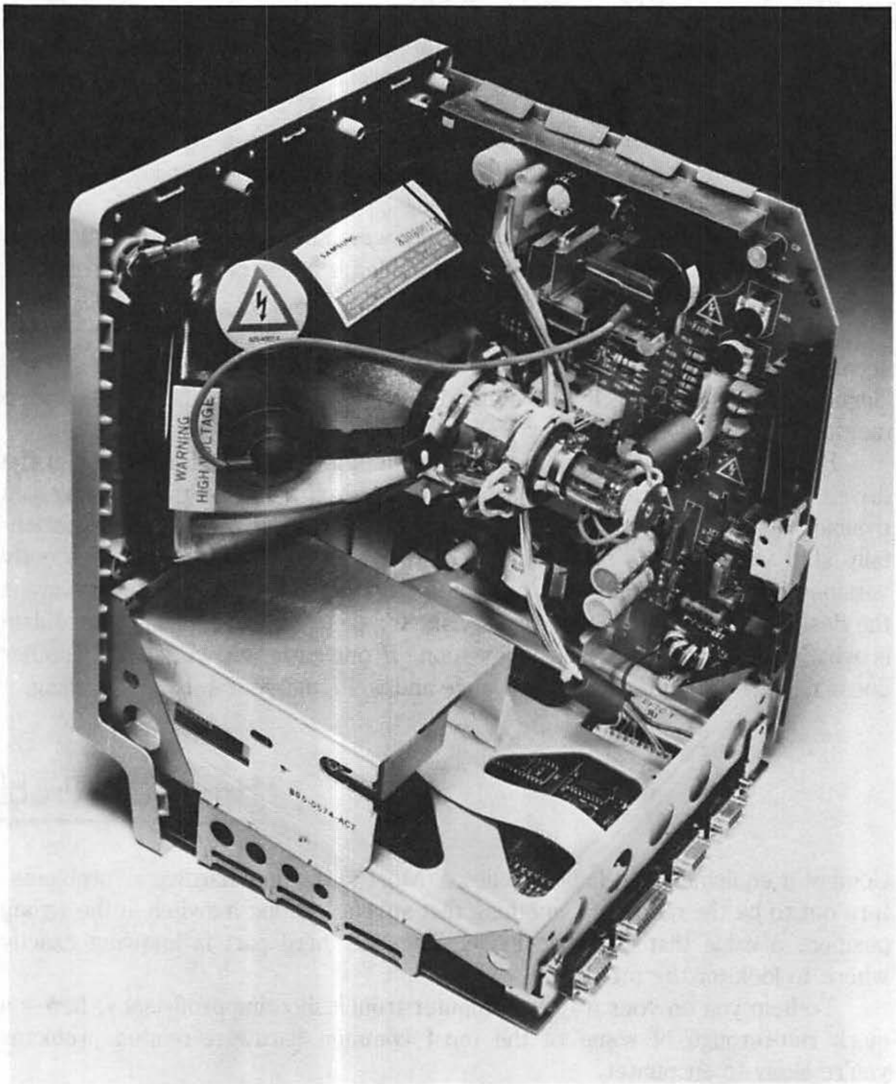
But just to be sure, try starting the computer with a different disk in the drive. Try using a different piece of software from the one that's giving you trouble. Disks go bad now and then, and occasionally software vendors accidentally ship test versions never intended to get into your machine. With early versions of some programs, it's possible to venture into dark, mysterious areas the designers never expected you to visit. It's possible that a chunk of bad data is what's giving your machine indigestion. If one program works and another doesn't, your computer is probably alive and well, and your software is ailing.

Hardware Problems

Computer equipment rarely breaks down. Most of the time hardware "problems" turn out to be the result of something that anyone can fix: a switch in the wrong position, a cable that's worked loose. The only hard part is knowing exactly where to look for the problem.

To help you on your way to computer troubleshooting proficiency, here's a quick run-through of some of the most common hardware-related problems you're likely to encounter.

Serious difficulties, though, are best solved by qualified people. If the most intense experience you've ever had with electronics is changing the batteries in your Walkman, trying to repair a computer is probably not the best place to get your education. And keep in mind that the Macintosh does not have a pop-top that offers easy access to its innards. In the time-worn phrase, there are no user serviceable parts inside the box. All the chips are soldered in place. In fact, you need a special tool, called a Torx screwdriver, just to get inside and take a peek. Doing so may invalidate your warranty, and, should you meet up with the high voltage stored inside even when the machine is disconnected, might even invalidate *you.*



Cutaway view of interior of Macintosh.

But that doesn't mean you should be in the dark about things that can go wrong. Any serious problems will require the assistance of your local Apple service representative. However, things that appear serious can often be solved with the magic of a little logic.

Some of our suggested solutions may seem insufferably trivial, but once you've lived with your computer for a while, you'll discover that most of your major catastrophes are simply minor details you happen to have overlooked.

Power-On Problems

- No tone
- No screen display
- No noise from the disk drives
- Computer seems dead

What to Check

- Is Mac's power cord securely connected to the receptacle on its back?
- Is the power cord plugged into a working source of power?
- If you're using an electrical power strip, is it plugged into the wall outlet?
- If the power strip has an on/off switch, is it in the *on* position?
- If the power strip has a fuse or circuit breaker, has the fuse blown or the breaker tripped?

General Guidelines

- When checking power connections, always make sure Mac's power switch is in the *off* position—and make sure any additional equipment connected to Mac is also turned off. Plugging or unplugging a power cord with the equipment on may produce dangerous electrical sparks.
- Try a lamp in the wall socket to confirm that there is indeed power. If not, check fuses and/or circuit breakers.

Video Problems

- No picture
- Screen display barely readable

What to Check

- Is Mac turned on? Review "Power-On Problems."
- Is the brightness control adjusted improperly? This control is located on the left side under the video ledge. Clockwise movement increases the brightness, counterclockwise decreases it. A screen image may not appear until the control is rotated more than halfway.
- Is the screen covered with dust? Clean as needed.

General Guidelines

- Mac does not include a screen contrast control. Improper room lighting may affect your ability to see the screen clearly. Reposition Mac and/or lamps wherever possible.
- If your screen flickers as you rotate the brightness control or a picture appears only momentarily, the control itself may be bad. Refer service to qualified personnel.

Audio Problems

- No sound
- Sound is weak or muffled
- Sound crackles or works intermittently

What to Check

- Is the Control Panel volume control adjusted properly?
- Are you using an external speaker or amplifier?
- Is an external cable plugged fully into Mac's audio jack?
- Is it plugged into the external speaker or amplifier?
- Is the amplifier connected to a power outlet, turned on, adjusted properly for volume?
- Is a speaker connected to the external amplifier?
- Is the connecting cable in good condition?

General Guidelines

- All power should be off to all units when checking connections. Observe electrical precautions for power-on problems.

