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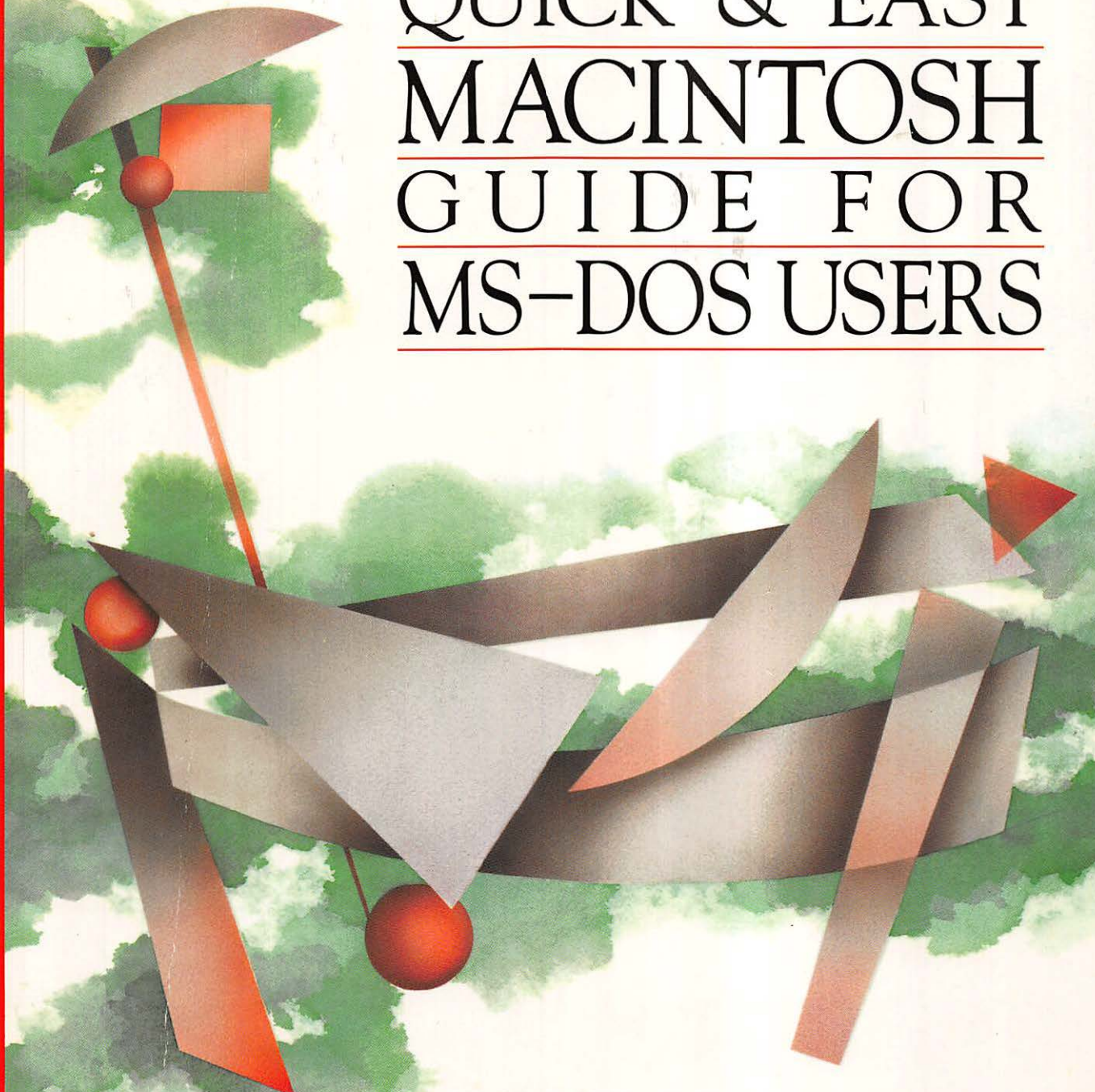
QUICK & EASY MACINTOSH GUIDE FOR MS-DOS USERS



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Quick & Easy Macintosh Guide for MS-DOS Users

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and
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Preface

Most often, when we travel to unknown places, we try to know something about our destination before we begin. Then, once we are there, we try to learn enough of the language, customs, and landmarks to get around comfortably, enjoy our stay and make it productive.

In many ways, when you move from one computer system to another, you embark on a journey to an unknown place. This book is mainly intended as a guidebook to moving from the PC to the Macintosh. Macintosh users moving in the opposite direction might find the information in this book useful, too; however, we present all information from the PC user's perspective.

The Macintosh system is touted as being user-friendly. However, it may not be enough for you that it's easy to use. You're on foreign soil here, and you might want to find out how the customs in this new place compare with those on familiar ground. You're used to doing things a certain way and making certain assumptions about your computer system. On the Macintosh, however, these assumptions may not always remain valid.

When you start to work with the Mac, you'll be given new tools to perform actions that have no parallel in DOS. You'll want to learn how to make the most effective use of these new tools. Even though the Macintosh deserves its reputation for being user-friendly, it doesn't mean everything you'll want to know is obvious.

Some people have described the Macintosh as a *closed* system and the PC as an *open* system. They also refer to DOS as *left brain* oriented and the Mac as *right brain* oriented. Others call DOS linear and text-based as opposed to the Mac's graphical and process-oriented system. In any case, these distinctions will become more clear as you read along.

Each chapter covers a separate subject, and some chapters appeal only to specific readers, while other chapters are fairly universal.

Chapter One provides a brief history of personal computers, specifics about the different Macintosh models available, and a general discussion about the different operating philosophies that characterize the PC and the Mac. This chapter sets the stage for subsequent discussions in the remainder of the book.

Chapter Two begins a three-part introduction to the Macintosh graphical interface. It is the graphical interface that distinguishes the Mac from the PC—from the user's point of view. Chapter Two includes a complete discussion of the various aspects of the graphical interface, including mouse techniques, menus and dialog boxes, and many other techniques. There are frequent hints for streamlining your approach to the Mac.

While Chapter Two discusses specific operating system features of the PC and the Mac, Chapter Three begins to define the components of the Macintosh Desktop. This chapter provides the basic tools necessary to interact with the Macintosh and presents a detailed look at the Finder (the closest equivalent to DOS on the Mac), and the Finder menus (the closest equivalent to the sum of DOS commands available on the Mac).

Chapter Four completes the three-part series on the graphical interface by introducing the Macintosh operating system files and tools. Some of these files are unique to the Macintosh while others have parallels in the DOS world. In particular, you'll want to look at the discussions of two very important system tools—the Chooser and the Control Panel.

If you're used to word processors, databases, and spreadsheets on a PC, what can you expect to see on a Mac? Chapter Five explains the kinds of things you could do on a Mac. We take another look at the graphical interface and how it affects the kinds of software developed on the Mac, and some of the differences between PC applications and their Macintosh counterparts.

Chapter Six introduces the PC and the Macintosh from the hardware point of view. This chapter discusses the architecture of the two machines, including their CPUs, bus and I/O systems, and peripherals. Those interested in learning about the various ports and peripheral options should review this chapter.

Chapter Seven is about networking and connectivity. We identify several programs that can be useful in bridging the gaps between these two operating environments. These programs range from DOS coprocessors on the Mac to various types of networks, direct links, telecommunications solutions, and other connections between two worlds. We also introduce the networking standards used in the Macintosh world and additional methods for connecting the Macintosh with other computer environments.

Chapter Eight is about going beyond this book. It talks about the future of the Macintosh as well as what you can do to expand your horizons as you become more familiar with the Mac environment.

Appendix A is a functional reference that walks through the Macintosh equivalent of DOS commands. This appendix is an excellent way to come to grips with the operating differences between the Macintosh and the PC. We highly recommend that you review this information. DOS users will find using this appendix one of the fastest ways to become familiar with the Mac.

For information on connections, or ports, refer to Appendix B. In this section, back panel configurations of the Macintosh show connecting devices for each port.

Appendix C is a listing of companies, suppliers, and dealers for the various products discussed throughout this book, including sources for other Macintosh items.

As stated earlier, this book is aimed primarily at crossover users from the PC to the Mac. We assume that you're at least familiar with DOS machines. However, we don't necessarily limit our approach to only one group. If you are among the following, this book should offer a valuable source of information.

- A PC user beginning to explore the Macintosh.
- A PC user who needs to accomplish specific tasks on a Macintosh will benefit most from Chapters Two through Five, as well as Appendix A.
- A PC user who wants to learn about networking with the Macintosh will want to pay special attention to Chapter Seven.
- A Mac user who wants to know more about the PC can benefit from DOS discussions throughout the book, particularly in Chapters Two through Four. These chapters draw parallels between Mac techniques and their DOS equivalents. Also, Appendix A provides useful parallels between DOS and the Mac interface.

- A new Macintosh user who hasn't worked with a PC before. Chapters Two through Four are perhaps all you need to get a very good start in the Macintosh environment.

In any case, we hope the information and presentation of this book helps you achieve more comfort and familiarity with both the PC and the Macintosh.

We have done our best to introduce technical terms gradually and define terms as we go along. However, bearing in mind that many readers may skip around and not take the "linear" approach to this book, we have provided a comprehensive glossary of terms for your convenience. If a word or phrase seems unfamiliar, check the glossary.

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Taking the Other Road

Two roads diverged in a yellow wood,
And sorry I could not travel both
And be one traveler...

—Robert Frost "The Road Not Taken"

Once the poet made a decision, chose a path and then wondered about the other. He never went back. Of course, for Robert Frost, the road he took was the one that was "less traveled by, and that has made all the difference." It was right for him. It may be that you will find some new opportunity or satisfaction in the road not taken. You, unlike Frost, have before you the opportunity to go back to the fork in the road, and choose the other road. As you travel down the other fork, the one you didn't take before, you embark on a journey to a new world. You don't need a spaceship, or even an airplane, bus, or car to get there. A good, comfortable chair would be nice, though.

The new road leads to a border where you may linger a moment. Behind you are all the familiar customs and cultural comforts you know so well. Ahead is the unknown—unknown language, unknown customs, unknown territory. Also ahead is the possibility of an adventure, offering more knowledge and new opportunity, so you stand ready to cross the line.

It might sound as if you're at the border of two countries, but you're not. Instead, you're at the border of two operating systems—two very dissimilar computers. You are about to replace the familiar techniques of one with the very different methods of another.

It may seem intimidating to some. You've heard it's easy, and yet it seems foreign and unwieldy somehow. Macintosh enthusiasts will tell you there's nothing to it. They speak a language full of Macintosh buzzwords like double-click, shift-click, Clipboard, marquee, drag, file types, icons, resources, and on and on. If some of this sounds like another language, perhaps it is. It could be called Mac-inese, but you'll soon discover that it is, in fact, quite easy to learn.

In this book, we'll introduce the Macintosh computer from the IBM personal computer perspective. As you move from the world of DOS, the disk operating system, to the Macintosh, in the simplest sense, you are moving from a world of keyboard commands to a world of pictures and mice. For some it is a foray into enemy territory, while others may view this journey as something like a visit to Disneyland.

NOTE: Macintoshes, as well as IBM (and compatible) computers are all, technically, "personal computers." However, this book will use the terms *PC* and *personal computer* to refer to DOS machines.

Each chapter of this book should bring you closer to a full understanding of the Macintosh—its hardware, its operating systems, its techniques, and its software.

There are several philosophical, physical, and procedural differences between the PC and the Macintosh. In this chapter, we'll identify some of those differences, and in subsequent chapters, we'll elaborate on those differences.

Not everything is contrast between the PC and the Macintosh, however. You'll also learn to identify the similarities, even when they are disguised by different procedures or methods.

Before you begin to explore the Macintosh, you might like to know a little about the events that led up to the development of this remarkable machine. In fact, history often provides clues to understanding a new environment or language. The following section presents a brief history of personal computers intended to provide some perspective on the position the Macintosh occupies in the development of personal computing.

Following the historical discussion is a brief description of the physical differences between the two machines, and finally, a discussion of the philosophical and procedural distinctions between them.

So, before beginning your journey down the road not taken, through the new land of Macintosh, you may want to take a look at what led up to the present.

Journey now into the land of yesteryear, when the tube was king and chips were made only from potatoes or corn...

A BRIEF HISTORY

The personal computer industry is relatively young, and the past ten years have brought about diverse developments. Over the years, computer manufacturers have taken many directions—some successful, some not—and along the way, we have observed the incredible growth of the personal computer. Not only has the personal computer become more and more commonplace in our homes and businesses, but the advances in technology have been staggering. Consider that a computer which fits neatly on your desktop today, only 10 or 15 years ago would have filled a room, but offered much less!

Disagreements abound in the computing world about the dawning of the personal computing age, but most people agree that the introduction of the IBM PC propelled personal computers into businesses around the world, setting in motion the personal computer boom. However, personal computers existed years before the IBM PC sounded its first beep.

Early personal computers were machines aimed primarily at hobbyists. They operated from a simple command line (much like today's PC) and featured all-text displays. The TRS-80 from Tandy Corporation and the Commodore PET were among the earliest personal computers.

However, several drawbacks limited mass-market acceptance of these early systems. Data was stored on cassette tapes offering only 16 or 32 kilobytes of usable memory; only a limited number of programs was available; and modifications to the basic system could be both expensive and difficult.

Perhaps the most important personal computer to appear (before the IBM PC) was the Apple II computer system introduced in the late seventies. Several key factors led to the success of the Apple II over previous systems:

- It was a graphic system in color—a major feature that placed the Apple II above its competition
- The sluggish and cumbersome cassette tape system was replaced by 5 1/4-inch disk drives
- It was expandable through a series of plug-in cards inside the chassis
- It was affordable
- With the Apple II Plus, it boasted a relatively whopping 48K of RAM
- It was *seeded*

This concept of *seeding* was one of Apple's great successes. Apple targeted the education market by offering it reasonably priced computers. This virtually assured that an Apple II would likely be the first exposure to computers that many students (and their families) would receive, thereby establishing Apple's reputation as the machine for education and creating its own market. When the IBM PC was introduced in the early eighties, it quickly became the machine of choice in business, but failed to supplant Apple's leadership in education.

Other manufacturers began building "personal computers" for the masses. Timex introduced the Sinclair, and other manufacturers followed suit. By 1981, a new industry was beginning to take shape.

While Apple began to explore technologies that would eventually lead to the introduction of the Macintosh, IBM was entering the PC marketplace with its first offering—the IBM PC. IBM was already the leader in computer mainframe technology and its credentials were unassailable. Where Apple was a company started in a garage and designed and marketed by young, radical visionaries, IBM was an established, conservative company that had the respect and the confidence of the business community.

The IBM PC was similar to the Apple II in many ways. They both featured an open, expandable architecture. Both came with color or monochrome systems and could handle graphics. Both came with a built-in Basic programming language, disk drives, and separate monitors.

The IBM PC also differed from the Apple in many important ways. For instance, it came with 64K RAM (random-access memory), as much as the most powerful Apple II, and was expandable to 640K. Back when the PC was first introduced, there were few people who expected to use all 640K. Today, 640K of RAM is needed to effectively run most PC programs.

One of the main reasons for the IBM PC's existence was to provide a common, independent terminal for use with IBM's ubiquitous mainframes. To some degree, the software interface, DOS, owes its existence to this plan. While Apple was looking at new ways for users to interact with the personal computer, IBM was looking for ways to keep experienced mainframe operators comfortable. Therefore, the DOS command line was the best approach.

Meanwhile, Apple had discovered some revolutionary work at Xerox and had acquired the technology as well as many of the engineers who developed it. That work would lead to the Macintosh interface and would change personal computing history.

Both the PC and the Macintosh systems were based on the component concept. The IBM PC is an *open system* which means that devices could be added or removed from inside the system chassis. The Apple system allowed the addition or removal of components from outside the chassis through built-in plugs and input/output (I/O) ports. Both IBM and Apple maintained their respective methods of adding components until 1987, when Apple introduced the

Macintosh II, which allows both internal and external methods of connecting devices.

Many battles have been waged between die-hard IBM PC users and faithful Apple Macintosh users regarding the pros and cons of each system. PC users often contend that the Macintosh is a mere toy, lacking the expandability and processing power required by serious applications. Mac users call the PC limiting because it's accessible and truly usable by only the most hardy computer users. Neither argument applies to today's PCs or Macs; but some of these misconceptions remain.

SYSTEM CONFIGURATIONS

In this section, you will see how the hardware of the two systems compares.

Evolution of PCs

Since its introduction in 1981, the IBM PC (and its "clones") have gone through several evolutionary steps. However, from the user's point of view, most PCs operate pretty much the same way. The main differences between PCs are as follows:

- **CPU** (*central processing unit*). The kind of chip used as the central processor is either the Intel 8088, 8086, 80286, or 80386. As you move through the list, the chips become faster and more powerful.

- **Speed**. The newer chips are faster. The 80386 chip will run the machine at speeds up to 33 megahertz (MHz) where the original 8088 ran at 4.77 MHz.

- **Memory**. Basic systems originally came with 64K, but today's machines generally *begin* with the full 640K that the CPU can directly address. This is called conventional memory and can handle larger amounts of expanded or extended RAM which is used to speed up operations or run multitasking solutions.

  Expanded RAM is memory above 640K that is not directly addressed. Extended RAM is directly addressable memory above 640K (used mostly on 80386 machines).

- **Drives**. Some systems use floppy disks only; others use hard disks of various sizes. Currently, there are two standard disk sizes for the PC—5 1/4-inch and 3 1/2-inch. (The Macintosh uses the 3 1/2-inch standard.)

- **Input/Output (I/O).** The PC uses both parallel and serial output ports. Some systems have these ports built in to the motherboard while others do not. In addition, more recent PCs (starting with the IBM AT and its clones) include onboard clocks and parameter settings. Older models, like the IBM PC and the IBM XT, lacked the clock and set most system parameters by using dip switches on the motherboard.

- **Open architecture.** All PCs feature an *open architecture*, meaning that users have access to the inside of the computer and can add peripheral equipment. Slots on the motherboard can accept a variety of peripheral *cards* which may be display adaptors, memory enhancements, network controllers, and a variety of other special purpose devices.

- **Screen.** Early PCs used lower-resolution monochrome or color screens, commonly divided into 25 rows and 80 columns. They offered no built-in graphic control.

During its evolution, the PC has passed several milestones: The introduction of the IBM PC established new standards and markets for the personal computer. The IBM AT offered greater speed and power using the 80286 chip. The Compaq Deskpro 386 was the first major machine to use the 80386 chip. The IBM PS/2 line of computers with Micro Channel architecture marked a new design and direction for IBM's line of computers.

Evolution of the Mac

What most distinguished the Macintosh from the DOS computers were the following features:

- **Configuration.** The Mac used the Motorola 68000 Family of chips, not the Intel series used by the PC. It came with its display screen, full memory, disk drives(s), and I/O ports built in. About all you could add to the system early on were a second floppy disk, a printer, and a modem.

  The Mac also came with a very sophisticated set of programs in ROM (Read Only Memory). These programs formed the basis for the graphical interface that helped make the Mac famous. Because these routines were built into the computer, almost all Mac applications look and act alike. In contrast, the PC had no such set of built-in routines and PC applications tended to present themselves using very divergent methods.

- **Design.** Where the PC was an open architecture, the Mac was *closed*. Just opening the cabinet voided the Apple warranty.

- **Screen.** The Mac used a small, but very high-definition monochrome display. Every pixel on the screen was controlled by the proprietary QuickDraw routines in ROM.

- **Mouse.** The mouse, a Xerox invention used by the Xerox Star and Alto Computers, was introduced to the world at large by the emergence of the Macintosh. Much of the identity of the Mac was tied to this form of screen manipulation and the mouse went "hand-in-paw" with the icon and menu-driven graphical interface.

- **Keyboard.** The Mac began life with a small, separate keyboard which lacked a numeric keypad. Since then, several Macintosh keyboards have appeared, the most recent of which is an almost exact duplicate of the popular AT keyboard on the PC.

- **Connections.** The Macintosh comes with two built-in serial ports and no parallel ports. The mouse originally connected to the back panel, but recent Macs feature the Apple Desktop Bus (ADB), which allows peripheral devices to be strung together. Using the ADB, the mouse is now connected to the keyboard.

  In addition, the Mac features a built-in networking protocol, originally called AppleTalk. Though there wasn't a network available at first, this protocol and special cabling enabled the Mac to use "intelligent" peripherals like the LaserWriter. Later, these same cables were used to connect multiple Macs.

  As the Macintosh developed, a new I/O port, the Small Computer System Interface (SCSI) port, was added for high-speed data transfers. This port was originally used to connect up to seven hard disks to a single system.

The Macintosh has evolved from the first 128K machine introduced in 1984 to the present models—the Macintosh Plus, the Macintosh SE, the Macintosh SE/30, and the Macintosh II, IIx, and IIcx.

Among the systems currently available, the Macintosh Plus is the most basic. It comes standard with 1 megabyte of RAM, a single built-in 3 1/2-inch floppy disk drive (that reads and writes only Macintosh formats), keyboard, mouse, and basic I/O. It is a closed system, and can be upgraded only with some difficulty.

The Macintosh SE is the next step up from the Mac Plus. It runs a little faster and usually comes with a built-in hard drive as well as one floppy. Although it is primarily a closed system, it does feature a single expansion port which allows the connection of ETHERNET, color, or graphics peripheral equipment. It comes with 1 megabyte of RAM.

The first truly open Macintosh is the Mac II. This computer resembles the standard PC both in its physical appearance and its open architechture. It has shed the built-in screen display in favor of a separate monitor. It can contain either one or two floppy drives and a hard disk, though it is usually sold with one hard disk and one floppy drive.

The Mac II cabinet opens to reveal five NuBus slots, similar to the slots found in PCs. These NuBus slots, which were originally developed by Texas Instruments, are used to add video drivers, co-processors, network boards (like the EtherTalk board), and other peripheral equipment. In addition, memory can easily be added to the system in the form of Single In-line Memory Modules (SIMMS). The maximum capacity of the Mac II is eight megabytes of RAM, though its Motorola 68020 chip is capable of handling much larger amounts of memory. Additionally, the Mac II was the first Mac to feature high-resolution color modes, which rival the highest resolutions available on today's PCs.

In the same way that the PC made the transistion from the IBM AT to the 386-based machines, the Macintosh IIx is an enhancement to the Mac II. It is built around the Motorola 68030 chip, a very powerful processor. Representing the next step in the Macintosh II series, it retains many of the features of the Mac II, including 256K ROM, graphics, high quality four-channel sound, SCSI bus, and NuBus.

The 68030 microprocessor in the Mac IIx is coupled with an 80-bit-precision 68882 math coprocessor, both running with a 16MHz clock. The 68030 has separate 256-byte caches for data and instructions plus a built-in Page Memory Management Unit (PMMU) used by advanced multitasking operating systems such as A/UX (the Macintosh implementation of UNIX).

Two caches speed up system operations by providing rapid access to the most recently used data and instructions. The new Motorola 68882 coprocessor shares the same instructional set as the 68881 used in the Mac II, and is capable of performing at up to two times the speed of the 68881 due to parallel operation capability. Therefore, all software written to take advantage of the 68881 can automatically take advantage of the 68882. Of great signficance to DOS users, the 3 1/2-inch disk drives in the Mac IIx will read and write PC formats (as well as Apple II's ProDOS) and store up to 1.4 megabytes on a single disk.

In 1989, Apple introduced both the Macintosh SE/30 and the Macintosh IIcx, two new systems based on the Motorola 68030 processor. The Macintosh IIcx is very similar to the Macintosh IIx in that it comes with the 68882 math co-processor. The main difference between the Macintosh IIcx and the Macintosh IIx is the smaller size of the chassis (footprint), and the inclusion of a new floppy disk drive, the Apple FDHD. This drive reads from and writes to MS-DOS, OS/2, and Apple II (ProDOS) formats.

The Macintosh SE/30 is also based on the 68030 processor and operates at up to four times the speed of the Macintosh SE. The SE/30 also comes with the new floppy drive as well as a new add-in slot called the Apple 030 Direct Slot, which allows special video cards to be added to the system to support gray scale and color monitors.

At the time of this writing, rumor has it that Apple plans to introduce the first laptop Mac. PC laptop computers are commonplace, but, so far, Apple has not introduced a Macintosh version, although they are available from other companies.

A more complete and technical discussion on PC and Mac hardware is contained in Chapter Six. One of the most significant differences between the two systems is, not hardware, but user interfaces, which represent two very different design philosophies.

PRACTICAL PHILOSOPHIES

When you think of a computer, you probably don't think about philosophy. You probably think most about the work you have to accomplish and how that machine can help you get it done. After all, computers do pretty much the same thing, don't they? They're number crunchers and information storage devices, not logicians or theologians.

It is true that computers can all perform the same, or similar tasks. However, all computers are the products of human design, and while they were evolving, different design philosophies were implemented.

The PC and the Macintosh now represent two very different approaches which are based on different philosophies of human interaction. One is essentially a verbal, language-based system. The other is visual and tactile. One issues commands. The other performs actions.

The PC philosophy is that *users communicate best with their computers through language*. Words and syntax, labels and commands are the bases of the language-based computer interface.

The Macintosh philosophy believes that *users communicate best by direct manipulation of objects*. Icons, windows, and menus along with a pointing device (the mouse) are the basic tools of the graphic interface.

Each of the statements in the list below presents ideas and concepts, setting the stage for a deeper understanding of the two systems. In the chapters that follow, each of these contrasts will be explained in more detail.

HOW YOU COMMUNICATE.

- **The PC uses the keyboard as the primary communication device.** Your location on the PC screen is indicated by a *cursor*. You issue commands at the cursor position by typing at the keyboard. You choose courses of action or choose menu choices by using the keyboard. Even movement on screen is performed using cursor movement keys.

- **The Mac uses the mouse to perform an action; the keyboard for entering text.** The Mac has two cursors—the *mouse pointer* and the *insertion point*. The

mouse pointer is used to position the cursor for selecting and manipulating objects on the screen. The insertion point is used to indicate where to enter text. Simple mouse techniques can often perform the same operation as several commands on the PC.

WHAT YOU SEE.

- **On the PC, you see information a screen at a time.** Whether you are viewing a directory listing or running a program, you generally see one action or "position" within the system at a time. In a sense, you have a *local* point of view.

- **The Mac splits the screen into windows.** On the Mac, each action or place occupies its own window at the Finder. Each drive or folder (directory) occupies a window, and each document in a running program also occupies a window. Because several windows can appear on the same screen, you can see different aspects of your work concurrently. In a sense, you have an *omniscient* point of view.

TEXT VS. GRAPHIC ORIENTATION.

- **The PC is text-oriented.** Because the PC is primarily concerned with text, visual information is often lacking. For instance, most programs simulate formatting and visual layout with text-based codes embedded in a document or report. Font styles and other effects as well as positioning of elements for printout are rarely shown on screen the way they will print. It is very difficult to combine graphics and text on screen and only specialized programs can combine them in print.

- **The Macintosh is graphic-oriented.** Because the Macintosh screen always displays high-resolution graphics, whatever you see on the screen is (almost always) what prints out. Layout and formatting details are accurately portrayed on the Mac screen and all Macintosh applications display different fonts and styles. In addition, it is common practice among Mac applications to combine graphics and text on screen, and in print.

USER INTERFACE.

- **The PC has no consistent user interface from program to program.** Programs written for the PC each reinvent the user interface. There are very few consistent standards, and users must learn each new program from the beginning.

- **On the Mac, the interface tools are built-in.** The Macintosh comes with its own interface standards. All Macintosh developers can use the built-in Toolbox routines to achieve a consistent interface. Therefore, each Macintosh application shares many features and techniques with every other one. Users learning a new program already know how to perform most basic operations.

DATA FORMAT.

- **The PC lacks any consistent means of sharing data between programs.** Few PC programs can share information easily, though some can translate the files of other programs. However, there is no standard data format and no consistent way to transfer information directly from one program document to another.

- **The Mac has the Clipboard, Scrapbook, and standard data formats.** The Clipboard lets Macintosh applications share both text and graphics. Any information cut from one document can be pasted into another via the Clipboard. There are a few limitations; for instance, you can't paste graphics into a document or an area of a document that can only accept text, but, for the most part, information can flow freely from one application to another. Virtually anything that can be displayed on the screen can be cut and pasted between applications.

FILE TYPES.

- **The PC differentiates between executable files and other files.** DOS uses a three-letter extension at the end of a file name to identify the kind of file it is. However, only three extensions really make any difference to the operating system: .exe, .com, and .bat. These three extensions designate executable files. All other extensions are optional and mean nothing to the operating system itself (though they may have meaning to individual programs).

- **The Mac tracks not only the file type, but the application that created the file.** Macintosh files each contain special information that identifies what kind of file it is (application, document, dictionary, and so on). Also, each file contains information that relates it to the program that created it. This enables the Macintosh to display each file with a unique and identifiable icon (*pictogram*). It also allows users to run a program simply by selecting one of its documents (*document launching*).

The PC is moving more and more toward a graphic interface standard. Many programs on the PC have now incorporated Mac-like features—Framework® and Reflex, to name only two. Even programs like dBASE IV™ use pull-down menus like those on the Mac, and Microsoft Windows creates an operating environment very similar to that of the Mac.

The newest PC operating system, OS/2 Version 1.1, will operate from a graphical interface, too. In fact, future applications on the PC will probably look very much the way the Macintosh looks now. As the two roads begin to reconverge, this book can help guide you along the path to a new way of working with computers—a way you will probably encounter in the future.

GOING FORWARD

By now, you're probably anxious to learn how best to translate your existing knowledge of PCs to the Macintosh. In the following three chapters, we present the operating environment of the Mac.

In Chapter Two, you will learn about the basic components of the Macintosh environment—icons, the mouse, windows, and more. These Macintosh *objects* are found in every Macintosh application.

Chapter Three continues this discussion by presenting the Finder, the Clipboard, and MultiFinder. The Finder is a collection of tools and menus that duplicates most of the functions of the DOS command line. You'll learn about each of the techniques and menus that the Mac uses to manipulate disk drives, files, and folders (directories). In addition, we'll introduce the Clipboard, the standard method for data exchange on a Mac. Finally, we'll discuss MultiFinder, the Macintosh multitasking operating environment.

Chapter Four explores the remaining System tools and utilities. Some of these tools and utilities correlate directly with DOS commands and procedures. Others are unique to the Mac. In addition, this chapter details the methods used for selecting printers and peripherals.

2

Basic Operating System Concepts

INTRODUCTION TO THE OPERATING ENVIRONMENT

A one-to-one comparison between the Mac interface and the DOS interface is virtually impossible. DOS is the PC language—a language of commands. By typing commands at the DOS command line, you can manage files and directories, run programs, and communicate with peripherals.

The Mac interface is not a language of commands. In fact, it is not a language at all. The Mac operating system does many of the same things as the PC operating system , but it does them in a different way.

On the PC, all commands have names. Type the name; the command is carried out. Many commands have *syntax*, which is the proper way to phrase the command and its parameters.

What the PC does with typed-in commands, the Mac does with *procedures*, *menu choices*, and other *utilities*. There is very little typing and no syntax. In place of syntax, there is *method* or *technique*.

The Consistent Interface

Many people credit the Mac's continuing success to its graphical interface, which is the subject of several of the chapters in this book. What makes the Mac interface especially useful is that it is always the same. Where PC programs may vary tremendously in how they look and act, almost all parts of the Mac environment—from the disk and file management and other DOS-like functions to complex third-party productivity programs—share a common set of techniques and features.

One result of this approach is that if you know how to work with one program written for the Mac, you know how to work with almost every other program written for the Mac. Many features and techniques may vary, but certain basic ideas do not change.

A complete comparison of the PC and Mac operating environments requires you to look at several parts of the Mac system and how they relate to the PC commands you have been using. In a sense, the Mac environment presents a puzzle—a collection of interrelated pieces that, together, make up a system more or less equal to the sum of the DOS commands.

About This Book

Most of the information presented in this chapter applies to the basic Mac operating environment called the *desktop*. The desktop is where all the action takes place. In its way, it is the equivalent of the entire screen on a PC, but, unlike the PC, the desktop has many characteristics that remain consistent whether you are running a program or working with the *Finder*, the closest Mac equivalent to the DOS level on a PC.

The Finder deserves some mention here, though you will learn more about it in Chapter Three. Briefly, the Finder is where you will perform basic file and folder (directory) management tasks including launching applications, viewing file listings, copying and erasing, changing folders and drives, viewing system statistics, and much more. This chapter contains some information about the Finder. In particular, all information about the mouse, icons, windows, and dialog boxes apply to the Finder as well as to other programs that you will run.

In this chapter, you will also learn how to start working with the Mac. We will discuss the following:

- The boot up sequence
- Mouse techniques
- Icons
- Windows
- Dialog boxes
- Menus

The information in this chapter is essential to using the Mac. If you can, read this chapter with the Mac running and look at the objects described. Try the procedures. The best way to familiarize yourself with the Mac is to experiment with your hands—as well as your mind.

In addition to the basic Mac information this chapter contains, you will learn something about the Mac equivalent (where one exists) of the following DOS commands and navigation keys:

- DIR
- CHDSK (partial equivalent)
- PATH
- ChDIR (CH)
- PgUp and PgDn
- Other cursor keys

For an alphabetical guide to DOS commands and their Mac equivalents, see Appendix A.

Some of the pieces of the Mac puzzle are always used. This chapter introduces you to these *basic concepts*–universal Mac tools, components, and techniques.

Another piece of the puzzle is provided by the Finder, through which you can duplicate the functions of most of the DOS commands—in addition to performing some uniquely Mac-like tasks. The Finder and its multitasking cousin, MultiFinder, are the subjects of Chapter Three—"Commands and the Finder."

Finally, there are some special utilities and tools that complete the Mac puzzle. Chapter Four, "Other System Utilities," deals with these special system tools and how they correlate with DOS commands and procedures.

Together, Chapters Two, Three, and Four provide a complete picture of the Mac operating system and environment.

Throughout this book, we will use the terms *program* and *application* interchangeably. However, we recognize that many people, especially PC developers, think of these as different terms. In ordinary PC language, a *program* is an executable file while an *application* is a specific, task-oriented system created by another program (for instance a dBASE accounting application where dBASE IV is the program). However, most Mac people use the term application to apply to the program itself. Therefore, when you see references to Mac applications, these refer to program files.

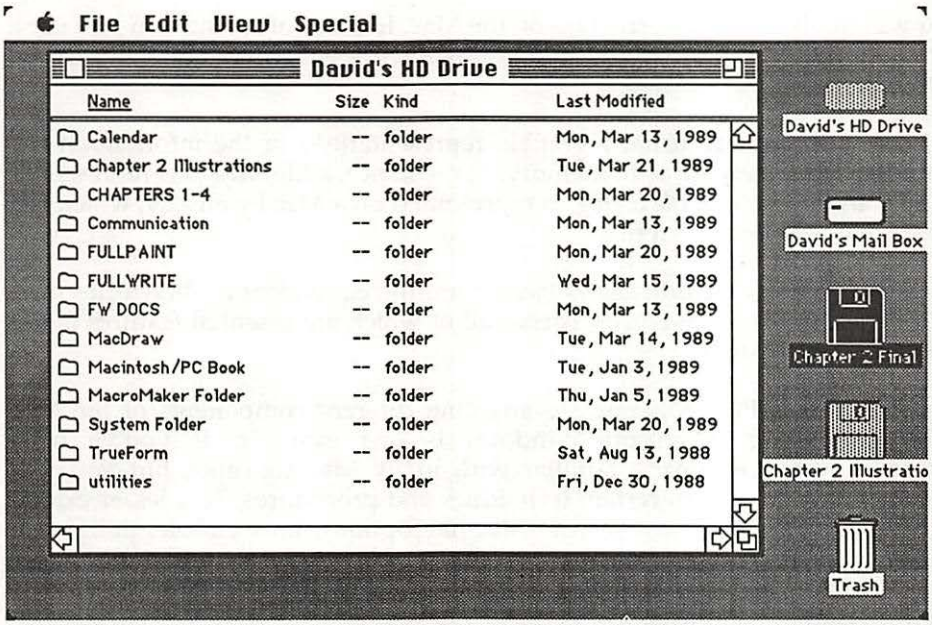
In addition, PC users generally refer to *running a program* where Mac terminology would say *launching an application*. Keep in mind that these two phrases are identical in operation, though the techniques used to perform them may vary. They both mean that a new program or application is activated.

DIFFERENT PERSPECTIVES—AN INTRODUCTION

As a PC user, you are probably familiar with DOS, the PC's Disk Operating System. DOS is a command-oriented language designed to communicate with the PC—to work with files; to run programs; and to communicate with peripheral equipment like monitors, modems, printers, and so forth. Any time you tell the PC to do something, you do so by typing a word at the *command line*, and you locate your current position within the system by reading a *prompt*—for instance the **A:** prompt that designates the first floppy disk drive, drive A.

On the PC you may think of *moving* from one directory or disk to another or *logging onto* a different drive or directory. On the Mac, the operating system is very different. On the Mac you think of *bringing a different window to the front* or making a new window *active*. The difference is one of concurrency. On the PC, you move to a new *location*. On the Mac, you activate a different *object*, but other objects are also present, waiting to be activated. There is no sense that you have *gone* anywhere.

You have a more omniscient viewpoint on the Mac because you can *see* various folders (directories) at once, though only one is *active*. On the Mac, you operate in two-dimensional space. On the PC, you only view one directory at a time; you exist in only one dimension at a time.




```
C>dir/w

 Volume in drive C has no label
 Directory of  C:\DOS

.               ..              ANSI     SYS    CLOCK    SYS    COMMAND  COM
COUNTRY  SYS    DISKCOPY COM    DISKINIT EXE    DISPLAY  SYS    DRIVER   SYS
ENHDISK  SYS    FASTOPEN EXE    FDISK    COM    FORMAT   COM    KEYB     COM
KEYBOARD SYS    MODE     COM    PRINTER  SYS    SYS      COM    VDISK    SYS
XCOPY    EXE    CONFIG   SYS    AUTOEXEC BAT    APPEND   EXE    ASSIGN   COM
ATTRIB   EXE    BACKUP   COM    CHKDSK   COM    COMP     COM    DEBUG    COM
DISKCOMP COM    EDLIN    COM    EXE2BIN  EXE    FIND     EXE    GRAFTABL COM
GRAPHICS COM    JOIN     EXE    LABEL    COM    LINK     EXE    MORE     COM
PRINT    COM    RECOVER  COM    RESTORE  COM    SHARE    EXE    SORT     EXE
SUBST    EXE    TREE     COM    WORDS           BASIC    COM    BASICA   COM
BASICA   EXE    NLSFUNC  EXE    REPLACE  EXE    SELECT   COM    SETCLOCK COM
INTEREST BAS    4201     CPI    5202     CPI    EGA      CPI    README   CPQ
ADAPT    COM    CACHE    EXE    CEMM     COM    CEMM     EXE    CHARSET  COM
FONTNO   F8     FONTNO   F14    FONTNO   F16    FONTUS   F8     FONTUS   F14
FONTUS   F16    HELP     COM    INSTALL  EXE    KEYBDP   COM    KP       COM
THINNO   F8     THINNO   F14    THINNO   F16    THINUS   F8     THINUS   F14
THINUS   F16    PFM      COM    72292500 $VM
       83 File(s)   9160704 bytes free

C>
```

Figure 2-1. Mac folders and DOS directories

You will rarely type an instruction on the Mac. In place of typing you will use a variety of *actions* and *procedures*, and you will work with a variety of new types of *objects*.

Objects on a Mac are usually graphic representations of the information the computer has in storage or in memory. For instance, a file, which is represented on a PC by a *name* in a *file listing*, is represented on a Mac by an *icon*, which is a *picture* that represents that file.

Other Mac objects include *folders* (which are the equivalent of directories on a PC), *menus*, *windows*, and *dialog boxes*—all of which are essential features of the Mac operating system.

More and more PC programs are adapting diferent components of the Mac operating system. Microsoft Windows is one example. If you've used Windows, you are already familiar with many Mac concepts, but you will probably have to relearn certain techniques and procedures. To a lesser extent, many other programs now feature Mac-like options, for example, pull-down menus, dialog boxes, windows, and more. However, even though many programs have begun to use these features, they are by no means standard to software running on the PC.

ROMs

ROM (Read Only Memory) is a set of programmed instructions and data built into a computer and stored on a memory chip. Information stored in ROM is permanent and does not change when you change software.

On the PC, there is a little bit of ROM which is used to control basic Input/Output (I/O) functions and system-level operations. The PC ROM routines do very little to dictate how the PC screen should *look*, nor do they contain any specific techniques for performing everyday operations. Nothing in the PC ROM suggests a style for menus, a form for screen images, or helps in any way with interface design. These ROMs, also known as BIOS (Basic Input/Output System), determine how the system communicates between different devices at a very basic level.

On the Mac, ROM provides the tools for the elements of mouse technique, icons, menus, windows, and the rest of the Mac "cast of characters."

Uniformity among Mac programs is no accident. The Mac was designed that way. The routines in the Mac ROMs are available to all developers, which is why the Mac interface is consistent from one program to the next. In fact, Apple has published several books of guidelines, and they strongly encourage potential Mac developers to follow established rules.

STARTING THE SYSTEM

Some of you are probably anticipating an end to all ordinary events—an end to computing as you know it. From all you've heard, the Mac is either a toy or a breadbox disguising itself as a computer. But you shouldn't be be surprised to learn that you can turn on a Mac the same way you turn on a PC. The only difference is that the switch is in back on the Mac and on the side (or in the front) on most PCs.

There is one exception. The Mac II family with any Apple keyboard, lets you turn on the computer from the keyboard. If you have such a system, the button in the upper-right corner applies power to your Mac II.

Figure 2-2. Extended keyboard power-on button

Anyway, once you turn on the machines, they do what all good computers do–they boot up. Booting a Mac is very similar to booting a PC. Once the power is applied, the Mac does an internal system check, then searches for a valid System file on an active disk. This is pretty much the same thing your PC does as you can see from the chart in Figure 2-3.

Bing! Oh, you might think the doorbell just rang or you might look around to see what floor the elevator is on, but that ring is just the Mac beeper, more melodic than that tinny noisemaker in the PC. You'll get used to it.

The discussion that follows compares the boot procedures of the two machines. However, you can probably start using the Mac without knowing all this, just as you can use a PC without understanding all about memory, the Config.sys, or the Autoexec.bat. You may want to jump ahead to the section called A First Look at the Mac Environment, and return to this section later.

Comparing Memories

After the PC is switched on, it starts to display the system memory on the screen while a small, square cursor blinks. How much memory gets counted depends on the kind of PC you have and how much memory is installed. However, from the PC's point of view, there are several kinds of memory.

Anything up to 640K RAM is considered *conventional* memory. This is the memory that the PC uses to run your programs. In addition, depending on the type of PC you use, you may have either *expanded* or *extended* memory. Without going into a long and possibly confusing discussion of PC memory issues,

suffice it to say that, from DOS, conventional memory is directly usable. The other kinds of memory require special software and hardware, and the PC is virtually "tricked" into using it. Only the 80386 chip (and future chips) can use memory above 640K directly.

In contrast, all the memory in a Mac is recognized as a block. There is no distinction, though most Macs can contain only 8 megabytes of memory on the system. (Note that the MacIIx and Mac IIcx can contain up to 32 megs of memory.)

One significance of this memory difference is that the Mac can (and does) use programs that require 1 megabyte or more to run. PC programs are still essentially limited to running with less than 640K of available RAM. Having more than one large program in memory at once, as the Mac MultiFinder does, is much easier to accomplish. On the PC, memory manipulation is a more complex issue.

Even though the Mac does not *display* the results of the memory check the way the PC does, it does *examine* the internal memory while the machine is booting. It just does it faster.

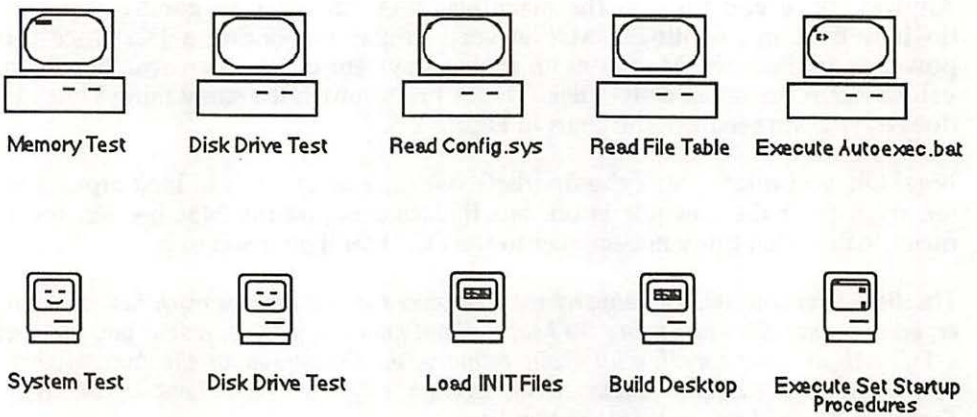


Figure 2-3. Comparing boot up

Looking for the Boot Disk

The PC can only boot from a floppy drive or from drive C, but the Mac can use any drive that contains the appropriate System files. This gives the Mac greater flexibility to boot from an externally attached drive.

The Mac normally looks at the drives in order, beginning with the floppy drives, then looking for an internal hard disk. If there is no internal hard disk,

the Mac searches the external SCSI ports for a hard disk. It boots from the first of these drives it encounters with the appropriate System files and it can boot from any attached hard disk. In addition, you can set which drive it should look at first using the Startup Device selection in the Control Panel (see Chapter Four for more about the Control Panel).

If the Mac cannot find a valid drive, it displays an icon with a question mark in the middle. If the Mac finds a bad floppy disk or one without a system, it ejects the disk and displays a disk icon with a large letter **X**.

In contrast, when the PC can't find a valid system, it may do any number of things, usually hanging endlessly with floppy drive A spinning.

Figure 2-4. No system disk on boot

Figure 2-5. Rejected disk on boot

A System by any Other Name

The PC looks for a valid Command.com file on the A or C drive. In addition to the Command.com, it looks for two hidden files (whose names may vary from one version of DOS to another). These three files together make up the DOS System.

The Mac looks for two essential files–System and Finder. There are many other files associated with the Mac operating system, but these two are the only essential ones. The presence of these two files is what makes a disk a System disk or a non-System disk.

Like DOS, the Mac System has gone through numerous revisions. At the time of this writing, DOS 4.0 is the most recent issue of the PC operating system, and System 6.03 is the most recent Mac system. These software revisions are used to update the technology and to add features.

For the most part, Mac systems are *upward-compatible*, meaning that, as a general rule, programs that ran effectively with older versions will still work with the newer ones. When upward compatibility fails, developers mass produce updated versions of their software shortly after the release of a new system from Apple.

At any rate, system software is necessary to boot both machines, and once they have located the necessary system files, both the PC and the Mac then proceed with the boot-up process. Look first at what the PC does as it sets up the operating environment.

The PC Boot

The PC reads important information from a file called Config.sys. Config.sys is not necessary to boot the computer, but provides a way to configure the operating system I/O, various system level settings, like FILES= and BUFFERS=, and to load various system device drivers. The PC uses device drivers to set up a mouse, networks, RAM disks, and expanded memory or any device that is system-specific rather than application-specific.

After reading the Config.sys, the PC reads a file called Autoexec.bat. This special batch file is not required, but if it is present, the PC will execute its commands in order. The Autoexec.bat is useful for establishing additional operating system conditions, for loading memory-resident programs, and for running a startup program. For instance, many people run special menu programs from their Autoexec.bat which lets them choose their applications from menus.

The Autoexec.bat is the last step in the PC's boot-up procedure. Unless the Autoexec.bat runs another program, the PC stops at the DOS prompt and the command line, ready to receive input from the keyboard.

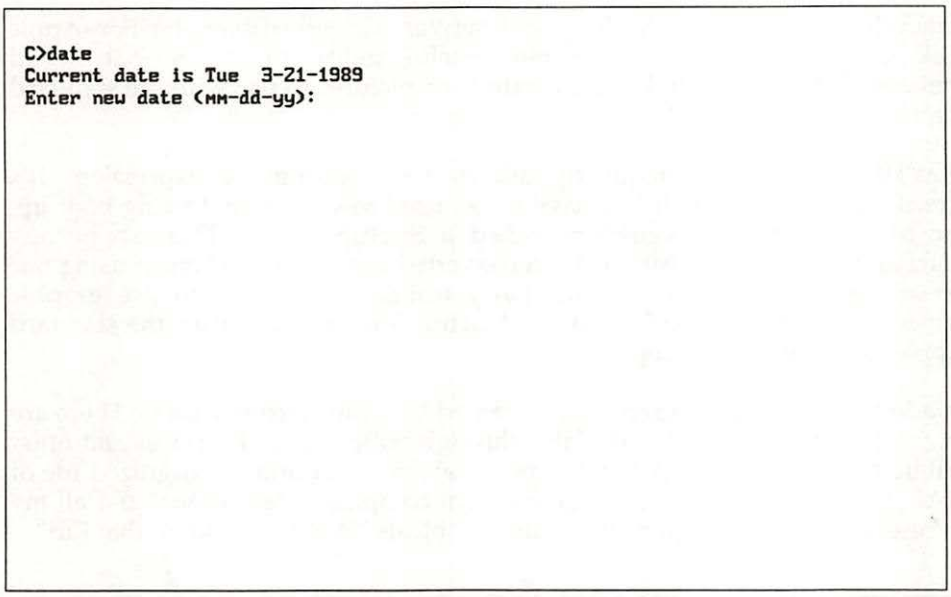


Figure 2-6. Typical PC screen after boot

The Mac Boot

Like the PC, the Mac performs its internal system and memory checks, then proceeds to the next step. The Mac does not have a Config.sys file. What is does have are special files called *INIT files* which may install additional device drivers or other special attachments to the system (more about INITs in the next section).

After the Mac reads INITs, it reads information about the disk's contents from an invisible file called Desktop, then builds the desktop image and displays it on the screen. In the process of building the desktop, the Mac reads special information about startup programs and loads the programs defined through a special dialog box called Set Startup. In some ways, this correlates with functions normally handled by the Autoexec.bat on the PC. You'll learn more about Set Startup later.

Config.sys vs. INITs

Although INITs often serve the same functions as device drivers, some are more complex than any DOS device driver and are more like TSRs. These more complex INITs actually function as independent programs running in the System memory.

Examples of INIT files include special network drivers, drivers for non-Apple disk drives and other peripherals, useful utility programs that install themselves at startup, and special sounds or pictures to use with the standard interface.

MACHINT: The Mac frequently allows you freedom of expression. It's something a PC user will just have to get used to–or ignore. During boot up, the Mac will display something called a Startup Screen. This can be any MacPaint style picture that has been converted to the Startup Screen using one of several methods. (Some third party utilities allow you to use graphic standards other than MacPaint.) The Startup Screen will replace the standard Apple logo that usually appears.

In addition to a startup graphic, you can add special startup sounds. There are many digitized sound files available through bulletin board services and other public domain outlets. (A favorite personal startup sound is a digitized file of HAL, the computer from *2001*, saying, "I'm completely operational and all my circuits are functioning perfectly." Another bleats "What did you do that for!")

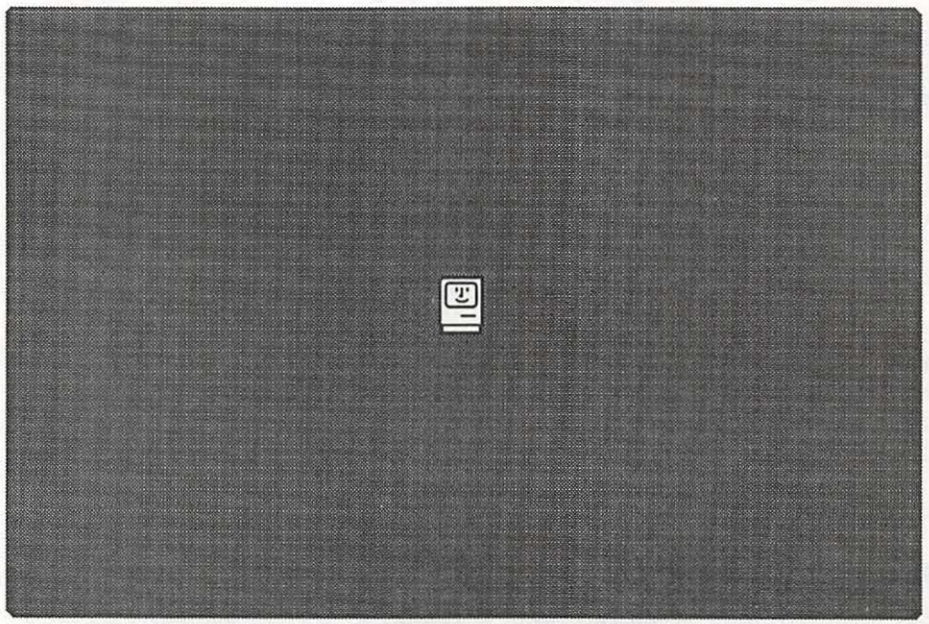


Figure 2-7. Standard startup screen

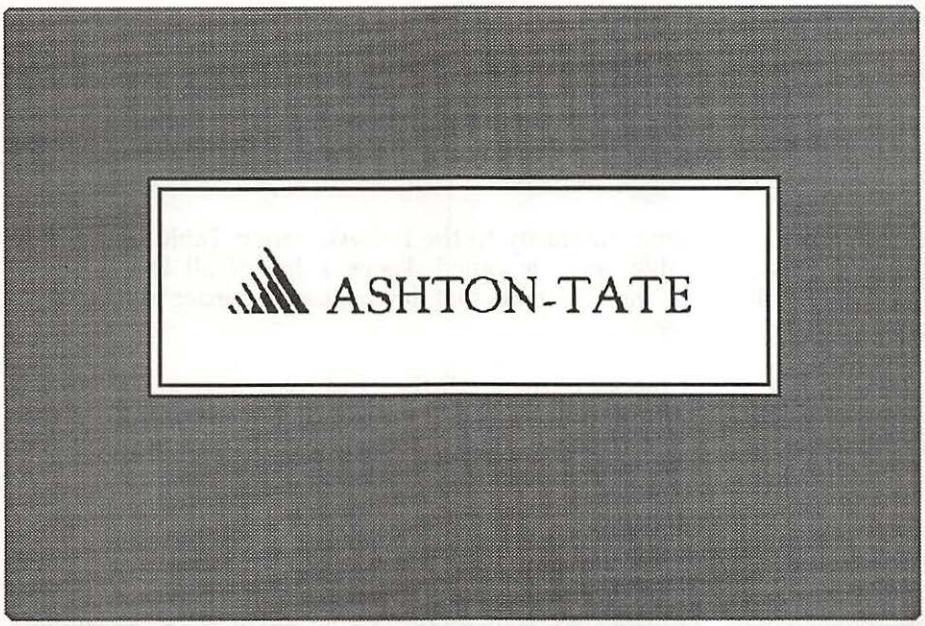


Figure 2-8. Customized startup screen

As the PC reads the information from the Config.sys, it often displays information about any device drivers it loads. For instance, a typical mouse driver, when loaded, displays its name and version number as well as the basic copyright information.

Similarly, the Mac displays a small, distinctive icon as it loads each INIT file, and sometimes a special message appears. Not all INITs display icons or messages on bootup, nor do all device drivers display information when loaded on the PC.

On the PC, you might use the Config.sys to set up a program to a buffer of memory, known as a *cache*, to improve the speed and handling of information. Caching can speed up operations, particularly repetitive ones. In DOS, the cache is set up while the machine boots. You cannot usually control the size or existence of a cache program from the operating system. On the Mac, a special RAM feature exists but you control it from the operating system after booting.

Another Config.sys function has no exact equivalent on the Mac. The settings for FILES = and BUFFERS = are not used on the Mac. On the PC, these settings initialize special areas of memory which manage the number of files that can be used concurrently. On the Mac, the number of open files is determined by the system itself.

Desktop vs. FAT

After displaying the startup screen and loading all the INITs, the Mac reads a special hidden (invisible) file called the Desktop. The Desktop tells the Mac which files and folders are present on the disk as well as where to place everything contained in the graphical display. At this point, it "builds the desktop" and displays the Finder on the screen.

This Desktop file has some similarity to the File Allocation Table found on a DOS disk. This FAT table, as it is called, keeps a list of all the files and directories on a disk. It is the FAT table that determines the order of files when you list a directory of files.

The Desktop file tracks the locations of all files and folders on a Mac disk; it also produces the visual map that locates the associated position of each file and folder on the Finder window. Both files are invisible to the user, but absolutely necessary to the operation of their respective machines.

There is one important difference between the FAT and the Desktop. If the Desktop is lost or corrupted in some way, the Mac can examine the disk and recreate that file. A lost FAT is usually a complete disaster, requiring, at best, the use of some very sophisticated recovery programs, and at worst, a complete reformat of the afflicted drive.

Other Factors

As we stated earlier, the two files that must be present to boot a Mac are the System and the Finder. However, there are other files that become associated with the System—for instance, the INITs. All System files, including third-party INIT files, must be located in a special folder called (not surprisingly) the System Folder. (This is true of all current versions of the Mac operating system. The only exception concerns MFS disks which are explained in Chapter Three.)

Which computer boots faster? The answer depends on several factors. For instance, the graphic Macintosh Desktop screen takes more time to produce than the DOS prompt on a PC. Also, on a Mac with plenty of memory, you may find people using five, ten, or even more INITs. Though useful, each INIT takes some time to load. In consequence, booting a fully loaded Mac can take some time.

The equivalent situation on a PC would involve loading ten or more device drivers or Terminate and Stay Resident Utilities (TSRs). There are some networks that require loading a host of utility drivers during boot up, but generally, a PC will only load a few drivers and TSRs at boot time—largely because of lack of available memory.

In the Mac's favor, it performs a very fast memory check—even up to its full 8 megabyte capacity—while many PCs still seem to count memory on their fingers and toes. You'll notice this especially on systems with expanded or extended memory.

Generally, things tend to even out. Sometimes a PC wil boot faster; sometimes a Mac will. Overall, the speed of booting is not too critical.

Startup Files (Autoexec)

Earlier we mentioned a correlation between the Set Startup menu option and the Autoexec.bat. On the Set Startup dialog box you determine which applications to start when the Mac boots. Generally speaking, either the Finder or MultiFinder is the startup application. Finder is the default. You could, however, set HyperCard as the startup and then the Mac would always start HyperCard when you booted.

Another setting in the Set Startup dialog box allows you to tell the Mac to remember which applications you are running and reopen them the next time you boot. This can be used as an equivalent to the DOS Autoexec for loading a set of applications at boot time. However, there is nothing in one place in the Mac operating system that performs all the functions of the Autoexec. Some Autoexec functions are performed by INITs, others are performed by System utilities like Set Startup, and some are not needed at all.

For instance, an Autoexec might be used to load TSR's like Borland's Sidekick. On the Mac, TSRs are replaced by INITs and desk accessories (DAs). This is explained in more detail in Chapter Four.

