2nd Edition

DOS WORKBOOK and DISK



Beginner's Guide to DOS 3.X & 4

Book & Disk Set

Step-by-Step Lessons

Hands-on Examples & Exercises

que®

DOS Workbook and Disk

2nd Edition

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Revised for DOS V4.x by
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DOS Workbook and Disk, 2nd Edition.

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Equipment You Need for the Lessons in This Book

To make full use of this workbook, you need the following hardware and peripherals:

- IBM PC, PC XT, Personal Computer AT, PS/2, or an IBM-compatible machine that uses the DOS operating system
- 128K of RAM, minimum
- Two floppy disk drives or one floppy and one hard disk drive
- An 80-character display monitor
- PC DOS, Version 3.3 or 4.0. (**Note:** Versions 3.0, 3.1, and 3.2 have the features needed for most of the lessons. Corresponding versions of MS-DOS also can be used for most of the lessons.) Lessons 10 through 13 apply only to DOS Version 4.0.
- Blank disks suitable for use with your system, with labels
- A printer that prints 80 characters per line hooked up to your computer (optional but recommended)

The examples in this workbook were created using PC DOS Version 3.3 and, where applicable, Version 4.0 on a 386-based AT-compatible computer system.

Lesson Disk Contents

The files on the lesson disk are stored in subdirectories by lesson number. When you ask for a directory of this disk, you see the following:

```
A>dir B:
Volume in drive B is DOSPRACTICE
Directory of B:\

LESSON5         <DIR>   09-01-89       5:20p
LESSON8         <DIR>   09-01-89       5:21p
LESSON9         <DIR>   09-01-89       5:26p
LESSON15        <DIR>   09-01-89       5:21p
LESSON16        <DIR>   09-01-89       5:34p
LESSON17        <DIR>   09-01-89       5:22p
          6 file(s)   319488 bytes free
```

This message tells you that the volume label for this disk is DOSPRACTICE and that the disk contains several subdirectories. Each subdirectory is named for the lesson with which the subdirectory should be used. In the subdirectories are the files to be used with the specified lessons in the *DOS Workbook and Disk*, 2nd Edition.

Introduction

As the user of an IBM Personal Computer (PC), an IBM PC XT (XT), an IBM Personal Computer AT (AT), an IBM Personal System/2 (PS/2), or an IBM-compatible machine, you have a powerful tool. Most likely, you acquired your computer to run applications programs like word processing, spreadsheets, or accounting. But do you know that the system itself has many powerful capabilities that can be used independently of applications software?

All computers require a program that takes care of basic functions. This program is called an *operating system*. Different kinds of computers use different kinds of operating systems: a mainframe computer does not use the same kind of operating system that your personal computer does. Most microcomputers use some version of the *disk operating system* (DOS). The first version of DOS was MS-DOS (from Microsoft Corporation); IBM customized MS-DOS for the IBM Personal Computer, and even though it was functionally the same as MS-DOS, it came to be called PC DOS. Because these versions of DOS are almost identical in their functionality, people have come to refer to either or both of them simply as DOS. You can use either of these versions with this workbook; where there are differences between the versions, the text makes this clear.

The purpose of this workbook is to teach you how to use DOS. The workbook provides both background information about DOS and hands-on experience in using DOS commands. The book was written primarily for DOS Versions 3.1, 3.2, 3.3, and 4.0 users, and it contains instructions for PC, XT, AT, and PS/2 users. This workbook can be used independently or with *Using DOS*, by David Solomon, if you want more background information. The workbook can be used as individualized instruction or in a classroom as part of large-group instruction.

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What Is PC DOS?

DOS is a collection of software programs that loads into the computer's RAM (random-access memory), and calls on other programs that are stored in the computer's ROM (read-only memory) for assistance. The operating system helps manage the microcomputer's resources (the system board, disk storage, printers, keyboard, display, and so on) and direct the fundamental operations of the computer. Like all operating systems, DOS gives you control of your computer. Without an operating system, a computer is a useless piece of hardware. With an operating system, you can interact with the computer and tell it what to do.

What Is DOS Version 3.3?

DOS Version 3.3 is a recent edition within the third major revision of DOS. DOS Version 3.3 provides all the primary functions and enhancements of DOS Versions 2.0, 2.1, 3.0, 3.1, and 3.2 as well as new features and commands.

DOS Version 3.3, like Version 3.2, supports both 3 1/2-inch and 5 1/4-inch disk drives. Each version of DOS V3.3 comes with two disk formats: two 5 1/4-inch 360K disks or one 3 1/2-inch, 720K disk.

New features unique to DOS Version 3.3 include the following:

- Support for faster disk access and file searching
- An increase in floppy disk storage
- Support for extended country information
- Enhancements in modifying file attributes
- Faster, easier, and more efficient backup and file restoration support
- Greater flexibility in using batch-file commands
- Support of time and date functions in both system and permanent clocks
- Support for international keyboard configurations

New functions and features provide greater sophistication and flexibility for DOS Version 3.3. As a result of the additional functions and features, however, Version 3.3 occupies more memory space than earlier versions.

What Is DOS Version 4?

DOS Version 4.0 and 4.01 (referred to as V4) is the latest version of DOS. It is an enhancement to earlier versions of DOS. Most significantly, it includes a DOS Shell program that allows you to use the keyboard or mouse to "point and shoot" DOS

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commands offered on a menu. A command is started by highlighting (pointing to) the desired command and selecting it (shooting) by pressing a button on the mouse or a key on the keyboard. This menu-style interface allows you to access the most common commands without having to learn a large number of commands.

Other enhancements to DOS V4.0 include an automatic installation program and device drivers that can provide expanded memory conforming with the Lotus Intel Microsoft (LIM) 4.0 Expanded Memory Specification (EMS) on your suitably configured computer.

How Is DOS Organized?

DOS is organized into three parts:

The input/output system

The command processor

The utilities

Figure I.1 shows the various layers of DOS. At the core is the computer hardware itself, and each layer is built on this base. As a user, you are outside these layers and interact with the outermost layer when you use DOS commands. DOS, in turn, interprets the commands and passes the necessary information to the next layer closer to the core and back out again until your command is completed.

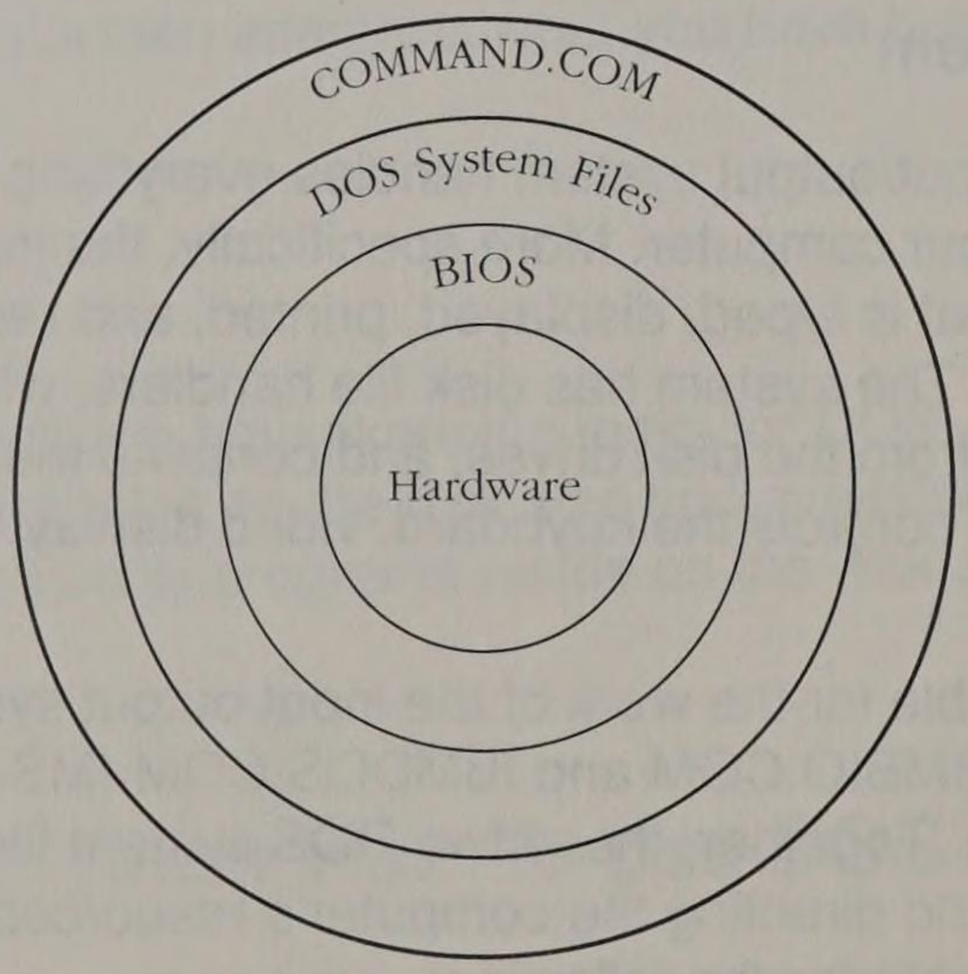


Fig. I.1. *The layers of DOS.*

As shown in figure I.2, DOS V4 adds an additional layer of software between you and the fundamental parts of the computer.

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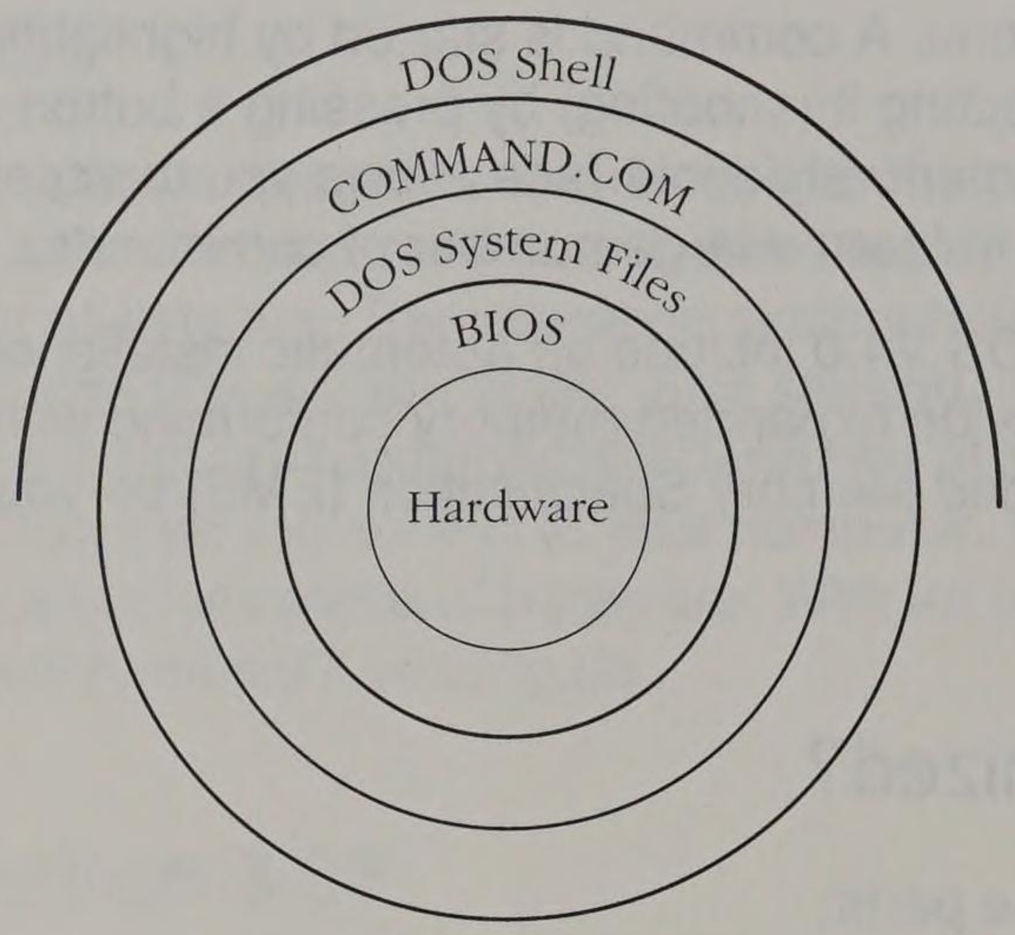


Fig. I.2. *The layers of DOS V4.*

If you are running an application program, such as a word processor or spreadsheet, the program communicates with DOS for you. When you instruct DOS to run a program for you, say, to copy a diskette, you are actually interacting with the command processor (COMMAND.COM). The command processor in turn uses the input/output system to control the disk drive and perform the copy command.

The Input/Output System

As its name implies, the input/output system handles everything that comes into (input) and goes out of (output) your computer. More specifically, the input/output system handles every character that is typed, displayed, printed, and received or sent through communications adapters. The system has disk file handlers, which store and retrieve programs and information from the disk drives, and contains the nondisk peripheral handler—the software that controls the keyboard, video display, communications, and similar devices.

Two disk files are responsible for the work of the input/output system of the microcomputer systems: IBMBIO.COM and IBMDOS.COM (MS-DOS calls these IO.SYS and MSDOS.SYS). Together, these two DOS system files provide a unified set of routines for controlling and directing the computer's resources. Among other things, these two files are responsible for the following:

- Creating files
- Writing information into files
- Reading information from files

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- Changing the names of files
- Listing the names of files
- Listing the size of files
- Removing files
- Loading and running programs
- Handling the hierarchical directory system

These files work in association with special read-only memory (ROM) situated in the computer itself. ROM contains programs collectively called the Basic Input Output System, or BIOS.

The input/output system of DOS does the hard work for you. All you have to do is learn to tell DOS what you want done. The lessons in this workbook have been specifically designed to teach you to communicate with DOS.

The Command Processor

The command processor, or command interpreter, is the program with which you communicate. This program, in turn, tells DOS what function to perform. The name of the disk file responsible for these activities is COMMAND.COM.

COMMAND.COM prints the system prompt (A>) on the screen when you begin DOS. When you type a command after the A>, you are communicating with COMMAND.COM, which then interprets what you have typed and takes appropriate action.

The Utilities

The utility programs perform housekeeping tasks for DOS. Utilities format diskettes and hard disks, give statistics on the disk size and available memory, and compare diskettes and files. The utility programs reside on the disk and are loaded into memory for use.

Why Should You Know How To Use DOS?

As a computer user, you will find that the more you know about your disk operating system, the more useful your computer will be. Certain DOS functions are absolutely essential to all computer users; for example, you cannot use your computer without knowing how to boot and format disks. Other DOS functions, like copying files and diskettes, calling up a directory, and renaming files make your life as a computer user

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much easier. If you don't know how to make backup copies of important disks, you risk losing important information through loss or damage. Learning the simple copying process and taking the time to back up disks may save you hours of work and frustration in the long run. Knowing some of the more advanced functions of DOS—especially the functions that are unique features of Versions 3.x and 4.x —will develop your knowledge of the system, as well as save you time and work.

Who Should Use This Workbook?

The *DOS Workbook and Disk* is written for a number of different users with varying levels of experience, including the following:

- Both beginning and experienced users of PC DOS and MS-DOS. This workbook is divided into three major parts. Part I introduces the novice user to basic DOS functions: booting, formatting, erasing, and copying. Part II introduces the features of the DOS Shell program supplied with DOS Version 4.0. Part III builds on the knowledge gained in the previous sections and enhances basic DOS skills by introducing more complex DOS features like I/O redirection and piping, batch files, and hard-disk backup procedures.
- Both individual users and instructors of group sessions. This workbook is designed to be used as an individualized instruction guide for those interested in learning more about DOS on their own, as well as a training manual for group seminars or workshops. (An *Instructor's Guide* is available for those using the workbook for group instruction.)
- Users of DOS-compatible applications programs. This workbook is especially helpful if you use programs like 1-2-3 and Symphony, which have the capability of incorporating DOS functions.
- Business and industrial training personnel and other instructors who need training for introducing DOS.

How To Use This Workbook

As an introduction to DOS, this workbook provides both practical background information and hands-on practice in using DOS functions. This book features the following:

- Introductory descriptions of each function, including definitions and explanations of applications
- Detailed and easy-to-follow steps for performing each DOS function
- Figures showing actual screen shots

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- Additional exercises for practice, including specially designed exercises to explain what to do when you make mistakes
- A summary of key concepts at the end of each lesson
- References for further reading in *Using DOS*, by David Solomon
- Appendixes containing additional information

The 17 lessons in this workbook are divided into three major parts. Part I, "What Every User Should Know," contains 9 lessons for the beginner. The sequence of the lessons in this first section duplicates as closely as possible the process by which a beginner learns DOS.

If you are a beginning computer user or a newcomer to the DOS operating system, you may want to work systematically through the first 9 lessons in order. If you are already familiar with some of the DOS functions presented in the first 9 lessons, you may choose to work through only the lessons or parts of lessons with which you are not familiar.

Part II, "Essential DOS Shell Features," introduces the newcomer to DOS V4.0 to the functions found in the DOS Shell program supplied with DOS V4.0. If you are using an earlier version of DOS, you can omit the lessons in this section. However, if you have V4.0, this section leads you through the four most significant aspects of the DOS Shell.

Part III, "Enhancing Your DOS Skills," contains lessons on some of the more advanced DOS procedures, such as backing up the hard disk (without using the DOS V4.0 Shell), setting up batch files, and using I/O redirection and piping. If you are an experienced DOS user already familiar with the basic DOS functions in Lessons 1 through 9, you may want to work through Lessons 14 through 17 in the order you choose.

In working through the individual lessons in the book, you should first read the overview of the DOS function, presented at the beginning of the lesson; then follow the step-by-step instructions for executing the function. Use the summary at the end of the lesson to review the major concepts presented in the lesson. For additional practice and review, review questions or exercises are provided at the end of most lessons. After you have worked through a lesson systematically from beginning to end, you should have a basic understanding of that DOS function as well as the skill and confidence to use that function in the future.

How To Use the Lesson Disk

The disk packaged with this workbook is designed for use with the *DOS Workbook and Disk*. The workbook describes all exercises in detail and should be used as the

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primary source of documentation for the lesson disk. This disk contains only the exercise files and not DOS itself.

The lesson disk can be used on an IBM PC or any compatible that uses DOS and has at least 128K of RAM and at least one disk drive.

All lessons were developed on a microcomputer system with 640K of RAM, an 80-character monochrome display, and two disk drives.

Before using the lesson disk, be sure to make a backup copy by using the DISKCOPY command, as described in Lesson 3 of the workbook. Make a backup copy so that the original disk stays intact for your future use and review. This safeguard protects you in case of loss or damage to your backup copy.

Creating a Bootable DOS disk

As you work through this workbook, you will, at the beginning of each exercise, be asked to start your computer using the *DOS Working Disk*. This section gives you instructions for creating your *DOS Working Disk*. Refer to the correct section for the version of DOS that you have.

DOS V3.0 through V3.2

Follow these steps to create a bootable disk:

1. Place the disk labeled *DOS* in drive A and turn on the power to your computer.
2. Enter the current date and time.

   If the date is March 13, 1990, type **3-13-90** and press Enter. If the time is 1:13 P.M., type **13:13** and press Enter. Time is entered in military hours.
3. Label a blank disk *DOS Working Disk*.
4. Type **FORMAT B:** and press Enter.
5. Place the disk labeled *DOS Working Disk* in drive B and press Enter.

   If you only have one floppy disk drive, when prompted to `Insert new diskette for drive B and press ENTER when ready`, remove the DOS disk, insert the *DOS Working Disk*, and press Enter.
6. When prompted `Format another (Y/N)?`, type N and press Enter.

   If you have only one floppy disk drive, remove the *DOS Working Disk* and place the *DOS* disk back in drive A.
7. Type **DISKCOPY A: B:** and press Enter. Press Enter again at the prompt `Press any key when ready.`

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If you have a system with one disk drive, you are prompted to place the target disk in drive A. Place the *DOS Working Disk* in drive A at that prompt and press Enter.

8. When asked `Copy another diskette (Y/N)?` type N and press Enter.

   Your *DOS Working Disk* is ready for use.

DOS V3.3

Follow these steps to create a bootable disk:

1. Place the 5 1/4-inch *DOS Startup* disk (or the 3 1/2-inch *DOS Startup/Operating* disk) in drive A and turn on the power to the computer.
2. Enter the current date and time.

   If the date is March 13, 1990, type **3-13-90** and press Enter. If the time is 1:13 P.M., type **13:13** and press Enter. Time is entered in military hours.
3. Label a blank disk *DOS Working Disk*.
4. Type **FORMAT B: /S** and press Enter.
5. Place the disk labeled *DOS Working Disk* in drive B and press Enter.

   If you only have one floppy disk drive, when prompted to `Insert new diskette for drive B and strike ENTER when ready`, remove the 5 1/4-inch *DOS Startup* disk or 3 1/2-inch *DOS Startup/Operating* disk from drive, insert the *DOS Working Disk*, and press Enter.
6. When prompted `Format another (Y/N)?`, type N and press Enter.

   If you have a single disk drive, remove the *DOS Working Disk* from drive A.
7. Place the 5 1/4-inch *DOS Operating* disk or the 3 1/2-inch *DOS Startup/Operating* disk in drive A. Your *DOS Working Disk* should be in drive B. At the `A>` prompt, type the following, pressing Enter after each command:

COPY DISKCOPY.COM B:
COPY FORMAT.COM B:
COPY EDLIN.COM B:
COPY CHKDSK.COM B:
COPY BACKUP.COM B:
COPY RESTORE.COM B:
COPY APPEND.EXE B:
COPY MORE.COM B:
COPY FIND.EXE B:
COPY SORT.EXE B:
COPY TREE.COM B:

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If you have a single disk drive system, you are prompted to place the source disk and target disk in the drive at alternating times. Your *DOS Operating* or *DOS Startup/Operating* is the source disk and the *DOS Working Disk* is the target disk.

These 10 copy commands place the files you will be working with in this workbook on the *DOS Working Disk*.

DOS V4.0 through V4.01

DOS V4 users should follow the steps outlined in the DOS manual to install the operating system either to diskettes if you have a diskette-only system, or to your hard disk if you have a computer with a hard disk. The following sections explain how to create a *DOS Working Disk* once you have installed DOS V4.0 or V4.01.

Hard Disk

Follow these steps to create your *DOS Working Disk* if you have installed DOS V4 to a hard disk system:

1. Turn on the power to your computer. Make sure that no diskette is in drive A.
2. Enter the current date and time.

   If the date is March 13, 1990, type **3-13-90** and press Enter. If the time is 1:13 P.M., type **13:13** and press Enter. Time is entered in military hours.
3. Label a blank disk *DOS Working Disk*.
4. Type **FORMAT A: /S** and press Enter.
5. Place the disk labeled *DOS Working Disk* in drive A and press Enter.
6. When prompted `Format another (Y/N)?`, type N and press Enter.
7. Type **CD \DOS** and press Enter, then type the following, pressing Enter after each command:

   COPY DISKCOPY.COM A:
   COPY FORMAT.COM A:
   COPY EDLIN.COM A:
   COPY CHKDSK.COM A:
   COPY BACKUP.COM A:
   COPY RESTORE.COM A:
   COPY APPEND.EXE A:
   COPY MORE.COM A:
   COPY FIND.EXE A:
   COPY SORT.EXE A:
   COPY TREE.COM A:

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Floppy Disk—5 1/4-inch

If you installed DOS V4 on 5 1/4-inch floppy disks, follow these steps:

1. Place the disk *Working 1* into drive A and turn on the power to your computer.
2. Enter the current date and time.

   If the date is March 13, 1990, type **3-13-90** and press Enter. If the time is 1:13 P.M., type **13:13** and press Enter. Time is entered in military hours.
3. Label a blank disk *DOS Working Disk*.
4. Type **FORMAT B: /S** and press Enter.
5. Place the disk labeled *DOS Working Disk* in drive B and press Enter.
6. When prompted `Format another (Y/N)?`, type N and press Enter.
7. From the DOS `A>` prompt, type the following commands, pressing Enter after each command:

   COPY DISKCOPY.COM B:
   COPY FORMAT.COM B:
8. Replace the disk *Working 1* with the disk *Working 2* in drive A, then type the following command, pressing Enter after each command:

   COPY EDLIN.COM B:
   COPY MORE.COM B:
   COPY FIND.EXE B:
   COPY SORT.EXE B:
   COPY TREE.COM B:
9. Replace the disk *Working 2* with the disk *Startup* in drive A, type the following command, then press Enter:

   COPY APPEND.EXE B:
10. Replace the disk *Startup* with the disk *Shell* in drive A, type the following command, then press Enter:

    COPY CHKDSK.COM B:
11. Replace the disk *Startup* with the original disk *Select* in drive A, then type the following commands, pressing Enter after each command:

    COPY BACKUP.COM B:
    COPY RESTORE.COM B:

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Floppy Disk—3 1/2-inch

If you installed DOS V4 on 3 1/2-inch floppy disks, follow these steps:

1. Place the disk *Startup* into drive A and turn on the power to your computer.
2. Enter the current date and time.

   If the date is March 13, 1990, type 3-13-90 and press Enter. If the time is 1:13 P.M., type 13:13 and press Enter. Time is entered in military hours.
3. Label a blank disk *DOS Working Disk*.
4. Type FORMAT B: /S and press Enter.
5. Place the disk labeled *DOS Working Disk* in drive B and press Enter.
6. When prompted `Format another (Y/N)?`, type N and press Enter.
7. From the DOS `A>` prompt, type the following commands, pressing Enter after each command:

   COPY DISKCOPY.COM B:
   COPY FORMAT.COM B:
   COPY EDLIN.COM B:
   COPY MORE.COM B:
   COPY FIND.EXE B:
   COPY SORT.EXE B:
   COPY APPEND.EXE B:
   COPY TREE.COM B:

8. Replace the disk *Startup* with the disk *Shell* in drive A, type the following command, then press Enter:

   COPY CHKDSK.COM B:

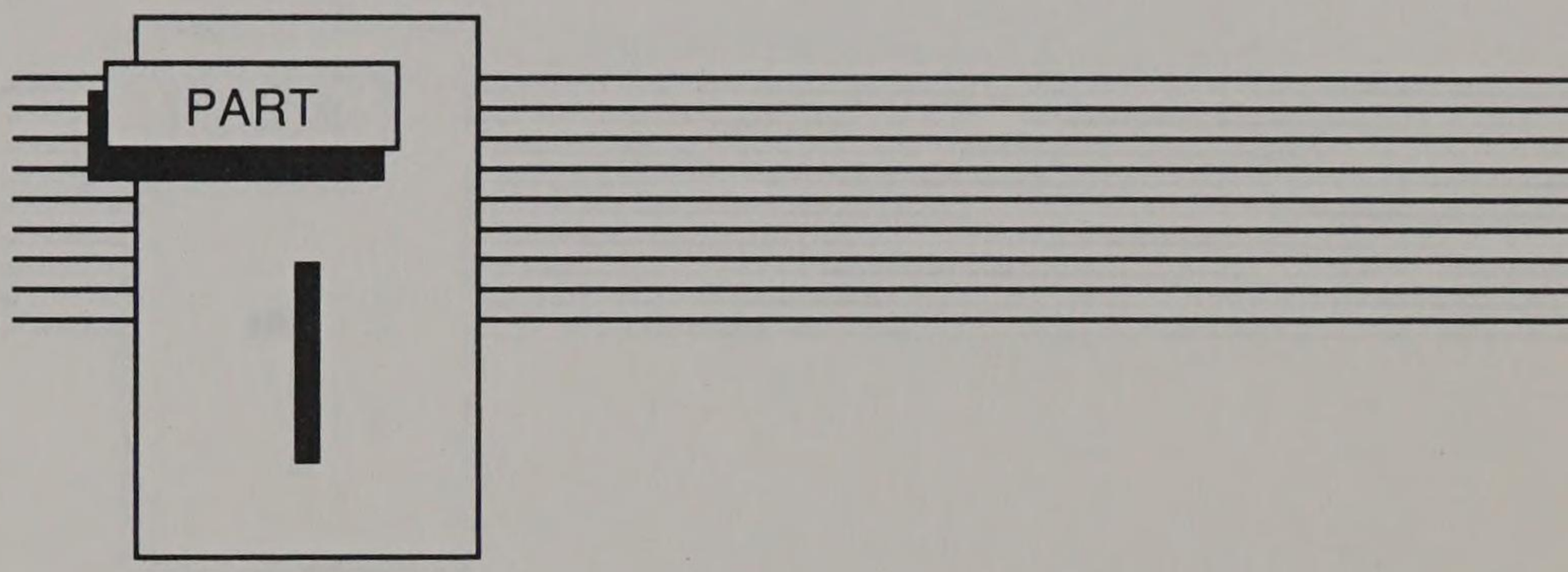
11. Replace the disk *Startup* with the original disk *Operating* in drive A, then type the following commands, pressing Enter after each command:

    COPY BACKUP.COM B:
    COPY RESTORE.COM B:

Continuing On in the Workbook

The *DOS Working Disk* that you have created is used at the beginning of many of the exercises. You will be instructed to place the disk in drive A and to turn on the computer. Do so for these lessons even if your computer has a hard disk. The commands work the same on a hard disk as they do from a floppy disk.

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What Every DOS User Should Know

The nine lessons in this section of the workbook introduce new computer users or new DOS users to the basic DOS functions and features that every user should know. In this section, you learn to do the following:

- Acquaint yourself with your computer hardware in Lesson 1
- Load and start DOS in Lesson 2
- Copy a disk in Lesson 3
- Format a disk in Lesson 4
- Name disk drives, disks, and files in Lesson 5
- Get a directory of files in Lesson 6
- Copy files in Lesson 7
- Rename and erase files in Lesson 8
- Create and use hierarchical directories in Lesson 9

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LESSON

1

Getting Acquainted with Your Computer

Before learning about your computer's operating system, DOS, you should first familiarize yourself with your computer hardware. Knowing about your hardware helps you use your operating system and other computer software more effectively. You will learn more about the computer as you use it, but first knowing some basics about your hardware will help you through the lessons that follow. If you are already familiar with your computer hardware, you may wish to move on to the next lesson.

In this lesson, you are introduced to the following:

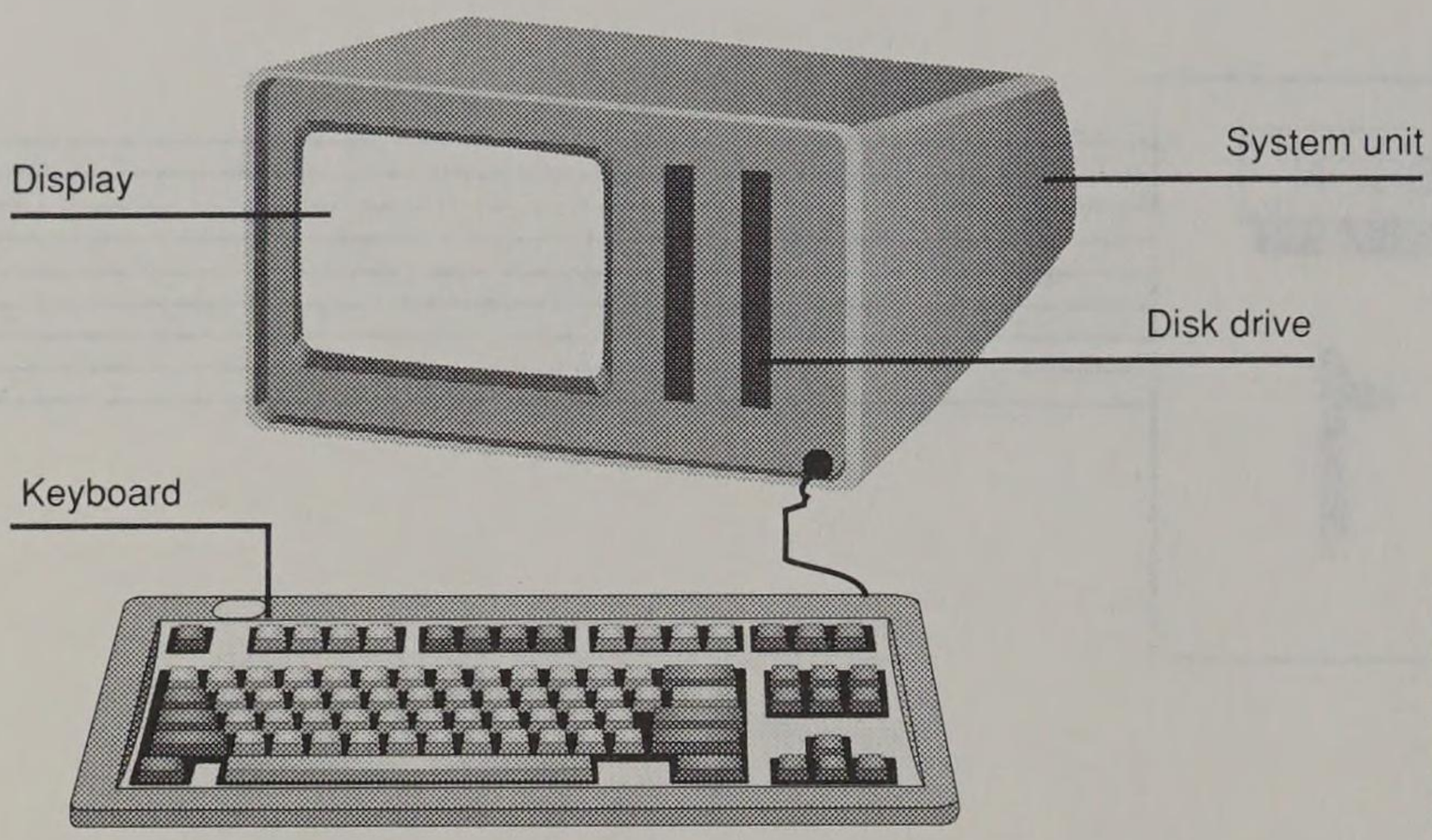
- The system unit
- The disk drives and disks
- The keyboard unit
- The mouse

What Does Your Computer Hardware System Include?

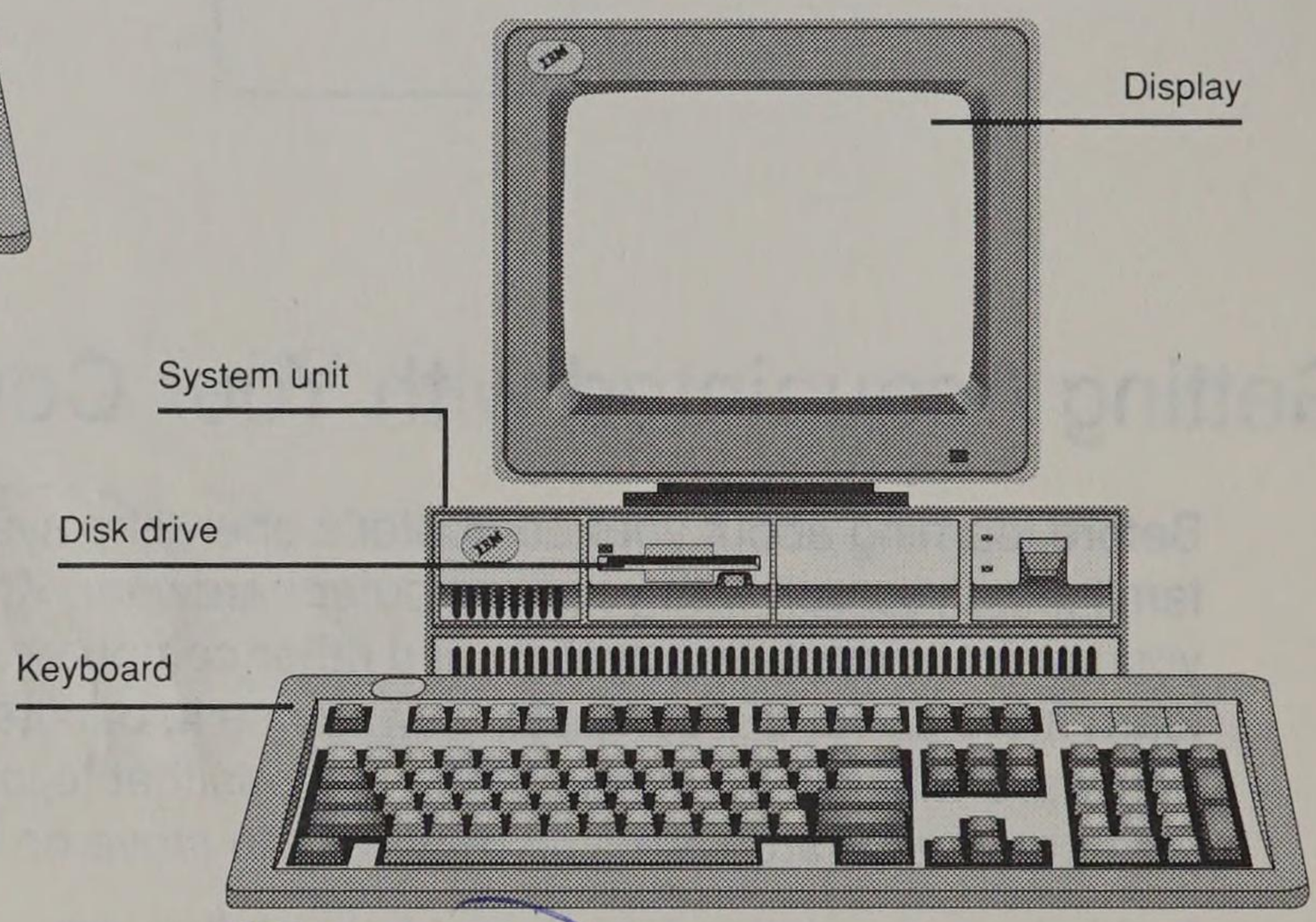
Computer hardware is the term for the computer equipment you are using. If you have an IBM microcomputer system—a PC, XT, AT, or PS/2—your system has certain essential parts and other optional features.