Startup Problems

- Repeated tone
- Repeated greeting message
- Frowning Mac icon appears
- Mac ejects disk repeatedly

What to Check

- Is the Programmer's Tool installed?
- Have you placed Mac with its left side against an object that might activate the switch?
- Have you installed the switch properly?
- Is the mouse's switch depressed?
- Are you using a boot disk (one with the correct system files) to start Mac?
- Are you inserting the disk in the right direction?

General Guidelines

- If the Programmer's Tool is installed improperly or Mac is placed against something that presses on the switch, Mac will not start correctly since it's constantly being interrupted or reset. Move Mac away from the object.
- If the mouse button is depressed while you turn Mac on, Mac will eject the startup disk. If this keeps happening when the button's not depressed, try disconnecting the mouse to see if its internal switch has malfunctioned.
- Try a new boot disk. Although the directory may display the correct system files, the physical tracks on the disk holding the boot information may be damaged. If this is the case, the disk will function normally in all but boot situations.

Disk and Disk-Drive Problems

- Disk ejects
- Disk will not start Mac
- All folders are lost
- External drive not recognized
- External-drive cable will not connect
- Can't copy disk
- Can't copy files
- Can't discard disk icons
- Can't read from or write to disk
- Mac keeps demanding disk swaps

What to Check

- Is the Programmer's Tool or mouse button depressed?
- Is there a disk in the drive?
- Have you inserted the disk in the proper direction?
- Is the write enable/protect tab in the correct position?
- Has the disk been initialized?
- Are the files or folders in use or locked?
- Are the files or folders selected?
- Is the disk icon selected?
- Is the external drive plugged into Mac?
- Are the system files on the applications disk?

General Guidelines

- Observe all power-line precautions outlined earlier. When dealing with the external disk drive and its cable, make sure the power is off.
- Tighten thumbscrews on the external disk-drive connector. If the connector does not attach correctly, check the orientation; the "D" design allows it to be connected only one way. Do not force the connection. Make sure the thin edge of the connector has not been bent.
- Check the Get Info box on any files or folders causing problems. They should not show an *X* in the "Locked" box. Most copy-protected programs may not be unlocked; neither may locked programs already in use.
- The Finder, System, and Clipboard files on the startup disk are usually in use. This may make copying or trashing them difficult, since Mac will not copy or discard a file or folder in use.

- Don't try to trash more than one disk icon at a time. It is not permitted.
- To write-enable a disk, make sure that the red tab is visible through the enable/protect hole.
- If Mac keeps asking you to swap disks when you begin working with an application, chances are you have a single-drive system and an applications disk that lacks the system files. Mac needs frequent access to the system files for most applications: the solution is to create working disks that contain both application and system files, and save data to separate data disks.

Keyboard and Mouse Problems

- Nothing happens when keys are pressed
- Nothing happens when mouse button is pressed or clicked
- Moving mouse doesn't move pointer
- Mac beeps when key is pressed or mouse button is clicked
- Keys or mouse doesn't work in usual ways

What to Check

- Is keyboard cable connected at both ends?
- Is mouse cable connected to Mac?
- Is retaining ring on mouse secure?
- Is mouse running on an adequate horizontal surface?
- Is mouse ball clean?
- Is software hiding the mouse pointer or changing its shape?

General Guidelines

- Mac won't warn you if the keyboard's not connected. If it's not responding, chances are disconnection is the problem.
- If the mouse or keys seem disabled or produce nothing but beeps, your software is probably awaiting a particular response from you. Clicking the mouse outside the buttons in a dialog box, for example, often produces nothing but beeps or nothing at all. So does pounding on the keyboard when a mouse response is called for.
- If the mouse is slipping, check the rubber ball inside it and clean if necessary. Also check the surface it runs on; an object may be blocking its path. If the retaining ring is loose, the ball may slip—or fall out entirely.

- If the mouse or keys work in unaccustomed ways, the software you're using is probably designed that way. Try a different program. If the keys work properly in a situation you're familiar with, hardware is probably not the culprit.

Printer Problems

- Won't print
- Prints garbage
- Prints fine for a page, then prints garbage
- No lights on control panel
- Printing is barely readable
- Printer on, print head moves, but no printing appears
- Paper/Error light on
- Select light off
- Printer on, unusual noise evident
- Printer won't line feed
- Printer won't form feed
- Printer tears holes in tractor-feed paper
- Printer won't advance regular paper

What to Check

- Is the printer plugged in?
- Is power available from the wall outlet or power strip?
- Is there a blown fuse or tripped circuit breaker?
- Is the cable connected between Macintosh and the printer?
- Is there paper in the printer?
- Is there ribbon in the printer?
- Are the printer covers in their proper positions?
- Is the power-on button pressed down?
- When trying to print, is the select light on?
- When trying to line or form feed, is the select light off?
- Are the paper tractors set properly?
- Is the release lever set properly?
- Is the paper-thickness lever set properly?
- Is the paper inserted properly?
- Is anything restricting the paper path?
- Have you removed the cardboard used to prevent head damage during shipping?

General Guidelines

- Observe all power precautions mentioned earlier. Before putting your hands inside the printer, turn off all power and unplug it.
- If you haven't removed the cardboard insert, do so immediately. Unusual noises when your printer attempts to print usually mean something is obstructing the head movement.
- If nothing at all happens, first turn the printer off and on again to clear its memory; software may have deselected it. Next, check the paper and all the printer switches, and make sure the front cover is closed and on the machine securely. Finally, check the printer's own fuse; be sure the printer is unplugged when you do.
- Many print-quality problems are caused by improperly inserting the ribbon cartridge. If the cartridge is not flush with the carrier, the ribbon will not move properly. The print head may be striking partially above or below the actual ribbon. If the ribbon jams in the cartridge and can't advance properly, the typing will gradually get lighter. Eventually the ribbon may tear due to the print head's repeated hits at the same location.
- If printing is consistently too light or too dark, adjust the paper-thickness lever under the right side of the front cover. Forward (up) is the correct setting for single sheets; for multiple sheets, pull it down and toward the front of the printer.
- If you notice a blank line running through the body of an otherwise fully formed character, one of the wires in the print head may be inoperative. Check and adjust the ribbon position and thickness lever first; if the condition persists, you will probably need to see a service representative.
- Make sure the select button is in the proper position for the operation you want. The printer should be selected if you want to print and deselected if you want to form or line feed.
- If the printer continually under- or overshoots the end of your page when you do a form feed, check the position of the printer's internal switches. The printer's manual will show you where they are. With the Imagewriter, switch 1-4 selects a page length of seventy-two lines if it's closed, but must be open to recognize the standard sixty-six-line page used in the United States.
- If you're getting double spacing when you should be getting single spacing, check internal switches. On the Imagewriter, if switch 1-8 is closed, it adds a line feed every time it receives a carriage return. If it's open—normal position for the Mac—it does not.
- If your printer prints gibberish at all times, even when using draft mode, it may not be matched to the correct speed of Macintosh. The computer prints at 9600 baud. The Imagewriter's internal switches 2-1 and 2-2 select its speed. See chapter 4 in the Imagewriter manual for details.