You might also use the Autoexec to set the PATH statement on the PC. However, there is no equivalent Path statement on the Mac. For additional information on organizing your files, see Chapter Three.

Although it seems that much has happened while the Mac is booting up, it all happens quickly (depending on how many INITs must be loaded). At the end, you'll see the standard Mac desktop environment called the Finder. Once the Finder is displayed, the boot-up process is complete. It's time to interact with the Mac. You'll learn more about the Finder in Chapter Three, but for now, you can think of it as the Mac equivalent of the DOS command level (the DOS prompt).

A FIRST LOOK AT THE MAC ENVIRONMENT

Among the concepts most critical to understanding the Mac operating environment, the most central may be the *icon*.

Icons

In some ways, working with a PC is pretty straightforward. You use words all the time in daily life, and, in a similar way, you use words on the PC. You're used to reading something and typing a response. You've done it hundreds of times—taking tests, applying for jobs, visiting a new doctor. In a sense, you are used to responding to words with words.

You are also accustomed to issuing commands: "Take me to Third and Broadway;" "Don't forget to write;" "I'd like a sirloin, medium rare." In the same way, you're used to telling the PC what to do—maybe not in English, but in its own language. You rarely issue commands on the Mac; you simply perform an action or choose from a menu. It's a little like the difference between saying, "Hey, you, move that rock over there," and picking up the rock and moving it yourself.

On the Mac, you use *icons*. Look at it this way—an ancient Egyptian would feel right at home. That is not to say that icons are hieroglyphics, but they are pictoral representations of things that, on a PC, would be words.

What are icons, anyway? In one sense, words are icons, but very sophisticated ones. Mac icons are much simpler. They are *pictures that represent things*. For instance, an icon for the Mac equivalent of a PC directory (called a *folder*) looks like a manila folder. An icon for a word-processed document looks like a page of text. In general, icons convey in a picture what might otherwise require several words.

The Mac uses icons to represent files, folders, disk drives, commands, and other Mac objects. Some of the most common standard icons are the disk drive icons, the folder icon, the trashcan icon, System icons, and the standard document icon. You will learn about the specific properties of Mac icons as you read further.

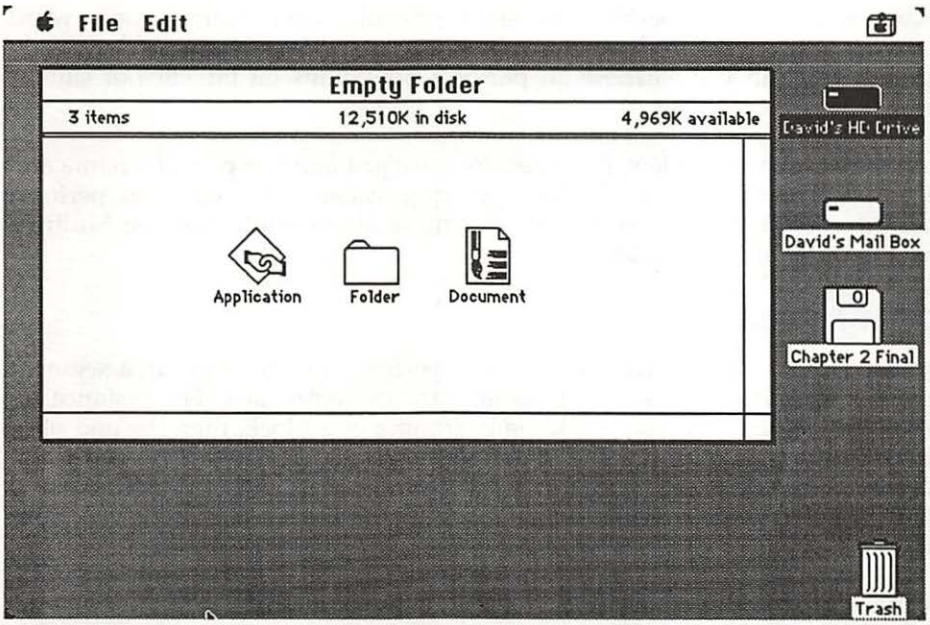


Figure 2-9. Standard icons

File Naming

On the PC, you can use almost any character except the backslash, the space, and the period to name a file. Each DOS file can have up to eight characters and the file extension up to three letters . A DOS file can be one character in length, with or without an extension. You probably never felt limited. You always understood what gr5d-4.doc meant even if nobody else did.

The Mac doesn't seem to be very word oriented, with its icons and windows and all, but it does like a good name. In fact, it likes names so much that you can create names with spaces (a PC no-no) and even with intelligible descriptions.

File and folder names can be up to 31 characters long and disk names can be up to 27 characters long. On a Mac, names can contain just about any character except the colon (which is the equivalent of the DOS backslash, used to designate elements of a path). Though the Mac lacks a PATH command, it does keep internal path information about every file, folder, and disk.

On the Mac, as on the PC, file names are not case-sensitive. A name like "apple folder" is the same as "Apple Folder" or "APPLE FOLDER."

Some PC users will miss the file extension. Not that you can't use a file extension on the Mac, it's just that the extension doesn't serve the same purposes as it does on the PC. On the PC, .exe, .com, or .bat files are all

executable files. .doc files may designate the files from your favorite word processor while .wk1 and .db may hold some special meaning for you. In addition, you can use *wildcards* to perform operations on bunches of similar files (Dir *.doc, for instance).

From the Mac point of view, file extensions are just another part of a name and hold no special signficance to the operating system. Nor can you perform wildcard operations with Mac files. For more about wildcards, see Multiple Selections later in this chapter.

Selecting Objects

In many PC programs, when you want to perform an operation on a segment of the information, you select it, using various commands. For instance, in many word processors, you mark the beginning of a block, then the end of it. The block changes color or highlights to indicated that it is *selected*. Similarly, you may select a range of cells in a spreadsheet or a subset of records in a database. You can then perform some operation on the selected portion of your data.

Though you will also select blocks of text, cells, or records in Mac programs, the concept of selection is even more important and pervasive in a graphic system like the Mac. Each icon is an object. You must select an object to tell the operating system, "This is the one I want to act upon."

Mac objects indicate the selected state in several ways, but the most usual way is to change the highlight color—the same way that a block of information on the PC is highlighted. In addition, certain icons may change shape when highlighted. Though this is rare, you may notice that some icons change completely when you select them.

USING THE MOUSE

At this point, you will have to hang up your keyboard for a while and start mousing around. If you are really a hard-liner, you may find yourself asking, "Isn't there a better way?" But take heart. Many a reluctant keyboard wizard has discovered that rodents aren't all bad.

One of the most important tools you will use when working with icons is the mouse. On the Mac, the mouse is not an optional appendage to the keyboard as it is for most PCs. It is an integral part of the Mac operating environment and is used to select objects as well as to perform a variety of other tasks.

When working with the mouse, you will often be working with icons. Most mouse techniques involve manipulating icons or choosing menu commands.

Button, Button...

If you are an experienced PC mouse user, you will probably feel that the Mac mouse has been through a difficult operation—to wit, the amputation of one of its buttons. (We all know what happens when you lose one of your buttons.) However, the Mac has always had only one button, while most of its PC counterparts have two or three.

Before you lament the vagaries of mouse evolution, you might want to know that the news isn't all bad. The single-button mouse is not as handicapped as it might seem. On one hand, you don't have that extra dimension, that extra choice or option represented by another button or two. On the other hand, you don't have to remember which button selected a word, which combination of buttons selects a paragraph, opens the menus, and so forth. On the Mac, the button is The Button. There is no other.

The question of how many buttons suggests several arguments. In favor of more buttons is the possibility of greater flexibility and control solely from the mouse. In favor of one button is the argument of simplicity. In addition, the single-button mouse has made a significant contribution to uniformity of technique among programs. Software developers can't be tempted to experiment with combinations of button presses. Though there will be proponents of both solutions, there does not appear to be any change in sight. The Mac mouse has always had one button, and appears destined to remain unchanged.

You might feel slightly handicapped at first if you are experienced with a multi-button mouse, but the Mac system has merit and works well. With a combination of simple techniques, you can use the Mac mouse to perform a variety of actions, and you'll soon find the very simplicity which at first seems limiting, becomes second nature.

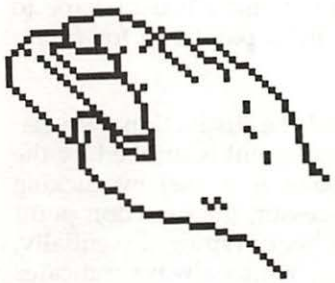


Figure 2-10. Holding the mouse

Cursors, Foiled Again

The mouse is a positioning tool. On the PC, you may be used to the cursor control keys located on or next to the numeric keypad. Among other things, you will use a mouse the same way you have used those keys—to relocate the cursor.

Usually, the cursor takes the form of a small blinking underline. This cursor represents the place where typed characters will appear on the screen. In Mac terms, this is the *insertion point*, and you'll see why this term holds significance on the Mac in a moment.

Another property of the PC's cursor is its ability to change shape. For instance, it can sometimes change from a blinking underline to a solid blinking square. This change often signals a shift from typeover mode to insert mode in certain programs.

THE MOUSE POINTER. Because the mouse is primarily a positioning tool, it uses its own cursor on the screen called the *mouse pointer*. When you move the mouse from one position to another, those movements are echoed by the mouse pointer on the Mac screen.

Ordinarily, the mouse pointer is a small arrow shape, but, like the PC's cursor, the pointer will change at times. This change in the pointer shape is a signal that the mouse function has changed or that the properties of the area beneath the mouse pointer are different. For instance, one common pointer type is called the *I-beam cursor*. The I-beam appears when you place the mouse pointer within an area that can accept text from the keyboard. Another common pointer shape is the *watch* (sometimes a spinning ball), which signals that the Mac is busy.

Many Mac programs use their own pointer shapes to indicate the current operation of the pointer. For instance, many paint programs use a brush shape to indicate that you can paint, a pencil for drawing, and a paint can for filling shapes with color or patterns.

THE INSERTION POINT. It is important to understand the distinction between the mouse pointer and the *insertion point*. The insertion point is marked by the presence of a blinking vertical bar. The insertion point is placed by clicking with the I-beam pointer. For instance, in a word processor, the insertion point represents the place where letters will appear if you begin typing. Essentially, the insertion point is the equivalent of the PC cursor, which always indicates the place where typed information will appear on the screen.

Figure 2-11. Mouse pointer shapes

The mouse pointer, on the other hand, is independent of the insertion point, and can be used to move the insertion point or to carry out other actions. In some programs, the mouse pointer will disappear while you type. However, moving the mouse will instantly make it reappear. At other times, there may be no insertion point until you specifically locate the mouse pointer in a text area and click.

> MACHINT: Holding and using a mouse is a fairly intuitive process, however for those of you who have never tried, here's a quick guide to proper mouse technique:
>
> To begin with, learn to hold the mouse comfortably. Place your hand, palm down, over the mouse. It won't bite. Your thumb should be located on the side of the mouse, and your third and little fingers should support the opposite side; the "tail" curls out in front of your fingers. Position your index and middle fingers over the mouse button, ready to tap it. Now move the mouse forward, backward, and side to side. Part of your hand can rest lightly on your desk or mouse pad while you move. By the way, a mouse pad is highly recommended. A mouse may find an ordinary table somewhat slippery and lose its footing. It also tends to get dirty and everyone knows that a dirty mouse is an unhappy mouse.

Sometimes you may find your mouse moving erratically. It may skip or become hard to control with precision. At first, you may suppose that the little rodent is damaged but it may only be dirty.

To clean the mouse, turn it over, twist the circular ring to open it, and remove the mouse ball. You may want to inspect the ball first, but inside the mouse are three round wheels. These often become encrusted with dirt from your desk and environment. With a toothpick, pen point, or other handy object, you can scrape off the coating of dirt, replace the ball, and find yourself with a mouse reborn.

Mouse Techniques

PC techniques almost all require effective use of the keyboard, the arrow keys, and the function keys. Important keys are the Ctrl and Alt keys which help modify the meanings of many of the PC keys.

On the Mac, the mouse is essential (not that the keyboard is entirely ignored). You use the keyboard primarily for basic text input, for issuing special commands (like on the PC), and for modifying the effect of the mouse actions. But you can't really use a Mac without getting your paws wet.

The basic mouse techniques are:

- Clicking
- Dragging
- Double-clicking
- Triple-clicking
- Marquee selections
- Shift-clicking

CLICKING. Clicking is used to select an object or to position the insertion point. Clicking the mouse is simply pressing the mouse button and letting go again, although sometimes, when you read a statement like "Click on the icon, and drag the mouse..." it refers to the dragging technique explained next.

To select an item, you simply position the mouse pointer over that item, press and release the button.

DRAGGING. Dragging is what you do at the end of a hard day at the PC. On the other hand, when you use a Mac, you start dragging almost immediately .

Dragging is actually a combination of clicking and moving the mouse. To drag an object, click the icon to select it, but don't release the button. Then, with the mouse button still down, move the mouse. The *outline* of the object moves with the mouse pointer. When you release the button, the icon of the object moves to the location of the outline.

You might give the command, **copy xyz.txt A:** on a PC to copy the file xyz.txt to the A drive. On a Mac, you simply would drag the file icon from one disk to the other disk.

You can use the dragging technique in many places. You use it to move files to other disks and folders; to relocate and resize windows (more on that later), to change the arrangement of objects on the screen, to draw shapes and lines in graphic programs, and even to select ranges of text, cells, or records within applications. As you will see later in this chapter, dragging is also the basic technique you'll use when working with the Mac's ubiquitous pull-down menus. Sometimes instructions in manuals will state simply "drag the icon..." but sometimes they will say, "click and drag the icon...." Both statements are equivalent.

MACHINT: Sometimes, when you are dragging an object, you will find that you cannot physically move the mouse any further in a certain direction. As long as you do not release the mouse button, you can lift the mouse from the desk or pad and reposition it. Then, you can continue with the dragging technique. This is especially useful when you have very little desk space available for the mouse.

DOUBLE-CLICKING. When you load a program on the PC, you usually type the name of that program or a batch file that runs it. To run a program on the Mac, in general, you would double-click on that program's icon.

Double-clicking is often used to activate a selection. For instance, to start a program, position the mouse pointer over the program's icon, then click the mouse button twice in rapid succession. You will learn many other appropriate places to use double-clicking. And don't worry if it seems awkward at first. It soon becomes very easy and it's generally much faster than typing a command.

MACHINT: Most mouse buttons have the same tension, but we have found some to be stiffer than others. If the button on the mouse you use seems very stiff, you may find double-clicking awkward and you may wish to trade it for an easier one.

TRIPLE-CLICKING. Triple-clicking is just what you'd think—clicking three times in rapid succession. Clicking three (or more) times isn't used too often.

Multiple Selections

Because icons on the Mac are individual objects, you can select them, pick them up and move them, and perform various other operations on them. What you can do to one icon at a time, you can often do to several. In this section you will see how to select more than one icon.

Although basic mouse techniques may seem foreign to many PC users, double-clicking often serves the same purpose as typing a .com, .exe, or .bat file name to execute a program. Here, multiple selection techniques are the closest Mac equivalent to PC wildcard operations which enable you to perform a single command on several files at once.

The Mac does not have wildcards. Because it is not text- or command-based, wildcards are not appropriate. However, this doesn't prevent you from acting upon more than one file or folder at the same time. It does mean that you will use different methods to choose the files and folders.

On the PC, wildcards are used to perform the same action upon a group of files that have some text information in common. For instance, you might issue a command like **COPY *.com A:** to copy all .com files to the A drive. Or you might issue a command like **ERASE Book*.doc** to erase all files that began with book and ended with .doc (book01.doc, booklet.doc, book999.doc).

On the Mac, there is no way to select multiple icons with wildcards by using a trait that they have in common. You can select icons on an individual basis or you can select multiple icons.

There are three basic techniques for selecting more than one item at a time:

- **Marquee**: Drawing a box around the icons to select multiple icons which are physically near each other on the desktop
- **Shift-click**: Using the Shift key with the mouse to select (or deselect) icons individually
- **Select All**: Using a commonly occuring menu item to select all the icons in the current folder (directory)

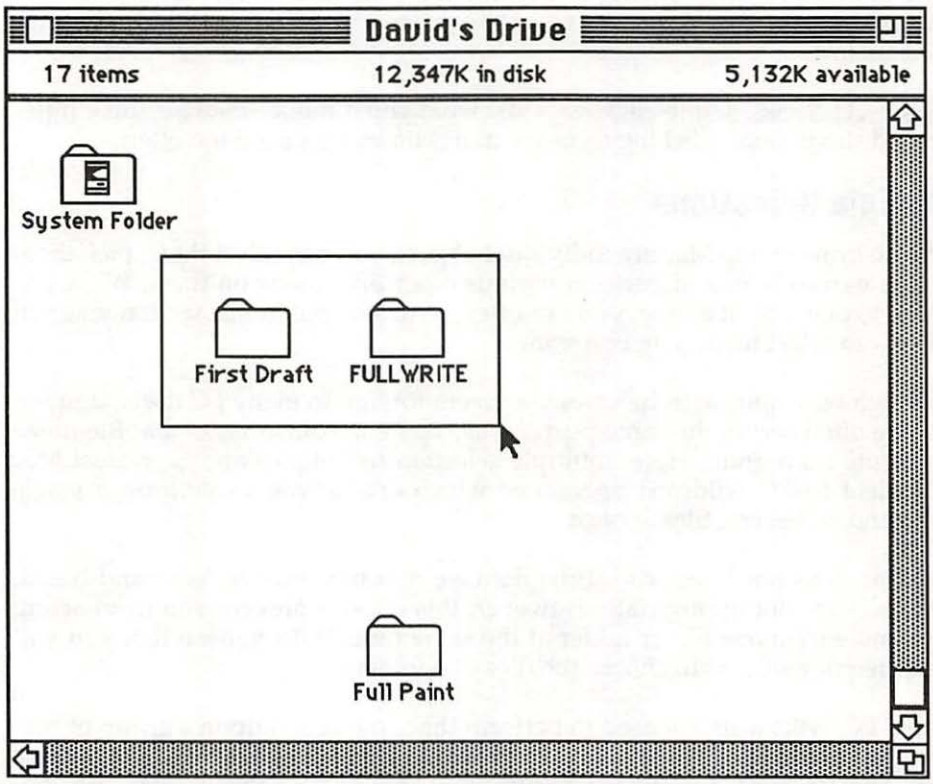


Figure 2-12. Marquee selection

THE MARQUEE. The first technique uses the dragging technique to draw a box around the items you wish to select. To do this, first envision the objects you wish to select as enclosed by an invisible square or rectangle. Then, find one corner of the shape and click once on that place. The mouse pointer should not touch any object or icon. Now drag the mouse from the original corner to the one diagonally opposite. A dotted enclosure (called a marquee) will expand as you move the mouse, and when you release the mouse button, all the objects

within that square or rectangle will be selected. You can now perform operations on those objects en masse.

SHIFT-CLICKING. The other way to select more than one object is called Shift-clicking. Shift-clicking involves holding down a Shift key on the keyboard while clicking the mouse. Shift-clicking extends the current selection, meaning that any currently selected objects or icons will remain selected, but the newly selected object or icon will also be selected.

Use Shift-clicking when you want to select non-contiguous objects and also to deselect an already selected object.

You can combine marquee selection with Shift-clicking. To do so, first select one or more objects using normal methods. Then, holding down the Shift key, draw a marquee around some additional objects. The new objects will be selected along with the original selections.

SELECT ALL. The Select All menu choice occurs at the Mac Finder level as well as in many programs. It simply selects all the files and/or folders in the current window (at the current folder, or directory, level). Most often, Select All is abbreviated Command-A.

MACHINT: You can also use the Shift-click technique as an exclusion operation. For instance, you can use Select All to select all the icons in the current window or the marquee technique to surround an imaginary rectangle containing the icons you want. But suppose that you don't want to select one or more of the icons within the selection. You can easily Shift-click on those that *don't* belong to exclude them from the selection, and therefore, from the current operation.

The characteristics of the mouse operation can be set to individual tastes. Chapter Four will explain how to set mouse speed, double-clicking speed, and other useful parameters.

WINDOWS

If you consider icons as the basic objects in the Mac system, and the mouse as the primary means for manipulating these objects, you still need a place to keep your information. In a sense, you need a container for your icons and for your work.

The Mac uses windows as the containers for information. These windows have many special characteristics. You can open them, close them, move them, change their shape and size, and display them side by side—one on top of another, or any way you want. Windows are another of the universal objects in the Mac system.

The bare DOS screen shows very little information. Typically, a drive letter and a flashing cursor are displayed. Until you actually issue a command, there is

little else to see—despite the fact that there may be a vast array of programs and document files on the disk waiting for you to work with them.

Likewise, it is probable that when you to boot up a Mac for the first time you will see nothing but a set of menus across the top of the screen, a disk drive icon, and the trashcan icon. If you are looking for the command line, forget it. There's no place to type a command.

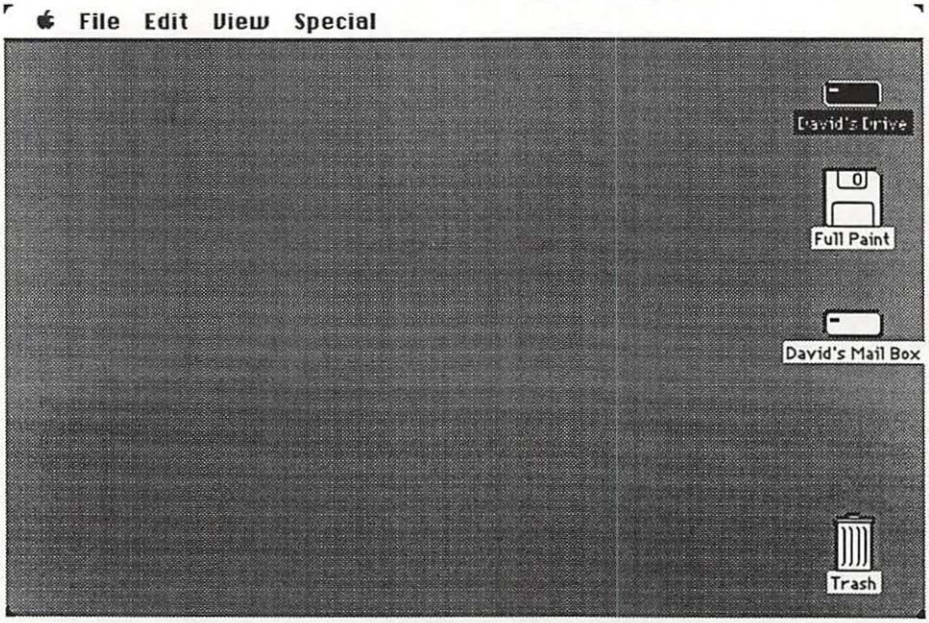


Figure 2-13. Finder with no open window

Now on the PC, if you want to see what is on a disk, you would use the DOS DIR command to list the contents of the disk to the screen. At any one time, you can list the contents of a single directory, and the root directory listing shows all the basic files and subdirectories at that level of the disk. This root directory listing is, in a sense, like peeking at the basic contents of your disk drive.

The information you see on the PC scrolls up and out of view. You can't move backward to view it at your leisure, though you can use various commands to stop the scrolling display a screen at a time.

The Mac places most of its information in windows. File and folder listings are always in individual windows; programs run inside their own windows; multiple documents opened at the same time by programs may each occupy a separate window. These windows aren't plate glass or even plexiglass. They are simply little software environments. But Mac windows all share certain common characteristics—whether they are file listings, a single folder, or a document running within an application.

Other than Microsoft Windows, Framework®, and various other specific PC programs, windows play little part in the daily life of the PC user. However, as much as you may think *mouse* when you think Mac, you'll also come to think *window*.

In this case, double clicking on the disk drive icon opens its associated window.

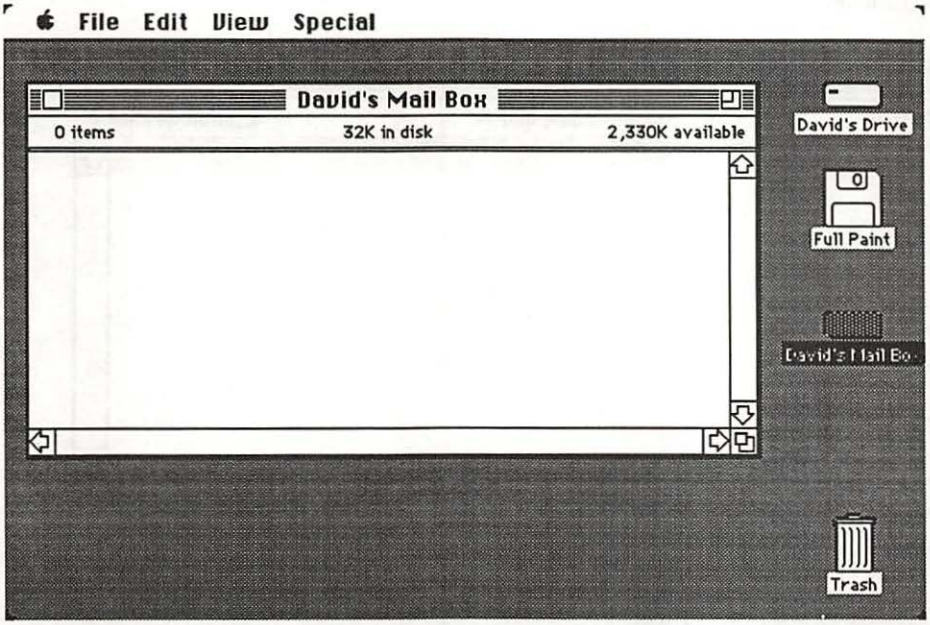


Figure 2-14. Finder with basic window

In some ways, the information displayed in that window is the same information you got when you executed the DIR command on the PC. It displays the file and folder icons that represent the information on the disk—at the root level. However, this display does not scroll, but remains stationary as you view it. Though these are both views of similar data, they employ vastly different systems and offer vastly different features.

Earlier, we said that you can open a disk drive window by double-clicking on the disk drive icon. This is also true of folders. Double clicking on a folder icon not only opens the associated folder window, it also makes that folder active. This is the direct equivalent of using CHDIR to change directories, then DIR to display the file listing for that directory.

(You can also open a disk drive or folder window by selecting its icon and choosing Open from the File menu).

When you open the drive window, ordinarily you will see a set of icons representing the files and folders on that disk. You'll also notice that the

window seems to expand out from the original disk icon. This is one of the useful features of the Mac that you'll probably take for granted. Whenever a window opens or closes, it expands out from or back to its origin—a disk icon or folder. On a crowded desktop, this can be a valuable way to locate your current working location. In addition, the drive or folder icon last used will remain selected. Although this may seem an unnecessary visual trick, it is much more.

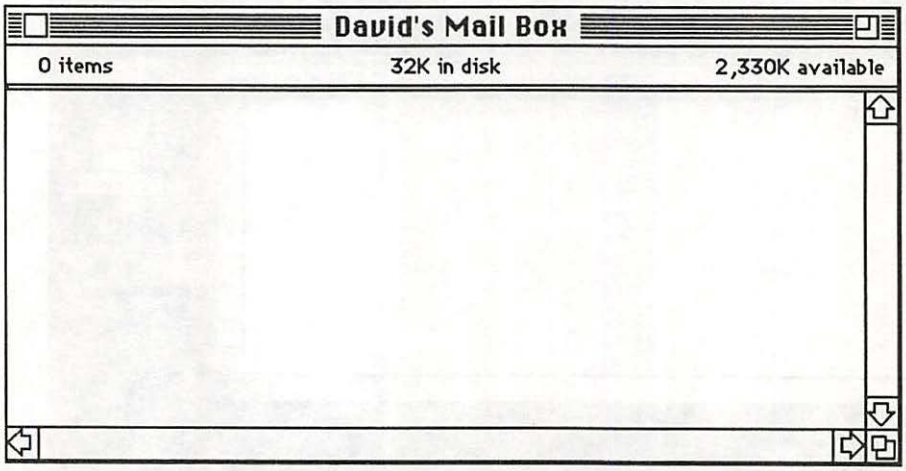


Figure 2-15. Labeled window example

Each disk, folder, or application window contains several important features:

- Title bar
- Close box
- Zoom box
- Scroll bars
- Size box or grow box

These features do not have exact analogies with familiar DOS constructs. They are more concerned with the physical side of window navigation and manipulation. However, some windows, particularly disk and folder windows, display information that you might obtain from various DOS commands. And some window operations have analogous procedures on PCs. Where these exist, we'll point them out.

The title bar. The title bar is the horizontal area at the top of the window. It contains the name of the disk, folder, or document to which the window belongs. Click and drag the title bar to move the window anywhere on the Mac screen. When there are multiple windows displayed on a screen, the title bar of the most recently selected, *(active)* window shows a series of horizontal black lines. *Inactive* windows still display their titles, but the lines are missing. Scroll bars are displayed only for the active window.

Figure 2-16. Title bars

Beneath the title bar of a disk or folder window, is a line containing information about the number of files on the disk or in the folder, and the space used and space still available on the disk drive. This is some of the same information you might obtain using the DOS command, CHKDSK. The contents of a window are, in fact, a directory listing of the disk or folder. Therefore, no explicit DIR command is used on the Mac. Simply opening a disk or folder window produces a file and folder listing. You'll learn more ways to display file listings in Chapter Three.

In contrast to disk and folder windows, ordinary document windows (the kind you use when running applications) display the data with which you are working (for instance, your writing– if the window belongs to a word processor).

Figure 2-17. Close box

The close box. In the upper left corner of the window inside the title bar is the close box. Clicking on the close box—you guessed it—closes the window.

The zoom box. The zoom box is handy for temporarily making a window fill the entire Mac screen. Click the zoom box again to return the window to its original size. Of course, if the window filled the screen to begin with, the zoom box will have no effect. (The zoom box is not available on some of the oldest Mac computers. If you don't see zoom boxes, chances are you have one of those systems.)

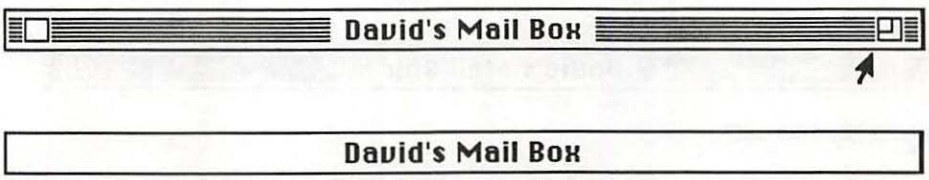


Figure 2-18. Zoom box

The scroll bars. Most PC programs, including DOS, display information screen by screen. In word processors, databases, spreadsheets, and the like, you can scroll to points above, below, right, or left of the current cursor position. You do so with the aid of keys on the keyboard (like the arrow keys, PgUp, and PgDn) and also special keys unique to the program you are running. In unmodified DOS, you can scroll information only in one direction. You can't scroll back up, for instance, in a directory listing.

Scroll bars are used in Mac windows and virtually all Mac programs wherever the contents of a window exceed that window's boundaries. Whatever kind of window—disk, folder, or document—the scroll bar is a standard feature.

Scroll bars can be either vertical or horizontal. The vertical scroll bar is more common, occurring in a wide variety of situations. It sits along the right side of a window. The horizontal scroll bar appears when the full contents of a window cannot be displayed in the window as sized. In some cases, if there is no data outside the current window's boundaries, the scroll bars will appear as empty outlines with no scroll box. If a window is inactive, the scroll bars will appear as empty rectangles with no scroll box or arrows.

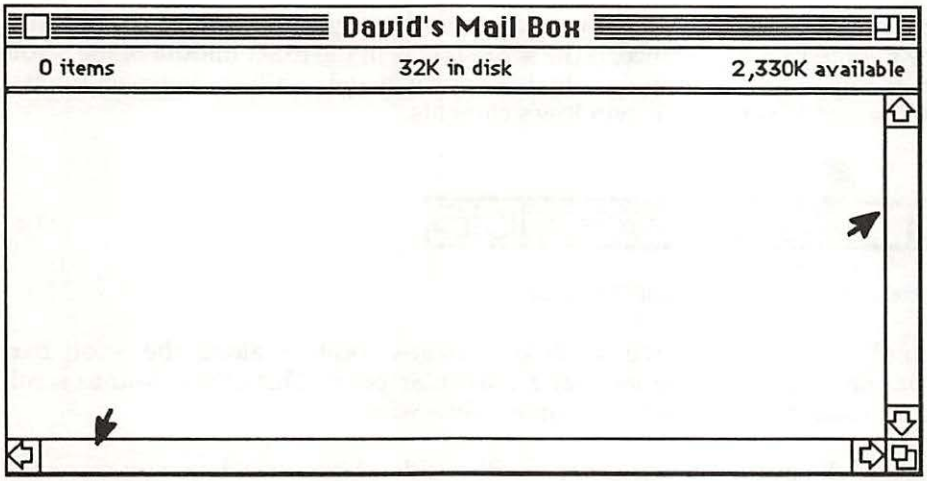


Figure 2-19. Window with empty scroll bars

A scroll bar itself is made up of several parts: the vertical or horizontal bar, the scroll arrows, and the scroll box (thumb).

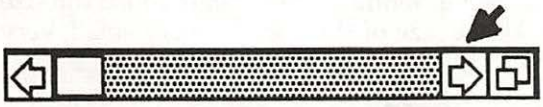


Figure 2-20. The scroll arrows in the scroll bar

The scroll arrows are at either end of the scroll bar. Clicking once on a scroll arrow moves the data within the window to display additional information one line or character at a time.

The scroll arrows work in much the same way as the Up and Down Arrows do in PC programs. For instance, with the cursor positioned at the bottom of a screen, you would press the Down Arrow key to move to the next line down. On the Mac, you would click on the downward facing arrow at the bottom of the scroll bar. The main difference is that, on the PC, when you press the Down Arrow, the cursor itself moves. On the Mac, clicking the scroll arrow always affects the entire contents of the window, not the insertion point (though the insertion point will usually stay in view).

The scroll arrows on a horizontal scroll bar function similarly to the Right and Left Arrow keys on the PC.

The scroll box (sometimes called the thumb) serves two purposes—neither of which has any exact parallel in most PC programs.

First, it gauges where you are in relation to the beginning and end of the window's contents. For instance, if the scroll box is in the exact middle of the scroll bar, then you are viewing data that is approximately halfway between the beginning and the end of the window's contents.

Figure 2-21. The scroll box in the scroll bar

Second, you can drag the scroll box to any location along the scroll bar, positioning the window view at a particular point. This allows you to scroll almost immediately to any position within a window.

If you click once in the scroll bar to either side of the scroll box, you cause the viewpoint within a window to move by approximately one screenful (depending on how much data remains to be displayed). This is a quick way to scroll through a desktop listing or document. Using this method is similar to using PgUp and PgDn within PC programs to scroll one screen at a time.

The size box. Where the scroll bars meet is another small square called the size (or grow) box. Drag this box to make the size of the window very small, very large, square, rectangular, and so on.

Figure 2-22. Size box or grow box

Using the size box and the title bar to size and position windows, you can customize the way your Mac screen appears. The Finder saves the size and position information for each window, so you needn't resize and reposition windows again and again if you like the way you have them organized. This is especially handy if you work with large screens, since you can have many folder windows positioned so they can all be visible at once. The Finder does not remember if a window was zoomed or not, however, so if you like to work with zoomed windows, you will have to click the zoom box each time you open a window or return to it after running an application.

MACHINTS: you don't want the Finder to "remember" anything about opening a window–its size or shape, or even the fact that it was opened at all–hold the Option key while you open the window. For instance, if you want to run an application within a folder, but you want the folder window to be closed when you quit the application and return to the Finder, hold down the Option key when opening the folder window.

With multiple windows on the Desktop, click one to make it active and bring it to the front of the stack. You can move a window that is currently in the background without activating it by holding down the Command key while dragging the window. It will move, but will not become active.

If several windows are open, and you want all of them to close, hold down the Option key and click the active window's close box.

Selecting the Active Window

The Mac uses the mouse to select objects, including drives and folders. Therefore, to select a new active drive, you would click either on its drive icon, or in its open window. Either action is the equivalent of typing a drive designation on the PC.

Similarly, to change active folders, either click on a folder icon or on the folder's open window. Either action takes the place of the DOS CHDIR command.

There is one additional circumstance–that of clicking an application window. You'll learn more about that in Chapter Three when you learn about MultiFinder, the Mac multitasking operating environment.

MENUS AND DIALOG BOXES

Menus

Well, you probably noticed those words at the top of the Mac screen right off. You probably recognized them as menu titles. Pull-down menus are pretty common these days in PC programs, so you probably aren't too mystified by the Mac versions.

On the other hand, you may not have used this kind of menu since not all PC programs use them. However, chances are good that you have used the so-called Lotus-style menus. Lotus-style menus are hierarchical menus that show a single line of options across the top of the screen. Some options lead to submenus while other options lead to prompts or carry out actions.

Some common PC programs that use Lotus-style menus are RapidFile®, Lotus 1-2-3 (of course), and Paradox.

On the other hand, many PC programs now use pull-down menus. Among them are some top programs like dBASE IV™, Windows, and PageMaker. So there is a passing chance that you've see Mac-like menus before.

A pull-down menu shows its menu title along the upper edge of the Mac screen. This lineup of menu titles is called the *menu bar*. Clicking on a menu title and holding the button down causes the actual menu to appear below the mouse. To select an option from a Mac menu: click on the menu title, keeping the button pressed as you pull down on the mouse to highlight the menu item desired. Release the mouse when you have selected an item. The selected item will flash briefly and the command will be executed.

MACHINT: If you start to choose from a menu, and then change your mind, simply drag the mouse pointer out to the side or out the bottom of the menu before letting go of the button. No menu item will be selected.

Most Mac applications feature their own sets of menus, but certain menus are almost universal. The Finder displays the Apple menu (indicated by a small Apple icon), the File menu, the Edit menu, the View menu, and the Special menu. Of these five menus, the Apple, File, and Edit menus are found in most applications (although frequently with some modifications to their contents). These menus are examined in more detail in Chapter Three.

Although menu items are ordinarily selected by dragging the mouse pointer (as explained above), many menu items have what are called Command-key equivalents. These are generally marked on the menu itself. For instance, in the File menu of the Finder, Command-N creates a new folder, Command-O opens a window on a selected folder or disk or launches a selected application, and Command-W closes a window (the same thing the close box, and the Close item on the File menu does).

AUTHORS' NOTE: How and when to use keyboard commands as opposed to menu commands or mouse techniques is a matter of personal preference. Each Mac user finds a unique blend of techniques that fits his or her personal work habits. Sometimes you'll find yourself using one technique more than another, then, suddenly, you'll find that you prefer to do things a different way. That's one of the beauties of the Mac system. You aren't locked into one way of doing things. The mouse is an intuitive way to do things, but keyboard commands are often more convenient, once you get used to them.

An experienced PC user at first may find using a mouse a bit awkward. Removing your hand from the keyboard to manipulate the mouse may be distracting. It was for us. However, as time passes, the techniques of keyboard and mouse will blend into a smooth operation, and the initial awkwardness will give way to a greater efficiency.

So if you are experiencing some difficulty adjusting to the mouse, you aren't alone. In all likelihood you'll find the transition is short and worth the effort, just as we did. Moreover, you don't have to feel trapped by the mouse. You'll learn that you often have options that let you use the keyboard for many operations.

Many menu options carry out commands immediately. These options are similar to DOS commands, which are usually immediate in effect. However, some menu items do not execute an immediate command. Instead, they cause the display of a special information box called a *dialog box*.

Dialog Boxes

DOS communicates with you in a brief and often cryptic way. A mistake is a Syntax Error, a Bad Command, or a Filename Error. In any case, what the PC says to you is short and to the point, but sometimes inadequate.

On the other hand, the Mac does things a bit more visually, and perhaps more loquaciously. The Mac communicates with you by means of *dialog boxes*. And what's more, it often gives you a chance to answer where messages from DOS are almost always rhetorical.

Often, a menu command will lead to a dialog box, which may simply be an *alert box* (a warning or message only), or a dialog box that requires you to make selections, insert text, or interact in some way.

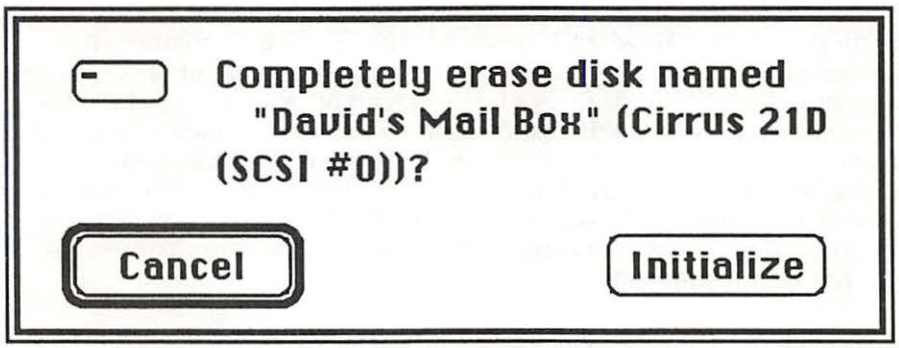


Figure 2-23. Alert box

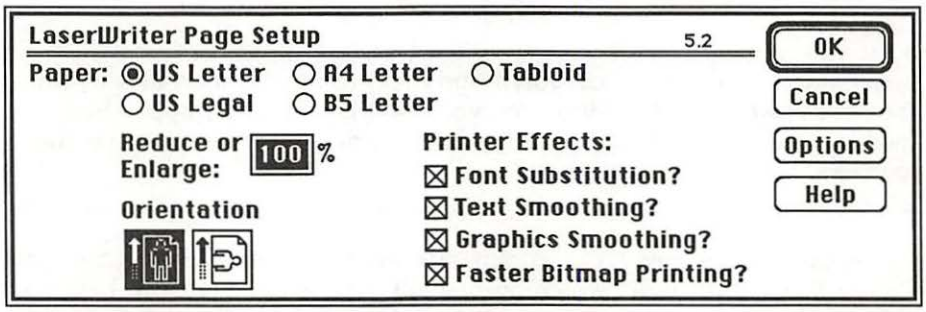


Figure 2-24. Dialog box example with buttons, default buttons, radio buttons, check boxes

Dialog boxes may contain one or more of the following items:

Buttons. Clicking a button instantly implements the action the button represents. Almost all dialog boxes have both the OK and the Cancel buttons. OK is used universally to accept the information in the dialog box and continue. Cancel generally backs out of an operation.

Default buttons. A button that has a thick outline around it is the default button. Pressing the Return key or sometimes double-clicking an *item* will also activate the default button. Buttons, however, are single-click items. You do not need to double-click a *button*.

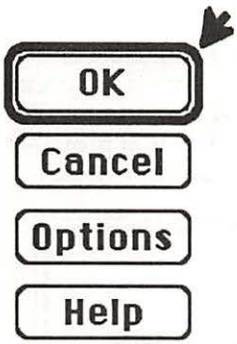


Figure 2-25. Default button

Radio buttons. Radio buttons are used to select from a list of possibilities. Only one radio button in a list of radio buttons may be selected. Selecting a radio button does not initiate an immediate action. It sets an option or choice to be implemented when you click the OK button. If you click the Cancel button, any choice you have made by selecting a radio button will be canceled as well.

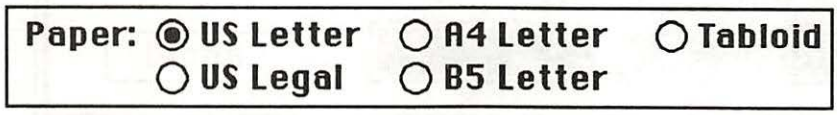


Figure 2-26. Radio button

Check boxes. Like the radio button, check boxes are used to select items from a list, but more than one check box can be selected per list.

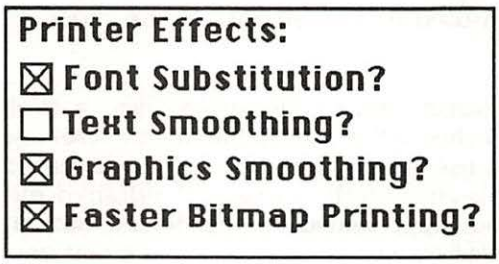


Figure 2-27. Check boxes

Text boxes. A text box is a place to insert text information. For instance, in a typical save file dialog box, you type the name of the file to save in a special text box field. When a dialog box contains more than one text box, use the Tab key or the mouse to move between them. Pressing the Return key will probably activate a default button or possibly erase the contents of the current text box.

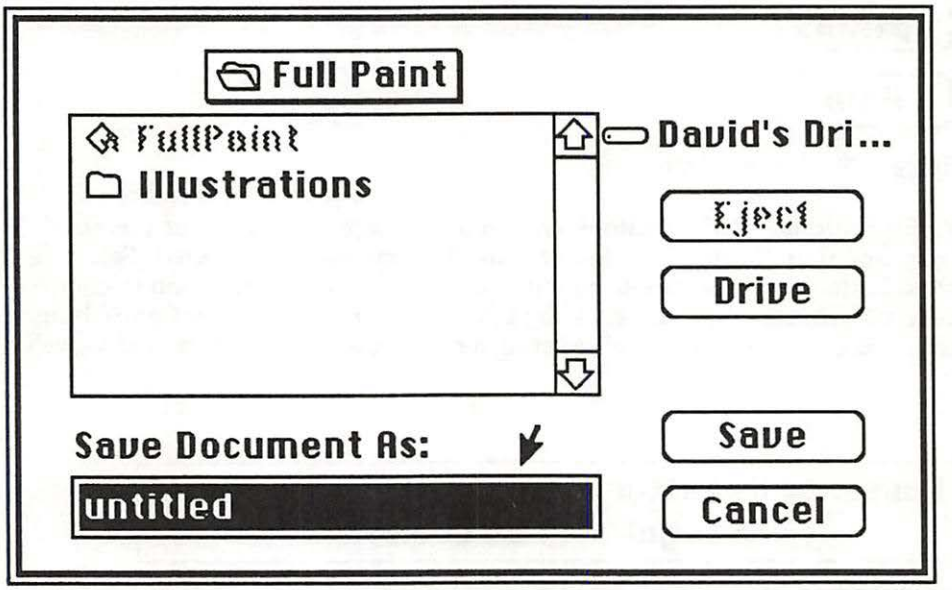


Figure 2-28. Text boxes

List boxes. On the PC, you select a program to run or a file to use by typing its name. Some PC programs will display a list of available document files from which you can choose. Others simply require you to remember which file you want. There is no universal convention used by PC programs when choosing files to load.

On the Mac, however, when you must select from among several files, most of the time you will see a list box. You can choose the appropriate file by scrolling through the list and selecting the file to use or by typing the first few letters of the file you want. You can often double-click on the name of the desired file both to select it and perform the action represented by the default button. Pressing the Return key with a file selected will also do so. Notice that you rarely have to type the actual file name itself. In fact, you usually type the name of a file only once on the Mac—when you first name (or rename) it.

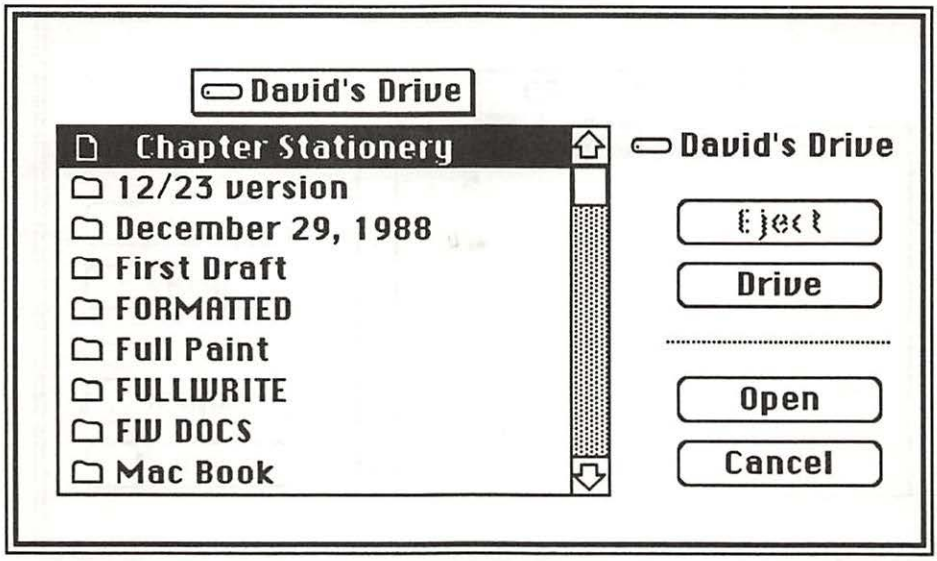


Figure 2-29. List boxes

The Drive button. On the PC, you can often load files from or save files to different directories or disk drives. Most PC programs provide a way to do so. However, there is no uniform method for doing so other than to type in the DOS path at the appropriate prompt.

On the Mac, you can select other active drives by clicking the Drive button on a standard list or save file box. You can move to folders at a lower level by double-clicking a folder name in the list, or by selecting and then clicking the Open button. If you need to change disks in a floppy drive, you can press the Eject button to remove the current disk and then replace it with another. Any time you place a new disk in a floppy drive while a dialog box with a Drive button is showing, that disk becomes the default drive.

You can move up the hierarchy of folders by clicking on the folder name above the file list, then dragging down to highlight the level to which you wish to move.

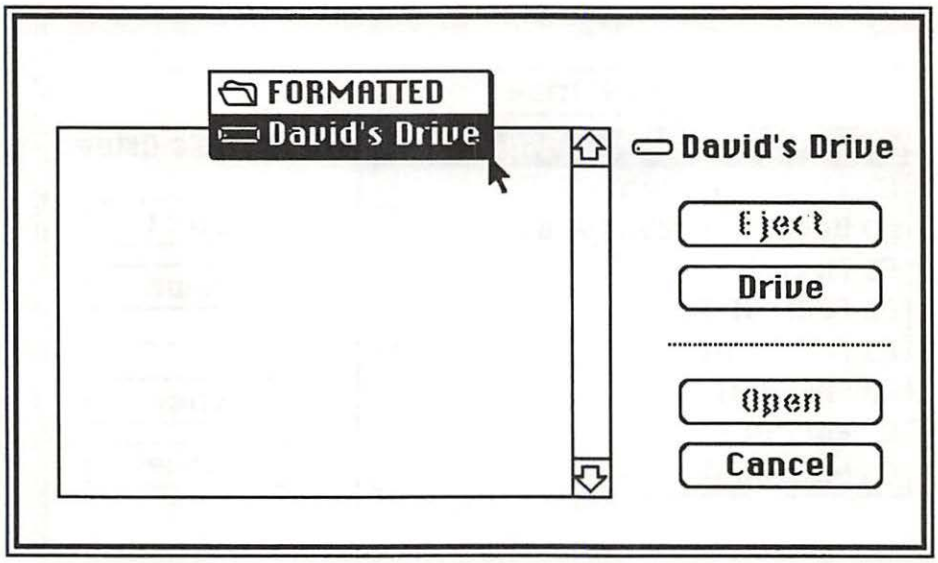


Figure 2-30. Selecting a folder in a dialog box

MACHINTS: Besides typing the first letter or so to select a file from a list, you can use keyboard shortcuts to change drives, to move up and down within the HFS system, etc. These shortcuts don't work within every application, but some quick experimentation will tell you whether they will or not.

- To change drives in certain dialog boxes, press the Tab key. To eject a disk in some dialog boxes, press Command-E. To move up the Hierarchical Filing System (HFS), press Command-Up Arrow. To move down the HFS, press Command-Down Arrow with the sub folder highlighted (same as double clicking). (For additional information on HFS and MFS, see Chapter Three.)

- In some cases, you can use the tilde key to move quickly to the end of a list, and the Backspace or Delete key to move to the beginning, but be advised that these options will not work in dialog boxes where a text box is present. In such dialog boxes, the insertion point is automatically placed in the first text box, and pressing any normal keyboard character will operate on the text box contents, not the list. This is also true of using the first letters to locate a specific file or folder.

Some practice with dialog box shortcuts will increase your enjoyment of the Mac. As you become more and more familiar with the tricks and shortcuts offered on the Mac, your actions will become more streamlined and you will save time and effort.

A Closer Look at Menus

Many PC users praise the simplicity of the DOS command line and like a no-frills approach to computing. If that description fits you, then you probably won't appreciate the many details that the Mac operating system throws at you. But, if the PC operating environment has some of the basic simplicity and beauty of the high desert, the Mac environment has perhaps made a forest path out of it—with lots of trees and subtle undergrowth.

One of the subtle visual clues the Mac offers has to do with the way it displays menu choices. There are several important and useful visual conventions designed to help you be more effective with menus.

- The Mac operating system is intelligent about when a particular menu command can or can't be used. When a menu item is unavailable, it is dimmed, or displayed in gray. For instance, if nothing is selected, the Open item in the File menu will appear gray—there is nothing to open. Click once on any icon, and the Open menu command appears dark again, meaning it is available.
- Menu items with Command-key equivalents usually indicate the appropriate Command-key to the right of the menu item.
- Often, menu commands are separated by horizontal lines. Though these lines do not change the functions of the menu commands, they are used to group menu commands for easy interpretation.

Other clues tell you something about what will happen when you choose a menu command:

- Plain menu choices perform an immediate action. These act as direct commands.
- Some menu commands lead to a dialog box. These contain an ellipsis (...) after the menu command name.
- Menu commands followed by a right-facing arrow lead to submenus or, in Mac terminology, *extended menus*.

Figure 2-31. Menu example with dimmed items, command keys, ellipsis

EXTENDED MENUS. Extended menus are among the newer innovations in Mac menus. You can open an extended menu by selecting a menu item which contains a right facing arrow after the option name. Once the extended menu is open, you keep pressing the mouse button, dragging it into the extended menu where you can highlight another choice. Releasing the mouse carries out the chosen action on the extended menu. This action requires more precision with the mouse than choosing from an ordinary menu.

Some special extended menus will remain on the desktop when you choose their title on a previous menu. You can then choose an option from one of these so-called *sticky* menus without the manual dexterity sometimes required of the ordinary extended menu.

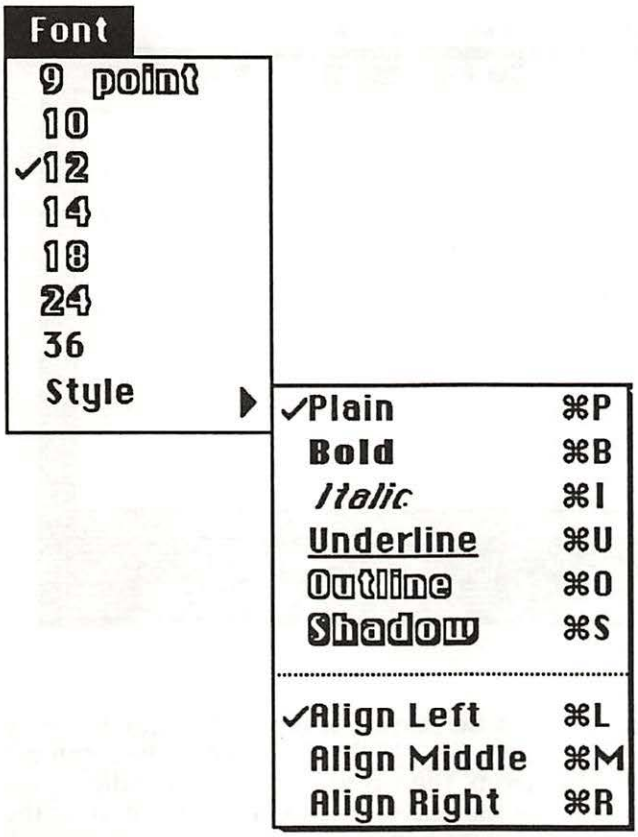


Figure 2-32. Sub menu

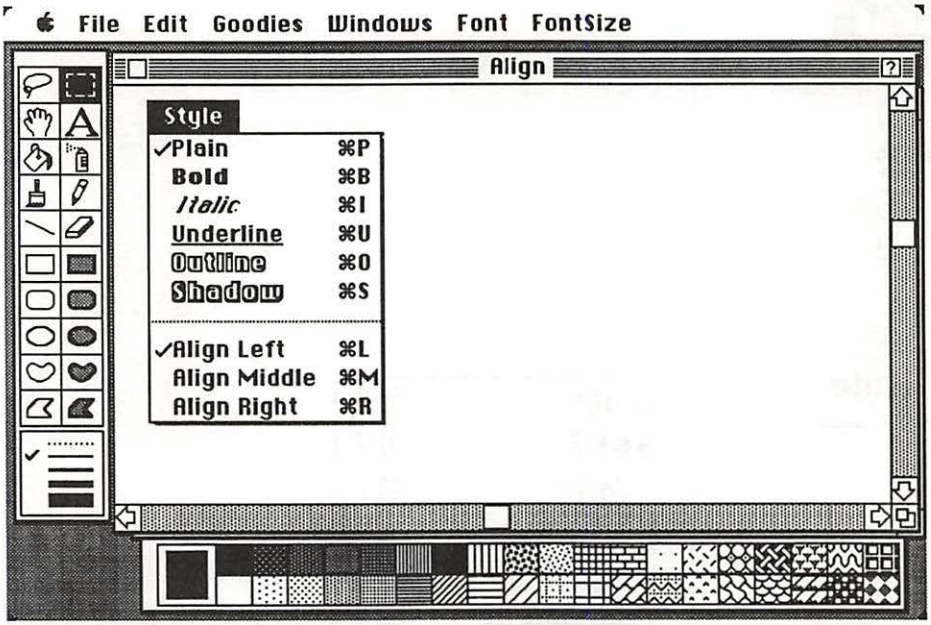


Figure 2-33. Tear-off menus

The newest kind of menus are called the tear-off menus. Although currently rare, this menu type allows you to actually take the menu out of the menu bar and place it anywhere on the Mac screen. There is no visual clue to indicate that a menu is of the tear-off variety, but the easiest way to find out is to drag the mouse all the way through a menu, out the bottom, keeping the button pressed. If the menu is a tear-off menu, a dotted outline of the menu will follow the cursor. An example of a tear-off menu is the Tools menu in HyperCard.

For more information about different types of Mac menus, see Chapter Five.

GOING FORWARD

In this chapter, you have learned many of the basic tools and techniques necessary to work effectively with the Mac. You have learned about the mouse, icons, and windows. You have also learned about starting the Mac. In the next chapter you will learn more about the Mac interface—in particular, about the Finder.

The Finder and the desktop are the Mac equivalent of the interactive portion of DOS. It is from the Finder that you will duplicate the operations you normally perform in DOS on the PC. However, the Finder has very different characteristics and methods as you have already seen in this chapter. Chapter Three explores these characteristics and methods further, with special attention to the standard Finder menus.

The Finder menus are, in some ways, the equivalent of the many DOS commands that you use from the DOS command line on the PC. Therefore, they form an integral part of the Mac Operating System.