The two essential components are the system unit and the keyboard unit. The major *peripherals* (additional devices used by the computer) are the video display screen and the printer. To make full use of this book, you should have all four of these components. Figure 1.1 shows three examples of typical computer configurations.

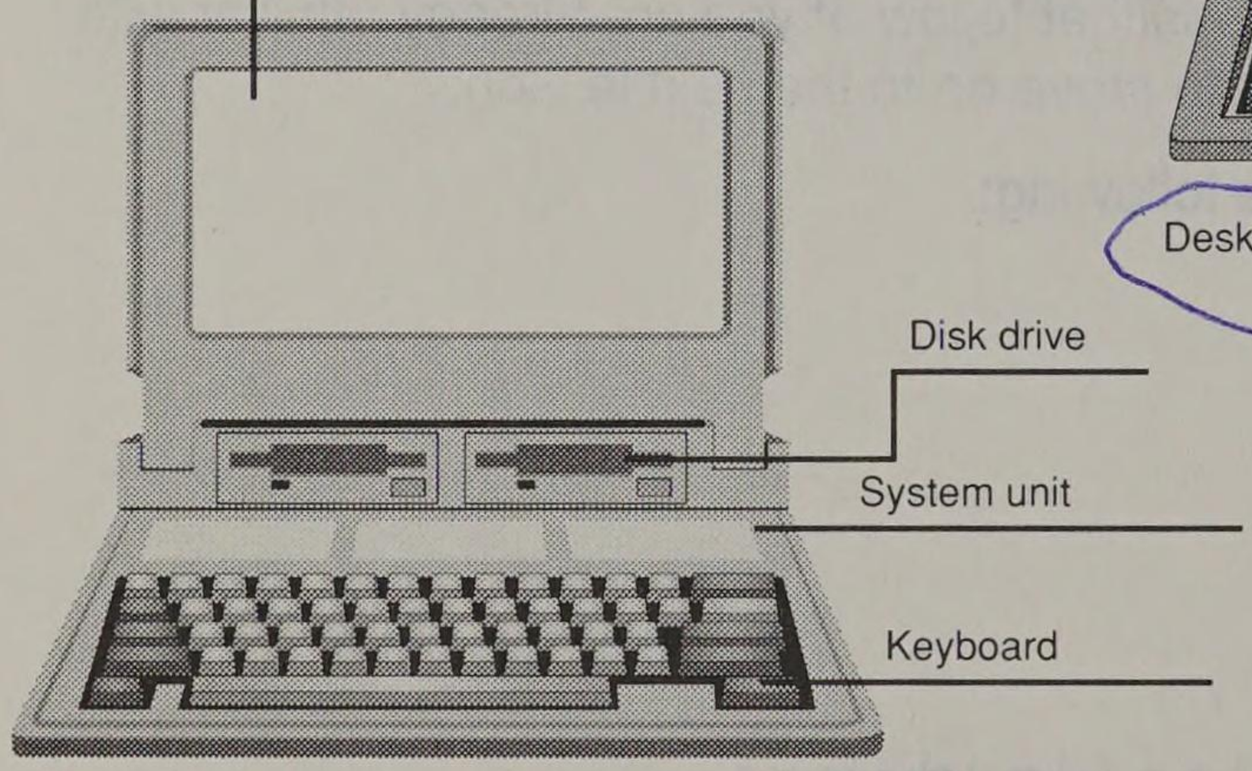
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Convertible Computer



Desktop Computer



Laptop Computer

Fig. 1.1. *Three examples of a typical computer configuration.*

The System Unit

Every personal computer system has a system unit. A typical system unit is shown in figure 1.2.

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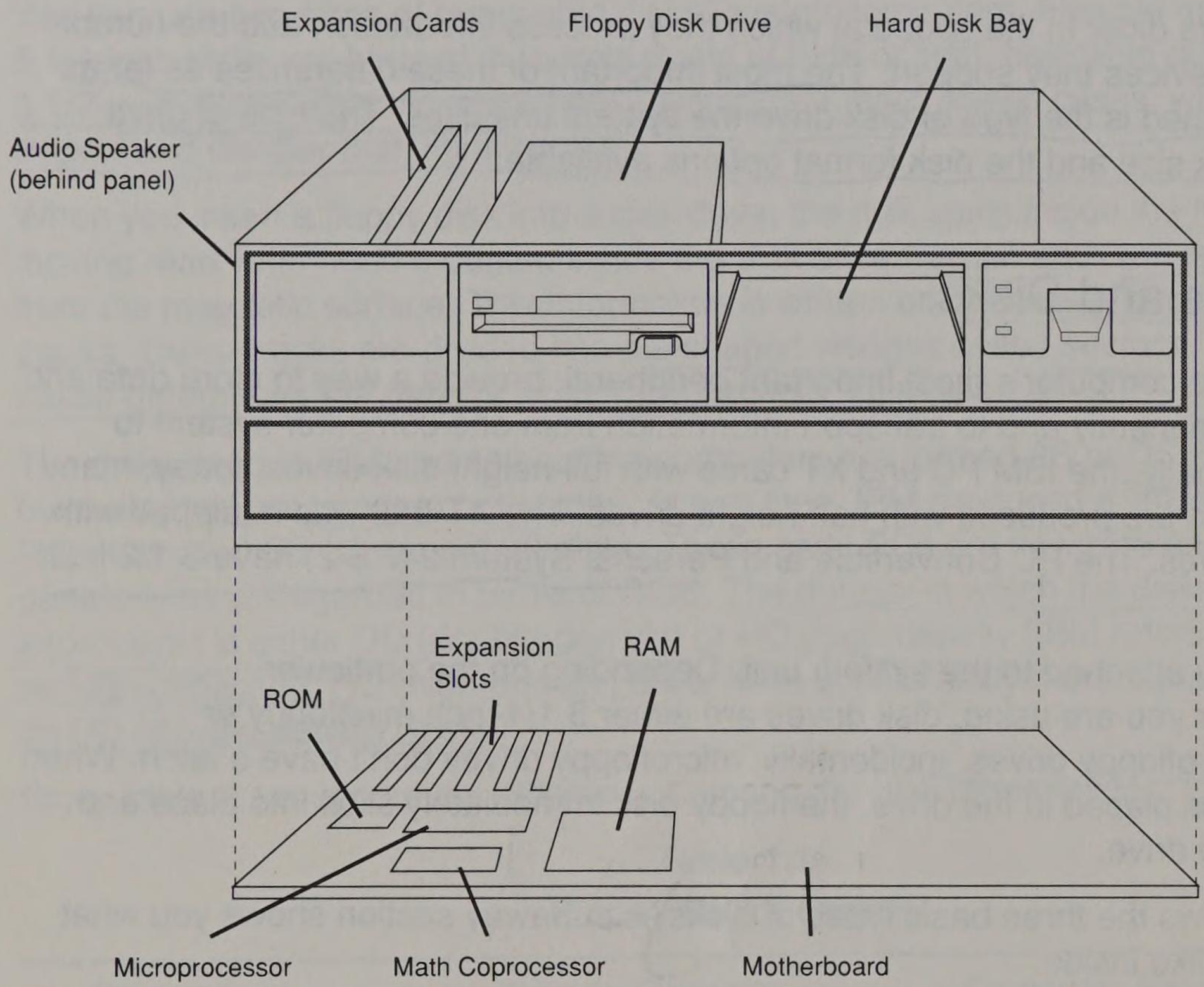


Fig. 1.2. *A typical system unit.*

The system unit is the actual computer itself and contains:

1. The "brain" of the computer, the microprocessor, also called the CPU (central processing unit)
2. Two types of memory:
   - ROM, or read-only memory, which is permanent memory
   - RAM, or random-access memory, which is user memory
3. Expansion slots
4. Two or more bays for 5 1/4-inch or 3 1/2-inch disk drives (floppy or hard)
5. The power supply
6. The audio speaker
7. Various connectors and ports

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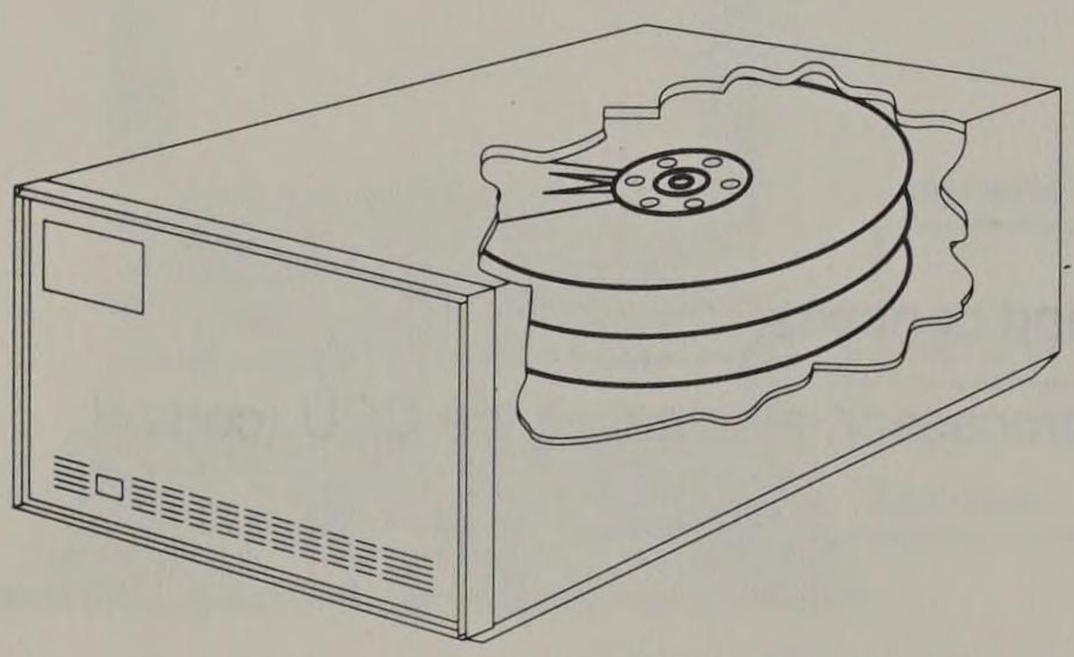
Microcomputers differ in the speed at which they process information and the number and types of devices they support. The most important of these differences as far as DOS is concerned is the type of disk drive the system unit uses. The type of drive affects the disk size and the disk format options available.

Disk Drives and Disks

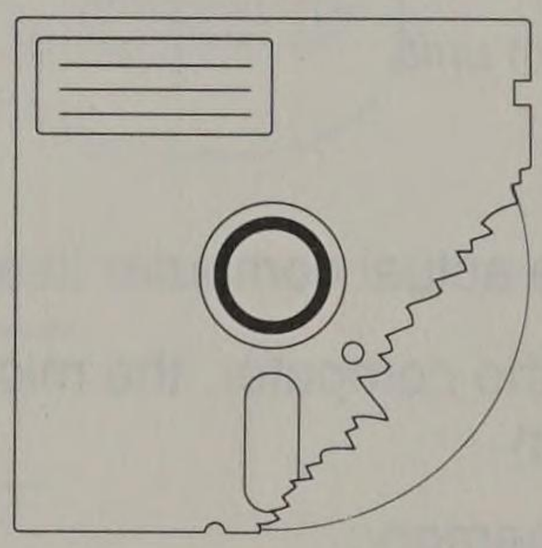
Disk drives, the computer's most important peripheral, provide a way to store data and programs permanently and to transport information from one computer system to another. Originally, the IBM PC and XT came with full-height disk drives; today, many XT compatibles are produced with half-height drives. The XT-286 was equipped with half-height drives. The PC Convertible and Personal System/2 (PS/2) have 3 1/2-inch drives.

Disk drives are attached to the system unit. Depending on the particular microcomputer you are using, disk drives are either 5 1/4-inch minifloppy or 3 1/2-inch microfloppy drives. Incidentally, microfloppy drives don't have a latch. When a microfloppy is placed in the drive, the floppy disk immediately slips into place and engages in the drive.

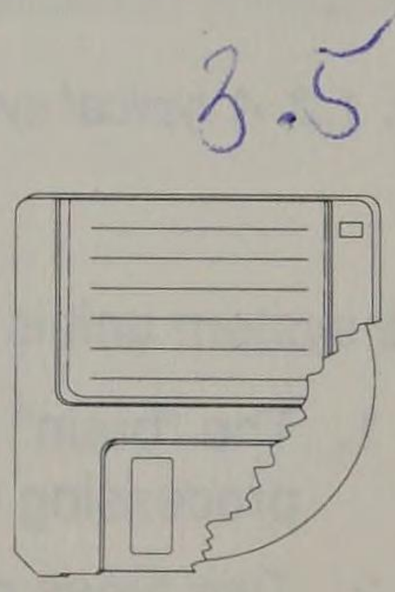
Figure 1.3 shows the three basic types of disks. A cut-away section shows you what the disks look like inside.



Hard disk drive



Minifloppy disk



Microfloppy disk

Fig. 1.3. *Three basic disk types.*

Floppy disks are circular pieces of mylar or other plastic-like material enclosed in plastic cases. You can store data on the disk, retrieve the data, use it, change it, or erase it.

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You can use two sizes of removable disks in microcomputers. Flexible minifloppy 5 1/4-inch disks are housed in jackets made of hard or light, bendable plastic. Smaller 3 1/2-inch microfloppy disks are housed in square, hard plastic cases, which are thicker and sturdier than minifloppies.

When you insert a floppy disk into a disk drive, the disk spins inside the housing. A moving read/write head mounted inside the disk drive "reads" and "writes" information from the magnetic surface. This information is written on concentric circles called *tracks*. These tracks are divided into pie-shaped wedges called *sectors*. The number of tracks determines the *density*, or storage capacity, of a disk.

The disks used in IBM and compatible computers are termed 2S or DS (double-sided) because they are used on both sides. At one time, IBM produced a limited number of PCs that used SS (single-sided) disks. These early PCs are now rare and can generally be disregarded in terms of DOS. The density in which the disks record information is either DD (double-density) or HD (high-density [IBM refers to these disks as high-capacity]). HD (high-density) disks have substantially more storage space than do DD (double-density) disks.

Study table 1.1 and note the differences among the disk formats.

Table 1.1
Floppy Disk Formats

Floppy Type	*Storage Capacity*	*Computer Base*
Mini SSDD	180K = 184,320 bytes	Older PCs (rare)
Mini DSDD	360K = 368,640 bytes	PC and XT
Mini DSHD	1.2M = 1,228,880 bytes	AT
Micro 2S2D or DSDD	720K = 737,280 bytes	PS/2 Model 25, 30, Convertible
Micro 2SHD or DSHD	1.44M = 1,474,560 bytes	PS/2 Model 50Z, 55, 60, 70, 80

Despite their smaller size, the microfloppy disks can hold more data than minifloppy disks can. Because properly maintained disks are vital for the accurate storage and transfer of information, you should know how to care for and handle your disks. (For "Dos and Don'ts for Your Disks and Disk Drives," see Appendix A. For "Directions for Inserting a Floppy Disk into a Disk Drive," see Appendix B.)

Hard disks (also called *fixed disks* or *Winchester disks*) are provided with the XT, AT, and PS/2 Models 50, 60, 70, and 80 computers and compatibles. Optional hard disks may be installed in the IBM PC, the PS/2 Models 30 and 25, and in many PC-compatible computers.

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A hard disk is similar to a floppy disk in "reading" and "writing" information. The main difference is that the hard disk uses a rigid metal platter, thus making the disk "hard." This platter is coated with metal oxide. Because the hard disk drive and sealed read/write heads are combined into one nonremovable unit, the drive is also called "fixed." Because you cannot remove a hard disk, you must transfer stored information to floppy disks for backup—just as you back up floppy disks.

The hard disk spins much faster than the floppy disk—usually at 3,600 rpm compared to the 300 rpm of a floppy disk. This faster spin provides faster transfer of information than is available with floppy disks.

The Keyboard Unit

The keyboard unit of the PC, XT, AT, PS/2, and compatibles provides standard typed input into the computer's system unit. The original PC and XT came with the standard keyboard, and the early ATs came with a redesigned standard keyboard. The PS/2 computer and newer XT and AT machines use the new Enhanced Keyboard. All three keyboards share similar groups of keys:

1. The standard alphanumeric (QWERTY) keys.
2. A cluster of numeric/cursor-control keys placed on the extreme right side of the keyboard.
3. A group of special-function keys. The PC, XT, and AT have a double column of 10 function keys to the left of the standard keyboard. The Enhanced Keyboard, however, has a single row of 12 function keys placed along the top of the keyboard.

   Another group of keys is available on the Enhanced Keyboard:
4. A cluster of cursor-control keys placed between the QWERTY keys and numeric/cursor-control keys.

The lessons in this workbook use keys from all these sections. Before you work through the lessons, familiarize yourself with the locations of the keys (see figures 1.4, 1.5, and 1.6).

QWERTY Keys

QWERTY comes from the letters on the left side of the top row of the keyboard. This section of the keyboard, which contains all the letters of the alphabet, closely resembles a standard typewriter keyboard. You'll use this section of the keyboard to type the commands you want the computer to carry out. If you are unfamiliar with a typewriter keyboard, you may want to spend a few minutes studying how the alphabetic keys are arranged.

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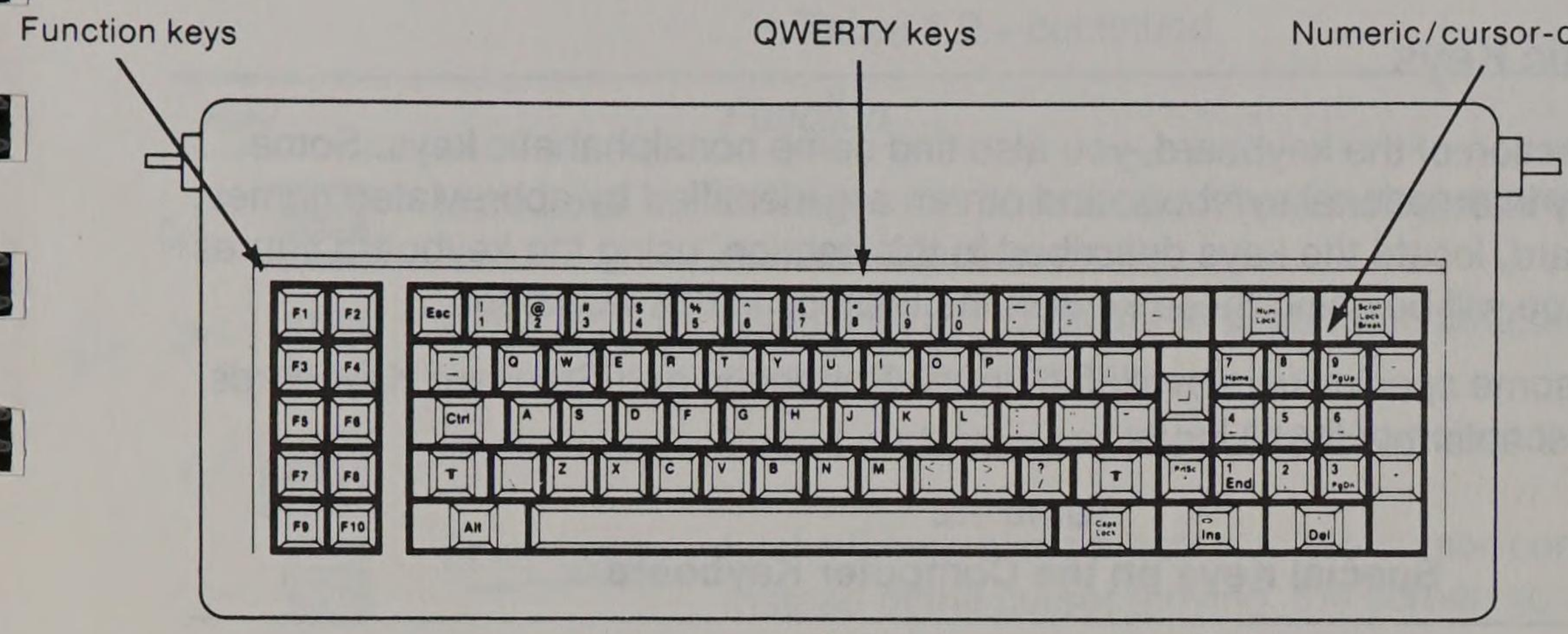


Fig. 1.4. *A standard keyboard with labeled sections.*

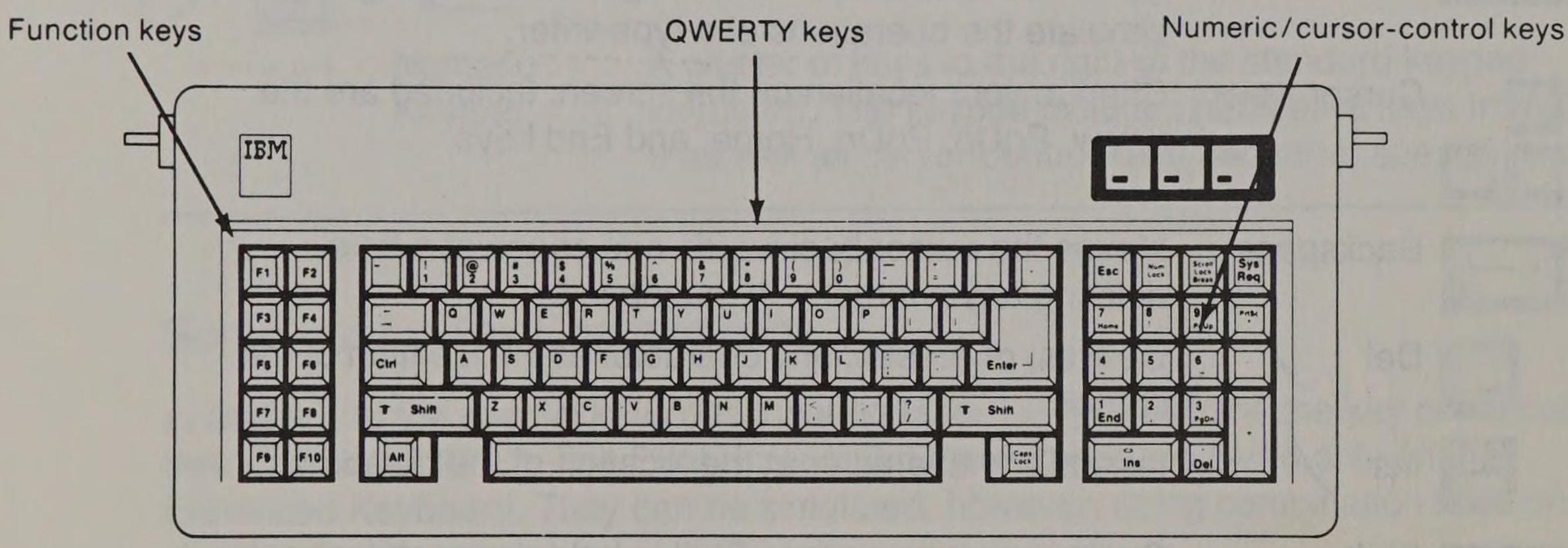


Fig. 1.5. *A United States AT keyboard.*

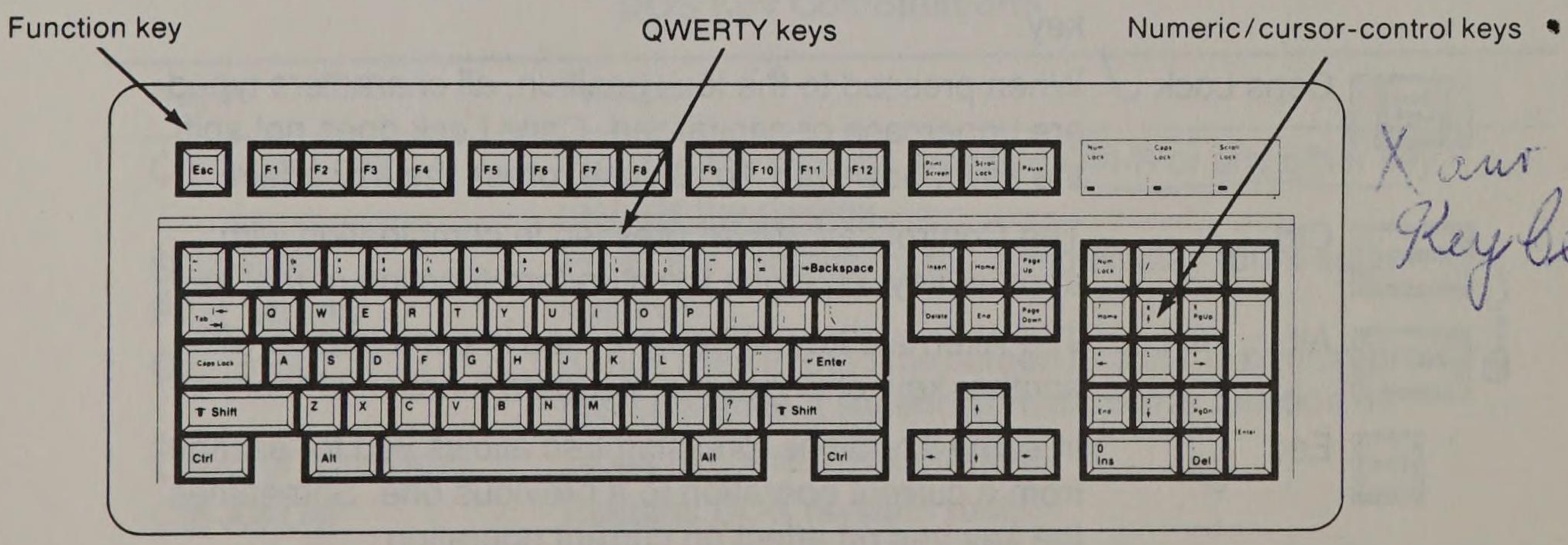


Fig. 1.6. *The Enhanced Keyboard.*

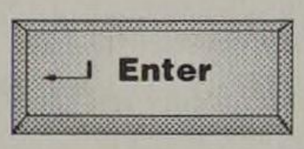
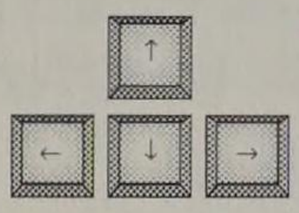
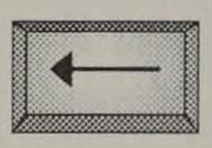
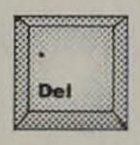
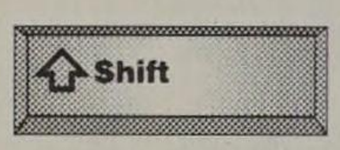
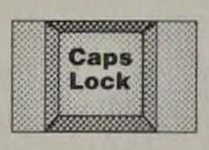
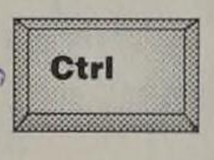
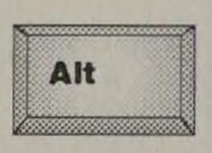
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Nonalphabetic Keys

In the center section of the keyboard, you also find some nonalphabetic keys. Some are identified by international symbols, and others are identified by abbreviated names. On your keyboard, locate the keys described in this section, using the keyboard figures to guide you. You will be using these keys in the lessons in this workbook.

Table 1.2 lists some special keys available on the Enhanced and Standard Keyboards, as well as a description of these keys.

Table 1.2
Special Keys on the Computer Keyboard

Key	*Function*
 Enter	Signals the computer to respond to the commands you type. Also functions as a carriage return in programs that simulate the operations of a typewriter.
 Cursor Keys	Change your location on the screen. Included are the arrow, PgUp, PgDn, Home, and End keys.
 Backspace	Moves the cursor backwards one space at a time, deleting any character in that space.
 Del	Deletes, or erases, any character at the location of the cursor.
 Ins	Inserts any character at the location of the cursor.
 Shift	Capitalizes letters when Shift is held down while the letter is typed. When pressed in combination with another key, can change the standard function of that key.
 Caps Lock	When pressed to the lock position, all characters typed are uppercase or capitalized. Caps Lock does not shift the keys, however. To release, press the key again.
 Ctrl	The Control key. When pressed in combination with another key, changes the standard function of that key.
 Alt	The Alternate key. When pressed in combination with another key, changes the standard function of that key.
 Esc	In some situations, pressing Esc allows you to "escape" from a current operation to a previous one. Sometimes the key has no effect on current operation.

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Table 1.2—continued

Key		*Function*
Num Lock		Changes the numeric pad from cursor-movement to numeric-function mode.
PrtSc		Used with the Shift key to send the characters on the display to the printer.
Print Screen		Found on Enhanced Keyboards. Same as Shift-PrtSc.
Scroll Lock		Locks the scrolling function to the cursor-control keys. Instead of the cursor moving, the screen scrolls.
Pause		Suspends display output until another key is pressed. (Found on Enhanced Keyboards.)
Break		Stops a program in progress from running.
Numeric Keypad		A cluster of keys to the right of the standard keypad keyboard. The keypad includes numbered keys from 0 to 9 as well as cursor-control keys and other special keys.

Some Useful Key Combinations

In addition to the special keys described in table 1.2, you will use the key combinations described in table 1.3. The Print Screen and Pause keys are found only on the Enhanced Keyboard. They can be simulated, however, using combination keys on the standard keyboard.

Table 1.3
DOS Key Combinations

Keys	*Function*
Ctrl-Num Lock	Freezes the display; pressing Ctrl-S or any other key restarts the display
Shift-PrtSc Print Screen	Prints the contents of the video display (print-screen feature)
Ctrl-PrtSc	Sends lines to both the screen and to the printer; pressing this sequence a second time turns this function off
Ctrl-C or Ctrl-Break	Stops execution of a program
Ctrl-Alt-Del	Restarts DOS (system reset)

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The Mouse

DOS Version 4.0 makes extensive use of a mouse. This small box with one, two, or three buttons is usually attached to the computer with a cable (although some are made wireless). Figure 1.7 shows a typical two-button mouse.

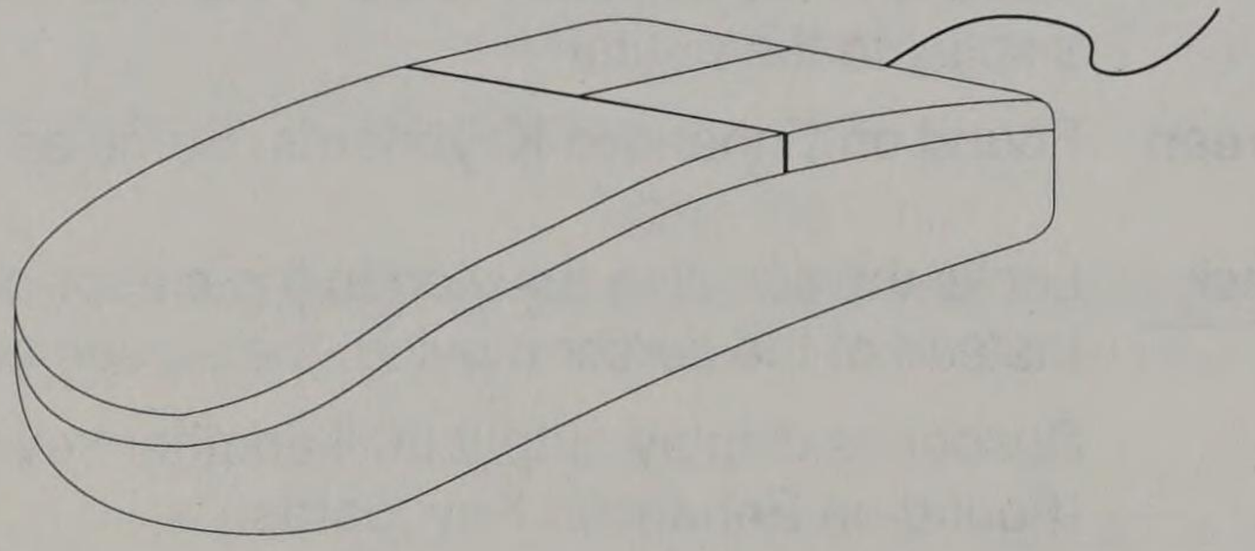


***Fig. 1.7.** A typical mouse.*

This device fits comfortably in your hand, allowing you to move it around easily and press each button as required. As you move the mouse around on the desk, this motion is registered on the computer display. Pressing a button does the same as pressing a key on the keyboard.

You can use a mouse only with programs specifically designed for one. Part II of this workbook, which covers the DOS Shell supplied with Version 4.0, makes extensive use of the mouse.

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SUMMARY OF CONCEPTS FOR LESSON 1

1. Computer hardware is the equipment that makes up your computer system—the IBM PC, XT, AT, PS/2, or IBM-compatible system.
2. The three essential parts of your computer system are the system unit, the disk drives, and the keyboard. The system unit is the computer itself; the disk drives provide for storage and retrieval; the keyboard provides the standard input to the system unit.
3. For some programs, you can use a mouse instead of the keyboard to select from a list of items shown on the screen. As you move the mouse around on a desk, the motion is reflected by the cursor on the screen.
4. Minifloppy and microfloppy disks are removable. Hard disks are fixed and nonremovable.
5. Disk formats depend on the type of disk drives installed in a system unit.

For Further Reference

If you would like further information about your computer hardware, consult *Using DOS*, by David Solomon (Que Corporation, Carmel, IN, 1989), Chapter 1.

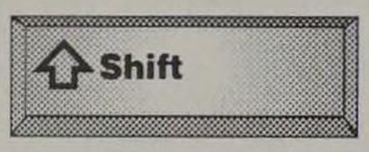
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SUMMARY EXERCISE FOR LESSON 1

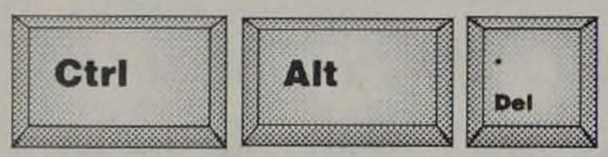
Review the use of the following keys by matching the functions in the first column with the keys listed at the bottom of the page. Write the letters for the correct answers in the second column. You may check your answers with those in Appendix C.

If You Want To	*Press Which Key?*
1. Capitalize all the alphabetic characters you type	G
2. Move the cursor backward one space at a time	D
3. Stop a program from running	H
4. Enter a command into the system	E
5. Reset the computer, or start over from scratch	B

Choice of Answers:

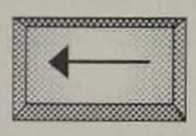
A . 

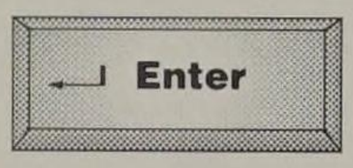
Shift

B . 

Ctrl-Alt-Del

C . Space bar

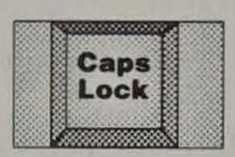
D . 
Backspace

E . 

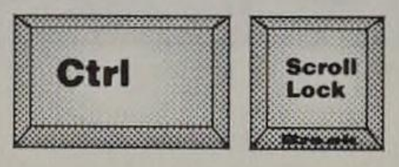
Enter

F . 