- If your printer prints correctly for the first half page or page and then produces gibberish, you may have the wrong data protocol or an incorrect cable from Macintosh to the printer. Make sure your printer cable has pin 20 on the twenty-five-pin D-connector. Original Imagewriter cables did not. Also check the Imagewriter's internal switch 2-3. It should be in the open position.
- If your printer will work in draft mode correctly but has difficulty with *MacPaint, MacWrite,* or any other program that produces high-quality output by controlling the graphics features, check the Imagewriter's internal switch 1-5. If it's closed, it will ignore the eighth data bit and cause problems with graphics interpretation. It should be open.
- If the paper isn't feeding properly, check to see that something's not obstructing it on the way in or out of the printer. Make sure the release lever is set to the proper position for the kind of paper you're using. If the printer is tearing holes in tractor-feed paper, check to see if the tractors are adjusted properly and the holes fit neatly over the sprockets.

Modem Problems

- Modem fails to communicate
- Strange characters appear on the screen

What to Check

- Is the modem turned on?
- Is the modem properly connected to Mac, the phone line, and wall outlet?
- Are you using the right modem-to-computer cable?
- Are communications parameters properly set?
- Have you given your "smart" modem the wrong commands?
- Is "call-waiting" disconnecting you?

General Guidelines

- Observe all power precautions mentioned earlier.
- Modem cables are *not* standardized. A single internal wire going to the wrong pin can turn the modem deaf to your machine. And be sure you're not using a printer cable; some look very much like the proper cable for the modem.
- All parameters (baud rate, word length, stop bits, parity, and duplex) must

match those of the machine on the other end of the line or garbled transmission will result. See chapter 14 for details.

- "Smart" modems speak a cryptic language of their own. (For example, some very popular models require that you address them in ALL CAPITAL LETTERS.) If you send them incorrect commands, they may not do what you intend. Turning the modem off for a few seconds and then on again will wipe the incorrect commands from its memory.
- Like anything else, communications hardware can go bad. If all else fails, try your machine with a different modem; try the modem with a different machine.

Precautions and Repairs

Most of the problems you'll have with Mac and the peripheral devices you use with it will be similar to those described in the preceding section. Loose cables account for the majority of work stoppages; replugging cables without first turning all power off accounts for most serious hardware damage.

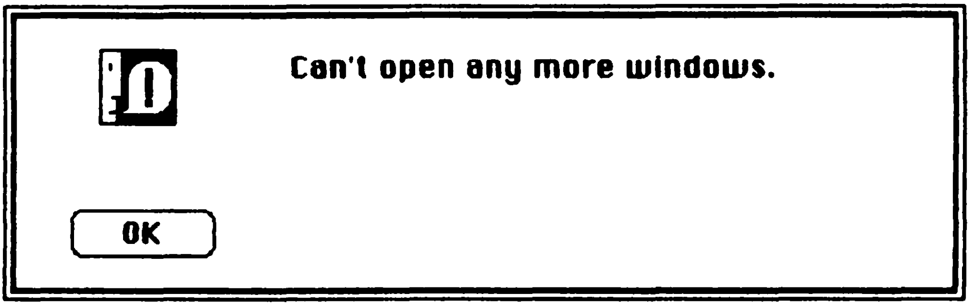
Even a cable that appears to be firmly plugged in can cause a problem. If you haven't *snugged* the connector down by screwing it in, oxidation can occur on the pins as they wiggle and leave small gaps in the connector holes. This combination of air, humidity, and metal can form an effective block to a complete electrical path. If you run into trouble, try unplugging the cable and cleaning the pins with a pencil eraser. Use the set screws to snug it into place when you reconnect it. Items connected via the AppleBus are likely to be particularly sensitive to this problem.

If a true hardware failure occurs, Apple dealer repair facilities should be able to get you up and running quickly. Every component in Macintosh can be removed and replaced in under three hours. This means *downtime* is more dependent on parts availability and repair schedules than on the complexity of the repair itself. In general, Mac boards are not repaired by the dealer. Instead, the dealer simply replaces them and returns them to Apple for reconditioning. Under this scheme, you may end up paying for a whole new board when a single inexpensive part is the source of the problem.

If you're not in a hurry, you can request that your Mac be sent to Apple's regional repair center. There, they will replace the actual damaged part, charging you for it and the labor involved. But that won't always save you money. There can be more labor involved in diagnosing and replacing two or three small parts than in diagnosing and replacing a full assembly. The increase in labor charges may well offset the lower parts cost. And you're likely to be without your Mac for a significantly longer period of time.

Software Problems

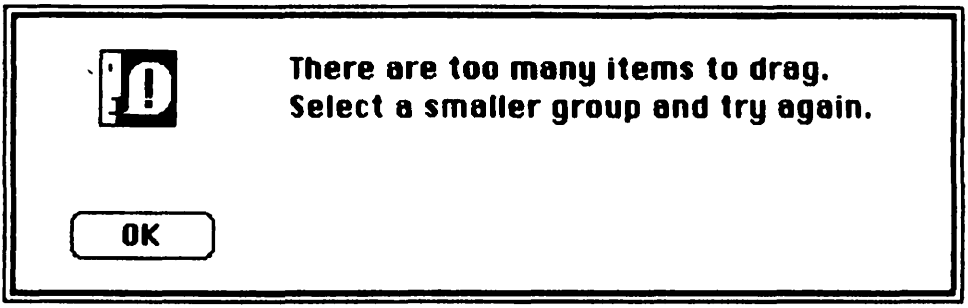
All new computer hardware and software have idiosyncrasies that take a while to get used to. And when you acquire something new, you're likely to press it to its limits just to see what it can do. Sooner or later you're going to reach those limits, and the computer won't be shy about letting you know. In this section we'll show you some of Mac's more important error messages and explain why you're looking at them.



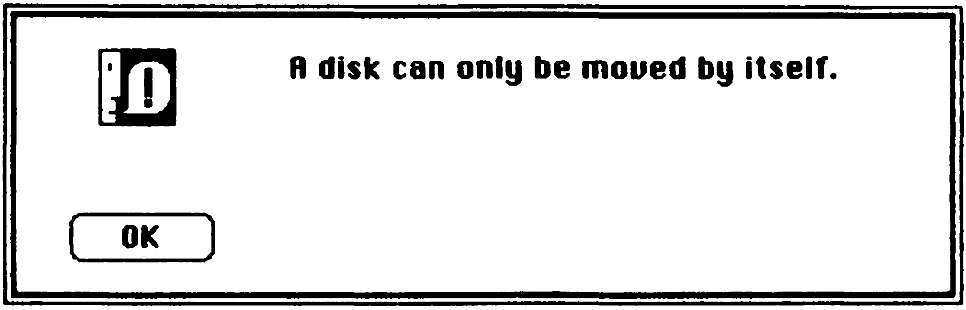
Mac's Finder has a finite amount of memory to work with in its Heap. On 128K Macs, with all the other things it has to keep track of (size of item in the Clipboard, total number of directory entries on all disks whose icons appear on Mac's desktop, total number of open windows, etc.), the practical limit to the number of Get Info windows is about six.