3

The Operating System—Commands and the Finder

The PC operating system comes with a set of internal commands like DIR and TYPE. It also features a set of external or file-based DOS commands that you access from a disk. These internal and the external commands are the primary tools of the PC operating system. You can use them to view and modify the contents of your disks, set the screen display, change input/output port parameters, edit text files, and much more.

(For a complete reference to DOS commands and how they relate to the Mac, see Appendix A.)

DOS commands are only useful at the DOS level, however. You will never see these commands operating from within other programs, which always use their own command structures. As a consequence, although a knowledge of DOS is important for handling disk-related and system-related situations, that same knowledge is of very limited use when it comes to learning new programs on the PC. Each program has its own commands, structure, and methods.

In contrast, many aspects of the Mac operating system are found universally in Mac applications. The reason for this uniformity has to do with the way the operating system works.

What we usually think of as the Mac operating system actually has two identities—one, a true operating system running behind the scenes, and the other, the Finder, a special Mac application. The Finder is the closest Mac

equivalent to the total set of DOS commands, but because it is also a Mac application, it shares many important features with all the other Mac applications.

Like the DOS system commands and tools, the Finder is a set of commands and utilities. Unlike DOS, however, the Finder uses the standard Mac interface with its icons, windows, menus, and dialog boxes—Mac features introduced in Chapter Two. In a sense, the Finder serves as a model for the Mac interface, which is why understanding how the Finder works offers such a leg up toward understanding how everything else works on the Mac.

For the most part, icons, windows, menus, and dialog boxes work the same way, regardless of the application. What differentiates one Mac application from another has more to do with the *contents* of the windows, and the *contents* of the menus than with the way these features work. In the case of the Finder, the windows always contain file and folder icons, and the menus offer specific commands and tools for working with those files, folders, and other aspects of the system.

Unlike DOS, many of the Mac system-level operations are always available. These features are not specifically part of the Finder, and you will learn more about them in Chapter Four in the discussions of System Folder files and desk accessories. For now, it is only important to realize that, although the Finder menus duplicate many of the functions of various DOS commands, they do not replace every DOS function.

In addition to the Finder and the Finder menus, this chapter introduces a very important Mac tool—the Clipboard. There is no DOS equivalent of the Clipboard, though some PC programs do offer internal clipboard-like utilities.

The Clipboard keeps information that has been cut or copied from the Mac screen. You can then paste that information back to the screen at another location or even within another window. The Clipboard is discussed in more detail later in this chapter.

The Clipboard becomes even more exciting when you start working with more than one application at the same time. On the PC, multitasking is not common, and requires special software, and usually extra memory, and faster, more powerful machines.

On the Mac, multitasking ability comes standard with every operating system. It's called MultiFinder, and you'll learn more about it later in this chapter.

In addition to a discussion of the Finder and its menus, the Clipboard, and MultiFinder, you'll learn more about the Mac equivalents (or the lack thereof) for the following DOS commands:

- CHKDSK
- VER
- MKDIR
- RENAME
- PRINT
- ATTRIB
- COPY
- XCOPY
- MODE
- DIR
- SORT
- MORE
- DELETE or ERASE
- FORMAT

THE FINDER

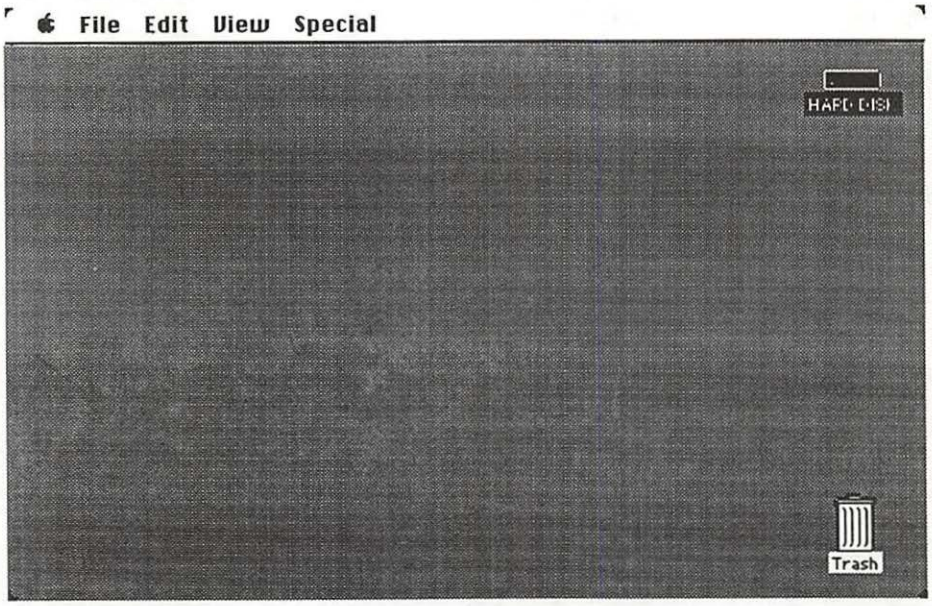


Figure 3-1. Generic Finder example

The Finder is the primary Mac "desktop." More accurately, the Finder is a collection of graphic elements and utilities that form the basic platform for launching applications and managing data. The Finder is an integral part of the Mac operating system. It is the part of the operating system that you see and that interacts with you.

In this chapter, you will learn more about the Finder, including specific information about the Finder menus, which, in their own way, form a large part of the basic operating system interface just as the set of DOS commands comprises the main operating system interface on the PC. In some ways, the Finder menus are your "command line" when you are working with the Mac.

Before learning about the Finder menus, however, you will find it helpful to learn how the Mac organizes and manages its files, folders (directories), and disks.

MANAGING FILES AND FOLDERS

It is a good idea to organize your data logically. That's true whether you use a PC or a Mac. Here, at last, there is agreement. On any large PC hard disk, you must use directories and subdirectories to keep your files in order.

Mac terminology refers to directories as *folders* and displays them as little images similar to manila folders used in file cabinets. Other than their appearance, folders serve pretty much the same purpose as PC directories. With folders you can manage even a very large hard disk with a minimum of effort. You might create a folder for all information pertaining to one department in your business, for instance, and create sub-folders for different document types.

On the PC, when you want to create a new directory, you use the MKDIR command. To create a new folder on the Mac, you can select New Folder from the Files menu, or press Command-N. The folder is initially called Empty Folder, but you can immediately type a new name for it.

The way you manage folders on the Mac is essentially the same as the way you manage directories on a PC. However, remember that Mac folders are also *icons*, and can be placed in different physical positions within a window. This ability to determine the order and arrangement of folders is a benefit in a graphical interface where objects exist in two-dimensional space. In contrast, you can work with PC directories one at a time, and nothing about their relative arrangement to each other makes any difference.

MFS and HFS

The folder icon is special in that it can contain other files and folders. Like a manila folder in a filing cabinet, a Mac folder can be used to contain numerous other items.

However, the original Macintosh Filing System (MFS) was a flat system which did not allow more than one folder level per disk. It has been almost completely replaced by the newer Hierarchical Filing System (HFS) which allows multiple folder levels. Under HFS, folders can reside inside other folders many levels deep. The invisible Desktop file keeps track of where files and folders are found.

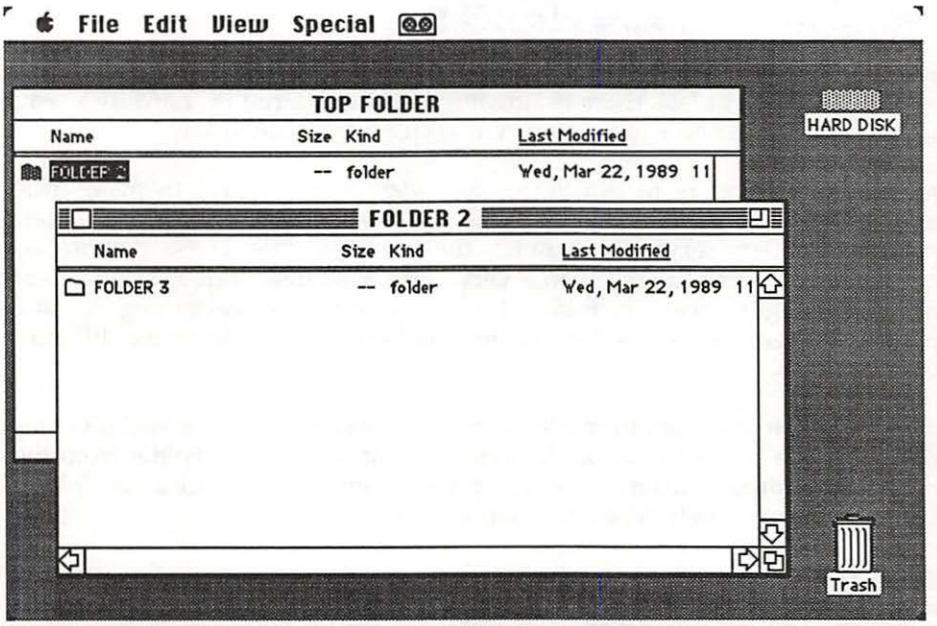


Figure 3-2. HFS folder structures

Diverging Paths

Part of managing directories on a PC involves using the PATH statement to make sure that you can run important programs from any disk or directory. Earlier in this chapter, we mentioned the absence of a PATH statement on the Mac.

To understand why the Mac has no PATH statement and the PC does, first look at how the PATH is used on a PC. It is used to tell DOS where to look when you try to open a file that is not in the current directory.

On the other hand, when you run a program on the Mac, you generally open its window and double-click on its icon. (This is the Edward R. Murrow approach—You Are There.)

Having multiple folder windows open on the desktop is no problem; a simple click of the mouse can bring one or another to the front of the stack. On a PC, moving to a different directory is a complete action and to move back again requires another complete action.

The PC's PATH command saves you from having to change directories. The Mac requires you to manipulate the icon directly. (There are some utilities available that allow you to run programs without direct manipulation of a program's icon, but ordinary Mac procedure is as described.)

Identifying File Types

Despite its lack of a PATH command, the Mac does have a few tricks up its sleeve and they have to do with the unique way the Mac operating system recognizes files.

On the PC, files you identify files by their three-letter extensions. Some files are *executable*—those with .com, .exe, and .bat extensions. All other files are *not executable*, but must, in some way, interact with another program or with DOS to be useful. You might think of these other files as *documents*.

The Mac also divides most files into two basic categories—applications and documents. Applications are like .com and .exe files. You can *launch* them. Documents must, in some way, interact with an application to be of use. There are some exceptions to this rule, including such files as INITs (which were introduced in Chapter Two) and desk accessories (which are discussed in Chapter Four). However, most files fall into either the application or the document category.

Every file on the Mac contains information identifying the type of file it is and what application created it. The file type is a special four-letter code. For instance, an application always has the file type designator APPL; however, you don't normally see the file type. It is used internally by the Mac operating system. Where you would use the PC's file extension to identify a file's type, on the Mac you use the file's icon to distinguish an application from a document.

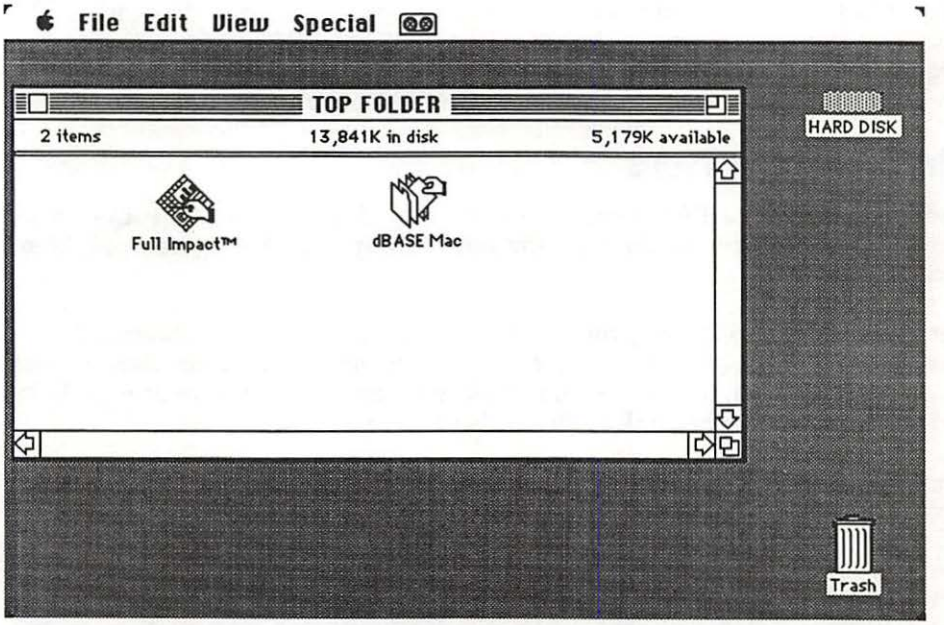


Figure 3-3. Application and document icons

Another internal code designates the application to which each document belongs. On the PC, you might know that Lotus 1-2-3 documents use a .wks or a .wk1 extension. At a glance, you can identify such a file as belonging to 1-2-3.

On the Mac, each document has a special four-letter code that tells the operating system what file created it. This is called the Creator. The document's icon is determined by its creator; therefore, most document files use a distinguishing icon to help you tell what application they belong to: A FullWrite document icon looks entirely different from a Microsoft Word document, or, for that matter, from a dBASE Mac or a 4th Dimension document. It is that special icon that helps you identify which document belongs with which program.

You'll notice that, in each system, there is a way for you to identify what kind of file you are viewing on a directory listing. However, on the PC, there is no way for the operating system to distinguish between a Lotus document and a dBASE document. In contrast, the Mac actually tracks each file and knows not only the application to which it belongs but what *kind* of file it is. Is it a word processing document, a personal dictionary file, a file containing preference settings, or even an ASCII file created by a specific word processor? The Mac knows.

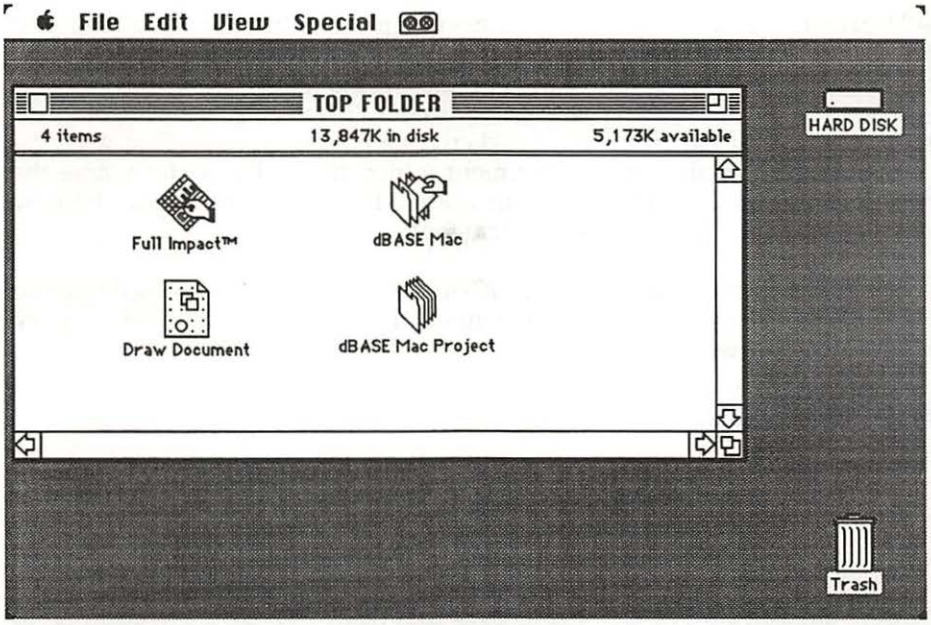


Figure 3-4. Application-specific icons

Document Launching

One primary benefit of the Mac's system of tracking file types and creators is the common Mac technique called *document launching*. By double clicking a specific document icon you can launch that program and the selected document in a single step. In some cases, you can even select several documents, then double click to load them all at once.

Programs don't have to be in the same folders as their documents. You can have word processor files in many different folders, arranged by department, or in some other way that is meaningful to you.

Of course, you can have document files in directories separate from PC programs, too. And you can use the PATH command to run a program without actually moving to its directory. It is difficult, however, to run a program from another directory and simultaneously load a particular document. In DOS this usually won't work. Few programs actually support that kind of document loading, and DOS can be finicky when you try to work with data files in directories outside the one a program is in. Regardless of whether it is possible to duplicate document launching on the PC, it is not standard practice.

MACHINT: There is a trick that uses document launching to save time and effort. If you launch an application from a document in a different folder, that folder becomes the current one—the one the Mac is logged onto. Even if you are going to create a new document in that folder, it is usually easier to open an existing document first, then close it and create a new document. That way, the new document is created in the document folder, not in the folder where the application resides. Of course, you can change folders before saving the new document, but that requires several extra steps.

One of our favorite utilities is the DiskTop DA which can often facilitate file management on large hard disks. For more information about DiskTop, see Chapter Five, "Software Guidelines."

Basic File Management

On the PC, you often have to perform basic file management, and you probably use the DOS commands COPY and ERASE often.

The basic file management operations on the Mac are quite different, though they accomplish the same results. In some cases, the Mac system is much easier and offers more flexibility. One example of that flexibility is that, in addition to file copy and erase, you can also copy and erase entire folders in one step.

Once again, your perspective changes working on the PC as opposed to working on the Mac. On the PC, you type commands at the DOS prompt. You can issue the COPY and ERASE commands from any location (any logged disk or directory) in DOS. As long as you enter a complete path name for the files you want to copy or erase, it doesn't matter where you are in the system.

Copy and erase functions on the Mac use objects. Once again, it is a matter of direct manipulation, meaning that you must *be there*. You can't perform any file or folder management from a distance, as you can in the command oriented DOS environment. The Mac style is strictly hands-on.

Looking at the Mac copy and erase from another angle, however, you'll also see that you perform them without using menu selections or typing keyboard commands.

COPY AND MOVE. To move a file on the PC you would first use the COPY command, then erase the file at its original location. That's two steps. You would also have to type the full directory path of at least one of the files—twice. To move a directory to within another directory—well, that's another story. You can use XCOPY to copy subdirectories, but there is no ordinary DOS command for creating a copy of an entire directory within another.

The Mac treats files, folders, and disks as icons. A disk is a bigger container; it can hold folders and files. A folder cannot contain a disk, but it can contain other folders and files. Of course a file cannot contain a disk or a folder. This isn't really any different in *concept* from the disk-directory-file structure on the PC.

But, there are some differences. Since a folder is just an icon on the Mac, you can move any folder to any other disk or folder as a whole object—with all its contents intact. What happens when you move the icon depends on where you move it, as you will see.

To move any icon, simply drag it to a new location.

- If the new location is within the same folder (window), the icon will be repositioned in two-dimensional space. This action has no PC equivalent.
- If the new location is in a different folder (window) on the same disk, the icon will be placed within the new folder.
- If the new location is on another disk, the file or folder will be copied to the new disk (the original will remain where it was).

How you move an icon depends on whether the target folder is open or closed. To move an icon into a closed folder, drag the icon over the destination folder's icon. When the destination icon changes color, release the mouse button. If the folder is open, it is often easier to drag the icon into its window to achieve the same result.

This is like a MOVE command since the original icon has been moved (not copied) somewhere on the same disk, but to a different folder.

When copying a file or folder to a drive, drag the icon until it is over the drive's icon. Release the button when the drive icon changes color. If the disk is open (has a window on the desktop), you can also drag the file or folder icon into the disk's window.

This action is more like a true copy on the PC—like typing **copy filename.ext A:** to create a copy of a file on another disk. The difference is that you can also copy a folder as easily, all in one simple action. On the PC, you would have to create a new directory on the target disk, then copy the contents of the orginal directory to the new one. On the Mac, the folder is copied intact.

When you copy files to another directory or drive on the PC, you receive a simple message like **1 File Copied.** In the case of multiple copies using wildcards, DOS displays the name of each file as it is copied.

Remember, on the Mac you can copy or move more than one item at a time by using one of the multiple selection techniques described in Chapter Two.

```
E>copy *.exe *.old
CM1B.EXE
CMSTORE.EXE
CMOPTION.EXE
BASRUN.EXE
BOOTZ1.EXE
FONTAR.EXE
CM1.EXE
CMFLOAT.EXE
PALMENU.EXE
DRCONFIG.EXE
VIEW.EXE
CMBATCH.EXE
CMZ.EXE
CMPIE.EXE
CMPRINT.EXE
       15 File(s) copied

E>
```

Figure 3-5. PC screen after multiple copy

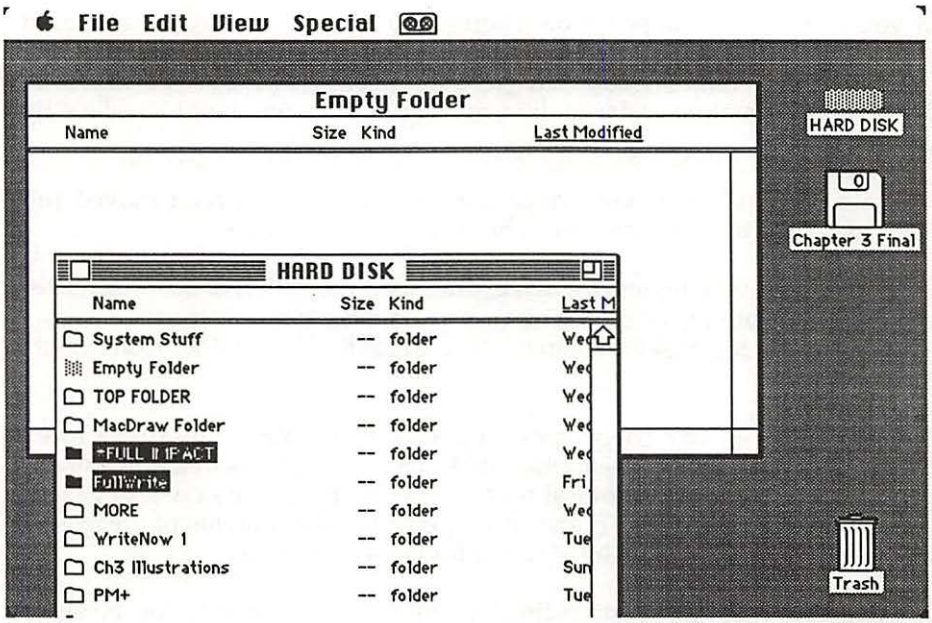


Figure 3-6. Mac copying multiple files to drive

The Mac operating system offers no commentary when you move a file or folder to another folder on the same disk; however it does provide you with a considerable amount of information when copying to another drive. The Mac displays a graph that shows how much of the copying process has been completed. It also shows you how many files remain to be copied, and it displays the current file it is reading or writing. However, before the Mac begins to copy, it does something even more useful.

Have you ever encountered that frustrating DOS message, **Disk full**, when you were copying files from one disk to another? If so, you'll appreciate one of the built-in features of the Mac. Whenever you drag one or more icons to copy them to another drive, the Mac automatically does some arithmetic and comes up with a figure. If all the files will fit, the procedure proceeds without interruption. However, if the target disk has, say, 145,000 bytes left and the icon(s) you have selected total 153,000 bytes, the friendly, helpful Mac presents an Alert box that states: **There isn't enough room on the disk to duplicate or copy the selected items (additional 8,000 bytes needed)**. And it does so *before* starting to copy the files, so you don't get a partially copied disk that you will, in all probability, have to clean up to make room for something else.

To move and duplicate a file or folder on the same disk, hold down the Option key while moving it to another folder. Using this Option-drag technique is the equivalent of the DOS COPY command. Without the Option key, the drag technique simply moves the file to a different position on the same disk (even if it is in a different folder).

MACHINT: The key combination, Command-D, is a short cut to duplicate a file.

ERASE. To erase a file or directory on a PC, you use the ERASE or DELETE commands. You can use wildcards to delete several files at one time. Once you have erased a file, that's it. You can't get it back by using ordinary DOS methods (though there are programs like Norton Utilities and Mace Utilities that can help you recover erased files). Furthermore, you can't erase a directory from a disk until you have removed all the files and subdirectories from it. If you try to do so, DOS warns you it its usual succinct way.

On the Mac, to erase a file or folder, all you do is drag it into the trashcan. Get it? You throw it away. Drag an icon over the Trashcan until it is highlighted, then release the mouse button. In more recent systems, the Trashcan will bulge when it contains discarded icons.

The Mac will let you throw away any file or folder. Throwing a folder in the trash also throws away any files or other folders (and their files) that are contained in that folder (see MacHint below). However, the file will not actually be erased from the disk until you:

- Empty the trash (using Empty Trash from the Special menu)

- Launch an application
- Copy a file to that disk
- Drag the disk's icon to the trash (if the file was on a floppy disk—this both erases the file and ejects the disk from the drive)
- Shutdown or Restart the Mac

If you change your mind (and you haven't done one of the operations listed above) you can open the trash window, just like you would open any window, and move the icons back to your disk.

Dragging a file or folder icon into the Trash is not really the equivalent of the DOS DEL or ERASE commands. Only when the actual trashcan is emptied by one of the methods mentioned above is the erasure actually carried out. Therefore, erasing files and folders is a two-step process on the Mac, even though the second step may be automatic. By contrast, erasing files is a one-step process on the PC, and, as noted earlier, erasing directories and subdirectories is a multiple-step process. However, in neither case can you change your mind once the command has been executed.

MACHINT: Whenever you try to move an application or folder containing applications to the trash, an Alert box asks you to confirm that you want to do that. Once you are comfortable with the process, you can hold down the Option key to skip that Alert box. However, it is a good idea to double check that you really want to throw the item or items away. With multiple selections, a separate alert box will appear for each application or folder that contains one or more applications.

Copying or erasing more than one file at a time using multiple selections is similar to using DOS wildcard commands. However, each system offers advantages. With wildcards, you can process all files related by some common element without additional effort. With the Mac system of multiple and extended selections, files lacking a common element can be more easily managed, and files in close proximity to each other, or all files within a folder can be manipulated very easily and logically.

MANAGING DISKS

Ejecting Disks and Powering Off

Most PC floppy disks are 5 1/4-inch flexible disks. When you insert one of these disks in a floppy drive, you can remove it at any time (except, or course, when the red light is on and the drive is working).

The Mac 3 1/2-inch floppies operate differently. Their eject mechanism is handled by the Mac. There are five ways to eject a floppy disk on the Mac:

1. Highlight the disk icon and select Eject from the File menu.

2. Highlight the disk icon and drag it into the Trashcan. This is the preferred method.

3. Press Command-Shift-1 (for the internal floppy drive), Command-Shift-2 (for the external floppy), or Command-Shift-0 for the third disk on a Mac SE.

4. Restart or Shutdown—this will eject any floppy disks.

5. In cases of emergencies, you can stick a wire (a bent paperclip does well) into the small hole to the right side of the disk slot and push. This activates a manual eject mechanism. *Do this with the power off.*

In very rare cases, a disk may become stuck so that it won't come out using any of these methods. If that happens, don't force the disk; see your Apple service person.

One very important fact to keep in mind: you must always use the Shutdown command (from the Finder Special menu) to turn off the Mac. This is especially important when you use a hard disk because the Mac reorganizes and updates all mounted disks during the Shutdown process. If you simply turn the computer off, you will have to wait longer for the Mac to rebuild the desktop, and you risk losing data or corrupting your drive. For a PC user who is accustomed to saving any documents and then flipping the power switch, this will be an important new habit to learn.

What happens if you accidentally shut off the computer without doing a proper Shutdown, and you leave a floppy disk in the drive? If the floppy doesn't have a System on it, the Mac will reject it when you boot the Mac again. However, if the floppy does have a System, and you don't want to boot from it, hold down the mouse button when you restart the Mac. This will cause the floppy to be ejected before the Mac begins to boot from it.

Write-Protecting Floppies

On PC 5 1/4-inch disks, there is a notch on the upper left that is known as the write-protect notch. If you cover the write-protect notch on a 5 1/4-inch floppy, the data on it is protected from changes, and you cannot write to the disk.

Both on the PC and on the Mac, 3 1/2-inch floppies use a special tab in the upper left corner. If the write-protect tab is covering the hole, it is not locked. To lock a floppy disk, slide the tab until the hole is open and you can see through the disk. (Of course, you shouldn't try to use a PC floppy on the Mac. It won't be recognized as a valid Mac disk, and the Mac will ask you if you want to initialize (reformat) it.)

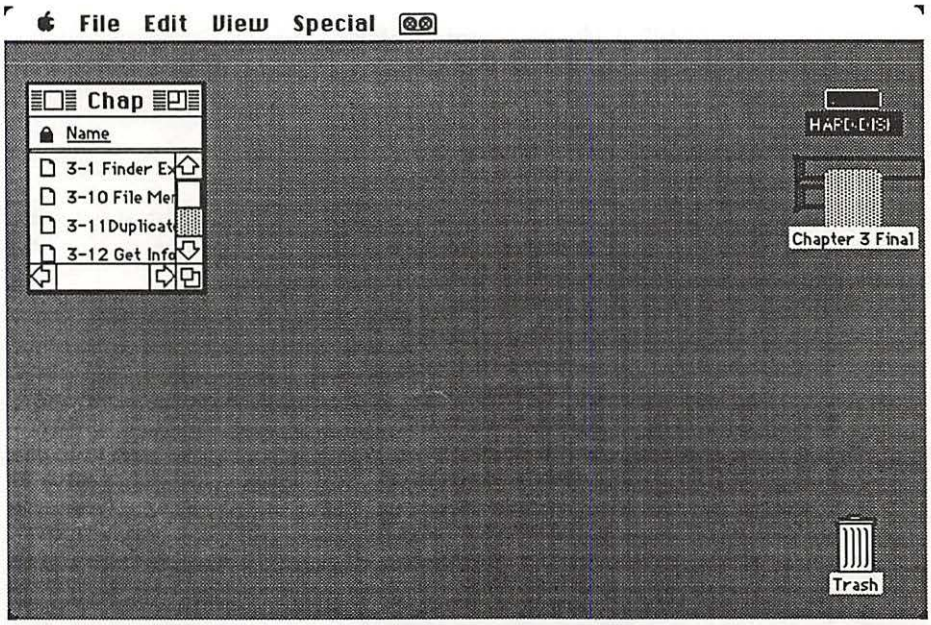


Figure 3-7. Locked disk window

If a disk is locked, a small lock icon will appear in the upper-left corner of the window when you double-click the disk icon.

Initializing and Formatting Disks

The Erase Disk command on the Special menu is the equivalent of the FORMAT command in DOS. Erase Disk will completely re-initialize a selected disk, erasing all files from it. In most systems, you can choose between initializing in 400K or 800K formats (called single-sided and doubled-sided, respectively). If you choose Erase Disk, you will be warned before the disk is erased and given an opportunity to back out of the procedure.

When you format a disk on a PC, you indicate the disk to format by identifying it as part of the FORMAT command (FORMAT A:). On the Mac, you select the disk to initialize by clicking on its icon—the same way you select any object on the Finder. You need to be sure that you have selected the correct disk,

however, as you won't be identifying it by name. However, if you place a blank, unformatted disk in the Mac floppy drive, the system will ask you if you want to initialize it, something that the PC does not do.

Creating System Disks

To make any formatted (initialized) floppy disk into a boot disk, you only need to copy a System Folder to it. In a sense, this is the functional equivalent of using the DOS SYS command to copy the hidden system files to a non-system disk on a PC. However, on a PC, you can also use the FORMAT /S command to create a system disk during format. On the Mac there is no option during initialization for adding a system. On the other hand, copying the System Folder is as easy as copying any other folder.

One problem you may encounter when making floppy System disks is size. Unlike the PC system files which are relatively small and haven't grown significantly in past versions, the Mac System files have not only grown in size, but in number. Many new icons have been added to the basic set of necessary files, and quite a few more have become optional, but useful. As a consequence, the Mac System Folder can often get quite large—so large, in fact, that there is little room left on a floppy disk for the data or program(s) that you originally might have wanted on the disk along with the System. This is especially true if you ordinarily use a hard disk and have let your System Folder grow with extra fonts, DAs, INITs, and other files beyond the basic System. Attempting to copy such a swollen folder onto a floppy disk is going to be non-productive.

The solution is to copy only the most necessary icons and leave others on the hard disk (if you have one) where space is not as critical. Ordinarily, you would want to boot from the hard disk, but there may be times when you can't, or you may not have one. (If you don't have one, we highly recommend it. Neither the PC nor the Mac works at its best without a hard disk.)

For more information about the System Folder and the Mac System files, see Chapter Four.

THE FINDER MENUS

You interact with Mac menus using the mouse, as you learned in Chapter Two. Each menu has a title and a list of options under the title. Mac menus are organized according to the type of options they contain; for instance, the File menu always contains options that deal with file management and the Edit menu always contains options that deal with management of data. Some specific options are always available—for instance, the File menu will always contain a Save option. However, other options may be unique to a specific application.

The Finder menus are divided by type. You will see either five or six Finder menus, depending on whether you have a system that supports color or not. These are:

- **The Apple Menu (**): Contains desk accessories.
- **The File Menu**: Contains options for managing files and windows.
- **The Edit Menu**: Contains options for cutting, copying, and pasting information.
- **The View Menu**: Contains different options for displaying the contents of disk and folder windows.
- **The Special Menu**: Contains options for working with windows, for erasing files and folders, and for shutting down or restarting the Mac.
- **The Color Menu**: Lets you color individual file and folder icons if you have a color system.

Many of the options on the Finder menus have special keyboard equivalents that use the Command key (⌘). You'll learn about each of these menus, their options, and their Command key equivalents in the sections that follow.

The Apple Menu

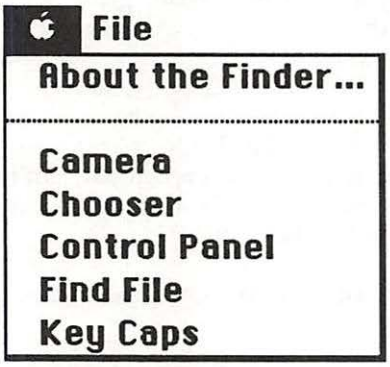


Figure 3-8. The Apple menu

The Apple menu is the first menu on the Finder menu bar. The Apple menu is a very special menu, and is used to contain what are called Desk Accessories (DAs). You'll learn more about DAs in the next chapter, but there is one DA under the Apple menu that you should know about. It is called About the Finder... (Notice that it ends with an ellipsis, meaning that selecting it will display a dialog box.)

The About the Finder DA performs some of the functions of two DOS commands: VER and CHKDSK:

- Like VER, About the Finder returns the current version numbers for the System and Finder files. Apple has periodically upgraded the operating system—including the Finder—sometimes adding new features or improving existing ones. Because the newer systems are more up-to-date and more powerful, it is a good idea to know what version you have. At the time of this writing, the current Finder is version 6.0. The current System file version is 6.03.

- Like CHKDSK, About the Finder displays how much RAM is in the system as well has how it is being used. If you are using MultiFinder (Apple's multitasking version of the Finder), About the Finder will display how much memory is being used by each application currently loaded in memory as well as how much is available in the largest contiguous block. The other functions of CHKDSK are duplicated at the top of the Finder window displays. For more information about these functions, see the discussion of the View menu later in this chapter.

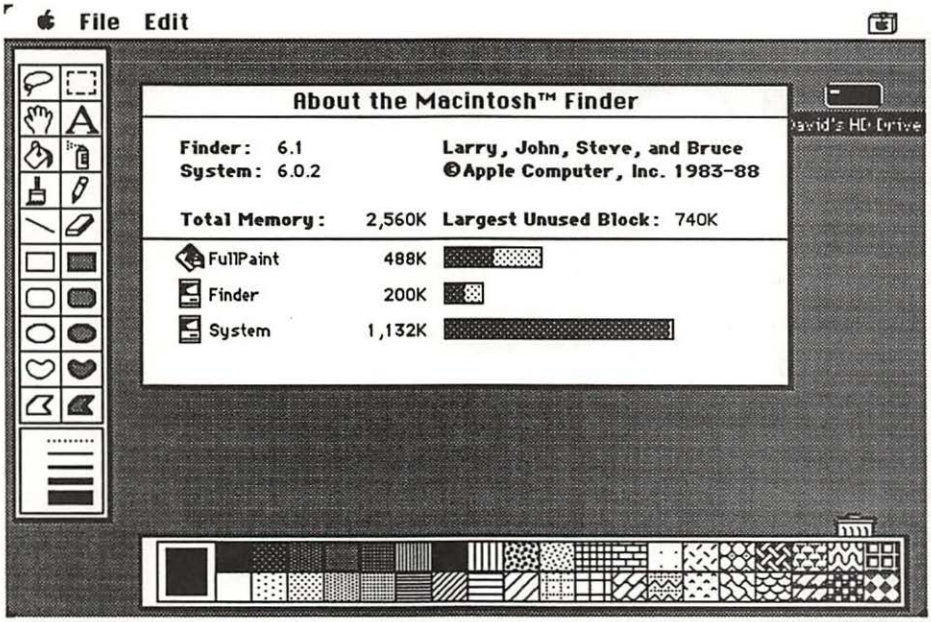


Figure 3-9. About the Finder in MultiFinder

One significant difference between About the Finder and the equivalent DOS commands is, because the Apple menu is almost always available even when running another program, that information is always available. On the PC, CHKDSK and VER are only available from the DOS prompt and even then they don't show as much information as About the Finder can.

About the Finder is actually just one example of what Mac users call an "About box." Every Mac application has an About box that is located as a desk accessory at the top of the Apple menu. About boxes range from simple copyright statements to elaborate presentations of credits similar to movie credits. Some About boxes contain on-disk manuals or an application's on-line help system.

The File Menu

The File menu contains commands used to manage files and folders. These include New Folder, Open, Close, Print, etc.

Figure 3-10. The File menu

New Folder. When you want to create a new directory on the PC, you use the MKDIR or MD command from the DOS prompt, then enter the complete PATH and name of the directory to create.

As we mentioned earlier in this chapter, you perform the same task on the Mac by choosing New Folder (Command-N). Use this option whenever you want to create a new, empty, untitled folder at the current folder level. Immediately after you create the folder, you can begin to type a name for it. The insertion point, even though it doesn't appear, is active on the name portion of the new folder and the entire name is highlighted. Therefore, the first normal key you strike will replace the words **Empty Folder**. In fact, whenever you highlight an icon, you can type a new name for it. If you type the same name as a file or folder at the same level of the hierarchy, you will receive a warning and the procedure will be aborted.

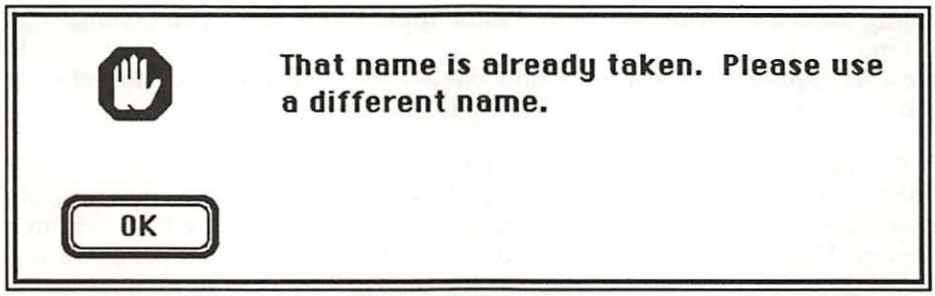


Figure 3-11. Duplicate name alert box

As you can see, there is no RENAME command on the Mac, but any object may be renamed easily—even disks.

If you want to alter the name of any file, folder or disk, you can select its icon, then type a new name. To edit the name, click once on the icon to select it, then place the mouse pointer over the text so that it becomes an I-beam. Select the spot where you want to edit and click. You can also click and drag to select several letters, then start typing to replace them all at once. Or, double-click to select a word at a time. If you double-click to select a word, then drag the mouse, you will continue selecting adjacent words.

If a file or disk is locked (see Get Info), the mouse pointer will not change to an I-beam when you place it over the name of its icon.

Open. The Open (Command-O) menu item opens disk and folder windows, and launches a selected application or document—depending on the type of icon currently selected. This command actually duplicates several PC commands. If you use Open on a:

- **File Icon**: You launch (load) that file. If it is a document icon, you load the program that created it and the document itself. If it is a program icon, you simply load the program. This Open is equivalent to typing the name of an executable file (.exe, .com, .bat) at the command line.

- **Folder Icon**: You open the window of the selected folder, making that folder active. This is pretty much the same as using the DOS CHDIR command to change directories and then typing **DIR** to display the directory's contents.

- **Disk Icon**: You open the disk's window. In effect, this is the same as typing the disk name at the DOS prompt and then typing **DIR** to view the root level directory.

Print. The DOS PRINT command is used sparingly by most PC users. Most printing is performed from within programs running on the PC. The same is true of the Finder Print option which is found on the File menu. Virtually all printing tasks are performed from within applications. The Print command at the Finder level is a unique case of the more general Print option found in almost all applications. (For more information about the application level Print option, see Universal Menu Items later in this chapter.)

In DOS, the PRINT command is nothing more than a binary dump to an I/O device. What this means is that PRINT is only useful with files already formatted for your printer. It is generally easier to print directly from within a program. However, one advantage of the PRINT command is that you can print multiple files by sending them to the DOS print queue. For instance, you could issue the command **PRINT Filename1.ext Filename2.ext Filename3.ext** to print three files: Filename1, Filename2, and Filename3. You can also use wildcards with PRINT (i.e. PRINT temp*.doc to print all files that begin with temp and end with .doc).

The Finder Print option does almost the same thing as the DOS PRINT command, but, as usual, it uses different methods to get the job done. To print from the Finder, you must select one or more document icons and select Print from the File menu. The Mac will then attempt to launch the document's Creator application, then load and print each document one at a time. In this way, the Finder Print acts like the DOS print queue, but it performs its printing tasks from within the application.

Ordinarily, when you print on a Mac, you will see a dialog box that lets you set options for the current print job (see Universal Menu Items later in this chapter for more about the standard print dialog). However, when you print from the Finder, you will not see the dialog box; you will not have an opportunity to set print options; and one copy of each selected document will print.

On the PC, to print a file from DOS, the file must be formatted with special printer information. Most ordinary document files for programs like word processors, databases, and spreadsheets (to name a few) are not formatted to print. You can select the I/O port to print to (and a printer number if applicable), and you can affect the print quality a little by using the MODE command to set normal or compressed print. Otherwise, you have little control over the results of the PRINT command.

On the Mac, however, you need no special file to print from the Finder since the Mac will use the file's own application to invoke the actual printing. However, the document will print just as it was last saved. Also, you won't be able to choose a printer or I/O port at the time you print, though you can use the Chooser prior to printing to set the printer to use. (For more information about the Chooser and other print options, see Chapter Four.)

Although the Finder Print option is a standard part of the Mac interface, not all applications allow you to print documents from the Finder. There are various reasons why certain applications don't support Finder Print, but they vary. The best way to find out if an application supports the Finder Print option is to try it. Select one of its document icons and then select Print from the File menu.

Close. Close (Command-W) closes the currently selected window. It emulates the action of the close box, which was introduced in Chapter Two.

As you can see, there are three ways to close a window on the Finder—from the close box, from the File menu, and from the keyboard (Command-W).

Where Open has several meanings, depending on the selected icon, Close performs only one task—to close a window. Close does not have an equivalent DOS command.

Get Info. Get Info (Command-I) can serve several functions. It tells you the name of the selected icon, what kind of icon it is, how big it is and how much actual disk space it consumes if it is a file, and how many bytes of files it contains if it is a folder. If you check Get Info for a disk icon, it shows how many files are on the disk and how much space they consume.

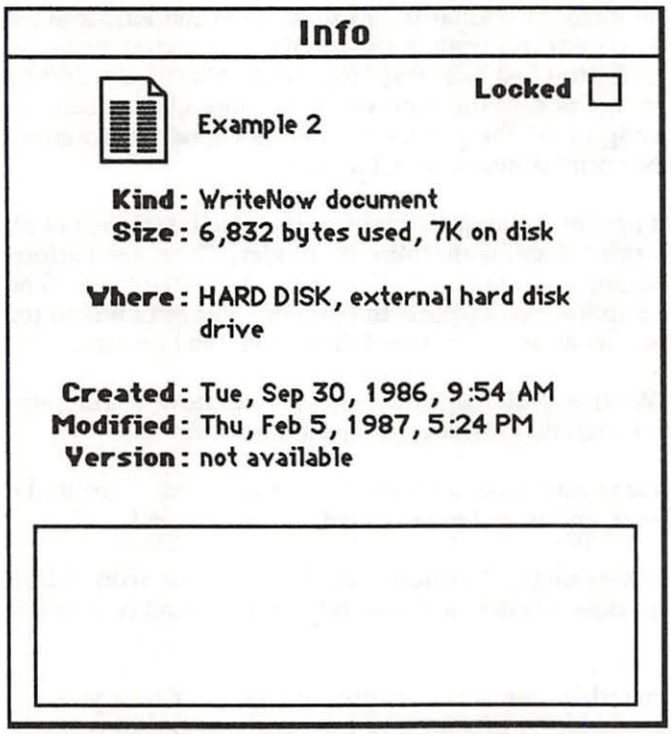


Figure 3-12. Get Info screen (file)

Get Info also shows you where the selected icon is located (what drive), when it was created, and when it was last modified. A text box allows you to enter notes about the icon which may help you identify it further.

Get Info also allows you to lock a file. A locked file cannot be altered (though it may be read).

Get Info performs some functions of DIR. Specifically, it indicates the name and size of a file as well as its date of last modification. However, you'll notice that it does somewhat more. It also performs some of the function of ATTRIB for setting or removing read-only status (ATTRIB +R Filename or ATTRIB -R Filename). ATTRIB also sets other parameters such as hidden or visible; however, Get Info does not duplicate these other functions. On the other hand, some of the other Get Info features are not available on the PC.

For instance, Get Info also serves a special purpose under MultiFinder. It lets you choose the amount of memory that an application will use. On the PC, you will rarely, if ever, have the opportunity to change the amount of memory a program uses. For more information about this Mac technique, see the section on Using MultiFinder at the end in this chapter.

Duplicate. When you want to create a duplicate file on the PC, you simply use the COPY command and give the copy a new name, or copy the file to another directory. Duplicating a directory is also possible with XCOPY, though with some limitations.

On the Mac, the equivalent of COPY is to drag an icon from one place to another, but in many cases this results in a new position for the same file, not two distinct files. Therefore, a special command is needed to create copies easily.

Duplicate (Command-D) is used to make a copy of a file or folder. The resulting copy will be named Copy of <Filename>. For instance, duplicating the System Folder would create a folder called Copy of System Folder containing copies of all the files in the original System Folder. Also remember, you can duplicate an item by moving it to another folder while holding down the Option key.

Put Away. You can move an item onto the desktop, outside of any window. It is technically still connected with its original disk, but it will display outside the window. You might do this, for instance, when you want to move an icon from one position in the window, to another that requires scrolling a long distance. By placing the icon outside the window, you can scroll to the new location, then drag the icon back into the window to its new place.

On the other hand, if you want to replace an icon that is currently on the desktop outside any windows, select Put Away from the File menu. Put Away will put any icon on the desktop back to its original location.

Page Setup. The Page Setup option displays a standard dialog box used to select default standards for your printer. These standards vary with the kind of printer you are using. For the ImageWriter, they allow you to set the size of paper, the orientation of the print, and certain special effects.

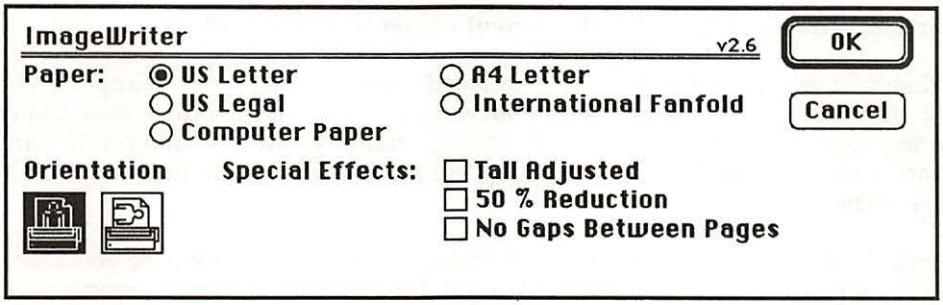


Figure 3-13. ImageWriter Setup

For the LaserWriter, Page Setup controls the orientation of the page as well as offering options for faster printing, smoothing of images, and reduction percentages.

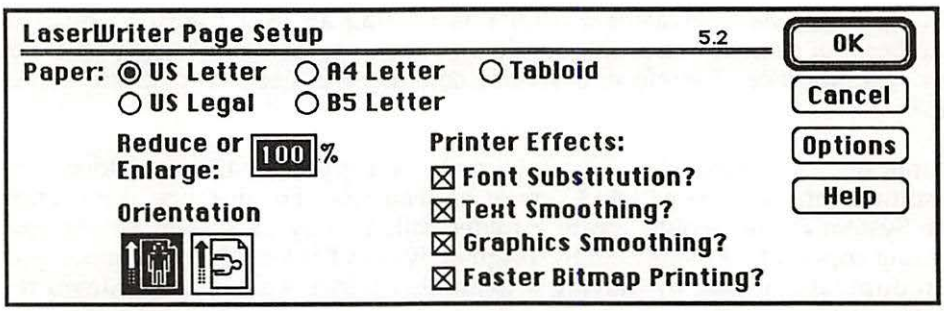


Figure 3-14. LaserWriter Setup

There is no exact equivalent for Page Setup in DOS. Although you can use the MODE command to set normal or compressed print, you can't change the orientation, paper size, or other details that the Page Setup allows. Some programs running on the PC may have their own settings to duplicate those of the Page Setup.

Print Directory. Print Directory (which was called Print Catalog in older systems) will print an image of the current Finder window to the currently selected printer. This image will vary according to the kind of view the window is currently displaying. (For more information about Finder window views, see the discussion of the View menu later in this chapter.)

This directory printout is equivalent to redirecting screen output to your printer and then using the DIR command to send a directory listing to the printer. The difference is that the Mac printout may list files in different sort orders or it may print an image of the icons visible in the current window. Print Directory always prints what the current Finder window displays.

When you select Print Directory, a standard printer dialog box will appear. The standard printer dialog boxes contain various options, including how many copies to make, beginning and ending page numbers, and so on. You'll learn more about the standard printer dialog boxes in Universal Menu Items later in this chapter.

Eject. You can simply take a PC floppy disk out of a drive any time you want, except when it is busy (the red light is on). However, there is no convenient or proper way to remove a floppy disk from a Mac drive without using some form of the Eject command.

Eject (Command-E) will eject a currently selected floppy drive. However, if the floppy disk that has been ejected contains the current System, it will have to be reinserted.

Because the System is frequently in use, removing a floppy disk with an active System may mean that you will have to switch disks frequently. If you boot from a hard disk, you will not have that problem.

On the PC, you would run into similar problems if you booted from a floppy disk and it expected to find Command.com on a disk you had removed.

MACHINT: There are other ways to eject floppy disks. You can press Command-Shift-1 to eject a disk from the first floppy drive (usually the internal drive). You can press Command-Shift-2 to eject a disk from a second floppy drive. Preferably, you can drag the disk icon into the trash. *This is usually the best method* because otherwise, the Mac remembers that you had the disk installed, and you may have to reinsert it later, even though you are finished with it. Therefore, drag the disk icon into the trash to eject a disk you are finished with.

The Edit Menu

The Edit menu is another standard menu, and many of its options are found universally within Mac applications. The standard Finder options are Undo, Cut, Copy, Paste, Clear, Select All, and Show Clipboard.

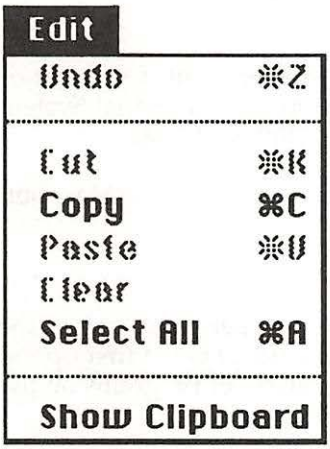


Figure 3-15. The Edit menu

THE CLIPBOARD. Before discussing the Edit menu, it is important to introduce the Mac Clipboard. The Clipboard is a special area of the Mac's memory set aside to hold material that has been cut or copied. The Clipboard can hold

graphics as well as text. What makes the Clipboard unique is its ability to accept almost anything the screen can display, and to do so in standard data formats. So you can move data from one application to another with incredible ease.

Since it is an independent part of the Mac operating system, the Clipboard is always functional. The Clipboard is automatically used when you cut, copy, or paste selected text or graphics.

Whatever you may feel about the Mac, whether you are wild about it or think it belongs in a slag heap, you have to love the Clipboard. This is a feature that simply doesn't exist on the PC, and it should. The Clipboard has a myriad of uses ranging from the simplest cut and paste operations to combining graphics with text, merging graphic images from different sources, and saving frequently used graphic or text templates to the Scrapbook (which you'll learn about in Chapter Four). The Clipboard makes it an easy matter to cut several records from a database, or several cells from a spreadsheet, and paste them into a word processor with only a few mouse moves. You'll probably become hooked on the Clipboard's convenience sooner or later. If one thing could dampen your enthusiasm for the PC, the Clipboard is probably that thing (with the possible exception of MultiFinder, but we'll get to that later).

There is only one Clipboard. Therefore, each time you cut or copy information to the Clipboard, it replaces what was there before. On the other hand, you can paste the information from the Clipboard as many times as you need to—even if you have changed applications since performing the last Clipboard operation.

Usually, the contents of the Clipboard are kept in memory, but if you cut or copy something that requires a lot of memory, it is saved to a special System file in the System Folder called (no surprise here) the Clipboard File.

The contents of the Clipboard are erased when you shut down the Mac, but, otherwise remain available during a session.

EDIT MENU OPTIONS.

Undo. There is no built-in undo function in DOS, and there isn't one at the Finder level of the Mac O/S. However, Undo (Command-Z) is the first option on the Edit menu, and it is a useful option within a variety of programs on the Mac. (In some products, the tilde key (~) functions as Undo, also.)

Undo is largely ignored at the Finder level where it serves little function other than to restore file or folder names in the case of inadvertant change or erasure. As useful as this may be, Undo is really most useful in applications where you may be able to undo an accidentally erased block of text or data or a mistake in a paint, draw, or CAD program.

Cut. Cut (Command-X) is used to remove text or graphics from the screen, placing it in the Clipboard. Although Cut will work with graphics in programs that can create and manipulate graphics (paint programs, word processors, desktop publishing systems), it does little on the Finder. It can be used to Cut icon names to the Clipboard, but there is really little reason to do so.

Copy. Copy on the Mac has no relation whatsoever to the DOS COPY command which copies files. Copy (Command-C) creates a copied image of any selected text or graphics and places the image in the Clipboard. Copy does not alter the original text or graphics. Like Cut, Copy offers little utility from the Finder level, but is widely used within applications.

Paste. Paste (Command-V) is used to move the contents of the Clipboard to the insertion point. Of course, if you attempt to Paste a graphic into a document or field that can only accept text, you will accomplish nothing. Like Cut and Copy, Paste doesn't see too much action at the Finder level, but is used extensively within many applications.

Clear. Clear is used to cut material, but not put it in the Clipboard. Clear is often used to remove information that has been placed in a text box within a dialog box or other field-oriented application.

Select All. Select All (Command-A) can be used to highlight all objects in a current window or document. It is the functional equivalent, at least in some ways, of using the PC wildcards *.* to indicate all the files in a directory. Of course, Select All will select files and folders.

As we said in Chapter Two, this command can be used if you wish to select all the icons in the current window. You might also use Select All when you wish to select *almost* all the objects in a window. You can then Shift-click those you don't want, to deselect them before performing the intended task.

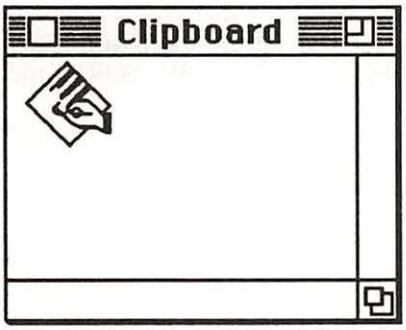


Figure 3-16. Show Clipboard with graphic

Show Clipboard. Show Clipboard does just what its name implies. If you are wondering what you last cut or copied—text or graphics—select Show Clipboard to open a Clipboard window that behaves just like any other Mac window. However, you can't alter the contents of the Clipboard within that window; you can only observe it. The Clipboard window is dynamic to the extent that its contents will change immediately if you cut or copy anything in another window while it is open.

The View Menu

The next standard Finder menu is the View menu. This menu allows you to alter the standard appearance of Finder windows.

Figure 3-17. The View menu

Even though the Mac is associated with the graphical interface, the View menu allows you to list files and folders within any window sorted by name, date, size, or kind—or color on a color system. You can also use small icons, allowing you to see a miniaturized image of the graphical interface.

The information displayed in the window varies with the different views. As you will see in the following sections, some of the information duplicates information you can obtain by using DOS commands like DIR, SORT, and CHKDSK.

BY ICONS.

By Small Icon: Choosing to display By Small Icon for any window allows you to see many more files in the same space. The icon graphics are still present, but they are very small.

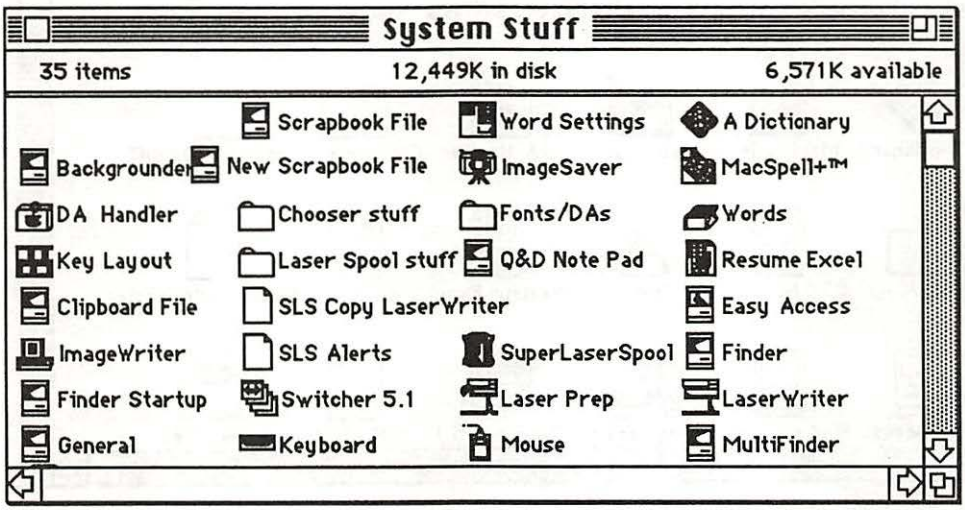


Figure 3-18. Small icon view

In addition to the small icons themselves, which represent the files and folders in the current window, the By Small Icon window also displays the number of items in the current window (like DIR), the amount of disk space used, and the amount of disk space remaining (like CHKDSK).