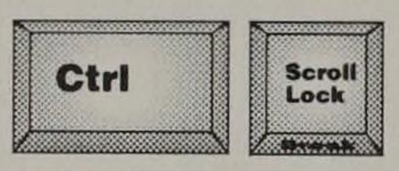
Num Lock

G . 

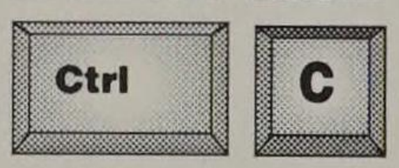
Caps Lock

H . 

Ctrl-Scroll Lock

I . 

Ctrl-Break

J . 

Ctrl-C

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LESSON

2

Loading and Starting DOS (Booting)

The process of loading and starting the disk operating system is called *booting*, from "bootstrap," as in the expression "pulling yourself up by the bootstraps." Booting refers to the sequence your computer goes through to load and start the disk operating system (DOS). Once the system is booted, DOS controls your computer system and handles everything you enter.

Booting is always the first step when you use your computer—whether you are using DOS for housekeeping purposes, such as copying or deleting files, or you are running an applications program, such as 1-2-3, WordStar, or others. When you use applications programs from floppy disks, the disk that contains the applications program often also contains copies of DOS and the AUTOEXEC.BAT file to start the application automatically. (You learn more about AUTOEXEC.BAT in Lessons 15 and 16.) When you use your DOS system disk alone to boot your computer, however, you have to remove the DOS system disk after the system has booted. Then you place the applications disk in the disk drive and enter the command to start the application.

The DOS system disk used to start your computer can be labeled "Startup," "System," "Main," or "DOS." The DOS system disk that you created for use with this workbook is called *DOS Working Disk*. If you have a hard disk, you do not normally need this disk to operate the computer. However, because hard disks can be configured in a variety of ways, you should use the *DOS Working Disk* to perform the exercises in the first part of this chapter. The second part of the lesson, "Using the DOS V4.0 Shell," shows the startup procedure for DOS V4.0 users with a hard disk. This procedure automatically loads the DOS Shell program onto your hard disk.

As part of the booting operation, DOS gives you the opportunity to enter the current date and time. Although entering date and time is optional, it's a good idea for

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recordkeeping purposes to get into the habit of entering the information every time you boot DOS or reset your computer. This information can come in handy later if you need to know the date you worked on a project or you want to check the time of day the project was finished. (You see how this identification procedure works in Lesson 6, "Getting a Directory of Your Disk.") Date and time information becomes increasingly important the longer you use your system and the more files you create.

In this lesson, you learn how to do the following:

- Load and start (boot) the disk operating system (DOS)
- Set the date and time
- Correct mistakes you make while booting

Booting DOS and Setting the Date and Time

Step 1: Put the *DOS Working Disk* into disk drive A and close the door. (If you have two disk drives, drive A is the farthest to the left or the top disk drive. If you need help inserting the disk properly into the disk drive, see the directions in Appendix B.)

Step 2: If your computer is off, turn it on.

If your computer is already on, press Ctrl-Alt-Del. That is, press and hold the Ctrl and Alt keys and press Del; release the three keys simultaneously. When you press these three keys, your microcomputer does a *system reset*. If your computer is on and you are running another program, you can start DOS again from scratch by doing a system reset.

The red light on the left disk drive comes on. Then DOS asks you for the current date and time. For the date, the screen looks something like figure 2.1.

```
Current date is Fri  8-18-1989
Enter new date (mm-dd-yy):
```

Fig. 2.1. *Date prompt.*

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Step 3: Type the date, using the following format:

mm-dd-yy

In this statement, *mm* is a one- or two-digit number for the month (for example, May is 05 or 5, and November is 11); *dd* is a one- or two-digit number for the day; and *yy* is a two-digit number for the year (1990 is 90).

Note: You also may type the four-digit number for the year.

If the date is May 9, 1990, you can type **05-09-90**, **05-09-1990**, or **5-9-90**. (You also may use slashes instead of hyphens to separate month, day, and year: **5/9/90**.)

On an IBM AT, PS/2, or compatible, the time and date functions are automatically read from a built-in clock. The current date and time are displayed for you to check. If the system clock is correct, simply press Enter in response to both the DATE and TIME prompts.

Step 4: Press the Enter key after you type the current day's date.

Now that you've entered the date, DOS asks you for the time. On the screen, you see the prompt shown in figure 2.2.

```
Current date is Fri  8-18-1989
Enter new date (mm-dd-yy):8-18-89
Current time is 16:55:11.70
Enter new time:
```

Fig. 2.2. *The time prompt.*

Step 5: Type the time, using the following format:

hh:mm:ss.xx

In this statement, *hh* is the hour; *mm* is the minutes; *ss*, the seconds; and *xx*, hundredths of a second. You must use a colon (:) between the hours, minutes, and seconds, but you use a period (.) between the seconds and hundredths of a second. Because DOS Version 3.3 and below uses a 24-hour clock, you must add 12 hours to the afternoon hours. For example, if the time is 10:20 A.M., you enter **10:20:00**. If it's 2:39 P.M., you enter **14:39:00**.

In DOS V4.0, which supports a 12-hour clock, you can type **10:20a** or **10:20p** for 10:20 A.M. or 10:30 P.M., respectively. Alternately, you can use the 24-hour clock syntax. Both are acceptable.

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Note: You do not have to include seconds or hundredths of a second in the time, so 2:39 P.M. can be entered simply as **14:39**.

Step 6: Press the Enter key after typing the correct time.

If your screen looks similar to the screen in figure 2.3, you've successfully booted DOS and entered the time and date.

```
Current date is Fri  8-18-1989
Enter new date (mm-dd-yy):8-18-89
Current time is 16:55:11.70
Enter new time: 16:58


The IBM Personal Computer DOS
Version 3.30  (C)Copyright International Business Machines Corp 1981, 1987
              (C)Copyright Microsoft Corp 1981, 1986

A>
```

Fig. 2.3. *A successful DOS booting.*

Notice the version number that appears on your computer screen. If your screen displays a version number different from that in the figure, your screen display may look slightly different from examples used in this book. Different DOS versions have different characteristics, displays, and features than are available in Version 3.3.

Also notice the A> (called the *A prompt* or the *system prompt*) followed by the blinking cursor on the last line on the screen. The A> tells you that you have completed the operation you were performing and that you may go on to the next command. The A> is the computer's signal to you that it's ready to go on. DOS is waiting for your next command.

When you see the A> on the screen, you may give the computer a new command or end your session by removing the disk(s) from the drive(s) and turning off the computer.

Note: You should remove disks and turn off your computer only when a system prompt—A>, B>, or the like—is on the screen. To do so at other times may cause you to lose information you want to store. Also, never try to remove a disk while the drive is spinning, because you may damage the disk.

Making Mistakes Entering the Date and Time

Everyone makes mistakes. But when you're a newcomer to computing, or when you're using an unfamiliar computer or operating system for the first time, mistakes can be especially frustrating unless you know what causes them and how to correct them. In this section, you learn some of the most common mistakes people make when booting

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the system and entering the date and time, and you learn how to correct these mistakes. You cannot always correct all mistakes. Recovery from some errors is virtually impossible. Such errors—and how to avoid making them—are discussed in later lessons.

Some of the most common mistakes you can make at the booting stage are these:

- Making a simple typing error
- Typing a nonsense date or time
- Using incorrect punctuation or format
- Trying to use the numeric keypad on the right side of the keyboard instead of the numbers along the top of the keyboard when the keypad is in cursor mode

DOS can identify only mistakes caused by an impossibility in logic, such as entering **15** for the month or **75** for the seconds, and mistakes caused by invalid format. DOS does not recognize an incorrect date or time if the entry is plausible and the format is valid.

Using the DATE and TIME Commands

DOS has two commands that are used to set the date and time. These commands—DATE and TIME—can be run, or *executed*, whenever the computer displays a system prompt.

Use these two commands to correct the date and time or change the date and time as recorded by your computer. You do not have to reset the system to change the date and time. Starting with DOS V3.3, the DATE and TIME commands reset the battery-backed clock of the AT and PS/2.

In the next sections, you intentionally make a few mistakes and find out what happens and how to correct them.

Practice Exercise: Entering the Date

Execute the DATE command from the system prompt: Type **DATE** and then press the Enter key. When you are asked for the new date, enter the nonsense date **15/45/99**, or a similar entry of your own making. The message in figure 2.4 appears on the screen.

```
D>a:

A>date
Current date is Fri  8-18-1989
Enter new date (mm-dd-yy): 15/45/99

Invalid date
Enter new date (mm-dd-yy):
```

Fig. 2.4. *Invalid date message.*

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Now try entering some other invalid date combinations:

Entry	*Reason for Error*
June 5, 1988	You can enter the date only in numerical format; you cannot use words.
2/30/88	Too many days for that month.
070288	No punctuation between mm-dd-yy.
12 13 88	You cannot use spaces to separate mm-dd-yy. You must use only hyphens (-) or slashes (/).
3/5/79	The year predates this version of DOS, which was created in 1980. DOS V3.3 accepts any year after 1980.

Each time you enter an invalid date, you get the same message and another opportunity to enter the date correctly. In fact, DOS gives you an unlimited number of opportunities to enter a valid date.

If you do not want to enter a new date, simply press the Enter key when you see the prompt.

Note: On some computers, if you press the Enter key instead of typing the date, the files you create may not be identified by the current date in your directory.

Practice Exercise: Entering the Time

Suppose that you have already entered an incorrect time when you realize that the correct time is 13:30:05. You want to correct the mistake so that the files you create are correctly identified. How do you correct the already entered mistake? You can always reset the system and start again, but using the TIME command is simpler. Here's how TIME works:

Step 1: When the A> appears on the screen, type the command **TIME** and press Enter. The current time appears on a screen similar to the screen in figure 2.5.

```
A>TIME
Current time is 17:43:43.69
Enter new time:
```

Fig. 2.5. *The current time.*

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Step 2: Enter the new time, **13:30:05**, and you've corrected the mistake.

Use the DATE and TIME commands to check the current date or time when the system prompt is displayed on-screen. In addition, you can check the day of the week for upcoming dates. Do you want to know on what day of the week December 25, 1990, falls? Type **DATE 12-25-90** and press Enter. The date comes back with the day of the week! Don't forget to use the DATE command to reset the system to the current date.

After you've entered a valid time, try using the TIME command to enter these invalid times:

Entry	*Reason for Error*
12/04/55/00	Incorrect punctuation. You can use only colons between *hh:mm:ss* and only a period between *ss* and *xx*.
1:30 pm	DOS Version 3.3 and under operates on a 24-hour clock. For hours after noon, add 12 to the hour; 1:30 P.M. is 13:30. With DOS V4.0, type **1:30p** to use the 12-hour clock feature.
16:10:45:30	You must use a period to separate seconds from hundredths of a second.
Try using the numeric keypad at the right to enter this valid time: **9:45**	Use the numbers at the top of the keyboard to enter the numbers. If you want to use the numeric keypad to enter numbers, you must first press the Num Lock key or hold the Shift key. Press Num Lock and reenter **9:45**. The time should now be accepted as a valid entry.

Just as you can ignore the date prompt by pressing the Enter key without entering a date, you also can ignore the time prompt by pressing the Enter key without entering the time.

Practice Exercise: Correcting Mistakes

The last two practice exercises have shown you what happens when you try to enter an invalid date or time. Suppose that your date and time entries are valid, but you make typing mistakes or you inadvertently enter the wrong date or time. Here's what you can do to correct those mistakes:

If you find an error before you press Enter, you can correct the mistake by using the Backspace key at the top right corner of the QWERTY section of the keyboard (←).

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When you press this key, you can erase the incorrect characters and replace them with the correct ones. Try this:

Step 1: Type **DATE** and press Enter.

Step 2: When you see the new date prompt, type **7-21-90**, but do not press Enter.

Step 3: Change the date to **7-20-90** by using the Backspace key or the left-arrow key (← on the number-4 key on the numeric keypad) until you wipe out the 1. Type **0**, and then retype the last half of the date.

You can use this method of correcting only if you have not *entered* the information (that is, pressed Enter). Once you have pressed Enter and the cursor has moved to the next line, you cannot use this correction method.

Using the DOS V4.0 Shell

This section is for users who have installed DOS Version 4.0 on their computers. If you are using an earlier version of DOS, you can skip this section and move to the lesson summary. If you have DOS V4.0 installed on your computer, you can use this section to learn how to start the Shell program and how to access the various menu options.

Starting the DOS Shell

If you have a computer with a hard disk, the DOS Shell program is located on your hard disk. If you have a machine with only floppy disk drives, use the DOS Shell diskette for this section.

Step 1: Start your computer. If you have a floppy disk-based system, place the DOS Startup disk into drive A, and turn your computer on (press Ctrl-Alt-Del if your computer is already on). If you have a hard disk, remove any diskettes in the floppy disk drives and either turn on your computer or press Ctrl-Alt-Del to reboot the computer.

As before, the computer initializes itself and boots the operating system. If prompted by the computer, check the date and time and correct them if necessary. Depending on how your machine is configured, you see either the DOS prompt `A>` or `C>` or the initial DOS Shell program screen.

Step 2: If you are at the DOS prompt and have a floppy-based system, remove the DOS Startup disk and insert the disk labeled DOS Shell. Hard disk owners have the program already available. Type **DOSSHELL** at the prompt and press Enter to start the DOS Shell. The screen shown in figure 2.6 appears after a few seconds.

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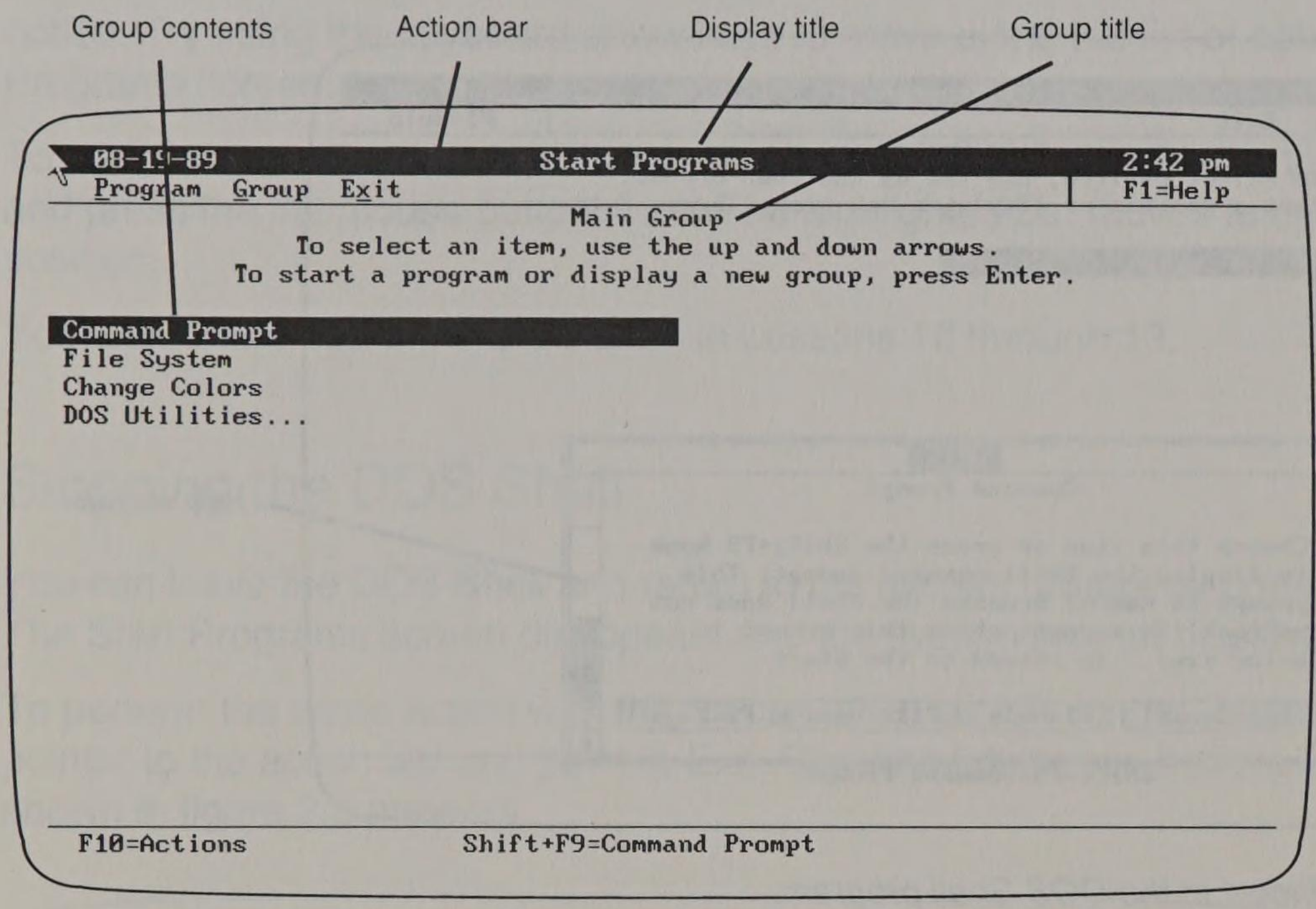


Fig. 2.6. *The opening screen for DOS Shell.*

The initial DOS Shell screen is entitled `Start Programs`. On either side of the screen title are the time and date. Under the title is the action bar (a line that displays the kinds of actions you can select). Positioned under the action bar are the group title line and the group contents. The Start Programs screen serves as your base to explore the important keystrokes you use in the DOS Shell.

Invaluable Help

The DOS Shell program is much friendlier than the DOS prompt. At any time, you can press a single key to get help on a particular subject. You can use the F1 key, located at the top of the Enhanced Keyboard or at the far left of the PC keyboard, to get more information. Figure 2.7 shows the screen displayed when you press F1 immediately after starting the DOS Shell. Additional information about the Command Prompt appears in a rectangle on the screen. (This rectangle is commonly called a *window*.) You can read the rest of the help information for the Command Prompt by pressing the down-arrow key. When you have looked at the information, press the Esc key to remove the help window.

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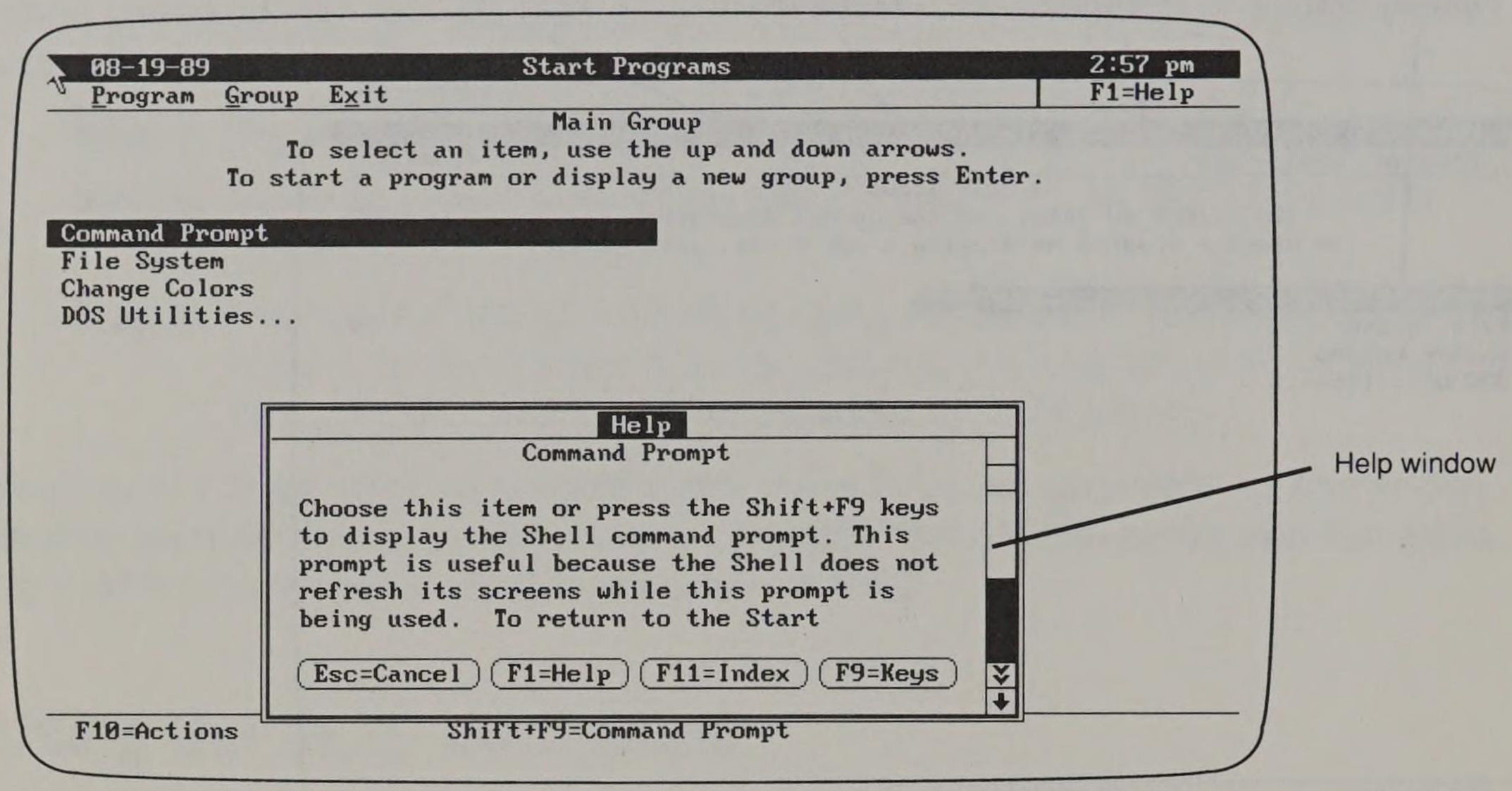


Fig. 2.7. *A help window in the DOS Shell program.*

The F1 key is important to remember because it can give you help at any time. If you are at a different place in the Shell program, pressing F1 gives you help corresponding to that area. Press the down-arrow key once to highlight File System, the second item on the list of possible actions. Now press the F1 key again and notice the change in the help information. Press the Esc key again to remove this help window.

You also can use the mouse to access the help window. Move the mouse around on the desk and watch the mouse pointer (the arrow) move around on the screen. Practice this until you feel comfortable with the movement. Notice that you can point to all areas of the screen.

With the mouse, point to the box on the action bar that contains the words `F1=Help`. The tip of the arrow must be in this area. Press the left mouse button and notice that the help window appears. Move the mouse to the box in the help window that says `Esc=Cancel`. Pressing the left button for a second time removes the help window.

Other Important Keys

The arrow keys are used to move the highlighted bar from selection to selection in a list. In the previous exercise, you used the down arrow to move to the File System

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option. Try using the keyboard arrow keys to move along the list of options on the Start Programs screen.

To perform the same action with the mouse, move the arrow to point to the new item and press the left mouse button once. The highlighted bar moves to the selected position.

You learn more about the DOS Shell in Lessons 10 through 13.

Stopping the DOS Shell

You can leave the DOS Shell and return to the system prompt by pressing the F3 key. The Start Programs screen disappears and the system prompt displays.

To perform the same action with the mouse takes slightly longer. Move the mouse pointer to the action bar and point to Exit. Click the left mouse button. The screen shown in figure 2.8 appears.

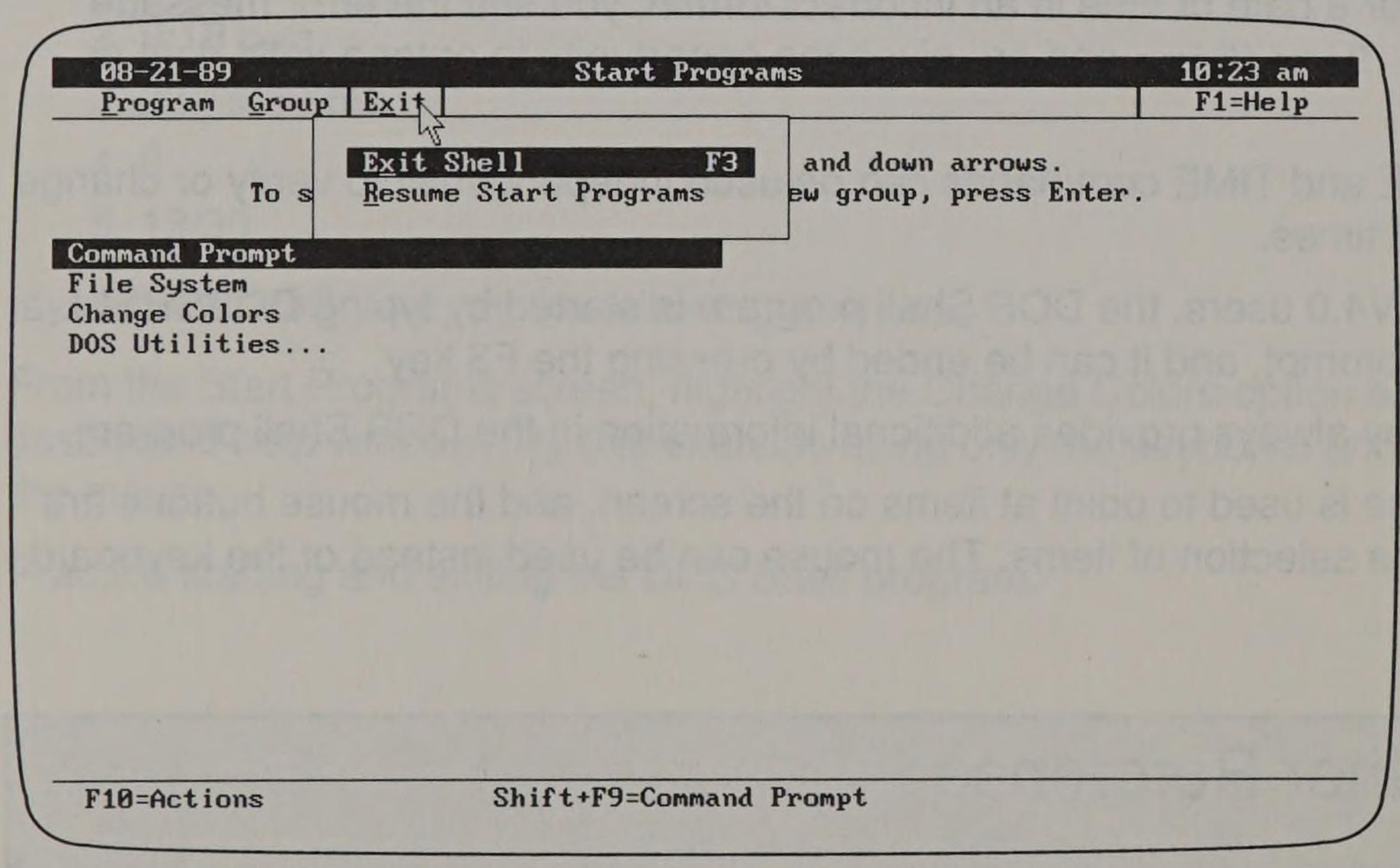


Fig. 2.8. *Using the mouse to exit the DOS Shell program.*

Move the mouse pointer to Exit Shell and click the left mouse button. The Start Programs screen disappears, and the system prompt appears. As you learn more about the DOS Shell program, you find that sometimes using the mouse to select an action is easier, and at other times using the keyboard is preferable.

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SUMMARY OF CONCEPTS FOR LESSON 2

1. *Booting* means loading and starting DOS. Booting DOS is the first step when you use your computer for any reason.
2. A system reset causes the computer to start again or reboot. You can perform a system reset by pressing Ctrl-Alt-Del.
3. As part of the booting procedure, DOS invites you to enter the current date and time in a specified format. The date and time you enter will be attached to any files you create during that session; this information is useful for identifying files and keeping records.
4. The `A>` is the computer's signal that a new command is needed. When you see the `A>` on the screen, you may enter a new command or end your session by removing your disk(s) from the disk drive(s) and turning off your computer. The `A>` is also called the *system prompt*.
5. If you enter a date or time in an incorrect format, you see the error message `Invalid Date/Time` and are given the opportunity to enter a valid date or time.
6. The DATE and TIME commands can be used independently to verify or change dates and times.
7. For DOS V4.0 users, the DOS Shell program is started by typing **DOSSHELL** at the DOS prompt, and it can be ended by pressing the F3 key.
8. The F1 key always provides additional information in the DOS Shell program.
9. The mouse is used to point at items on the screen, and the mouse buttons are used in the selection of items. The mouse can be used instead of the keyboard, if desired.

For Further Reference

If you would like to read further about booting, consult *Using DOS*, by David Solomon (Que Corporation, Carmel, IN, 1989), Chapter 3.

If you would like to read further about the DOS V4.0 Shell program, consult *Using DOS*, by David Solomon (Que Corporation, Carmel, IN, 1989), Chapter 14.

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SUMMARY EXERCISES FOR LESSON 2

Listed below are some dates and times that you can try to enter as part of the booting process. Identify which entries are valid and which are invalid, and find a solution to the invalid entries. Check your answers by entering the dates and times on your computer and by consulting the answers in Appendix C.

Entering Dates

1. 2,25,85
2. 19/9/86
3. 1/15/87
4. 11/31/86
5. 12 25 85

Entering Times

1. 10:20.30
2. 9:18 p.m.
3. 23:59:59.59
4. 8
5. 13/30

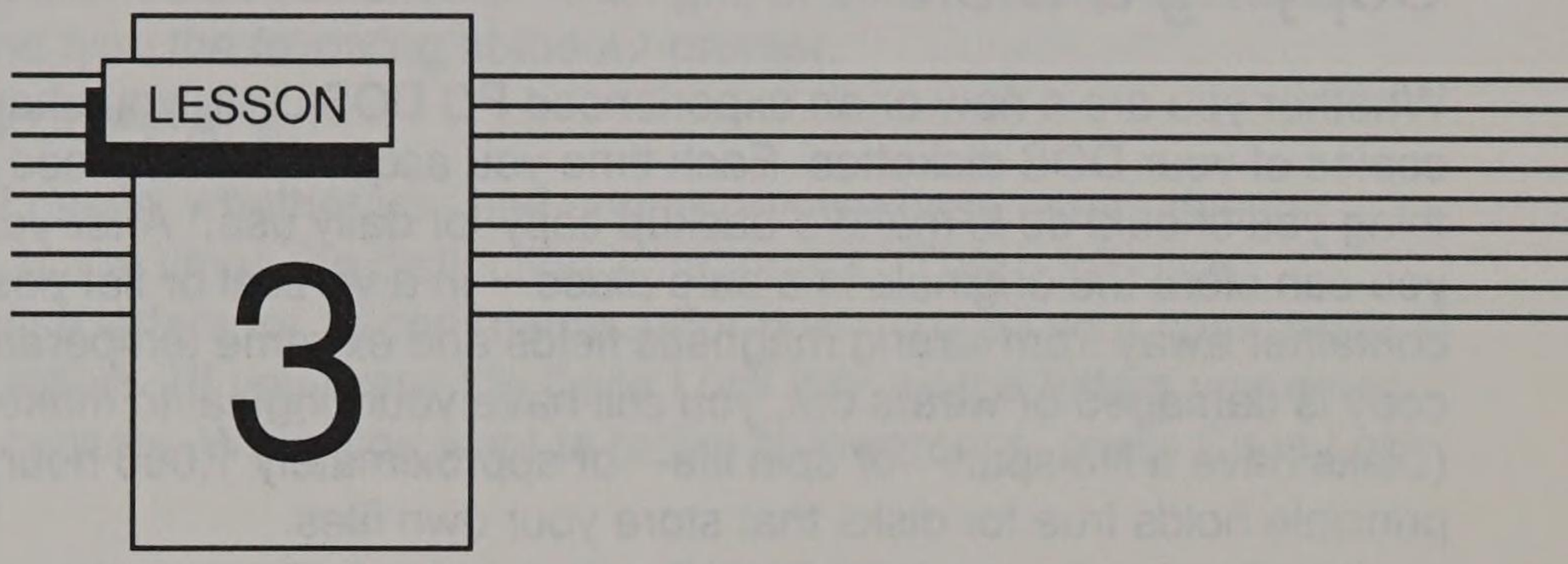
If you have DOS V4.0, try the following exercises:

From the Start Programs screen, highlight the Change Colors option and read the associated help window. Try this exercise using only the keyboard and then using only the mouse.

Practice starting and exiting the DOS Shell program.

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Copying Disks

One of the most important DOS features is the capability to copy. With the copy commands DISKCOPY and COPY, you can make backup copies of whole disks, copies of individual files, and combinations of files.

Why is copying so important? You copy disks and files for the same reason you photocopy paper documents: to save backup copies in case of damage or loss, and to combine and consolidate information. In fact, copying disks may be even more important than copying paper documents, because one disk holds the equivalent of many different papers. For example, if you use single-sided, double-density disks, each disk can hold up to 64 files of information; and if you use double-sided, double-density disks, each disk can hold up to 112 files (approximately 150 pages). As you can imagine, damage to even one disk can mean the loss of many important files.

Taking a few minutes periodically to make backup copies may save you many hours of work in the long run. Backing up your disks may also save you money. If, for example, an important disk like your DOS system disk were destroyed, your only option would be to purchase another—an unnecessary expense if you had made a copy.

In this lesson, you learn how to do the following:

- Copy a disk
- Stop a program from running

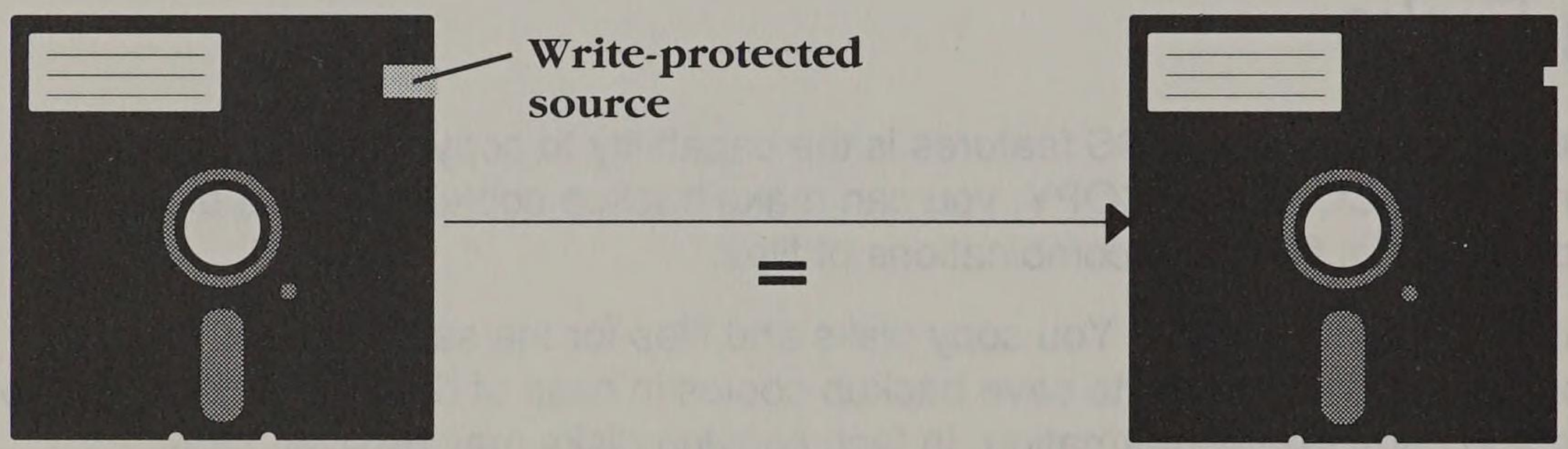
You also make copies of your diskettes supplied with DOS. The exact names of the diskettes depend on the version of DOS you are using. In a later lesson, you learn how to copy individual files and join files.

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Copying a Disk

Whether you are a new or an experienced PC DOS user, you should have backup copies of your DOS diskettes. Each time you acquire a new piece of software, the first thing you should do is make a backup copy for daily use.[1] After you've made copies, you can store the originals in a safe place— in a vertical or flat position in a sturdy container away from strong magnetic fields and extreme temperatures. That way, if the copy is damaged or wears out, you still have your original to make another copy. (Disks have a life span—or spin life—of approximately 1,000 hours.) The same principle holds true for disks that store your own files.

The DISKCOPY command makes an exact copy of another disk. The command requires that the source and destination disks be the same size and capacity.



Source disk **Target (destination) disk**

If your computer has two identical floppy disk drives, go through the steps in the following section to make a copy of your DOS system disk or any other disk you want to back up.

If your computer has one floppy drive or two drives that are not identical, such as an HD and a DSDD drive, turn to this lesson's section "Using a Microcomputer with a Hard Disk or One Floppy Disk Drive."