One common way to get this message is to Select All under the File menu, then use either the ⌘-I key sequence or the Get Info option to open info windows. You're likely to reach the limit before you've looked at all the icons you've selected.

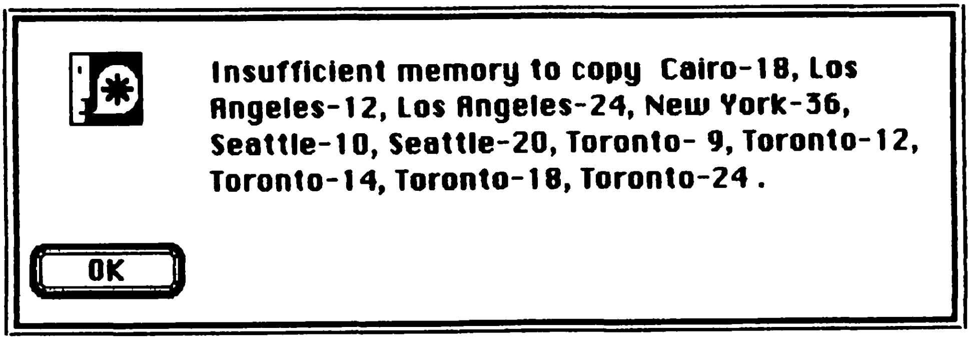
Be realistic. The windows appear one on top of the other, slightly offset toward the bottom. There's little practical reason to keep so many windows open at once.



Mac has a lot of work to do when you drag multiple items. Since it must know what you're dragging and keep track of the positions of each outline you drag, forty-seven may tax its fevered brain. Sixteen, on the other hand, is a reasonable possibility.



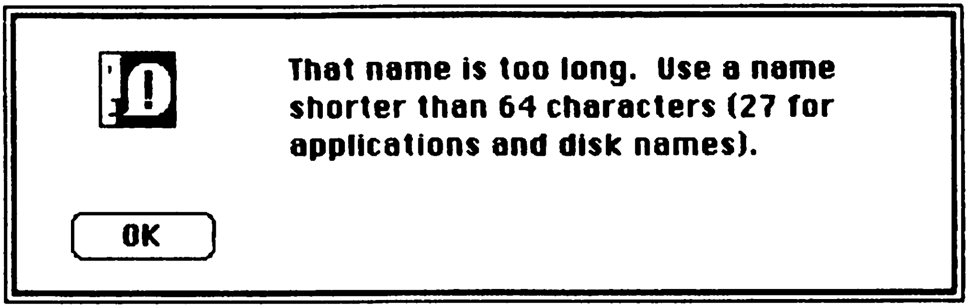
With disk icons, there's a special limit on the number you can drag around at once, and that limit is one. You cannot move more than one disk icon at a time, even though more than one may be selected.



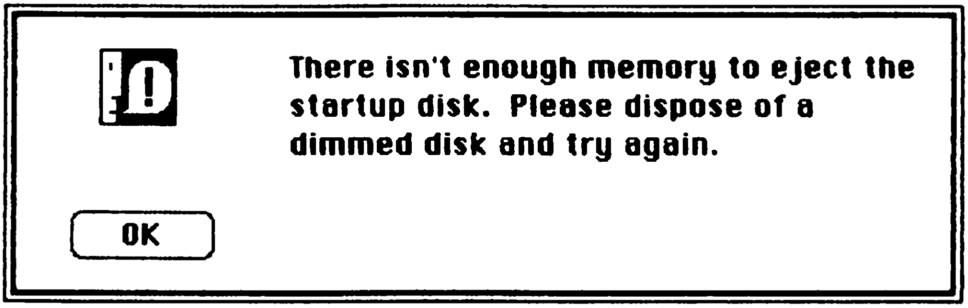
When using the Font Mover, you may not be able to copy all (or any) of the fonts you want. Sometimes you can solve the problem by moving the fonts in multiple steps instead of all at once. But occasionally that won't work.

To try and get around the problem, Quit the Font Mover and go back to the desktop. Once there, trash any dimmed icons, whether you'll be using them again or not. If need be, move the Font Mover and Fonts file onto the system disk you're using.

The idea is to clear up as much internal space as possible. If you have anything in the Clipboard, copy something small, like a single letter of a disk's name, into it to flush it as clean as possible. Using just one icon on the desktop should allow you to proceed.

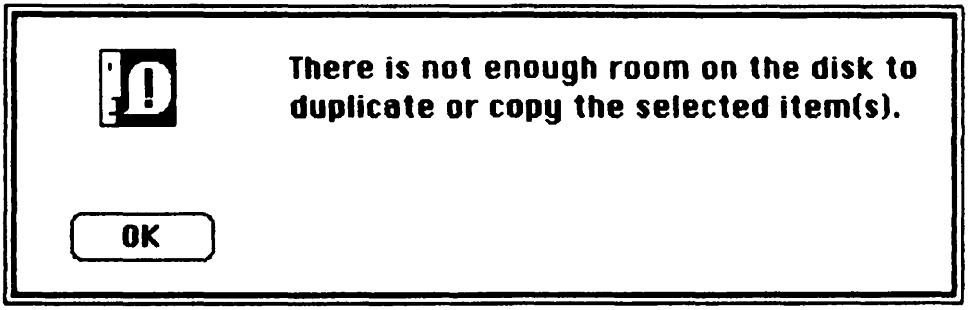


Playing with Mac's Cut and Paste facilities or adding a name to an icon doesn't give you absolutely unlimited freedom. Your data documents can have fairly long names, but the name length of disks and applications is more limited. If it's any comfort, microcomputers traditionally have allowed only a grand total of eleven characters for *any* file or disk names.



When you eject a disk, Mac retains its directory information until you throw its dimmed icon away. If there isn't enough memory to do that, you can't eject the disk. Mac will suggest that you throw away some other dimmed disk icons first, but there are times (most often if you're using an external hard disk), when you'll see the message and there will be no other dimmed disks to eject.