By Icon: By Icon is the normal Mac display that utilizes the full-sized icons. In addition to the icons themselves, the By Icon window also displays the same disk-related information as the By Small Icon window does.

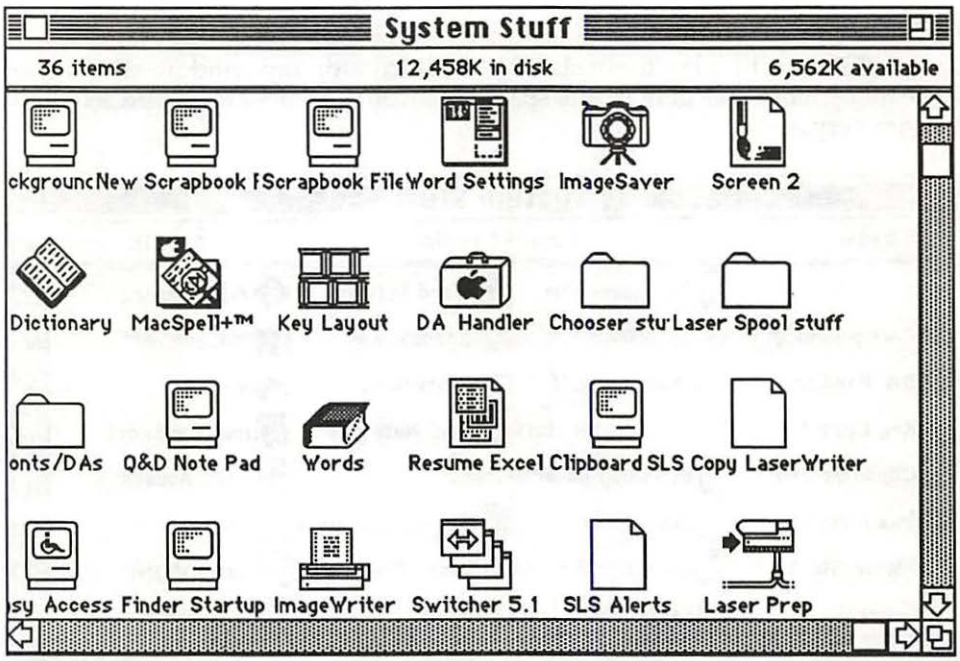


Figure 3-19. Icon view

IN A SORT ORDER. The following five View menu options all display information very similar to the information you see when you type the DIR command from DOS. These views are text listings, but each displays the contents of the current window in a specific sort order.

On the PC, when you use the DIR command, you can also add special "switches" like /p or /w for page at a time or wide display. The Mac handles these text listings in its usual fashion—by fitting what it can in the current window and using scroll bars to let you see the rest at your leisure. Unlike DOS directory listings, you can scroll backward and forward to view the contents of your disks and directories, and you can, of course, view several listings on the same screen, each in its own window.

Each of these five views displays the same information about each file:

- A miniature generic icon that indicates whether it is an application, a document, or a folder
- The file or folder name
- Its size (for files only)

- The type of file it is. For instance, a dBASE® Mac® document would state, **dBASE Mac Project**; a folder simply states, **folder**

- The date and time the file was last modified

In contrast, a PC directory listing shows the file name and extension, the size of the file, and the date and time it was last modified. You can tell all the same information from the DOS listing, with the possible exception of the specific file type. However, the filename extensions tell you a lot about the kind of file you are viewing.

None of the text views display the file and disk information displayed by the By Icon and By Small Icon views. Therefore, though these views duplicate most of the functions of the DOS DIR command, they do not duplicate any functions of the CHKDSK command nor do they count the files in the current window (which the DOS directory listing does do for the directory listed).

The By Name listing, in particular, is similar to using the DIR command in combination with the SORT command. This will work with versions of DOS that accept Pipes. For instance, to sort by name, type **DIR | SORT** and press Return. To sort the directory by extension (similar to By Kind), type **DIR | SORT /+10** and press Return. To sort by size, type, **DIR | SORT /+14** and so forth. To display any of these listings a screen at a time, add **| MORE** to the end of the command (i.e. **DIR | SORT | MORE**).

By Name. By Name orders the contents of a folder into a text listing sorted alphabetically by name. By Name displays a miniature icon; the file or folder name; its size; the kind of object it is (applications, folder, dBASE Mac, and so on); and the date and time it was last modified.

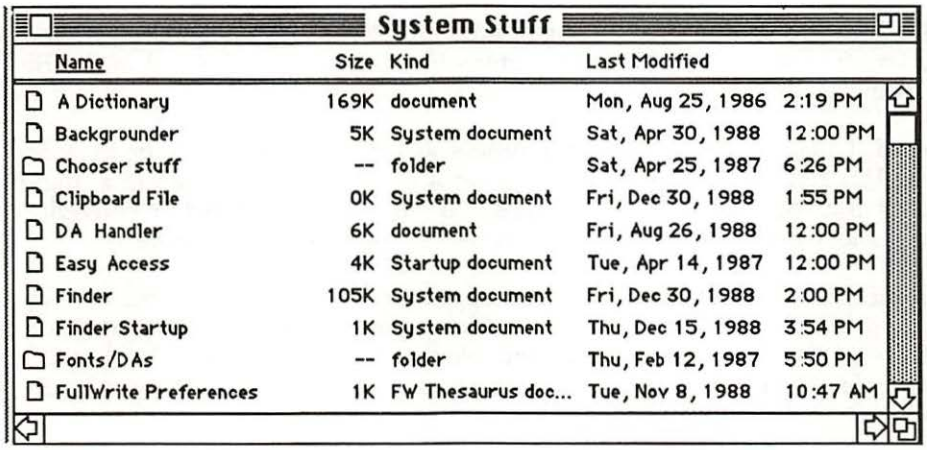


Figure 3-20. By Name window listing

By Date. By Date sorts the contents of a window by the last modified date. This is very useful since the most recently modified files are placed at the top of the list. Use this view, for instance, to manage your correspondence or other word processor tasks. Since the most recent documents will appear at the top of the list, they will be in order. You might also use the By Date view with projects that use different versions of files. The most recent versions will always be at the top of the list.

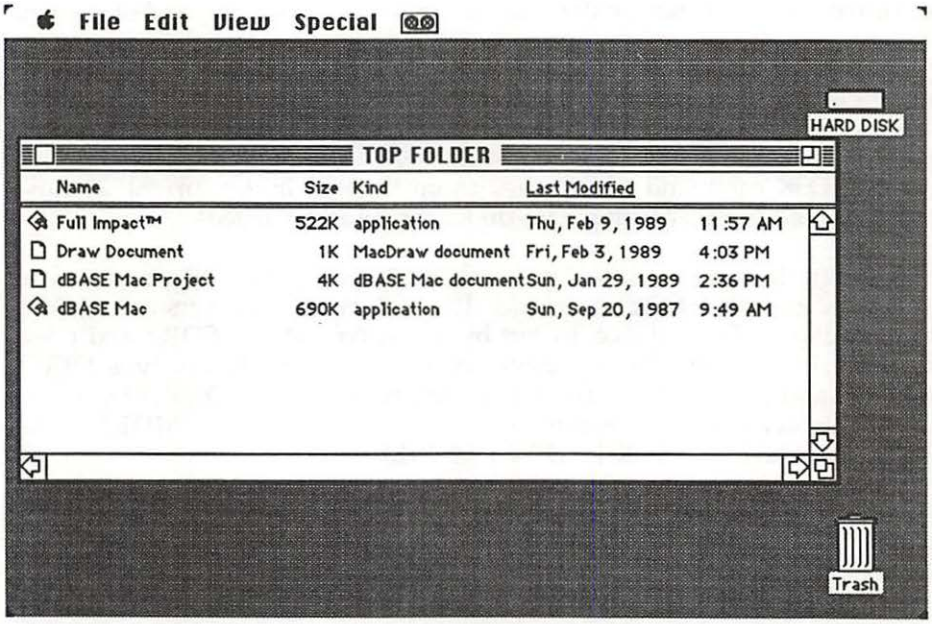


Figure 3-21. By Date window listing

By Size. By Size shows you a listing of all applications and documents ordered from larger to smaller. Folders are automatically placed at the end of the By Size listing.

By Kind. To see a listing of files and folders sorted by file type, use the By Kind listing. This can be handy if you have several different types of files in a single window and you want to see what files you have for HyperCard or FullWrite, for instance. Again, folders are placed at the end of the By Kind listing.

By Color. On color systems, you can add another dimension of organization by assigning colors to different files and folders, then sorting the listing by color. In this way, you could assign different colors to regional documents or to different divisions in your company, making it easy to sort them by type using By Color.

MACHINT: Sometimes you can actually lose a file or folder when working with icons or small icons. You know the file is there, but you just can't spot it on the screen for some reason. This can easily happen on a large capacity hard disk with hundreds of files. One trick is to change the view to By Name, find the file, select it (by clicking on it), then change back to By Icon. The file will remain highlighted, and will stand out from the crowd.

The Special Menu

The Special menu is just that. It contains some useful and important Finder selections like Clean Up, Empty Trash, Erase Disk, Set Startup, Restart, and Shut Down. Most of these options duplicate familiar PC tasks. For instance, Empty Trash is step two of the Mac equivalent of ERASE or DEL (though with some differences as noted earlier in this chapter). Another example is Restart which duplicates the Ctrl-Alt-Del sequence used on the PC to warm boot the machine. And, as you'll see, most of the other Special menu options duplicate procedures you know on the PC.

Figure 3-22. The Special menu

Clean Up. There is no DOS equivalent to the Clean Up option on the Special menu. Clean Up is used to physically reorganize icons within the current window. Since this is an inherently graphic operation, it has no counterpart in a text-based system like DOS.

Clean Up is unusual in that it's name changes depending on the circumstances. For instance, if a window is open, but nothing is currently selected, the Clean Up command actually reads **Clean Up Window**, and, if activated, it will reorganize the icons, placing them on an invisible grid. Any icons not on that grid will be moved to another location.

If there is one or more icon selected, Clean Up reads **Clean Up Selection**, and it will only rearrange the currently selected icons. This is useful for moving one or just a few icons to new locations without completely reorganizing the desktop. For instance, you may actually prefer to place some icons outside the

grid for the sake of convenience. Choosing Clean Up Window will move those icons. But if only certain icons need to be reorganized, select them and choose Clean Up Selection.

If you hold down the Option key, then open the Special window, the item reads simply, **Clean Up**, and selecting it will rearrange all the icons in the window starting in the upper left hand corner of the window and moving in horizontal rows. If you have a hopeless mess on your desktop, this might be a good way to go about rearranging it. Using this method periodically can also improve efficiency on a hard disk because it reorganizes the invisible Desktop file.

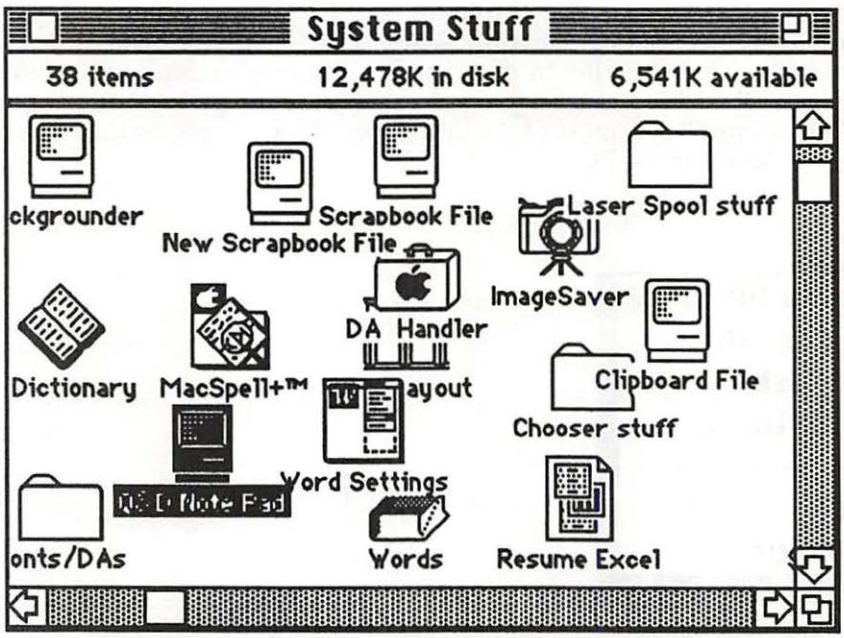


Figure 3-23. Before Clean Up

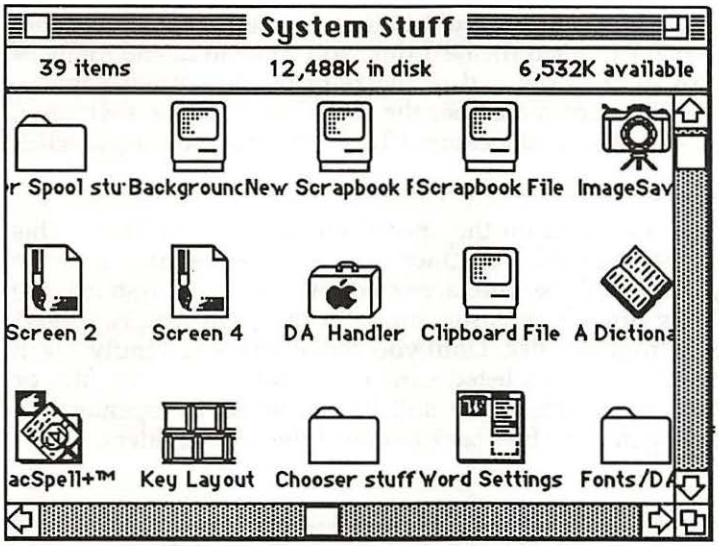


Figure 3-24. After Clean Up

MACHINTS: You can use the Clean Up command to control the way the icons on your desktop appear. For instance, suppose you want to change from normal icons to small icons. As you saw earlier in this chapter, the small icons are spaced far apart. You can simply choose Clean Up Window, but the icons will be rearranged randomly. Holding down the Option key when you rearrange the small icons should result in an arrangement closer to the original one, but more tightly packed.

Another trick allows you to create a window with all the icons arranged alphabetically. To do that, first change the view to By Name. Then Select All (Command-A) and drag the icons onto the desktop (outside all the windows). They will form a pile of icons, but will remain selected. Now drag the icons back into the original window and select by Icon (or by Small Icon). They will be arranged alphabetically, left to right in rows. The same technique can be used to arrange icons by size, date, or kind by choosing the appropriate view from the View menu.

Tricks that involve dragging icons to the desktop may not be available when you are working with a network on a remote server. If you try to drag icons to the desktop on some networks, you will get an alert box message and the task will be aborted.

Also remember, the Clean Up command works within the current window size, and organizes according to the window's width. Therefore, if you zoom a narrow window, the icons will display in a narrow column, leaving a lot of white space. If you zoom such a window, then choose Clean Up Window, the

icons will be rearranged to fill the zoomed window. However, remember that the window will not remain zoomed the next time you come to it, and many of the icons will be out of sight below and to the right of the normal window boundaries. (The Finder does not remember the zoom condition of a window, though it does remember its size and location.) To see the full view again, click the zoom box.

Empty Trash. The next command on the Special menu is Empty Trash. This option will ordinarily be dimmed, but once you drag something into the trashcan icon, Empty Trash will become activated. With newer systems, the trash can will bulge. Any time there is something in the trash, you can select Empty Trash to purge it from the disk. Until you actually choose Empty Trash (or perform one of the other actions listed earlier in this chapter), the files or folders that you placed in the trash may still be recovered by opening the trashcan window and dragging the files back to one of the active folders.

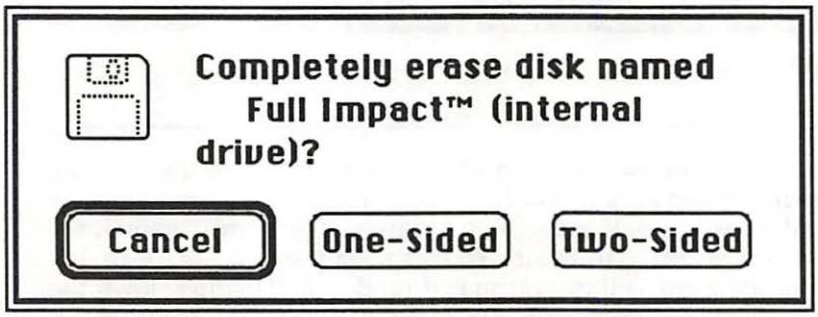


Figure 3-25. Erase Disk dialog box

Erase Disk. Erase Disk will re-initialize a selected disk, erasing all files from it. For more information, see the section Initializing and Formatting Disks and Creating System Disks earlier in this chapter.

Set Startup. The Set Startup option duplicates some functions of the DOS Autoexec.bat, but it is not as versatile. Essentially, you can use Set Startup to predetermine the application the Mac will use when it first boots up, or you can tell it to reopen the current set of open applications the next time you boot. Choosing Set Startup reveals a dialog box on which you can set the startup application.

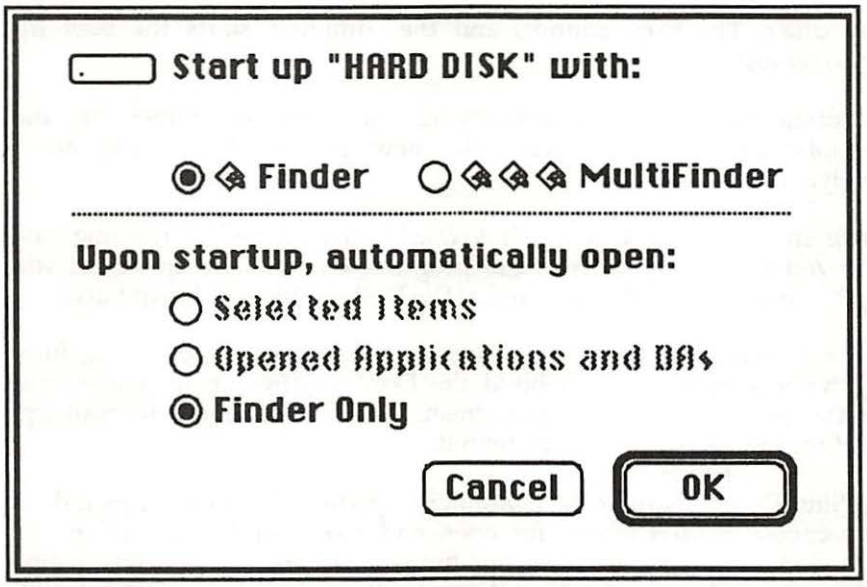


Figure 3-26. Set Startup dialog box

You have three choices on startup:

- Start with either Finder or Multifinder active.
- Start with a chosen application loaded.
- Start with all currently opened applications and desk accessories.

If no application (or document associated with an application) is currently selected or operating, then you will only be able to select between Finder and MultiFinder startups. If you select an application or document before selecting Set Startup, you will be able to select that application as the startup application. If you have one or more applications or DAs running when you select Set Startup, you can instruct the Mac to reopen them the next time it boots. Normally, either the Finder or the MultiFinder is the startup application. Whenever you change the startup application, you must reboot for it to take effect.

Restart. Restart is the equivalent of the Ctrl-Alt-Del key sequence for rebooting the PC. However, because of the differences between the two operating systems, the Mac performs several specific tasks before rebooting. For instance, before rebooting, the Mac checks to make sure all applications are closed and all modified documents have been saved. If not, you will see a dialog box for each application and document asking you what you want to do. In addition, the Mac empties any current trash, saves the desktop information, then ejects

all floppy disks. The beep sounds, and the computer starts the boot up procedure over again.

Restart is often used when you have changed a system parameter (like the startup application) and you want the new parameters to take effect immediately.

Shut Down. In most cases, you can shut off a PC any time without losing data as long as you have saved all work in progress. On the Mac, however, you must use the Shut Down command so that the Desktop file will be updated.

If you do not shut down properly, you may risk corrupting or losing files, although the Mac will usually rebuild the Desktop after an improper shut down or (heaven help us!) a system crash. It will take longer to boot up, however, if the Desktop file has to be rebuilt.

Choosing Shut Down instructs the computer to perform the same steps it does when you choose Restart (check for open and modified documents, empty trash, save desktop, eject disks), but this time, it will not reboot immediately. On all Mac models (except the Mac II family of products), an alert box will display with a message, **You may now switch off your Mac safely**, and a button stating **Restart**. If you click the Restart button, the Mac will reboot. Otherwise, you may cut the power at that point. On a Mac II, instead of the alert box, the system simply turns off.

The Color Menu

The Color menu appears only on color systems like the Mac II series. Selecting this menu displays eight color bars. You can use this to colorize any selected folder or file icons. Color is useful for making some icons stand out and also for sorting the contents of a window By Color. (See the section on the View menu earlier in this chapter.)

UNIVERSAL MENU ITEMS

Each application usually has its own menu structure. However, most Mac applications use certain standard menus. All of them feature the Apple menu (which is discussed in Chapter Four). In addition, most Mac applications include the File menu and the Edit menu. Other menus may vary greatly from application to application.

Although the Edit menu items are almost always the same items found on the Finder Edit menu, they are often more useful inside an application. The common File menu items, however, differ from those found at the Finder level.

Common File Menu Options

Virtually all Mac applications include the same File menu options. The Command key equivalents given are most common choices, though a few applications don't use them or use them for other tasks:

- **New** (Command-N). To create a new document file.
- **Open** (Command-O). To load a document file from disk.
- **Close** (Command-W). To close the current document window.

  If you try to Close a document that has been modified, the Mac will warn you (see the note under Save below).

- **Save** (Command-S). To save a file.

  The first time you select Save from the File menu, you'll see a dialog box that lets you name the file. You can change the active folder or disk before completing the Save action.

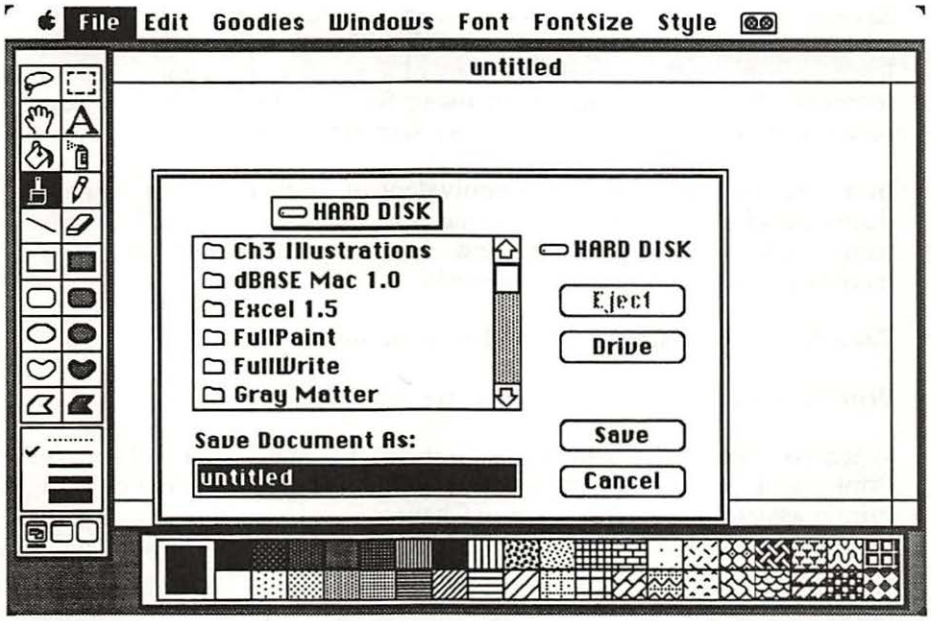


Figure 3-27. Save File dialog box

NOTE: A Mac application will generally not let you quit or close the document without saving any work in progress.

If you quit an application without saving any files you have created or modified during the current session, the Mac will display another dialog box that asks you if you want to save the file. You can answer Yes to save the file, No to quit without saving, or Cancel to return to the application.

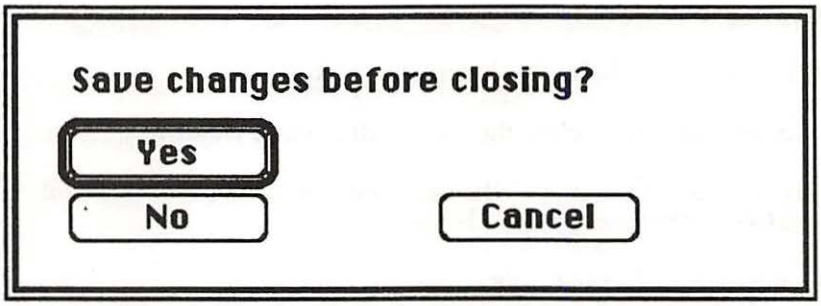


Figure 3-28. Save File alert box

- **Save As.** To save a file under a different name.

  Save As saves the current document in memory under a new name without affecting the original file, which still retains its name. Save As lets you work with multiple versions of a file or use another file as a template. By loading a file, then using Save As to save it to a new name, you can use the original file as a starting point.

  In a way, Save As is the DOS equivalent of using COPY to create a duplicate of a file with a new name. The difference is that it works from within an application and is always available to make incremental versions of the same work.

- **Page Setup.** The same as the Finder menu option.

- **Print (Command-P).** To print the current document.

  When you select Print from an application's file menu, you will see the Print dialog box. The dialog box you will see depends on the current printer assignment (see Chooser in Chapter Four).

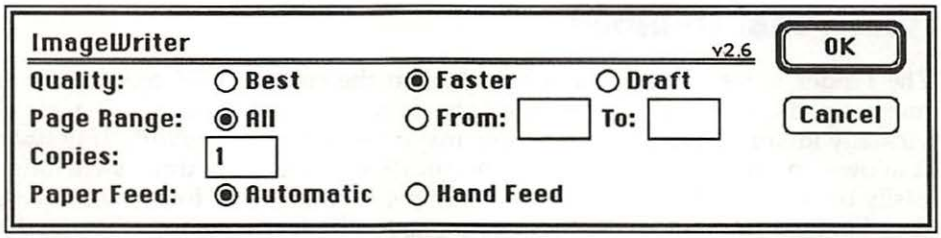


Figure 3-29. ImageWriter printer dialog box

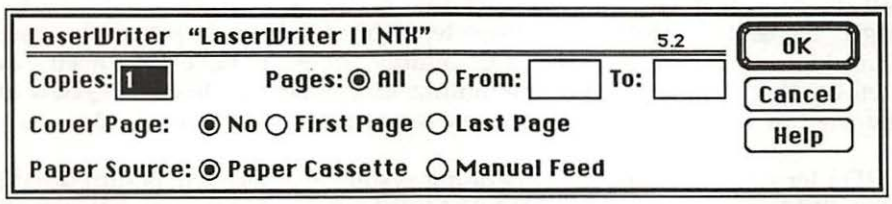


Figure 3-30. LaserWriter printer dialog box

The standard printer dialog box lets you choose the number of copies to make and the range of pages to print. Other options depend on the type of printer currently chosen. Figures 3-29 and 3-30 show the standard ImageWriter and LaserWriter printer dialog boxes.

Even though the printer dialog box is a standard Mac feature, application developers can customize the dialog box to incorporate special features for their printing needs. For instance, many applications will print collated documents.

- **Quit**. To close the application and return to the Finder.

  If you try to quit an application with any modified documents still open, you will see a dialog box as described in the Note under Save.

By learning the most common Finder and application menu options, you have learned how to do many common Mac operations. Some of these operations are similar to the DOS commands we have mentioned, while others may vary greatly from one PC program to another. For instance, quitting an application, and saving files are two common operations for which there is no standard method on the PC. Each program uses its own commands and methods.

ABOUT MULTIFINDER

The Finder is the closest Mac equivalent to the collection of commands that make up the DOS command interface. However, the Finder has a cousin, virtually identical, but different in one major respect—it is a *multitasking system*. It allows you to run more than one application at the same time, switching as easily between applications as you would between disk and folder windows on the Finder. In the following section, you'll learn about the Finder's cousin—MultiFinder.

Although the Clipboard may possibly be the feature that you most appreciate about the Mac, it may be MultiFinder that really gets to you. That's because, though it isn't perfect or complete, MultiFinder is practical, useful multitasking—something that DOS simply doesn't have by itself, and something that even the best of the multitasking programs like DESQview and Windows can't offer without limitations, reservations, and incompatibilities.

MultiFinder is a part of the Mac operating system and, as such, is supported by almost all Macintosh programs. While MultiFinder shares many features with the Finder, it also allows multiple applications to run concurrently and even allows a degree of foreground and background tasking (meaning that an application may continue to process information while you work actively with another one).

Before looking more closely at MultiFinder, look at the issues that face both the PC and the Mac when trying to create a multitasking solution.

The PC Multitasking Dilemma

On the PC, you can create a multitasking environment. You can use programs like Windows and DESQview or you can use the new operating system, OS/2. In each of these cases, you need a powerful, fast PC with lots of extra memory.

Multitasking on a PC began long before the advent of MultiFinder. Early attempts, like Topview and APX Core, partitioned the conventional PC memory (up to 640K) into separate segments. These were never completely acceptable solutions due to memory limitations and a basic awkwardness of design. Even recent programs, like Microsoft Windows and DESQview, (sophisticated, powerful programs that have many users), do not fit into most PC users' systems.

Part of the problem is that most people do not have machines powerful enough to take full advantage of these newer multitasking systems. Also, these programs still have to contend with the limited amount of memory that the PC can address directly; every solution uses some of that precious memory. Newer systems, particularly those with the 80386 chip, like the IBM PS/2 Model 80 and the Compaq 386 Deskpro, are capable of much more than their predecessors.

Despite advances in technology, DOS is still not a multitasking operating system. In contrast, OS/2 is designed to be a multitasking operating system, and its future development will provide new capabilities for the PC. Current implementations of OS/2 are able to run several programs at the same time, both in the background and the foreground, though there are, as yet, only a limited number of programs available for OS/2. And OS/2 requires a lot of memory, as well as a PC with one of the more advanced chips.

On the other hand, MultiFinder works today on just about any Mac. Why is MultiFinder already here when PC multitasking is still difficult and expensive to implement?

MultiFinder is the beneficiary of several Mac features:

- The earlier Mac Systems (the Mac Plus and SE) can directly address any amount of RAM up to 4 megabytes. This limitation was made because the ROM programs started at the 4-megabyte location.

  Because all RAM is considered equal on a Mac, the operating system can dynamically allocate whatever amount of memory is needed by each application you run.

- The graphic interface—windows in particular—allow an easy platform upon which to run multiple applications.

- The Clipboard makes data sharing easy and practical.

None of these Mac advantages are shared by PC systems. There is no DOS metaphor that makes multitasking easy, nor is there any universal data format and exchange medium like the Clipboard. And, most importantly, memory usage is limited and difficult on DOS systems.

There is a definite, on-going convergence of style and approach between the PC and the Mac and the graphical interface is becoming more and more the norm. OS/2 is heading toward the graphical interface, and the emergence of the Presentation Manager does offer hope to PC users who would prefer a more Mac-like approach.

The newer versions of DOS 4.0 supply a semi-graphical interface very similar in appearance to the Microsoft Windows. DOS 4.0 still limits the user to 640K partitions, however, while the available memory for running programs is whittled away by the graphical menu.

Multitasking on the Mac

Unlike the PC, to create a multitasking environment on the Mac, you don't really need a powerful, fast, expensive system. You need—a Mac. Although MultiFinder works best on a Mac with more than the (current) standard of 1 megabyte of RAM , no extra hardware or software is needed.

During normal operations using the Mac, it is necessary to return to the Finder whenever you quit an application. Each time you do so, the invisible Desktop file is loaded, and the Finder is rebuilt. On slower systems using slow drives, this can take some time.

Suppose you are working on a document in your word processor, and you need to check some information that is stored in your database. In ordinary circumstances, you would have to quit the word processor (saving any current documents, of course), return to the Finder, load the database, and check the information (perhaps copying it to the Clipboard). Next you would quit, and, if necessary, save the database, return to the Finder, then load the word processor and its files again. If you had copied information from the database to the Clipboard, you would now paste it where you needed it. There must be an easier way!

Suppose that, by clicking the mouse one time you could be in your database. By clicking once more, you could return to the word processor with your documents still intact. That would be much better.

The first multitasking system for Apple computers was called Switcher. Switcher allowed you to allocate different parts of memory to run more than one application at a time. Each application resided in memory simultaneously, but only one could be active at any one time. In many ways, Switcher was similar to the early PC attempts like Topview and APX Core. It partitioned memory and allowed you to switch from one partition to another. The main difference is that the Clipboard made data sharing fairly easy with Switcher,

but the lack of data standards limited the data sharing abilities of Topview and APX Core.

Switcher proved to be a help to many people who needed to work with more than one program at once, but it was not particularly elegant and it wasn't always reliable with some programs. Furthermore, when Switcher first came out, Macs had, at most, 1 megabyte of memory while programs grew larger and larger. As the trend continued, it meant that fewer programs could reside at one time in Switcher memory.

In 1987, Apple released MultiFinder, its first system with a multitasking operating system. It is a substantial improvement. First, it is part of the Mac system software, not a separate program. Second, it contains true multitasking elements that allow programs to work in the background.

Also, MultiFinder is easier to use. With Switcher, you had to concern yourself with the amount of memory each application required, sometimes resetting the amount to minimum amounts which might make the program run poorly or become unstable. MultiFinder generally knows how much memory a program requires and allocates that amount. (There is a way to modify the amount of memory an application uses under MultiFinder, as you will see later.)

Even though most applications do not actually continue to process in the background, their windows remain open when you move from one application to another. Therefore, simply clicking in a background window is sufficient to open that window and make the other application the active one. With the increasing availability of large-screen monitors and higher memory configurations, it is conceivable to have several applications all open on the screen at once.

Suppose you work regularly with a word processor, a database, a spreadsheet, an accounting package, and telecommunications. With enough memory, you would be able to leave all those programs open at once, switching between them at will. For example, a telecommunications session could continue, or a spreadsheet could carry on a long calculation, while you work on another project. Cutting, copying, and pasting between applications is a snap, and you can still use your desk accessories, too! Such a system is entirely possible on today's Macintoshes.

Multitasking Differences

There are three major differences between multitasking on the PC and on the Mac:

- First, saving work in progress is automatic on the Mac. No Mac application will let you close a modified document, database or worksheet without prompting you to save it first. You can then decide to save it, not save it, or cancel the current operation.

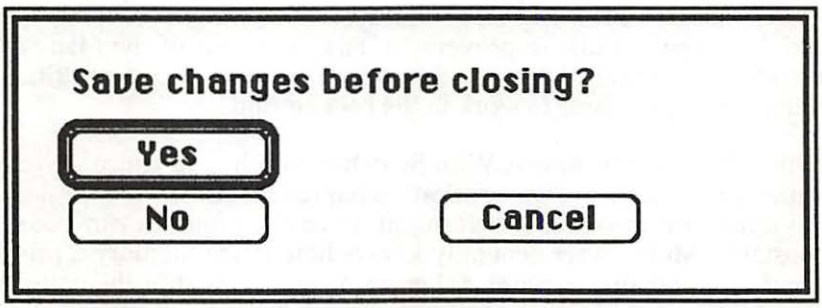


Figure 3-31. Standard Mac Save dialog box

- Second, returning to DOS is quicker than returning to the Finder since no desktop graphics have to be displayed. Also, some DOS applications allow you to exit to a DOS shell (a multiple copy of the Command.com run under the first copy). Although there can be some problems with trying to do too much in a DOS shell, it does represent an alternative to quitting the current application. The Mac has no equivalent of the DOS shell.

- The third difference is, of course, the Clipboard. There is no built-in DOS method for extracting data from one application for immediate use in another, and, even if there were, there is no universal format that all PC programs can share.

The parallel development of MultiFinder and OS/2 is being closely watched by industry analysts, and anticipation is high that both systems will eventually provide complete multitasking solutions. Presently, MultiFinder is a better established and more feasible solution.

Of all the current DOS multitasking solutions, DESQview is emerging as the best. Using DESQview, you can emulate most of the functions of MultiFinder or OS/2 multitasking in a DOS environment, though cut and paste functions will not work as smoothly as they do on the Mac. The main limitation is the lack of uniformity among PC text and graphics formats.

USING MULTIFINDER

With MultiFinder, you can load more than one application at a time. The Mac automatically places each active application in its own window.

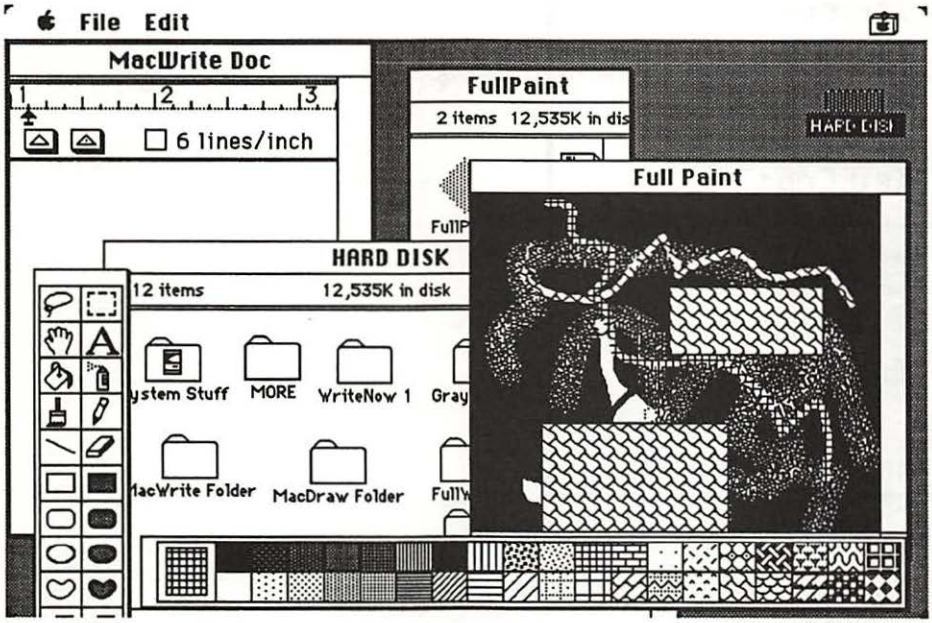


Figure 3-32. Multiple applications in individual windows

There are three ways to switch between multiple tasks:

- Click in any inactive window to bring it to the front and make it active.
- Open the Apple menu and select the application from the list that occurs after the desk accessories.
- Click the MultiFinder icon at the upper right corner of the screen.

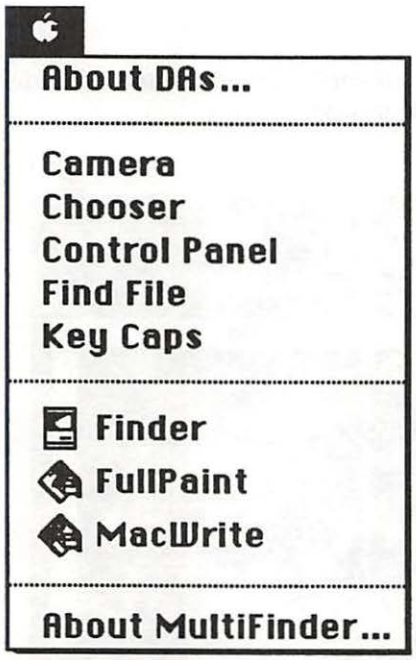


Figure 3-33. Switching applications from the Apple menu

Here are some tips for using MultiFinder most effectively:

- **Load either the largest or the most stable applications first.**

  MultiFinder assigns memory to tasks as you open each new application. As you open and close applications, memory is dynamically reallocated. However, your ability to load new programs into memory is dependent on how large a block of contiguous memory is available. If there isn't enough memory in one "block," you may not be able to load a particular file. Therefore, to be safe, load the application that requires the most memory first.

  That is one way to manage applications. Another way is to first load the most stable programs—the ones that you will want to remain in memory all the time. The programs that you may open and close often should be the last ones you load since they will probably be the first ones you'll close.

- **Manage your windows.**

  Move and resize windows as needed to place windows in convenient locations. On a small screen, you may want to overlap the windows so that you can click the mouse on a visible edge to bring a hidden

window to the front. If you aren't careful, you'll bury your windows, making it harder to activate their applications. Remember, you can switch MultiFinder tasks by selecting from the Apple menu or by clicking on the MultiFinder icon in the upper right corner of the screen.

- **Increase the Application Memory Size.**

  If an application does not seem to be performing correctly, or you are receiving out-of-memory messages, you may want to increase the amount of MultiFinder memory allocated to the product. To do so:

  Click the product's application icon once (not one of the document icons) to highlight it. Select Get Info (Command-I) from the File menu. You will see a dialog box that describes the current version.

  At the bottom of the dialog box, you will see the captions **Suggested Memory Size (K):** and **Application Memory Size (K):** with numbers printed next to each one. You'll notice that the number for Application Memory Size is enclosed in a standard Mac text box. You can change this value.

  If you change the value in the Application Memory Size box, then close the Get Info dialog, MultiFinder will attempt to load the file using the amount of memory specified.

  WARNING: If you attempt to lower the Application Memory Size below the Suggested Memory Size, the program may run incorrectly. Also, making the Application Memory Size a higher value does not always guarantee improved performance, and may result in unnecessarily wasted memory. In addition, you must be sure you have enough memory available on your system to run an application using more memory. Don't forget that the System and Finder will require some of your available RAM.

- **Watch performance with background programs running.**

  There are several programs that will run in the background while you continue to work in the foreground, but these programs may cause the performance of your foreground programs to suffer. Background tasking is very useful for telecommunications sessions, large spreadsheet calculations, and other time consuming tasks. Just remember that the performance of other applications may be affected.

  MultiFinder is something new and unfamiliar to PC users. So is the Clipboard for that matter . The main point we would like to stress here is that both are very useful tools and can make your time on the Mac time well spent.

GOING FORWARD

In this chapter, you learned about the Finder menus, some common application menu items, the Clipboard, and MultiFinder. With the information here and in previous chapters, you are well on your way to making effective use of the Mac.

In the next chapter, you will see the final pieces of the puzzle that, together, form the whole Mac user interface. In particular, you will see what we call System Tools. Some of these tools, like DAs, have many uses, including taking the place of TSRs on the PC. Other tools, like the Chooser, perform operations that you also perform on the PC, but do so very differently. The Control Panel is a very important desk accessory, a powerful and highly useful System tool that parallels many PC functions and introduces a few new ones.

When you complete Chapter Four, you will have learned enough about the Mac graphical interface to do just about anything you want. Throughout the rest of this book, you will learn about other aspects of the Mac—from software to hardware to resources.

4

Other System Utilities

Chapter Two introduced many of the most important Mac techniques and concepts. Chapter Three presented the Finder and common application menus, the Clipboard, and MultiFinder. Both chapters dealt with basic information about the Macintosh operating system and graphical interface. However, there is one more piece to the puzzle that still needs to be filled in—System Tools.

Some of the Macintosh System Tools correlate directly with DOS commands. Others are unique to the Mac. In addition, the Mac provides special kinds of System drivers called desk accessories (DAs). DAs serve many functions including setting system parameters and selecting printers and printer ports. However, the closest PC concept that approximates DAs is the Terminate and Stay Resident (TSR) utility.

On the PC, TSRs are not a part of the operating system. In fact, the idea of the TSR didn't exist on PCs until the advent of Borland's Sidekick, which showed PC users and developers how to create a program that could sit in memory and wait for you to activate it—even from within another program. Until Sidekick, all work on the PC was done using one program at a time. TSRs opened a world of new opportunities for PC users.

The Macintosh DA is not a technological development added after the fact. DAs are an integral part of the Macintosh operating system, and allow an extra level of operation similar to what TSRs add on the PC, but without inherent memory and compatiblity issues that plague TSRs.

DAs are activated from the Apple menu. You have already encountered one DA in Chapter Three, "Commands and the Finder." In this chapter, you will learn about several other important DAs that come with the Macintosh system. These System DAs often duplicate the functions of one or more DOS commands.

In addition to DAs, there are several files associated with the Macintosh System. Most of these files are found in the System Folder. In this chapter, we will provide a short description of each of the files and icons that you will find in the System Folder. Though you will not interact with all of these icons, you may be curious about their functions and how they relate to DOS.

In this chapter you'll learn about desk accessories and other system tools, including the following:

- Chooser
- Control Panel
- Find File
- TeachText
- Disk Firstaid

The Macintosh system files are a collection of files that work together to make a consistent whole. In some ways, these system files fulfill many of the same functions as the DOS internal and external commands. In other ways, they are completely different.

MAC SYSTEM ICONS: A BRIEF OVERVIEW

The Macintosh system is actually made up of several different components—some in the hardware and the rest in software.

The hardware portion of the Mac system is called the Toolbox or the ROM (Read-Only Memory) Operating System. The Toolbox determines the basic look and feel of the Macintosh.

Unless you are a programmer, you probably won't be too concerned with the Toolbox or with ROM. In contrast, nothing in PC ROM suggests a style for menus, a form for screen images, or in any way helps with interface design.

As we have indicated in earlier chapters, not only do the Macintosh ROMs suggest such form, they contain standard programming that is available to all developers, making the Macintosh interface consistent from one program to the next. These ROM routines are built into the Mac and don't change often.

The Toolbox and ROM portion of the Operating System is, in some ways, equivalent to the ROM routines built into the PC. However, the Mac ROM routines are more extensive, mapping out many of the features of the graphical interface presented in Chapters Two and Three (including window management, menus, and mouse handling, among others). The PC ROMs control basic I/O functions and system-level operations, but don't affect the software interface the same way the Mac ROM routines do.

The software component of the Macintosh System is made up, primarily, of the System and the Finder files which are normally found in the System Folder. However, there are many other files that function as part of the operating system. These include the hidden Desktop file, MultiFinder, the printer drivers, the Clipboard File, and many more.

In the following section, you will learn more about the functions of the System Folder files.

System Folder

The System Folder serves the important function of containing all the System files. Its closest PC equivalent might be the \DOS directory that many people create to contain all the DOS files; however the analogy is not complete. For instance, where the \DOS directory is used to collect all the DOS files in one directory, you can still work with those files regardless of their location. In addition, to implement DOS commands, you still have to type the command at the command line.

The files in the System Folder, for the most part, are files that the Macintosh uses without your intervention. They must be in the System Folder. What contact you do have with those files is generally through other parts of the Macintosh system. One good example is the Clipboard File. You never deal directly with the Clipboard File—the Mac does that automatically when you cut or copy a large block of text or graphics. Your involvement is to implement the appropriate procedure. The Mac then works directly with the appropriate files.

You can recognize the System Folder, not only by its name, but by the small picture of a Mac that is on its folder icon. No other folder can display this icon.

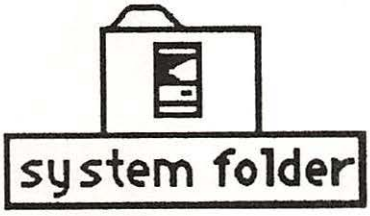


Figure 4-1. System Folder icon

What makes it a System Folder? Any folder which contains both the System and the Finder files can be a system folder, regardless of its name (though it is standard practice to name it System Folder). When you boot the Mac, it will search for an appropriate system folder, first on the internal floppy disk, then on an internal hard disk, and finally on a hard disk attached to the SCSI port. You can set the Mac to look first on any attached hard disk and ignore the floppy drive.

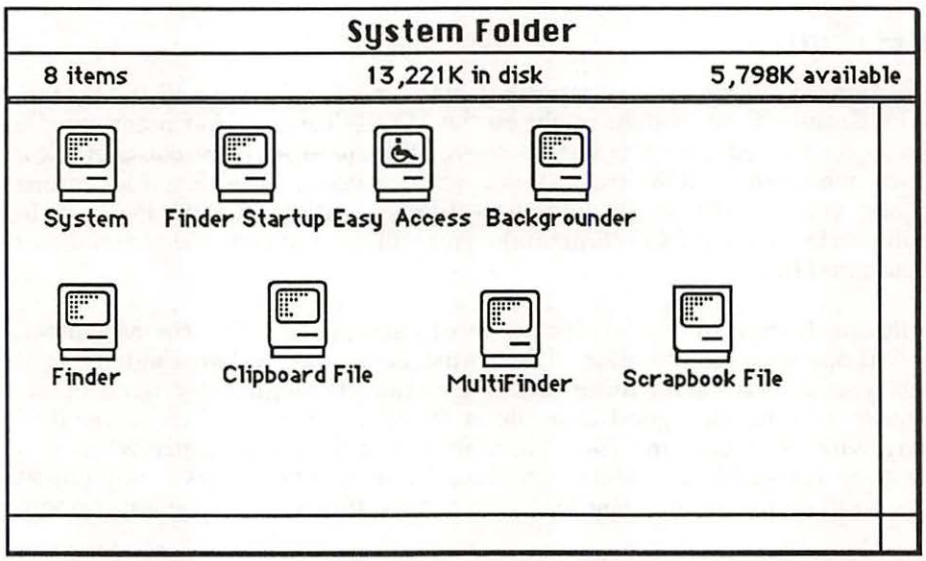


Figure 4-2. The System Folder files

The System folder is where the Macintosh operating system looks to find certain special files, including:

- System, Finder, and MultiFinder
- Printer resources
- INITs and CDEVs (Control Panel Device files)
- Startup sounds and pictures
- Clipboard File and Scrapbook File

Many applications also use the System Folder as a place to keep their specific settings files. For instance, many word processors and databases can be configured by the user to keep their global settings in the System Folder so the program will always be able to find them, even if the application is moved.

Figure 4-3. System illustration

Like Command.com on a PC, a System file is essential to run a Mac. The System version determines the features of the operating system of the Mac, and is periodically updated. The most recent system version is 6.03. With each system release, Apple modifies the capabilities of the Mac. In the same way that DOS has increased its functions and power with its first release of DOS Version 1.00, and now progressing to DOS Version 4.xx, so has the Macintosh System evolved.

As you read this chapter, you will learn more about the specific System Folder icons and their functions. The only two that are absolutely necessary are System and Finder, though you may want to include other files as part of any floppy boot disk. (You learned how to create a System disk in Chapter Three.)

THE SYSTEM FOLDER FILES

Finder

Whereas the System file serves many background functions in the Macintosh operating system, the Finder interacts with you and helps you manage your files and folders. The Finder controls the way you interact with the Macintosh graphical interface as explained in Chapters Two and Three. The Finder is not *technically* part of the actual operating system. It is an application like any other, but one that accompanies each release of the System and forms an integral part of the Macintosh interface.

The Finder keeps the invisible Desktop file updated. It is the Desktop file that helps the Finder locate and keep track of all the files and folders on a disk—hence the name Finder.

MultiFinder

You learned about MultiFinder in Chapter Three. In short, MultiFinder works with the Finder to allow more than one application to share the desktop. In essence, MultiFinder is a multitasking application used in conjunction with the System and the Finder.

Control Panel

On a PC, when you want to alter the system level operations of the computer, you must issue DOS commands—often accompanied by a collection of command line switches (like /S /E, and so on). For instance, to change the screen display you might issue the command MODE CO40 or MODE CO80. To change the system time, you would type TIME and then enter a new time.

On the Mac, the Control Panel is one of the most important System desk accessories. It lets you set many of the system-wide parameters of your Mac including the time and date, the speed of mouse movement, speaker volume, and more.

The Control Panel actually displays special control device files called CDEVs (their file type is cdev). Although several of these are supplied with the operating system, third party developers also have increased CDEVs to give you access to the operation of other products.

There are three CDEVs that are used by all Mac systems—General, Keyboard, and Mouse. The Startup Device CDEV is used only by the Mac SE and the Mac II. The Color, Monitors, and Sound CDEVs are used by Mac IIs only.

To select a CDEV, first open the Control Panel from the Apple menu, then select the appropriate CDEV icon from the scrollable list on the left side of the window. Each CDEV will display a different set of options in the Control Panel Window.

You'll learn more about the specific Control Panel utilities later in this chapter.

Clipboard File

The Clipboard is the universal background storage area for text or graphics that you cut or copy. This temporary storage area works between applications, so it is possible to cut or copy text and/or graphics from one application and paste to another.

For more information about the Clipboard see Chapter Three.

Scrapbook File

The Scrapbook is a desk accessory that comes with the Macintosh System releases. This is a handy place to keep text or graphics that you may use often in your work. Since it is a DA, you can dig into your Scrapbook any time to recover a picture or paragraph copied originally from another document. The Scrapbook works a little like a permanent Clipboard. The Scrapbook file is generally found inside the System Folder where it can always be located.

The closest PC equivalent to the Scrapbook would be a TSR like Sidekick or one of the freeform data managers like MemoryMate or AskSam which allow you

to store and retrieve information "on the fly." One major difference is that the PC applications don't store graphics—only text.

General

The General icon represents the file which contains many of the settings used by the Mac interface. These settings and others are determined in the Control Panel desk accessory discussed in more detail later in this chapter.

Backgrounder

The backgrounder file is used in conjuction with Print Monitor to allow background tasks. This allows background processing to occur without interrupting the task on the desktop. The function of the Backgrounder is handled entirely by the Mac.

There is no exact equivalent for the Backgrounder on the PC, though the DOS print queue is similar in function. On the PC and the Macintosh the Backgrounder and print queue files are usually passive in nature, that is, they operate without any input or intervention from the user.

DA Handler

The DA Handler is responsible for monitoring and controlling memory allocation for desk accessories. The DA Handler is something that many people would like to see on the PC—a manager for memory allocation for TSRs.

Font/DA Mover

Unlike TSRs, which exist independently of other programs on the PC, desk accessories are often loaded into an application file so that, when that application is launched, the desk accessory is also made available through the Apple menu. The most common place to put a desk accessory is to load it in the System file which makes it available at all times.

The Font/DA Mover is a utility which loads and removes fonts or desk accessories to and from application files. It also can save fonts and desk accessories to special files reserved only for fonts or desk accessories. These files are shaped like suitcases and are referred to as *suitcase* files.

The Mac handles fonts the same way it handles desk accessories: they can be associated directly with a specific application or loaded into the System File to be used by all applications.

Figure 4-4. Suitcase files

Font/DA Mover is usually required to install most DAs and even DAs that come with an Install file usually use Font/DA Mover to do the loading.

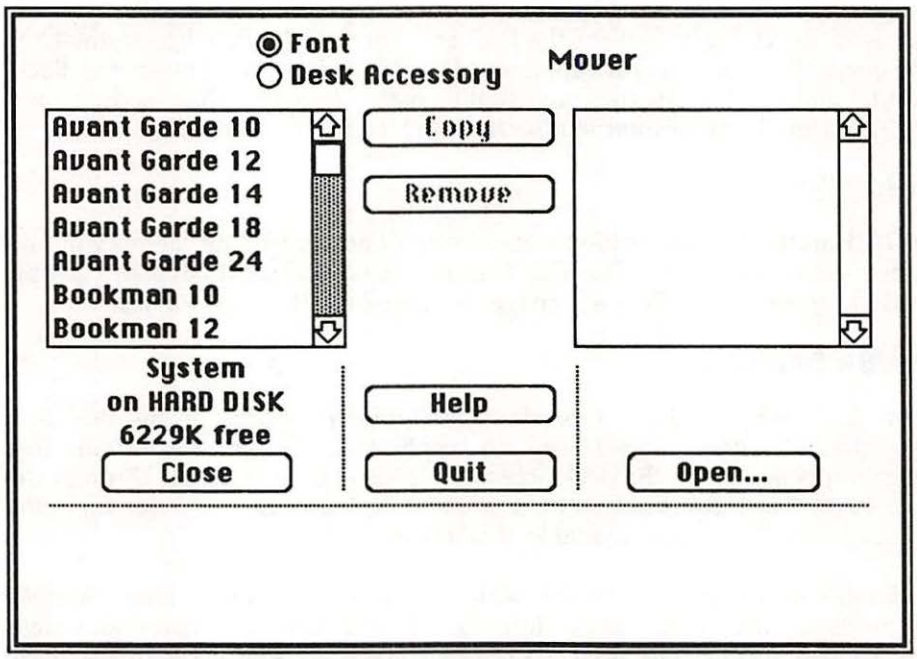


Figure 4-5. Font/DA Mover screen

Keyboard

Keyboard is a Control Panel utility (CDEV) which allows you to define the keyboard delay rate and speed. For more detail about Keyboard, see The Control Panel later in this chapter.

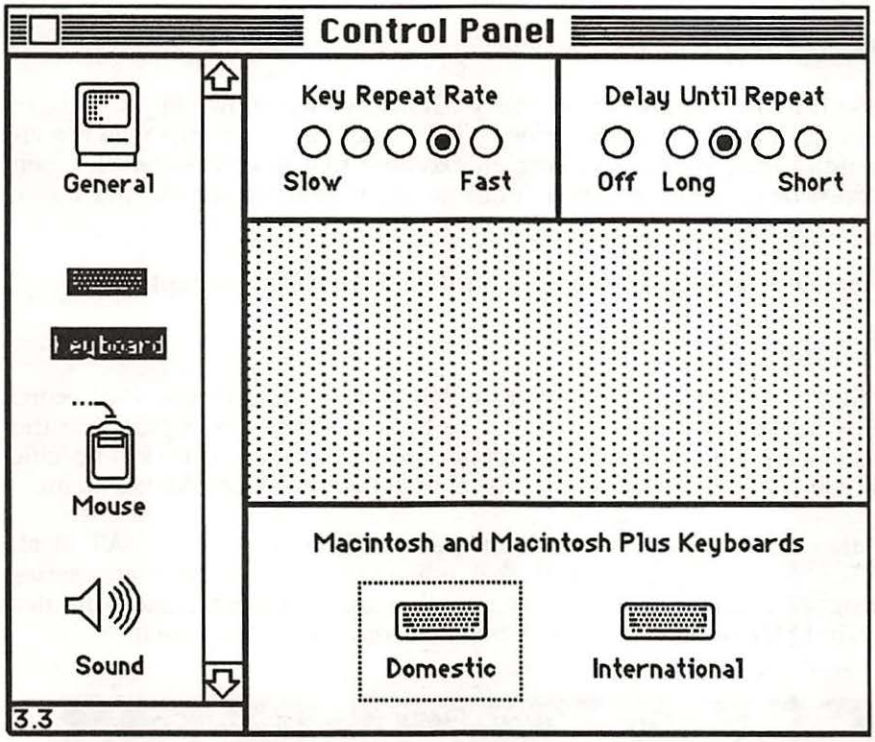


Figure 4-6. Keyboard screen

Printer Drivers

Since there are few if any standards for printer communications on the PC, most PC programs provide their own printer drivers. On the Macintosh, there are basically two printer standards—ImageWriter and LaserWriter—and specific printer drivers for Apple printers are provided with the System releases. These drivers are located in the System Folder. In addition, some third-party printer manufacturers provide printer drivers for the Mac for use with non-Apple-compatible printers.

You select the printer driver to use by accessing the Chooser DA. You'll learn more about the Chooser later in this chapter.