Using a Microcomputer with Two Disk Drives

Step 1: Start DOS by booting the system with the *DOS Working Disk* in drive A.

If you did not turn off your computer after Lesson 2, DOS is already booted. If your computer is off, follow the steps in Lesson 2 to start DOS, and then proceed with Step 2.

---

[1] Some copy-protected commercial programs are exceptions to this rule. You cannot make copies of some master disks, so you must use the originals.

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Step 2: Place a blank disk into drive B—the right, or bottom, drive. Close the door and type the following at the A> prompt:

DISKCOPY A: B:

In most cases, whether you use upper- or lowercase letters doesn't matter, but at times the distinction is important. (This book uses uppercase letters for all commands.) For now, type all your commands in capital letters. (If you press the Caps Lock key, all the letters you enter will be capitals. When you want to return to lowercase, press Caps Lock again.)

Be sure to leave a single space after DISKCOPY and after A:. If you omit the spaces, DOS does not understand the command, and an error message appears on the screen.

Step 3: Press the Enter key after typing the command.

The red light on drive A comes on briefly; then the message shown in figure 3.1 appears.

```
A>DISKCOPY A: B:

Insert SOURCE diskette in drive A:

Insert TARGET diskette in drive B:

Press any key when ready . . .
```

Fig. 3.1. *The prompt for DISKCOPY.*

For the copying process, the *source disk*, or the disk that you want to copy, is the master in drive A. The *target disk*, or the disk you want to write on, is the blank disk in drive B. If you inserted the disks in the drives correctly before you typed **DISKCOPY**, you have nothing more to do at this point. If you have not inserted a blank disk into drive B, do so now.

When the DOS message says `Press any key when ready`, it really means, "Press *almost* any key." If you press the Shift, Alt, Caps Lock, Num Lock, or Scroll Lock key, DOS ignores your action and continues to wait. If you press the system reset keys (Ctrl-Alt-Del), your computer reboots, so don't press that combination unless you really want a system reset.

Replace the *DOS Working Disk* in drive A with one of your DOS master disks. If you are using DOS V3.1 or V3.2, insert the disk labeled *DOS*. DOS V3.3 users with 5 1/4-inch disks should insert the *Startup* disk, while 3 1/2-inch disk users should insert the *Startup/Operating* disk. DOS V4.0 and V4.01 users should insert the 5 1/4-inch or 3 1/2-inch *Install* disk.

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Step 4: To start the copying process, press any key other than those just mentioned. The space bar and the Enter key are two easy keys to press when DOS gives you the choice, but any letter or number key will do.

If your disk drives are not identical, an error message is displayed (see fig. 3.2). Disk drive incompatibility is usually found only on the IBM AT, PS/2, or compatibles. If this error appears, press N to exit the copy program and follow the instructions found in this lesson in the section "Using a Microcomputer with a Hard Disk or One Floppy Disk Drive."

```
A>DISKCOPY A: B:

Insert SOURCE diskette in drive A:

Insert TARGET diskette in drive B:

Press any key when ready . . .

Drive types or diskette types
not compatible

Copy process ended

Copy another diskette (Y/N)?
```

Fig. 3.2. *The DISKCOPY error message.*

Most disk drives are identical. Within 10 to 50 seconds, the light on drive A goes out, and the light on drive B comes on. The screen output usually resembles that shown in figure 3.3. The tracks and sectors available on your disk drive may be different from those shown in the figure. If you are using DOS V4.0 for the disk copying process, the message shows the percentage of the disk formatted rather than the number of tracks and sectors formatted.

```
A>DISKCOPY A: B:

Insert SOURCE diskette in drive A:

Insert TARGET diskette in drive B:

Press any key when ready . . .

Copying 80 tracks
18 Sectors/Track, 2 Side(s)

Formatting while copying
```

Fig. 3.3. *The DISKCOPY in progress message.*

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The message in figure 3.3 tells you that DOS is preparing the blank disk to hold the information to be transferred from the master disk in drive A. While the data is being copied, the drive lights may go on and off a number of times, depending on the amount of RAM in your computer.

If you're using single-sided disks, the message says `1 Side(s)` rather than `2 Side(s)`.

After DISKCOPY has finished copying the disk, you see the message shown in figure 3.4. The prompt asks whether you want to copy another disk.

```
Copy complete

Copy another diskette (Y/N)?
```

Fig. 3.4. *The DISKCOPY complete message.*

Step 5: Press N for No.

Notice that you do not have to press the Enter key after Y or N. The `A>` reappears.

You have just made a copy of the DOS master disk.

Step 6: Remove the copy from drive B and label the disk.

Take one of the blank paper labels that came with your disks and write the name of the disk on the label. Copy the name from the original disk, adding the words *backup copy*. For example, if you copied the DOS V4.0 Install disk, write on the label *DOS V4.0 Install backup copy*. Place the label on an upper corner of the disk.

If you are using a 5 1/4-inch minifloppy disk, it's a good idea to place a write-protect label (one of the small special labels that come with a box of disks) over the notch on the outside edge of the disk. If you are using a 3 1/2-inch microfloppy disk, turn the disk over and slide the small notch in the lower right corner to expose the opening for write-protection.

Write-protection prevents you from changing or writing on your DOS master disk copy. Notice that the original DOS master disk does not have a write-protect notch, which means that the disk cannot be written on or edited.

Remove from drive A your original DOS disk, put it in its envelope, and store the disk in a safe place. This way, you can use the copy of the master rather than the original and save the master disk—just in case.

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If you have more than one DOS disk, follow the above steps to make backup copies of the other DOS disks. At Step 3, however, you will insert one of the other DOS disks, rather than the one you just copied. For example, if you have 5 1/4-inch DOS V3.3 disks, replace the *DOS Working Disk* in drive A with the *Operating* disk.

If you use one disk drive, the following section can help you practice the copy procedure on your machine. If you have finished working with the copy procedure, you can skip several pages to "Stopping a Program from Running."

Using a Microcomputer with a Hard Disk or One Floppy Disk Drive

Step 1: Start DOS by booting the system.

If you did not turn off the computer after Lesson 2, your system is already booted. If your computer is off, follow the steps in Lesson 2 to start DOS, and then proceed with Step 2.

Step 2: With your *DOS Working Disk* in drive A, type the following after the A>:

DISKCOPY A: A:

or

DISKCOPY

(You can perform the same task by typing either command because you are using the same disk drive to make the copy.)

In most cases, whether you use upper- or lowercase letters doesn't matter, but at times the distinction is important. (This book uses uppercase letters for all commands.) For now, type all your commands in capital letters. (If you press the Caps Lock key, all the letters you enter will be capitals. When you want to return to lowercase, press Caps Lock again.)

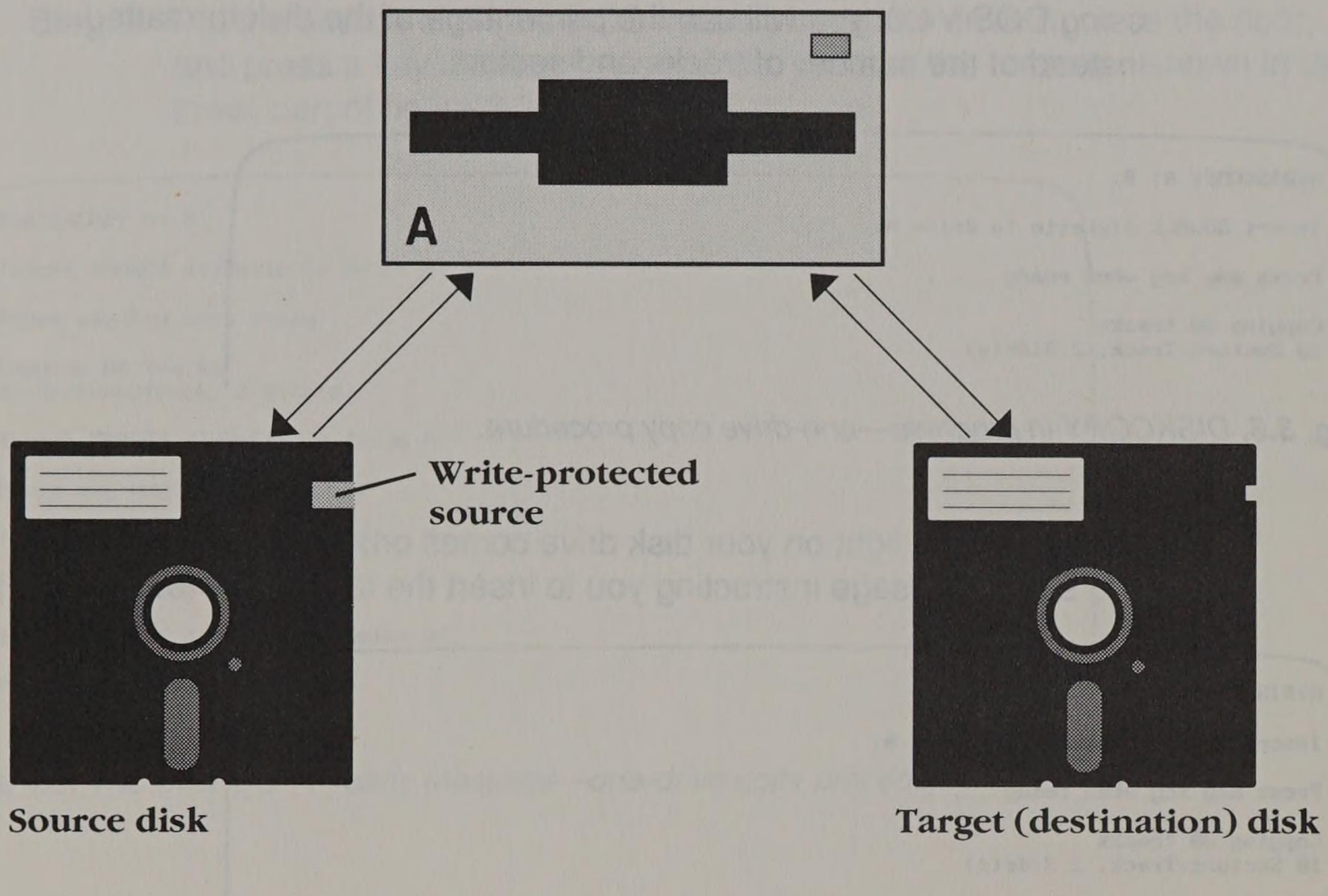
Be sure to leave a single space after DISKCOPY and after the first A:. If you omit the spaces, DOS does not understand the command, and an error message appears on the screen.

Step 3: Press the Enter key after typing the command.

On the screen you see the message shown in figure 3.5.

The *source disk* in this case is one of the DOS master disks. When DOS says `Press any key when ready`, the message really means, "Press *almost* any key." If you press the Shift, Alt, Caps Lock, Num Lock, or Scroll Lock key, DOS ignores your action and continues to wait.

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```
A>DISKCOPY

Insert SOURCE diskette in drive A:

Press any key when ready . . .
```

Fig. 3.5. *The DISKCOPY prompt that appears during the one-drive copy procedure.*

Replace the *DOS Working Disk* in drive A with one of your DOS master disks. If you are using DOS V3.1 or V3.2, insert the disk labeled *DOS*. DOS V3.3 users with 5 1/4-inch disks should insert the *Startup* disk, while 3 1/2-inch disk users should insert the *Startup/Operating* disk. DOS V4.0 and V4.01 users should insert the 5 1/4-inch or 3 1/2-inch *Install* disk.

Step 4: Press any key other than those just mentioned to start the copying process. The space bar and the Enter key are two easy keys to press when DOS gives you this choice. You see the message shown at the bottom of figure 3.6. The number of tracks and sectors may differ, however, depending on the type of drive your computer has. If you are

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using DOS V4.0, you will see the percentage of the disk formatted instead of the number of tracks and sectors.

```
A>DISKCOPY A: B:

Insert SOURCE diskette in drive A:

Press any key when ready . . .

Copying 80 tracks
18 Sectors/Track, 2 Side(s)
```

Fig. 3.6. *DISKCOPY in progress—one-drive copy procedure.*

Notice that the light on your disk drive comes on. In 10 to 30 seconds, you see a message instructing you to insert the target disk (see fig. 3.7).

```
A>DISKCOPY A: B:

Insert SOURCE diskette in drive A:

Press any key when ready . . .

Copying 80 tracks
18 Sectors/Track, 2 Side(s)

Insert TARGET diskette in drive A:

Press any key when ready . . .
```

Fig. 3.7. *The DISKCOPY prompt to insert target disk—one-drive copy procedure.*

Step 5: Take the DOS disk out of the drive, put in a blank disk, close the door, and press a key.

DOS is now preparing your disk to hold information from the DOS master disk. You see the message shown in figure 3.8.

```
A>DISKCOPY A: B:

Insert SOURCE diskette in drive A:

Press any key when ready . . .

Copying 80 tracks
18 Sectors/Track, 2 Side(s)

Insert TARGET diskette in drive A:

Press any key when ready . . .

Insert SOURCE diskette in drive A:

Press any key when ready . . .
```

Fig. 3.8. *The DISKCOPY prompt to insert source disk—one-drive copy procedure.*

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Step 6: Put the source disk (the DOS master) back into drive A, close the door, and press a key. After a few seconds, you see the message shown in the lower part of figure 3.9.

```
A>DISKCOPY A: B:

Insert SOURCE diskette in drive A:

Press any key when ready . . .

Copying 80 tracks
18 Sectors/Track, 2 Side(s)

Insert TARGET diskette in drive A:

Press any key when ready . . .

Insert SOURCE diskette in drive A:

Press any key when ready . . .

Insert TARGET diskette in drive A:

Press any key when ready . . .
```

Fig. 3.9. *The DISKCOPY ready message—one-drive copy procedure.*

The messages may appear again once or twice. If they do, exchange disks each time and press a key.

When DOS has completed copying the disk, you see the message shown in figure 3.10.

```
Copy complete

Copy another diskette (Y/N)?
```

Fig. 3.10. *The DISKCOPY complete message.*

When you have copied all the disks you want, press N for No. The A> prompt appears.

Step 7: Label the copy of your DOS master disk.

Take one of the blank paper labels that came with your disks and write the name of the disk on the label. Copy the name from the original disk, adding the words *backup copy*. For example, if you copied the DOS V4.0 Install disk, write on the label *DOS V4.0 Install backup copy*. Place the label on a upper corner of the disk.

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If you are using a 5 1/4-inch minifloppy disk, it's a good idea to place a write-protect label (one of the small special labels that come with a box of disks) over the notch on the outside edge of your disk. If you are using a 3 1/2-inch microfloppy disk, turn the disk over and slide the small notch in the lower right corner to expose the opening for write-protection.

If you have more than one DOS disk, follow the above steps to make backup copies of the other DOS disks. At Step 3, however, you will insert one of the other DOS disks, rather than the one you just copied. For example, if you have 5 1/4-inch DOS V3.3 disks, replace the *DOS Working Disk* in drive A with the *Operating* disk.

If you want to go on to the next lesson, put your copy of the DOS master disk into the disk drive. If you want to stop at this point, turn off your computer.

Stopping a Command from Running

Suppose that you start the copying process with the DISKCOPY command but decide to stop the command before it finishes running. Two reasons why you may need to stop a command are given here:

1. You realize that you don't have the correct source disk in drive A.
2. You realize that you don't have a blank disk in drive B.

   Note: If you accidentally put a used disk into drive B as the target disk, the source disk is copied onto the disk in drive B—right over the files that were there. All the information you had on that disk is wiped out. If you no longer want the files on that disk, you can write over them; but the former data is erased. To keep this loss from happening, make sure that all your disks are labeled.

In the first part of this lesson, you learned how to copy disks, and you made a copy of your DOS master disk. In this exercise, you learn the most common mistakes made while copying, and you learn how to stop the copy process once you've given the command.

Step 1: Repeat Steps 1, 2, and 3 of the copy process.

Step 2: When you see the message `Press any key when ready`, press the following keys: Shift, Alt, Caps Lock, Num Lock, and Scroll Lock. Notice that nothing happens; DOS does not respond to these keys.

Step 3: Now, instead of pressing "any" key, press Ctrl-C or Ctrl-Break.

On the screen, you see `^C`. Both Ctrl-C and Ctrl-Break tell DOS to stop the command and take control of the system. You know that DOS has taken over when you see the `A>` on the screen.

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Ctrl-C and Ctrl-Break are panic buttons. They can be used when things go drastically wrong, such as when you put the wrong disk into a drive, use the wrong file, or invoke the wrong command. You should be able to stop any program by pressing Ctrl-C or Ctrl-Break. If neither of these panic buttons works, you may have to turn the computer off and then on again.

SUMMARY OF CONCEPTS FOR LESSON 3

1. Using the DISKCOPY command, you can copy an entire disk so that you have backup copies of important files.
2. The DISKCOPY process automatically formats a blank disk before DOS copies information from the source disk (the disk in drive A) to the target disk (the disk in drive B). The DISKCOPY process also destroys all the information on the target disk, so be sure that you have in drive B a blank disk or one with information you no longer want.
3. Ctrl-Break and Ctrl-C (^C) are panic buttons used to stop programs from running.

For Further Reference

If you would like to read further about copying disks, consult *Using DOS*, by David Solomon (Que Corporation, Carmel, IN, 1989), Chapter 5.

SUMMARY EXERCISE FOR LESSON 3

Practice what you have learned in Lesson 3: Copy the additional DOS disks before proceeding to the next lesson.

When the copy process is complete, be sure to label the copy of the original disk.

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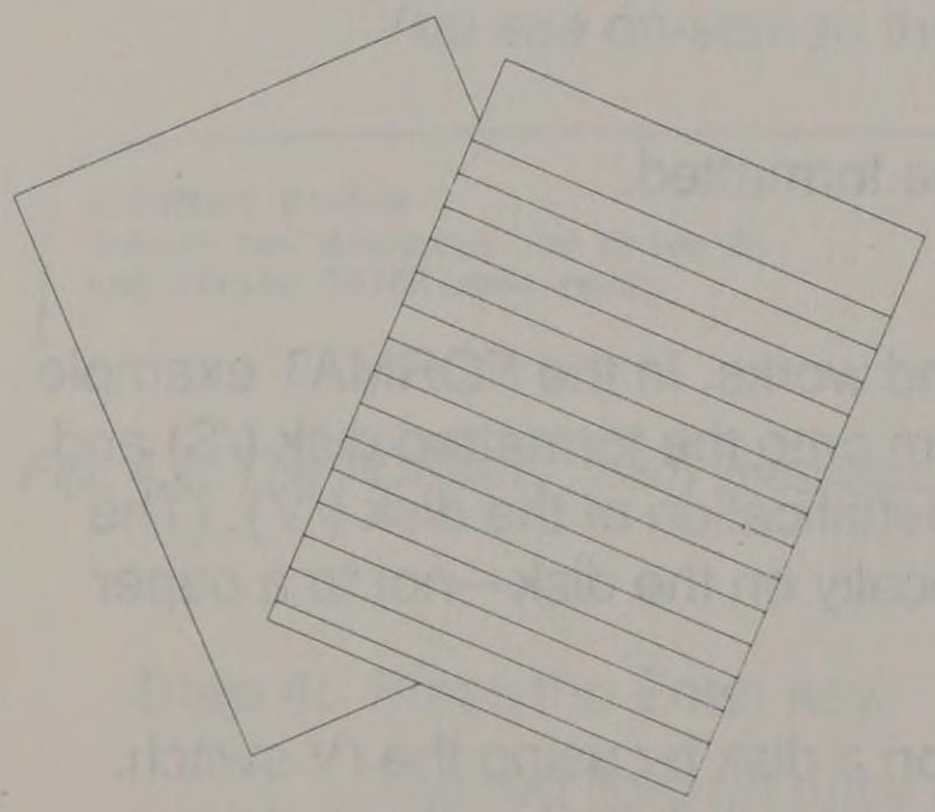
LESSON

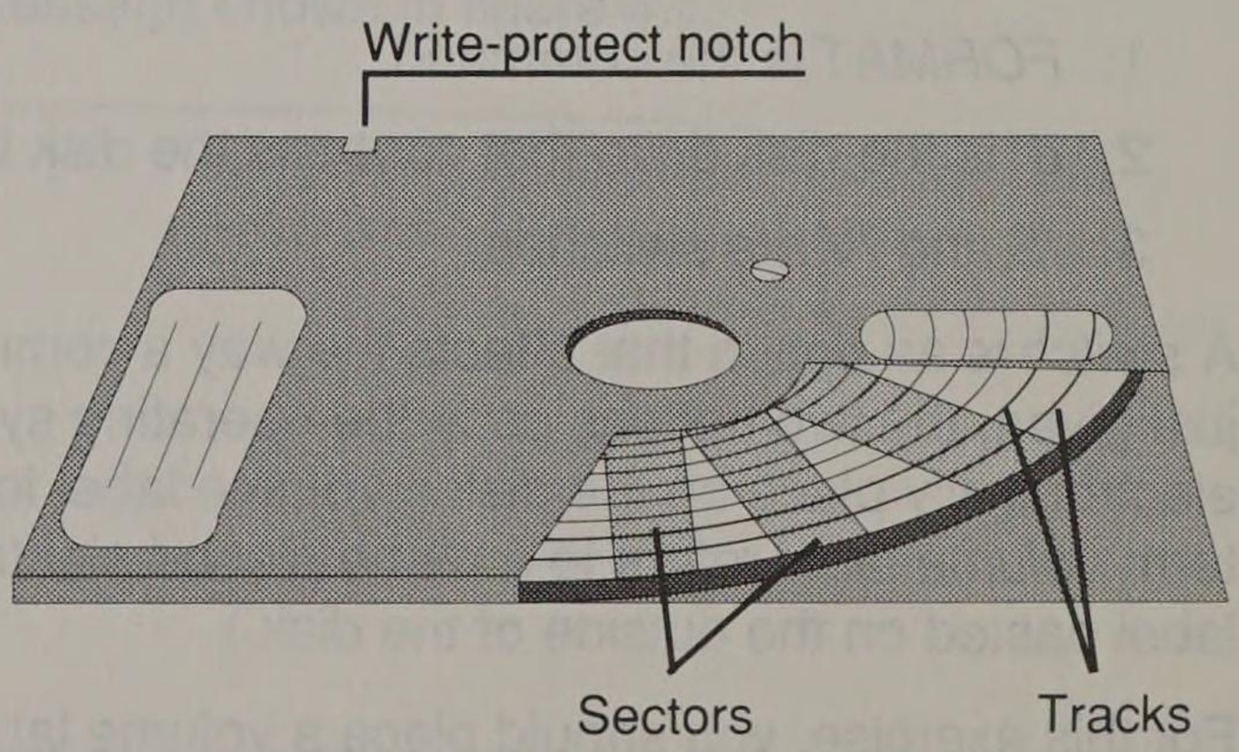
4

Formatting Disks

In Lesson 3, you learned to copy disks and to make backup copies of your DOS disks. In addition to copying disks, you need to know how to prepare blank disks to receive the information you plan to enter, such as spreadsheets, databases, and files containing correspondence. The process of preparing disks to receive information is called *formatting* or *initializing*.

Before a disk is formatted, it is nothing more than a round piece of plastic coated in magnetic material held in a plastic jacket; but once formatted, the disk can store any information you send to it. Formatting prepares the disk to store your information. Blank unformatted disks are comparable to unlined paper. Just as the lines on the paper are guides for the reader, the tracks and sectors on the disk serve as guides for the computer.





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When you were working with Lesson 3, "Copying disks," you saw the message `Formatting while copying`. In that case, the formatting was automatically done as part of the copy process. At times, however, you won't want to copy information, but you will need to prepare a new disk to receive files you will be creating. You also may want to erase a disk holding files you no longer need. In either case, you can use the FORMAT command.

In this lesson, you learn how to do the following:

- Format blank disks
- Erase disks
- Use switches
- Assign volume labels

Formatting and Erasing Procedures

The formatting procedure erases everything on the disk being formatted. A blank disk, of course, has nothing to erase; but if you format a disk that has been used, everything stored on that disk is erased—whether you want it to be or not. So be careful not to format a disk containing files you want to keep. Once again, make sure that all your disks are labeled clearly.

The basic syntax of the FORMAT command is as follows:

```
FORMAT d:
```

In this lesson, you add to the command these switches:

```
FORMAT d:/S/V
```

This command statement consists of the following parts:

1. *FORMAT* is the command.
2. *d:* is the disk drive that contains the disk to be formatted.
3. */S* and */V* are switches.

A *switch* is an option that affects the way a command works. In the FORMAT example just given, the two options copy the operating system onto the formatted disk (/S) and electronically place on the disk a volume label for identification of the disk (/V). (The term *volume label* refers to a name placed electronically on the disk—not to a paper label pasted on the outside of the disk.)

For this exercise, you should place a volume label on a disk by using the /V switch. The use of a volume label permits quick identification of a disk. Later, if you do not want to add the operating system or a volume label to a formatted disk, do not use these switches.

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The /S switch is necessary to create a bootable disk that contains the operating system. Without the /S option, you can't boot a formatted disk. Disks without the operating system are used primarily for data storage. On computers without a hard disk, the data diskettes are generally used in drive B. On computers with a hard disk, the hard disk is usually the bootable disk, and drive A is used to save the data. Generally, you do not use the /S switch on computers with a hard disk.

Use the correct type of disk for your disk drive. DOS does support a lower-density disk in a higher-density drive, but not a higher-density disk in a lower-density drive. For example, a 5 1/4-inch, 1.2M disk drive will support both a 360K diskette and a 1.2M diskette. However, a 5 1/4-inch, 360K disk drive will only support a 360K diskette, not a 1.2M diskette.

If you have two disk drives, follow the steps outlined in the next section to format or erase disks.

If you have one disk drive, with or without a hard disk, follow the steps provided in the section "Using a Microcomputer with a Hard Disk or One Disk Drive."

Using a Microcomputer with Two Disk Drives

Step 1: Place into drive A the *DOS Working Disk* and boot DOS.

You know you're ready to proceed when you see the A> on the screen.

Step 2: Place into drive B the disk you want to format (or erase).

Step 3: Type **FORMAT B:/S/V** and press Enter.

(Remember, you do not have to include either of the switches. If you want to format a disk without the options, type **FORMAT B:** and press Enter. For now, however, include the switches.)

You see on-screen the message shown in figure 4.1.

```
A>FORMAT B:/S/V
Insert new diskette for drive B:
and strike ENTER when ready
```

Fig. 4.1. *The FORMAT ready message.*

Step 4: Press the Enter key.

The red light on drive B comes on, and you see the message shown in figure 4.2.

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```
A>FORMAT B:/S/V
Insert new diskette for drive B:
and strike ENTER when ready

Head:   1 Cylinder:    1
```

Fig. 4.2. *The FORMAT in progress message.*

The number of heads and cylinders constantly changes to reflect the part of the disk being formatted. The number corresponding to the head tells you which side of the disk is being formatted. The cylinder or track shows which track is being formatted. (Versions of DOS earlier than V3.2 do not display these numbers. DOS V4 shows the percentage of the disk that has been formatted.)

After 20 to 40 seconds, you see the message shown in figure 4.3.

```
A>FORMAT B:/S/V
Insert new diskette for drive B:
and strike ENTER when ready

Format complete
```

Fig. 4.3. *The FORMAT complete message.*

The disk drive continues to spin for a few more seconds. Then the statement shown at the bottom of figure 4.4 appears.

```
A>FORMAT B:/S/V
Insert new diskette for drive B:
and strike ENTER when ready

Format complete
System transferred
```

Fig. 4.4. *The System transferred message.*

This message tells you that the operating system has been transferred to the disk. In other words, the purpose of the /S switch has been accomplished.

Next, a prompt asks you for a volume label (see fig. 4.5). In DOS V3.3 and earlier, this is because you used the /V switch. In DOS V4, this is

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either because you didn't use the /V switch at all, or you didn't use the full switch option /V:*label*, where *label* is the name you want to assign to the disk.

```
A>FORMAT B:/S/V
Insert new diskette for drive B:
and strike ENTER when ready

Format complete
System transferred

Volume label (11 characters, ENTER for none)?
```

Fig. 4.5. *The Volume label prompt.*

Step 5: Type **PRAC DISK 1** and press Enter. When you format on your own, you can add a volume label of your choice—up to 11 characters, including spaces. If you do not want a volume label, just press the Enter key.

The disk spins; then DOS tells you how much information the disk can hold, how much space is being used, and how much space is left. You see a message similar to the one shown in figure 4.6.

```
362496 bytes total disk space
 78848 bytes used by system
283648 bytes available on disk
```

Fig. 4.6. *The Status message.*

What you see depends on the system you have. The byte count may be higher or lower, depending on the type of disk and disk drive you are using.

If you are using DOS V4, you see a slightly different message (see fig. 4.7).

```
1213952 bytes total disk space
 107520 bytes used by system
1106432 bytes available on disk

    512 bytes in each allocation unit
   2161 allocation units available on disk

Volume Serial Number is 0F2A-17E2
```

Fig. 4.7. *The Status message for DOS V4.*

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As in the earlier versions of DOS, this message shows the number of bytes on the disk, the number in use by the system files, and the number of free bytes. The next two numbers show a further segregation on the disk.

The bytes of data are arranged on the disk in groups, known as *allocation units* or *clusters*. These two numbers tell you the number of bytes in an allocation unit and the number of allocation units on the disk. If you multiply the number of bytes in an allocation unit by the number of allocation units, you arrive at 1,106,432—the number of bytes available on the disk.

DOS V4 also assigns a serial number to each disk. This number is related to the current time and date. Each time you format a diskette using DOS V4, the disk receives a serial number.

Sometimes you see the message `bytes in bad sectors`, which means that DOS has found parts of the disk that cannot be used to store information. The available space is reduced by the number on this line.

Sometimes, at the beginning of formatting, you see the message `Invalid media or track 0 bad—disk unusable`. This message means that the disk cannot be used at all.

If you have a disk with a bad sector, you can have your dealer replace the disk, or you can use the disk with less storage space. Defective disks with a bad 0 track must be replaced or thrown away. Before you do either, however, try reformatting the disk. Some disks do not format properly the first time, but they may format with a second try.

When you see the message shown in the lower part of figure 4.8, you have two options: to terminate the formatting session—press N for No—or to format another (or reformat the same) disk—press Y for Yes.

```
    362496 bytes total disk space
     78848 bytes used by system
    283648 bytes available on disk

Format another (Y/N)?
```

Fig. 4.8. *The FORMAT request.*

Press Y if you want to try to reformat a disk with a bad sector or if you want to format another disk. Notice that you do not have to press Enter. If you're reformatting a disk with a bad sector, take the disk partially out of the drive, reinsert the disk, close the door, and press a key. If you want to

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format another disk, remove the formatted disk and place the next one to be formatted into drive B, and then repeat Steps 4 and 5.

You can format an unlimited number of disks with one FORMAT command, so you may save time by formatting a large number of disks at once. That way, you'll always have a supply of formatted disks ready to use.

Step 6: Press N for No if you do not want to format another disk. You do not have to press the Enter key. The A> reappears.

Now that you have formatted disks that contain a copy of DOS, you are ready to begin creating your own files on the formatted disk. Lesson 5 tells you what you need to know about using DOS to create and name files.

Using a Microcomputer with a Hard Disk or One Disk Drive

Formatting destroys all data on a disk. You must be extremely careful when you use this command, especially if your system has a hard disk. Hard disks contain large amounts of data that may be difficult to replace if the disk is formatted accidentally. Be careful to specify only drive A or B when you format. If you do accidentally specify your hard disk, you see an extra warning message.

To format a disk on a computer with a hard disk or one disk drive, follow these steps:

Step 1: Put into drive A your *DOS Working Disk* and boot DOS. You are ready to begin formatting when you see the A> on the screen.

Step 2: Type **FORMAT A:/S/V** and press Enter.

Remember, either or both of the switches are optional. If you want to format a disk without transferring the operating system or assigning a volume label, type only **FORMAT A:** and press Enter. For now, however, include the switches. In DOS V4, you can omit the /V if desired for this exercise, because DOS prompts you for a volume label unless you use the full label switch discussed later.

After you enter the FORMAT command, the red light on the disk drive comes on. Then you see the message shown in figure 4.9.

```
A>FORMAT A:/S/V
Insert new diskette for drive A:
and strike ENTER when ready
```

Fig. 4.9. *The FORMAT prompt—one-drive format procedure.*

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Step 3: Take the *DOS Working Disk* out of drive A, put a blank disk into the drive, and press the Enter key.

The red light comes on again, and you see the message shown in figure 4.10.

```
A>FORMAT A:/S/V
Insert new diskette for drive A:
and strike ENTER when ready

Head:   1 Cylinder:    1
```

Fig. 4.10. *The FORMAT in progress message—one-drive format procedure.*

The number of heads and cylinders constantly changes to reflect the part of the disk being formatted. The number corresponding to the head tells you which side of the disk is being formatted. The cylinder or track shows which track is being formatted. (Versions of DOS earlier than V3.2 do not display these numbers. DOS V4 shows the percentage of the disk that has been formatted.)

After 20 to 40 seconds, you see the message shown in figure 4.11.

```
A>FORMAT A:/S/V
Insert new diskette for drive A:
and strike ENTER when ready

Format complete
```

Fig. 4.11. *The FORMAT complete message—one-drive format procedure.*

The disk drive continues to spin for a few more seconds. Then the statement shown at the bottom of figure 4.12 appears.

```
A>FORMAT A:/S/V
Insert new diskette for drive A:
and strike ENTER when ready

Format complete
System transferred
```

Fig. 4.12. *The System transferred message—one-drive format procedure.*

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This message tells you that the purpose of the /S switch has been accomplished and that the operating system has been transferred to the disk.

The next prompt asks you for a volume label. In DOS V3.3 and earlier, this is because you used the /V switch. In DOS V4, the prompt asks you for a volume label because either you didn't use the /V switch at all or you didn't use the full switch option /V:*label*, where *label* is the name you want to assign to the disk.

Step 4: Type **PRAC DISK 1**, as shown in figure 4.13, and press Enter.

```
A>FORMAT A:/S/V
Insert new diskette for drive A:
and strike ENTER when ready

Format complete
System transferred

Volume label (11 characters, ENTER for none)? PRAC DISK 1
```

Fig. 4.13. *The Volume label prompt—one-drive format procedure.*

When you format on your own, you can add a volume label of your choice—up to 11 characters long, including spaces. If you do not want a volume label, just press the Enter key.

The disk spins; then DOS tells you how much information the disk can hold, how much space is being used, and how much space is left. You see a message similar to the one shown in figure 4.14.

```
A>FORMAT A:/S/V
Insert new diskette for drive A:
and strike ENTER when ready

Format complete
System transferred

Volume label (11 characters, ENTER for none)? PRAC DISK 1


   1457664 bytes total disk space
     78336 bytes used by system
   1379328 bytes available on disk
```

Fig. 4.14. *The Status message—one-drive format procedure.*

The status message showing space varies according to the type of drive you are using. If you are using DOS V4, you see a slightly different message (see fig. 4.15).

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```
1213952 bytes total disk space
 107520 bytes used by system
1106432 bytes available on disk

    512 bytes in each allocation unit
   2161 allocation units available on disk

Volume Serial Number is 0F2A-17E2
```

Fig. 4.15. *The Status message for DOS V4.*

As in the earlier versions of DOS, this message shows the number of bytes on the disk, the number in use by the system files, and the number of free bytes. The next two numbers show a further segregation on the disk.

The bytes of data are arranged on the disk in groups, known as *allocation units* or *clusters*. These two numbers tell you the number of bytes in an allocation unit and the number of allocation units on the disk. If you multiply the number of bytes in an allocation unit by the number of allocation units, you arrive at 1,106,432—the number of bytes available on the disk.

DOS V4 also assigns a serial number to each disk. This number is related to the current time and date. Each time you format a diskette using DOS V4, the disk receives a serial number.

You sometimes see the message `bytes in bad sectors`, which means that DOS has found parts of the disk that are bad and cannot be used to store information.

The amount of space you can use is reduced by the number of bytes shown on the bad-sector line. If you have a disk with a bad sector, you can have your dealer replace the disk, or you can use the disk with less storage space. Before you do either, however, try reformatting the disk. Some disks do not format properly the first time, but they may the second time.

When you see the message shown in the lower part of figure 4.16, you have two options: to terminate the formatting session—press **N** for No—or to format another disk (or reformat a bad disk)—press **Y** for Yes.

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```
A>FORMAT A:/S/V
Insert new diskette for drive A:
and strike ENTER when ready

Format complete
System transferred

Volume label (11 characters, ENTER for none)? PRAC DISK 1


   1457664 bytes total disk space
     78336 bytes used by system
   1379328 bytes available on disk

Format another (Y/N)?
```

Fig. 4.16. *The FORMAT request—one-drive format procedure.*

Step 5: Press Y if you want to reformat a disk with a bad sector, or if you want to format another disk. Notice that you do not have to press Enter.