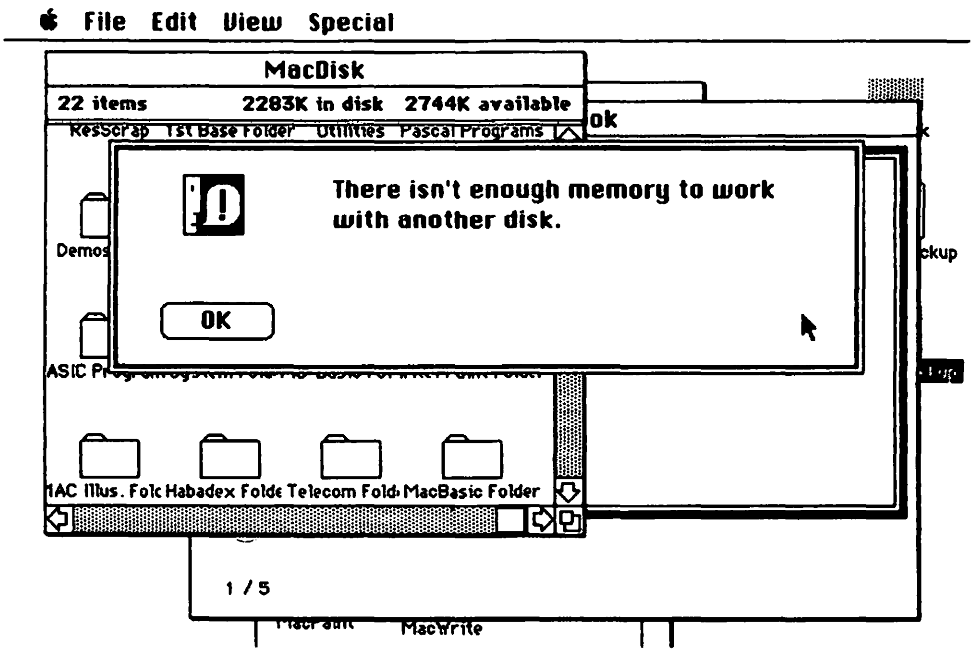
In that event you have very few options remaining. In fact, your only choice will be to eject the disk using something other than the "approved" menu or ⌘ -key disk-ejection methods.



Before Mac begins to copy anything from one disk to another, it first inspects the material in question to make sure none of the documents are in use. Then it looks at the destination disk to see if any files with the same name as those you're copying already exist there. Combined with this overall look ahead is a check to make sure you won't run out of disk space after you've begun.

This message will appear if you already have documents on the destination disk and what you want to add would exceed the available space. In that case, you can trash unneeded documents from the destination drive and try again.

You might also be the surprised recipient of that same message if you're using a hard disk. Because of the large minimum file size used by both Tecmar's and Davong's drives, Mac may be fooled into thinking that the documents you

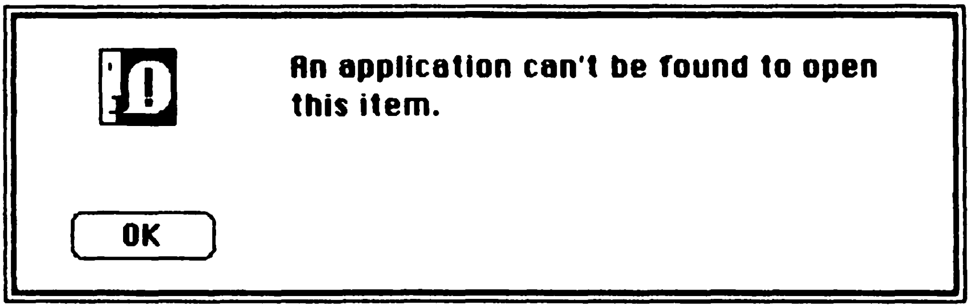


want to copy won't fit on your disk. If that's the case, just try copying a smaller group of files. You should be able to get them over in sections.

Sometimes Mac won't accept a new disk. You can probably duplicate the problem by opening a window and then putting as many desk accessories as possible on the desktop. If you keep inserting and ejecting disks, you should eventually get the message.

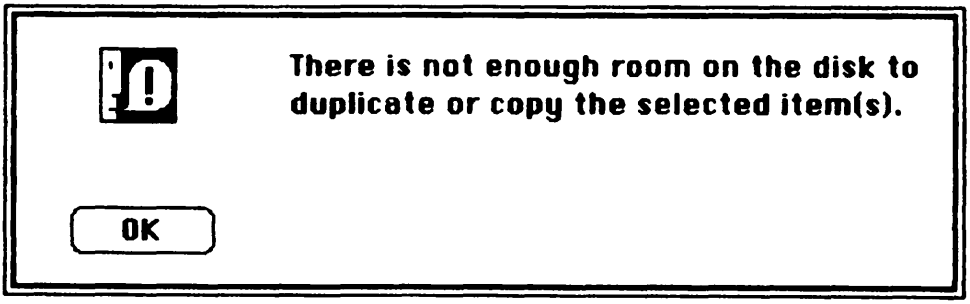
If you happen to see this error box in other situations, there may be a way out. First, close any open windows. Then trash any dimmed icons to unburden the Finder from remembering their directories.

In all cases, whether you're using an application or working directly from the desktop, it's the Finder and the Heap that may keep you from doing some of the things you want to. In some applications Mac will offer alternatives which will attempt to manage its available memory.

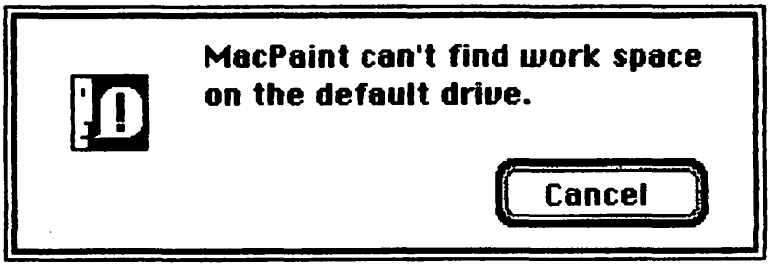


If you double-click a *MacPaint* document, you'll automatically run *MacPaint*—as long as it's on the same disk as the document or in the directory of any dimmed or active disk icon on the desktop. If it's not, Mac will tell you that it can't find an application for this file.

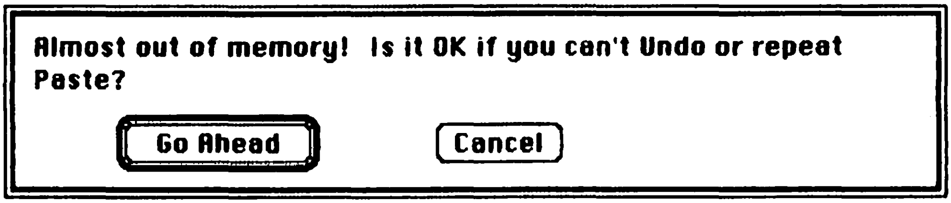
You'll get the same message if you try to run something that doesn't have an application associated with it. Double-click any of the files in the System Folder for a practical demonstration.