Easy Access

Easy Access is a new addition to the system files. It allows handicapped users to perform multiple key operations with one hand. Through the use of special shifted keystrokes, which Apple terms as "sticky keys," keys stay depressed even after released. There is no PC equivalent for Easy Access.

CloseView

CloseView is a new Control Panel utility (CDEV) which allows up to 16 times magnification of a section of the screen. This is helpful for people who are visually handicapped as well as being an excellent tool for precise work when using a draw or graphics program. It has no counterpart on the PC, nor is one needed.

There's more information about the Control Panel later in this chapter.

MacroMaker

MacroMaker is a Control Panel utility (CDEV) which allows users to record keystrokes, mouse movements, and mouse button clicks to be replayed in the same sequence at a later date. The replay mechanism can be tied to specific keystrokes to invoke the replay or can be chosen from the MacroMaker menu.

MacroMaker is the closest System equivalent to DOS batch files (.BAT files). Like a batch file, you can create a file that, when invoked, will carry out a series of pre-programmed commands. There are other, more powerful macro utilities available, but MacroMaker is the only one that comes with the System.

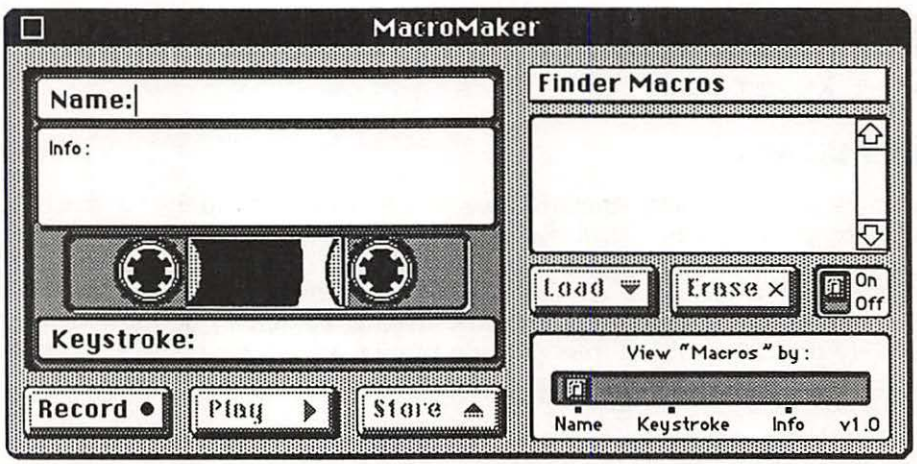


Figure 4-7. MacroMaker screen

TeachText

TeachText is a text editor that is commonly distributed with software packages and System updates. It provides basic instructions and hints to users similar to the Read.me text files frequently found on installation disks for PC software packages.

In a sense, TeachText is the Macintosh equivalent of EDLIN and the TEXT commands in DOS. It lets you create simple text files like EDLIN, and it lets you read text files like the TEXT command does. There are better text editors on both systems, but EDLIN and TeachText are useful and are included with their respective systems.

One difference between the TEXT command and TeachText is that you can scroll back and forth in TeachText; you can only watch the text go by when using the TEXT command. In a sense, using TeachText to read text files is more like using the popular shareware utility, LIST.COM for doing the same thing on a PC.

TeachText is a full application; therefore it is not as quick and easy as using TEXT on the PC. You'll probably find you use TeachText less often than you had previously used TEXT (or LIST).

MAC SYSTEM TOOLS

System DAs

Desk accessories are one of the most important built-in tools that the Macintosh operating system provides. They can range from simple desktop tools like a calculator or notepad, to very sophisticated applications for database processing, text editing, or graphics. Desk accessories are found as menu choices under the Apple menu.

DAs are, in many ways, the Macintosh equivalent of the TSR on the PC. Both are always available, even when you are working in another application, and both types of programs cover a wide range of uses from simple desktop tools to sophisticated integrated environments like Borland's Sidekick Plus.

On the Mac, however, DAs also fulfill the function of many of the utilities that you would ordinarily find operating from the DOS command line. For instance, there are several DAs designed to help you find lost files on a hard disk. In DOS, there are several small utilities that do the same thing from the command line. The difference is that most people would not make a TSR of these small programs. The Macintosh makes it very easy to create all kinds of utilities and add them to the system by making them into DAs.

Another significant difference between DAs and TSRs is the way they are loaded in memory. TSRs on the PC must be loaded into memory and must remain there until needed. They must take and hold onto a certain amount of

RAM; on a PC, that RAM is often very critical. Therefore, you would never think of having 15 or more TSRs loaded at the same time.

On the Mac, however, DAs do not actually occupy significant amounts of memory until they are specifically activated from the Apple menu. In this way, you can have the maximum of 15 DAs installed at the same time. In fact, with third-party products, like Suitcase and Font/DA Juggler, you can have many more than 15 DAs available at any one time.

The other important difference between TSRs and DAs has to do with how they are activated. A TSR is activated when you press a hot key combination. Since you need to be able to activate a TSR at any time, the program must constantly monitor the keyboard looking for its hot key combination. Though most modern TSRs are "well behaved," conflicts can arise between TSRs and the programs you run or simultaneously loaded TSRs.

The Mac has no such problem. DAs are listed in the Apple menu, a System menu that is always present, regardless of the application you are running. Therefore, a hot key is not needed to activate a DA (though a few offer that as a choice). You simply pull down the ever-present Apple menu and choose the DA you want.

The Macintosh operating system comes with several desk accessories included:

- About the Finder
- Alarm Clock
- Calculator
- Chooser
- Control Panel
- Find File
- Key Caps
- Scrapbook

If you have AppleShare, you will also have the Access Privileges DA in your system which is used to manage network functions.

In the sections that follow, you will learn more about each of these System DAs.

About the Finder

You learned about the About the Finder DA in Chapter Three, however, you may want to refresh your memory about what this very important utility does. You can open About the Finder to find out about:

- The current Finder version number
- The current System version number
- Credits to the developers and copyright information

- Total memory (RAM) in the system
- Largest unused block of memory available
- The amount of memory currently in use by various applications (MultiFinder only)

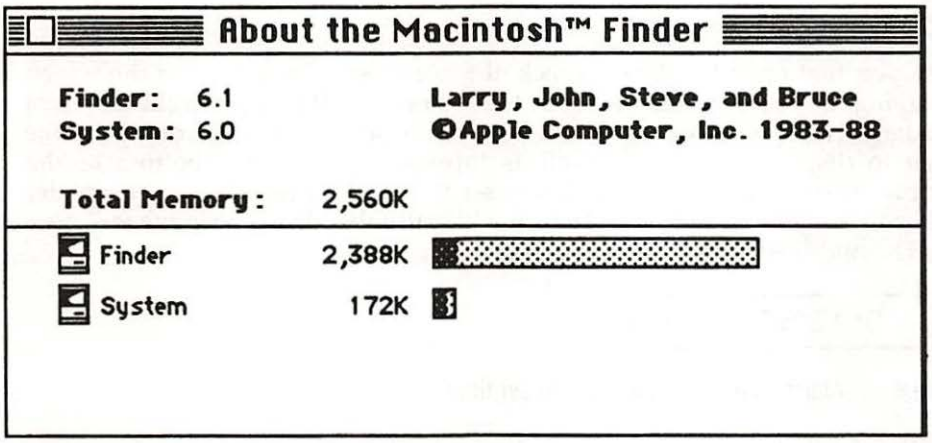


Figure 4-8. About the Finder

When you open About the Finder under MultiFinder, it displays memory information in a *dynamic* way. That means that you can leave About the Finder open on the desktop to view an ever-changing window into your memory use. You can open and close applications and perform various tasks at the Finder level, and the About the Finder window will continuously update its display to show how much memory is being used.

The About the Finder DA serves several purposes—some that parallel DOS functions, some unique. The version numbers are similar to using the DOS VER command. The Total Memory is part of what you get if you run a CHKDSK in DOS. However, there is no native DOS command that will return the exact memory usage of applications on the system, though the shareware utility, MAPMEM, from the TSR Utilities, will perform a similar service. There is also a similar utility, OS2MEM, that will return the largest available block of memory running under OS/2.

Although About the Finder is the DA that accompanies the Macintosh System, most applications also have an About DA. For instance, dBASE Mac has one called About dBASE Mac, and Studio 8 has one called About Studio 8.

These About DAs may serve several purposes of their own. Some simply list the current version number of the product, and includes the credit of its company and developers. Other About DAs will contain elaborate notes about the product or even complete help systems. Therefore, it is often useful to check the About DA of a product the first time you use it.

Alarm Clock

Like About the Finder, the Alarm Clock comes with the Mac operating system. The Alarm Clock lets you set the System date and time (like the DOS commands DATE and TIME). However, it also lets you set an alarm, a feature missing from DOS.

When you first open the Alarm Clock, it places a small window on the screen displaying the current time (as set in the system). At the upper right corner of the Alarm Clock window is a small key icon. Clicking on this icon opens the screen to display the date as well as three icons along the bottom of the window. The large clock icon lets you set the time on the clock. The smaller clock icon lets you set the alarm (which will cause the Mac to beep when it goes off). The middle icon is the calendar icon.

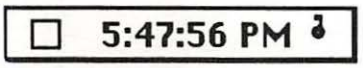


Figure 4-9. Alarm Clock window open to set time

You'll notice that you can click on the lower display of time, date, or alarm time to enter a new value, either from the keyboard or by using the mouse to click on the small arrows that appear.

You can also set the time and date from the Control Panel (which is explained later in this chapter).

You can leave the Alarm Clock window on the desktop to display the time.

Calculator

Although many TSRs on the PC offer built-in calculators, there is no DOS calculator. The Calculator DA that comes with the Macintosh operating system is a simple calculator that opens in its own window and contains only the basic numeric operations. More sophisticated calculator DAs are available in commercial DA collections and in shareware.

You can also cut and paste from the Calculator.

Figure 4-10. Calculator DA

Chooser

The Chooser is one of the most important System desk accessories. Aptly named, it allows you to choose which printer to use and which network and/or network zones to enter, as well as to turn AppleTalk on or off. It also lets you identify yourself by name on the AppleTalk networks.

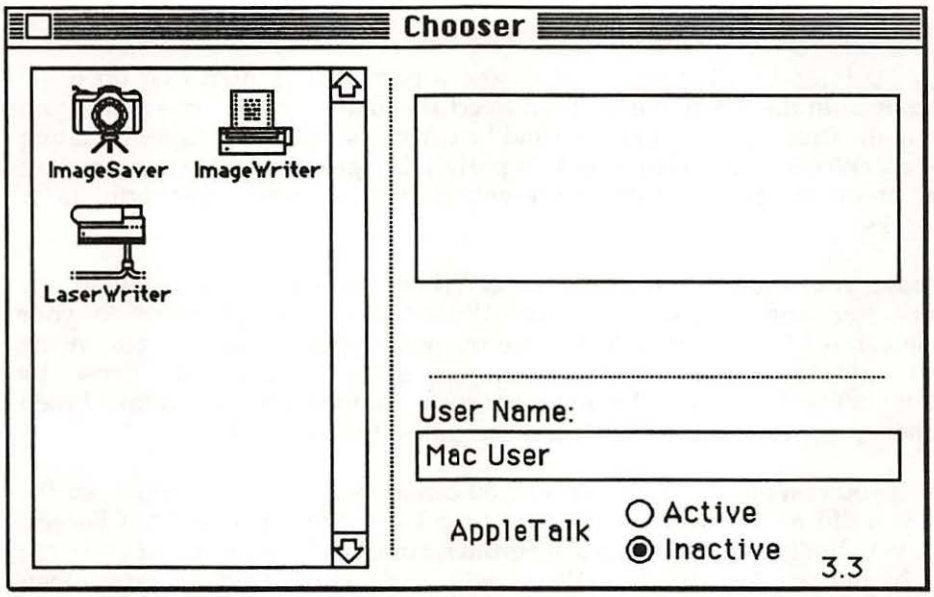


Figure 4-11. Chooser screen

One of the Chooser's functions is to select the active printer to use. On a PC, you might direct printer output from a parallel port to a serial port by using a DOS command like MODE LPT1: = COM1. Another example simply changes the active printer port—MODE LPT1:. However, these commands only redirect output while you are at the DOS level. Most PC programs let you select and change printers and I/O ports from within the program, but, again, these settings are true only for the current program.

On the Macintosh, you can use the Chooser to select a printer *for all applications at once*. If you have more than one printer—several LaserWriters, for instance—you can open the Chooser and select the one to which you want to print. Since you can give each printer a different name, the Chooser makes it easy to identify different printers. Since the Chooser is a desk accessory, you can change printers at any time—within any application. You can also log onto different servers or zones on a network at any time, working through the Chooser.

Although the Chooser replaces printer redirection on the PC, it also gives you somewhat more control over specific printer output over LocalTalk. Even

though there is only one Printer Port, you may choose among any number of printers specifically, by name (see How to Use the Chooser). On a PC, unless you are operating on a network that has its own "chooser," the most you can do is direct output to a parallel or serial port (of which you may have several).

The Chooser DA also provides a convenient place for network logon to occur. Specifically, 3Com networks use the Chooser to log on and mount drives on the network.

HOW TO USE THE CHOOSER. To choose a particular printer, first open the Chooser from the Apple menu. Then select the kind of printer you want from among the icons in the upper left hand box. You should see icons representing the LaserWriter, ImageWriter and AppleTalk ImageWriter. Your system may vary, and you may see icons representing other devices, either printers or networks.

Suppose you want to choose a LaserWriter. Click once to highlight the LaserWriter icon. A list of all LaserWriters currently connected to your Macintosh (or to the network you are on) will appear in the list box in the upper right. Click once to select the one you want, then close the Chooser by clicking in the close box at the upper left corner of the Chooser window. When you next print, the LaserWriter you chose will be the one used.

Even if you don't have a LaserWriter, you can format the output from your file as if you did have one. To do so, select the LaserWriter icon in the Chooser. Since you don't have one, no specific printer names will appear, but if you close the Chooser window, the LaserWriter will be the current printer type. Open any print dialog box or Page Setup to confirm this.

The Control Panel DA

Many PCs keep important system settings in a special memory backed up by a battery. Such settings include the system time and date, the memory installed, and the number and kind of drives connected to the system.

The Macintosh also keeps specific information in memory and uses a built-in battery to maintain it. On the Macintosh, many of the settings of this *parameter RAM* are defined in the Control Panel DA.

The Control Panel DA is a special case, like the Chooser. It is an integral part of the Mac system. Though it is similar to the Setup program that often accompanies PCs, it is more flexible and easier to use.

Setup is a common file used by 80286 and 80386 machines, though the actual file name may vary from one manufacturer to another. You can use Setup to define the various parameters mentioned before. However, Setup must be run by itself, and you always have to reboot the PC once you have changed the Setup parameters.

In contrast, the Control Panel is always available, just like any other DA. In addition, the Control Panel uses special files called CDEVs, which stands for Control Panel Device. Although the Control Panel comes with several CDEVs as part of the Macintosh System, other developers can use CDEVs as control devices for programs and utilities of their own.

When you open the Control Panel DA, it displays icons that represent each of the CDEVs in your System Folder. In a way, some of the Control Panel CDEVs serve purposes that, on a PC, would be served in the Config.sys file, but CDEVs are accessible at all times where the Config.sys only does its work at boot time.

There are eight standard Control Panel devices that come with the Macintosh System:

- **General.** Lets you define many standard parameter settings.
- **Color.** Lets you choose highlight colors on color Macs.
- **Keyboard.** Lets you set option for your keyboards.
- **Map.** Lets you view a map of the world.
- **Monitors.** Lets you select the number of colors and screen positions for multiple monitors, define screen resolution and color (on Mac II series only).
- **Mouse.** Lets you customize mouse response.
- **Sound.** Lets you set volume.
- **Startup Device.** Lets you define the drive to look at first during boot up.

GENERAL. The General CDEV is the one you will use most often, though you may not have to use it at all. There are actually several different areas on the General screen. You can choose:

- **Desktop Pattern.** To change the background pattern (behind the windows). To choose one of the predefined patterns, click on the small arrows at the top of the right-hand screen, then click inside the screen itself to make change the current pattern. To design your own background pattern, click in the left-hand box to alter the pattern of dots that make up the desktop background. If you have a color Macintosh, you can create backgrounds in color.

  Although you can change the color of the text display on a PC using complex ANSI codes, there is no exact equivalent for the Desktop Pattern customization on the PC.

- **Rate of Insertion Point Blinking.** To alter the rate at which the insertion point blinks on and off.

- **Menu Blinking.** To set the rate at which a selected menu item blinks when you choose it, or to turn off menu blinking. The PC operating system doesn't ordinarily use menus, so there is no equivalent for this in DOS.

- **Time.** To set the current System time. You can type in a new value for hours, minutes, or seconds, or click on the arrow keys to change them.

  Time is, of course, an exact equivalent of the DOS TIME command.

- **Date.** To change the System date. System time and date are used by various applications and also for time stamping files. Remember, if you don't correctly set the date, file listings by date will be inaccurate.

  Date is also an exact equivalent of a DOS command—DATE.

- **RAM Cache.** To set the amount of memory to use for caching and to set the cache on or off. The RAM Cache helps speed up some operations on the Mac by saving recently used instructions and executing them quickly if they are repeated.

  RAM Cache is an example of a setting that you would have to include in the Config.sys on a PC, but you can set and reset through the Control Panel on the Mac.

  NOTE: Optimum cache size on a Mac is 128K.

- **Speaker Volume.** To set the volume level for the internal speaker.

  There is no equivalent DOS command.

COLOR. The Color CDEV lets you use the Color Picker (a large color wheel) to select the highlight color for the Finder and other System utilities. Note that this does not affect the highlight in the menus or in other applications.

KEYBOARD. The Keyboard CDEV lets you set parameters for the keyboard. You can set:

- **Key Repeat Rate.** To determine how fast a key will repeat when you hold it down.

- **Delay Until Repeat Rate.** To determine how quickly a key will begin repeating when you hold it down.

- **Domestic or International.** To use the U.S. keyboard layout or an international setup.

You can use DOS KEYBxx (or KEYB in some versions) commands to select various international keyboards on the PC. For more information about KEYBxx, see your DOS manual. However, there is not, to our knowledge, a standard command to alter the key repeat rate or delay settings through DOS (though some third-party utilities and certain graphics-based applications can do so).

MAP. The Map CDEV is new to System 6.0. It shows you a miniature map of the world and lets you see such information as the latitude and longitude of various cities, the distance between two cities, and the time in any part of the world. The Map CDEV has no equivalent on the PC. This utility is an extra gadget that Apple has added to the Mac System. It might be very useful for finding the time in different parts of the world as well as finding the locations of specific cities as well as the distance between two points. Those who don't need such information will wonder why the Map CDEV is there. Those who do need it will probably wonder why it was so long coming.

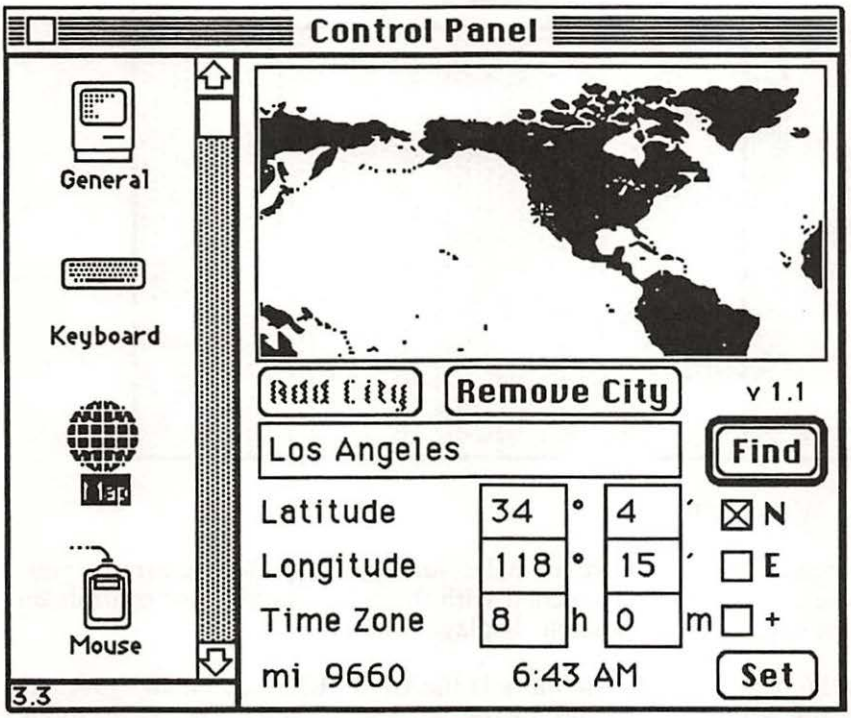


Figure 4-12. Map screen

MONITORS. The Monitors CDEV is available only on the Macintosh II family of products. It lets you choose different color modes for your system. You can use Monitors to turn color on or off and to select the number of colors from a choice of 2, 4, 16, or 256. Some programs will not work unless the color mode is set appropriately. For example, some color programs will only work properly when set to 256 colors, while other non-color programs must be set to 2 colors.

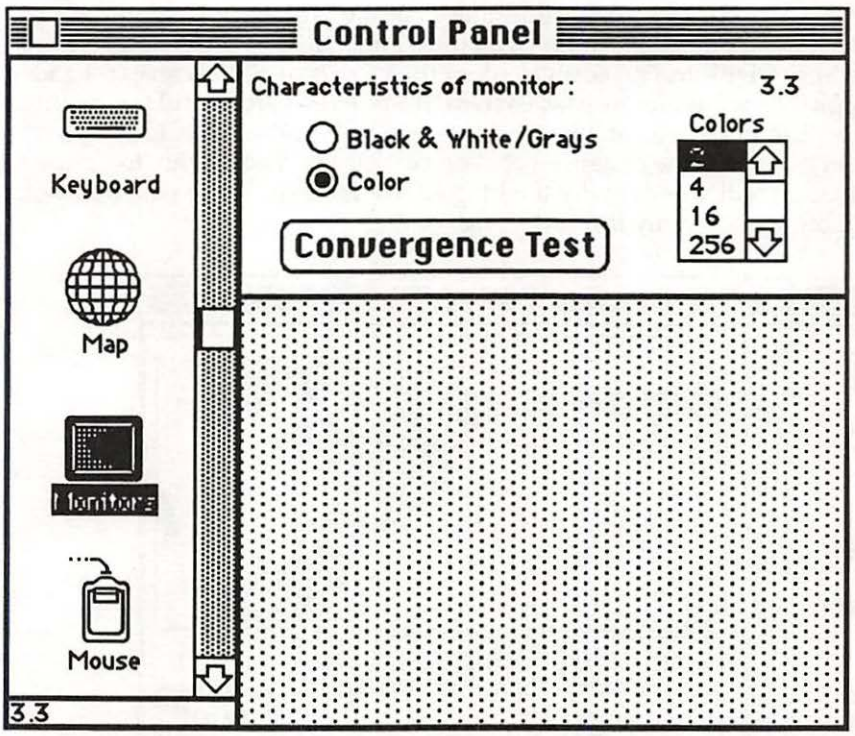


Figure 4-13. Monitor screen

The Convergence Test is used to make sure the display is clear on your monitor. You can use it in conjunction with the color convergence controls on your monitor to get the best possible display.

The closest PC equivalent to Monitors is the DOS MODE command that lets you select different display modes for the PC. Though the PC display options are different, the basic idea is similar. On the PC, however, you switch between different color and black-and-white 80-column and 40-column display modes. MODE is also used to define settings for I/O ports, something that is handled from the Chooser on the Mac.

The Monitors CDEV is also used to position and select the default monitor on multi-monitor systems.

MOUSE. The Mouse CDEV is found on all Macs. You can set the speed and responsiveness of the mouse movement, depending on your needs. For instance, if you have a very large monitor, you will want to set Mouse Tracking to Fast. By doing so, you will be able to move the mouse much more quickly from one edge of the monitor to the other.

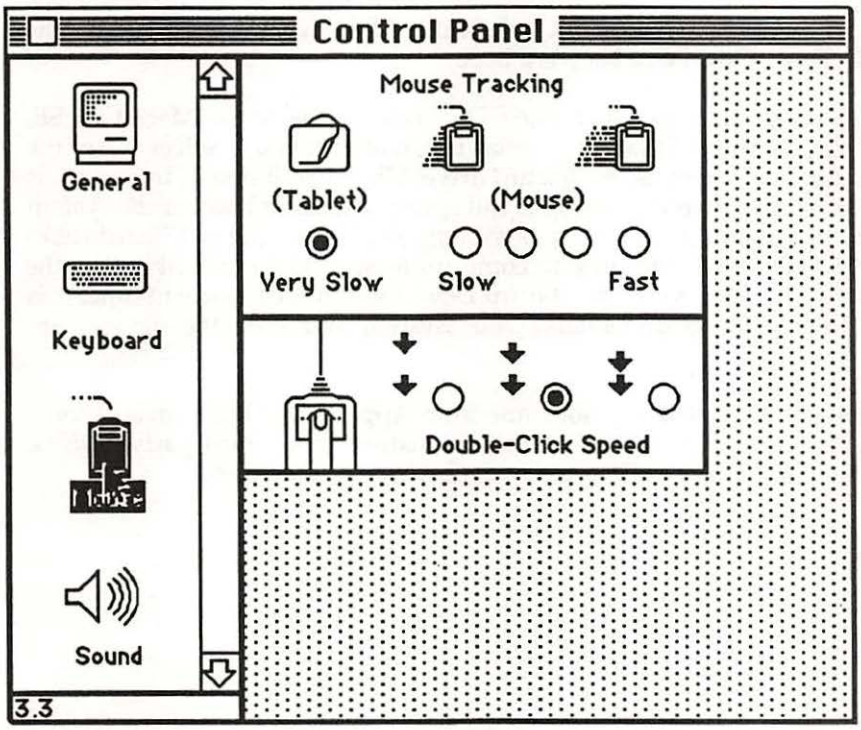


Figure 4-14. Mouse screen

Sometimes, especially when you are performing delicate graphics procedures, you may want the mouse to move very slowly for better control. In that case, you can set Mouse Tracking to Slow, or even to Very Slow, which is the speed used with graphic tablets.

Since double-clicking is such a common action on the Macintosh, the Mouse CDEV lets you select one of three speeds. Each person has his or her own preference for the double-click rate of the mouse.

Many PCs today also use a mouse, but the mouse settings are usually loaded during boot—either in the Config.sys or in the Autoexec.bat. Special mouse drivers are necessary, and the parameters that affect mouse operation are loaded with the drivers. Some mouse programs also include special configuration programs that allow you to modify the response of the mouse at any time (like the Mouse CDEV does on the Mac).

SOUND. The Sound CDEV is only found on the Macintosh II series. You can use this resource to set the speaker volume (which you can also use the General CDEV to do), and you can set the beep sound used by the system. The choices that come with the Mac are Boing, Clink-Klank, Monkey, and Simple Beep (the default selection). On a PC, a beep is a beep.

STARTUP DEVICE. The Startup Device CDEV is available on the Macintosh SE, SE 30, and the Macintosh II family of products. It allows you to select one of the internal or external drives as the startup drive. However, if one of the drives is selected, it must be powered up and at full speed when you boot, or the system will search for another disk that has a system on it. Since the SCSI hard disks used on the Mac take some time to come up to speed, it is possible that the drive you have selected to be the Startup Device will not be ready in time. It is important, therefore, to understand your system and how the devices are powered up.

There are other CDEVs that do not come from Apple, but which can add some interesting abilities to your system. For information about third-party CDEVs, see the section on CDEVs in Chapter Five, "Software Guidelines."

Find File

The Find File DA comes with the Macintosh System files. You can use it to search for files on a hard disk. Find File will search for any file by name or by part of a file name.

There is no DOS equivalent of the Find File DA, though there are several shareware utilities that perform the same service on a PC.

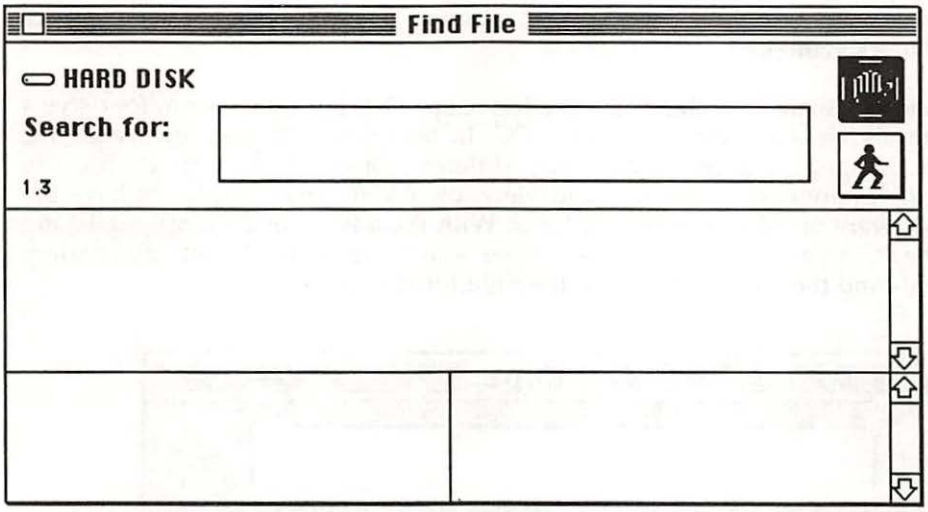


Figure 4-15. Find File screen

Key Caps

Use the Key Caps desk accessory to see the character set for any font you have installed in your system. When you select Key Caps from the Apple menu, a new menu item appears at the top of the screen. You can open this menu to choose the font to display. Then click on a key to see what it will look like in that font. Hold down one of the Shift keys (or the Caps Lock) to see what the capital letters will look like, or hold down the Option key to see what the alternate character set contains. Key Caps is especially useful when you get specialized fonts and you want to examine all their character combinations, or when you are searching for a specific alternate character like the copyright or trademark symbols.

On the PC, there is nothing like the Key Caps DA. For one reason, font styles are rarely shown accurately on the PC. In fact, until the past few years, PC users thought much less about using different fonts than Mac users. Because font styles are easy to change (and view) on a Mac, most Mac users have become aware of different types of fonts. With the advent of desktop publishing on the PC, more and more PC users have become aware of the potential variety of fonts and the impact that using the right font can have.

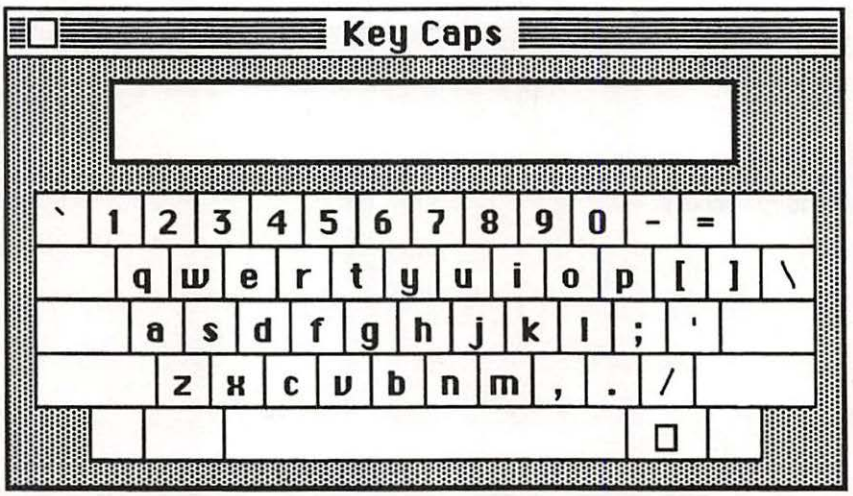


Figure 4-16. Key Caps window

Scrapbook

The Scrapbook is used to keep text and graphics for later. Anything you can put in the Clipboard by cutting or copying, you can also paste into the Scrapbook. Since the Scrapbook is a desk accessory, you can easily retrieve anything it contains at any time. For instance, suppose you have several standard logos you have created in one of the Macintosh drawing or paint programs. You can keep your logos in the Scrapbook, then paste them into your word processor or page layout documents whenever you need them.

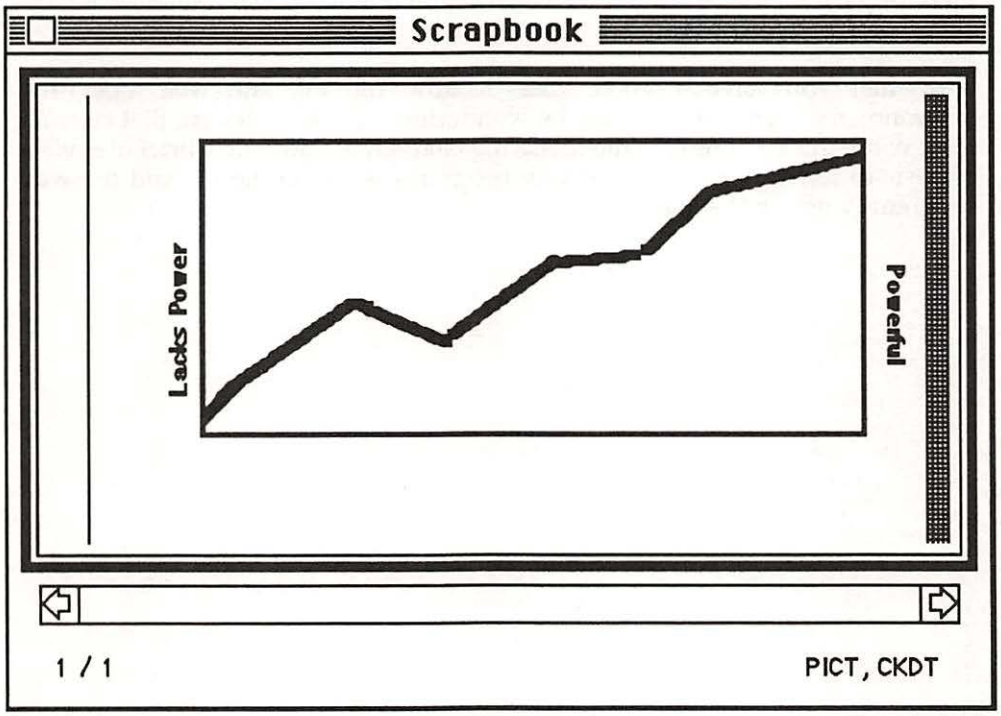


Figure 4-17. Scrapbook screen

There is no exact duplicate of the Scrapbook on the PC, though, as we said earlier in this chapter, there are some TSR utilities that can function similarly, at least with regard to keeping and retrieving text information.

GOING FORWARD

In this chapter, you have filled in the pieces of the Macintosh operating system puzzle. From the information in Chapters Two, Three, and Four, you should be able to manage files and folders, manipulate windows, run programs, use desk accessories, and CDEVs, and select printers. Only practice will make the techniques and various functions of the Mac become second nature.

We have tried, throughout these chapters, to relate what you know about the PC to what you are learning about the Mac. For a different way of looking at this comparison, see Appendix A, which contains a functional reference of DOS commands and their Macintosh equivalents.

Now that you have a good idea of how the PC and Mac operating environments compare, you may be wondering how the software that runs on them compares or differs. In the following chapter, we provide a brief overview of basic differences between the way programs work on the PC and the way programs work on the Mac.

5

Software Guidelines

Up to now, this book has discussed and compared the operating system enviroments of the PC and the Mac. If this were strictly a DOS-oriented book, you would have learned little about the nature of the programs that run on the PC. However, in learning about the Macintosh operating system as well, you have probably already learned a great deal about Macintosh software.

The purpose of this chapter is to summarize the Macintosh graphical interface as it affects off-the-shelf software programs.

You might be wondering what it will be like to begin working on a Mac. Will the word processor, database, or spreadsheet bear any resemblance to what you've used on the PC?

The answer is yes, for the most part. All word processors process text information, all databases keep lists, and all spreadsheets crunch numbers—whatever system they run on. Although software for the Mac performs the same basic functions as software for the PC, you may find that you don't work with it in the same way. The standard Macintosh interface accounts for many of the differences you will encounter, but there are other obvious ones you might like to know about.

A complete treatment of Macintosh and PC software would be another book in itself. This chapter discusses some of the basic differences you may encounter and identifies some of the leading programs for the two types of machines.

THE SOFTWARE INTERFACE

Personal computer software reflects the design philosophy of the programmers who make it. In the case of DOS programming, however, the operating system does not suggest much about the way the program should look or operate, and developers have invented many different user interfaces.

The Macintosh operating system contains special tools that help developers make their programs more uniform in appearance and operation. This

ultimately helps users because almost all Macintosh programs look similar. For instance, basic operations, like pulling down menus, mouse selections, manipulating windows, and even some of the menu commands themselves, behave the same way from one program to another.

The standardization of the Macintosh interface benefits users who must learn new programs or move from one program to another. There are fewer things to remember, and the same techniques work throughout a computer session. In contrast, moving from one PC program to another may entail a complete change of procedures and methods—not to mention commands and structures.

Businesses benefit from the standard interface. Employees learn more quickly in a standardized environment, thereby reducing training expenses. Once a user has established Mac literacy, or a familiarity with basic Macintosh techniques and structures, he or she can move easily from one application to another. On the PC, such migration from one product to another often requires much more retraining and adjustment. Because the Mac provides a standard software interface, it is possible to make some general statements about Macintosh programs:

- They use a graphical interface.
- They operate in windows.
- They use pull-down menus.
- They use the mouse extensively.
- They interact with the user through dialog and alert boxes.
- They all contain certain File and Edit menu items.
- They all use identical file-saving and retrieving methods (though there are different file types).
- They all use the Clipboard to cut, copy, and paste text and graphics.
- They all share the same graphic formats.
- Text can be moved from any application to any other via the Clipboard (without formatting).
- They all contain internal information that ties documents to the application that developed them, and they are displayed as identifiable icons on the Desktop.

You'll notice that all these features are consistent parts of the graphical interface described in detail in Chapters Two, Three, and Four.

In addition to these almost-universal similarities, there are some additional features that are found more often than not:

- Memory permitting, most Macintosh applications allow you to open more than one document at a time, each in its own window.
- The features of Macintosh windows are almost always the same, including the scroll bars and the size and zoom boxes.

Contrast these features with those of the average PC application:

- PC programs use a variety of interfaces, including menu-driven structures, command-driven structures, graphical interfaces, and combinations of these.
- PC programs seldom use windows.
- Most PC programs do not support the mouse. Those that do rarely depend on it to any great degree, although there are some exceptions.
- PC programs rarely share any similarity of structure or commands, except by accident. Even products from the same publisher may differ greatly.
- There is no standard for cutting and pasting information between programs, though many products provide ways to cut and paste internally, and others provide ways to import and export text and (sometimes) graphics; some products offer an internal Clipboard substitute.
- Generally, PC programs will load only one document at a time, although some *can* load more than one.
- PC documents and files are often identifiable by their three-letter extensions (.com, .doc, .txt, and so on), but, from the operating system's point of view, they are not otherwise tied to the application that created them.

Some of the key differences are discussed in greater detail in the following sections.

Windows

Many PC users will be unfamiliar with the concept of windows on a computer because windows are not used universally in PC applications, whereas Macintosh users tend to take windows for granted.

As stated in Chapter Two, windows are separate, independent areas of the screen, each devoted to its own document and/or application. For instance, you can have several different documents, each in its own window, or you can

have several applications (with a multitasking operating system), each occupying a separate window. It is also possible to have several applications open, each of which has several active documents in separate windows.

DOS programs like Microsoft Windows and IBM's Presentation Manager are window-based programs. So are Sidekick Plus and Framework III (which was one of the first window-oriented products for the PC).

Nearly all software for the Macintosh operates in one or more windows. There are a few exceptions, but these do not conform to the Macintosh interface standards.

Because there are many different kinds of monitors available for the Mac, especially for the Mac II series, ranging in size from 11 inches to more than 25 inches, windows have become even more useful. The original Mac screen can feel cramped with more than a few windows, but large monitors can provide a virtual kaleidoscope of active documents and applications.

Since windows can be moved, resized, and even zoomed to fill the whole screen, they offer a very flexible way to work.

On the PC, you can have one monochrome and one color system on the same machine, though their uses are very limited. On the Macintosh II series of machines, you can attach several monitors and actually use them as if they were one single screen. You can move windows from one monitor to another. Although this is a very costly kind of system, it does allow you to display many more windows than could fit on a single screen.

Dialog and Alert Boxes

Throughout all Macintosh applications, you will see dialog and alert boxes similar to those you've seen in the Finder. Dialog boxes generally require input from you, while alert boxes serve to warn you of a current situation.

Dialog and alert boxes are so common in Macintosh operations that you probably can't use any Mac application without encountering at least one of them. Examples of common dialog boxes are the Open (file) and Save As dialog boxes. The alert that appears when you try to close a document or quit an application before saving any changes is standard.

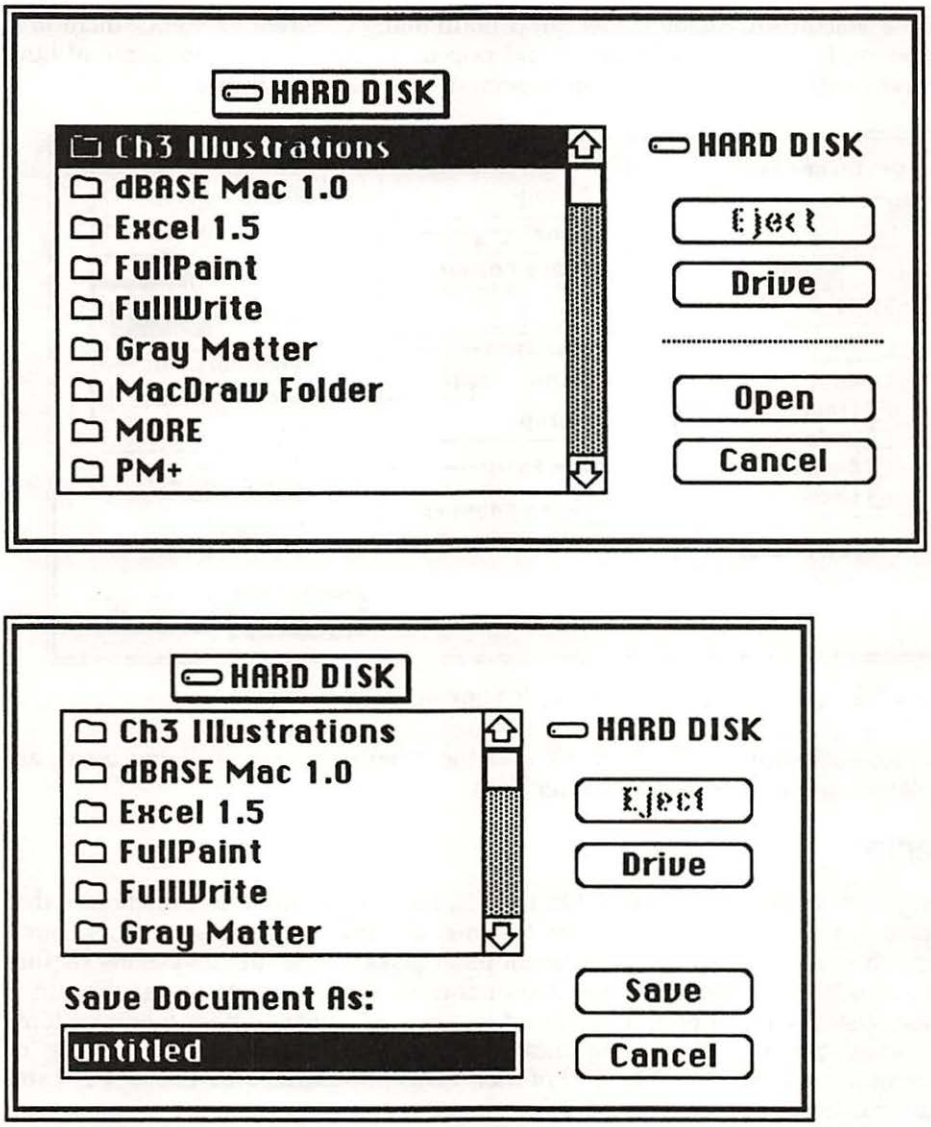


Figure 5-1. Open (file) dialog box and Save alert box

PC applications usually use some kind of message line to alert you to conditions, or they may use modal menus to present choices (for instance, Microsoft Word on the PC). Lotus-style menus (see Menus in the next section) use a combination of prompts on the menu line with messages on a special message line. Examples of programs that use this type of menu are 1-2-3 and Paradox. A few PC applications use dialog boxes. For instance, Microsoft's Bookshelf, Reflex, and others have incorporated basic aspects of the graphical interface.

On the Macintosh, dialog boxes can contain many different elements, including list boxes, buttons, radio buttons, and pop-up menus. A good example of how complex a dialog box can get can be seen in the following figure.

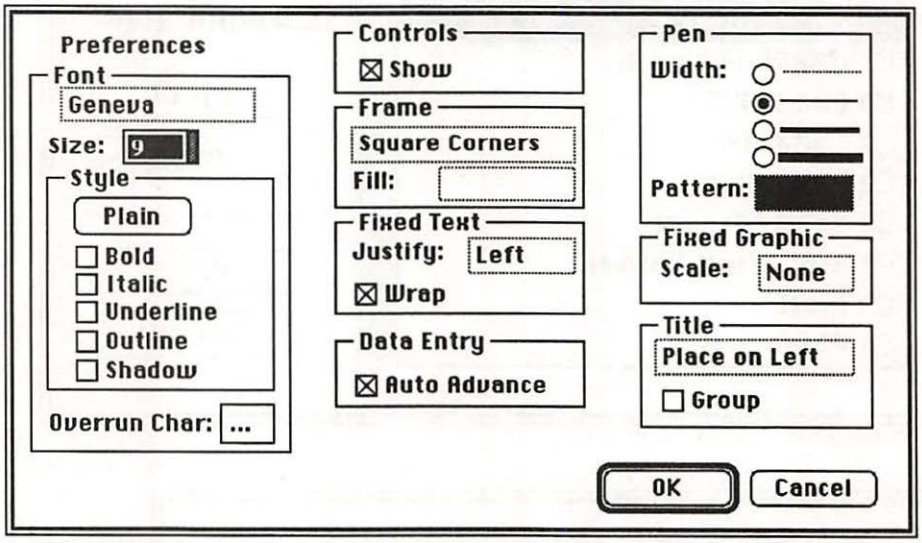


Figure 5-2. dBASE Mac Preferences dialog box with labels

List boxes, buttons, radio buttons, and the other elements of dialog boxes are explained in more detail in Chapter Two.

Menus

Many applications use menus. On the PC, menus are often lists of choices that appear on the screen from time to time. By following these menus, often through several levels, you can accomplish tasks. Some menu systems require the whole screen and take over the operation of the application at that time. These systems are sometimes referred to as *modal systems*. Other menu systems are available within the application and consist of several levels of interconnected choices. This kind of menu was popularized by Lotus' 1-2-3 and is often called a Lotus-style or 1-2-3-style menu.

More and more popular on the PC these days are the so-called pull-down menus. Programs like Framework from Ashton-Tate and Borland's Reflex were among the early adopters of this system of menus, but today many programs feature this type of interface. Lotus-style menus are structurally similar to pull-down menus. The differences are largely cosmetic, though pull-down menus offer more flexibility in labeling the options available.

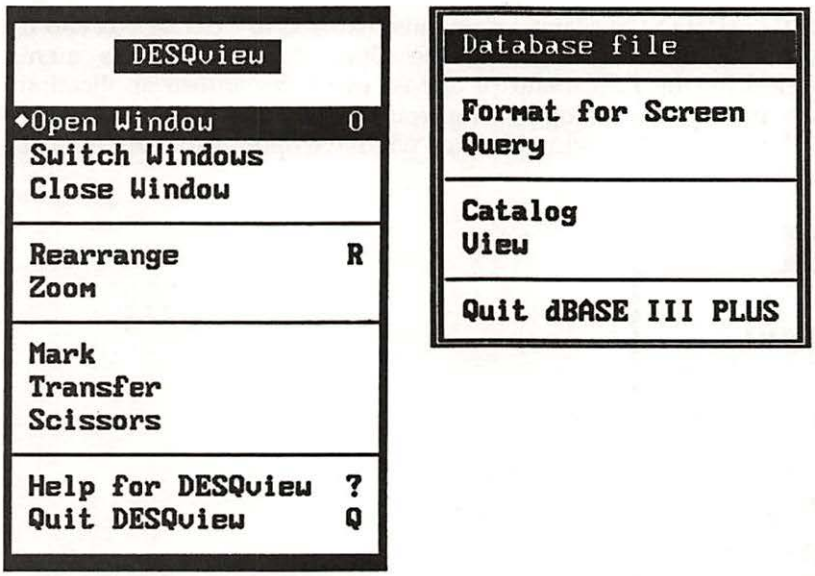


Figure 5-3. A dBASE IV menu and a DESQview menu example

On the Mac, menus are almost exclusively pull-down, but the Mac version has undergone some refinement. Today, the basic pull-down menu may offer one of several different types of options. When you select a menu command from a Mac menu, it may:

- Have an immediate effect (such as Paste, to paste text or graphics from the Clipboard)
- Open a dialog box
- Open a temporary (hierarchical) submenu—one that disappears when you release the mouse
- Open a sticky submenu or a tear-off menu

TYPES OF MENU COMMANDS. Menu commands that lead to a dialog box end in an ellipsis (...). For instance, selecting the Open or the Save As menu commands, found on the Edit menu of almost every Macintosh application, will present an appropriate dialog box for you to name the file to load or to save. The Goodies Box of a drawing package will have options that are indicated by an ellipsis.

Figure 5-4. Goodies box showing ellipsis choices

Menu commands that have submenus show a right-facing arrow. Clicking the menu command causes another menu to open to the side of the current command. Choose the submenu command by holding down the mouse button, moving the pointer onto an item in the other menu, and then releasing the mouse button.

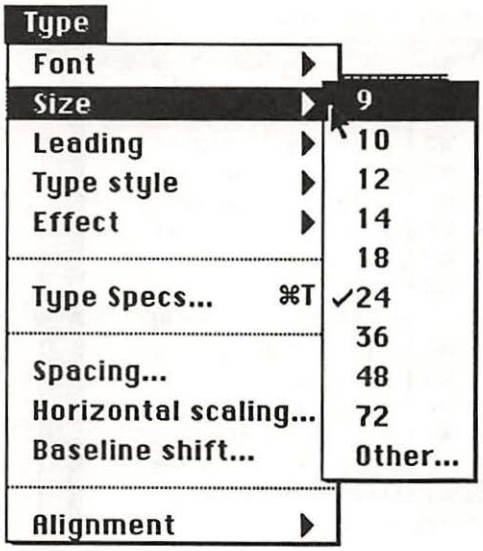
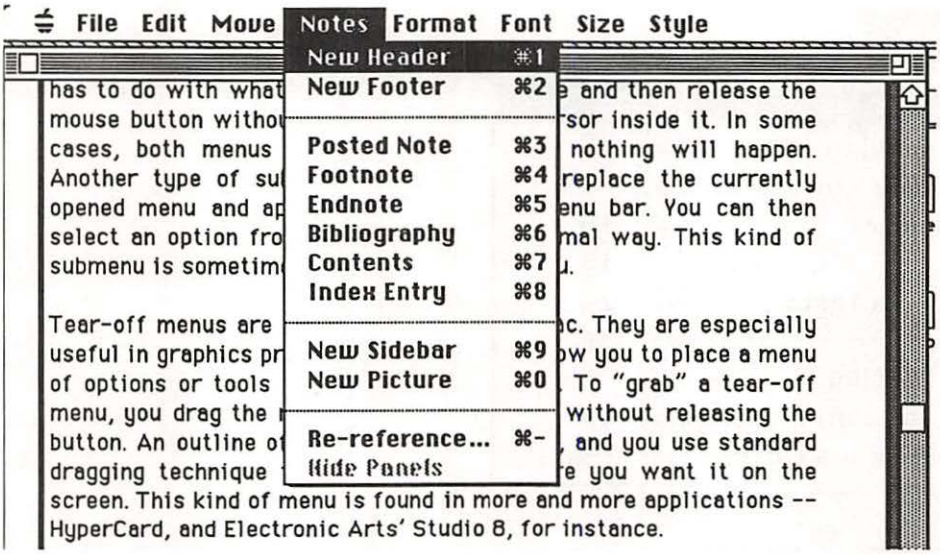


Figure 5-5. The submenu operation

There are two kinds of submenus. The difference between them has to do with what happens if you open one and then release the mouse button without moving the mouse cursor inside it. In some cases, both menus will simply close and nothing will happen. Another type of submenu replaces the currently opened menu and appears just below the menu bar. You can then select a command from that menu in the usual way. This kind of submenu is sometimes called a sticky menu.

Tear-off menus are relatively new to the Mac. They are especially useful in graphics programs because they allow you to place a menu of options or tools anywhere on the screen. To grab a tear-off menu, drag the mouse through the menu without releasing the button. An outline of the menu then appears; drag the menu where you want it on the screen. Tear-off menus are found in more and more applications—HyperCard, and Electronic Arts' Studio 8, for instance.



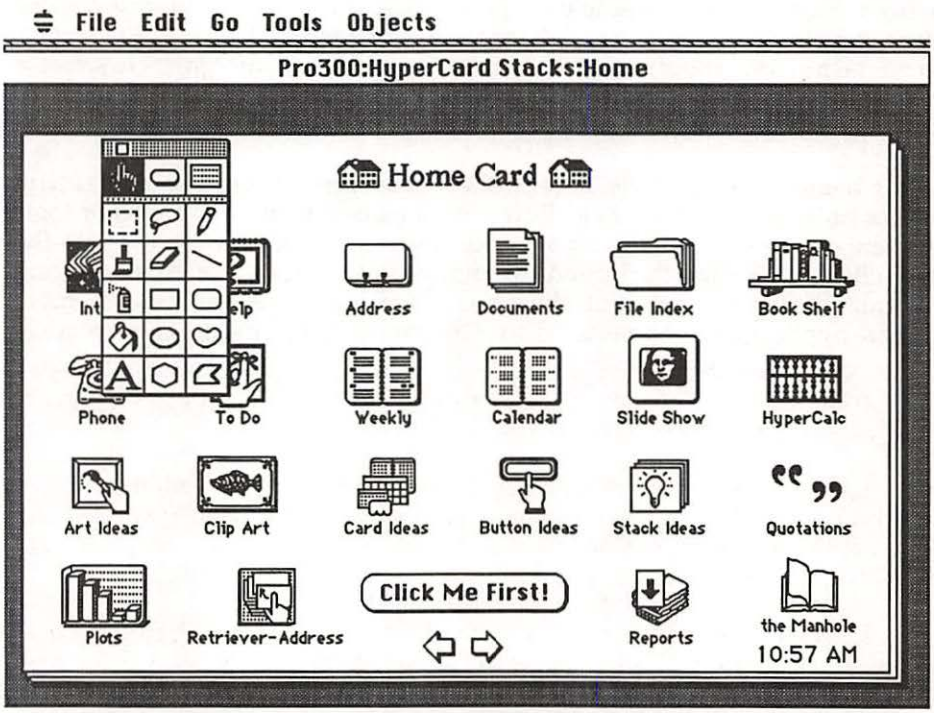


Figure 5-6. A sticky menu and a tear-off menu

Icon Bars

Icon bars are uniquely Mac-like replacements for commands and menus. Most icon bars display one or more columns of icons vertically along the left edge of the Mac screen.

Icon bars were first introduced with MacPaint—one of the original Macintosh applications. Icon bars are used most often by graphics programs, in which the icons represent different draw and paint tools. For instance, clicking a circle icon turns the mouse cursor into a circle-making tool. Clicking a text icon allows you to type words on a graphics screen.

Other icon bars are used to replace menus or procedures. For instance, in HyperCard, icons on the Tools menu change the operating mode for HyperCard. In programs like Full Impact and dBASE Mac, icon bars may replace menus or even represent user-created macros.

There is no exact PC equivalent for icon bars.

Mouse Techniques

Mouse techniques are clicking, double-clicking, dragging, Shift-clicking, and marqueeing. If a PC application uses the mouse, it will use some combination of these techniques, though often it won't use all of them. These are explained in greater detail in Chapter Two.

The mouse techniques available in an application depend entirely on that application, but there are some general rules. For instance, text-oriented applications are less likely to use the marquee technique for multiple selections but instead will extend a selection by letter, word, or paragraph. Graphic programs like MacPaint, Claris CAD, SuperPaint, or Pixel Paint (to name just a few) generally use all available mouse techniques.

PRODUCTIVITY SOFTWARE

The basic applications available on any personal computer system consist of so-called *productivity software*—notably spreadsheets, word processors, databases, and telecommunications tools. Though there are other types of applications, these are by far the most commonly used.

Mac programmers and developers have attempted to redefine these applications to fit the graphical interface. In doing so, they have expanded the utility of many Mac products and, in many cases, have inspired PC programmers to match their efforts.

PC applications now feature interfaces similar to the Mac standard. Thus, as time passes, it should become easier to switch between the two machines. Many industry leaders expect the PC to look more and more like the Mac. OS/2 Presentation Manager is evidence of that.

PC and Mac applications—spreadsheets, word processors, databases, and so forth—differ from each other in several respects. Many, perhaps most, of the differences can be attributed directly to the contrasting interface standards. Despite these, there are some tips that may help you move from PC to Mac applications.

In the following sections, you will learn something about specific types of software on the Mac and how they compare with similar software on the PC. Each section contains a partial list of the main products in that type followed by a brief discussion of history and product contrasts. Some sections contain a few specific tips and statements that summarize general differences between PC products and Mac products. The purpose is to help you make the transition from PC to Mac—not to provide you with either a buyer's guide or a comprehensive list of options available on either system.

> **NOTE:** The discussions that follow vary in length and content primarily because some kinds of programs on the PC contain substantial differences from their Mac counterparts. Other types of programs are not different from each other simply because of their respective operating environments, but only because they have different design implementations or features. For instance, Ventura Publisher works directly with word processor files, but PageMaker must import files before working with them. This is a valid distinction, but it is not a PC/Mac issue. It is a difference in design—not a feature that exists on one machine and is absent on the other. The goal is to provide an overview of productivity software, not to review or contrast specific products.

Spreadsheets

SIGNIFICANT PRODUCTS.

PC Spreadsheets	Mac Spreadsheets
1-2-3	Excel
Quattro	Full Impact
Excel	Trapeze
SuperCalc V	

HISTORY. Spreadsheets are simple number-crunching machines, and after 1-2-3 there can be no progress. True or false?

Although it's true that 1-2-3 almost single-handedly elevated the PC to the position in business it now occupies, competition is still alive and the art of the spreadsheet continues to evolve.

The graphical interface of Excel on the PC is no surprise because Excel on the Mac has been the best-selling Mac spreadsheet since its introduction. Excel's

success on the Mac points out a difference between Mac users and PC users. Where the PC user still swore by 1-2-3, Mac users pointed out the superiority of Excel.