If you are reformatting a disk with a bad sector, take the disk partially out of the drive, reinsert the disk, close the door, and press a key. If you are formatting another disk, take the formatted disk out of drive A and insert the next disk you want to format. Then repeat Steps 4 and 5.

You can format a large number of disks with one FORMAT command. That way, you'll have a supply of formatted disks ready to use. This suggestion becomes much more relevant when you get to Lessons 13 and 14, which explain how to back up your hard disk.

Step 6: Press N if you do not want to format another disk. You do not have to press the Enter key. The `A>` reappears.

Now that you have formatted a disk that holds a copy of DOS, you are ready to begin creating and naming your own files. In Lesson 5 you learn how.

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SUMMARY OF CONCEPTS FOR LESSON 4

1. Before a new disk can be used to store information, the disk must be formatted with the FORMAT command.
2. The FORMAT command also can be used to erase all information from a used disk.
3. Switches may be used with the FORMAT command to add options. For example, /S tells DOS to add the operating system to the disk being formatted.
4. The message `bytes in bad sectors` tells you that some parts of the disk are bad and cannot be used to store information. If you choose to use a disk with bad sectors, you can expect reduced storage space.

For Further Reference

If you would like to read further about formatting disks, consult *Using DOS*, by David Solomon (Que Corporation, Carmel, IN, 1989), Chapter 6.

SUMMARY EXERCISE FOR LESSON 4

You need at least three formatted practice disks to carry out the examples and exercises in later lessons. You have already created one practice disk and assigned to it the volume label PRAC DISK 1. You also should attach a paper label to the outside of the disk, as you did in Lesson 3 with the disks you copied.

Practice what you learned in Lesson 4: Format two more disks before proceeding to the next lesson. For DOS V3.3 and earlier, use /S to put the operating system on each disk and /V to assign volume labels. For DOS V4, use /S to put the operating system on each disk and /V:*label* to assign volume labels. Assign the volume labels PRAC DISK 2 and PRAC DISK 3. For DOS V4, the command to format and label the first disk is as follows:

```
FORMAT A:/S/V:PRAC DISK 2
```

When you're finished formatting, attach a paper label to the outside of each disk.

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Naming Disk Drives, Disks, and Files

Once you know how to boot DOS and are able to copy and format disks, you're ready to create your own files. Although you will usually create files by using an applications program (a word processing program like WordPerfect, a spreadsheet program like 1-2-3, or a database program like dBASE IV), you also can create files and store information by using your DOS master disk. DOS contains a built-in line editor, called EDLIN. Although not as sophisticated or powerful as word-processing programs, EDLIN does allow you to create and edit files.

This lesson explains the principles behind naming disk drives, disks, and files. It also stresses the importance of careful and correct naming. Understanding these principles will enable you to use DOS more fully and help you understand the naming conventions of applications programs you use.

When you create your own files, you should be familiar with three different kinds of names: disk drive names, volume labels, and file names. In this lesson, you learn how to do the following:

- Name disk drives
- Assign volume labels
- Name files
- Create and edit files with EDLIN

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Disk Drive Names

Your disk drives, whether you have two floppy disk drives or one hard and one floppy disk drive, already have unique names. A disk drive name is two characters long: the first character is always a letter, and the second is always a colon (:). The colon is extremely important, because it tells DOS that you're naming a disk drive rather than a file.

If your computer has two floppy disk drives, the first one (on the left, or top) is called A:, and the second one (on the right, or bottom), B:. If your computer has more than two disk drives, the subsequent drive names follow the letters of the alphabet: C:, D:, E:, and so on.

If you have one floppy disk drive or one floppy and one hard disk, the floppy drive functions as two drives. In the lessons on copying and formatting, you see that a system with one disk drive uses it alternately as drive A and drive B.

Finally, if your system has one floppy disk drive and one hard disk drive, the hard disk is drive C. For example, an XT, AT, or PS/2 owner who wants to refer to the hard disk drive uses the drive name C:.

Why should you know about drive names? When you use the disk drive name before a program name or a file name, you are telling DOS which disk to read to find your program and files. Also, almost any time you specify a file name, the disk drive name precedes the file name. In many cases, when you tell DOS to run a program from a disk, the program name is preceded by the name of the drive.

To practice using different disk drives and shifting drives, work through the following steps.

Note: The following directions are written for a computer with two floppy disk drives. If you have a hard disk, substitute C: everywhere you see B: in the steps. If you have more than two drives, practice with all the drives by using the appropriate letters.

Step 1: Put the *DOS Working Disk* into drive A and a new disk formatted in Lesson 4 into drive B. Boot DOS.

When you see the A> on the screen, you know that you have successfully booted your system and are ready to proceed. The A> tells you that drive A is the currently logged disk drive. If you do not specify a different drive, DOS automatically uses the current drive.

To change the currently logged disk drive (also called the *default* or *logged* drive), type the name of the new drive, followed by a colon. Then press the Enter key.

The following steps change from drive A (the current disk drive), to drive B (or C if you have a hard disk).

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Step 2: After the A>, type **B:** and press Enter (or type **C:** if you have a hard disk).

The system prompt changes to B> (or to C> if you have a hard disk).

Step 3: After the system prompt, type **A:** and press Enter.

This action changes the currently logged drive back to A.

Usually, you change disk drives with a program you want to run or a file you want to retrieve. You learn how this works in the next lesson.

If you have additional disk drives, try changing to a drive other than drive A or B. But don't ask for a disk drive you don't have. If you do, you will receive an error message.

Guidelines for Naming Disk Drives

1. A disk drive must have a two-character name: the first character is a letter; the second, a colon.
2. The first disk drive is A, the second disk drive is B, and so on. The first hard disk drive, if you have one, is C.
3. When you tell DOS to run a program, the program name may be preceded by the disk drive name.
4. When you specify a file name, the name of the disk drive should precede the file name—unless the file is in the currently logged drive.
5. Be sure to use an existing disk drive. If you name a nonexistent disk drive, DOS displays an error message.

Volume Labels

A *volume label* is a name given electronically to a disk for grouping or identifying purposes. DOS displays the label when you ask for the directory of a disk, check the disk (with the CHKDSK command), display the directory path (with the TREE command), or issue one of a variety of other commands.

As explained in Lesson 4, the volume label switch (/V) is used with the FORMAT command. Recall that when you format a disk with the /V option, DOS asks for an 11-character volume label after the program has formatted the disk. In DOS V4, you are prompted for a label if you don't use the /V switch, unless you use the full /V:*label* switch. This volume label can easily be checked with the VOL command. Volume labels can be created, changed, or deleted with the LABEL command. Practice using the VOL and LABEL commands by following these steps:

Step 1: Make sure that you have changed back to the A drive and that the system prompt displays A>.

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Step 2: To check the volume name of the disk you formatted in Lesson 4, type **VOL B:** and press Enter.

If you entered a volume label in Lesson 4, the screen shown in figure 5.1 is displayed. With DOS V4, the volume serial number is displayed also.

```
A>VOL B:

 Volume in drive B is PRAC DISK 1

A>
```

Fig. 5.1. *The volume label message for drive B.*

Step 3: Check the volume label of the *DOS Working Disk*. Insert the disk into drive A, type **VOL A:**, and press Enter.

Because this disk does not have a label, you should see the message in figure 5.2.

```
A>VOL A:

 Volume in drive A has no label

A>
```

Fig. 5.2. *The volume label message for drive A.*

Step 4: You can give a volume label to the disk in drive A by typing **LABEL A:** and pressing Enter.

You see the prompt shown in figure 5.3.

```
A>LABEL A:

Volume in drive A has no label

Volume label (11 characters, ENTER for none)?
```

Fig. 5.3. *The volume label prompt.*

Step 5: DOS prompts you to enter the volume label to be assigned to this disk. If you press Enter without providing a label name, no volume name is assigned. You can use almost any sequence of characters in assigning a volume label, except for the following special characters:

* ? / \ | . , ; : + = < > [ ] Esc Tab

To provide a volume label, type **DOS WORKING** and press Enter.

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Guidelines for Volume Labels

1. You can give only one volume label to a disk.
2. You can assign the volume label as part of the formatting process, or using the LABEL command.
3. The 11-character volume label is the only name that can include a space.

File Names

A *file* is a collection of similar data items. Like a file folder in a filing cabinet, a file on a disk contains information about a particular subject, such as names and addresses of clients, financial information, inventory records, or correspondence. And just as files in the filing cabinet are labeled and arranged to help you find information easily, files on your computer disks and the information within those files can be organized for maximum efficiency.

The key to any filing system is the person in charge of the filing system—in this case, the person entering data onto the disks. You have complete control over the way information is arranged on your disks and how easily that information can be accessed. Careful and correct naming can help you efficiently organize and retrieve information. If you name your files well, the file names cue you as to the type of information contained in each file.

When you create a new file, you give it a name. A file name has two parts: a *root name* and an *extension*, or *suffix*. The root name can be one to eight characters long, and the extension can be one to three characters long. The root name is separated from the extension by a period (.). (The period is only used as a separator and is not part of the file name.) Any characters may be used in a file name except these:

[space] + = / [ ] " : ; ? . * < > | \

Note: The characters ? and * are called *wild-card characters*. They have a special meaning for DOS when they are used in file names. The special meaning and the use of ? and * with file names are discussed in Lesson 6.

Consider the following file name stored on the DOS master disk:

COMMAND.COM

The first part of the name, COMMAND, is the root name; the second part of the name, COM, is the extension, or suffix. A period separates the extension from the root name.

Each file stored on the same disk must have a unique name. If you assign the same name to two different files, DOS does not recognize the difference and replaces the previously stored information with the information in the new file.

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If you assign a root name longer than eight characters, DOS stores only the first eight characters as the root name. Any extra characters are stored as the extension. For example, if you create two files containing 1988 and 1989 profit figures, you may call these files PROFITS88 and PROFITS89, respectively. The actual filenames DOS stores are PROFITS8.8 and PROFITS8.9. This may seem acceptable. However, some programs such as Lotus 1-2-3 Release 2.2 assign extensions to filenames. In the case of Lotus 1-2-3 Release 2.2, the extension is WK1. If you save the file PROFITS88, it will be saved with the name PROFITS8.WK1. When you save PROFITS89, it also will be given the name PROFITS8.WK1. The file containing 1988 profit information will be overwritten.

Be careful when you name files. You want the name to be meaningful so that you can easily recall what the file contains by glancing at the name. However, you still must keep within the constraints of DOS file names. If you have an option to give an extension with a file name, do so. For example, you might name your file containing profits for 1989 as PROFITS.89.

Note also that an extension is not always required, but it is often useful for distinguishing files. If you choose not to use an extension, you do not need the period. If you choose to use an extension, choose one that is meaningful. Some common file name extensions are given in table 5.1.

In addition to the files listed in table 5.1, many popular programs create their own special extensions. Some of these programs and their extensions are listed in table 5.2.

Table 5.1
File Extensions

Extension	*Meaning*	*Extension*	*Meaning*
ASM	Assembly language source code	EXE	Executable file
BAK	Backup file	HLP	Help file
BAS	BASIC program file	LET	Letter file
BAT	Batch file	LIB	Program library file
BIN	Binary file	LST	Listing of a program in a file
C	C Source file	PAS	Pascal program file
COM	Command file	SYS	System configuration file
DAT	Data file	TMP	Temporary file
DIF	Data interchange file	TXT	Text file
DOC	Document or documentation file	$$$	Temporary or incorrectly stored file

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Note: Some of these extensions, like BAK and $$$, are automatically assigned to file names by DOS. Do not use these for files that you create.

Table 5.2
Special Extension Names

Extension	*Program*	*Extension*	*Program*
DBF	dBASE II and dBASE III	PIF	Program Interface File (TopView or Windows)
FW	Framework	RBF	R:BASE System V
FW2	Framework II	RBS	R:base 5000
FW3	Framework III	WKS	1-2-3
KEY	ProKey	WK1	1-2-3 R2.01 and R2.2
MAC	Macro file (SuperKey or WordPerfect)	WK3	1-2-3 R3.0
NDX	dBASE III index file	WRK	Symphony
		WR1	Symphony 1.1

The basic format for a file name is as follows:

d:filename.ext

This statement consists of the following parts:

1. *d:* is the name of the disk drive on which the file is stored.
2. *filename* is the root name you're giving to the file.
3. *ext* is the extension.

Examine the following valid file names. Each file name is correctly phrased and has no illegal characters. Notice, however, that although they are all valid, some of the file names do not appear particularly meaningful.

WORKBOOK.TXT	IDEAS
HALPERN.LET	INFO.BAK
CHAPTER1	01234567.890
1989.DAT	ZZZZZ.ZZZ
REQUEST.1	$#&@!&().~~~
REQUEST.2	SALES90.$

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Guidelines for File Names

1. A file name consists of a root name containing one to eight characters, an optional extension (suffix) of one to three characters, and a period between the root name and extension (if used).
2. The characters you may use in a file name are the letters of the alphabet, the numbers 0 to 9, and most special characters and punctuation symbols except those listed in Guideline 3.
3. The characters you may not use in a file name are as follows:

   [space] + = / [ ] " : ; ? . * < > | \

4. Each file name in a directory must be unique.
5. A drive name and path name (the position on the disk, as discussed in Lesson 9) usually precede a file name.

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SUMMARY OF CONCEPTS FOR LESSON 5

1. To make full use of your system, you need to understand the principles behind naming. Three types of names are important: disk drive names, volume labels, and file names.
2. A disk drive must have a two-character name. The first character is a letter (A for the first disk drive, B for the second disk drive, and so on); the second is a colon.
3. When you specify a program name or a file name, you may precede either with the disk drive name. If you do not specify a disk drive, the currently logged disk drive is used.
4. A volume label of 1 to 11 characters may be assigned to each disk while you are formatting. The volume label helps you group and identify disks.
5. A file name has three parts: a root name of 1 to 8 characters, an optional extension of 1 to 3 characters, and a period between the root name and the extension.
6. Each file stored on the same disk must have a unique name. Assigning meaningful names to your files will help you remember the contents of the files.

For Further Reference

If you would like to read further about the naming conventions used by DOS, consult *Using DOS*, by David Solomon (Que Corporation, Carmel, IN 1989), Chapter 5.

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SUMMARY EXERCISES FOR LESSON 5

Exercise A: File Names

Following is a list of possible names you can assign to new files. Identify which are valid and which are invalid. Explain why the invalid file names are incorrect and how DOS would interpret them. Check your answers with those in Appendix C.

	File Name	*Validity*	*Explanation*
1.	NEW FILE	_____	_____
2.	STAFF.MEMO	_____	_____
3.	TXT	_____	_____
4.	MEG.#4	_____	_____
5.	DOSWORKBOOK.CH4	_____	_____
6.	?4CHRIS	_____	_____
7.	SALESVOL.BAK	_____	_____
8.	#83-1542	_____	_____
9.	$5,000+.DAT	_____	_____
10.	GRADES.89	_____	_____

Exercise B: Creating Dummy Files for Practice

If you are a new computer user, you may be using only the disks you have created in the lessons up to this point. For the following lessons, you need several disks containing practice files for the new DOS functions you will learn. In this exercise, you create your own practice disk with dummy files to use in subsequent lessons. At the same time, you learn how to use EDLIN, DOS's built-in text editor.

To create your practice disk, you need your *DOS Working Disk*, which contains the EDLIN program, and the blank disk with the volume label PRAC DISK 1, which you formatted in Lesson 4. If your computer has one floppy and one hard disk drive, use your *DOS Working Disk* and your hard disk.

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To create, edit, and store files, follow these steps:

Step 1: Place your *DOS Working Disk* into drive A and boot DOS, or do a system reset.

Step 2: Place your formatted PRAC DISK 1 disk into drive B if you have a second floppy disk drive. (If you have a hard disk and only one diskette drive, substitute C: for B: in the steps.

Step 3: After the A>, type the following:

EDLIN B:CLIENTS.ADD

If you have a hard disk, type the following:

EDLIN C:CLIENTS.ADD

With this command, you are asking DOS to load the EDLIN line editor and create a file on the disk (in drive B) or on the hard disk (in drive C) called CLIENTS.ADD. If you do not specify the drive, the file is created on the disk in drive A, because drive A is the currently logged drive.

Note: Be sure to leave a space between the name of the program (EDLIN) and the drive (B: or C:), but do not leave a space between the drive and the file name; otherwise, you receive an error message.

Step 4: After you have typed the command correctly, press the Enter key.

When you see the message and prompt shown in figure 5.4, you are ready to begin entering information into the CLIENTS.ADD file.

```
A>EDLIN B:CLIENTS.ADD
New file
*
```

Fig. 5.4. *The EDLIN prompt.*

Step 5: Type **I** (for Insert) and press Enter.

The screen now looks like figure 5.5, indicating that you are ready to add information to this file.

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```
A>EDLIN B:CLIENTS.ADD
New file
*I
        1:*
```

Fig. 5.5. *The EDLIN ready screen.*

Step 6: Type your name on line 1 and press Enter.

On the screen, you see the line shown in figure 5.6, with your name in line 1.

```
A>EDLIN B:CLIENTS.ADD
New file
*I
        1:*SHEILA C. EWING
        2:*
```

Fig. 5.6. *The EDLIN prompt, second line.*

The EDLIN prompt (*) after the number 2 means that you are now ready to enter information in the second line of this file.

Step 7: Type your own address, one line at a time. After typing each line, press Enter. When you are finished, you have a file three, four, or five lines long, containing your name and address. Your screen looks something like the one in figure 5.7.

```
A>EDLIN B:CLIENTS.ADD
New file
*I
        1:*SHEILA C. EWING
        2:*QUE CORPORATION
        3:*11711 N. COLLEGE AVE
        4:*CARMEL, IN 46032
        5:*
```

Fig. 5.7. *An EDLIN file containing one name and address.*

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Although you can continue to add information to this file, this lesson stops with one address and saves the file.

Step 8: Press Ctrl-Break or Ctrl-C to stop inserting lines.

Step 9: Type **E** and press Enter.

E ends EDLIN and saves the edited file.

You have just created a file with the EDLIN line editor, named the file CLIENTS.ADD, and stored it on the disk in drive B or on the hard disk in drive C.

Follow the same nine steps to create two more files. Name one file FAMILY.ADD and enter the name and address of a family member into this file. Name the other file FRIENDS.ADD and enter the name and address of a friend.

Finally, create 10 more dummy files with EDLIN, using the following valid file names:

CHAPTER2.TXT	PROFITS.88
CHAPTER3.TXT	PROFITS.89
ASHE.LET	PROFITS.90
CLANCY.LET	SALES.88
	SALES.89
	SALES.90

If you don't want to enter information into these files, leave them empty by omitting Steps 5, 6, and 7 and following only Steps 1, 2, 3, 4, 8, and 9. When you finish this exercise, you have created and saved 13 files. You use this practice disk and the dummy files in the next several lessons.

If you prefer, you can copy these files from the lessons disk packaged with this workbook. To copy the files from the Lesson disk, follow these steps:

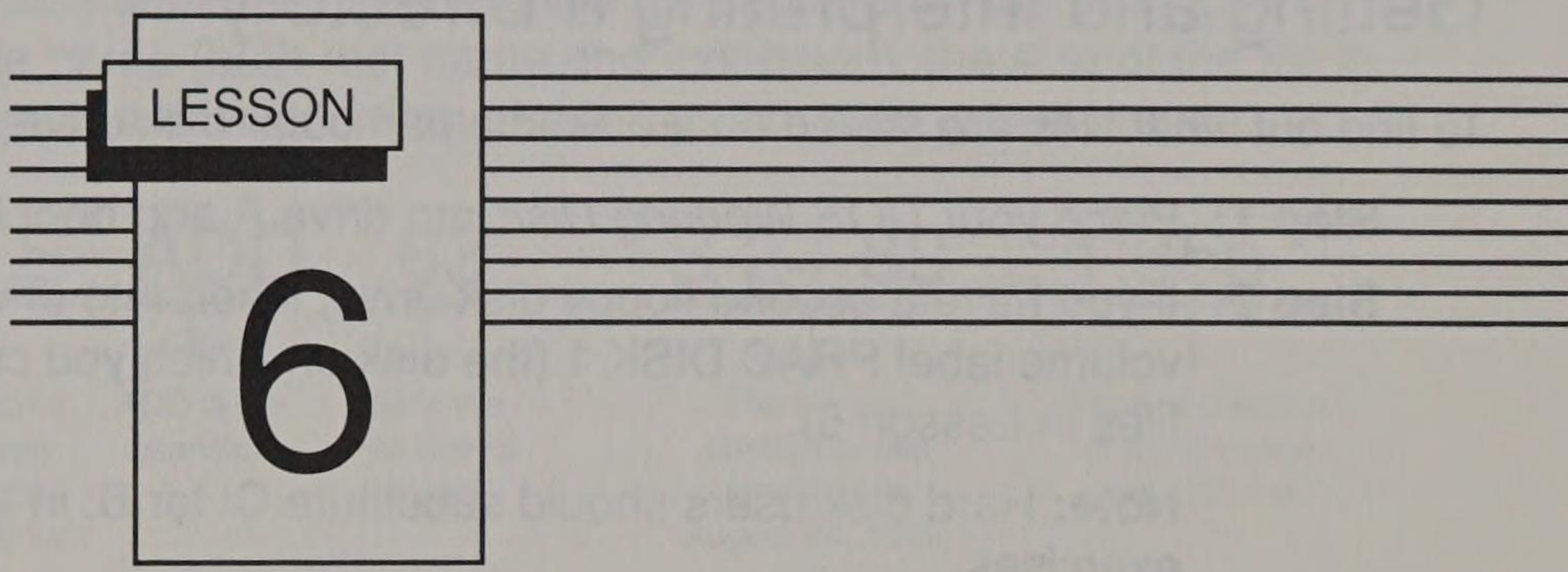
1. Replace the *DOS Working Disk* in drive A with the lesson disk. Make sure that *PRAC DISK 1* is in drive B. (Hard disk users with only one diskette drive, replace B with C in the following command.)
2. Type **COPY A:\LESSON5*.* B:** and press Enter.

   All 13 files for Lesson 5 are copied from the lesson disk to *PRAC DISK 1*. These files will be used in subsequent lessons.
3. Replace the lesson disk in drive A with the *DOS Working Disk* .

How can you make sure that the disk in drive B really contains the files you created and saved? Turn to Lesson 6 to find out.

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Getting a Directory of Your Disk

By this point, you should be feeling comfortable with some of the features of DOS. You will find that your disks multiply rapidly as you become more familiar with your system and more experienced in expanding and editing the files you create.

With only volume labels on these disks, you may wonder how you will know what files are stored on each disk. The directory (DIR) command is invaluable for this purpose. The DIR command displays a list (a directory) of the names of the files stored on a disk. In addition, the directory displays information about the size of each file, the date and time each file was created or edited, and the amount of space remaining on the disk.

In this lesson, you learn how to do the following:

- Get a directory of a disk
- Read and interpret directory information
- Display a directory using the /P and /W switches
- Clear the screen
- Get a printed copy of a directory
- Use wild-card characters
- Use the CHKDSK (check disk) command

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Getting and Interpreting a Directory

To find out what files are stored on a disk in a particular disk drive, follow these steps:

Step 1: Place your *DOS Working Disk* into drive A and boot DOS.

Step 2: If you have a second floppy disk drive, insert into drive B the disk with the volume label PRAC DISK 1 (the disk on which you created and stored files in Lesson 5).

Note: Hard disk users should substitute C: for B: in the examples and exercises.

Step 3: Type **DIR B:** (or **DIR C:**) and press Enter.

You have just told DOS to display a list of files from the disk in drive B (or the hard disk, drive C). If you created files using the file names in the Lesson 5 exercise, you should see a list similar to the one shown in figure 6.1.

```
A>DIR B:

 Volume in drive B is PRAC DISK 1
 Directory of  B:\

COMMAND  COM     25308   2-02-88  12:00a
ASHE     LET       729   8-24-89   2:08p
CHAPTER2 TXT       214   8-24-89   1:27p
CHAPTER3 TXT       299   8-24-89   1:38p
CLANCY   LET       609   8-24-89   2:10p
CLIENTS  ADD        63   8-24-89   1:35p
FAMILY   ADD        34   8-24-89   1:46p
FRIENDS  ADD        85   8-24-89   1:57p
PROFITS  88        298   8-24-89   2:29p
PROFITS  89        298   8-24-89   2:39p
PROFITS  90        302   8-24-89   2:45p
SALES    88        293   8-24-89   2:13p
SALES    89        293   8-24-89   2:16p
SALES    90        293   8-24-89   2:25p
       14 File(s)    270336 bytes free

A>
```

Fig. 6.1. *Directory of drive B.*

The first line of this message shows the volume label assigned to the disk during the formatting process. (In Lesson 4 you named this disk PRAC DISK 1.)

The second line tells you what disk drive and directory path are displayed. In this case, you are getting a directory of drive B, and the slash tells you that this directory is the root directory. (Lesson 9 presents more about root directories and paths.)

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Below these lines, you see one line for each file on the disk. Each line lists a file name (both root name and extension), the size of the file in bytes, and the date and time of the file's creation or last update.

CLIENTS	ADD	63	8-24-89	1:35p
CLIENTS is the file name. The file name is seven characters long. Eight characters is the limit for file-name lengths.	ADD is the extension.	63 is the file size in bytes.	The file was created or last modified on August 24, 1989.	Time of creation or modification was 1:35 P.M.

The last line tells you the number of files contained in the directory and the amount of free space on the disk. This information is especially useful when you need to know how much storage space remains on the disk.

The last line says that 14 files are stored on this disk. However, you created only 13 files in the last exercise. Where did the extra file come from? The extra file is COMMAND.COM—the system file that was transferred to the disk when you formatted it with the /S switch.

Now find out what files are stored on the *DOS Working Disk* in drive A.

Step 4: Type **DIR A:** or just **DIR** after the system prompt, A>, and press Enter.

Remember, you do not have to specify the drive if you're requesting something from the currently logged drive. A directory of the disk in drive A should now be displayed.

When you display the directory of the disk in drive B or your hard disk, C, all the information fits easily into one screen, and you can examine the information at your leisure. But what happens if there are more files on the disk than can be displayed at once on the screen? File names at the beginning of the directory pass out of sight before you have a chance to read them, and all that remains on the screen is the last part of the directory. This phenomenon is called *scrolling*.

When you have a directory too large to fit on one screen, you can use several options to see and use the whole directory.

Freezing the Screen (Ctrl-S or Pause)

You can stop the lines of text from scrolling off your computer screen and "freeze" a portion of the information on the screen for as long as you wish. The method you use depends on the computer system you are using. On any computer that does not have an Enhanced Keyboard, press Ctrl-S (press and hold the Control key while you press the S key) as soon as the directory begins to appear on the screen. If you use an

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Enhanced Keyboard, press the Pause key. On both machines, the scrolling stops until you press any other key to resume scrolling. Try it.

Step 1: Replace your *DOS Working Disk* in drive A with one of the following disks:

DOS Version	*5 1/4-inch disks*	*3 1/2-inch disks*
3.1 or 3.2	DOS	—NA—
3.3	Operating	Startup/Operating
4.0 or 4.01	Operating 1	Operating

Step 2: Type **DIR A:** or just **DIR**, and then press Enter.

Remember that if you're requesting a directory of the currently logged drive, specifying the drive is optional. In this case, DIR A: and DIR are equivalent commands.

Step 3: As soon as the scrolling begins, press either Ctrl-S or the Pause key. The scrolling stops.

Step 4: Press any key when you're ready for the scrolling to resume.

You can press Ctrl-S or Pause any number of times to stop the scrolling while you examine a long directory. Ctrl-Num Lock also freezes the screen.

Using the /P and /W Switches

Two *switches* (options) are available for use with the DIR command. /P (Pause) stops the scrolling after 23 lines (approximately one screen) are displayed. When you press a key, the next set of files is displayed, and so on, until you've seen all the file names.

What's the difference between using the /P switch and using Ctrl-S or Pause? When you use /P, the top few lines containing the volume label, disk drive name, and path scroll off the screen, leaving only the list of files. With the Ctrl-S or Pause key, you can view the top lines in the directory; you also have more control over which files are displayed at any given time.

/W produces a wide display of files on the screen. When you use this switch, only file names are displayed—five per line. File size, date, and time are not displayed.

The basic format for using either /P or /W is the same: the directory command followed by the appropriate switch. Use /P for Pause and /W for Wide.

To get a drive A directory that pauses, follow these steps:

Step 1: Type **DIR A:/P** and press Enter.

Step 2: Press any key when you're ready to see the next display of files.

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To get a wide directory of drive A, follow these steps:

Step 1: Type **DIR A:/W** and press Enter.

A list of file names similar to those in figure 6.2 appears on the screen.

```
A>DIR /W

 Volume in drive A has no label
 Directory of  A:\

COMMAND  COM     ASSIGN   COM     ATTRIB   EXE     BASIC    COM     BASICA   COM
COMP     COM     DEBUG    COM     DISKCOMP COM     EDLIN    COM     FILESYS  EXE
FIND     EXE     IFSFUNC  EXE     JOIN     EXE     LABEL    COM     MEM      EXE
MODE     COM     MORE     COM     MORTGAGE BAS     SHARE    EXE     SORT     EXE
SUBST    EXE     TREE     COM     XCOPY    EXE
       23 File(s)     30720 bytes free

A>
```

Fig. 6.2. *A wide directory of files in drive A (DOS V4.0 Operating 1 Disk).*

Getting a Printed Copy of a Directory

If you want a printed copy (also called a *hard copy* or *paper copy*) of the displayed directory, use the Shift-PrtSc combination (or the Print Screen key if you are using an Enhanced Keyboard). These keys can be used whenever you want a copy of what you see on the screen.

Another useful DOS command is CLS (clear screen). This command produces a more attractive screen print by eliminating unwanted screen clutter. When you type CLS and press Enter, the screen clears except for the system prompt in the upper left corner.

If your printer is hooked up to the computer system and is turned on, follow these steps to get a clean copy of the directory in drive A:

Step 1: Type **CLS** and press Enter.

The screen should clear and display the system prompt.

Step 2: Type **DIR /W** and press Enter.

Step 3: With the directory on the screen, press Shift-PrtSc or Print Screen. Whatever is on the screen is sent to the printer.

Replace the disk in drive A with the *DOS Working Disk*.

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Using TYPE To Display the Contents of a File

After you get a list of files on a particular disk, you may want to display the contents of one or more files you see listed in the directory. By using the TYPE command, you can display the contents of a file without changing to another program. The TYPE command displays on-screen the information contained in a specified file.

To see how this command works, follow these steps:

Step 1: Ask for a directory of the disk in drive B (**DIR B:**) or of your hard disk (**DIR C:**).

Step 2: Choose a file you would like to examine, such as CLIENTS.ADD.

Step 3: Type **TYPE B:CLIENTS.ADD** and press Enter. If you have a hard disk, type **TYPE C:CLIENTS ADD** and press Enter.

Be sure to leave a space between the command (TYPE) and the drive name, but do not leave a space between the colon and the file name. In addition, be sure to specify both the root name (CLIENTS) and the extension (ADD) if the name has one. If you do not type the file name exactly as it is listed in the directory, you receive the message `File not found`.

If you want to display the contents of some of the files on your *DOS Working Disk* in drive A, use the TYPE command, but don't be alarmed by what you see on the screen. You're asking for a DOS program file. The information will look like nonsense, with a few recognizable words here and there.

Using the CHKDSK Command

Suppose that you want to check the amount of space remaining on a disk, but you don't want the list of files that the DIR command provides. The CHKDSK (check disk) command also reports disk storage space and provides the following useful information:

- Volume name and creation date
- Total disk space
- Number of bytes used for hidden or system files
- Number of bytes used for directories
- Number of bytes for user files
- Bytes used by bad sectors (if the disk is flawed)
- Bytes available for use (free space)
- Bytes of total memory (RAM)
- Bytes of free memory

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Run CHKDSK by following these steps:

Step 1: Place your *DOS Working Disk* in drive A and boot DOS.

Step 2: Place PRAC DISK 1 in drive B if you have a second floppy disk drive.

Step 3: Type **CHKDSK** and press Enter.

Because you did not specify a drive, check disk is run on the disk in drive A. The number of bytes may differ, depending on your computer. Information similar to that in figure 6.3 is displayed.

```
A>CHKDSK

   362496 bytes total disk space
    70656 bytes in 2 hidden files
   206848 bytes in 11 user files
    84992 bytes available on disk

   655360 bytes total memory
   361632 bytes free

A>
```

Fig. 6.3. *The results of CHKDSK.*

After you've examined the information, run a check disk on the other drive.

Step 4: Type **CHKDSK B:** and press Enter. (If you have a hard disk, type **CHKDSK C:** and press Enter.)

Using Wild-Card Characters

When you examine the directories of your *DOS Working Disk* and PRAC DISK 1, you may notice certain similarities among file names. For example, a group of file names may have the same extension, such as .EXE, .COM, .BAT, or .86. Or a group of files may have similar root names, like SALES88, SALES89, SALES90, and so on.

DOS has a feature that enables you to work with groups of similar files at the same time. To use this feature, you must know about wild-card characters and how to use them.

Wild-card or *global characters* are special characters that can be used in a file name to make the name ambiguous. When you use these special characters, the file name you specify can match more than one file on the disk.

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The two wild-card characters that DOS accepts are the question mark (?) and the asterisk (*). DOS interprets the question mark to mean "match any one character in the file name." DOS interprets the asterisk to mean "match any number of characters in the file name." Both ? and * match places where characters are not specified in a file name. Combinations of ? and * also can be used. Table 6.1 serves as a reference for selecting file names with DOS wildcards.

Table 6.1
Wild-Cards in the DIR Command

?	With wild cards, you can tailor DOS commands. The ? replaces any single character in a file specification.
*	The * replaces every character from the asterisk to the end of the part of the command where the asterisk is located.
* . *	The wild-card file name replaces every character in the root file name and every character in the extension. *.* selects *all* files in a directory.

Examples:

DIR MYFILE.123	Presents directory information for the file MYFILE.123.
DIR *.123	Lists each file in the directory that has the extension 123.
DIR M*.*	Lists each file whose file name begins with the letter M.
DIR *.*	Lists all files in the directory.
DIR *.	Lists all files that have no extension.
DIR ???.BAT	Lists all three-letter file names that have a BAT extension.
DIR MYFILE.???	Lists all files named MYFILE that have three-letter extensions.

For example, if you want to do the same thing with all your SALES files from the '80s, you can use the question mark like this: **SALES.8?**. DOS then matches this ambiguous name with all the files on the disk and comes up with SALES.88, SALES.89, SALES.90, and so on. Or suppose that you want to do something with all the files that have the extension BAS (BASIC files). You can use the asterisk like this: ***.BAS**. DOS matches the asterisk with all files that have the BAS extension.

Follow these steps to see how wild-card characters can be used with the directory command:

Step 1: Put the *DOS Working Disk* into drive A and boot DOS.

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Step 2: Put PRAC DISK 1 into drive B if you have two floppy disk drives.

Step 3: Type **DIR *.COM** and press Enter.

In this statement you are asking for a directory of the disk in drive A; you want all the files that have the COM extension. Your screen should look something like figure 6.4.

```
A>DIR *.COM

 Volume in drive A has no label
 Directory of  A:\

COMMAND  COM    37637   6-17-88  12:00p
DISKCOPY COM    10428   6-17-88  12:00p
FORMAT   COM    22923   6-17-88  12:00p
EDLIN    COM    14249   6-17-88  12:00p
CHKDSK   COM    17771   6-17-88  12:00p
BACKUP   COM    33754   6-17-88  12:00p
RESTORE  COM    40030   6-17-88  12:00p
MORE     COM     2166   6-17-88  12:00p
       8 File(s)     84992 bytes free

A>
```

Fig. 6.4. *The directory of *.COM files.*

Step 4: Type **DIR B:CHAPTER?.TXT** and press Enter. (Or if you have a hard disk, type **DIR C:CHAPTER?.TXT**)

In this statement you are using the ? wild card to ask for a list of all CHAPTER files. Your screen looks like figure 6.5.