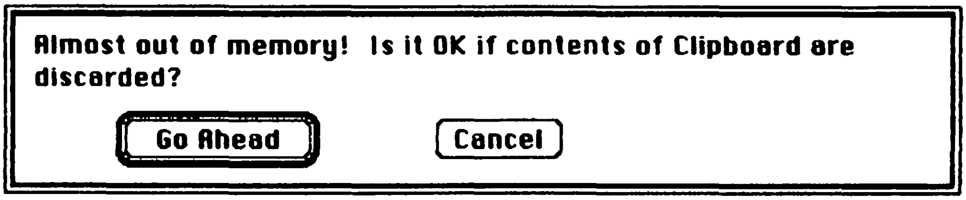


Sometimes this message may mean exactly what it says. Sometimes it may actually mean that the disk is write-protected (or locked), and for functional purposes, Mac considers it full. Solution: unlock the disk, write-enable it, or if there really isn't enough room, trash some files.



Strange things happen when your disk is write-protected. If you ask Mac to open a document, it tries to change the date that document was last modified. When that document exists on a write-protected disk, the changes can't be made, so Mac can't open the document. Solution: write-enable the disk.





These particular messages are from *MacWrite.* They may offer viable solutions if the current contents of the Clipboard aren't valuable to you. But once you exclude the clipboard from your workspace, you limit editing capabilities. Solutions are discussed in chapter 11.

Avoiding the One-Drive Blues

A one-drive Macintosh can sometimes be altogether too ornery when it comes to swapping disks in and out of the internal drive. Its demands for the current priority disk again and again as it needs to consult the Finder about your requests can become very annoying very quickly.

One obvious solution is to purchase the second disk drive. Using at least two drives has always been the most sensible setup with any serious computer system, not just Mac. However, ingenuity can obviate at least part of the problem.

All of the better applications for Macintosh offer the standard Load and Save As procedures. These allow you to select the appropriate disk by ejecting and switching, as well as by choosing among multiple drives when they are available.

On a one-drive system, make sure all applications are on bootable disks and that there is at least 40K of available space on each of them. When switching from one application to another, you may need to swap the current priority disk with the new application disk two or three times as the Finders mesh and the new disk replaces the old in the upper right-hand corner of the screen. But once that's done, you'll be left alone until you want to save to a data disk or switch applications. The process will repeat itself at that point; still, this method of doing things is as easy as it gets with only one drive.

In *MacPaint,* for example, start a new graphics document from a bootable *MacPaint* disk. When you're done, select Save As and then eject the *MacPaint* disk, inserting the correct data disk after that.

When you want to work on an existing document, again, start with the *MacPaint* bootable disk. Select *MacPaint* from it; select Load, and then get your document by ejecting the bootable disk and inserting your data disk. Most likely, this will leave you with the data disk in the drive, but as soon as you try to do anything with *MacPaint,* you'll be asked to reinsert the *MacPaint* disk. After that, there will be no more interruptions until you want to perform another save.

When You Can't

A similar problem will arise when Mac won't let you do something like write to the Note Pad or copy into the Scrapbook or save a new desktop pattern. These are signs that the priority disk is write-protected. Eject it, check the write protect/enable tab, and make sure you *can* see it through the small window.

If your disk is write-protected, it won't remember the most recent positions and sizes of the various windows you've left open. It also causes a curious reaction from the Control Panel. If you attempt to modify any of the Control Panel settings, you'll be allowed to do it. But changes you make to the desktop pattern are stored on disk, so if the disk is write-protected, those changes will only be temporary.

However, all the other Control Panel settings are stored in the CMOS RAM section of the clock chip, which is powered by the battery. Even if you make changes while a write-protected disk is in the drive, Mac will remember them.

But when your battery backup runs down, you'll lose your desktop settings. When you finally get Mac running precisely the way that suits you, pull down the Control Panel and use the ⌘ -shift-3 or ⌘ -shift-4 key sequences while it's displayed. This will send a picture of the panel either to a disk as a *MacPaint* document (the former option) or send it to the printer (the latter). Just make sure the printer is on if you ask to use it.

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MACFUTURE

Guessing what the future holds for Macintosh is becoming a computer-industry sport, so we may as well join in the fun. Many pundits claim Mac will eventually eclipse Apple's high-end machine, Lisa, just as Apple // improvements supplanted the Apple ///. Macintosh, after all, has many of Lisa's best features and is a good deal less expensive. But it's still too early to predict Lisa's demise.

It's safe to say, though, that the world of the Macintosh will continue to excite the imagination. Let's take a look at possible Macs of the future.

Fat Mac

It's no secret that both Mac's memory and disk capacities will be upgraded. It's just a question of *when.* You won't need a crystal ball for the 512K Fat Mac: The future is now. In September 1984, Apple unveiled the 512K Mac at $3195 and announced a price reduction to $2195 for the original 128K model.

According to Apple, you'll be able to upgrade a 128K Mac to a 512K machine. For $995, your dealer will install a new main logic board with 256K bit memory chips in place of the current 64K bit models. To soothe the effects of the upgrade's cost, Apple's initial offer includes a coupon for free copies of *MacDraw,* an object-oriented drawing system, and *MacProject,* a critical-path project management tool, both derived from highly-acclaimed programs for Apple's Lisa. Unavailable at this writing, *MacDraw* and *MacProject* should be ready by the time you read this.

Should you immediately run out and order the upgrade or the bigger model? That depends. Initial reports from Apple indicate no change in how the Finder organizes memory-critical things like the Heap. That means that even with the additional space, the number of directory entries Mac can handle will remain the same. Hard-disk handling will still be touchy until the Finder is revised. And programs like *MacPaint* are unlikely to perform significantly better on the new model.

On the other hand, *MacWrite* will benefit. Its capacity will zoom from a nominal ten to a nominal eighty pages. *Multiplan* will also reap some rewards. While the physical size of the spreadsheet will not change, the amount of it you can use will be greater. Disk copying should be faster. And Lotus has promised a version of its best-selling integrated software by early 1985. Like other forthcoming second-generation programs, it will run *only* on the Fat Mac.

If you've been using a 128K Mac and you're happy, there may be no reason to go through the expense of the upgrade. If you need the kind of power Fat Mac offers, or software that won't run on the original model, then the upgrade or the 512K machine will be virtually mandatory for you.

At this writing, the latest upgrade information from Apple is that the 800K disk drives won't be available until about midsummer 1985. Apparently technological problems are delaying the release, and Apple and Sony are working overtime on remedying them.

The new double-sided disk drives will hold 800K. The upgrade will probably work the same way as with RAM: take your machine to the dealer, hand over some money, and wait for him or her to swap drives.

Mac Jr.

A *junior* Mac is also a possibility. Apple's Steve Jobs has been insisting for some time that he wants to produce a book-sized computer. If his engineers can transfer Mac's screen resolution to an electroluminescent or LCD panel (like the one soon to be released for the Apple //c), the computer could be condensed into a package about 6½ inches high. Though you may consider a 6½-inch book pretty hefty, it's remarkably thin for a computer with a disk drive and a built-in screen.

Color

Color capabilities for Mac are undoubtedly on the drawing board. The question is whether a Mac color screen will be a medium-resolution monitor or a much more expensive high-resolution model. Best guess: the Mac engineers will try to find a way to chop the priciness out of the fancier type.