Excel uses pull-down menus and the mouse plays an active role during ordinary operations. In 1-2-3, to define a range, you would enter a starting cell value, press the period key, then enter the ending cell location. In Excel, to define a range, you can use the mouse to select a block of cells.

Cut, copy, and paste features work in Excel the way they work in other Mac applications, so it is very easy to work with the contents of cells. In 1-2-3, it is also easy but requires many keystrokes. The difference may be minor to some, but it points to the whole philosophical difference between the two systems.

One of the features that frequently appears on the Mac is the integration of different types of information—text and graphics, for instance. Spreadsheets are evolving in that direction, too. One spreadsheet, Full Impact from Ashton-Tate, allows the incorporation of text and graphics with spreadsheet data to create a *presentation spreadsheet.*

Full Impact further exemplifies the contrast between accepted PC spreadsheets and what is happening on the Mac. Full Impact uses traditional pull-down menus, along with icon bars that can be customized by the user and even attached to user-created macros.

GENERAL TIPS.

- PC spreadsheets use various interfaces, including the familiar 1-2-3-style menus. Some PC spreadsheets (such as Quattro) offer pull-down menus (like the Mac) but otherwise operate like a PC application. Excel, which works under Microsoft Windows, has the most Mac-like interface among PC spreadsheets.

- Mac spreadsheets take full advantage of the Mac interface and use the mouse for selecting ranges; they cut, copy, and paste while defining formulas.

- Mac spreadsheets allow you to open more than one worksheet at the same time. PC spreadsheets have traditionally limited you to one open sheet at a time.

- Mac spreadsheets can usually read 1-2-3 worksheet data, though they will not translate 1-2-3 macros. Since all popular PC spreadsheets write to the 1-2-3 format, Mac spreadsheets can share data with them. Also, Excel on the Mac can also read and write files compatible with Excel on the PC.

Word Processors

SIGNIFICANT PRODUCTS.

PC Word Processors	Mac Word Processors
WordPerfect	Microsoft Word
Microsoft Word	WordPerfect
MultiMate Advantage II	FullWrite Professional
Sprint	MindWrite
WordStar	Write Now
Samna	Nisus
DisplayWrite	MacWrite II

HISTORY. PC word processors have evolved from the command-driven CP/M products like WordStar to today's powerhouse programs like WordPerfect and Microsoft Word. In a continuing battle of features, however, the basic user interfaces of these products have changed little. WordStar has come out with more friendly approaches, but WordPerfect and Microsoft Word—the two leading word processors—have hardly changed their approaches over the past several years. They have added lots of features to the same basic product.

When the Mac was first released, it had only two applications—a word processor and a paint program. The word processor was MacWrite, and it set the standard for all Mac word processors to follow.

In contrast to the diversity on the PC, word processors on the Mac all contain a few of the same features:

- They use the graphical interface, specifically, sizable and scrollable windows; mouse techniques; and standard menu commands like Save, Save As, Cut, Copy, Paste, and so on.
- They support multiple fonts, font sizes, and typestyles (bold, underlined, outlined, and so on).
- They use visible, editable ruler bars.
- They are almost entirely WYSIWYG (What You See Is What You Get).
- They can interchange text easily through the Clipboard.

The uniformity of Mac word-processor interfaces contrasts with the diversity of PC word-processor interfaces. Some may have a menu-driven interface; others may use commands. Each word processor uses its own commands for cut, copy, and paste (and usually its own terminology, too). Some word processors, like DisplayWrite, for instance, use modal menus. Others use pull-down menus (like Sprint or New York Word Processor). Still others, like WordPerfect, rely

on massive collections of commands that make extensive use of the PC's function keys in different combinations with the Alt, Shift, and Control keys. Some use combinations of commands and menus, like Microsoft Word for the PC.

PC word processors are just beginning to work effectively with multiple fonts and font sizes, though they have always had special effects like boldface and underline. However, PC word processors are usually not completely WYSIWYG to the extent that Mac word processors are. Though special effects may display in different colors or with different video attributes on a PC, they rarely display exactly as they will print. On the Mac, indentations, multiple columns, graphics, specific fonts, sizes, and special effects are all displayed graphically on the screen, exactly the way you will see them on the printed page.

One of the key differences between PC and Mac word processors is text selection. On the PC, you usually use a combination of keystrokes to mark the beginning and the end of a block of text to be selected, and then you perform an operation on it. On the Mac, you use standard mouse techniques. Generally, double-clicking selects a whole word and other mouse techniques may be available (depending on the word processor) for selecting an entire sentence, paragraph, page, or document. Today, most Mac word processors offer keyboard text selection as well.

Many people who touch type have trouble adapting to using the mouse with a word processor because they have to remove their hands from the keyboard. However, people who work with the Mac long enough begin to appreciate the added convenience of mouse techniques which can become second nature. Most Mac word processors also include a full complement of keyboard techniques to access menu operations. For instance, Microsoft Word and Ashton-Tate's FullWrite Professional both have many key combinations using the Command and Option keys along with other alphanumeric keys. Standard combinations like Command-X for Cut, Command-C for Copy, and Command-V for Paste are found in almost all Mac applications. Others may vary from one application to the next.

Various word processors on the Mac offer subtle improvements to the interface. For instance, FullWrite offers special Command-keys to open and select commands from menus. WordPerfect for the Mac uses sticky menus (discussed earlier in this chapter).

Furthermore, both Microsoft Word Version 4 and WordPerfect provide ways for you to customize the interface. Word lets you redefine the menus and the shortcut keys assigned to each menu command, and WordPerfect lets you create keyboard-activated macros that can emulate any combination of menu commands. On the PC side, WordPerfect and Sprint allow the same kind of flexibility.

GENERAL TIPS.

- Use the mouse as a selection tool in Macintosh word processors. Double-clicking to select a word is almost universal.
- Learn the keyboard equivalents for the menus you use most often.
- Use the Clipboard or the Scrapbook whenever necessary to bring in graphics or text information from other applications.
- In addition to the Clipboard, most Mac word processors can import and export ASCII text files (including those created on PCs). Sometimes, they can read and write formats for other products.
- When working with PC text files on a Macintosh, you will want to eliminate *gremlins* that appear. These gremlins are often the line feed characters used on the PC but eliminated on the Macintosh. Line feeds show up as empty boxes on the Macintosh screen. There are several utilities, such as Apple File Exchange, which will eliminate line feed characters.

Page Layout

SIGNIFICANT PRODUCTS.

PC Page Layout	Mac Page Layout
PageMaker	PageMaker
Ventura Publisher	Quark Express
Byline	Ready, Set, Go
	Ragtime
	FullWrite Professional

HISTORY. Page layout software, also called desktop publishing, though a relative newcomer to the personal computer, has quickly become widely used. PageMaker on the Mac was the first significant page layout product. PageMaker defined the standards that have since been followed almost entirely by other desktop publishing products on both the PC and the Mac. Most desktop publishing programs (DTP) all feature windows, mouse techniques, and pull-down menus—in short, they are all Mac-like regardless of the system for which they were written.

More and more frequently, DTP functions can also be found in some word processors and even in some spreadsheets, like Full Impact.

Page layout programs allow you to combine text and graphics visually and to control the details of each page. Page layout programs have become popular at all levels of publishing, from company and local newsletters to professionally produced books. In fact, this book was completely formatted with FullWrite Professional. Since all of the high-end page layout programs can work directly

with laser printers, professional typesetting equipment, and other printing resources, their range is not limited to one group of users. All Macintosh DTP programs use the mouse and windows to facilitate page layout, while not every PC application incorporates them. Byline, for example, does not require the use of a mouse to operate, instead it relies on the cursor keys to move text and graphics.

The good news is that, because it was a Mac product that set the standards for this software genre, it is pretty easy to migrate from the PC products to their Mac counterparts. At least as far as DTP software is concerned, transition from PC to Mac should not be a great shock, and, if you use PageMaker, you can even bring your documents along with you.

Databases

SIGNIFICANT PRODUCTS.

PC Databases	Mac Databases
dBASE III, III PLUS, IV	dBASE Mac
RBase	4th Dimension
Paradox	Double Helix
Reflex	Reflex for the Mac
RapidFile	Foxbase Mac
Foxbase	Filemaker II

HISTORY. Databases on the PC evolved from mainframe data processing solutions, and most early database products were, in fact, programming languages with almost no supporting structure. Over time, databases evolved, and now there are many different solutions featuring a variety of approaches.

On the PC, most databases are either command- or menu-driven. Command-driven databases include dBASE II, dBASE III, Knowledgeman, and GURU. Menu-driven products include Paradox, RapidFile, and Alpha Three. Some products include combinations of menu-driven and command-driven interfaces, including dBASE IV, RBase, and others.

There are *flat file* (non-relational) databases on the PC, which can manage mailing lists and other simple database tasks, and there are hefty *relational* databases, like dBASE IV, which feature powerful fourth-generation programming languages. This same diversity exists in the world of Macintosh database products.

Although databases on the PC and the Mac are different, the same basic principles of data management apply, whatever the interface. However, Macintosh databases have experimented consistently with graphical interfaces in processing data.

Many Mac databases use a visual model to define files and fields. dBASE Mac, 4th Dimension, and Reflex for the Mac all feature graphic file representations with visual markers to represent relations. Instead of creating relational models by defining relationships or issuing complex queries, programs like dBASE Mac and 4th Dimension let you use the mouse to draw a relationship from one file structure to another. At the top of the visual spectrum Double Helix uses icons to represent all the elements of a procedural database application.

Another example of the visual model includes the use of icons to represent commands and menu options. dBASE Mac uses such icon bars.

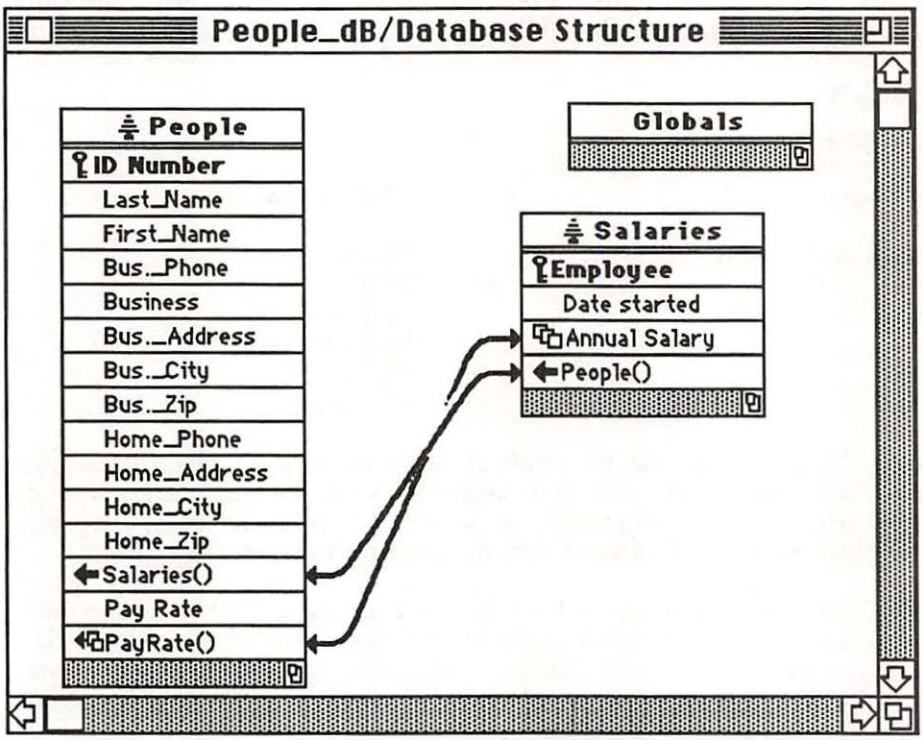


Figure 5-7. dBASE Mac structure window showing related files

Another feature common to Mac database products is the graphic report layout, which uses standard Macintosh object-manipulation techniques. Creating reports within Macintosh databases often involves using the mouse to move and manipulate objects that represent fields and other data. In addition, reports can be WYSIWYG and you can view fonts, field positioning, headers, footers, and graphics just as they will print.

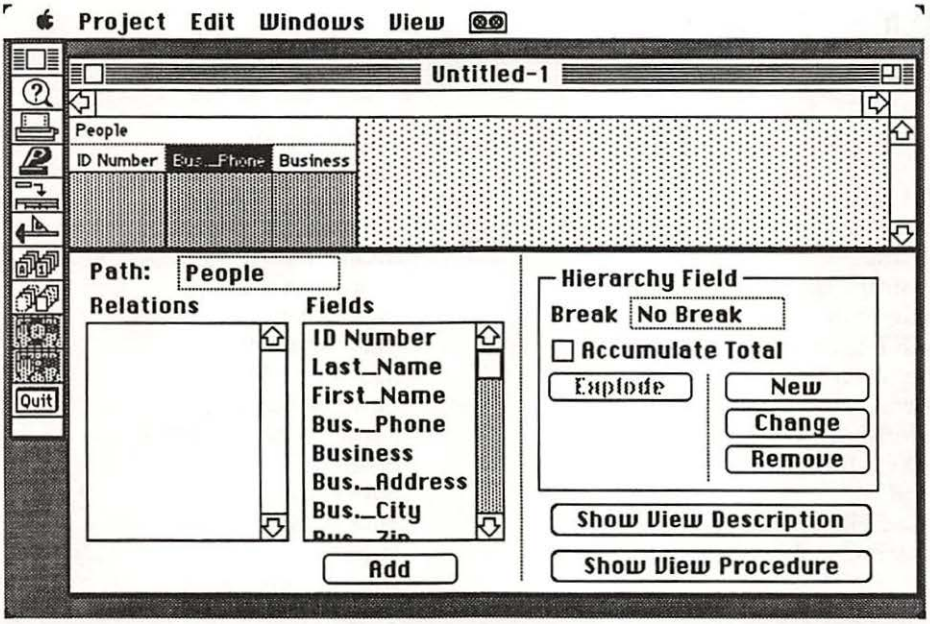


Figure 5-8. dBASE Mac layout screen

Some Mac databases include menus that contain the commands for their programming languages. By selecting from the menus, users can build simple or complex programs without typing. One advantage of this method is that fill-in-the-blank constructions are automatically added in one step. For instance, selecting IF from the dBASE Mac menus adds the construction for IF..THEN..ELSE..END. You simply fill in the conditions. With multiple IF statements, you don't end up with as many syntax errors—leaving off an END statement, for example.

Mac databases also provide the same standard menu options that other Mac applications provide—making it easier to know how to manipulate files and to cut and paste data.

Despite some useful innovations, Macintosh databases have not caught up with data processing software on the PC. Speed is the main reason. Even on faster Macs, the database software tends to be slower than a database on a PC—perhaps because of the graphic overhead. You will almost certainly notice a difference, especially if you work with very large databases.

Graphics Software

SIGNIFICANT PRODUCTS.

PC Graphics	Mac Graphics
AutoCAD	AutoCAD (soon)
VersaCAD	VersaCAD
PC Paint	MGMStation
PC Paintbrush	Claris CAD
Deluxe Paint	Mac Draw II
CHART-MASTER	Mac Paint 2.0
Paintworks Gold	Illustrator 88
Lumena	Lumena (coming)
RenderMan	RenderMan (coming)
DRAW APPLAUSE	Freehand
GRASP	Superpaint
Art and Film Director	SuperCard
Harvard Graphics	Super3D
	Digital Darkroom
	Image Studio
	HyperCard
	FullPaint
	Studio 8
	Photon Paint

HISTORY. It should come as no surprise that graphics programs on the Mac are both numerous and varied. They range from simple paint programs like the original, MacPaint, to very sophisticated photo-touchup programs like Digital Darkroom and Image Studio. In between are powerful paint programs, draw programs, and CAD systems. With the advent of the color Macintoshes, graphics options have expanded rapidly.

Graphics programs on the PC and Macintosh have very little in common, though most graphics programs on the PC look a lot like the early Macintosh paint programs, and a few of the newer ones (like Deluxe Paint) are becoming as sophisticated as many of the Mac paint programs. Of course, some of the draw and CAD programs are direct imports from the PC to the Mac (AutoCAD and VersaCAD, for example), but they are different on the Mac. In at least one case (Adobe Illustrator), a graphics program is migrating from Mac to PC.

The PC has had high-resolution graphics display capability for only a relatively short time, while the Macintosh has had exceptional graphics capability since its inception. Typically, graphics software in the DOS world has been targeted to specific tasks such as charting data into various presentation styles like pie-charting and bar-charting. Products like SIGN-MASTER and CHART-MASTER are used frequently in the DOS world to prepare graphic presentation material. There is no truly accepted standard for graphics on the PC, although there are several formats that are gaining acceptance.

Newer programs, like Deluxe Paint and Paintworks Gold, have begun to gain a following and offer much of the same power and functionality on the PC that powerful Mac programs, like Pixel Paint, Studio 8, and others, can offer on the Mac. At the high end of the spectrum are programs like Lumena and Pixar's RenderMan, which offer exceptional color processing power on the PC and are being ported to the Mac.

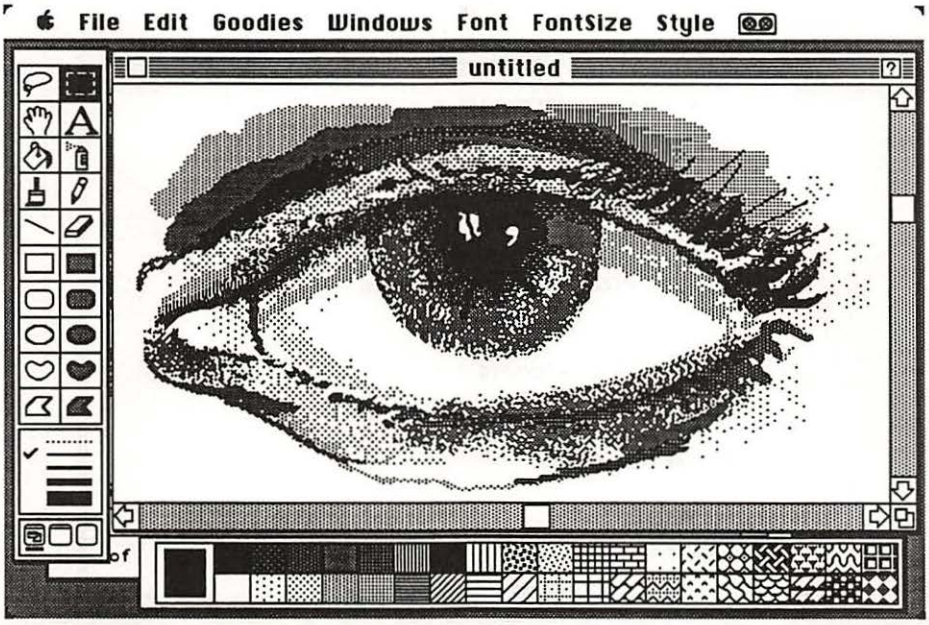


Figure 5-9. FullPaint screen

Mac graphics are much more tightly integrated into everyday operations than they are on the PC. Presentation software has been less necessary on the Mac, since most software packages designed for the system make some use of the graphics capability inherent in the machine. Software packages such as MacDraw and FullPaint introduced Mac users to freehand drawing years ago. In contrast, freehand packages (such as DRAW APPLAUSE) have only recently been available in the DOS world and will run only on high-end systems.

It is worthy of note that many of the most powerful Macintosh paint and draw programs work in color, but that only a few Macintosh models (the Macintosh II and the Macintosh IIx, for example) support color. Thus, though graphics have been a mainstay of Mac applications from day one, the most sophisticated systems are used by a few. In contrast, almost any PC can use high-end color graphics, given enough memory and the addition of a graphics board that supports EGA, VGA, or MCGA.

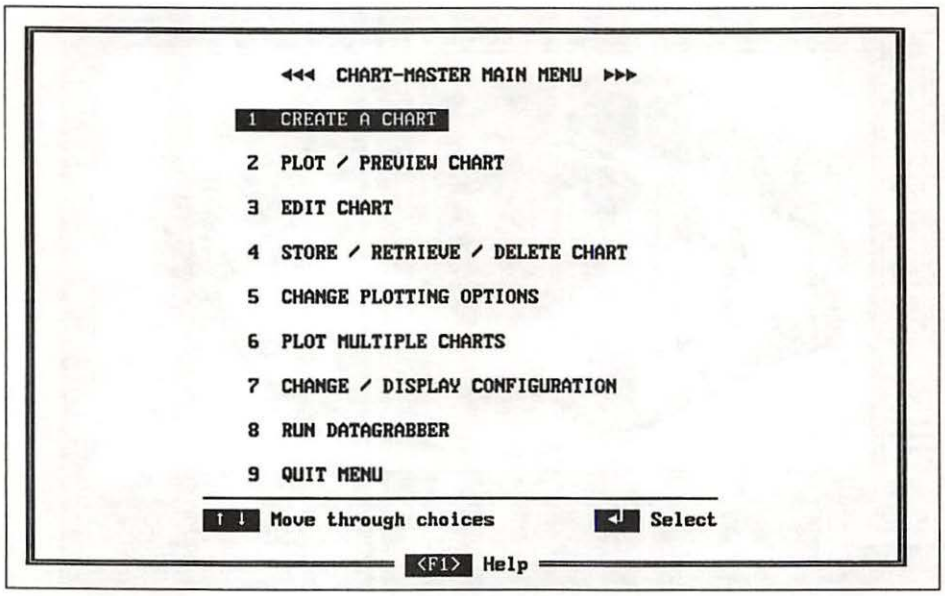


Figure 5-10. CHART-MASTER screen

The Macintosh graphics software environment is moving toward more professional-level graphics output exemplified by products such as Adobe Illustrator. These products address some of the more mathematical issues required by technical drawing, such as Bezier curves and other precise drawing requirements. Illustrator is also being introduced on the PC. Other titles of note are MacDraw II, SuperPaint, Pixel Paint, Studio 8, Photon Paint, Dreams, AutoCAD, VersaCAD, Claris CAD, MGMStation, Pegasus, and a host of other drawing, paint, and CAD programs. You'll notice that AutoCAD and VersaCAD (and, soon, Illustrator) are the only graphics programs that currently support both PC and Mac versions, though PageMaker can also use graphics from both systems.

The lack of compatible graphics standards has acted as a barrier between Macintosh and PC graphics programs, but standards are beginning to appear. Many Macintosh and PC graphics programs will read and write TIFF files, a format used by many FAX machines and scanners.

Figure 5-11. Adobe Illustrator screen

There are also several animation programs available for each system. On the Mac, the leader is VideoWorks, though Silicon Beach's SuperCard (when released) will be able to produce sophisticated animation as well. On the PC, animation products range from Paul Mace Software's GRASP to Art and Film Director from Epyx. Each can produce highly pleasing and sophisticated animation.

Image and photo retouching is another growing field. High-end PC products (like Lumena) have been able to perform graphic miracles. Recently, relatively low-cost programs like Digital Darkroom and ImageStudio allow sophisticated image modification on gray-scale images; color retouching on the Mac is not far away.

When switching from a PC-based graphics program to a Mac program, the key benefit you will immediately notice is the ease of moving the graphics image to other document types (such as word processing programs and spreadsheets). Most PC applications require exporting and importing the graphics to incorporate the image in another document type. The Mac allows normal cut-and-paste procedures, as in any other Mac application.

Integrated Software

SIGNIFICANT PRODUCTS.

Integrated PC Programs	Integrated Mac Programs
Framework II	Jazz
Framework III	Microsoft Works
Microsoft Works	
Enable	

HISTORY. The degree of difficulty in moving from one type of application to another, as well as the high cost involved in buying several different packages, spurred the growth of the integrated software market in the DOS world. Packages such as Framework II, Framework III, and Enable allow users to have word processing, database, communications, and spreadsheet capabilities in one package. These packages also allow for simple transfer of data from one package to another. The cut-and-paste facilities in Framework III, for instance, are simple and quick.

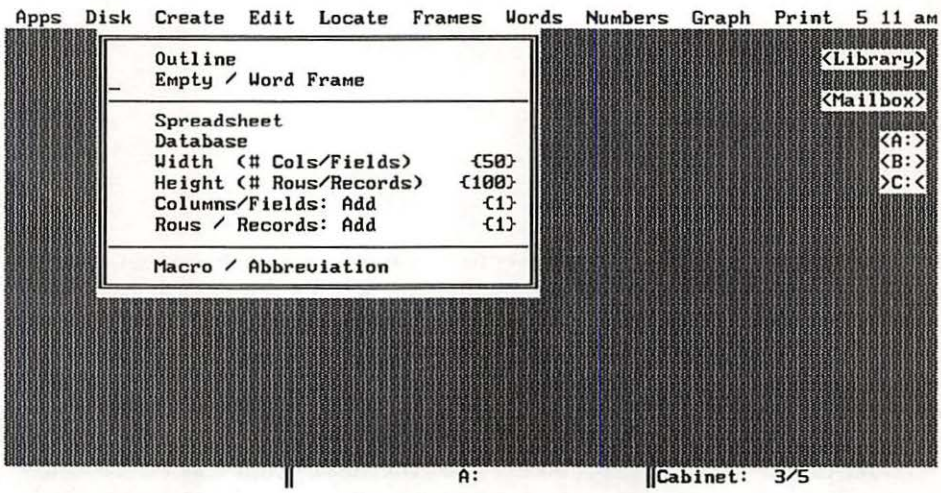


Figure 5-12. Framework III screen

The Macintosh community has demonstrated less need for this type of a package, largely due to the cut-and-paste capabilities inherent in the desktop. Therefore, sharing data between products does not require data reformatting. Lately, however, demand appears to be increasing for integrated packages, and they have begun to appear on dealers' shelves. Microsoft Works is an excellent

integrated package now available in most stores. Works is available on both the PC and the Mac and represents the only viable integrated package on the Mac at this time.

Integrated packages vary a great deal in their design and interface philosophies. Framework was one of the first PC products to use a graphic interface very similar to that of the Mac. With multiple, sizable windows and pull-down menus, Framework featured a somewhat Mac-like approach. Other integrated PC packages vary and cover the whole spectrum of presentations and interfaces. However, if you have been using an integrated package on the PC, you will probably find less need for such a package on the Mac, particularly if you have enough memory to use MultiFinder effectively. With MultiFinder and the Clipboard, you can choose your own software environment and make it work almost as smoothly as the best integrated package. With Lotus' dwindling support of Jazz, Microsoft Works is just about your only choice for an integrated package for the Mac.

Telecommunications Software

SIGNIFICANT PRODUCTS.

PC Com Programs	Mac Com Programs
Smartcom	Smartcom
CrossTalk	Red Ryder
Procomm Plus	Microphone
Lotus Express	Desktop Express
Relay Gold	Intalk
QModem	
GT Powercom	
Boyan	

HISTORY. Telecommunications is the use of telephone lines to send data between computers at different locations. Telecommunications ultimately boils down to modems, baud rates, protocols, and the other buzz-words of the genre. Although the interfaces may be different, technically, Mac and PC telecommunications products work more or less the same.

Perhaps the most significant difference between the two systems is the MacBinary protocol. Because PC files do not contain the same resource information as Mac files (specifically the file type and creator information presented in Chapter Three), file transfer protocols like Xmodem and its derivatives (Ymodem, Zmodem, and so on) have been adequate to send and receive all kinds of files.

MacBinary is an Xmodem derivative also, but one that reads the file resource information and can therefore transfer a Mac file intact. Generally, when you use MacBinary, the filename, its type and creator are all included in the transfer so the resulting file is identical to the one sent, right down to its icon.

Other than MacBinary, differences between communications programs are largely cosmetic and follow the general differences between PC and Mac programs. There are two kinds of PC telecommunications programs—menu- or command-driven. Popular programs like Procomm and Qmodem follow the command format with various menu screens. However, these same products also use pop-up information windows to display upload and download progress information, baud rate options, protocols, and other information. Many PC telecommunications programs also include sophisticated Pascal-like programming languages.

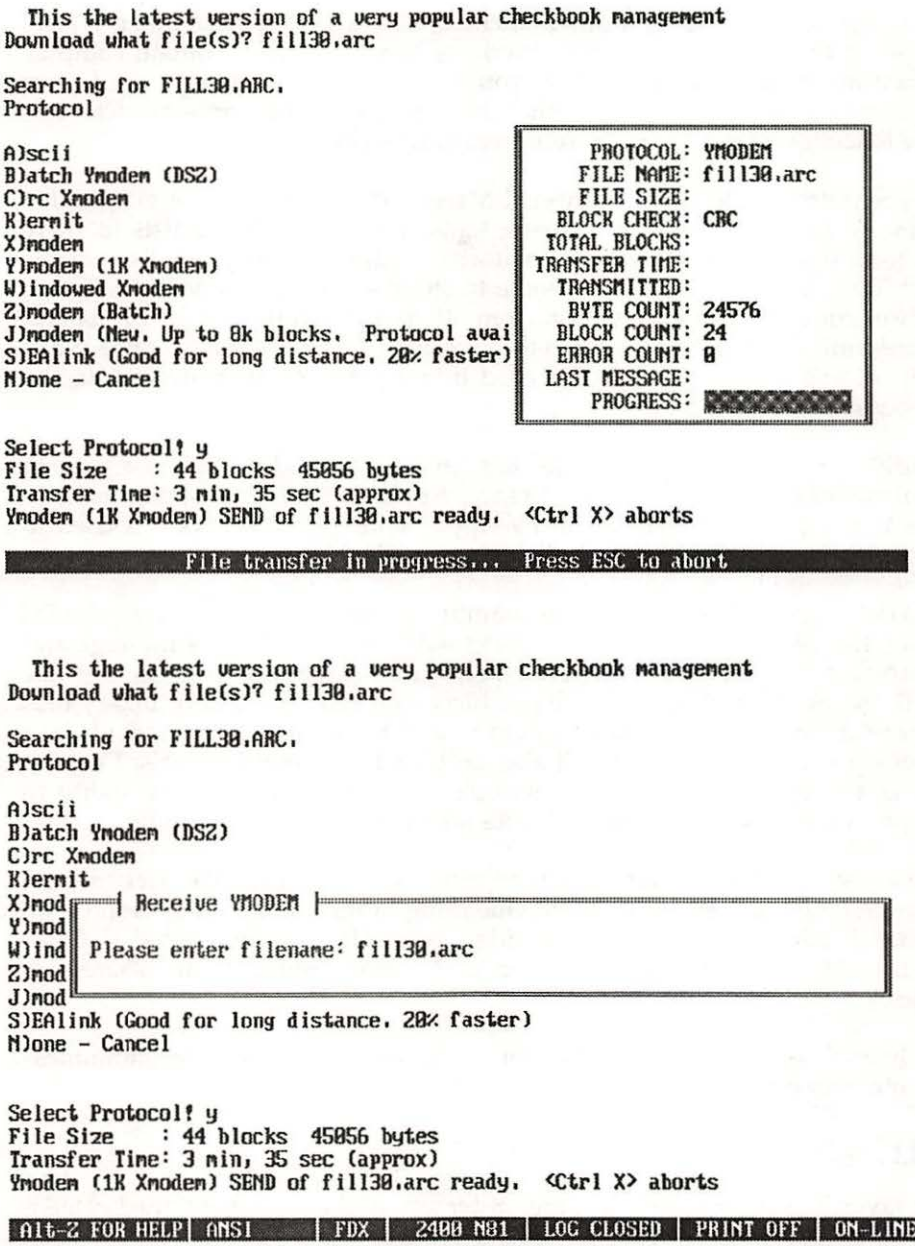


Figure 5-13. Qmodem screens

Mac programs use the pull-down menus, dialog boxes, and other typical features of the graphical interface. Products like Red Ryder contain complex programming languages that allow you to customize many aspects of your telecommuncations sessions. Another Mac program, Microphone, lets you define Macintosh button icons to represent your scripts.

Hayes Smartcom II lets two connected Macintoshes communicate via graphic screens. A very simple set of drawing tools could allow two artists to share ideas for a drawing, or allow story editors to rough out story boards over the phone lines. It might also allow people to share ideas for a newsletter layout, and even cut and paste information from other applications via the Clipboard, then transmit the images directly to the screen of the remote Mac, where it can be copied and pasted via the Clipboard into a graphics program or into the Scrapbook for storage.

In addition to general-purpose telecommunications products, there are some specialized programs as well. For instance, AppleLink software allows users to access the AppleLink network run by Apple, and special software is used to connect with another Macintosh bulletin board, MacNet.

MCI Mail supports two specific telecommunications products—one for the PC and one for the Mac. Lotus Express works with MCI to automate message and file transfers through the E-mail service. Similarly, Desktop Express on the Mac does the same. With either of these products, you can send text or binary files to other subscribers of the E-mail system. Currently, Lotus Express will work in the background on a PC and will also poll MCI at preset intervals. Desktop Express, though more Mac-like in its interface, currently lacks the ability to function in the background and also does not do any automatic polling.

There are some other interesting telecommunications utilities like Backdown, a desk accessory that performs file downloading in the background, even on an ordinary Macintosh without MultiFInder. A similar product called IL.COM will download in the background on a PC. Both products are shareware utilities.

See Chapter Seven, "Connections," for more information on telecommunications and networking.

UTILITIES

Some favorite software doesn't come under any of the aforementioned categories, but, instead, could be called "utility software."

There are so many utilities available for both systems that they can't all be listed here. There are literally hundreds of valuable utility programs, in both commercial and shareware. They are used for a variety of purposes. This section provides a brief overview of some of the types of useful utilities you may encounter.

Most Mac desk accessories come under the heading of utilities, as do many tools available for the PC. Think of utilities as small programs that become indispensable parts of your daily life.

Utilities help you do things better. They are often an extension of the operating system, or a replacement for its lesser features.

Some typical utilities on the PC include Whereis and Sfind, two shareware programs that help you locate lost files on a hard disk. Menu programs like Automenu or shell programs like Directory Scanner are very useful additions to the typical PC system. There are also various directory programs like HDIR, which displays a directory with each different file extension in a different color, and Xtree, which displays your file directories in a graphic format.

Archiving

Some of the most useful kinds of utilities are the file squeezing and library utilities. They combine several files into a single smaller file and can be used in telecommunications and for archiving information.

On the PC, archiving/file squeezing utilities include ARC, PKARC, and ZOO. On the Mac, the original library utility was called PackIt, and the most recent favorite is called StuffIt! The main difference between Mac and PC library files is the interface. As usual, the PC programs use a command line interface with special switches entered at the command line.

There are some fine shareware utilities that can help you work with PC library files in a menu-oriented application. These include programs like Arc Master, LARC, and NARC.

The Macintosh programs use windows, menus, list boxes, and dialog boxes. Also, double-clicking a PackIt or StuffIt! library will automatically invoke the appropriate program.

The operation of StuffIt! is typical of Mac applications. You can archive files by selecting them from the standard file list box. You can also unarchive files by selecting appropriate files from a list. If you have ever used one of the PC programs, you'll find StuffIt! easier to use and understand.

More CDEVs

In Chapter Four, you learned about the Control Panel resources called CDEVs. The ones mentioned in that chapter come with the Macintosh System files. However, some CDEVs are available from other developers. For instance, Vaccine and GuardDog are anti-virus utilities that use the Control Panel. Pyro is an excellent screen saver program that can be controlled from the Control Panel, and SoundMaster is a versatile program for attaching special sounds to different Macintosh II activities (like ejecting a disk, startup and shutdown, and so on).

Another CDEV is used by the Apple and 3Com network software to switch between LocalTalk and Ethernet operation.

Other MacFavorites

On the Mac, one favorite utility is Disktop, a desk accessory that contains a great many useful features like sophisticated file searching (more comprehensive than Find File) and a host of other file and disk maintenance features. You can use Disktop to find a DOS file that was brought into the Mac system, then modify its file type or creator.

Another fine utility is On Cue, a quick and easy application-launching system that lets you open an application or document from anywhere without having to open its window or even look for it. With the press of a couple of keys and the mouse button, you can open a pop-up window of applications from which to choose. Under MultiFinder, you can switch between active applications quickly and easily.

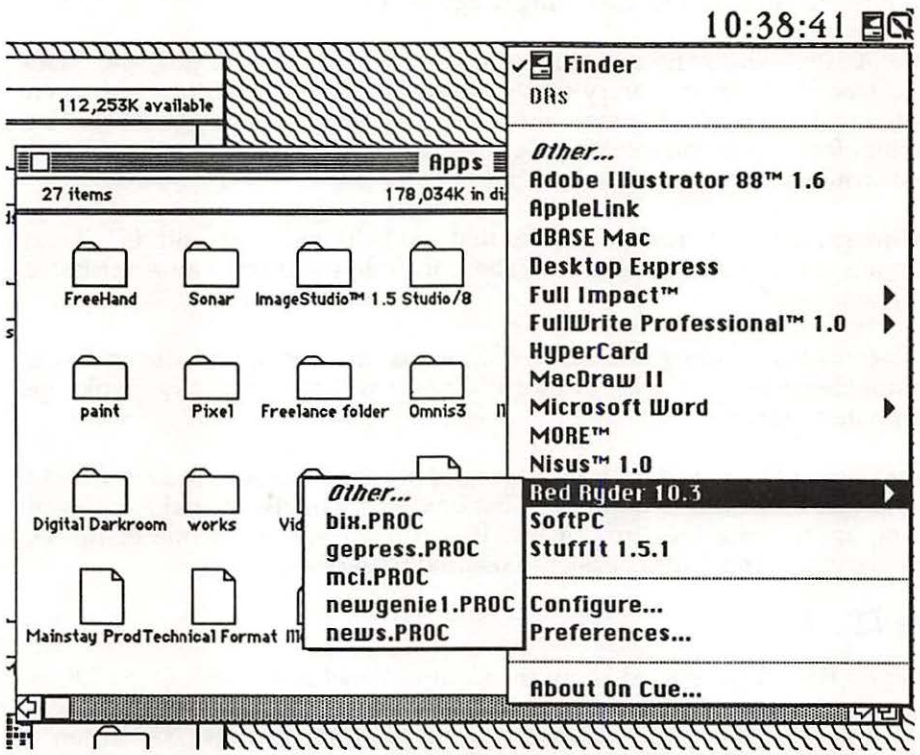


Figure 5-14. On Cue screen

Another powerful program is QuickKeys, a macro creator for the Mac. QuickKeys takes the place of the DOS.bat file by letting you program a series of actions and assign it to a keyboard command or menu choice. QuickKeys allows you to assign frequently used tasks (such as getting into a calendar or a calculator) to easy-to-access keystrokes.

There are also desk accessory databases like Retriever, DAtabase, and Quickdex for handy database management; text retrieval like GOfer; and various other kinds of DAs like HyperCard readers, mini paint programs, and many more.

One product of possible interest to people who use PCs and Macs or who regularly download text files from other sources is McSink. This desk accessory is a very fine text editor with the ability to add or strip line feed characters instantly from text files. This is significant because most text files created on PCs and other systems use a special invisible character to indicate a new line of text. On the Macintosh, these line feed characters display as empty boxes.

With McSink, you can instantly strip those line feeds from a file you want to use on a Mac, or, if you are going in the other direction, add them. McSink will also reformat a text file to fit into any window size and can create paragraphs from text that has carriage returns and line feeds at the end of each line (which is how most text files are received). By creating paragraphs, McSink makes these files more suitable for editing in a word processor or for sending to a page layout program.

Other indispensable programs are Suitcase and Font/DA Juggler Plus. One of these programs should be on your Mac hard disk because they allow you to use a virtually unlimited number of desk accessories and fonts. Ordinarily, you can have no more than 15 desk accessories in your system. With Suitcase or Font/DA Juggler Plus, you can truly make use of the many utilities that are available in this form.

Here are a few more of our favorite Macintosh utilities—ones that we have found to be stable and useful. Many of them are INITs; some are DAs or CDEVs. Look for them:

- **Findswell**. Helps locate files from the Open file dialog box inside an application
- **Aask**. Select CDEVs to load at boot time
- **HireDA**. Used to display menus associated with desk accessories—especially useful for opening the Control Panel to a particular CDEV
- **Sound Master**. Lets you select sounds to associate with different Macintosh events (startup, restart, eject disk, and so on)

- **SuperClock**. An excellent on-screen clock/alarm utility with lots of options
- **Moire**. A very entertaining screen saver utility
- **Apfont**. Redefine the default font used by the system or within applications
- **Laser Status**. Monitors the status of the print queue
- **Screener**. Select different screen display sizes with non-standard monitors

VERTICAL SOFTWARE PACKAGES

DOS-based vertical software systems were known as solutions systems; that is, they were usually sold by systems integrators or small computer stores to solve specific computing needs. Accounting packages are typical of the vertical market (as well as medical packages, legal packages, and so on). The DOS world has had an advantage over the Macintosh in the vertical market arena because more development tools have been readily available on the PC than on the Mac. Only recently have high-level development tools been available to users. dBASE Mac, 4th Dimension, and FoxBase Mac are all products that bring development capabilities to the Macintosh. Typical application development on the Macintosh using the Macintosh Programmer's Workshop (MPW) can be very time consuming. However, several powerful programming languages are available for Macintosh developers, including several versions of C and Pascal. More and more, vertical market applications are finding their way onto the Mac.

6

A Tale of Two Machines

The Macintosh and the PC-based systems feature distinct hardware configurations. Because hardware is the platform on which operating systems evolve, understanding the differences between these two systems can facilitate switching between the PC and the Mac environments. This chapter will discuss the following hardware topics:

- Design issues (memory management, system design)
- Hardware components
- Peripherals
- Miscellaneous devices

IBM introduced the forerunner of today's PC standard in 1981. Two years later, Apple introduced the Lisa, the forerunner of the Macintosh and Apple's first computer to feature the graphical interface.

The first Macintosh was introduced in 1984. The evolution of the Macintosh family of computers closely parallels that of the PC family. This evolution has come about as major advances in technology have become cost-efficient.

This chapter outlines the major differences between the PC's hardware environment and that of the Mac—from the "closed" architecture of the early Mac systems to the "Semi-open" architecture of the Macintosh II.

Both the Mac and PC-based systems are sold in a standard configuration consisting of the central processing unit (CPU), some configuration of temporary memory known as random access memory (RAM), disk drives of some type, a monitor and adapter card, and a keyboard. While both systems contain these components, vast differences exist between components and options available for the different systems.

HARDWARE OVERVIEW

The most significant difference between the chip sets—one which affects most users—is the way the CPUs address the memory needed for program operation. For a discussion of memory see Central Processing Unit (CPU) below. For more information on memory usage, see The Multitasking Dilemma in Chapter Three.

Central Processing Unit (CPU)

The most significant difference between the PC and the Mac starts at the core of the systems, the CPU.

The CPU is the brains of the computer—responsible for processing all of the instructions for the system. The CPU receives an instruction sent to it, executes the instruction, directs the result, and fetches the next instruction.

The speed with which the CPU processes depends on two factors: how much data can be received and transmitted to and from the system bus and how much data the CPU can process internally.

The PC family is based on the Intel 8080/8088 family of CPUs. The Mac is based on the Motorola 68000 family of CPUs.

The 68000 can receive or transmit 16 bits of data at one time externally, but can internally process 32 bits at one time. The 68020 CPU, the chip in the Macintosh II, supports both internal and external 32-bit processing. The 8088 CPU of the PC is also a 16-bit processing chip, while the 80286 and 80386 are 32-bit chips. However, the PC and PC/XT architecture only supports 8-bit data flow while the PC/AT and most 386 boxes only support 16-bit data flow.

In 1988 and early in 1989, Apple introduced the Macintosh IIx and the Macintosh SE/30, the first Apple products to feature the 68030 CPU. The 68030 runs Mac applications approximately 15 percent faster than the 68020. The CPU also has a built-in Paged Memory Management Unit (PMMU) which provides the necessary memory management facilities for multitasking operating systems such as A/UX.

Read Only Memory (ROM)

If the CPU is the "brains" of the system, the system ROM (read only memory) is the "heart" of the machine. ROM stores information required by the CPU to control systems operations. The ROM chip is permanent memory and cannot be changed or altered without replacing the chip with a new ROM.

The information stored in the Mac's ROM includes programs that control the user interface, the mouse, the different I/O devices, and other key components

of the Mac. The Macintosh 128 was delivered with a 64K ROM chip which had limited storage capacity, thus limiting the functionality of the system. Advanced ROM technology and the increased sophistication of the Mac opened the way for the 128K ROM available in the Macintosh 512K and also the Mac Plus. The trend toward greater sophistication has led to the present 256K ROMs found in the Mac SE and Mac II series. These higher-capacity ROM chips have done much to increase the rapid growth of Mac capabilities.

In contrast, the PC ROM is fairly straightforward. It handles certain portions of the I/O handling and (on IBM machines) part of the native Basic language. Most of the PC ROM information deals with the actual controlling of data to and from the hardware components, rather than setting specific guidelines for what to do with that data as the Mac ROMs do (in the case of the desktop toolbox).

Random Access Memory (RAM)

RAM is an area of temporary memory storage which is referred to as *volatile memory*. When the system is turned off, any information in RAM is lost. RAM is a temporary work area for running applications and processing data.

When starting a program, the program instructions and related data are shuttled from the disk device to RAM by the CPU. The size of available RAM directly affects the potential size of any programs that may be run on a system.

ABOUT RANDOM ACCESS MEMORY. On DOS machines, the software controls most memory management instructions. Those machines which contain the 80386 chip are exceptions, because this chip has a built-in Memory Management Unit (MMU). What this means is that memory addressing on the PC systems was left up to the operating system software, MS-DOS and PC-DOS, and they allow the CPU to address only 640K directly as operating space.

Additional memory may be added to the PC, PC/XT, or PC/AT; however, it must be identified to the CPU as either expanded or extended memory. This memory is marked as available to the CPU by the use of device drivers loaded into the operating system stack space on boot up. The device drivers allow the operating system to use the extra memory, which is usually reserved for storing data or special routines for quick access by the CPU. Most programs cannot run directly in extended or expanded memory; therefore, programs must take up less than 640K of memory to run (allowing for operating system size, most programs that specify 640K may take up between 512K and 560K of memory space).

The Mac is a different sort of computer and requires a different approach to memory. Reproducing graphics requires more memory than reproducing text. To operate, large graphic-based applications generally need a large amount of memory. It is imperative that a graphical system like the Mac have freer access to memory than the text-based PC.

The Motorola 68030 used in the Mac has a built-in MMU that allows it to address all memory present in the system. A system that has 4MB of RAM has the entire memory area available for program usage.

Even though the PC, PC/XT, or PC/AT could only address 640K of RAM directly, it held a distinct advantage over the early Mac systems in that up to 15MB of memory could be added to the system as extended or expanded memory. The early Macs were restricted to a configuration of 128K or 512K, unless the user wanted to risk voiding the warranty with the addition of third-party memory boards.

The introduction of the Mac SE allowed users to add up to 4MB of memory to their systems. Additionally, the introduction of the Mac II allowed users to add up to 8MB to their system with the use of single in-line memory modules (SIMMs); up to 2 gigabytes of memory may be added by using the expansion slots (NuBus). The Mac IIx will support up to 4 gigabytes of RAM through the NuBus—more than 30,000 times the capacity of the original Mac!

Since the CPU can directly address any memory on the system board, adding more memory (up to the maximum allowed) is a simple matter of seating the SIMMs in the appropriate slots on the system board—a task that requires no skill or dexterity.

In contrast, adding memory to the PC is (at least) a two-step process: 1) the purchase of special memory boards or the tedious addition of memory chips into their sockets on the motherboard; and 2) the addition of special software drivers.

Bus Stop

PC and Mac systems process and communicate information between the internal devices in the chassis very differently. The PC-based systems are designed with a chassis technology known as S-BUS architecture or industry standard architecture (ISA). In an S-BUS chassis, the CPU not only controls the processing of information, but also acts as "bus-master," directing data to and from the various devices in the system.

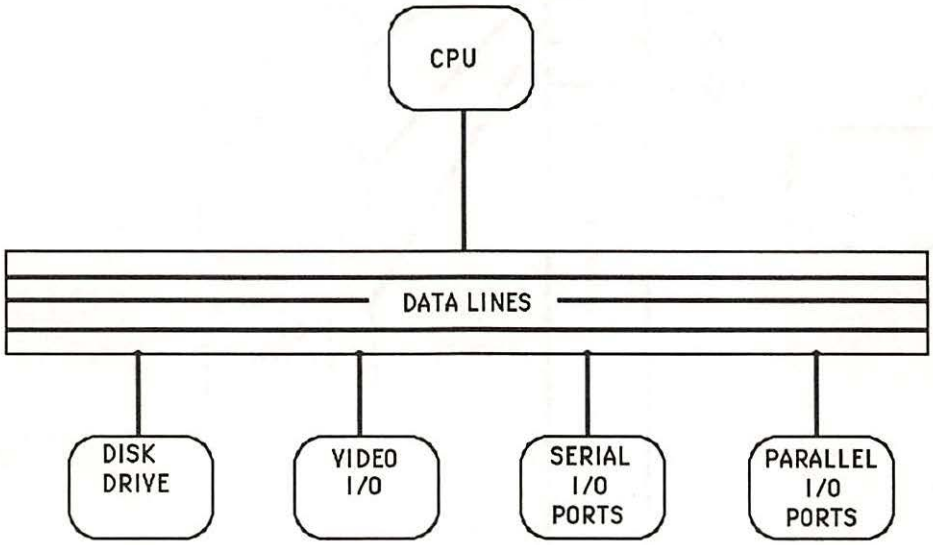


Figure 6-1. S-Bus architecture

Under this arrangement, the CPU must pause from processing information to direct the data to the devices. While this may not be the most efficient method of managing the data stream, it creates fewer compatibility problems for add-on board manufacturers.

The Mac, (with the exception of the Mac II), uses a method of communicating internally known as memory-mapped I/O. In this method, each device on the system reads and writes data from a specific location in memory.

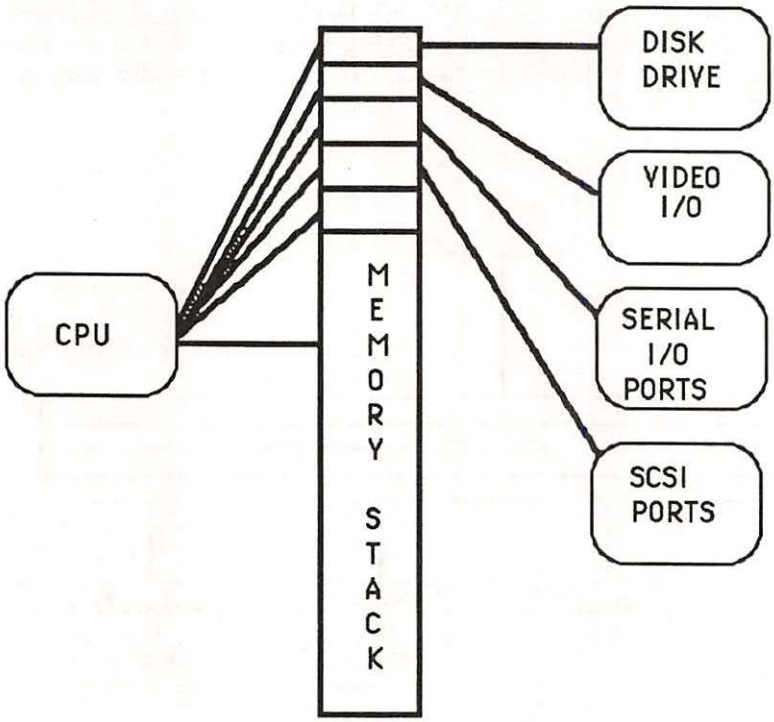


Figure 6-2. Memory mapping

Each device on the system must contain special logic to recognize where to read and write data and to define its specific address on the chassis. This need for special logic is why third-party add-on components are not easy for a novice to install and why Apple voids their service warranty for tampered systems. These restrictions are why the Mac is described as a closed system.

The Mac II utilizes a method known proprietarily as NuBus architecture. With the NuBus, each device has an intelligent processor on-board and searches the data stream for data that is specifically addressed to it. This frees the CPU from having to interrupt important processing tasks to address routing requests from internal devices. The inclusion of intelligent boards allows for quick data traffic along the bus lines.

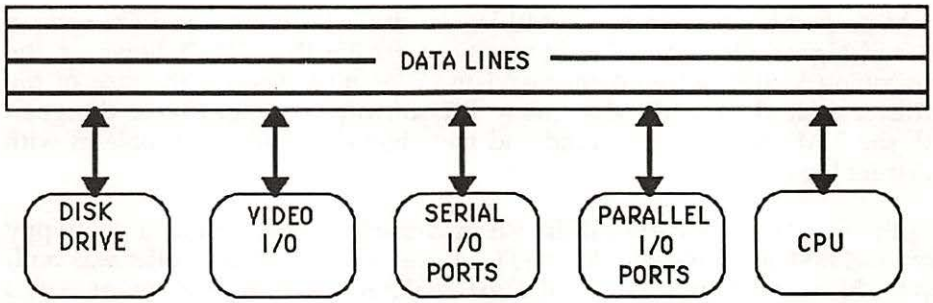


Figure 6-3. NuBus architecture

While the components in the NuBus also require special logic to recognize data addressed to them, the ability to poll a stream of data greatly increases the performance of the system, and the ability to build intelligent boards that reduce the dependence on a single bus-master has made it easier for vendors to develop add-on boards and open the Mac architecture.

Disk Drives

All PCs come with at least one floppy disk drive. The early floppy drives for the PC used 5 1/4-inch double-sided diskettes with a storage capacity of 360K. At the time these were introduced, they compared favorably with the single-sided 5 1/4-inch drives used on the Apple II. The first PCs had room to house two full-height floppy disk drives or one floppy drive and one hard drive.

Eventually, other kinds of floppy disk drives appeared on the PC. For instance, the high-density drive which has a capacity of 1.2 megabytes was introduced with the IBM PC/AT. The 1.2-megabyte floppy also uses a 5 1/4-inch diskette. Recently, with the introduction of the PS/2 line of computers, IBM PCs are moving toward 3 1/2-inch floppy disks with a capacity of 1.44 megabytes each. Most laptop PCs use 3 1/2-inch disks as well.

The PC/XT was the first to offer a hard disk drive as a standard feature. Even the IBM PC could use a hard disk with the addition of an appropriate drive controller, but the XT's beefed-up power supply made hard disk usage feasible, whereas the underpowered IBM PC sometimes balked at the extra load a hard disk imposed. Although some PCs come with the drive controller built in, most use one of the peripheral slots to house it.

Most common drive controllers can handle up to two floppy drives and two hard disks, but in practice, few systems will contain more than two floppies and one hard drive.

The DOS world has always been forced to operate under the limitations of a maximum of 32MB of data addressable by the CPU. This forced users to *partition* their hard drives into multiple logical drives (for example, drive C and drive D), if the hard drive was larger than 32MB (a 40MB drive, for example,

would be partitioned into two 20MB logical drives). Changes to DOS version 3.31 and higher allow the PC user partitions greater than 32MB; however, the partitioning is still not automatic and the user must specify the size of the partition desired. Additionally, many PC software packages were designed with the 32MB limitation in mind and have had compatibility problems with the larger logical drives.

Like the first PCs, the early Macintosh models also came with a single floppy drive and no hard drive. Unlike the PC, however, the disk controller was built into the Mac, and there was a second, external port designed to accommodate a second floppy drive. The first Mac had room for only one internal floppy drive and no hard drive.

The early Macs (Macintosh 128K and 512K) were shipped with single-sided 400K micro-floppy drives. The diskettes for the Mac are a hard shell media with a metal shutter door to protect the sensitive magnetic disk in the case. The single-sided drives were replaced by double-sided 800K drives in the Mac Plus and subsequent machines. The Mac IIx, Mac IIcx, and the Mac SE30 now have 1.44-MB floppy disks. The double-sided drives have proven to be very popular with Mac users and developers and will most likely be the micro-floppy device in the future.

The micro-floppy 3 1/2-inch disks are the same disks gaining popularity on the newer PCs and on laptop PCs. They are smaller and more durable than the 5 1/4-inch floppies; however, they have a greater tendency to get lodged in the drive if the hard shell jams in the disk slot. Apple's engineers foresaw that possibility and provided an opening for manual ejection of disks. You can insert a thin, strong item (like a straightened paperclip) into the hole to the right of the disk slot and press to eject the disk.

Unlike DOS, the Mac operating system was designed without any practical limit to the size of storage media; therefore, an entire drive is recognized by the system and available to the user—regardless of its size. No partitioning is needed with larger hard disks.

Hard-disk options are plentiful for the Mac, although the Mac SE was the first system to support *internal* hard drives without voiding the Apple warranty. Apple supplies internal or external hard drives of 20MB, 40MB, 80MB, or 160MB capacity. Third-party drives of more than 300MB capacity are also available.

Hard drives may be connected to the Mac by two different methods, bus connection or port connection.

Bus connection is the method most commonly used by *internal* hard drives as they are connected directly into the system's bus lines for faster communication with other devices. The bus-connected hard drive is recognized internally as an independent device; however, any interruption of the physical drive connection results in an inoperable system.

Hard drives that do not talk directly to other devices but require the use of an external port are treated by the system as external devices (much as printers are regarded). The disk speaks with the other devices on the bus by communicating through the I/O port which translates and passes the data into the bus stream. Disconnecting a port-connected device will still allow the user to operate the system with micro-floppies.

Hard drives can be *externally* connected through the serial port or the external floppy drive port. However, the most common method of connecting external hard drives is the SCSI (Small Computer System Interface) expansion port which became standard on the Mac beginning with the Mac Plus. The SCSI interface was one of the first methods for connecting hard and floppy drives to various systems. It established a standard set of port connections and protocols for drive connections.

The SCSI port allows drives to connect directly to bus lines. While serial-port hard drives were the only option of the early Mac, poor performance and speed have proven to be major obstacles to the continued use of these drives. Because SCSI-port drives tap directly into the bus line, they achieve better performance.

Getting the Picture

A major advantage of early PCs over the Mac was the availability of numerous monitor configurations. The PC offers many different monitor and graphic solutions. These range from the basic TTL monochrome monitor to IBM's new Video Graphics Array (VGA). In addition, PCs can support up to two monitors on a single system—one monochrome and one color. Very few PC programs make use of this dual monitor approach, but it is an option.

Such variety offers a PC user more options; however, inconsistencies and incompatibilities between graphics processors have proven a nightmare for users looking for graphics-dependent software.

A video display is made up of thousands of dots or elements known as *pixels*. The Mac began life with a standard 9-inch high-resolution monochrome monitor with a count of 512 x 342 pixels-per-screen. The Mac II offers a 12-inch high-resolution 640 x 480 pixels per-screen-monochrome monitor or a 13-inch 640 x 480 RGB color monitor. In contrast, various PC graphics modes offer pixel counts of 320 x 200 in CGA mode, 640 x 350 in EGA mode, and 640 x 480 in VGA mode.

The Mac uses a method of video display known as *bitmapping*. Each pixel is directly mapped to a bit which is stored in *Video RAM*—a section of memory that is isolated and reserved for video mapping. A 0 bit in memory represents a white pixel on the screen and a 1 bit represents a black pixel. The system recomputes the pixel status more than 60 times per second. This standard bitmapping scheme allows for extremely sharp graphics imaging and allows graphics compatibility in the Mac environment.