```
A>DIR B:CHAPTER?.TXT

 Volume in drive B is PRAC DISK 1
 Directory of  B:\

CHAPTER2 TXT      214   8-24-89   1:27p
CHAPTER3 TXT      299   8-24-89   1:38p
        2 File(s)    270336 bytes free

A>
```

Fig. 6.5. *The director of CHAPTER?.TXT files.*

As you can imagine, this wild-card feature can be enormously useful when you want to manipulate more than one file at the same time. Wild-card characters also can be dangerous when used with certain commands. In the lessons that follow, you learn more about wild-card characters and how to use them cautiously with other commands.

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SUMMARY OF CONCEPTS FOR LESSON 6

1. The directory command, DIR, displays a list of all the files stored on a disk. In addition to file names, the directory also shows the volume label (if one was assigned), the date and time a file was created or edited, and the amount of space remaining on the disk.
2. To change from the currently logged disk drive to any other drive, type the letter of the new drive, followed by a colon (for example, **B:**).
3. To handle a directory too long to fit on one screen, use Ctrl-S or the Pause key to stop the scrolling motion of the screen, /P to get a directory that pauses, or /W to get a wide listing of file names.
4. To display the contents of a file, use the TYPE command, followed by the exact name of the file you want displayed (for example, **TYPE MYFILE.1**). If you do not type the file name exactly as it appears in the directory, you get the message `File not found`.
5. To get a printed copy of what is displayed on-screen, press Shift-PrtSc or Print Screen.
6. To erase the contents of the screen use CLS.
7. To obtain certain information about your disk without a directory, use the CHKDSK, for example, to find out how much storage space is left on a disk.
8. The wild-card characters ? and * can be used in file names to make the file names ambiguous. This feature enables you to work with similar files at the same time. The ? tells DOS to match any one character in the file name; the * tells DOS to match any number of characters in the file name.

For Further Reference

If you would like to read further about working with directories, consult *Using DOS*, by David Solomon (Que Corporation, Carmel, IN, 1989), Chapters 7 and 8.

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SUMMARY EXERCISES FOR LESSON 6

Practice what you learned about directories in Lesson 6. Put PRAC DISK 1 into drive B. (If you have a hard disk, put the disk into drive A after DOS is booted.)

Now do the following:

1. Request a directory of the disk.
2. Request a directory again, this time using /W.
3. Make a paper (or hard) copy of the directory to store with the disk.
4. Display the contents of a file of your choice.
5. Get a list of all the text files (those with the extension TXT) by using a wild-card character.
6. Run a check disk of the disk.
7. Clear the screen.

Try to carry out these operations on your own by referring to the explanations in Lesson 6. If you need help, consult Appendix D, where the DOS commands are listed for you. The answers to these specific questions are listed in Appendix C.

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LESSON

7

Copying Files

In Lesson 3 you learned how to make a backup copy of an entire disk by using the DISKCOPY command. At times, however, you won't want to copy a whole disk but only one or several files. For example, you may want to reorganize your files by placing all related files together, with word processing on one disk, spreadsheets on another, and databases on still another. You can perform these operations with the COPY command.

The COPY command also makes possible (1) storing the same file on several different disks, (2) making a copy of a file to edit without changing the original file, (3) using an existing file as the basis of a new file without destroying or altering the existing file, and (4) combining two or more files into one new file.

In this lesson, you learn how to do the following:

- Copy a file onto the same disk
- Copy a file onto another disk
- Join two or more files
- Use wild-card characters to copy several files

Copying a File onto the Same Disk

Suppose that you want to use the CLIENTS.ADD file of names and addresses (created in Lesson 5) as the basis for creating a larger address file on the same disk, but you also want to keep the CLIENTS.ADD file intact. To perform this operation, you

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first have to make a copy of CLIENTS.ADD by using the COPY command. Because you are going to store the copy of the target file on the same disk as the source file (CLIENTS.ADD), you must assign a new name to the copy (suppose that you want to use the name MAILING.LST).

Step 1: Place your *DOS Working Disk* into drive A and boot DOS.

Step 2: If you have two floppy disk drives, put PRAC DISK 1 into drive B. If you have a hard disk drive, your files are stored on the hard disk . (Remember: hard disk users should substitute C: for B: in the instructions.)

Step 3: Type **DIR B:** and press Enter.

Before performing a copy operation, you should check several things:

1. That the correct source disk is in drive B (use the DIR command to make sure).
2. That you know the exact name of the source file.
3. That enough space is left on the disk for another file the same size or larger than the source file.
4. That you don't give the target file the same name as another file on the disk. (Remember, if you do, you will lose the contents of the existing file.)

The directory of the disk in drive B should look similar to the screen in figure 7.1.

```
A>DIR B:

 Volume in drive B is PRAC DISK 1
 Directory of  B:\

COMMAND  COM    25308   2-02-88  12:00a
ASHE     LET      729   8-24-89   2:08p
CHAPTER2 TXT      214   8-24-89   1:27p
CHAPTER3 TXT      299   8-24-89   1:38p
CLANCY   LET      609   8-24-89   2:10p
CLIENTS  ADD       63   8-24-89   1:35p
FAMILY   ADD       34   8-24-89   1:46p
FRIENDS  ADD       85   8-24-89   1:57p
PROFITS  88       298   8-24-89   2:29p
PROFITS  89       298   8-24-89   2:39p
PROFITS  90       302   8-24-89   2:45p
SALES    88       293   8-24-89   2:13p
SALES    89       293   8-24-89   2:16p
SALES    90       293   8-24-89   2:25p
       14 File(s)    270336 bytes free

A>
```

Fig. 7.1. *Directory of drive B.*

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When you examine the directory, you can see that the source file (CLIENTS.ADD) is stored on the disk in drive B and that plenty of space remains for another file of the same size or larger. You also can check the new name you've chosen for the target file, MAILING.LST, against the other file names in the directory.

Step 4: Type **TYPE B:CLIENTS.ADD** and press Enter to display the contents of the source file to ensure that it contains the data you want to copy.

Step 5: Type **COPY B:CLIENTS.ADD B:MAILING.LST** and press Enter.

This command tells DOS to make a copy of the file CLIENTS.ADD stored on the disk in drive B, name the copy MAILING.LST, and store it on the same disk.

Note: If you do not specify the drives, the default drive is used. For example, if you do not specify drive B before CLIENTS.ADD, DOS searches the default drive for the source file. If DOS doesn't find the file, the message `File not found` is displayed. Similarly, if you do not specify the drive before MAILING.LST, the target file is copied onto the default drive.

When the copy operation is complete, you receive the message `1 File(s) copied`, and the `A>` returns to the screen.

Step 6: Type **DIR B:** and press Enter.

Once the copy operation is complete, this action checks the directory to be sure that the new file name, MAILING.LST, has been added to the directory.

Step 7: Type **TYPE B:MAILING.LST** and press Enter.

With this command, you can view the contents of the new file and verify that it is identical to the source file.

You have just created a copy of a file and stored the copy on the same disk under a different name. You now can make changes to one of the files and leave the other intact.

Copying a File onto Another Disk

The process of copying a file onto a disk in another disk drive is basically the same as copying a file onto the same disk. When you copy a file onto another disk, however, you do not have to change the file name—although you may do so. Suppose that you want to make a backup copy of the MAILING.LST file you just created, and that you want to place the copy on one of the new disks you formatted in Lesson 4.

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If you have two floppy disk drives, you can copy the file from one floppy disk to another. If you have a hard disk, you can copy the file from the hard disk (drive C) to the floppy disk in drive A. In Lesson 9, hard disk users learn how to store more than one copy of the same file under the same name on the hard disk by creating subdirectories.

If you did not complete the exercise at the end of Lesson 4, prepare two disks now by using FORMAT with the /S and /V switches. Give one disk the volume name PRAC DISK 2 and the other PRAC DISK 3.

Step 1: Put the *DOS Working Disk* into drive A and PRAC DISK 1 into drive B; boot DOS. (Hard disk users use the files stored in drive C.)

Step 2: Type **DIR B:** (or **DIR C:**) and press Enter.

This command gives you the opportunity to check the exact name and size of the file you want to copy.

Step 3: Remove the *DOS Working Disk* from drive A and insert PRAC DISK 2.

Step 4: Type **DIR A:** and press Enter.

This way, you can make sure that you have enough space for the copy and that the target disk does not contain a file with exactly the same name as the source file.

If you're using a new disk for the copy, such as PRAC DISK 2, you don't have to be concerned about space or other file names. But when you are trying to copy a file onto a disk that already contains files, you may save yourself time and unnecessary frustration by checking before you copy.

Step 5: At the `A>`, type **COPY B:MAILING.LST A:** and press Enter, or type **COPY B:MAILING.LST** and press Enter.

(Hard disk users should be sure to substitute C: for B: in these statements.)

Both statements tell DOS to do the same thing: copy the file MAILING.LST on drive B to drive A under the same file name.

Step 6: After you see the message `1 File(s) copied`, type **DIR A:** to check the directory of A for a file named MAILING.LST.

You've just copied a file under the same name from one disk to another. If you want to change the name of the file, you can do so by following the steps with one addition. In Step 5, add the new file name to the end of the statement by typing the following:

COPY B:MAILING.LST A:NEWLIST.90

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Press Enter.

You also can type **COPY B:MAILING.LST NEWLIST.90** and press Enter.

Both of these commands instruct DOS to make a copy of the MAILING.LST file in drive B and store the file in drive A under the new name, NEWLIST.90.

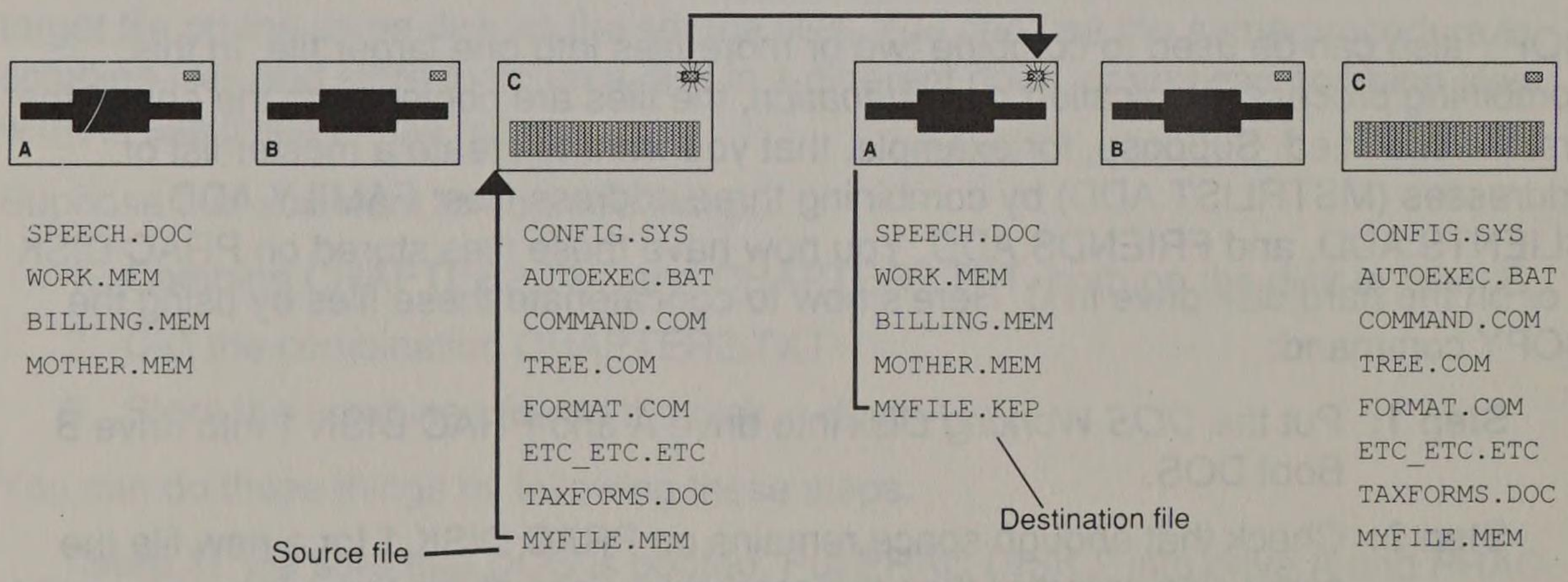
The importance of making backup copies of files cannot be overemphasized. Just as you keep a backup copy of a whole disk to use in case the original is lost or destroyed, you should make backup copies of important files periodically (perhaps every day).

The following figures summarize the COPY command. When you issue a full COPY command, you supply the source drive, the source file name, the destination drive, and the destination file name. (Lesson 9 adds subdirectories into the picture.) However, if you omit one or more of these items, known as *parameters*, DOS makes assumptions. These assumptions are often called "the rule of currents." DOS says, "If a parameter is missing, use the current setting." So, for example, if you omit the destination file name, DOS assumes you want the current file name specified as the source name.

For example, if you omit the destination file name, DOS will name the new copy of the file the same as the source file.

Command as issued:

COPY C:MYFILE.MEM A:MYFILE.KEP/V

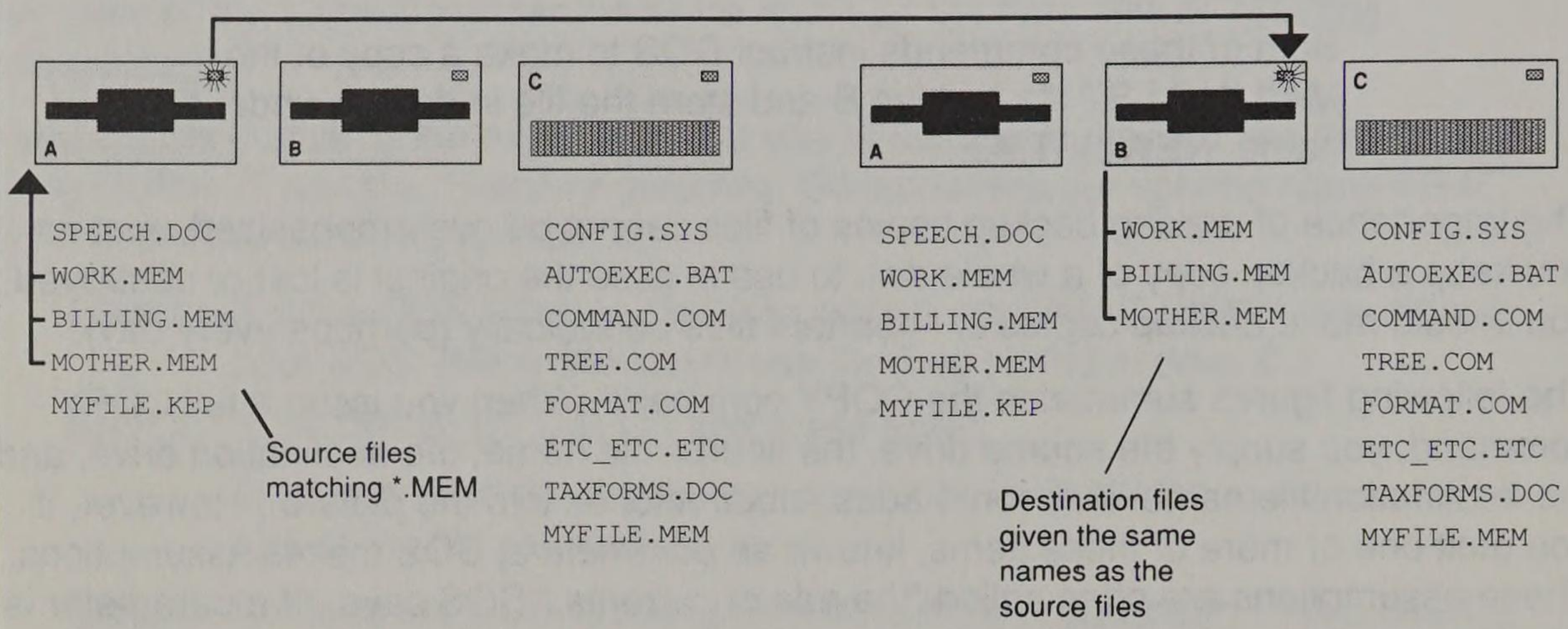


In this version of COPY, the full form of COPY is used. The command gives DOS all the parameters needed to locate and copy a file from the source drive to the file name of the destination drive. The /V at the end of the command is a switch that tells DOS to verify the copied file after the copy is made. The full version of COPY does not rely on DOS's current default drive.

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Command as issued:

COPY A:*.MEM B:



This example of COPY copies multiple files from disk to disk. *.MEM tells DOS to copy any file from the source disk that matches the MEM extension. Because the destination file name and extension are omitted, DOS uses the file names of the source files for the copies.

Combining Files while Copying

COPY also can be used to combine two or more files into one larger file. In this combining process, also called *concatenation*, the files are copied onto the end of the first file specified. Suppose, for example, that you want to create a master list of addresses (MSTRLIST.ADD) by combining three address files: FAMILY.ADD, CLIENTS.ADD, and FRIENDS.ADD. You now have these files stored on PRAC DISK 1 or on the hard disk drive in C. Here's how to concatenate these files by using the COPY command:

Step 1: Put the *DOS Working Disk* into drive A and PRAC DISK 1 into drive B. Boot DOS.

Step 2: Check that enough space remains on PRAC DISK 1 for a new file the same size or larger than the combined sizes of the three files you want to join.

Step 3: Type the following command, all on one line:

COPY B:FAMILY.ADD+B:CLIENTS.ADD+B:FRIENDS.ADD B:MSTRLIST.ADD

(Hard disk users should be sure to substitute C: for B: in this statement.)

Press Enter.

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The statement tells DOS to combine three files from drive B into one file called MSTRLIST.ADD and then store the new file in drive B.

Note: If you do not specify the drive for each target file, DOS searches the default drive. If DOS does not find a file by the name specified, DOS ignores that file and combines only the files located.

The combining and copying process is complete when you see a list of files copied followed by a statement of the number of files copied, like the one shown in figure 7.2.

```
A>COPY B:FAMILY.ADD+B:CLIENTS.ADD+B:FRIENDS.ADD B:MSTRLIST.ADD
B:FAMILY.ADD
B:CLIENTS.ADD
B:FRIENDS.ADD
        1 File(s) copied

A>
```

Fig. 7.2. *The statement of files copied.*

Step 4: Request a directory of drive B (or drive C if you have a hard disk).

Notice that a new file, MSTRLIST.ADD, has been added to the directory. Also note that the source files are still stored as separate files.

In this example, you combined three files, renamed the target file, and stored the target file on the same disk as the source files. You can use the same procedure to combine files and store them on a disk in a different drive, or you can combine files without assigning a new name.

Suppose that you want to do three things:

1. Combine CHAPTER2.TXT and CHAPTER3.TXT, both on the disk in drive B
2. Call the combination CHAPTER2.TXT
3. Store the combined file on the disk in drive A

You can do these things by following these steps:

Step 1: Be sure that DOS is booted. Put PRAC DISK 2 into drive A and PRAC DISK 1 into drive B. (If you have a hard disk, the files are stored on the hard disk in drive C.)

Step 2: Type **COPY B:CHAPTER2.TXT+B:CHAPTER3.TXT** and press Enter.

(Hard disk users should be sure to substitute C: for each B: in Step 2.)

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Because a new file name has not been specified for the target file, the second file is appended to the first file, and the name of the first file is retained. The default drive receives the combined file, because a disk drive has not been specified for the target file.

Step 3: Check the directory of drive A. A new file, CHAPTER2.TXT, should be listed.

Copying All Files from One Disk to Another

In Lesson 3, you used the DISKCOPY command to make backup copies of whole disks. You also can use the COPY command to make a copy of a whole disk. Why are two different commands needed for the same operation? What's the difference between DISKCOPY and COPY?

Both DISKCOPY and COPY can make copies of whole disks, but the two commands do so in different ways and produce slightly different products (the differences are not noticed by the user, however).

DISKCOPY produces an exact copy of the original disk. That's fine if the original is a master copy of an applications program, such as your DOS master disk. However, if the disk you want to copy contains files that you've edited a number of times, some of the files may have become *fragmented*. That is, parts of files added or changed at different times may be stored at different locations on the disk. When you perform a DISKCOPY, this fragmented organization is also duplicated.

COPY, however, does not make an identical copy of the original disk. Instead, files are copied one at a time. If files have been fragmented on the original disk, the fragments are reunited on the target disk. Follow the steps outlined in the following section to make a copy of a disk by using the COPY command.

If you have two floppy disk drives, follow the steps in the section "Using Two Floppy Disk Drives." If you have a hard disk, follow the steps in the section called "Using a Hard Disk Drive."

Using Two Floppy Disk Drives

Step 1: Boot DOS.

Step 2: Insert PRAC DISK 1 into drive A and PRAC DISK 3 into drive B.

Note: Although formatting was part of the copy process when you used DISKCOPY, formatting is not part of the process when you use COPY. Therefore, you must use a formatted disk here.

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Step 3: Type **COPY A:*.* B:/V** and press Enter.

This command tells DOS to copy all files from drive A to drive B. Remember that the * is a wild-card character. *.* tells DOS to match all characters in the file names, or, in other words, to copy all files. The switch at the end of the statement, /V, instructs DOS to verify that all the files are transferred correctly.

When you get the message `X file(s) copied`, the copy process is complete, and you have a backup copy on the disk in drive B of each file on the original disk.

Using a Hard Disk Drive

Copying files to a hard disk is very similar to copying files to diskettes. In these steps, you copy files from PRAC DISK 1 to your hard disk. The files will be copied to a subdirectory. The use of subdirectories and paths becomes clearer as you work through Lesson 9.

Step 1: Put the *DOS Working Disk* into drive A and boot DOS.

Step 2: Type **MD C:\PD1** and press Enter.

This step creates a subdirectory on your hard disk called PD1. Used here, PD1 is an abreviation for *P*RAC *D*ISK *1*.

Step 3: Replace the *DOS Working Disk* in drive A with PRAC DISK 1.

Step 4: Type **COPY A:*.* C:\PD1 /V** and press Enter.

This statement tells DOS to copy all the files from drive A into the PD1 subdirectory on drive C. In very little time, all the files are copied.

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SUMMARY OF CONCEPTS FOR LESSON 7

1. The COPY command makes copies of individual files. You can store a copy on the same disk as the source file if you change the name of the target file, or you can copy a file to another disk with or without changing the name.
2. With COPY, you can concatenate (or combine) two or more files into one file. You can store the new combined file on the same or another disk. Additionally, you can assign a different name to the new combined file or use the name of the first source file.
3. COPY also can be used instead of DISKCOPY to copy a whole disk. When you use COPY *.*, each file is copied individually onto the new disk.

For Further Reference

If you would like further information about use of the COPY command, consult *Using DOS*, by David Solomon (Que Corporation, Carmel, IN, 1989), Chapter 9.

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SUMMARY EXERCISES FOR LESSON 7

Practice what you learned about the COPY command in Lesson 7 by doing these exercises.

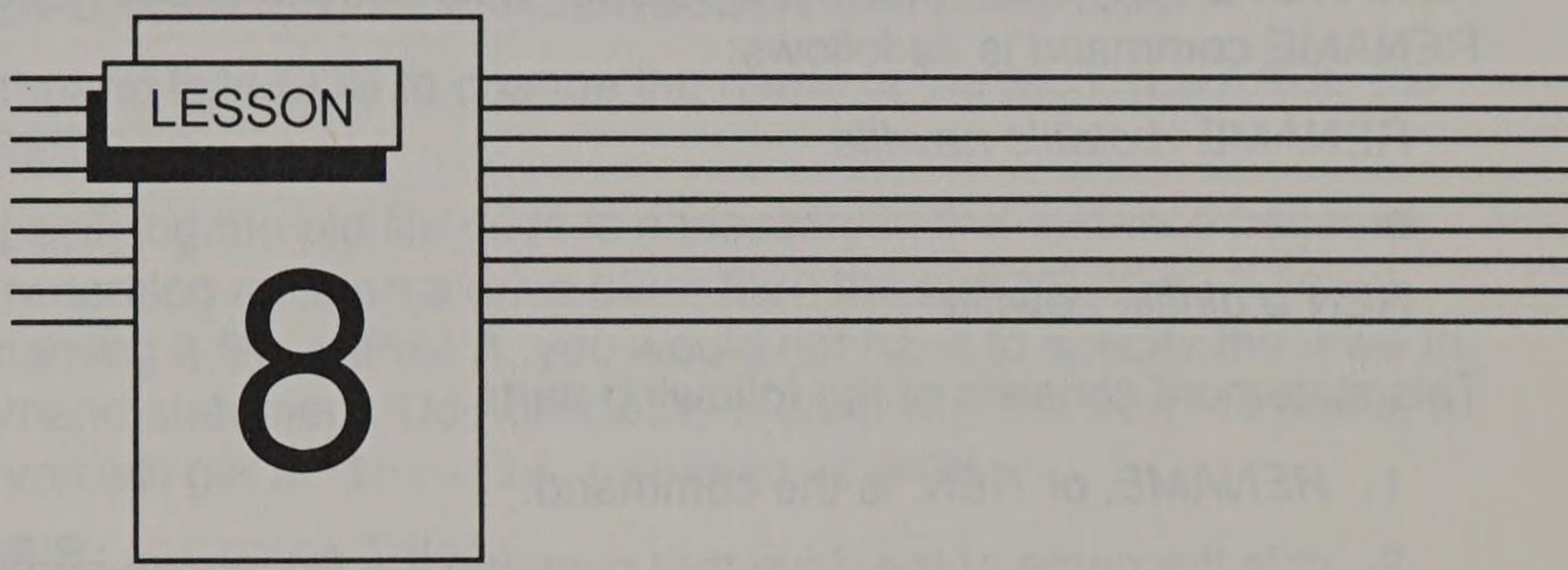
In Lesson 5 you created the following files on PRAC DISK 1 (or on your hard disk if you have one): PROFITS.88, PROFITS.89, PROFITS.90, SALES.88, SALES.89, SALES.90, CLANCY.LET, and CHAPTER2.TXT. Use these files on PRAC DISK 1 and the COPY command to do the following:

1. Copy CLANCY.LET from PRAC DISK 1 to PRAC DISK 2.
2. Make another copy of CHAPTER2.TXT on PRAC DISK 1 and name the file WORKBOOK.TXT.
3. Combine SALES.88 and PROFITS.88 into one file, name it S&P.88, and store it on PRAC DISK 2.
4. Make backup copies of all the SALES files and PROFITS files on PRAC DISK 1 and store them on PRAC DISK 2. Use wild-card characters to make your job easier.

Try to perform these operations on your own by referring to the explanations given in Lesson 7. If you need help, refer to the DOS command statements in Appendix D. The answers to these specific questions are listed in Appendix C.

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Renaming and Erasing Files

Renaming and erasing are two additional DOS operations that help you manage your files. With RENAME (also called REN) you can change the names of files. With ERASE (also called DEL) you remove files from the directory.

In this lesson, you learn how to do the following:

- Rename files
- Erase files

Note: If you want to work through this lesson more than once, and feel that you may have erased some files, you may copy the files used for this lesson from the lesson disk to PRAC DISK 1. To copy the files, follow these steps:

Step 1: Place the *DOS Working Disk* in drive A and boot DOS.

Step 2: Place the disk PRAC DISK 1 into drive B.

Step 3: Replace the *DOS Working Disk* with the lesson disk.

Step 4: Type the command **COPY A:\LESSON8*.* B:** and press Enter.

PRAC DISK 1 now contains the files used in this lesson.

Renaming Files

The RENAME command (REN) allows you to assign different names to files. You have several options with the REN command: (1) you can change the whole name of a file, (2) you can change either the root name or the extension, or (3) you can delete the extension.

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RENAME, a fairly straightforward command, is easy to use. The format for the RENAME command is as follows:

RENAME *d:oldfile newfile*

or

REN *d:oldfile newfile*

This statement consists of the following parts:

1. *RENAME*, or *REN*, is the command.
2. *d:* is the name of the drive that contains the file whose name you want to change.
3. *oldfile* is the complete name (root name and extension if the name has an extension) of the file you want to change.
4. *newfile* is the complete new name you want to assign to the file.

Specifying the disk drive is optional if the file you are renaming is on the current disk drive or in the current directory. If you are renaming a file not on the currently logged drive, you must specify the drive. If you don't, DOS searches the wrong directory, and an error message appears when the old file name is not found. If DOS does find the same file name on another directory, DOS renames that file—whether or not you want that file renamed.

You can use wild-card characters to rename groups of files.

What happens if you try to rename a file, using an already existing file name in the directory? Does DOS wipe out the existing file? No, DOS is user friendly in this respect. If you try to rename a file with a file name already in use, you receive the message `Duplicate file name or File not found`, and you are given a chance to start again.

Assume that you want to rename the file MSTRLST.ADD, created in Lesson 7, to ADDRESS.90.

Step 1: Place your *DOS Working Disk* into drive A and boot DOS.

Step 2: If you have two floppy disk drives, put PRAC DISK 1 into drive B. If you have a hard disk, the files you need are already stored on the hard disk in drive C.

Step 3: Type **DIR B:** and press Enter.

(Hard disk users should be sure to substitute C: for B: in this and subsequent steps.)

This step checks the directory to be sure that you know the exact name of the file you want to change. Also use the directory listing to make sure that no file in the directory has the same name as the new file name you selected.

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Step 4: Type **REN B:MSTRLST.ADD ADDRESS.90** and press Enter.

This command tells DOS to change the name of the MSTRLST.ADD file to ADDRESS.90.

Note: Specifying the old file drive is necessary in this instance because you are renaming a file on a drive other than the current drive. If you were renaming a file in drive A, you would not have to specify the drive in the command statement. Do not specify a drive with the new file name. If you do, you will get an `Invalid parameter` error.

Step 5: Type **DIR B:** and press Enter.

Check the directory for both the old and new names. Notice that the old file name is no longer listed—the new file name has taken its place.

Once the file name is changed, DOS recognizes only the new file name. The old file name no longer exists. If you type DIR B:MSTRLIST.ADD, you get the message `File not found`.

Now try renaming a file, using a file name that already exists in the directory. Type **REN B:SALES.90 PROFITS.90** and press Enter. The message `Duplicate file name or File not found` appears on-screen.

Erasing Files

Just as you can erase a whole disk by using the FORMAT command (see Lesson 4), you can delete individual files you no longer need. ERASE and DEL are useful commands because they allow you to free up space on your disks. However, ERASE and DEL are also dangerous commands, because with them you can inadvertently erase the wrong file. Once a file has been erased, it is nearly impossible to recover. (It is possible to unerase a file, but only if you haven't written any new information to the disk and have a special utilities program that does not come with DOS.) Because ERASE and DEL are permanent, be especially careful when using these commands.

Erasing a file is a fairly simple operation. The format of the commands are as follows:

ERASE *d:filename*
or
DEL *d:filename*

These statements consist of the following parts:

1. *ERASE* and *DEL* are the commands.
2. *d:* is the disk drive containing the file to be erased.
3. *filename* is the complete name (root name and extension) of the file you want to erase.

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For example, to erase PROFITS.90 from PRAC DISK 1 (or from your hard disk), do the following:

Step 1: Insert the *DOS Working Disk* into drive A and boot DOS.

Step 2: If you have two floppy disk drives, put PRAC DISK 1 into drive B. If you have a hard disk, the files you need are stored on that disk.

Step 3: Type **DIR B:** and press Enter.

Check the exact name of the file you want to erase in the directory.

Step 4: Type one of the following forms of the erase command:

ERASE B:PROFITS.90

or

DEL B:PROFITS.90

Before pressing the Enter key, double-check the spelling of the file name for a typo that could cause you to delete the wrong file. In this case, typing **89** instead of **90** in the extension would erase the wrong file. Once you're sure that you have specified the correct file name, press the Enter key, and the file is deleted.

Step 5: Type **DIR B:** and press Enter.

Check the directory for a file named PROFITS.90. You won't find it because that file no longer exists.

Note: When you erase a file, the contents of that file are not immediately deleted. Instead, DOS marks the entry in the directory as "Not in Use" and frees the space occupied by the file. Then, when you write new information onto the disk, the new data is written over the contents of the erased file. For that reason, you can recover a file that was mistakenly erased only if you have the required utility program for recovering erased files, and if you haven't added new information to the disk.

Using Wild-Card Characters with ERASE and DEL

You can use wild-card characters with the ERASE and DEL commands, but you should do so carefully. For example, you can use wild-card characters to erase all files with the same extension by entering the following:

```
ERASE *.EXT
```

Because all file names with the specified extension are erased, be absolutely certain that you don't need any of those files before you issue the command.

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Wild-cards and ERASE also can be used to delete all files from a disk. To tell DOS to erase all files, type **ERASE *.***. This command can be very destructive, although DOS does display a prompt asking whether you are sure that you want to delete the files. Still, use ERASE and DEL carefully!

SUMMARY OF CONCEPTS FOR LESSON 8

1. RENAME, or REN, allows you to change the name of a file by specifying after the command the old file name followed by the new file name.
2. ERASE and DEL enable you to delete files, thus freeing up storage space on a disk. These commands should be used carefully, because once a file is deleted, recovering the contents of the file is difficult.
3. Wild-card characters can be used with ERASE and DEL to delete more than one file at a time or with RENAME to change a group of files.

For Further Reference

If you would like to read further about renaming and erasing files, consult *Using DOS*, by David Solomon (Que Corporation, Carmel, IN, 1989), Chapters 9 and 14.

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SUMMARY EXERCISES FOR LESSON 8

Practice the RENAME and ERASE and DEL commands using the files on PRAC DISK 3.

Note: For some of the exercises, you get an error message.

1. Rename the following files on PRAC DISK 3:

Change File Name	*to File Name*
ASHE.LET	ASHE1.LET
CHAPTER2.TXT	CHAPTER2
MSTRLIST.ADD	MAILING.LST
SALES.90	90SALES.FIG

2. Use the ERASE or DEL command to erase the three files you just renamed: ASHE1.LET, CHAPTER2, and 90SALES.FIG. In addition, try to erase SALES.90. What happens and why?
3. Use the wild-card characters to erase all the remaining files on PRAC DISK 3.

Try doing these operations on your own by referring to the explanations in Chapter 8. If you need help, the DOS command statements are listed for you in Appendix D. The answers to these specific questions are listed in Appendix C.

Note: Before continuing, copy the file COMMAND.COM back to PRAC DISK 3. Follow these steps:

Step 1: Place the *DOS Working Disk* in drive A and boot DOS.

Step 2: Place PRAC DISK 3 in drive B.

Step 3: At the A> type **COPY A:COMMAND.COM B:** and press Enter.

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LESSON

9

Using Hierarchical Directories

In Lesson 5, you learned how to create and name files. You can place a maximum of 64 and 112 files on a minifloppy disk (depending on whether it is single-sided or double-sided), and you can store 224 files on a high capacity (also called High Density and abbreviated HC or HD) disk. The size of each file, of course, dictates how many files can be contained on a disk. For easy access, floppy disks can be sorted and organized by different tasks or functions. For example, you can arrange these disks by function (such as word processing, databases, and spreadsheets); by topic (such as letters on one disk, memos on another, and sales figures on still another); by year; by company; or by any logical grouping. Then, when you want to know what specific files are stored on a particular disk, you can simply ask for a directory and view the file names.

But what if you have a hard disk that can store thousands of files? Searching through a directory containing such a large number of files is both time-consuming and cumbersome. To solve this problem, DOS has made possible the use of *hierarchical directories*.

In this lesson, you learn how to organize hierarchical directories, including how to do the following:

- Create directories with the MKDIR command
- Change directories with the CHDIR command
- Remove directories with the RMDIR command
- Display the files in directories with the DIR command
- Use the TREE command

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What are Hierarchical Directories?

Hierarchical directories enable hard disk users to organize files on a hard disk in much the same way that floppy disk users can organize their disks. But instead of having a number of disks, each disk with its own purpose or topic, the hard disk user organizes files into subdirectories.

You can think of a directory as a file storing the names of files on the disk. Each disk, whether hard or floppy, starts out with one directory, called a *root directory*. The root directory has no name but is identified by the backslash (\). (You have already seen this symbol, you may recall, when you asked for a directory of your DOS master disk; you saw `Directory of A:\`. The backslash identifies the root directory.) The root directory holds programs or data files, but the root directory can also store the names of other directories, called *subdirectories*.

DOS's directory structure is sometimes referred to as a *tree-structured hierarchy*. In simple form, the directory resembles an inverted tree. The root directory is the topmost directory. The numbered boxes in figure 9.1 represent directories (also called *subdirectories*) on branches of the tree. For example, directories 1, 2, and 3 are on the same branch of the tree.

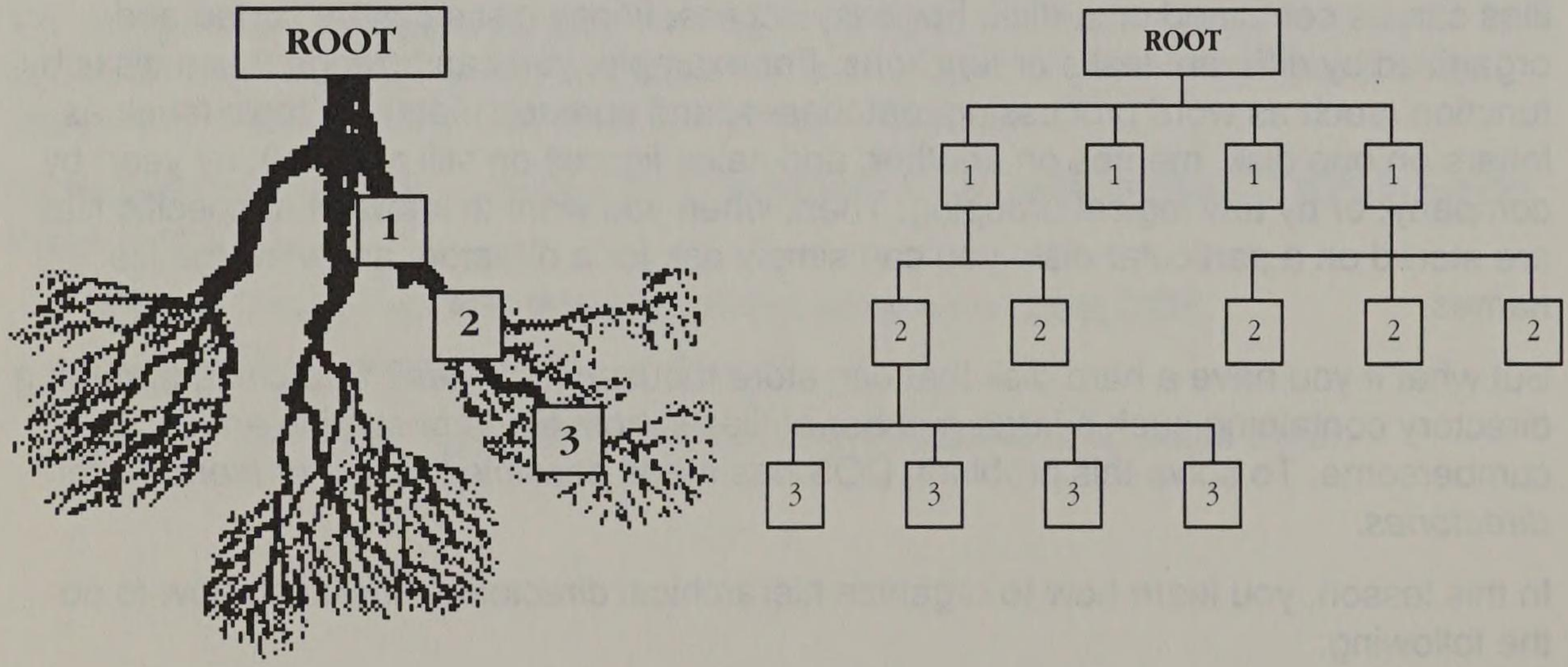


Fig. 9.1. *A diagram of a sample directory tree.*

The tree-structure analogy loses some of its neatness when it is expanded to cover the hierarchical directory structure. That is because any directory, except the root, can have as many subdirectories as space on the disk allows.

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As you move from the root directory to a subdirectory, you move to a further subdivision of the disk. The inverted tree is similar to a family tree or an organizational chart. In this case, the root directory can be compared to the oldest generation or the most senior person in an organization.

Disk directories are frequently referred to as *parent* and *child* directories. This structure can be compared to that of a well-diversified corporation with numerous subsidiaries. Each "child" of the parent can have "children" of its own. In the directory hierarchy, each directory's "parent" is the directory just above it (see fig. 9.2).

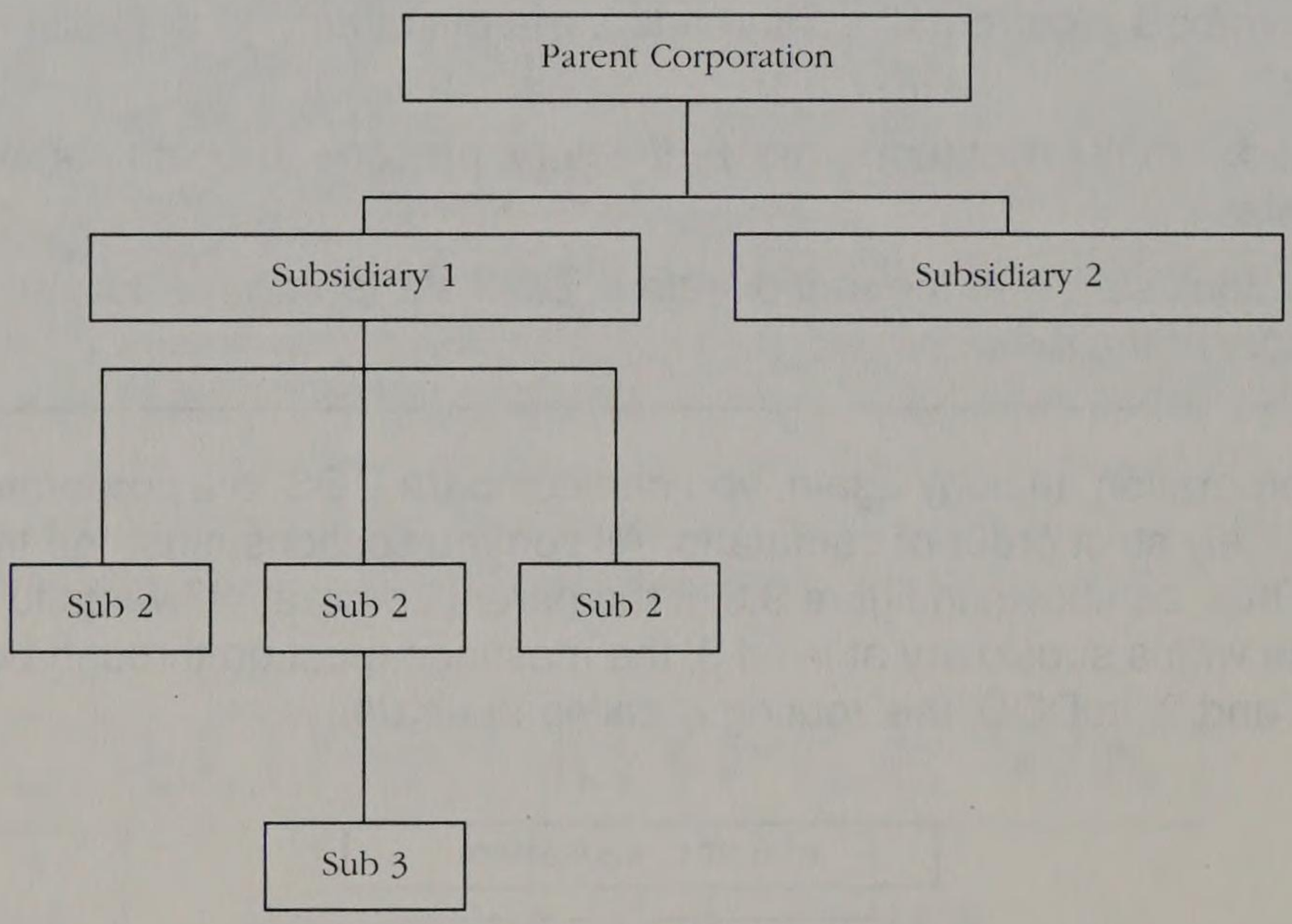


Fig. 9.2. *A diagram representing parent and child directories.*

Subdirectories can hold the names of files and other information; subdirectories also can hold the names of other subdirectories. With all these directories and subdirectories, how do you find an individual file that may be stored in the subdirectory of a subdirectory? Actually, finding a file is not as difficult as it may seem. DOS makes use of *paths*, or chains of directory names, to guide itself through directories to find the file you want. When you want to find a file stored in a subdirectory, for example, you must indicate the path for DOS to take to locate the file. To indicate the subdirectory and the file, you use the path symbol, the backslash (\).

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Guidelines for Path Names

1. A path can be from 1 to 63 characters long.
2. The path is composed of directory names separated by backslashes (\).
3. A drive name may precede a path name.
4. Generally, a file name follows a path name and the path name is separated from the file name by a backslash.
5. Each drive has its own path, which DOS keeps in memory.
6. The symbols . (current directory) and .. (parent directory) are valid in a path name.
7. To start with the root (uppermost) directory, precede the path name with a backslash.
8. If you don't start with the root directory, DOS starts with the current default directory of the disk.

Using the corporation analogy again, you can compare DOS to a corporate empire that has an extremely strict order of command. All communications must "go through channels." Thus, as shown in figure 9.3, if the parent corporation wants to communicate with a subsidiary at level 3, the message must go through both subsidiary 1 and 2. In DOS, this routing is called the *path*.

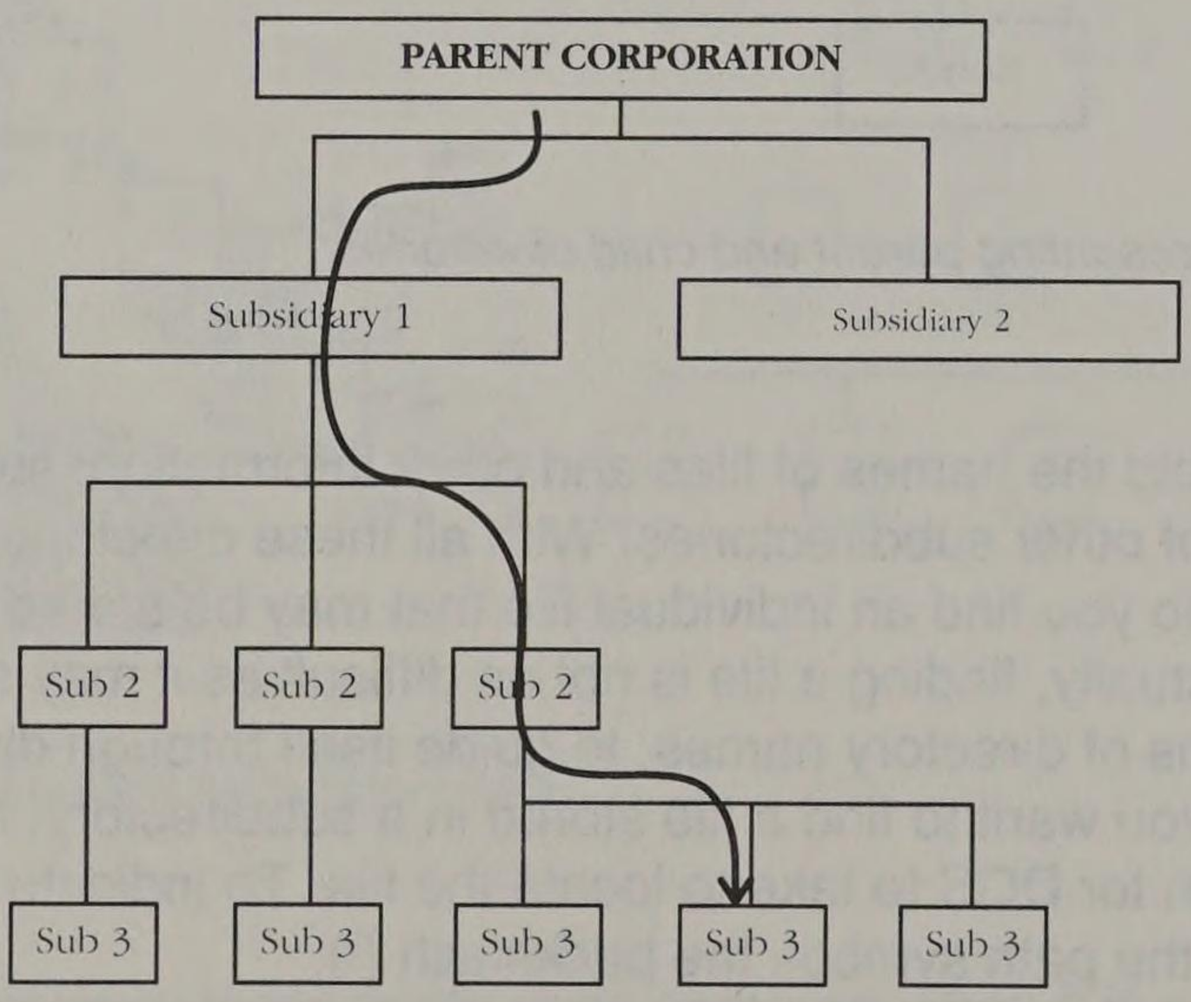


Fig. 9.3. *A diagram of a path in a multilevel directory tree.*

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Use the simple directory setup, shown in figure 9.4, to understand the concept of directory paths in DOS. Each subdirectory in this example is a subdirectory of the root directory. One subdirectory, LOTUS, has a data file, MYFILE.WK1 . Another subdirectory, TEMP, has a file called TAXFORMS.DOC.

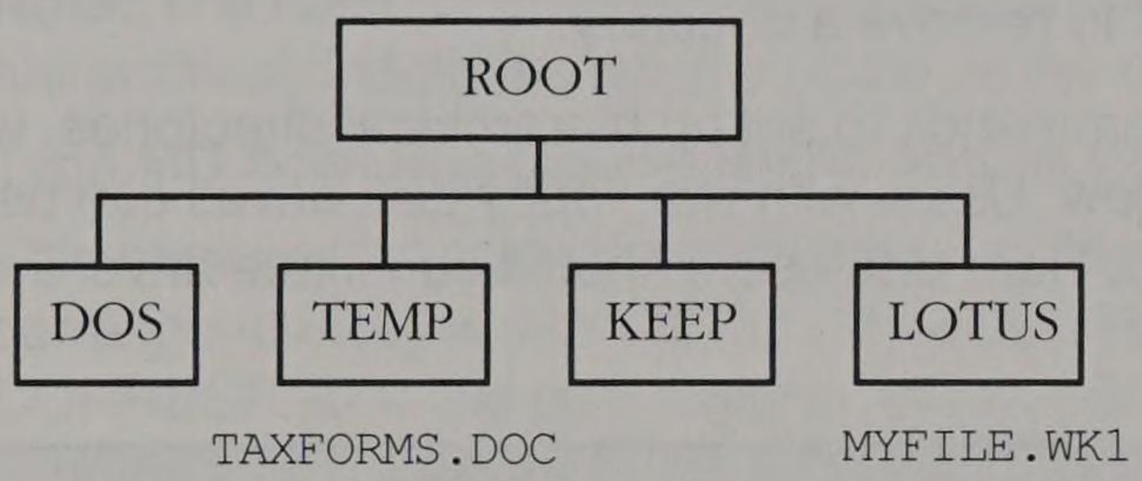


Fig. 9.4. *A simple directory setup.*

In figure 9.5, MYFILE.WK1 is a data file in the LOTUS subdirectory. The complete path name for this file is the chain of directories that tells DOS how to find MYFILE. In this case, the chain consists of just two directories: the root (\) and LOTUS. The path to the TAXFORMS.DOC file also consists of two directories: the root (\) and TEMP.

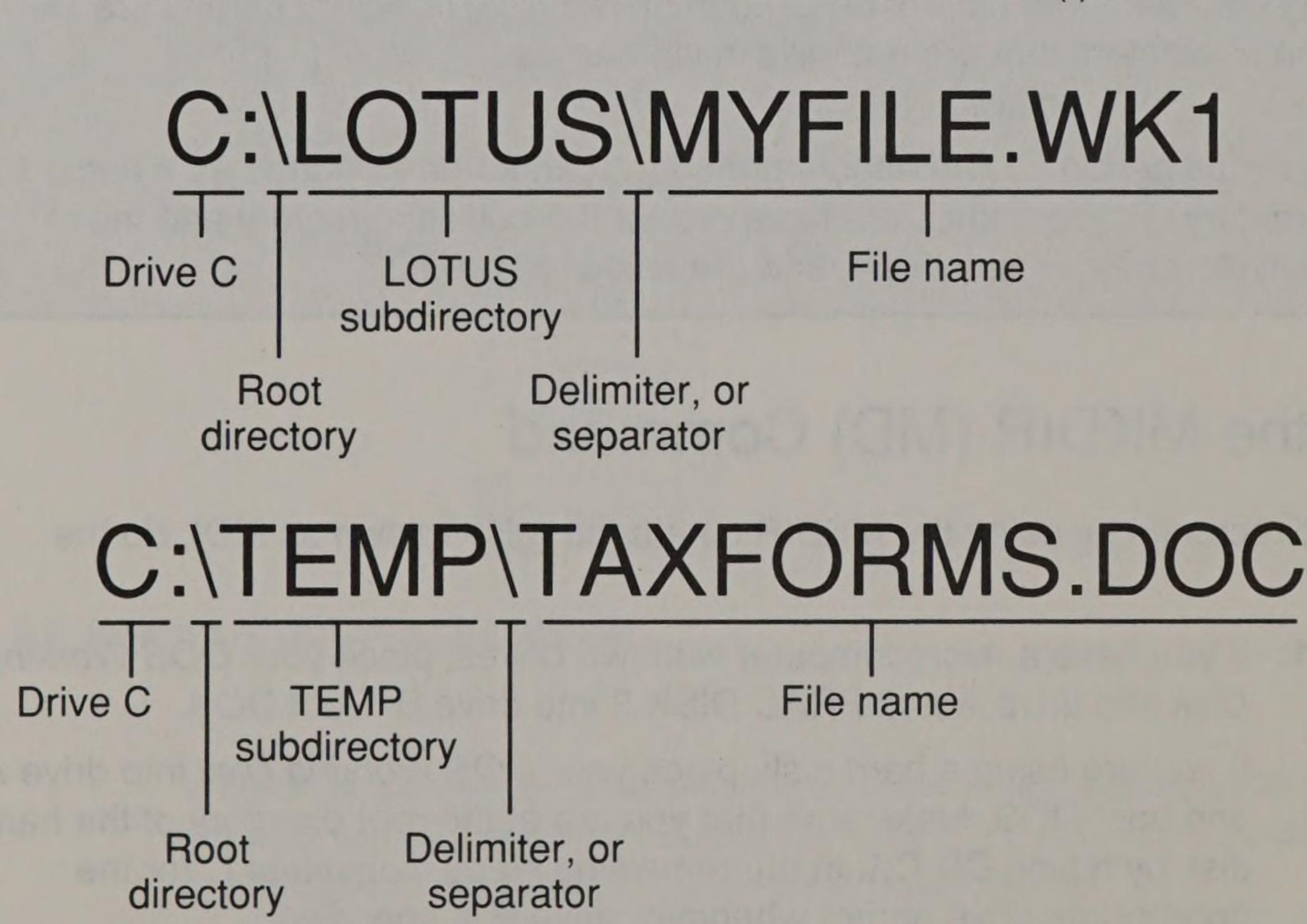


Fig. 9.5. *Path name examples.*

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Before working through a simple example, you should know about three new commands:

CHDIR, or CD, tells DOS to change directories.

MKDIR, or MD, tells DOS to make a new directory.

RMDIR, or RD, tells DOS to remove a directory.

To learn how to use these commands to set up hierarchical directories, work through the simple examples that follow. Users with two floppy disk drives can use the directions as they are printed. Hard disk users should substitute drive C when drive B is mentioned.

Guidelines for Hierarchical Directory Names

1. A hierarchical directory name has a root name of one to eight characters, an optional extension of one to three characters, and a period separating the root name from the extension.
2. Valid characters for hierarchical directory names are the same characters that are valid for file names: the letters A to Z, the numbers 0 to 9, and the following special characters: $ # & @ ! ( ) - { } ' _ ; ^ ~
3. The characters that cannot be used in hierarchical directory names are the same characters that are not valid in file names: + = / [ ] " : ; , ? * \ < > | . [space]
4. The single period (.) and double period (..) cannot be assigned as a name to a directory. These names are reserved for the current directory and the parent directory, respectively, and are assigned by DOS.

Using the MKDIR (MD) Command

To create directories by using the MKDIR command (also known as MD), do the following:

Step 1: If you have a microcomputer with two drives, place your *DOS Working Disk* into drive A and PRAC DISK 3 into drive B. Boot DOS.

If you are using a hard disk, place your *DOS Working Disk* into drive A and boot DOS. Make sure that you are at the root directory of the hard disk by typing **CD C:**. In the remaining steps, substitute C (or the appropriate drive name) whenever drive B is specified.

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Step 2: Type **MD B:WORD** and press Enter.

This command creates a new subdirectory called WORD to hold all your word processing files. The B: indicates that you want to create this subdirectory on the disk in drive B.

Note: The rules for creating directory and subdirectory names in hierarchical directories are the same as the rules for file names.

Step 3: Type **MD B:WORD\CORRESP.90** and press Enter.

This command creates a subdirectory called CORRESP.90 (1990 correspondence) within WORD. The backslash between WORD and CORRESP.90 is the path symbol, which tells DOS to create a new subdirectory (CORRESP.90) within the already existing subdirectory (WORD).

Step 4: Type **MD B:WORD\CORRESP.90\COMPANYX.LET** and press Enter.

This command creates a subdirectory in CORRESP.90 for letters to Company X. To create this directory, DOS moves down through the path names; when it reaches the last name in the path, DOS creates a new directory named COMPANYX.LET.

You have just created a series of subdirectories organized hierarchically under the root directory (see fig. 9.6).

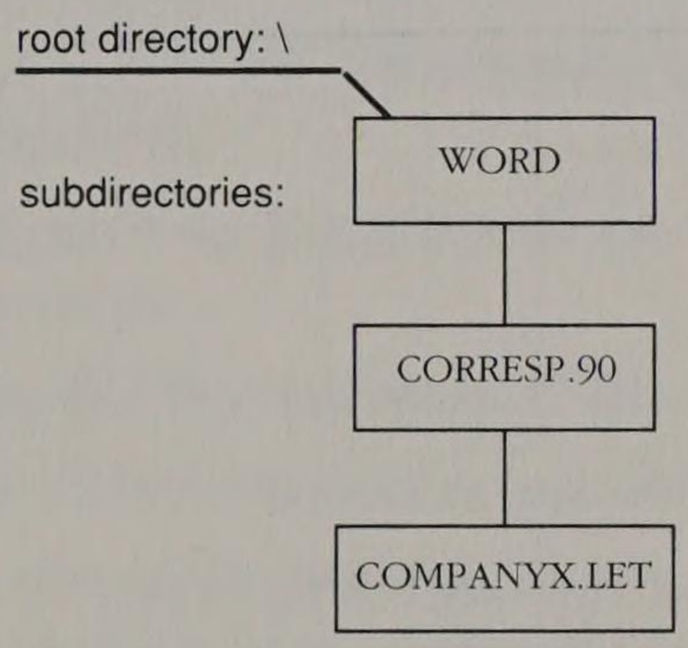


Fig. 9.6. *Diagram of sample subdirectories.*

Within the same root directory, many other subdirectories can be created, using the principles just explained. To see how this arrangement is depicted in the directory, use the DIR command.

Step 5: Type **DIR B:** and press Enter.

On the screen you see the directory shown in figure 9.7.

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```
A>DIR B:

 Volume in drive B has no label
 Directory of  B:\

COMMAND  COM    25308   2-02-88  12:00a
WORD         <DIR>      2-08-90   2:05p
        2 File(s)    280576 bytes free

A>
```

Fig. 9.7. *The directory displayed by the DIR command.*

What you see is a listing of root-directory files on the disk. The backslash after the B: tells you that you're looking at the root directory. Notice that you have two files in the root directory. COMMAND.COM was created when you copied the system onto the disk during formatting. WORD is the first subdirectory you created; it is identified as a subdirectory by <DIR>.

Step 6: Now find out what is in the directory WORD by typing **DIR B:WORD** and pressing Enter.

On the screen you see a directory of the WORD directory like the one shown in figure 9.8.

```
A>DIR B:WORD

 Volume in drive B has no label
 Directory of  B:\WORD

             <DIR>      2-08-90   2:05p
..           <DIR>      2-08-90   2:05p
CORRESP  90  <DIR>      2-08-90   2:05p
        3 File(s)    280576 bytes free

A>
```

Fig. 9.8. *The contents of the WORD directory.*

The CORRESP.90 directory is one that you created, but where did the single-period and double-period directories come from? The single-period directory represents the directory you are now viewing (the WORD directory); the double-period directory represents the parent directory of the WORD directory. (In this case, the parent of WORD is the root directory.) Notice that the dates and times of the single-period and

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double-period directories are the same as the date and time for the WORD directory. When DOS creates a subdirectory, DOS makes the entry in the parent directory and establishes the . and .. directories at the same time, giving them all the same time and date.

Using the CHDIR (CD) Command

Now that you have created a series of hierarchically organized directories, you can move among these directories by using the CHDIR, or CD (change directories), command. Suppose that you want to move from the root directory down to the COMPANYX.LET directory. You can do that by following this series of steps:

Step 1: Make sure that you are at the root directory by typing **CD B:** and pressing Enter. (Hard disk users should substitute C for B in these directions.)

Step 2: Type **CD B:WORD** and press Enter.

This command tells DOS to check the root directory for the subdirectory WORD. If DOS finds the subdirectory, DOS goes to that location.

Step 3: Type **CD B:CORRESP.90** and press Enter.

This command moves you one level down; you are now in the CORRESP.90 directory.

Step 4: To move to the last directory level, type **CD B:COMPANYX.LET** and press Enter.

Type **DIR B:** and press Enter. Now you can examine the contents of the directory.

Step 5: Type **CD B:** and press Enter.

This command returns you to the root directory.

Movement between directories is easier if you combine the commands into a single executable command. You can combine Steps 2, 3, and 4 by typing the following and pressing Enter:

CHDIR B:\WORD\CORRESP.90\COMPANYX.LET

DOS interprets this command to mean, “First, look in the current directory for the subdirectory WORD; move into this subdirectory and find the subdirectory CORRESP.90; move into that directory and find the subdirectory COMPANYX.LET; then move into the COMPANYX.LET subdirectory.”

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Using the TREE Command

With many subdirectories and files stored on a hard disk, how can you find out what is stored where? You still have the option of using the directory (DIR) command to search for a file in each subdirectory, but for hard disk users, the TREE command offers an easier alternative.

With the TREE command you can display all the subdirectories on a disk and have the option to display all the files in each subdirectory at the same time. The format for the TREE command is as follows:

TREE *d: /F*

This statement consists of the following parts:

1. *TREE* is the command.
2. *d:* is the disk drive from which you want a tree displayed. If you want a tree of your hard disk, the drive is C:.
3. */F* is the switch that tells DOS to display all the files in all the subdirectories on the disk, beginning with the root directory. If you do not use the switch, only the directories with full path names are displayed.

When you use the TREE command, DOS displays one directory or one file per line. As a result, a large directory can scroll off the screen. To prevent scrolling, use the Ctrl-Num Lock combination to stop the screen from scrolling. Better still, print a paper copy of the whole directory for easy reference.

Suggestion: Print a new tree after you back up your hard disk. (Backup procedures for hard disk users are covered in Lesson 12.)

Follow these steps to get a printed copy of all directories and files:

Step 1: Be sure your printer is connected to your computer and turned on.

Step 2: Boot DOS.

Step 3: If you're using two floppy disks, be sure that the disk you created with hierarchical directories (PRAC DISK 3) is in drive B. If you're using a hard disk, the files you organized hierarchically are stored on your hard disk.

Step 4: Type **TREE B:/F>PRN** and press Enter.

This command tells DOS to give you an entire copy of the tree, including the files in each subdirectory, and to redirect the output to the printer.

If you are using DOS V4.0 and your printer cannot print graphics characters, use the following command:

TREE B:/F/A>PRN

Note: If you do not have a printer, type only **TREE B:/F**.

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If you want only a listing of the directories, omit the switch (/F).

Notice that when you use the TREE command, the date, time, and size of the files are not displayed. To get this information, you must use the directory (DIR) command.

Figure 9.9 shows the tree for PRAC DISK 3.

```
DIRECTORY PATH LISTING
Files:              COMMAND .COM
Path: \WORD
Sub-directories:    CORRESP .90
Files:              None
Path: \WORD\CORRESP.90
Sub-directories:    COMPANYX.LET
Files:              None
Path: \WORD\CORRESP.90\COMPANYX.LET
Sub-directories:    None
```

Fig. 9.9. *The results of the TREE command.*

Using the RMDIR (RD) Command

With the RMDIR, or RD, command, you can remove subdirectories you created. Three safety features are built into this command to prevent you from accidentally erasing files you want to keep:

1. You cannot use RD on the current directory.
2. You cannot use RD on the root directory.
3. You cannot use RD on a directory that contains files or other subdirectories.

For example, try to remove the subdirectory CORRESP.90.

Step 1: Type **RD B:\WORD\CORRESP.90** and press Enter.

On the screen you get an error message: `Invalid path, not directory, or directory not empty`. The subdirectory

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CORRESP.90 is not an empty directory; CORRESP.90 contains the directory COMPANYX.LET.

COMPANYX.LET is an empty directory, so you can remove it. First, use the CHDIR command to get into the CORRESP.90 subdirectory.

Step 2: Type **CHDIR B:\WORD\CORRESP.90** and press Enter.

This command moves you to the desired subdirectory.

Step 3: Type **RD B:COMPANYX.LET** and press Enter.

This command removes the specified directory.

Step 4: Type **DIR B:** and press Enter.

Notice that COMPANYX.LET is no longer listed in the directory.

Suppose that you want to erase all the files in a subdirectory. You already know that you cannot use the RMDIR command on a directory that is not empty. You first must use the ERASE or DEL command with the wild-card symbol (*.*). For example, if COMPANYX.LET had not been empty, in Step 3 you would have typed **ERASE B:COMPANYX.LET*.*** or **DEL B:COMPANYX.LET*.*** and pressed Enter. Then you could have removed the directory.

Note: If you want to practice the CHDIR (CD) command more, place the lesson disk in drive B. The lesson disk has several directories on it. The directories that you worked with in this lesson are in a subdirectory called \LESSON9.

How Path Names Affect Commands

In Lesson 7, you learned to use the COPY command with DOS. You can copy files between disks or to a new position on the same disk. Now that you are familiar with path names, you can use the full form of the COPY command. The syntax of the command is:

COPY *d1:\pathname1\sfile d2:\pathname2\dfile*

This statement consists of the following parts:

1. *d1:* is the source drive, and *d2:* is the destination drive.
2. *pathname1* is the path name for the source file, and *pathname2* is the path name for the destination file.
3. *sfile* is the file name for the source file, and *dfile* is the file name for the destination file.

The only difference between the full version of the COPY command and its use in Lesson 7 is the addition of the path name. Remember, if DOS is not given a particular

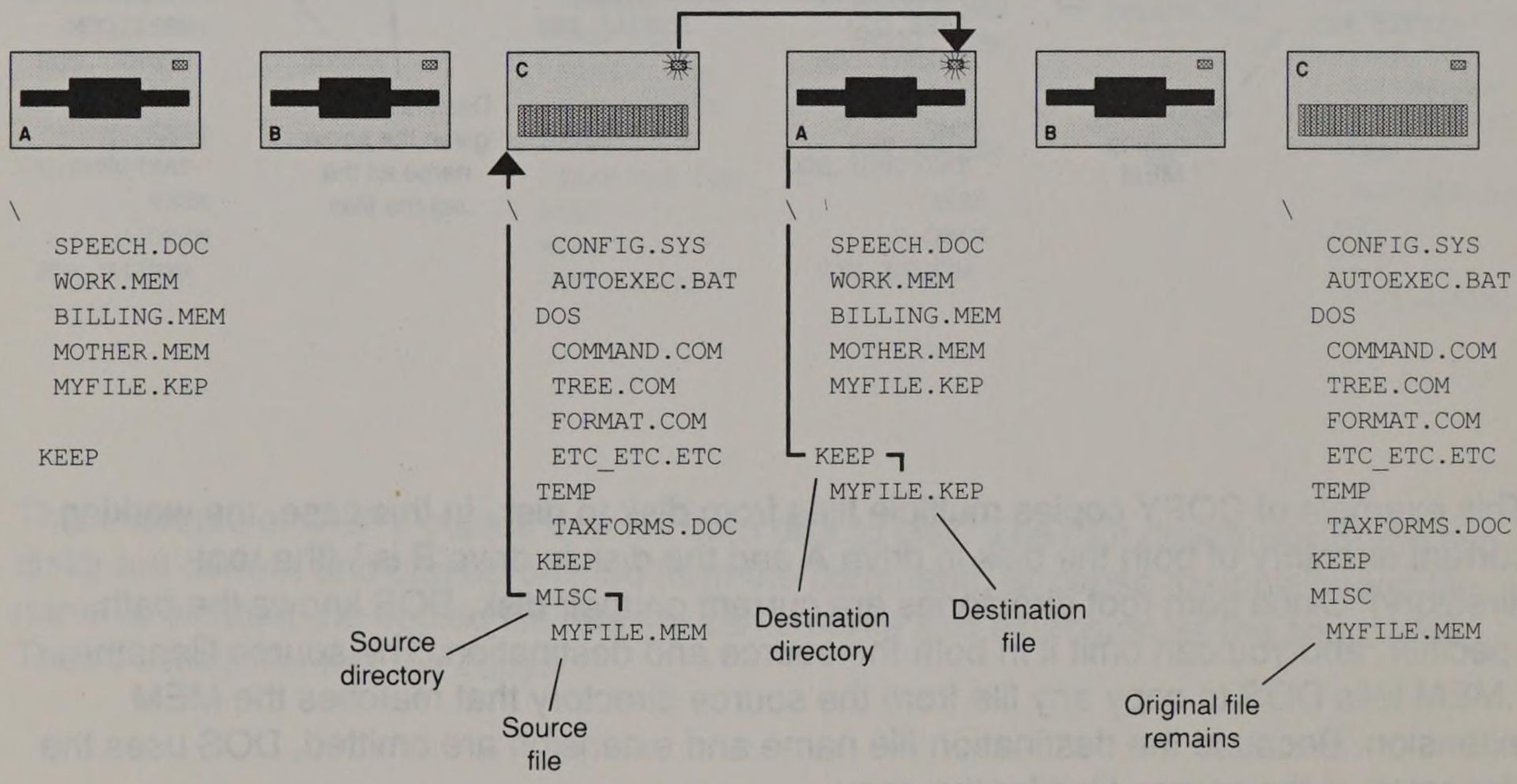
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parameter, the "rule of currents" applies. If you omit the path for the source file, DOS assumes that the current path is to be used.

The next six examples show how to use the COPY command to copy files among subdirectories and disk drives. Each example shows what you type to copy a particular file or group of files. Then, at the end of each example, you see how DOS interperts your command.