When this comes (and it's not likely to be in any hurry), current Mac owners may find upgrading their machines expensive. Of course, Mac engineers may find a way to offer a connector for an external color monitor.

Networking

Many experts consider microcomputer networks the wave of the future, particularly for offices. In a network, several machines are cabled together and share a single printer and/or high-capacity hard-disk system. Apple is planning to release a networking system for Mac before long.

Apple has spent more than three years developing its AppleBus system. In theory, all Apple products from the Apple // models on up through Lisa could be tied together, but differing document types would cause some severe constraints in actual use.

Other Products

On the more practical side you'll definitely see external disk drives for the Macintosh produced by vendors besides Apple. You may even see external memory: a company called Axlon has been experimenting with several types of nonvolatile memory, a type of memory that preserves data even when the power is removed.

Such nonvolatile memory could be used as a RAM disk, a fast, reliable storage medium. It's really just like any other RAM memory, but software is used to fool the computer into believing that it's actually a floppy disk. Since everything moves at the speed of electrons—there's no disk or read/write head that has to move physically—RAM disks can be up to twenty times faster than floppies.

On the horizon is a digitizer that can take the output from a video camera and put it into Mac's RAM, where it can be handled as a graphics document. Imagine doctoring photos with *MacPaint!* For the musically inclined, a company called Mark of the Unicorn is about to introduce a full-scale music composer that will produce printed scores on both the screen and the printer. Sophisticated voice synthesis and recognition—talk to Mac and it will talk back—are somewhat further down the road. More mundane, and more likely to appear soon, is a bar-code reader that will connect between Mac and its keyboard.

Software should truly blossom in the coming months. Apple's *MacDraw* is expected to go beyond *MacPaint* in capabilities, difficult as that is to believe. Microsoft's *Chart, Word, File,* and similar Macthings are imminent. Lotus's wildly successful *1-2-3* and *Symphony* integrated packages should be available as soon as the RAM upgrade they need begins to be available for Mac. The popular Logo programming language, an assembler, and new compilers are certain to appear in short order.

But the most exciting hardware and software is undoubtedly a bit further away. It takes time for developers to realize just what any new machine can do and produce programs ideally suited to it. With Mac, the developers have been given a machine that does so many things so well, and so differently, that they've only just begun to figure out all the possibilities. The future should be dazzling.

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MACINFO

Just because you've taken your Mac home with you doesn't mean you've been cast adrift on a sea of ignorance. Thousands of Mac users and fanatics across the country are willing to help you get more and more out of your machine. All you need to know is where to look.

User Groups

The best source of advice, discounts on hardware, and free public-domain software for Mac is your local user group. This is usually composed of a band of Apple owners who have come together out of their own fears and need for information and who have begun to master them.

User groups welcome new members warmly. Chances are that if you do run into a problem, no matter what it is, someone in the group has had a similar experience and knows exactly what to do about it. User groups offer public-domain software that's absolutely free. And subsidiary special-interest groups (known as SIGs) pinpoint your personal interests, be they graphics or financial analysis. Membership is rarely more than $25 per year, and it's almost always worth many times more than that, particularly if you're just starting out.

Virtually every city has at least one Apple user group. Unfortunately, a list that covered them all would require a book of its own. In New York City, for example, a group was recently formed among the tenants of a single building; it included fifteen Apple owners.

Your Apple dealer will usually know how you can contact your local user groups. If not, you can contact:

International Apple Core
908 George Street
Santa Clara, CA 95050

This organization of user groups maintains a list of every member group and can supply you with the information for your area. If you're interested in saving money, you might even consider joining the IAC. It offers discounts on collections of member-contributed software, as well as access to information and resources not otherwise available.

Telecommunications Services

The second-best sources of information are computerized services you can access with Mac and a modem. As well as the features mentioned in chapter 14, many have their own Apple user groups on-line. The following phone numbers will get you information on what's available and how to subscribe.

BRS
(800) 833-4707
(800) 553-5566 (in NY)

CompuServe
(800) 848-8199
(614) 457-0802 (in OH)

Delphi
(800) 544-4005
(617) 491-3393 (in MA)

DIALOG
(800) 227-1927
(800) 982-5838 (in CA)

Dow Jones News/Retrieval
(800) 257-5114
(609) 452-1511 (in NJ)

The Source
(800) 336-3366
(703) 821-8888 (in VA)

Many individuals and clubs offer their own electronic "bulletin boards" full of free information and software. Unfortunately, their numbers have a tendency to change almost daily. Any list included here would be outdated before the book was published and useless soon after that.

Fortunately, many of the information systems maintain lists of current active bulletin boards. On The Source, one can be found under PUBLIC 112 (an address in a bulletin board called PUBLIC). On CompuServe look under MAUG

XA4. The information is also available directly at The People's Message System, (619) 561-7277. You'll have to introduce yourself to the system by entering your name and vital statistics, but after that a menu will come up on screen to help you along.

Magazines

A+
The Independent Guide to Apple Computers
P.O. Box 2965
Boulder, CO 80322
This monthly publication covers all aspects of Apple computer use in an easy-to-read format. One section of the magazine is dedicated to Macintosh, and includes coverage of new products.

Apple Orchard
P.O. Box 6502
Cupertino, CA 95015
A bimonthly publication of the International Apple Core, it's a good source of user-group information and product reviews.

Byte
70 Main Street
Peterborough, NH 03458
Not for the new user. An often technical monthly that covers a variety of theoretical and high-level approaches to computing on all computers. Mac coverage is beginning to appear with increasing frequency.

Creative Computing
39 E. Hanover
Morris Plains, NJ 07950
A lively monthly publication not specifically aimed at the Macintosh owner, but often containing informative and entertaining articles on products and applications, including Mac-related material.

MacWorld
Subscriber Services
P.O. Box 20300
Bergenfield, NJ 07621
All Mac, cover-to-cover, every month, in a striking oversized format. The magazine stresses Mac applications and clever ways of getting the most from them, and provides a new-product directory and in-depth reviews. You can even get it free if you send in the card that may have come packed with your Mac.