The Mac ROM contains a set of tools known as QuickDraw which manages the complex graphics of the Mac bitmapped screen. QuickDraw is used by the Font Manager to create typefaces on the screen and draw graphic images fairly quickly. The majority of the time-consuming work of actually determining which pixels are on or off is controlled by Quickdraw.

The early Macs were somewhat limited by the size of their screens. In spite of the fact that the text and graphics on the Mac's monitor were clearer and sharper than those on all but the most advanced PC, many people thought it looked too small.

With the advent of MultiFinder and the possibility of running several applications concurrently in separate windows, the 9-inch screen seemed cramped. And with the rapid growth of desktop publishing, the ability to see an entire page (or two) at a time became imperative.

Many third-party manufacturers introduced larger screens for the Mac Plus and the Mac SE. However, the introduction of the Mac II and its open architecture spurred the development of different kinds of video displays—both color and monochrome. At 12 inches, the Mac II's own standard monitors were larger than that of the original Mac, but many third-party developers introduced monitors of 16, 19, and even 26 inches. On larger screens, it became much easier to display several windows, or full pages of text. It also became easier to work with larger graphics in paint, draw, and CAD programs.

With the revolution in desktop publishing, there came a growing demand for print-quality graphics. Along with color imaging, there was a need to produce gray-scale images such as those found in newspaper and magazine photographs. The Mac II introduced true gray-scale processing on-screen, along with color. With the ability to display up to 256 colors or scales of gray, came new technologies.

Higher-resolution images became possible with the addition of 24-bit video cards, direct video links, and high quality scanners. Like the PC using a VGA adaptor, today's Mac can support nearly photographic-quality images.

Another Mac II innovation was the ability to use multiple monitors concurrently—as if they were all one screen. By adding video adaptor cards to the Mac II NuBus and attaching a separate monitor to each card, you can actually treat a bank of monitors as if they were one screen. You can move windows freely from one monitor to another without any noticeable change. Applications capable of running in the background under MultiFinder can continue to process on one monitor while you work on the active window on another. At the beginning of this section, we mentioned that the PC could support both a monochrome and a color monitor in the same system. However, they can't work as one screen, and only rarely are they used concurrently. People who have both usually use only one at a time.

There are many third-party monitors available for the Mac Plus, Mac SE, and the Mac II. Mega Graphics offers 19-inch displays for color, grayscale, and black and white output. The Mega Graphics Monitors and controllers have a resolution of 1024 x 826 pixels. Both Apple and Radius offer a 19-inch display, known as the two-page display, that has special programs for select item magnification, side-by-side display capability, screen blanking, and tear-off menus. Other fine third-party monitors are available from SuperMac, Jasmine, and others. These third-party products are great options for the serious Mac user.

Sounds

Nobody has ever accused the PC of providing symphonic sounds. The tinny speaker common to all PCs delivers its messages in the most succinct and rudimentary way—its usual comment consists of a single beep.

In contrast, the sound generator is an integral part of the Mac system, and, though the Mac speakers are not going to blow down the roof, they are more melodic than their PC cousins. Moreover, every Mac has a method for sending sound output to external speakers.

Early Mac systems had a four-voice sound generator. This generator converted a digital signal to analog wave which was output to the speaker or speaker jack for amazing clarity. The Mac II, Mac IIx, Mac IIcx, and Mac SE/30 all have a much more sophisticated sound generator known as the Apple Custom Sound Chip (ASC) that does four-voice wave table synthesis and is capable of driving stereophonic mini-phone-jack headphones or stereo equipment. This improved sound technology makes the Mac a logical machine for tying sound and images together through applications or specialized musical interface devices, called Musical Instrument Data Interface or MIDI.

Keyboards

PC keyboards have undergone some changes over the years, though the basic components remain—function keys, modification keys (Control, Alt, and Shift), basic typewriter keys, and the numeric keypad which doubles as a cursor control pad. Some keys have been added and other keys moved, but the basic functions remain.

The Mac keyboard has undergone more considerable change. The early Macs were delivered with a 58-key keyboard that closely resembled a standard typewriter keyboard and lacked the numeric keypad. Later Macs were available with 78-key keyboards—adding the keypad and eventually slimming down the design. Finally, the so-called extended keyboard mimics the popular AT-style keyboard used on PCs—right down to the function keys.

Although the function keys are almost entirely ignored by Mac applications, they can serve a purpose during the operation of DOS software, which may be run on the Mac II using a DOS coprocessor.

Mac and PC keyboards are similar, with the exception of the Option key (similar to the Alt key on a PC keyboard) and the Command key. The Option key is used to get an optional or accented character set. You can view the optional key sets by choosing Key Caps on the Apple menu, holding down the Option key and pressing keys on the keyboard. The optional characters will display in the Key Caps window.

The Command key, when used with another character key, is a shortcut to a menu command. Menu options that support shortcuts list the appropriate Command-character next to them. PC users will discover that the Command key is the Mac's functional equivalent of the PC's Control key. The Mac II extended keyboard also features a true Control key for use with DOS software.

The Command key is also used as a Break key on the Mac to stop long operations. To break a process, press the Command and Period keys at the same time.

The Mac can also support the qwerty or Dvorak keyboards; however, not all programs support the Dvorak key layout, and special drivers are normally necessary for its operation.

Pointing Devices

Although the mouse is an option on today's PCs, it is hardly an integral part of the machine's environment.

The Mac uses the mouse and other pointing devices as integral parts of the user interface. The mouse is used to navigate through menus as well as mark areas of text or graphics for cut/paste operations or for deletion. The integration of the mouse into the user interface has made the Mac an excellent machine for graphics manipulation, text manipulation, and just plain fun—the mouse is also used for the many games that are available for the Mac.

There are several pointing devices used by the Mac. These devices are the standard Apple tracking mouse, infrared mouse, trackball, fingerpad mouse, and graphics tablet.

STANDARD APPLE TRACKING MOUSE. The standard Apple tracking mouse uses a ball in a socket to determine motion and speed of the mouse movement. The ball spins against rollers, which trigger photoelectric devices to help determine movement. These photoelectric devices transmit the relative codes to the system which in turn moves the cursor on the screen. Most PC mouse devices use similar systems.

INFRARED MOUSE. The infrared mouse uses a light-emitting diode (LED) which is positioned on a grid plate. Moving the mouse over the grid allows the diode to differentiate the distance, speed, and direction of the mouse's movement by bouncing light off of the grid into a photo-sensitive cell.

TRACKBALL DEVICE. At first, the trackball device appears to be an upside-down tracking mouse! The trackball works on a principal similar to the standard tracking mouse.

FINGERPAD MOUSE. The fingerpad mouse is a small device that allows the user to guide the cursor by the movement of a single finger. Selections are made (button-up/button-down events) by pressing the finger into the pad.

GRAPHICS TABLET. A graphics tablet (also known as a stylus pad) is a flat pad that serves as a drawing surface. A pen-like apparatus allows the user to draw on a paper residing on the pad. The motions of the pen are duplicated on screen by the cursor. Graphics tablets are excellent for tracing artwork or inputting data by hand.

Printers

When selecting a printer, PC users have been continually faced with monumental decisions. Should they choose a serial or parallel printer? Is there a port available to support the new printer? Will the printer require a special driver and, if so, will it be compatible with existing software?

There have always been many different printer models available for the PC. Most early printers were either dot matrix or daisy wheel printers. Although this wide selection gave users many choices of styles and features, it also had the same effect that the diversity of video display options had—a compatibility conflict.

It became the job of each PC program to supply appropriate software that would allow communication with each different printer model and type. Because not all programs include printer drivers for all models, many printer owners found their printers either useless or only partly functional with certain software.

In its design of the Mac, Apple went to great lengths to ensure these would not become issues for Mac users. Selecting and installing a printer is fairly easy and straightforward on the Mac.

The Mac computer uses the LocalTalk connector as the printer port during cable installation. This port is also used on the AppleTalk network. Generally, any printer that is connected through the LocalTalk port becomes available on the AppleTalk network. Most Macs use a simple print device driver installed with the system. The user selects which printer to use by selecting the appropriate driver in the Chooser window (see Chapter Four for more about the Chooser). After selecting the printer driver and directing the software package to print, the Mac uses the Printing Manager to manage printing resources.

Apple selected the QuickDraw language as the standard output language for printing. QuickDraw was the standard printer language until the introduction of the LaserWriter, which used a new page display language called PostScript from Adobe Systems. The Mac can translate QuickDraw into PostScript.

Apple designed the printing scheme to simplify installation and use; however, many printers still don't conform to the Apple cabling requirements, or have print drivers unusable on the Mac. The next section will provide a brief overview of third-party solutions that can bring these printers to your Mac environment.

DOT MATRIX PRINTERS. The most common printers are *dot matrix* printers. These printers use tiny pins that impact the paper in a vertical array, pressing on inked ribbon as the pins strike the paper. Dot matrix printers form images and letters by printing these dots in a pattern. The most common brands are the Epson FX series, C. Itoh printers, Citizen printers, the IBM ProPrinter series, and the Apple ImageWriter series.

ImageWriter. The standard Apple dot matrix printers are the Apple ImageWriters. ImageWriters print all of the Mac screen fonts and graphics and will work with almost all programs that work on the Mac. They support draft, standard, and near-letter-quality (NLQ) modes.

The ImageWriter operates by printing the bitmapped image in bands. The image printed on paper will not look exactly like the screen image, since the system adds additional dots to the paper to do high-resolution printing.

ImageWriter II. The ImageWriter II is the entry-level printer. It supports three different modes: draft, mid-speed correspondence, and near-letter-quality. The ImageWriter II also can also be equipped with a one-bin, cut-sheet feeder or can use tractor-fed paper. It supports color printing with the use of the ImageWriter II color ribbon.

ImageWriter LQ. The ImageWriter LQ is a higher quality dot matrix printer designed for high-end processing such as office print work. The ImageWriter LQ prints letter-quality correspondence. Like its counterpart, the ImageWriter II, the ImageWriter LQ supports color printing. It also supports printing on multi-part forms as well as labels. A key peripheral attachment is the cut sheet feeder with up to three bins to handle different letterheads and an envelope attachment.

LASER PRINTERS. The first really popular laser printer was the Apple LaserWriter. Many more PC users also have discovered laser printing. Many actually use the LaserWriter, which is compatible with computers other than the Mac. Also popular is the Hewlett-Packard LaserJet. Though it started with the Mac, laser printing has become a standard and has solidified the Mac's position as an industry leader.

The Mac supports laser printers in a very different way from the PC environment. PC printers often require the addition of a special board to support anything but basic text printing, or they require the specific application to generate output in a way that is acceptable to the printer. The Mac uses a single laser printer driver (specified by an icon in the Chooser) to convert Macintosh QuickDraw output to PostScript output. This frees the user from having to specify a printer-support driver each time the application is launched.

The LaserWriter, LaserWriter Plus, LaserWriter IISC, LaserWriter IINT, and LaserWriter IINTX are Apple's current offerings. The LaserWriters will work with other computers, either through the serial port or over the AppleTalk network.

LaserWriter and LaserWriter Plus. The LaserWriter and LaserWriter Plus are based on the Canon LPB-CX engine. Both of these printers have a Motorola 68000 CPU operating at 12 megahertz (MHz). These printers come with 2MB of RAM for image printing and processing and up to 160K of RAM for font caching. These printers were originally designed for light printing tasks.

The LaserWriter is a PostScript printer, which means it relies on the printer driver to convert the QuickDraw output into PostScript to print. This printer can also act as an ASCII text printer. Its default font (Courier) emulates the Diablo 630 daisy wheel printer.

LaserWriter IISC. The LaserWriter IISC is a major departure from the rest of the Apple LaserWriter family in that this printer uses QuickDraw rather than PostScript. The LaserWriter IISC is based on Motorola's 68000 CPU operating at 7.45 MHz. The LaserWriter IISC is totally dependent on QuickDraw output because there are no built-in fonts. The LaserWriter IISC has only 1MB of RAM internally. It is operated from the SCSI port.

LaserWriter IINT. The LaserWriter IINT is PostScript printer based on the Canon SX engine. This printer also has a Motorola 68000 CPU that operates at 12 MHz. This printer has 2MB of RAM for processing and printing including 200K for font caching. The LaserWriter IINT has a distinct advantage over the LaserWriter Plus in that it can interface with the Apple Desktop Bus (ADB) as well as the AppleTalk or serial port. Also, it is considerably lighter and smaller than the Plus and has advanced paper-handling capacity. The LaserWriter IINTX supports envelope printing as well as standard 8 1/2-inch x 14 paper. The LaserWriter IINT can be upgraded to a LaserWriter IINTX.

LaserWriter IINTX. The LaserWriter IINTX is the top-of-the-line Apple laser printer as of this writing. This printer comes with a Motorola 68020 CPU operating at 16.67 MHz. The LaserWriter IINTX is a PostScript printer that also supports Diablo 630 daisy wheel and HP LaserJet Plus emulation. The printer is delivered with 2MB RAM installed, which can be expanded to 12MB. This printer operates from the Apple Desktop Bus (ADB), the SCSI port, serial port, or LocalTalk port. In addition, the IINTX has a special SCSI port available to

interface with a hard disk designed to store fonts. This is especially useful in high-volume professional printing situations in which a very large number of fonts must be made available (such as in printing houses or publishing companies).

Other Laser Printers. The Mac can support many other laser printers on the market today. Almost any laser printer that supports PostScript may be connected to a Mac. The price varies greatly, but deciding factors for the user should be ease of use and compatibility. There are too many third-party laser printers that interface with the Mac without modification to settle for one that requires special hardware or converters. Be aware of hidden requirements for non-standard components when you shop for a laser printer.

Other Printing Solutions

It is possible to use other kinds of printers with the Mac. If you are a PC user, there is a good chance that you already have invested in another printer for your PC. You may have a daisy wheel printer or even a thermal transfer printer or plotter—all types of hardware that Apple doesn't manufacture. In most cases, there are ways to get your device to work with the Mac.

Most of the printer conversion software and/or hardware packages require the printer to be a serial-connected device. Parallel printers need a parallel-to-serial conversion device even to begin using the Mac printer converters. These converters supply either new device drivers that take the place of the ImageWriter device drivers or new cards for the printers to allow direct ImageWriter printing.

While printer conversion kits are readily available, it is recommended that they be considered only for utilizing an already existing-printer. If you don't already have a printer, the differences in print quality, speed, and ease of use offered by Apple's line outweigh any cost benefits the user might get by buying a third-party printer not specifically designed for the Mac systems.

Other Devices

The Mac supports numerous other devices that are not standard or essential to most users' operations. These devices run the gamut from new input devices (scanners and MIDI devices), to backup devices (Tape Backup Units). While most users will want to explore these items, there are too many of them to cover in this book.

The following devices are Apple equipment we feel are significant additions to the Mac line. However, there are many excellent third-party scanners and FAX machines available for use with the PC as well as the Mac.

APPLE SCANNER. With the increased importance of computerized graphics, especially in desktop publishing applications, scanners have become widely used. Scanners are used to read both text and graphic information into a

computer file format for incorporation in applications. With the addition of optical character recognition software (OCR), many scanners can read text from a printed page and put it into a word processor format.

The Apple Scanner is an optical image scanner for inputting high-quality images and text into the Mac system. The scanner supports line art, gray scale, and half-tone modes. The scanner works with any Mac application that supports Picture File Format (PICT), Tagged Image Format (TIFF), or MacPaint file formats. These three formats are the most common graphic formats used on the Mac, and both PICT and TIFF can be used by some PC applications.

The Apple Scanner comes with its own application which allows complete control over imaging, brightness control, scan area, and pattern control. It also allows you to reduce or enlarge the scanned image, and lets you scan at variable dots per inch (dpi) so images can be accessible to the AppleFax modem and Apple printers. The scanner is connected to the computer through the SCSI interface.

APPLEFAX MODEM. The fax has become a necessity in business almost overnight. The convenience of being able to transfer hardcopy information at electronic speed has caused a revolution in information sharing.

The AppleFax Modem allows for convenient sending and receiving of facsimile files and performs high-rate Mac file transfers (9600 bps). The AppleFax Modem supports facsimile transmissions to Group 2 and Group 3 facsimile machines (which equal more than 90 percent of the installed base).

The AppleFax Modem is delivered with two pieces of software, the AppleFax Resource file and the AppleFax Application Program. The resource file acts like a standard printer resource and is accessed through the Chooser. The application is an easy-to-use program that allows users to send and receive facsimiles and Mac data files.

FUTURE COMPATIBILITY. There are many, many hardware options available for the PC and the Mac—again, too many to discuss in just one chapter. The single most impressive thing about the Mac is the upward *and* downward compatibilty of both hardware and software. Apple has gone to great lengths to ensure that your hardware is not made obsolete by the addition of new components or systems. The introduction of the Mac II and Mac IIx brings the power of many minicomputers to the desktop.

PC users who have struggled with incompatible boards and drivers often find the Mac a welcome relief. Users who have come to expect application incompatibilities due to device settings or variances in drivers between applications embrace the Mac's ingenious approach to peripherals.

This ease of use, speed, and ongoing compatibility have made Mac systems among the most user-friendly in the world.

GOING FORWARD

The Mac and the PC differ in many ways, yet they perform the same basic functions. They use different CPUs, different bus architectures, different video technology, and even different sound. But they both help us with our information and communication needs.

It is possible to connect these diverse systems, both by telephone (via modem), by direct wire connections, by installing a coprocessor or other compatible equipment, or by networking.

The next chapter covers connectivity issues—both Mac to Mac and PC to Mac.

7

Connections

When the Macintosh was first introduced, it was very much a machine in isolation. Even though the important structures were in place that would link Macs to each other, there was no network software to provide that link.

Like its predecessors at Apple—the Lisa and the Apple II—the Mac had no imitators, and its operating system and environment were unique. There was almost no way for the Mac to communicate with other machines. This was in marked contrast with the IBM PC, which had already spawned a booming industry of imitators and already had ways of linking with other PCs and mainframes.

Until 1986, the primary interest in Mac connectivity was in linking with other Macintosh systems and peripherals. As the Mac grew in popularity and utility, it became increasingly desirable to be able to link it with other systems—most notably DOS machines, which predominanted in the business community. Viable connectivity and data-sharing solutions would help the Mac penetrate PC-dominated work environments. However, three factors made this challenging:

- The operating systems were so different—one text-based, linear, and command-oriented and the other graphic and process-oriented—that there was too little common ground for an easy solution.

- Many businesses had already invested heavily in IBM mainframes and PCs. Bringing in an incompatible new machine did not make good business sense.

- The majority of users had become accustomed to the PC way of working and were skeptical of the Mac.

The first two factors could be met by providing greater compatibility or linking between the Mac and the PC worlds. The third began to be overcome when individual Macintosh users brought their personal Macs to work and other users saw how easy they were to use.

The Mac got a definite boost with the introduction and widespread acceptance of desktop publishing and laser printing. As more and more Macintoshes appeared in businesses, so did the ways to connect them with other machines.

In the past few years, many solutions have been developed to bring the Mac closer to the PC. These solutions fall into several categories:

- Add-on disk drives
- Coprocessors
- File translators
- Telecommunications
- Direct cable connections
- Networks

Each of these methods has one or more appropriate uses. In this chapter, we'll take a look at the pros and cons of each.

First, we'll introduce some of the ways you can use Macs and PCs to translate and share information on a single workstation. These solutions include specialized disk drives, coprocessors, and file translation software. In the second part of the chapter, we'll introduce solutions that require two workstations—direct cable connections and telecommunications. Finally, we'll look at multi-system solutions and discuss network basics and some of the specific network solutions available to connect Macs and PCs.

SINGLE-SYSTEM SOLUTIONS

There are several ways to translate information to and from the PC and the Mac—disk drive add-ons, coprocessors, and file translation software. Each of these solutions has specific advantages and disadvantages. For instance, though an add-on disk drive may offer a relatively low-cost method of moving files between two machines, this method requires you to copy data onto a disk on one machine, and hand-carry the disk to the second machine.

In each of the following discussions, you'll see a list of advantages and disadvantages. This list should give you a quick guide to the kind of solution being discussed. If you find solutions that meet your needs, we recommend you look into them further by contacting the companies listed at the end of this book.

Disk Drives

For low-volume file transfer and conversion, disk drive add-ons offer a combination of ease-of-use and low cost. Special disk drives may be added to the Mac or the PC to read and write across formats.

There are several add-on solutions available for sharing files between the PC and the Mac. Two devices attach to the Macintosh, one to the PC. In addition, Apple has introduced a new drive featured in the Macintosh IIx, IIcx, and SE/30—a 1.44 MB 3 1/2-inch floppy drive that can read and write PC formats.

PROS AND CONS.

Add-on drive advantages:

- Disk drives are very easy to use and to set up.
- In some cases, disk drives can be moved easily from one system to another.
- Compared with network and co-processor solutions, drives are relatively inexpensive. Disk drive options tend to be in the middle of the price spectrum.
- Disk drives are very convenient to use because they generally fit in as an integral part of the operating enviroment.

Add-on drive disadvantages:

- Disk drives can only handle a limited volume—the amount that will fit on one floppy disk at a time.
- Files must be hand carried between machines (on floppy disks).
- Drives require additional desk space, which can be a problem in crowded work environments.
- Using a disk drive requires that you use a *copy* of a file. In contrast, PC and Mac users could share *the same file* on a network.

SOLUTIONS.

Apple 5 1/4-inch PC drive. The Apple PC 5 1/4-inch drive is a simple 360K PC drive that can be attached to a Macintosh SE or Mac II using a special add-on board supplied by Apple. This drive has limited usefulness—working with Apple File Exchange (AFE) and with AST's Mac286 co-processor boards (see below) for the Mac II. The Apple PC drive is housed in beige plastic to match the Mac design. It is heavier than the average PC drive and slower in operation. In addition, its drive door lacks an indentation to facilitate removal of disks. If

the spring inside the drive does not eject the disk far enough, it is difficult to remove. However, at this time, this drive is required to load the software for the Mac286.

DaynaFile. A more complete disk drive solution is the DaynaFile—a dual drive add-on device that can work with any Mac that has a SCSI port.

The DaynaFile is an elegant solution for several reasons. First, it works with any Mac that has a SCSI port, while many other file-sharing solutions are limited to certain models. Second, it can be configured with any combination of PC drive types—3 1/2-inch as well as 5 1/4-inch. Third, it is fully usable from the Mac desktop; although the drive reads and writes in the PC format, it can be opened by any Mac application. In contrast, the Apple drive can only work directly with AFE.

What this last point means is that files can be transferred directly, even from within a program. Suppose, for example, you have a Word or WordPerfect document on the PC and you want to process it on the Mac. Simply copy it to a floppy disk, then take the disk to the DaynaFile and insert it. Open Word or WordPerfect, and open the file directly from the PC disk. The file will open without problems.

DaynaFile works very well, although it is slower than the ordinary PC drive. Its main advantages are convenience, simplicity, and relatively low cost when compared with network solutions. Because it doesn't require any dedicated cabling, it can work in remote locations as well as office environments.

One unique use of the DaynaFile is not specific to the Mac, however. By configuring the DaynaFile with one 5 1/4-inch drive and one 3 1/2-inch drive, it becomes a convenient and quick method for converting PC files between the two standards. This is especially helpful when moving between IBM PS/2 machines or laptops using 3 1/2-inch diskettes and the standard PCs which use 5 1/4-inch formats. To copy the contents of one type to the other, you just insert the source and destination disks, then drag the disk icon of the source disk over the icon of the destination disk. That's all there is to it.

MatchMaker. MatchMaker takes another approach. MatchMaker is actually a PC plug-in card and software that will read and write to and from a standard Mac floppy drive. Using the MatchMaker card and one of Apple's disk drives allows file sharing between the Mac and the PC. MatchMaker software includes a superset of DOS commands to manage the files on the Mac drive, even allowing control over file type and creator type (see Chapter Three for an explanation of these unique Macintosh resources). MatchMaker is a good alternative for people who prefer the DOS interface, but it lacks some of DaynaFile's convenience—especially when it comes to opening files directly from within applications.

MatchMaker is the least expensive disk drive solution (if you don't count the cost of the required Mac drive that attaches to the MatchMaker card). The cost

of a Mac 800K floppy drive can add several hundred dollars, but many people will be able to use a Mac floppy purchased with their original systems.

Coprocessors

The PC and the Macintosh use completely separate central processors (see Chapter Six for more information about CPUs). These two distinct CPUs require different instructions and process information in different ways—partly explaining why you can't simply use software from one machine directly on another.

One way to get around the problem of these CPU differences is to place the processor chip of one machine directly inside the other. Though this is a simplistic explanation, it is essentially what a coprocessor does.

There are currently three coprocessing solutions for the Mac—MacCharlie, Mac286 (and Mac86 for the Mac SE), and SoftPC. Two feature hardware add-on equipment that contains an 8080-family chip and other circuitry to mimic a PC inside a Mac; the other does virtually the same thing but entirely in software.

PROS AND CONS.

Coprocessor Advantages:

- Coprocessors allow you to integrate information very smoothly between PC and Macintosh applications.
- Coprocessors let you use the same file in both environments (depending on the file's format and the applications used, of course).
- Coprocessors let you transfer information from a PC program to a Mac program (or vice versa) by cut-and-paste using the Macintosh Clipboard. This makes the direct sharing of information within files both easy and convenient.
- Coprocessors allow you to view and work with both DOS software and Macintosh software on the same screen. With MultiFinder, you can switch quickly and easily from one environment to the other.

Coprocessor Disadvantages:

- Coprocessors support only one user at a time. In contrast, a separate PC facilitates data- and file-sharing and also provides two separate machines that can accommodate two separate users at any one time.
- Having one machine double as both PC and Mac may increase the work load of that machine and might cause bottlenecks in busy offices.
- Coprocessors lack some options available with a separate machine; for

instance, higher screen resolutions, peripheral connections (I/O), expanded and extended memory.

- Current coprocessor solutions limit the size of the DOS window on the Mac screen and don't allow screens as large as an ordinary PC screen.

SOLUTIONS.

MacCharlie. MacCharlie is an add-on unit from the makers of DaynaFile that emulates a dual-floppy 8088 PC-type computer umbilically attached to a Macintosh. It is possible to switch between a PC session and a Mac session at will, and the Clipboard is used to transfer data. Otherwise, the two environments remain apart. MacCharlie does take up less space than a PC because it is a smaller unit and shares the screen and keyboard of the Mac. But when you consider the cost, it is probably easier to get a PC clone and use one of the direct link solutions mentioned below.

Mac286. The second coprocessing solution is the Mac286 board for the Mac II. Actually consisting of two plug-in NuBus cards, the Mac286 is like having an AT clone in a Mac. (NuBus is Apple's proprietary bus structure, Apple's answer to IBM's micro channel architecture.) Just about anything the PC can run, the Mac286 can run. In fact, the Mac286 even shares a hard disk with the Mac II and installation is an exact replica of the standard DOS FDISK process. It is uncanny how well the Mac286 emulates a PC while residing in a Mac II. Although early versions of the product were plagued with poor screen handling and keyboard irregularities, the newer version is highly satisfying. Mac286 is a very useful product for people who want both standards under one roof, so to speak.

Mac286 comes with 1 MB of RAM, of which 640K RAM is available for a PC-compatible operating system. It can emulate monochrome, Hercules, and CGA graphics (although the CGA graphics may not be satisfactory when running certain highly animated programs). It can create its own subdirectories on the portion of the Mac hard disk it shares and can also access a special folder on the Mac, which it sees as a D drive. This D drive allows easy file sharing between the Mac and the coprocessor. Using MultiFinder, it is easy to switch from PC to Mac, and you can use the Clipboard to move data back and forth.

The Mac286 emulation takes place in a standard Macintosh window that can be moved anywhere on the screen and resized.

Soft PC. Soft PC is a remarkable achievement in programming, which simulates an 8086 MS-DOS machine on a Macintosh without the use of any additional hardware. The entire simulation is programmed. Moreover, the resulting coprocessing environment is compatible with the PC, and we haven't found any applications software that won't work with it.

As remarkable as this product is, SoftPC does have a few drawbacks. For one, it requires a lot of memory. An optimal configuration requires 2.4 MB, though the product can be installed in a thriftier configuration (1.7 MB) with some loss of performance.

SoftPC must be installed using a DOS 5 1/4-inch drive, like the one from Apple; however, once installed, it will also work with the DaynaFile, but only as an extra drive (E). Like the Mac286, you can use drive E to share files between the Mac and Soft PC.

The Soft PC emulation takes place in a standard Macintosh window that can be moved anywhere on the screen. You can display the screen in one of two sizes—standard or zoomed. The zoomed image takes up about the space of a standard Macintosh 9-inch screen, but it doesn't expand on bigger monitors.

Soft PC is relatively slow compared with Mac286 or any turbo-charged PC. Though it is a satisfying solution technically, its use of memory and its speed limit its appeal. With enough memory, it will work on a Mac SE, so it may be an alternative solution for SE owners who need a coprocessing solution.

Conversion Software

Apple is committed to bringing the Macintosh and the PC closer together. One tangible result of that commitment is the Apple File Exchange (AFE) software that comes bundled with the Apple system files. AFE is a utility that allows the conversion of files to and from the Mac and the PC formats.

Although Apple doesn't provide much in the way of actual conversion software to accompany AFE, the door was left open for third-party vendors to add conversions to the system. The major supplier of AFE translators is DataViz, whose MacLink product was one of the first to offer such translations (even before AFE came out). DataViz offers a set of more than 40 specific conversions that can work with AFE to make it easy to move data from one format to the other. The DataViz translators are available directly from DataViz, with their MacLink product (see later in this chapter), or from retail outlets.

These translators are used to convert the file structure of one program or machine type to another. For instance, a specific translator might convert Macintosh ASCII files (which lack the line feed character at the end of each line) to PC ASCII files (which contain a line feed for each carriage return). That is a simple example, but more complex translators might convert a MacWrite word-processed document into a Word document, or a list of text information to a dBASE format, for example.

Translation software is also available with other products. For instance, many word processors, databases, and spreadsheets read and write the files of other products. As explained in Chapter Six, some Mac applications can work with files from PC products. For instance, dBASE Mac can read and write the

dBASE III format and Excel and Full Impact can import 1-2-3 files. Word, WordPerfect, PageMaker, VersaCAD, and AutoCAD are all examples of products that have both PC and Mac versions and allow file sharing without separate conversion.

Neither the AFE solution nor compatible software will help much if there is no way to move data from one place to the other. To do that often requires one of the other solutions described in this chapter.

Finally, it is important to remember that translating a file from one format to another means that you have created an entirely new file. If the file must return to its original system, it will have to be translated back again, creating yet another file.

Converting Graphics

While ordinary file translators will convert text and specific document formats, they do not support graphic formats. However, there are some solutions for converting between PC graphics and Mac graphics.

To view Mac graphics on a PC, there are several shareware and public-domain programs that will work. For actual conversion, you may want to try The Graphics Link, a product that converts MacPaint-style pictures to various PC formats and back to Mac. From Inset, Hijaak converts a variety of different PC formats to Mac format, and also converts images to MacPaint format. A shareware program called Optiks is also available. Optiks converts a wide range of PC formats, and includes MacPaint as one of its many options.

At present, nothing converts the more detailed PICT formats, which are used in drawing programs like MacDraw.

A more-or-less recent file format, the GIF format for graphic images, is becoming popular on both systems. In theory, GIF documents should be interchangeable.

DUAL-SYSTEM SOLUTIONS

Disk drive add-ons, coprocessors, and file sharing require the resources of one computer at a time. However, some file sharing solutions directly involve two computers simultaneously. One solution—the direct cable connection—is useful almost exclusively for file sharing. The other dual-system solution—telecommunications—can be used for many other purposes, in addition to file sharing. For more information about PC/Mac telecommunications, see Chapter Five.

Direct Connection

One of the easiest ways to connect a PC and a Mac is the direct cable connection. This is generally accomplished by hooking a serial cable from the Macintosh modem port to a serial port on the PC. Special software then drives the file transfers.

PROS AND CONS.

Direct connect advantages:

- Because they require no significant hardware additions, direct cable connections are relatively inexpensive—typically under $200.
- Direct cable connections operate at very fast file transfer speeds—typically many times faster than modems—comparable to network transfer speeds.
- Direct cable connections can quickly transfer several files at a time.

Direct connect disadvantages:

- Like disk drives, direct connections don't allow users to work with the same file but only to transfer a copy of the file from one machine to the other.
- Direct cable connections require the machines to be in close proximity (about 10 or 20 feet apart).
- Direct cable connections generally require dedicating both machines to file transfer operations during transfers.
- Direct cable connections occupy one port on the Mac and one serial port on the PC. Since these ports are often needed by other devices, users may have to disconnect and reconnect the cables frequently.

SOLUTIONS.

MacLink Plus. MacLink Plus is a direct-connect file transfer system from DataViz. This was the first solution of its kind offered. It comes with appropriate cabling to connect the Mac's modem port to a serial port on a PC. Files are transferred at up to 56,000 baud. The MacLink Plus system includes a full set of file translators to convert files between PC and Mac formats. These translators work with MacLink Plus or Apple File Exchange software distributed with the Macintosh System files.

LAP-LINK Mac. The makers of LAP-LINK (PC Magazine's 1987 Product of the Year), now have LAP-LINK Mac, offering file exchanges at up to 56,000 bits per second, supporting multiple file transfers. It comes with a universal cable for connecting between a variety of Macs and PCs. LAP-LINK has various versions, which allow transfer of data from desktop PCs to laptop computers as

well as desktop PCs to Macs. Many users find LAP-LINK an excellent tool for moving data where a network or disk transfer is not sufficient.

QuickShare. Falling somewhere between the disk drive solution and the dedicated cable link is QuickShare from Compatible Systems. QuickShare consists of a SCSI board for the PC, along with special dedicated cabling that connects from the PC board to a SCSI port on the Mac. The QuickShare solution lets you dedicate *a portion* of a PC disk to look and act just like a SCSI drive does to a Macintosh. From the PC's perspective, the dedicated portion of the disk looks like one large file. From the Mac's perspective, it looks just like any SCSI drive.

Using QuickShare, the two machines can share files quickly (at up to 1.4 million bits per second). In addition, the QuickShare drive can even be used as a boot drive for the Mac. Since PC hard disks are less expensive than Mac hard disks, this may be an economical way to add storage capacity to the Mac. The PC drive can also act as a file server for an AppleShare network.

QuickShare does require a dedicated cable from the Mac SCSI to the PC card; therefore, the machines should be close to each other.

Telecommunications

PROS AND CONS.

Telecommunications Advantages:

- Telecommunicating is most useful and convenient for occasional file transfers. However, because the telecommunications link must be established each time you want to share data, this method is not preferable where constant access is required. In such cases, a network is preferred.

- Telecommunications uses standard I/O ports, modems, and telephone lines—all ordinary equipment used in other everyday operations. In contrast, most other solutions require the addition of specialized equipment.

Telecommunications Disadvantages:

- Telecommunications solutions, like disk drives and direct connections, require that you work with copies of files, not the files themselves. You can't work directly on the same file in both the PC and the Mac environments.

- When compared with other solutions, telecommunications is relatively slow. For instance, the highest practical telecommunication speed is currently around 56,000 bits per second (although higher transfer rates are possible). Direct cable connections can operate at 56,000 bits per second and above, while networks and disk drives may be even faster.

- Telecommunications can tie up two computers for some time—depending on the size and number of files to transfer. Some exceptions may exist where the telecommunications software is capable of working in the background or during non-working hours.

SOLUTIONS.

Telecommunications is a good alternative for occasional data sharing. Using a simple setup of modems on each machine, data can be transferred at rates up to 19,200 bits per second (with today's high-speed modems and ideal conditions), although, typically, transfer rates closer to 2400 baud are financially more feasible. Telecommunicating is not, however, a very useful alternative where sharing must be frequent, unless each machine has a line that can be dedicated to telecommunications on a regular basis. It becomes more feasible in conjunction with telecommunications programs on the Macintosh such as Red Ryder 10 or Smartcom II, Version 3.0, or programs like the brand new TSR collection, Sidekick Plus on the PC. All can be set either to run automatically at a specific time or to operate in the background.

Another telecommunications solution is the remote access program. Programs like Carbon Copy, PC Anywhere, and CloseUp have been popular on the PC for years. Now, the people who make PC Anywhere have developed PC MacTerm, a companion product that allows a Mac user to operate a PC remotely.

One of the fastest-growing areas in Macintosh connectivity involves remote access to computers and networks. This method of connectivity allows a single user or group of users to connect to Macintosh systems or networks at remote facilities or locations.

Remote data access is split into two areas: *remote data access* and *remote bridging*. Remote data access allows a single user with a modem access to a remote AppleTalk network. Remote bridging lets one AppleTalk network connect via modem to another network. Remote services include disk access, file sharing, mail services, and printer sharing.

NETWORKS

Perhaps the most powerful solution available is a network that can link multiple PCs and Macs. Although more complicated to set up and maintain and more expensive than other solutions, networks offer several important advantages.

PROS AND CONS.

Network Advantages:

- Networks offer simultaneous file sharing and don't require copying files before using them on different systems.
- Most networks include security options to impose restrictions on file access—something that other solutions don't include.
- Networks offer the added advantages of inter-system mail options, which can be used to distribute copies of files to different systems.
- On a network, access to files is usually immediate and requires no copying or conversion between compatible types.
- Network file access and transfers are generally fast (at least when compared with telecommunications).

Network Disadvantages:

- Networks require more expertise to set up than other solutions.
- Networks require maintenance.
- Networks often use more memory overhead on host systems, thereby limiting the availability of memory for running programs.
- In some cases, network drivers and software may be incompatible with other programs and applications, causing problems that must be traced.
- Network hardware and software generally costs more than any other connectivity solution.
- Wiring a network from one location to another may be difficult.

Network technology has grown more sophisticated over the years, and networks have become increasingly common and accepted. As people use networks more and more frequently to connect PCs to PCs and Macs to Macs, the desire to connect to a multitude of different environments has become stronger. While simple PC-to-PC solutions abound, the average microcomputer user has become more sophisticated and is no longer satisfied with

communicating only with other network nodes. Many users now connect to mainframe, mini, and super microcomputers through a variety of methods.

This chapter outlines the basic methods of communication for the Macintosh. Separated into three main categories, they are: communications facilities, networking, and asynchronous communications.

The Macintosh Communication Facility

Unlike the PC, which has no built-in connections other than serial or parallel ports, the Macintosh has been designed to communicate via an internal standard method known as LocalTalk. By setting a standard interface, LocalTalk simplifies the connectivity issue on the Mac.

The Macintosh is equipped with two serial ports. The modem port is more suitable for high-speed communications, while the printer port is specifically designed for printer or AppleTalk use only. These ports can support a variety of communication devices. On the Mac II, add-in communication cards can also be added to allow additional connectivity solutions.

The serial ports on the Macintosh systems vary from one model to another (see Appendix B). The earlier Macintosh systems, the Macintosh 128 and Macintosh 512, were equipped with nine-pin serial connections. The later Macintosh systems, the Macintosh Plus, Macintosh SE, and Macintosh II, employ the newer round serial connector—the Mini-8 connector. These ports are controlled by an internal chip known as the Serial Communications Controller (SCC) chip and support both the RS-422 and the earlier (RS-232C) protocols.

The terms LocalTalk, AppleTalk, and AppleShare are frequently thrown around when discussing the Macintosh printer port and some users may find the terms confusing. Additional confusion was created when, in 1988, Apple announced that, henceforth, AppleTalk and LocalTalk would have distinct meanings.

- *LocalTalk* is actually the twisted pair cabling that connects the Mac printer and modem ports with other Macs, peripherals, and network equipment.

- *AppleTalk* is the Apple communication protocol used with this port. AppleTalk is a protocol that may be used by non-Apple networks and cabling other than LocalTalk cables—for instance, PhoneNet and ETHERNET cabling.

- *AppleShare* is Apple's file serving software usually used with the AppleTalk and LocalTalk system.

Network Topologies

Networks come in two basic types: LANs (local area networks) and WANs (wide area networks). LANs are the most prevalent type of network configuration implemented by microcomputer users. A LAN is made up of computers linked together by using a similar layout or hardware protocol. A WAN consists of several different network types spread across various locations and linked together via a similar connectivity method known as a *backbone*. This chapter deals mainly with LAN setups.

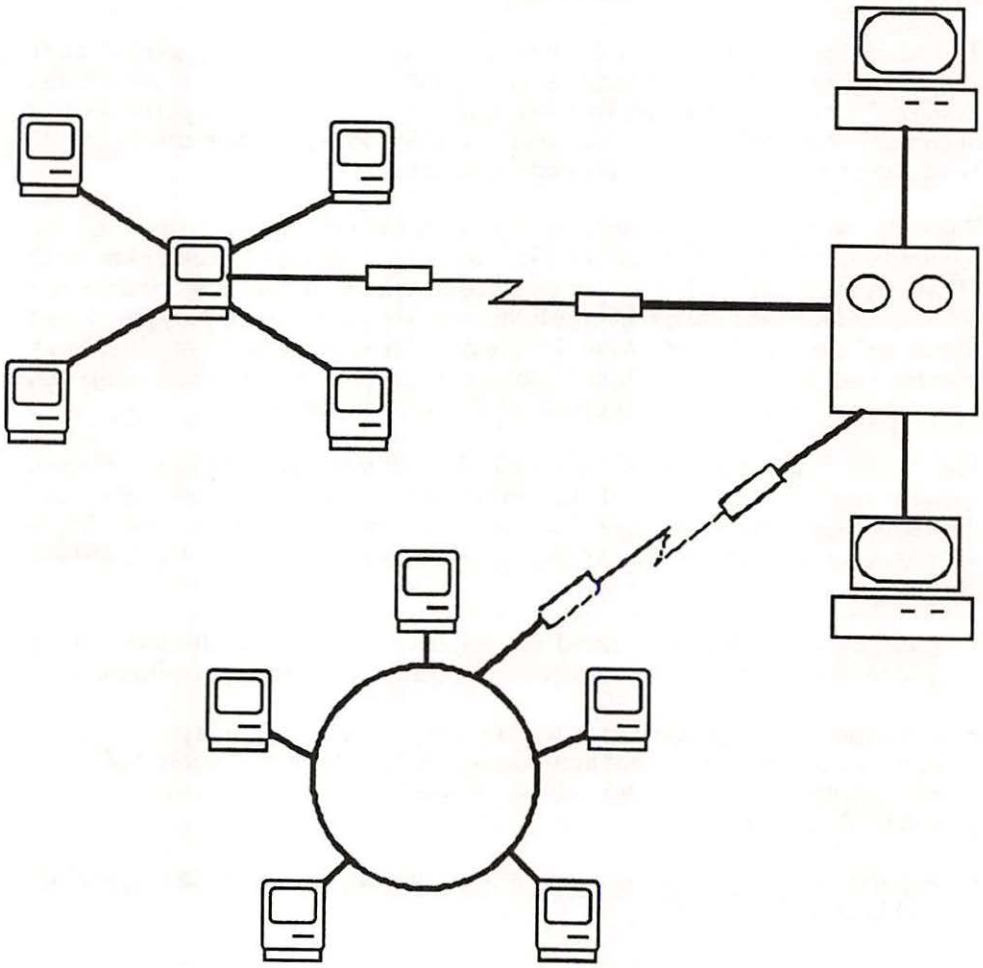


Figure 7-1. Wide area network

The basic network configurations are known as network *topologies*. These topologies are industry-specific not computer-specific; that is, each topology could be implemented for a network of PC systems, Macintoshes, or DEC VAX systems.

The main LAN topologies in use today are bus, star, and ring configurations.

Bus Configuration. A bus configuration consists of a single line connecting all the nodes together. The line does not loop continuously. On the network each node is dependent only on itself and is not integral to the remainder of the network. In a bus configuration, the node continually checks the data line for network communications addressed to itself. If a node is disconnected or hangs, the network continues to operate and simply ignores the missing node. ETHERNET, LocalTalk, and IBM's PCnet broadband system are examples of a bus configuration.

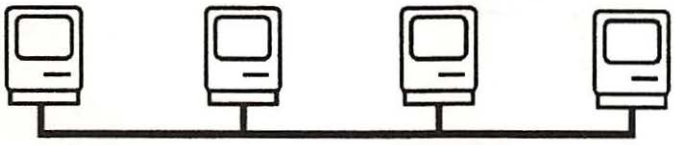


Figure 7-2. Bus configuration

Star Configuration. This configuration depends on a central hub to handle all network data. The hub is critical to the operation of the network. If the hub fails, the network ceases operation. A mainframe serving PCs and Macs is an excellent example of a star configuration.

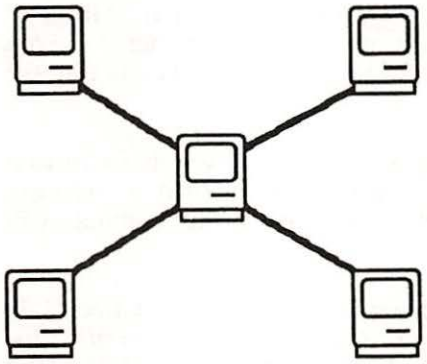


Figure 7-3. Star configuration

Ring Configuration. A ring configuration consists of a single closed line of data that depends on repeaters for each node to direct information to and from the node to the network data line. If a repeater on the line fails, the network stops. Because the repeater can regenerate the signal, the ring network can be spread over a large area. This configuration is used for very high performance network processing. IBM's Token Ring Network is an example of ring configuration.

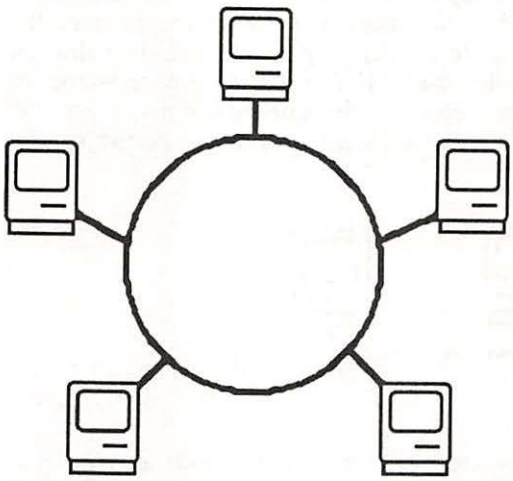


Figure 7-4. Ring configuration

MACINTOSH-TO-MACINTOSH NETWORKING. Basic networking capability is built into the Macintosh through the AppleTalk protocol. Only the addition of LocalTalk cabling is needed to connect Macintosh printers together. Network software that accesses the AppleTalk protocol completes the installation of the network.

The Macintosh System and Finder are equipped to allow users to do various low-level networking tasks such as print sharing, communication resource sharing (sharing modems), and a limited amount of file sharing, without extra software.

Adding AppleShare software to a Macintosh configuration linked by LocalTalk cables adds a higher level of capability such as electronic mail services, file sharing, and application serving. AppleShare depends on the AppleTalk Filing Protocol (AFP) to handle file storage structures and expects all nodes on the network to be AFP-capable. While AppleTalk components are currently available to allow PCs to access the AppleTalk network, the solutions are slow and generally not preferable.

MACINTOSH-TO-PC NETWORKING. Fortunately, manufacturers of popular PC-based network systems have begun offering acceptable options that allow the Macintosh to coexist in the mainstream PC network world. Unfortunately, connecting to the existing network does not guarantee the user the ability to share files, since file structures and application differences between the Macintosh and PC may be markedly different. Therefore, connecting a Macintosh to a PC network faces two challenges: physically connecting the Macintosh to the PC-based network, and accessing and transferring data between the different devices on the network. As we saw earlier in this chapter, there are several solutions for translating file types.

THE PHYSICAL CONNECTION. There are two generally accepted methods for connecting Macintoshes and PCs for networking. The first method consists of adding an AppleTalk plug-in board to the PC, which effectively makes the PC a node connected to the rest of the Mac system via LocalTalk cabling. This method is used by networks such as Tops, TangentShare, and AppleShare PC. The main disadvantage to this method is its speed—LocalTalk is relatively slow.

The other physical connection option for the Macintosh consists of bridging an AppleTalk network configuration to an ETHERNET backbone. Using ETHERNET speeds up the communications over the network and allows the direct integration of the Macintosh into the network bus lines. Using ETHERNET, you can still keep the AppleTalk configuration, which allows the system to tap into the built-in capabilities of the AppleTalk protocols.

There are several devices available to bridge AppleTalk to ETHERNET, including several special gateways like Fastpath from Kinectics. Another option is the EtherTalk card for the Macintosh II, available both from Apple and 3Com. In addition, both Tops and Dayna Communications have announced speed-up peripherals for LocalTalk networks.

Several large PC network vendors offer software packages that allow the Macintosh to be recognized as a native node by the server. Besides allowing access to the server, these software drivers give the Macintosh access to higher-level network services such as transparent file accessing between PC and Macintosh nodes, high-performance server based print services, and electronic mail services.

There are several specific network solutions used to connect PCs and Macs—AppleShare and AppleShare PC, TangentShare, TOPS, 3Com's 3Plus and 3Plus for the Mac, and Novell networks.

AppleShare and AppleShare PC. AppleShare requires a dedicated Mac (or, using QuickShare, a dedicated PC) to act as a file server. A special AppleTalk card is required on each PC that is included in the network using the AppleShare PC software. Users on the network can share files residing on the server, and have access to various security options available at the folder level.

AppleShare nodes can be linked to speed up network communications and data traffic via EtherLink gateways like the Kinectics Fastpath. However, without the use of EtherLink gateways, AppleShare is relatively slow.

TangentShare. Tangent Technologies released their PC version of AppleShare in the fall of 1987. It does virtually the same things that AppleShare does. It works with either Apple's PC board (which Tangent developed) or a similar board from Tangent. TangentShare works well and, like AppleShare PC, offers full AppleShare networking to PC users.

TOPS. TOPS is possibly the most transparent and easy-to-use network available for linking Macs and PCs. And it is the only major network solution that does not require a dedicated file server. Each machine on the TOPS network will work equally with the drives, files, and AppleTalk peripherals (like ImageWriter or LaserWriter) on each others machine. Although TOPS is only as fast at the LocalTalk network (which is pretty slow), it uses the TOPS FlashCard to run significantly faster from PC to PC than it does from Mac to Mac or Mac to PC. TOPS' FlashCard speeds the network communications of AppleTalk-based networks to three times the normal speed of AppleTalk communications.

TOPS includes print spooling and network messaging, plus easy links to SUN Microsystems' UNIX workstations. TOPS is also more intuitive and requires less administration than any of the other PC to Mac network alternatives.

3Plus for the Mac. The first major network manufacturer to support the Mac was 3Com. 3Plus networks can also include several PC systems running off one or more dedicated servers. 3Com offers full-service networks for larger installations, and includes full network mail, peripheral sharing, and much more.

Unlike the PC side of 3Com, 3Plus for the Mac is very intuitive and easy to grasp. It is even possible to use the 3Com server to boot the Mac. 3Plus for the Mac is expensive to install when there is no existing 3Com network, but it makes a lot of sense if such a network is already in place.

Novell. Novell has recently introduced a Macintosh version of its network. Novell's Netware for the Macintosh provides transparent access to the Novell network which may be configured to include OS/2- or DOS-based servers or nodes. Novell provides users with a strong networking system that incorporates special features to ensure data security and data protection.

Asynchronous Communication

MACINTOSH TO VAX AND BEYOND. In early 1988, Apple announced a relationship with Digital Equipment Corporation (DEC) that paved the way for developers to open solutions for Mac-to-mini connections including the Mac to DEC's VAX mini. These solutions range from merely using the host systems as file servers, to actually "massaging" and downloading data from remote data files located on the mini.

Connectivity. There are several ways to connect the Macintosh to the DEC VAX environment, but the most notable way is through an ETHERNET gateway. Kinectic's Fastpath allows AppleTalk-to-ETHERNET bridging to give the Macintosh access to the DECNET backbone. This access method allows the Mac to act either as a mere terminal (a dumb terminal) operating off the VAX or as a full computer using connectivity software to implement the VAX. These two connectivity methods are called *remote file services* (when the Mac acts as a dumb terminal) and *remote file accessing* (when the Mac acts as a computer connected to the VAX).

Remote File Services. Remote file services use an external system as a remote file server. For example, a Mac can connect to the VAX operating system (VMS) via DEC's AppleTalk for VMS service. This partitions the VMS drive so that the Mac recognizes it as a Mac drive. This also gives other Macs that have access to the VAX host the ability to share and store files in the same place on the host. However, it does not give the Mac access to the other Vax files (for instance, the Mac can't access or understand QDBMS files.

Remote File Access. Several new products use the ETHERNET connectivity solution to allow the Mac to become intelligent terminals to the host system. This gives the Mac user the ability to connect to a host system, select a host-native data file, pass a select or search criterion, and download the information to the Mac for further processing or reporting. Additionally, this capability is *bidirectional*; that is, the user may enter data from his Mac to the host, or from the host to the Mac. This capability gives the Mac user access to a wider range and greater amount of data than ever before and gives the host system user access to the Mac's excellent graphics capabilities.

GOING FORWARD

Networking solutions are constantly in development, as are all aspects of the personal computer industry. In the future, we can expect to see new kinds of PCs as well as new kinds of Macintoshes. In addition, we will probably see new peripherals and new ideas that will be as revolutionary as desktop publishing and laser printing have been to personal computing.

In Chapter Eight, you'll see some of the trends for the Macintosh.

8

Where to Go from Here

Now that you have begun to explore a new path and have made the transition from the PC to the Mac, you may want to know what the future holds. PC systems and the different Macintosh models vary in several ways. The command-driven linear model of the PC contrasts sharply with the graphic-, object-, and process-oriented Macintosh environment. In Chapters Two, Three, and Four, you learned how to apply Macintosh techniques and how they compare with equivalent DOS operations.

In Chapter Five, you learned how the graphical interface of the Macintosh can affect the way software products work, and how that may differ from products you have used on the PC.

PCs and Macs also have different hardware, as you saw in Chapter Six. The Mac started out as a closed system and the PC began with an open system. They use different central processors, which has led to some very significant effects on software and memory. Their different video displays helped to shape the development of contrasting product lines.

The two systems have even approached peripheral equipment in different ways. IBM never dominated the market for printers and other peripherals in the way that Apple has. Apple's design philosophy was tailored to help them control that market. Only recently have third-party peripherals begun to appear in number and variety approaching those available for the PC.

As more and more Macs enter our homes and workplaces, the need to connect them with PCs and other systems grows. Information is best when shared, and a world with two incompatible standards is a poorer one for the lack of communication. Happily, there are signs of reconciliation between the warring factions in the PC and the Mac camps. In Chapter Seven you learned of several ways to connect Macs with PCs, as well as the hint of some other connectivity solutions.

One of the pleasant surprises in following the development of the Mac is the discovery of Apple's firm commitment to upward compatibility of their systems. Users who started with the Macintosh 128 were offered smooth migration paths to the Macintosh 512. Similarly, the Macintosh 512 users were offered solutions to the Macintosh Plus. The consistent thread for the Macintosh faithful has been the ability to move the Macintosh applications from system to system with virtually no changes to the software. This has been a cornerstone to the Macintosh's continued success.

That brings us to this chapter. We've covered the major information, and we have begun to draw close to the end of our journey. However, we would like to leave you with some further thoughts about the future and with some resources to help you continue on your way from the PC to the Mac.

FUTURE TRENDS

The computer industry is in transition, as always, and some of the major changes are already beginning to influence everyday operation. Other changes can only be hinted at, and, at the outer limits of imagination, the changes will be so revolutionary as to obviate the need for books like this one. However, in the immediate future, certain trends and developments are fairly certain.

Changes in technology are opening vast new horizons for computer users. PC users who have mastered single-tasking applications now look to OS/2 to provide multi-tasking capabilities at a single keystroke. Macintosh users also are moving to the multi-tasking/multi-user environments with both MultiFinder and A/UX. Additionally, personal computing is evolving rapidly. As the PC world migrates closer to the Macintosh world with products like Windows and OS/2 Presentation Manager, the Macintosh world is moving still farther from the PC spectrum with greatly improved sound and video imaging. Regardless, all these changes bode well for both the PC user and the Mac user.

In this section, we'll go on a small side excursion. For the moment we'd like to take you away from the issue of today's PCs and Macs and on a short journey of possibilities. The future always starts with the present, and any good prognosticator has a pretty good idea of current events along with a sprinkling of knowledge about what is happening behind the scenes. In this journey of speculation, we'll start with a look at two current developments—OS/2 Presentation Manager and A/UX.

OS/2 and Presentation Manager

IBM's commitment to OS/2 and Presentation Manager is a very direct statement, and one that will be hard to ignore. For Macintosh users, it represents a vindication. More than one person will be saying, "I told you so." However, DOS will continue for some time, and many people may prefer to work with DOS or a command-oriented OS/2 as time passes. Regardless of personal choice, the graphical interface is going to be a standard feature of nearly every computer system before long. The planned implementations of

OS/2 are Standard Edition and Extended Edition with either a command-line interface or a graphical interface (Presentation Manager).

OS/2 Standard Edition is a multitasking operating system for PCs which use the 80286 or 80386 Processor. It will not work on the older PC and XT models. OS/2 allows applications to run concurrently with other applications and does not limit the application to 640K of memory. Applications running under OS/2 mode use what is known as *Protect Mode* to ensure that one application does not run over another application. Software must be written specifically for OS/2 mode; therefore, most applications currently on the market for the PC are not OS/2-based. For existing DOS applications OS/2 hosts a special session known as Compatibility Box to allow applications to run unprotected under OS/2. A possible setback to running under the Compatibility Box is that an application that hangs in DOS Mode may crash the entire system while an application that hangs under Protect Mode will probably allow the system to continue running.

The Extended Edition of OS/2 includes all of the features of Standard Edition plus the inclusion of three significant modules, the Data Manager, Communications Manager, and the Local Area Network Requestor. These modules provide significant services to applications to allow the system to handle multi-tasking requests from various applications at the same time. OS/2 Extended Edition is a significant step toward moving the mini computer power and multitasking capabilities down to the desktop level.

Both editions of OS/2 come in either command-line interface mode or Presentation Manager. Users familiar with Microsoft Windows will probably have little problem getting familiar with the PM interface, as it is strikingly similar to the iconic references of Windows. As PM becomes more and more prevalent in the PC world, we expect to see a tighter convergence to the Macintosh Interface (hence the Apple-Microsoft lawsuit on the issue of "look and feel").

A/UX

In mid-1988, Apple formally introduced its implementation of UNIX known as A/UX. Based on an implementation of AT&T's UNIX System V, A/UX incorporates many of the Mac interface features into the UNIX environment and allows the intermixing of data from the Mac environment into the UNIX environment. A/UX is billed as an alternative to the Mac operating system and is only available on the Macintosh II family of computers. As well as providing UNIX applications with a "Mac-like" look and feel, many command-line interfaces are available for A/UX to accommodate the hardcore UNIX fans for whom the graphical interface is a no-no.