Addresses for Products Mentioned

MacWrite, MacPaint, MacDraw, Macintosh BASIC, Macintosh Pascal
Apple Computer, Inc.
20525 Mariani Avenue
Cupertino, CA 95014

MacFORTH
Creative Solutions, Inc.
4801 Randolph Rd.
Rockville, MD 20852

MacDisk
Davong Systems, Inc.
217 Humboldt Court
Sunnyvale, CA 94089

Sargon III
Hayden Software Company
600 Suffolk Street
Lowell, MA 01853

The Witness
Infocom, Inc.
55 Wheeler St.
Cambridge, MA 02138

Maccessories (swivel stand, surge protector, disk case)
Kensington Microware Ltd.
251 Park Avenue South
New York, NY 10010

MS-BASIC, Multiplan, Chart, File, Word
Microsoft Corporation
10700 Northrup Way
Bellevue, WA 98004

Transylvania
Penguin Software
830 Fourth Ave.
P.O. Box 311
Geneva, IL 60134

ClickArt
T/Maker
2115 Landings Dr.
Mountain View, CA 94043

MacDrive
Tecmar, Inc.
6225 Cochran Road
Solon (Cleveland), OH 44139-3377

APPENDIX: MACFACTS

Macintosh

Processor
- MC68000
- 32-bit architecture
- 7.8336 MHz clock frequency

Memory
- 128K (512K) bytes RAM
- 64K ROM

Disk capacity
- 500K (1 meg) unformatted
- 400K (800K) formatted
- 3.5 inch diameter single-sided (double-sided) hard-shell media

Video display
- 9-inch diagonal, high resolution
- 512 pixels horizontal, 342 pixels vertical
- bit-mapped display

Interfaces

- Synchronous serial keyboard
- RS-232 serial printer port

RS-232 serial modem port
  230.4K baud maximum
  0.920 megabit/second if clocked externally (RS-422 standard)
Mouse interface
External disk interface

Sound Generator

Four-voice sound
8-bit digital-analog conversion
22KHz sample rate

Keyboard

58 keys
2-key rollover
software mapped

Mouse

Mechanical tracking
Optical-shaft encoding
3.54 pulse per mm (90 pulse per inch) of travel

Clock/Calendar

Custom CMOS chip
4.5V Eveready no. 523 (or equivalent)

Power Requirements

105 to 125 VAC
50 to 60 Hz
60 watts

Environment

Operating: 10° C to 40° C (50° F to 104° F)
Storing: −40° C to 50° C (−40° F to 122° F)
Humidity: 5% to 90% relative humidity
Altitude: 0 to 4,615 m (0 to 15,000 feet)

Physical Dimensions

	Weight	Height	Width	Depth
Main	16 lb, 8 oz	13.5″	9.7″	10.9″
Keyboard	2 lb, 8.5 oz	2.6″	13.2″	5.8″
Mouse	7 oz	1.5″	2.4″	4.3″

Imagewriter

Print method	Dot matrix, logic seek (line by line)
Printing speed	At 10 characters per inch: 120 characters/second 72 lines/minute
Character format	Standard characters: Up to 7 dots wide by 8 dots high Custom (downloaded) characters: Up to 16 dots wide by 8 dots high
Standard characters	96 ASCII (alphanumeric and symbols) 25 European language characters
Vertical dot spacing	1/72 of an inch
Line length	8 inches maximum
Paper width	3 to 10 inches
Paper thickness	0.05–0.28 mm (0.002–0.011 inch) Original + 3 copies maximum

Paper-feed method	Friction or sprocket/pin feed
Paper Types	Single sheet Roll paper Fanfold sprocketed paper (hole centers 4.0–9.5 inches)
Paper entry	Top rear of printer
Ribbon	Inked fabric 13 mm wide by 13,000 mm long Auto-reversing in cassette
Data interface	8-bit serial
Power	115 VAC at 60Hz 100 VAC at 50/60Hz 220 VAC at 50Hz 240 VAC at 50Hz (all voltage + or − 10%) Operating 180 watts maximum Standby 16 watts maximum
Environment	Operating 5° C to 40° C (41° F to 104° F) Storage −25° C to 60° C (−13° F to 140° F) Operating 85% humidity, noncondensing Storage 90% humidity, noncondensing

Dimensions	Width	Depth	Height
	15.7″	11.3″	5.3″

DIP switch settings

SW1-1	SW1-2	SW1-3	
Open	Open	Open	American
Closed	Closed	Open	British
Open	Open	Closed	German
Open	Closed	Closed	French
Closed	Open	Closed	Swedish
Closed	Open	Open	Italian
Closed	Closed	Closed	Spanish
Open	Closed	Open	American

SW1-4		
Open	66 lines per page	
Closed	72 lines per page	
SW1-5		
Open	recognizes 8 data bits	
Closed	ignores 8th data bit	
SW1-6	SW1-7	
Open	Open	Pica
Closed	Open	Elite
Open	Closed	Ultracondensed
Closed	Closed	Elite proportional
SW1-8		
Open	No LF after CR	
Closed	Add LF after CR	
SW2-1	SW2-2	
Open	Open	300 baud
Closed	Open	1200 baud
Open	Closed	2400 baud
Closed	Closed	9600 baud
SW2-2		
Open	Data terminal ready (pin 20)	
Closed	XON/XOFF	

BOOKS

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ABOUT THE AUTHOR

BILL O'BRIEN is a widely published writer and recognized expert on Apple computers. He is the author of *The Apple //c Book* and writes the long-running "O'Brien's Journal" column in *inCider*. He has been a contributing editor for *A +* magazine and a frequent contributor to the Time-Life *Access* newsletters and such magazines as *Creative Computing, Microcomputing,* and *80 Micro.*

O'Brien has had hands-on experience with every type of Apple computer ever made and has owned an Apple // since its infancy. Included among his personal collection of computers are an Apple //e, Apple //c, two Apple ///s, and a Macintosh.

Tapping the Full Potential of the Revolutionary Mac

Here is an invaluable book that cuts through the mysteries surrounding Mac's introduction to give you hundreds of facts and tips you won't find anywhere else. Written for new or soon-to-be Macintosh owners by an acknowledged Apple expert, this illustrated guide takes you step-by-step through the multi-talented Mac—powers and possibilities which have never before been available in a personal computer.

- **Creating Your Own System**—How to connect disk drives, printers, modems and all the peripherals you need.
- **Using Mac's Tools**—Mouse magic that whisks you through the world of Mac's windows and icons; shortcuts with Mac's built-in Clipboard, Notepad and Scrapbook.
- **Driving Your Disks**—The fastest, safest, most efficient ways to protect, copy and work with MacDisks; how to avoid frustration and disaster.
- **MacWrite, MacPaint, Multiplan** and **MacTerminal**—Not just brief descriptions, but detailed hands-on tutorials that explore techniques, tricks and facts the documentation leaves out.
- **Programming Languages**—An in-depth exploration of the tools that let you control your Macintosh to the *n*th degree.
- **Choosing Software for Mac**—The most up-to-date appraisals of recreational, business, educational and utility packages show you how you can make your Mac what you want it to be.
- **Special Sections and Features**—Care, maintenance, troubleshooting, users' groups, bulletin boards, comprehensive index, Mac-generated illustrations; plus, a peek into the future at the MacWonders ahead.

Bill O'Brien, the author of ***The Apple IIc Book,*** is a widely published writer and a recognized expert on Apple computers. He has been a contributing editor to *A+* magazine, has written for ***Creative Computing, Microcomputing*** and ***80 Micro*** and is the author of a long-running, popular monthly column, "O'Brien's Journal," for ***InCider*** magazine.

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