The true task of the operating systems of the future will not be in the ability to multitask alone—that is available now in both the PC and the Macintosh. DESQVIEW from Quarterdeck has offered multitasking to the DOS world for several years. MultiFinder is now coming into its own as developers begin to work out the kinks inherent in multiple-application processing.

The real promise to be realized in the future multitasking operating systems will be the ability to communcate between the various processes running in the system. This *inter-process communications (IPC) capability* will be the cornerstone to developing more complete and complex products. Imagine being able to add a customer's name and address to your database while the system automatically generates a letter in the background through the word processor welcoming their business. At the same time, the Accounts Receivable accounting system opens a new account and adds the customer to the system automatically—all activated by your initial entry into the database. It sounds unrealistic but that is the direction in which operating systems are going. Developers are already designing software to have just that capability! In fact, as you continue on this journey of speculation, you'll see that some people are already expanding on ideas like this one.

Chips of the Future

Advances in CPU development are rapidly changing the face of personal computing as mini-computer power is quickly being overshadowed by the performance of the 68030 and 80386 CPU chips (see Chapter Six). As faster processors become available, higher-resolution imaging and image manipulation also become possible. Sound handling is improved.

Video-quality animation becomes more viable as the processor becomes able to handle the sophisticated algorithms necessary to give true real-time imaging. Already, people are using computers to retouch images, capture live video, and perform sophisticated animation. By mixing input from the computer and the world, information can be presented in new ways.

Limitations in memory management, operating system design, and processing power of the CPU have reduced the ability to implement significantly advanced applications. However, this is no longer the case.

In 1988, advances in system engineering and design broke through previously existing commercial limitations to micro systems. Parallel processing (as in Levco's Transputer) opened the door for applications previously thought to be too intense for the micro platform. Progress in CD-ROM and disk technologies has expanded storage and retrieval capabilities ten-fold. MultiMedia advances such as sound synthesis, voice recognition, and image processing are rapidly moving personal computing into the twenty-first century. Instead of 2001, we may expect to meet a real-life counterpart to HAL the computer in the 1990s.

Connecting to Bigger Systems

IBM's Standard Applications Architecture (SAA) concept provides interconnectability between IBM platforms and standard IBM communication protocols by controlling the flow of information between the devices. This dimension gives users the flexibility of the wide range of IBM products and computing power. Corporate users who had felt alienated by the separation of the micros from the mini- and mainframe world have looked forward to seeing

SAA implemented. Thus far, however, SAA has not lived up to its early promises.

Apple's approach to the mini- and mainframe world has been substantially different. Apple has encouraged third-party developer solutions as the answer to the connectivity questions. The opening of the Macintosh architecture aided development of third-party solutions such as emulation boards, coprocessor boards, and connectivity boards (the Kinectics ETHERNET board, for example).

Apple's landmark deal with Digital Equipment Corp. opened the way for Macintosh users to tap into a powerful network of high-performance-processing minis. The solutions that have been developed (remote access systems such as Alisashare) are becoming the models for connectivity solutions with other computing targets.

Language development has also taken radical new directions under the Macintosh as Object-Oriented Languages (OOL) or Object-Oriented Programming (OOP) have begun to emerge and evolve. OOLs are considered to be the programming environments of the future.

Current and Future Mac Development

Changes in the way people use computers have helped define the future Macintosh. The incorporation of the Mac in everyday use, as well as the anticipated need to support the users' current investment in software, helped initiate the releases of the Mac IIx, IIcx, and SE/30.

This new technology makes a strong statement about Apple's commitment to coexist with the DOS world, and to remove the shroud of isolation that once hung over the Mac. With continued development in this direction, the Macintosh will no longer be considered as a fringe option or a machine for only specialized image processing purposes, and will be able to function easily in a world of DOS machines, minis, and mainframes.

There have long been rumors of a Macintosh portable or laptop. The absence of a portable machine has been a hindrance to the Macintosh's growth because users have found it difficult to transport the Macintosh. While Apple has denied any plans to develop a laptop for production due to the lack of acceptable video devices, recent breakthroughs in video technology have made the portable Mac a possibility, and the demand from corporate users may push Apple to produce it. As of this writing, rumors are strong that such a product does indeed exist.

KNOWLEDGE NAVIGATOR. At the time we write this, the introduction of several new machines from Apple and the expectation of the first 80486-based PC both point to positive advances in technology and future processing power. In 1988, in a short video called "Knowledge Navigator," Apple set forth its vision of the future of personal computing.

In the video, a college professor comes home and walks up to his desk. On the desk is a computer roughly the size and shape of two legal-sized pads placed side by side. It has no keyboard and virtually no visible controls. A small video camera lens pokes out of the top, and it has a flat screen hinged in the middle.

Some icons are still present on the screen—notably a movie projector, a book, and the familiar trashcan. Along the top of the screen are menus, though they are different from those on today's Mac. The Knowledge Navigator's menus are Files, Network, Tools, Schedule, and Agent.

Noticeably absent, however, is the mouse, which has been replaced by a touch pad. Although there seems to be some small storage-type media, they look nothing like floppy disks. No disk drive is visible. Incredibly, the whole system looks completely portable; no wires show anywhere.

The professor speaks to the computer. The computer answers. A small image of a man (he's called the Agent) appears to speak, repeating the professor's telephone messages. The professor asks the Agent to display some research information. Later, he asks the Agent to call a colleague. He talks to his colleague through the computer while viewing her image and asks to see some data she's collected. Almost immediately, graphs and maps representing the data appear on the screen.

At other points during the video, the Agent makes some correlations between different facts and data, and displays graphs as well as geographical maps. In short, the Knowledge Navigator talks, listens, and responds to complex commands. From time to time, the professor touches the screen with his finger to indicate a particular fact or image he wants to work with.

The video is, in fact, science fiction suggesting several technological advances. It postulates a completely portable computer incorporating a video telephone; a sophisticated (world-wide) network; and artificial intelligence in a graphic-based, voice-activated system. Although some may disagree with this image, it is at least one vision of where we may be heading.

IBM hasn't released any speculative science fiction about its future vision, but, no doubt, it would seem equally far-fetched if they did. But, far-fetched or not, we've included a visit with the Knowledge Navigator because you, a PC user who is becoming acquainted with the Mac, might like some insight into Apple's thinking about the future.

That ends our sidetrip down a possible future road. We'll return you now to the present and give you a little information about joining the community of Mac users, and about other resources at your disposal.

JOINING THE MACINTOSH COMMUNITY

One of the strongest factors in the Mac's explosive growth is the availability of organized support and assistance for the everyday user. Unlike the PC environment, which is largely made up of dissimilar user types (corporate, small business, pleasure), the Mac seems to foster a fraternity of followers constituting a powerful voice in the direction and growth of the Macintosh line. Mac users are famous for being supportive, and most are anxious to advance both the Macintosh successes and the Macintosh philosophy.

The organization of available Mac support is divided into three groups: bulletin boards, on-line services, and user groups.

Bulletin Boards and On-Line Services

There are numerous bulletin boards and on-line services that offer excellent support facilities. These services are extremely helpful as support forums and conferences are generally available to all users. On-line services provide a great way to trade tips and solve problems with other users in a "live" conference setting. Bulletin boards tend to be geared more towards communicating via electronic mail. Bulletin boards are excellent locations to get free software utilities and programs.

Among the most popular on-line services are the following:

AppleLink Personal Edition. AppleLink Personal Edition is offered by Apple to all users willing to pay the service charges. This service allows users to talk to each other and access both Apple-specific and general on-line information. Personal Edition can be used to exchange electronic mail, check stock quotes, sample software, or participate in on-line forums with other users.

CompuServe. One of the most popular services for both PC and Macintosh users, CompuServe offers electronic mail and conferencing as well as on-line reference systems, and software and hardware support forums. (Ashton-Tate maintains an active on-line service through CompuServe.)

Macnet. Macnet is very similar to AppleLink, with the exception that it is a private on-line service not supported by Apple. Like Compuserve, Macnet also has on-line support forums as well as an excellent stock retrieval system and mail system.

Other On-Line Systems. There are other excellent on-line systems as well. GEnie is an on-line service similar to CompuServe at a lower price. MCIMail is an electronic mail service which supports Desktop Express, a Macintosh front end, and Lotus Express, its PC counterpart.

The Macintosh User Groups

The Macintosh user groups constitute one of the strongest conglomerates of computer users in the industry. User groups serve to inform members of new products, techniques, and news of events in the Macintosh world. Most user groups are community- or business-oriented. This helps maintain the level of participation, as the support group is local rather than remote. Many user groups have special interest groups (SIGs) that concentrate on specific products or needs (for example, some user groups have dBASE Mac SIGs). These special interest groups with similar needs meet and discuss problems and workarounds in a forum-like setting. Apple has a toll-free number (800-538-9696) to get user group referrals. The referral service is available every day of the year, 24 hours a day.

CONCLUSION

Well, you've gotten through it! You now have a feel for the Macintosh mystique. We have attempted to lead you through the Mac in the most natural progression—from the beginnings of personal computing to one vision of the future. While this may have answered some questions, it probably whetted your appetite for more information. Not wishing to leave you hanging, we would like to suggest several books that pick up where we leave off:

The Apple Macintosh Book
Cary Lu
Microsoft Press

The Macintosh Advisor - Essential Techniques for Experienced Users
Cynthia Harriman and Bencion Calica
Hayden Books

The Macintosh Bible (book and HyperCard stack from STAX!)
Edited by Arthur Naiman
Goldstein & Blair

Basic Tips and Techniques for the Macintosh (This is a must-have book after you have finished this one.)

And when you *really* want some answers....

The Technical Introduction to the Macintosh Family
Addison Wesley Publications

We hope that this book leaves you with an understanding of the Macintosh and a more comfortable feeling in a new environment. The journey continues for us all, and we wish you much success in your adventures to come.

A

Functional Reference

Chapter Three introduced the Macintosh graphical interface in a procedural manner, concentrating on Mac techniques. In this appendix, we focus on how to do things from a functional point of view. You should be somewhat familiar with DOS commands and techniques, as most of Appendix A is an alphabetical listing of DOS commands with the equivalent Macintosh procedures (if any).

Some commands have no Macintosh equivalent; others are duplicated on the Mac in very different ways. For most commands, we have tried to indicate not only how the Mac equivalent (if any) works, but a little about why.

COMMAND REFERENCE

APPEND

APPEND is used to set a search path for data files. It can set the path for executable files an option. (See also, PATH.)

Mac Equivalent: None

The Macintosh does not use a search path. However, if you double-click any document on any disk, the appropriate application will load if it is present on one of the active drives. In a sense, then, the Mac doesn't need a path statement. However, sometimes, especially on large hard disks, a particular document or application may be located in a special window and it may be easier to launch that application through the use of one of the third-party utilities like Power Station or On Cue. HyperCard can also be used as a program launcher.

When you use one of these other programs to launch documents, the program itself takes care of remembering the path.

It is important to note that the Macintosh does have a syntax for designating disks and directories (folders), and therefore, does have a definable path,

though no path statement. One difference between the Mac system and the PC's is that the colon (:) is used to separate parts of the path. Another is that Mac drive, folder, and file names can contain more than one word, as well as backward slashes and other characters that would be considered illegal on the PC. They cannot, however, contain a colon.

A typical PC path might read:

C:\DBASE\FILES\SALES.DB

A similar hypothetical path on the Mac might read:

My Disk Drive:dBase Mac:Files:Sales List (1987)

ASSIGN

ASSIGN is used to make temporary changes to a disk drive's designation. For instance, if a program customarily looks for data on drive B, but you want the data files to be used on the C drive, you can reASSIGN B to C using:

ASSIGN B=C

All commands for drive B will then be executed on C until you change the assignment again, or turn off, or reboot the computer.

Mac Equivalent: None

Mac programs generally read and write data files to the active disk and folder, which can be changed from within the standard file listing dialog box. There is no way to reassign a drive, because there is no need to. Some programs allow you to predefine folders for special files. For instance, FullWrite Professional lets you predefine a special folder for handling stationery documents (templates).

ATTRIB

ATTRIB is used to set special file attributes—notably read-only status and the archive bit (read by some programs to determine whether a file has been backed up or not).

Mac Equivalent: Get Info

There is no exact equivalent for the archive bit, but any file can be made read-only by selecting it and opening Get Info from the File menu. At the top of the Get Info dialog box is a small box labeled Locked. Clicking this box is the equivalent of the DOS command:

ATTRIB +R <filename.ext>

BREAK

BREAK is used to tell DOS whether to scan for the Ctrl-Break or Ctrl-C keyboard entries. The syntax is:

BREAK = [ON | OFF]

Mac Equivalent: None

The most common method for interrupting a Mac procedure during execution is the Command-Period keystroke combination (⌘-.). Although this is an almost-universal function, it is not a built-in Mac procedure, and there are no user commands for turning it on or off.

BACKUP

BACKUP is the DOS command for backing up files from a hard drive to floppy disks. Various command-line options allow you to back up specific files, groups of files, files modified since the last backup was performed, and so on.

Mac Equivalent: HDBackup

Apple supplies a program called HDBackup with the system. This program will back up all files, one designated file, or all files that have been modified since the last backup. HDBackup also contains the file recovery functions that are equivalent to the RECOVER command (discussed later in this section).

CHDIR

CHDIR (abbreviated CD) is used to move from one directory to another. The syntax is:

CD [d:][path]

where d: is the optional drive name, and path is the optional destination. CD alone will return the name of the current directory.

Mac Equivalent: Finder

To move from one directory to another on the Mac, you simply open and close folders. To open a folder, double-click its icon. To close the folder, click the close box at the upper left corner of the folder window. The active folder window is a typical Mac window complete with title bar, close box, scroll bars (if necessary), size box, zoom box, and varying information on the title bar. (See DIR for more information about the way folders display their contents on a Mac.)

Several folders may be open at once. To switch between open folders, you simply click in the window of the desired folder, bringing it to the front. If the

folder is hidden behind another window, double-click its icon again to bring it to the front.

CHKDSK

CHKDSK is used to check a disk for errors and, if instructed, correct them; also the status of your files and directories. It also returns information about the memory usage on your PC.

Mac Equivalents: Finder, About the Finder, Disk First Aid, Get Info

CHKDSK has no single equivalent on the Mac, but each of its functions is echoed in different aspects of the system. To correct disk errors, use the Disk First Aid program, provided with the Mac system.

To view the status of the Mac's memory, beginning with Finder version 6.0, you can open the About the Finder desk accessory. This DA will only be available when the Finder is the active application. Under MultiFinder, About the Finder displays the memory usage of each active application on its own meter graph so you can see the total amount of memory that application is using, and how much of that memory has been allocated.

Finally, you can see total disk space as well as space remaining by selecting the disk, opening its window, and displaying the files and folders By Icon (use the View menu to choose the display method).

In addition, you can see the size of any individual folder by selecting it and choosing Get Info from the File menu. If you select several files or folders and then choose Get Info, a separate information box opens for each one. A typical Get Info box for a folder displays the size of the folder in bytes, how much disk space it uses, how many files it contains, its location, the date it was created, and the date its contents were last modified.

CLS

CLS is the DOS command to clear the screen. This works only from the DOS command line.

Mac Equivalent: Close windows

You can close any window, one at a time, by clicking its close box, by selecting Close from the File menu, or by pressing Command-W (this works in the Finder and also in some applications). Or you can press Option-Command-W to close all active Finder windows. You can close windows from within applications using the close box. However, the Command-key combination for closing a window within an application varies.

COMMAND

COMMAND is used to load a secondary DOS processor or shell.

Mac Equivalent: None

Although you can't load a secondary processor on the Macintosh, with MultiFinder you don't need to. However, the Macintosh can allow you to switch the active System by using a process called switch launching. Switch launching is not the same as the DOS shell, and you are not often likely to need to do this.

COMP (COMPARE)

COMP is used to compare a file or set of files with another file or set of files. Basically, COMP tells you if the files being compared are identical or not, and pinpoints the differences by their hexadecimal locations. After finding ten unequal comparisons, DOS considers the two files to be too different to compare and ends the process.

Mac Equivalent: None

COPY

COPY is the DOS command used to copy a file from its present location to another disk or directory. You can copy a file by giving it another name:

COPY<filename.ext> <newfile.ext>

COPY does not affect the file being copied.

You can also use COPY with wildcards to select files with similar names. You can use it to concatenate files and also to send files to a printer.

Mac Equivalent: Drag, Option-drag

Normally, when you move a file from one location to another on a Mac, you simply highlight the icon or icons you want to move and drag to the new location.

When you drag an icon to another disk window or icon, the dragged icon is copied and the original is left intact. This functions the same way the COPY command does on the PC.

However, when you drag an icon to a new location on the same disk, the process actually moves the icon, removing it from the original location. To perform a file copy from one folder to another, press and hold the Option key while you drag the icon. This leaves the original file or folder in place and creates a new copy in the new location.

If you want to create a duplicate of a file or folder (or a group of them) in the same folder, select the icons to copy and select Duplicate from the File menu (or press Command-D). A new file or folder is created for each selected file or folder with the title Copy of... followed by the original title of the icon. This is the Mac Equivalent of the DOS syntax example shown earlier in which the file was copied to a new name.

You can use the Marquee and Shift-clicking to select multiple icons, though you can't use any wildcard methods on the Mac.

When you copy or move files on the Mac, a window opens to show you how many files remain to be copied. A bar gauge shows you the progress graphically, and the names of all files being read and written flash across the screen. The speed of this display depends on the speed of the drive(s) being used. On floppies, the files will pass by quite slowly; when copying between fast hard drives, the file names will pass by in a blur.

Unlike DOS COPY, Mac copy procedures can not be used to concatenate files, or send them to a printer.

DATE

DATE is used to set and display the current system date. In most PCs, there is a battery that keeps the current date and time. This command displays the current setting and allows you to change it.

Mac Equivalent: Control Panel, Alarm Clock DA

On the Macintosh, the system date is also kept current by a battery. To set the date, open the Control Panel and select the date. Either type in a new value, or use the arrow keys that appear when you highlight the date. You can also change the current system date by opening the Alarm Clock, clicking the date icon and changing it there. Because both methods use desk accessories, you can change the system date at any time. (For more on the Control Panel and the Alarm Clock DAs, see Chapter Four, under System DAs.)

DELETE

DELETE is commonly abbreviated DEL. This command is used to erase a file on the PC by changing the first character in the file's name to a special deletion character. Using one of the commercial or shareware undelete programs, you can often recover deleted files, though they will be written over in time.

Mac Equivalent: Drag to the Trashcan

On the Macintosh, when you want to delete a file, a folder or groups of files or folders, highlight the icons and drag them to the Trashcan. When the Trashcan icon changes color, release the mouse button.

If you attempt to drag any applications or folders containing applications into the trash, an alert box warns you and give you the opportunity to change your mind. To bypass the warning altogether, press the Option key while you drag the files or folders into the trash.

At this point, the files and folders will be removed from their current window, but will not be removed from the disk until you:

- Select Empty Trash from the Special menu.
- Leave the Finder by launching another application.
- Shutdown or Restart the Mac.

You can tell if the Trashcan contains any files because it bulges when full. If files have not already been removed from the disk, you can retrieve them by double-clicking the Trashcan. An ordinary Macintosh window opens, displaying the contents of the trash. Sometimes, however, if the Finder needs memory for some purpose, it may empty the trash; so it isn't a good idea to leave anything in the trash if you think you may change your mind.

You may also eject a disk from a floppy drive by dragging its icon to the Trashcan. The disk ejects and the icon disappears from the desktop.

DIR

DIR shows the contents of a directory. It shows the filename and extension, any subdirectory names, the size, and the creation date of the file.

Mac Equivalent: Various views of windows

On the Macintosh, files are automatically listed when you open a disk or folder icon. How they are listed depends on the current setting of the View menu options. If the View menu is set to display by Icon, or by Small Icon, then you will see all the contents of the current folder as icons. Only their names will display, though each icon clearly identifies what kind of file it is (the equivalent of the DOS file extension, but more accurate).

If you select by Name, by Size, by Date, by Kind, or by Color, the listing is sorted appropriately, and you will see a miniature file icon, the file name, the file size, file type, and most recent modification date and time.

You can also find out more about a file by selecting Get Info from the File menu.

In DOS, you can show the contents of another folder by executing the command DIR <foldername>. On the Mac, you must open a folder to display its contents (though most applications use the standard Open File dialog box which also lists the contents of any folder or disk).

DISKCOMP

DISKCOMP is used to compare the contents of two disks.

Mac Equivalent: None

DISKCOPY

DISKCOPY is the DOS command that copies the contents of one entire disk to another, formatting the disk if necessary.

Mac Equivalent: Drag icons

To copy a disk from one to another, simply drag the source disk icon to the destination disk icon. Since the Mac asks you to initialize (format) any uninitialized disk when you place it in the drive, the disk is assumed to be formatted.

If you want to copy the entire contents of a floppy drive onto a hard disk, simply drag the floppy icon to the hard disk icon (or into a disk window). You will be prompted that the two are different types of disks. The Macintosh will create a folder for the floppy disk, using the same name, and copy all the contents of the floppy into that new folder.

If you try to copy the contents of an 800K disk onto a 400K disk, for example, you will receive an error message saying there isn't enough room. This is one of the advantages of the Macintosh system.

EDLIN

EDLIN is the built-in DOS line editor. It can be used to create simple text files, batch files, and the like.

Mac Equivalent: TeachText

With later Mac systems comes a small application called TeachText that allows you to create simple text documents. The advantage of using it is that any other Macintosh will recognize the files it creates. Both EDLIN and TeachText files are ASCII files, and can be read by most word processors and other applications that use text.

ERASE

ERASE is functionally the same as DELETE.

EXIT

EXIT is used to leave a DOS shell.

Mac Equivalent: None

There is no shell used by the Mac. To leave any application or window in MultiFinder, you simply close the window. To leave temporarily, you can click in another window, click the MultiFinder icon at the upper right corner of the screen, or select another application from the bottom of the desk accessories menu.

FDISK

FDISK is used to partition a hard disk before formatting.

Mac Equivalent: HD Setup

Depending on the hard disk you are using, you will probably use the HD Setup program to set up your drive; however, it is not generally necessary to partition Mac hard drives since the Mac can recognize much larger drives than the PC (which, up until DOS 4.0, was limited to 32 megabytes). On the Mac, a single drive of 300 megabytes or larger is no problem.

FIND

FIND is the DOS command for searching one or more files for specified text strings.

Mac Equivalent: None

There is no built-in equivalent for the DOS FIND command, though third-party programs like GOfer and Sonar will perform wonders with text retrieval. The DOS FIND command is not the equivalent of the Mac Find File DA, which searches for a file by name. On the other hand, DOS has no built-in file locator command, though several fine shareware applications will perform that function.

FORMAT

FORMAT is used to prepare a disk to receive information. FORMAT can also label a disk and automatically create a system disk.

Mac Equivalent: Erase Disk

The Macintosh will not accept a disk that has not been properly initialized. When you place a blank floppy disk in the drive, a dialog box will ask you if you want to format it. You will receive the option of initializing as a single- or double-sided disk. Single-sided disks are 400K; double-sided disks are 800K.

After the disk has been successfully initialized, give it a name. You can rename a disk any time by simply placing the cursor on the disk title, highlighting the title, and then typing a new name.

If you want to reinitialize a disk that has already been used, select its icon on the desktop, then choose Erase Disk from the Special menu. You will receive the usual initialization options.

To create a system disk, first initialize it, then drag a System folder onto it. A system disk must have at least the System icon and either Finder or Mini-Finder. You can only start the Macintosh with a system disk (either a floppy or a hard disk).

GRAPHICS

The GRAPHICS command is used to dump an image to a compatible printer.

Mac Equivalent: Command-Shift-4

On the Mac, you can use the built-in key commands to dump screens and windows. Command-Shift-4 dumps the current window to the current printer. Command-Shift-Caps Lock-4 dumps the entire screen. Command-Shift-3 will dump the window to a MacPaint file on the desktop. These key combinations, however, do not work properly on the Macintosh II.

There are also various commercial products available for both systems that you can use to capture screen images to file or disk.

JOIN

JOIN is used to artificially create a directory (or assign an existing directory) to represent the files from another drive. For instance, entering:

JOIN A: C:\temp

will cause all files on the disk in drive A to be accessed through a subdirectory on C called \temp.

Mac Equivalent: None

KEYBXX

Use KEYBXX to define the current keyboard driver. DOS supports drivers for several foreign and domestic keyboard types.

Mac Equivalent: Various

You can order the Mac with a foreign keyboard, but many foreign characters

are available by using the Option key in combination with a letter key. Which characters are available varies from one font to another. To see what characters your fonts contain, select the Key Caps DA and look at the fonts on your system. With Key Caps active, press the Option key to see the alternate character set for any font.

LABEL

LABEL lets you add, modify, or view the label on a disk. The PC lets you have up to 11 characters to define a disk label.

Mac Equivalent: Type a name

On a Macintosh disk, you can change the label simply by highlighting the existing title under the disk's icon and retyping it. If you want to edit the label, simply place the cursor in the position from where you want to begin editing. The cursor should change to the vertical bar (the text cursor). Click and begin editing. If the disk's window is open, you'll see the new name echoed at the top of the window in the title bar.

MKDIR

MKDIR is often abbreviated MD. This command creates a new directory on the PC drive. The syntax is:

MD [d:]<path>

For instance, to create a new directory called newdir on the C drive, you would type:

MD C:\newdir

Mac Equivalent: New Folder

To create a new folder on the Mac, select New Folder from the File menu or press Command-N. A folder called Empty Folder will be placed on the desktop. It will still be highlighted, and you can give it a new name. You can also move it to a new location if you are displaying by icon.

MODE

MODE sets printer and screen parameters.

MODE also has other uses on other machines. For instance, on a Compaq machine, MODE is used to set several system-level parameters.

Mac Equivalent: Chooser, Control Panel

The closest equivalent to MODE can be found in the Chooser desk accessory

which lets you set the current printer, set baud rates for serial devices, choose the output port (modem or printer) for a device, and so forth. However, the screen setting side of the MODE command is best compared to the Monitors CDEV (control device) found in the Control Panel. This is found on the color Macs only, and allows you to set different video modes more or less the way MODE does in DOS.

MORE

MORE is actually a filter command that stops a listing of information after one full screen and waits for a keypress. It is usually used with the pipe symbol, for example:

TYPE <filename.txt> | MORE

Mac Equivalent: Scroll Bars

The Mac usually doesn't force you to try to read something as it scrolls by. Almost always, any listing that is too long (or too wide) to fit into one screen will be in a window with scroll bars that allow you to look at any part of the listing.

PATH

The PATH command sets the search path for DOS. For instance, if you issue the command:

PATH=C:\;C:\DOS

DOS will search first in the current directory, then in the root directory (C:\), and finally in the \DOS directory. PATH works with command and executable files (.com and .exe) as well as batch files (.bat). It does not search for data files. For that, you would use APPEND (see APPEND).

Mac Equivalent: Internal file handling

Though the Mac does not have a PATH command, it does know where everything is, and every file and folder has a path designation. For a more complete discussion of Macintosh path structures, see the listing for APPEND at the beginning of this section.

PRINT

PRINT sends the contents of a designated file to a printer. PRINT has quite a few command line options which can affect the meaning of the command. The PRINT command will print to a buffer to allow printing in the background.

Mac Equivalent: Print command on the File menu

The closest Mac equivalent of the PRINT command is the Print command on the File menu of the Finder. When you select Print from the File menu, it automatically opens the application for the selected file or files and initiates the print sequence. You can, therefore, highlight several files to print one after another. However, unless you have placed some specific spooler on your system, the printing will take place in the foreground. If your application is MultiFinder-friendly, it may print in the background if MultiFinder is active.

RECOVER

RECOVER is used to retrieve files from disks that have gone bad. You can RECOVER all files or selected ones from the disk.

Mac Equivalent: Disk First Aid and others

File recovery on the Mac can be a matter of using the correct tool. Disk First Aid may be able to repair a damaged disk and recover the files. If not, various third-party programs like MacTools, MacZap, Symantec's Utilities, and FEdit are all handy for such situations.

RENAME

RENAME is often abbreviated REN. It is used to RENAME a file or group of files (using wildcards). For instance, to RENAME all files with the .BAK extension to the same name with .DOC you would issue the command:

REN *.BAK *.DOC

If you attempt to rename a file to a name already taken in the current directory, you receive a DOS error message and the procedure is canceled.

Mac Equivalent: Type the new name

The Macintosh lets you name any file, folder, or disk icon simply by typing beneath the icon, or in the name portion of a text listing. Like DOS, if you attempt to use a name already in use in the current folder, the Mac will warn you and cancel the procedure. However, you can't rename more than one file at a time, as you can in DOS.

REPLACE

REPLACE is generally used to write new files over previous files of the same name. At any rate, the source files of a particular name will completely REPLACE the destination files of the same name in the designated directory.

Mac Equivalent: Drag

The DOS Replace command contains several command line options that make it able to do various things like prompt you before each replacement. The

Macintosh equivalent of this command is simply the icon dragging procedure. If you attempt to drag a file or group of files into another folder or onto another drive, the Macintosh first checks to see if there are any duplicated file names. If there are, an Alert box appears informing you that there are duplications and asking your permission to replace them. If you click OK, any duplicates will be replaced. Click Cancel to back out of the procedure.

RESTORE

RESTORE is used to transfer files than have been archived with the Backup command. You can designate specific files to recover, or do a full recovery.

Mac Equivalent: HDBackup

HDBackup lets you recover a single file or all files from archived disks. See BACKUP earlier in this section.

RMDIR

RMDIR is often abbreviated RD. It is used to remove a directory from a disk. You cannot remove a directory that still contains files or subdirectories.

Mac Equivalent: Trashcan

On the Mac, you drag a folder icon into the Trashcan to remove a directory. You can throw away any folder, empty or not, but if the folder contains any applications, an alert box will ask if you really want to throw away the applications in that folder. Click OK to continue, or Cancel to replace the folder on the desktop. Holding down the Option key while you drag the folder into the trash will bypass the warning message. Remember, you can remove folders containing only documents without getting a warning message.

SET

SET is used to equate one string with another in the background.

For instance, if an application usually looks for a file called Appsfile in the C:\Apps directory, and you have renamed that file Myfile, and moved it to D:\Mydir, you could use the SET command as follows:

SET C:\Apps\Appsfile=D:\Mydir\Myfile

Mac Equivalent: Internal file handling

On the Macintosh, there is no need to worry about environmental strings like those created by the SET command. The Mac takes care of all file searches and automatically recognizes files that belong to an application, wherever it is. Most applications also take care of placing and tracking their own temporary and special settings files (most often they are placed in the System Folder).

SORT

SORT can be used to reorder text information as well as directories. For instance, to sort the contents of a text file, Mixed.txt, and send the results to a file named Order.txt, you would issue the command:

SORT<Mixed.txt>Order.txt

To sort a directory listing, use:

DIR | SORT

Mac Equivalent: View by Name

The only function that is available on the Mac system that is analogous to the DOS SORT command is the View by Name function which will sort a listing of files alphabetically by name. This is the equivalent of the second command example given above. All other uses of the SORT command are not duplicated by the Mac system, though they may be available in specific applications.

SUBST

SUBST is used to assign a drive letter to a path. For instance, suppose you often refer to the directory C:\Mail\Incoming. Using the SUBST command, you could refer to it simply as F:, by entering the following command:

SUBST F: C:\Mail\Incoming

Mac Equivalent: None

There is no such path substitution available on the Mac, nor is one needed. See the discussions of APPEND and PATH, earlier in this section.

SYS

SYS is used to place the DOS hidden system files on a disk. You can then copy the Command.com file to complete the creation of a system disk.

Mac Equivalent: Copy System Folder

Generally, when you want to create a boot disk or system disk, you simply copy the System Folder to the desired location. However, if the System Folder is too large, you can create a system disk by simply copying the System icon and the Finder or Mini-Finder.

TIME

TIME displays and sets the internal time on a DOS machine. If the machine has an internal battery, the time remains set. If it does not, you will have to reset the time each time you reboot the computer.

Mac Equivalent: Control Panel, Alarm Clock

You can set the internal system time and date from the Control Panel DA or the Alarm Clock DA. To do so, click the appropriate display and then either type the new time, or use the arrows to move the entry up or down. You set each portion of the time (hours, minutes, seconds) separately. (See also, DATE.)

TREE

The TREE command displays a visual image of the directory structure of a DOS disk.

Mac Equivalent: None

There is no built-in hierarchical tree display for the Macintosh, though there have been some third-party programs that display such a tree structure.

TYPE

The TYPE command is used to display a scrolling listing of a text file on the PC.

Mac Equivalent: None

On the Mac, when you double-click a file, the application associated with it will open and display its contents. The closest equivalent to the TYPE command may be text editing desk accessories which can be used at any time to display the contents of text files. A very good one is McSink.

VER

VER is used to display the current DOS version being used.

Mac Equivalent: About the Finder

The About the Finder box will always display the current version number of the System and the Finder. In addition, the About box of almost any application will show its version number. Sometimes version numbers are found in the Get Info box.

VERIFY

VERIFY is used to always be sure that information written to a disk is accurate. It is turned on or off during a DOS session using the VERIFY ON and VERIFY OFF commands.

Mac Equivalent: None

VOL

VOL displays the current volume name (if any).

Mac Equivalent: Disk Icon

The volume name of any disk mounted on a Mac is displayed beneath its icon.

XCOPY

XCOPY copies all files and also all subdirectories and their contents, in the source path specified in the command. COPY does *not* copy subdirectories.

Mac Equivalent: Drag folder

When you drag a folder to copy it on a Mac, all sub-folders and their contents are automatically copied along with it.

OTHER FUNCTIONS

Warm Boot (RESET)

On the PC, to reboot the computer, either turn the computer off and then on again, or press Ctrl-Alt-Del.

Mac Equivalent: On the Macintosh, you must always select Shutdown from the Special menu to turn the computer off. On most Macintoshes, you can turn the computer off after the Shutdown process is complete and the message reads:

You may now switch off your Macintosh safely.

Click Restart to reboot; otherwise switch the computer off.

On the Macintosh II series, selecting Shutdown also turns the computer off.

To perform the equivalent of the PC's Ctrl-Alt-Del series, select Restart from the Special menu.

However, what happens if something goes wrong and your computer is locked? In that event, you have two choices:

- Turn the computer off, wait ten or fifteen seconds, then turn it on again.

  If you have to turn off the computer without using Shutdown, the Desktop file on any mounted drives (especially hard drives) must be rebuilt, so you will have to wait while the Mac attempts to rebuild the Desktop file for each mounted drive.

- Use the front part of the Programmer's Switch to reboot.

  The Programmer's Switch is located on the side of the machine (your left on most Macs; right on Mac IIs). The Desktop file for each mounted drive will be rebuilt. The Programmer's switch can be used to allow code insertion into a debugger window. It is possible to send internal codes through the debugger window to return to the Desktop in cases of a system lockup. Using the internal code is not highly recommended unless you know what you are doing. There is a possibility of damaging files under some circumstances. But if you are sure that no files will be affected, using this method will sometimes take you back to the Desktop without having to reboot.

Print Screen

Pressing Shift-PrtSc on a PC dumps the current screen image to an on-line printer. Whether the image prints intelligibly depends largely on the kind of printer you are using and the kind of screen being dumped.

On the PC, there are several fine screen capture utilities, too: for instance, Imcap, Hijaak, and Hot Shot.

Mac Equivalent: On a Mac, you can dump the screen image to the printer by pressing Command-Shift-4. However, you can also dump a screen or current window to a MacPaint file on the Desktop using Command-Shift-3 (current window) or (whole screen). The resulting MacPaint files are named Screen0 to Screen9.

These internal commands work on Macs up to the Mac II. On the Mac II, at least so far, you must use a third-party screen capture program, like Capture, which will let you make a file of any portion of a screen, in color or black and white. Capture even works with large screens.

Another excellent utility for capturing screens on Macs (other than the Mac II) is Camera. Camera has two main advantages over the Command-Shift-3 combination. First, it lets you capture up to 100 screens in a single session (as opposed to only 10 for the internal key command) by numbering them Screen00 to Screen99. Second, you can actually place a delay on the screen

capture, allowing you to capture processes like open menus and modal dialog boxes where you can't press the internal key combinations. This gives you a much greater range of choices.

Help Key

PC applications usually use the F1 function key to access on-line help subjects.

Mac Equivalent: The Macintosh Extended keyboard has a key labeled Help. This key does not have a function at the Finder level, but some applications use it to open help dialog boxes. Ordinarily, help systems for Macintosh applications are found in the About box (the About DA); some applications use Command-?.

Function Keys

The Function keys (F1-F10 or F1-F12) on a PC are used for many things, both at the DOS command line and within applications. Most Mac keyboards do not have function keys, and therefore most Mac applications do not use them. A few programs, notably programs with DOS counterparts like WordPerfect for the Mac, can use the function keys on the Macintosh Extended Keyboard, which is almost identical to a newer IBM AT keyboard.

Mac Equivalent: On the Mac, there are special programmable keys, called Fkeys. The Command-Shift-4 used to dump the screen to a printer is an Fkey, and there is space for up to ten Fkeys concurrently on a Mac. There are two other Fkeys that come with the System—Command-Shift-1 and Command-Shift-2. The former ejects any disk in the first (internal) floppy drive on any Mac. The latter ejects a floppy disk from an external, or a second floppy drive. The preferred method of ejecting disks, however, is to drag them into the Trashcan.

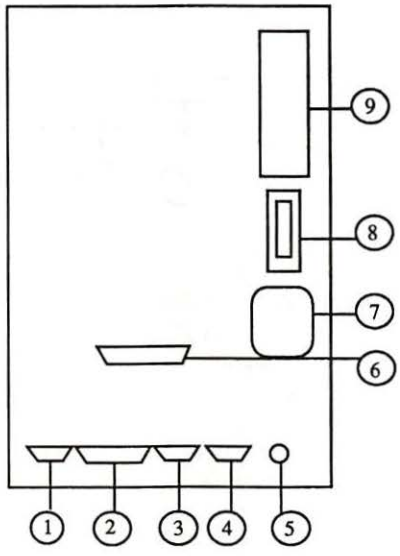
Normally, Fkeys are installed using special programs, and all are supplied by third-party manufacturers. Many of them are shareware products.

If you are just beginning with the Mac, you probably won't want to get too involved with Fkeys. They can be unreliable, and it is also possible that they will interfere with the operation of some applications or other System utilities. Fkeys are generally safe and easy to use, but it is best to become familiar with the Mac before attempting to use them.

B

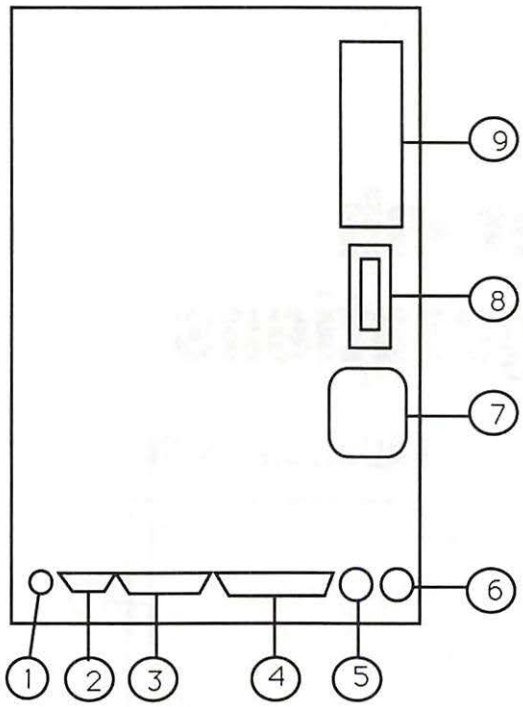
Macintosh Configurations

MACINTOSH 512K



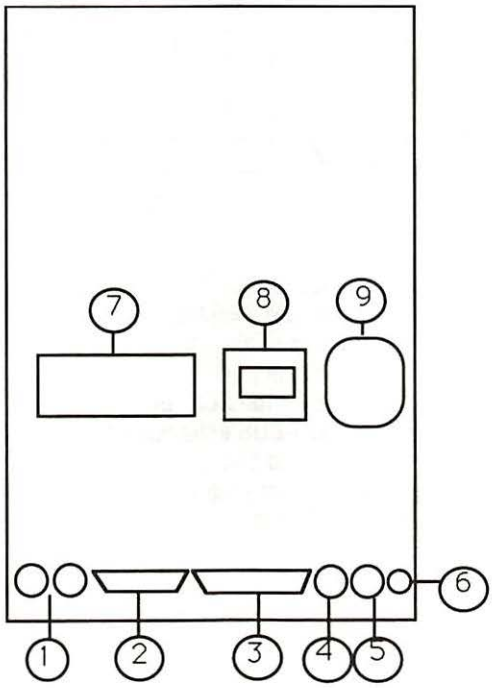
1. Mouse connector
2. External floppy drive controller
3. LocalTalk port
4. Serial port
5. Sound plug
6. External SCSI port
7. Power plug
8. Power on switch
9. System battery

MACINTOSH PLUS



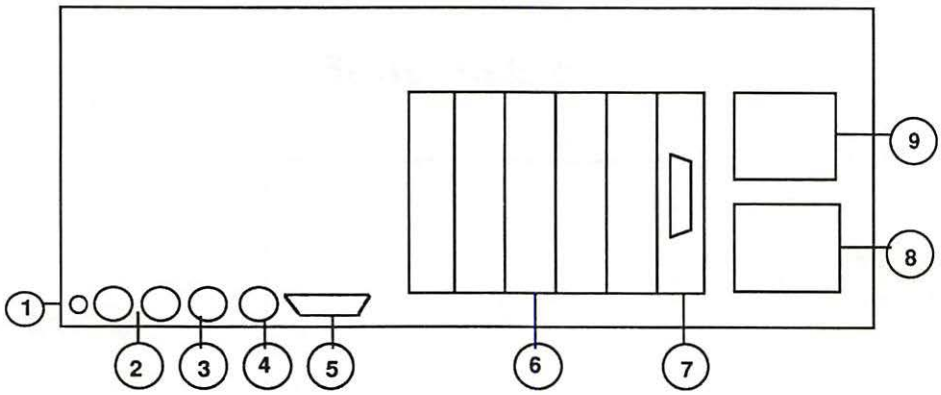
1. Sound port
2. Mouse connector
3. External floppy drive port
4. External SCSI port
5. LocalTalk port
6. Serial port
7. Power plug
8. Power on switch
9. System battery

MACINTOSH SE



1. Apple Desktop bus ports (ADB)
2. External floppy drive connection
3. External SCSI port
4. LocalTalk port
5. Serial port
6. Sound jack
7. Opening for option board
8. Power plug
9. Power on switch

MACINTOSH II



1. Sterephonic sound jack
2. Apple Desktop bus ports (ADB)
3. LocalTalk port
4. Serial port
5. External SCSI port
6. NU-BUS expansion slots (6)
7. Video board
8. Power plug (in)
9. Monitor power plug (out)

C

Sources

The following listing is of products and companies that are referenced, discussed or suggested throughout this book. It is not intended to reflect the authors' personal preferences.

Chapter 1

DeskScene
PBI Software, Inc.
1163 Triton Drive, Foster City, CA 94404
(415) 349-8765
Desktop screen customization utility

Chapter 2

DiskOrder
Paragon Concepts Inc.
4954 Sun Valley Road, Del Mar, CA 92014
(619) 481-1477
Disk file organizer

Disktop
CE Software
P.O. Box 65580, W. Des Moines, IA 50265
(515) 224-1995
File management utility

HyperCard
Apple Computer, Inc.
20525 Mariani Avenue, Cupertino, CA 95014
(408) 996-1010
Hypertext application development system to allow customization and creation of information cards and stacks

HyperDA
Symmetry Corporation
761 East University Drive, Mesa, AR 85203
(800) 624-2485
Desk Accessory to access Hypercard stacks

MacTree
Software Research Technologies
22901 Mill Creek Rd., Suite B, Laguna Hills, CA
(714) 472-0474
Hard disk management program

Chapter 5

dBASE Mac
Ashton-Tate Corporation
20101 Hamilton Avenue, Torrance, CA 90502-1319
(213) 329-8000
Database system for the Macintosh

Framework III
Ashton-Tate Corporation
Integrated software package for the DOS environment

Full Impact
Ashton-Tate Corporation
Full-featured spreadsheet with graphics and language capabilities for the Macintosh

FullWrite Professional
Ashton-Tate Corporation
WYSIWYG word processor for the Macintosh

Microsoft Excel
Microsoft Corporation
16011 NE 36th Way, Box 97017, Redmond, WA 98073
(206) 882-8080
Spreadsheet with graphics for the Macintosh

Microsoft Word
Microsoft Corporation
Word processor for the Macintosh

MultiMate Advantage II
Ashton-Tate Corporation
Word processor for the DOS environment

1-2-3
Lotus Development Corporation
161 First Street, Cambridge, MA 02142
(617) 577-8500
Spreadsheet for the DOS environment

WordPerfect
WordPerfect Corporation
288 W. Center Street, Orem, UT 84057
(801) 225-5000
Word processing package for the PC, Xenix, and the Macintosh

Chapter 6

Apple MIDI Interface
Apple Computer, Inc.
Connection kit to allow MIDI devices to connect to the Macintosh

Grappler
Orange Micro Inc.
1400 N. Lakeview Avenue, Anaheim, CA 92807
(714) 779-2772
Serial-to-parallel printer connection kit

Mega Screen Displays
Mega Graphics Inc.
20954 Osborne Street, Canoga Park, CA 91304
(818) 407-0571
Extra-large monitors and display capture devices

Radius Displays
Radius, Inc.
404 E. Plumeria Drive, San Jose, CA 95134
(408) 434-1010
Full-page, two-page, and gray-scale monitors

Universal Print Buffer
Johnathon Freeman Designs
P.O. Box 880114, San Francisco, CA 94188
(415) 822-8451
Printer converter and buffering device

Chapter 7

Apple PC Drive, AppleShare, AppleShare PC, AFE
Apple Computer
Apple communications and data transfer offerings

DaynaFile, MacCharlie
Dayna Communications
50 South Main Street, Suite 530, Salt Lake City, UT 84144-9901
(801) 531-0600
Disk drive units to allow PC-to-Mac data sharing

LAP-LINK Mac
Traveling Software
North Creek Corporate Center
19310 North Creek Parkway, Bothell, WA 98011
(206) 483-8088
Connection kit to allow for serial connection between a Mac and a PC

Mac Link Plus
AFE Translators
DataViz, 16 Winfield St., Norwalk, CT 06855
(203) 866-4944
Data conversion software package

Mac286
AST Research, Inc.
Apple Products Division
2121 Alton Ave., Irvine, CA 92714
(714) 553-0340
80286 Co-processor board to allow DOS software to operate on a Macintosh

MatchMaker
Micro Solutions, Inc.
132 West Lincoln Hwy., DeKalb, IL 60115
(815) 756-3411

Netware for Macintosh
Novell, Inc.
122 East 1700 South, Provo, UT 84601
(800) 453-1267
LAN support software to support Macintosh on Novell-based networks

Red Ryder 10
FreeSoft Company
150 Hickory Drive, Beaver Falls, PA 15010
(412) 846-2700
Communications package

Sidekick Plus
Borland International
4585 Scotts Valley Drive, Scotts Valley, CA 95066
(408) 438-8400
Memory-resident desk accessories for the PC

3Plus for the Mac
3Com Corporation
3165 Kifer Road, Santa Clara, CA 95052-8145
(408) 562-6400
LAN system for PC, Macintosh, and other systems

TOPS
A SUN Company
2560 9th St., Suite 220, Berkeley, CA 94710
(415) 549-5900
LAN system for PC and Macintosh systems

Chapter 8

AppleLink Personal Edition
Apple Computer, Inc.
On-line information service

CompuServe
CompuServe Information Services, Inc.
P.O. Box 20212, 5000 Arlington Center Bldg., Columbus, OH 43220
(614) 457-0802
On-line information service

DESQview
Quarterdeck Systems
150 Pico Blvd., Santa Monica, CA
(213) 392-9851
Window and multitasking system for the DOS environment

GEnie
General Electric Information Services
401 W. Washington Street, Rockville, MD 20850
(800) 638-9636
On-line information service

MacNet
Connect, Inc.
10101 Bubb Road, Cupertino, CA 95014
(408) 973-0110
On-line information service

MCIMail
MCI Telecommunications Corp.
1150 17th Street NW, Washington DC, 20036
(800) 444-6245
On-line information service

Source, *The*
Source Telecomputing Corporation
1616 Anderson Road, P.O. Box 1305, McLean, VA 22102
(800) 336-3366
On-line information service

G

Glossary

active window

The window that is in use on the desktop. It is identifiable by its visible title and scroll bars.

alert

A warning or report of an error, usually in the form of a system beep or an alert box with a message.

Apple Desktop Bus (ADB)

A low-speed serial port that is used on the Macintosh SE, Macintosh II, and Macintosh IIx to connect the keyboard, mouse and specially designed peripherals.

Apple Sound Chip (ASC)

A proprietary component used in the Macintosh II to support high-level sound capability.

AppleTalk

The local area network communications facility built into the Macintosh that allows data exchange with other intelligent devices.

asynchronous communicatons

A method of communicating between remote devices in which the receiving device and the sending device don't share a common timer.

audio port — The sound port on the Macintosh that makes sound generation possible; it is connected to the speaker or to the 1/8-inch audio jack.

A/UX — Apple Computer's implementation of UNIX for the Macintosh.

baud — A unit of measure in communications. Generally the number of signal events per second.

beta software — Software that is being distributed for testing, but not yet commercially available. It has become a more accepted practice recently to release beta software to the general public. Be careful, however, as system-damaging bugs have been known to occur.

bit — A contraction of *binary digit*. A unit of data, representing either a positive signal (1) or a negative signal (0). One character usually takes up eight bits, or one byte.

bit-map — A series of bits that represent a two-dimensional surface. In the case of bit-mapped displays, one bit in memory represents one pixel on the display.

boot up — Start-up; the initialization sequence for the computer. In the case of the Macintosh, boot up consists of loading specific operating data, loading special device drivers and INIT files and building the Desktop.

bulletin board — An on-line sysem (usually dialed into over modem lines), when clicked for the purpose of electronic messaging and file transfers.

button — A feature that, when clicked, causes some action to occur.

byte — A sequence of eight bits which generally makes up one character.

C — A high-level programming language that is easily movable between various systems. Software companies are quickly standardizing on C to allow quick portability between different hardware platforms.

Cancel — An option in most dialog boxes that allows termination of a task or activity and returns the user to the prior position.

character style — A set of type styles, such as bold, italic, and underline. Most software packages use Command-key equivalents for easy access to these styles.

check box — A standard control feature associated with an option in a dialog box. Displays on or off by a check or X in a box.

Chooser — An Apple desk accessory that allows users to select printers.

Clean Up — An option in the Finder Special Menu to reorganize folder entries into a more legible format.

Clipboard — A buffer area to hold objects that have been cut or copied in memory for pasting into another location; used by most applications.

close box — The box in the upper-left-hand corner of an active window that is used to close the window. If the work in the window has not been saved, an alert box will usually appear to prompt the user to save.

color picker — A CDEV that allows a Macintosh II user to select colors.

command key

A special key to the left of the space bar. It is used in conjunction with other keys to send command shortcuts to the system and also in combination with the mouse to drag windows.

command line interface

The standard interface of the DOS environment. The entry point is identified by a command line prompt such as C>.

Control Panel

A desk accessory that allows users to set general operating conditions of their system; such as mouse speed, sound level, and cursor blink rate.

cursor

The symbol, or flashing point, that indicates current working location. On the Macintosh, it is generaly identifiable as the *mouse pointer.*

Cut

To remove data from one location to be stored for use in another location. Not to be confused with Clear, which erases the selected area.

data-fork

The section of the file that contains information to be accessed by the File Manager. Genrally, this is the location for user-generated data.

default

A preset choice offered by the software. In the case of a default button, pressing the Enter key initiates the action specified.

desk accessory

An accessory program that can be accessed from the Apple menu while an application is active. Some examples are the Calculator, the Alarm Clock, and the Chooser.

Desktop

The primary menus and visual interface displayed; the working environment.

dialog box — A window that requests user input, generally appearing after a command is issued.

dimmed choice — Indicates a menu choice is not currently available for selection.

document — Any information or text that is stored in a file to be accessed by an applicaton. A document may be made up of text or graphics.

dot-matrix — A method of printing in which the character is formed by several pins on the printhead striking the paper in a pattern to create the image. The ImageWriter printers from Apple are dot-matrix printers.

double-clicking — Pointing the mouse pointer at an object and clicking the mouse button twice rapidly to activate a choice or initiate an event.

edit — To change or modify information in a document.

enter key — A key that usually confirms a command or initiates an event. Has the same effect as double-clicking.

fat bits — A graphic editing option that presents sections of the graphic in enlarged detail to allow precision editing.

Finder — The part of the Macintosh operating system that manages the desktop and the file services.

folder — A collection of applications and/or documents. Similar to a directory in the DOS environment.

font — A complete character set in a single typeface consisting of different styles and sizes.

Font/DA Mover — An application used for installing or removing fonts or desk accessories from the system file.

graphic — An image or picture type of document.

HFS — The Hierarchical File System. A file system that allows multiple levels of folders.

highlight — To make an object visually distinct on the screen to indicate a selection. Usually identifiable by inverting the object image.

I-beam — A mouse pointer shaped like the capital letter "I"; used with text handling to indicate the text insertion point.

icon — A graphic image representing an object. The folder, trashcan, and file page are all icons.

initialize — To format a disk to allow data storage and retrieval.

justification — The horizontal placement of lines of text relative to the vertical boundaries of the text insertion area.

keyboard macro — A software enhancement in which a series of keystrokes, mouse selections, or text insertions are mapped to a command keystroke.

Local Area Network (LAN) — A series of intelligent devices linked together via communications devices that allow for transfer of information from one device to another.

locked file — A file whose data may not be copied or changed.

Macintosh Programmer's Workshop (MPW) — Apple's software development system for the Macintosh programmers.

menu — A listing of choices or items to be selected by the user. Dragging a mouse over the menu and releasing or clicking the mouse button on a menu item chooses the menu command.

menu bar — The line at the top of the screen that lists available menus.

modem — A peripheral device connected through the serial port to allow communications between computers over phone lines.

MultiFinder — A version of Finder that allows more than one application to be open and active at one time.

Note Pad — A desk accessory that allows small amounts of text to be stored or cut and pasted for use in other documents.

NuBus — The data handling design internal to the Macintosh II and Macintosh IIx. NuBus is a trademark of Texas Instruments.

open — To activate a folder, application, icon, window, or document for use.

Option key — A special key on the Macintosh keyboard. It is used in conjunction with other keys or with the mouse to produce special characters or symbols, or give different meanings to mouse actions.

paste — To place information that has been cut or copied from one marked location into another location.

pixel — An individual dot on a screen.

pointer — The item on the display that marks the current position of the mouse. The pointer can be shaped like an arrow, an I-beam, a crossbar, or a wristwatch. See also *cursor*.

pull-down menu — On the Mac, a set of menu choices that are displayed by positioning the mouse pointer on the menu name, pressing the mouse button, and dragging the mouse to reveal menu commands. Items are chosen by positioning the pointer on the menu command and releasing the mouse button.

Random Access Memory (RAM) — Memory that can be written to and read from many times. RAM stores information only while the user works on it. Usually called volatile memory, as items in RAM are available only as long as the system is turned on.

Scrapbook — A desk accessory used to store data that is cut or copied for future use. Similar to the Clipboard except that images in the Scrapbook are stored on disk.

scroll — To move the display of information within a window to show contents that may not be visible.

select — To choose an item or event. Generally, items are selected by double-clicking the mouse button on the item to be activated.

Standard In-line Memory Module (SIMM) — A memory expansion module used in some Macintosh systems and the IBM PS/2; consists of memory chips on a small printed circuit board that installs in special SIMM slots on the system board.

size box — The small overlapping boxes in the lower right-hand corner of the window. Used for adjusting the size of the window.

text — Any grouping of characters, generally in the form of letters or numbers.

title bar — The top bar of a window, which displays the title, close box, and zoom box.

Undo — Used to reverse the last action initiated. Undo is often used for recovering accidentally erased information.

windows — The frame used to display a document or application.

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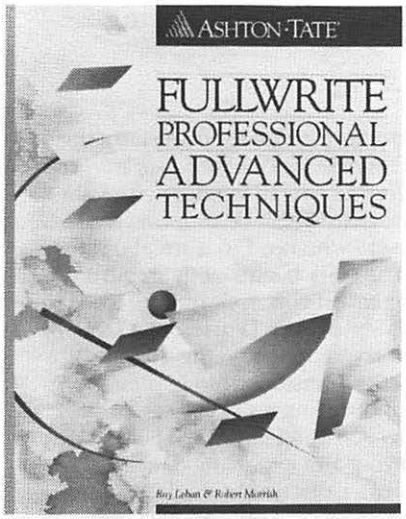

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By Roy Leban & Robert Morrish

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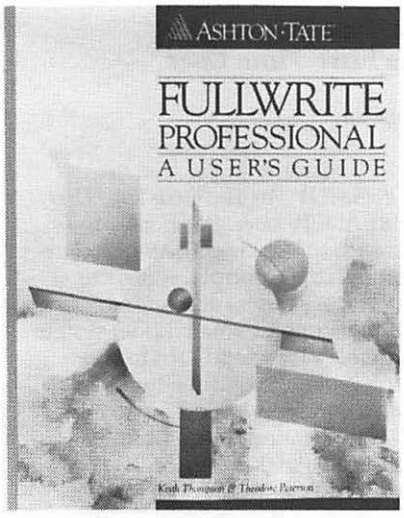

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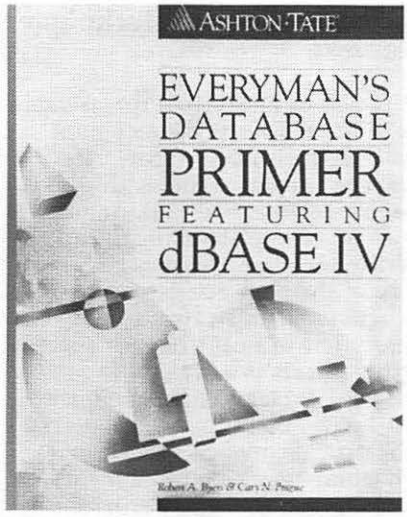

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Illustrated by Catherine Ledbetter

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This book also provides valuable insights into software, hardware and peripherals, and data-sharing options for the Mac. The final chapter offers a glimpse at likely future developments for the Mac.

About the Authors

Rusel DeMaria is a freelance writer and MS-DOS Editor for *Macazine,* U.S. Insight columnist for *Nikkei Byte* in Japan, and Associate Editor for *Computer Play Magazine.* He is the co-author of *Working with dBASE Mac* and *Public Domain Software and Shareware.* He lives on the island of Maui.

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