Command as issued:

COPY C:\MISC\MYFILE.MEM A:\KEEP\MYFILE.KEP/V

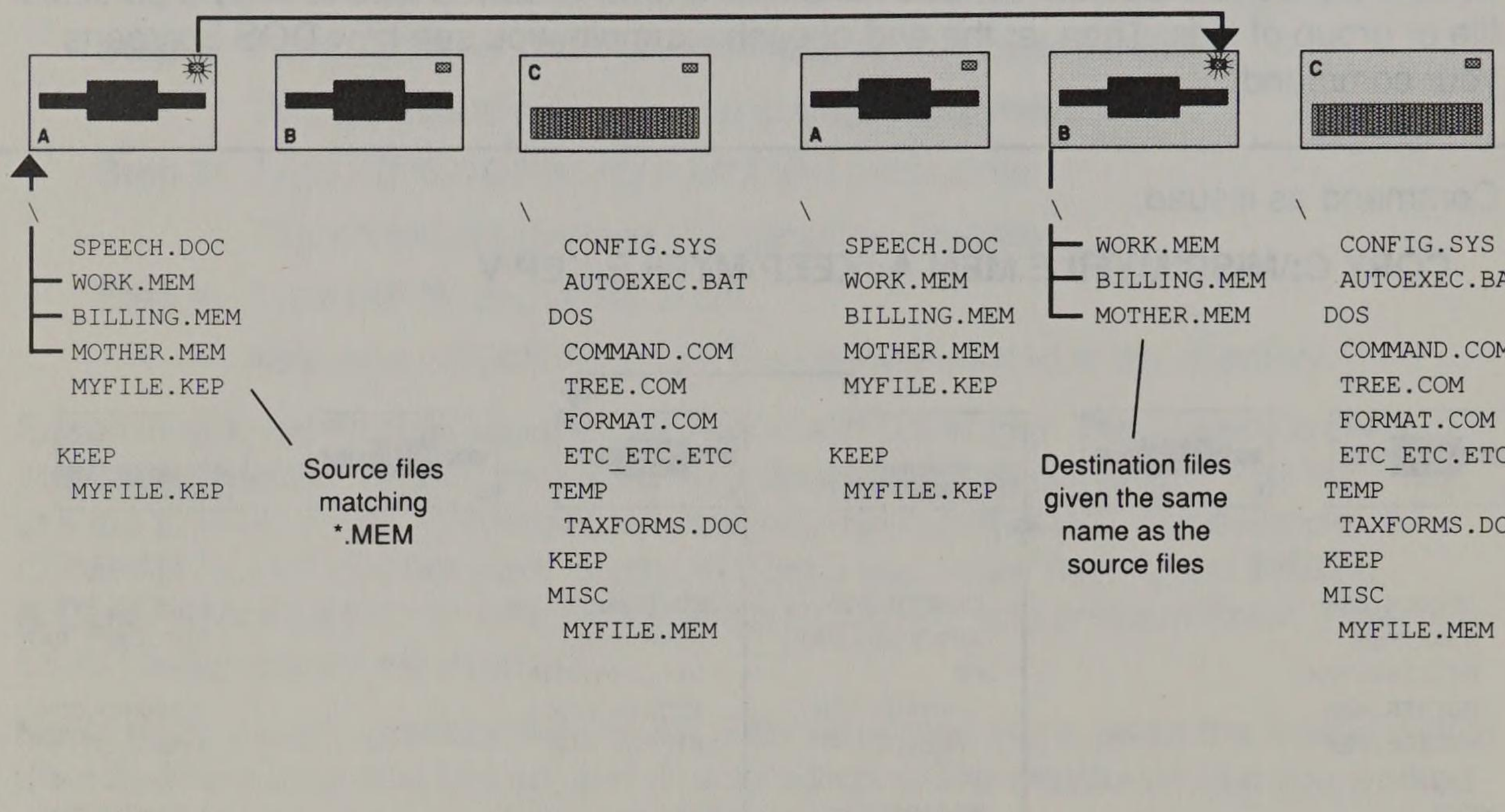


In this version of COPY, the full form of COPY is used. The command gives DOS all the parameters needed to locate and copy a file from the directory tree of the source drive to the directory and file name of the destination. The /V at the end of the command is a switch that tells DOS to verify the copied file after the copy is made. The full version of COPY does not rely on DOS's current default drive or directory.

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Command as issued:

COPY A:*.MEM B:

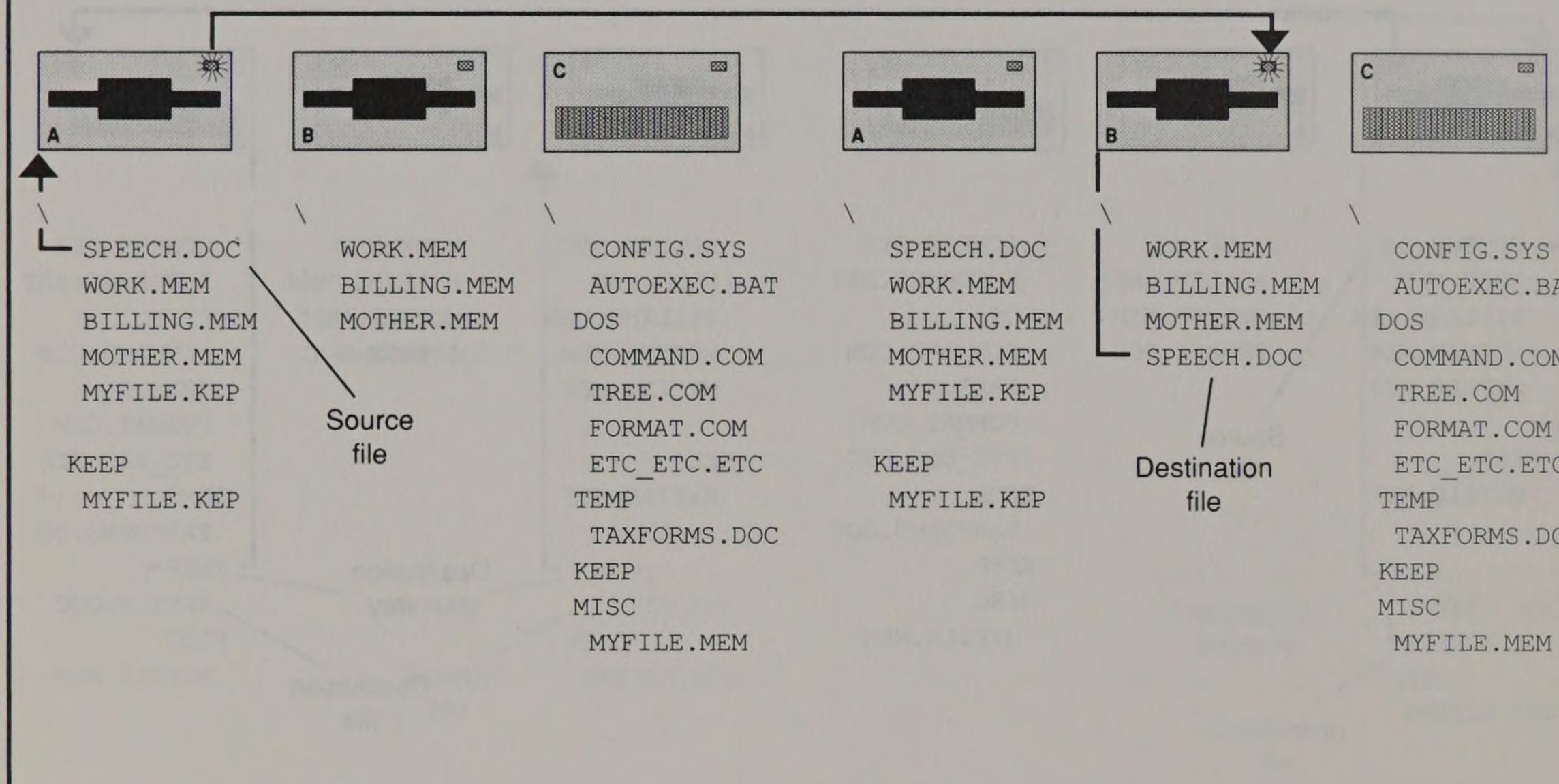


This example of COPY copies multiple files from disk to disk. In this case, the working current directory of both the disk in drive A and the disk in drive B is \ (the root directory). Since both root directories are current on their disk, DOS knows the path specifier, and you can omit it in both the source and destination. The source filename *.MEM tells DOS to copy any file from the source directory that matches the MEM extension. Because the destination file name and extension are omitted, DOS uses the filenames of the source files for the copy.

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Command as issued:

COPY A:SPEECH.DOC B:/V

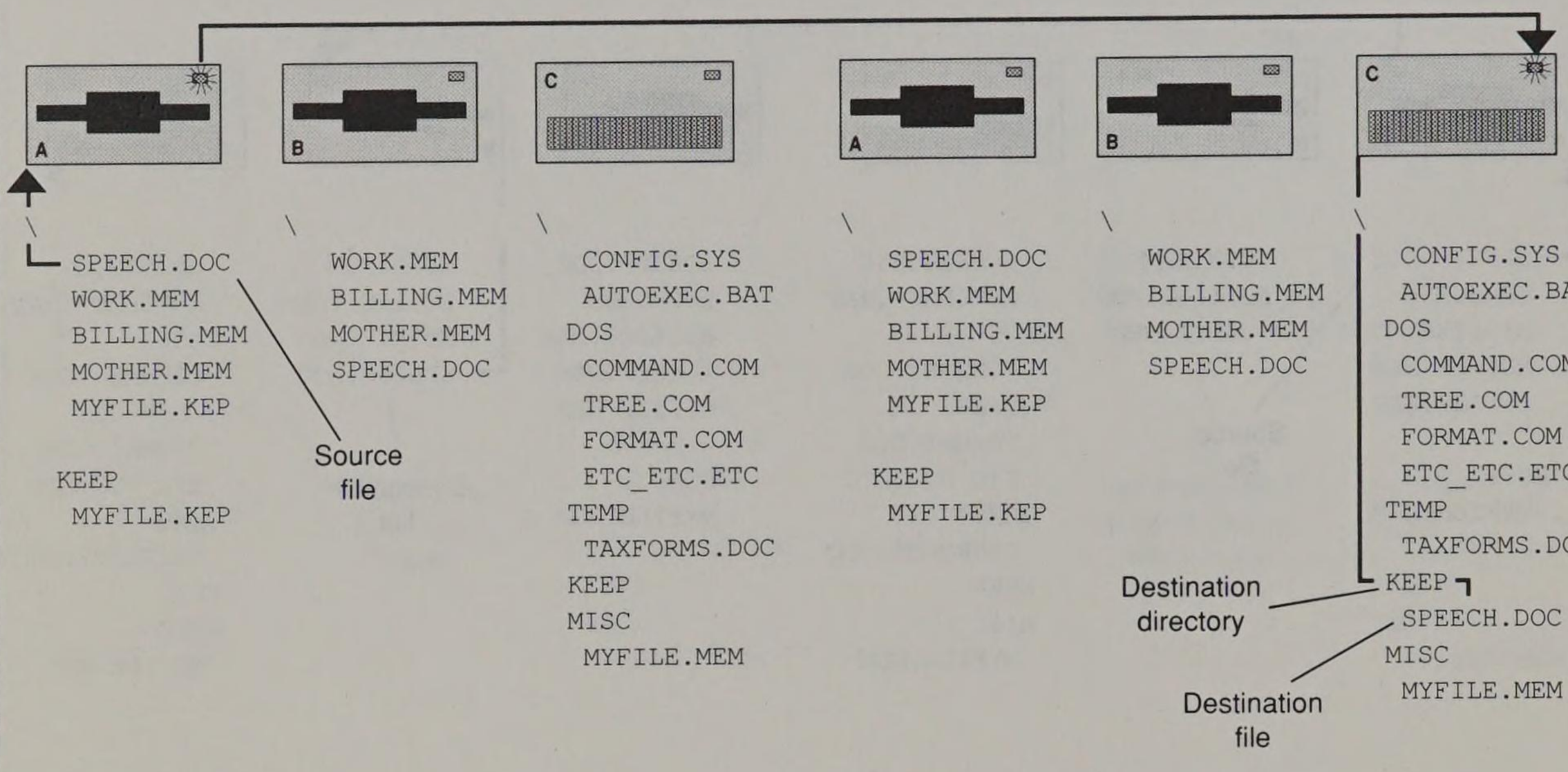


This example of COPY copies one file from disk to disk. The root directories of the two disks are current and can be omitted from the command. Because the destination file name is omitted, the copied file has the same name and extension as the source file. The /V switch verifies the copy.

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Command as issued:

COPY A:SPEECH.DOC C:/V

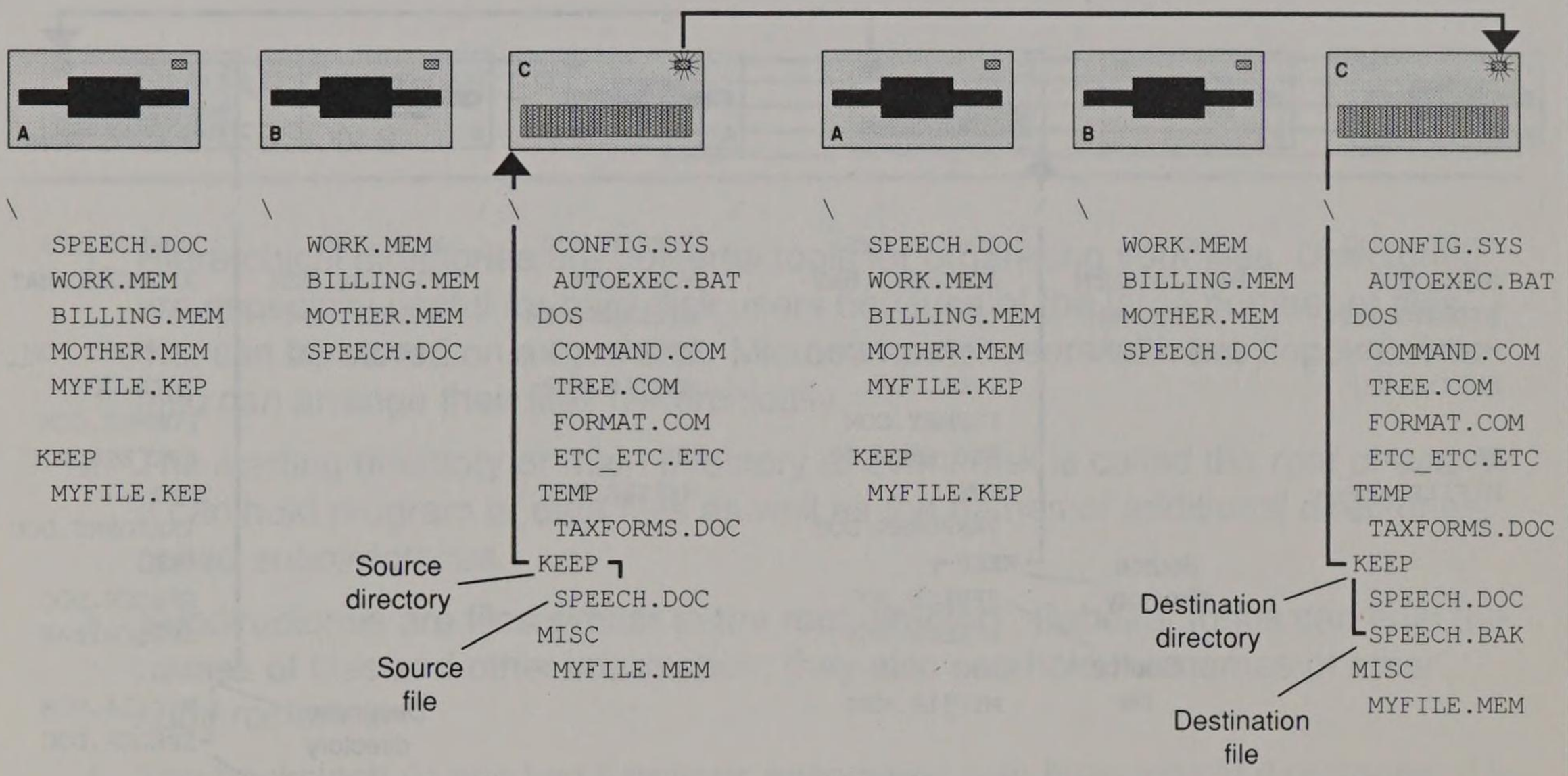


In this example of COPY, the directory \KEEP was made current on drive C with a CD\KEEP command. This is a floppy disk to hard disk copy where the path specifiers for the source and destination drives are omitted. The destination file name is omitted also. Because DOS knows the omitted parameters are its current defaults, the copy is made. The /V switch verifies the copy.

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Command as issued:

COPY SPEECH.DOC SPEECH.BAK

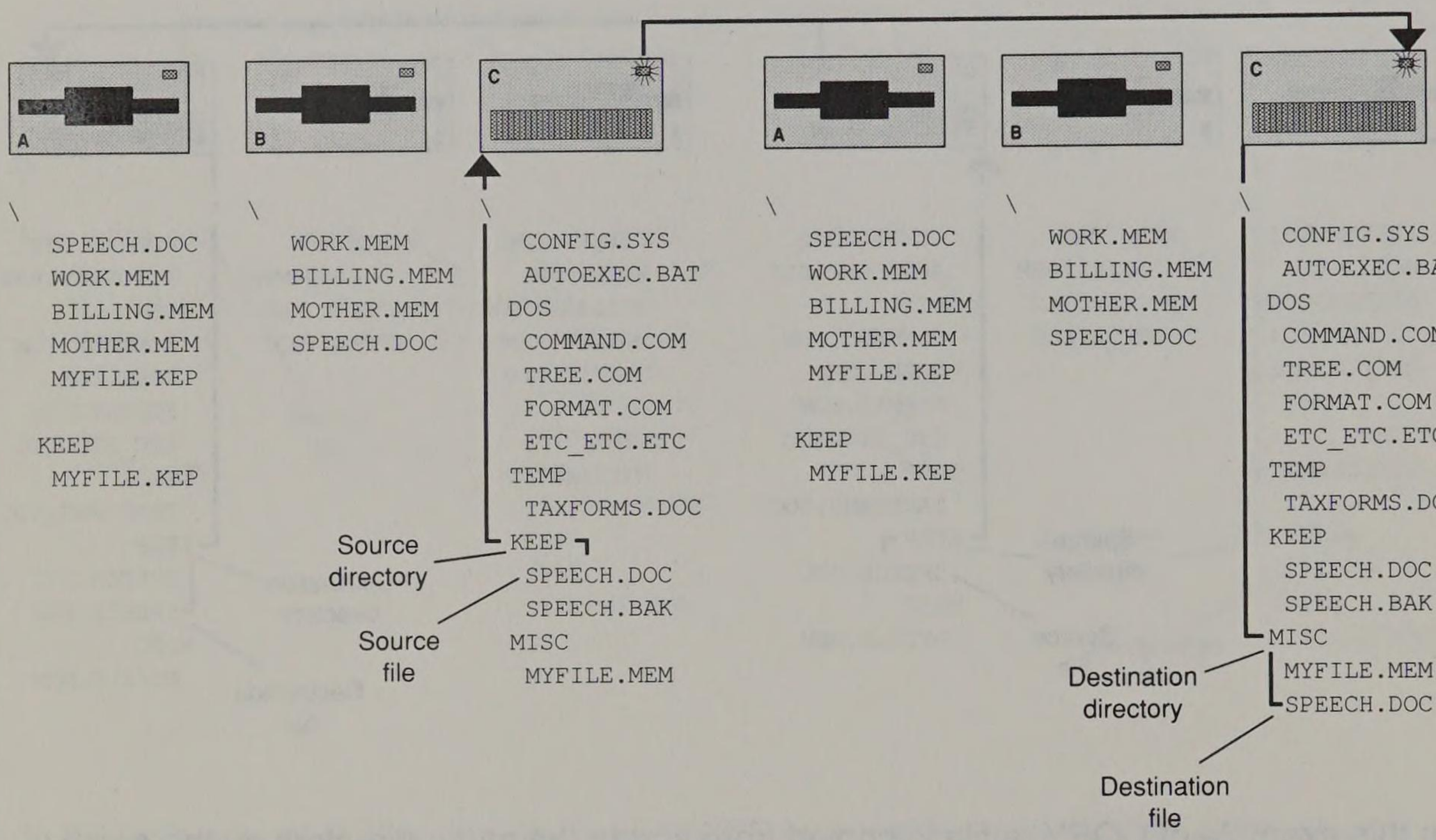


In this example of COPY, a file is copied from and to the same directory on the same disk. The current drive is C, and the current directory is \KEEP. Because DOS does not allow duplicate file names in the same directory of the same disk, the extension of the destination file name has been changed. After the copy, the two files contain the same information (as with any copy). This form of copy is good for preserving a copy of a file in case the original file is erased or rendered incorrect.

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Command as issued:

COPY SPEECH.DOC \MISC



In this example of COPY, a file is copied from one directory to another on the same disk. The current drive is C, and the current directory is \KEEP. Because C:\KEEP is the current drive and directory, it is omitted from the source parameters. Only the destination directory is given in the destination part of the COPY command, because C: is current and the destination file name and extension are to match the source. DOS allows duplicate file names on the same disk as long as they are in different directories.

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The addition of a path name doesn't only affect the COPY command. Separating your files into subdirectories on any disk, and in particular on a computer with a hard disk, makes them much easier to find. You can use path names with many DOS commands to indicate explicitly the file of interest.

SUMMARY OF CONCEPTS FOR LESSON 9

1. Hierarchical directories are powerful tools for organizing your files. Directories are especially useful for hard disk users because of the large number of files that can be stored on a hard disk. Microcomputer users with two floppy drives also can arrange their files hierarchically.
2. The starting directory or main directory of every disk is called the *root directory*. It can hold program or data files as well as the names of additional directories, called *subdirectories*.
3. Subdirectories are files similar to the root directory. Subdirectories can hold the names of files and other information; they also can hold the names of other subdirectories.
4. The backslash (\) has two functions associated with hierarchical directories: it is the symbol for the root directory, and it is the path symbol that separates directory names.
5. A *path* is a chain of directory names that tells DOS how to find the directory or file you want.
6. Three commands function specifically in relation to hierarchical directories: with MKDIR (or MD) you create subdirectories; with CHDIR (or CD) you change directories and move among subdirectories; with RMDIR (or RD) you remove subdirectories.
7. The TREE command displays all subdirectories on a disk and optionally displays all the files in each subdirectory.
8. The path name is used in many DOS commands to explicitly describe a location on the disk.

For Further Reference

If you would like further information about hierarchical directories, consult *Using DOS*, by David Solomon (Que Corporation, Carmel, IN, 1989), Chapter 7.

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SUMMARY EXERCISES FOR LESSON 9

Practice the MKDIR, CHDIR, TREE and RMDIR commands with PRAC DISK 1 in drive A and PRAC DISK 3 in drive B.

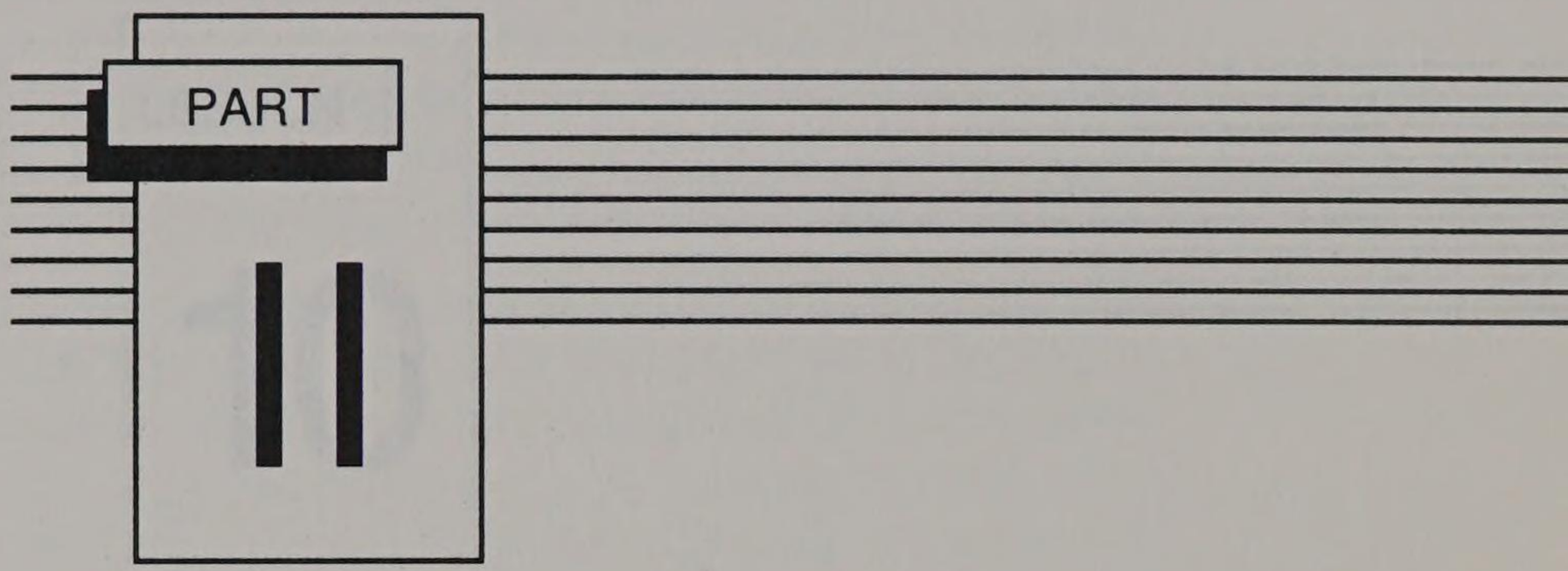
1. Create on PRAC DISK 3 the following subdirectory path:

   \MEMO\DEPT1\JOHN

2. Copy the files PROFITS.88, PROFITS.89, and PROFITS.90 on PRAC DISK 1 to the subdirectory JOHN on PRAC DISK 3.
3. Display the tree structure of PRAC DISK 3.
4. Change to the directory JOHN on PRAC DISK 3 and using the DEL command you learned in Lesson 8, delete the files in the subdirectory JOHN on PRAC DISK 3.
5. Remove all of the subdirectories on PRAC DISK 3.

   As you do these operations, you may refer to the explanations in Lesson 9. If you need help, the DOS command statements are listed for you in Appendix D. The answers to these specific questions are listed in Appendix C.

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Essential DOS Shell Features

The four lessons in this section relate to the use of the DOS Shell program supplied with DOS V4.0. If you do not have Version 4.0, you can skip these lessons and move to Part III. The lessons in Part II supplement functions learned in Part I, and allow you to make use of the graphical user interface of DOS V4.0. In this section, you learn to do the following:

- Use the basic functions of the Shell in Lesson 10
- Use the DOS utilities in Lesson 11
- Investigate the File System in Lesson 12
- Back up and restore with the Shell in Lesson 13

Although you can use the Shell program on a dual floppy system, you benefit most from these lessons by using a hard disk. If you do not have a mouse, you can omit the sections pertaining to the mouse.

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LESSON

10

Basic Shell Operation

The Shell program is a new feature with DOS V4.0. Because the Shell groups commands and programs together and lists them on the screen, it is easier to use than the system prompt. (With the system prompt, you must know the names of any commands you want to run; with the DOS V4.0 Shell program, the available commands are listed.)

The Shell program can be started in one of two ways: If your computer is configured in a particular way (with the DOSSHELL command in the AUTOEXEC.BAT file), the Shell program starts automatically when you turn on your computer. If you see the system prompt when you turn on your computer, you start the Shell from there. Lesson 2 briefly introduced the Shell program.

In this lesson, you learn how to do the following:

- Start and exit the Shell program
- Change the colors on your screen
- Reach the system prompt without leaving the Shell
- Use the Help features in the Shell

Starting the Shell

If you have a computer with a hard disk, the Shell program is on the hard disk. If you have a two floppy disk system, you need the disk labeled *Shell* that was created when DOS V4.0 was installed on your computer.

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Step 1: Start your computer. If you have a floppy disk system, place the DOS Startup disk into drive A and either turn on your computer or press Ctrl-Alt-Del if your computer is already on. If you have a hard disk, remove any diskettes in the floppy disk drives and either turn on your computer or press Ctrl-Alt-Del to reboot the computer.

The computer initializes itself and boots the operating system. If prompted by the computer, check the date and time, correcting them if necessary. Depending on how your machine is configured, you see either the system prompt (`A>` or `C>`) or the initial Shell program screen. If you are at the initial Shell program screen, skip Step 2.

Step 2: If you are at the system prompt and have a floppy-based system, remove the DOS Startup disk and insert the disk containing the Shell program. Hard disk owners will have the program already available. At the system prompt, type **DOSSHELL** and press Enter to start the Shell. The screen shown in figure 10.1 appears after a few seconds.

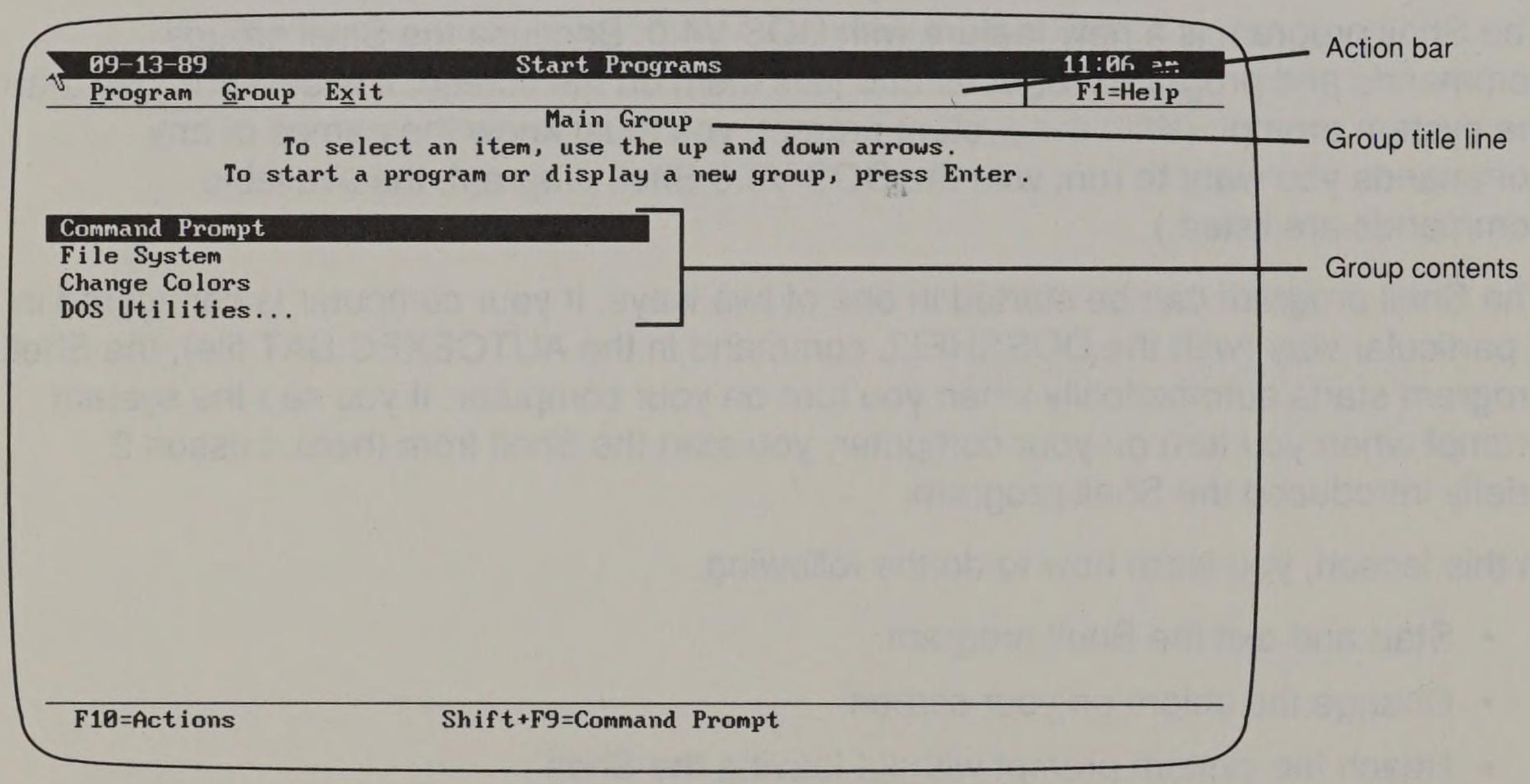


Fig. 10.1. *The Start Programs screen.*

As you learned in Lesson 2, the initial Shell screen is entitled `Start Programs`. On either side of the screen title are the time and date. Under the title is the *action bar*, a line which displays the kinds of actions you can select. Positioned under the action bar are the *group title line* and the *group contents*. The Start Programs screen serves as your base to explore the important keystrokes you use in the Shell.

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In Part I, you learned that you should only turn off the computer when you are at the system prompt. This is still true with the Shell program. Before turning off your computer, you should always exit the Shell program.

Leaving the Shell

You have two methods to exit the Shell:

Method 1: Press the F3 key. On an Enhanced Keyboard, this key is located in the top row of keys above the QWERTY section of the keyboard. On most other keyboards, the F3 key is on the far left side.

The system prompt appears, and you have exited the Shell program.

Restart the Shell program by typing **DOSSHELL** at the system prompt and pressing Enter.

Method 2: Press F10; the word `Program` on the action bar is highlighted. By pressing the right-arrow key twice and the down-arrow key once, the screen shown in figure 10.2 appears.

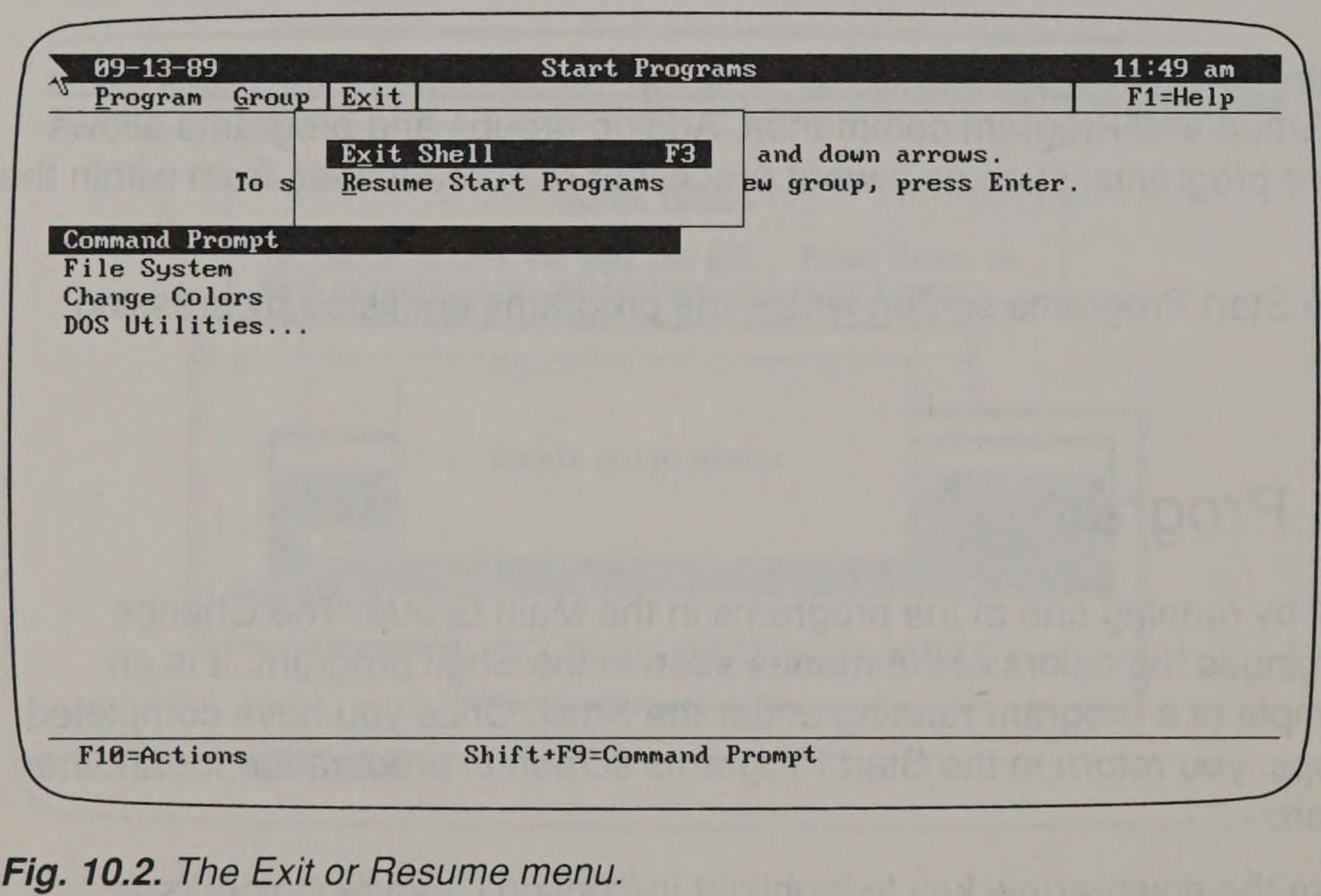


Fig. 10.2. *The Exit or Resume menu.*

Notice that each menu selection has a letter underscored. When you select the menu, you can press the underscored letter to activate the menu item. For example, After pressing F10, you can press x to select the Exit pull-down menu.

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If you press the x key again, you leave the Shell program and reach the system prompt. If you don't want to leave the Shell, press r to continue in the Shell.

If you have a mouse, you can exit the Shell by moving the mouse pointer (the arrow) across the screen. Point to the word Exit on the action bar and press the left mouse button once to bring down the Exit or Resume menu shown in figure 10.2. Point to the Exit option and press the button again to leave the Shell, or move the mouse pointer to the Resume option and press the button to remain in the Shell.

Using the Action Bar

As demonstrated with the Exit command, you reach the action bar in the Shell program by pressing F10 or pointing with a mouse. When you start the Shell, the Main Group of programs is listed: Command Prompt, File System, Change Colors, and DOS Utilities.

You use the action bar to add programs to this group or to change them; to add another group of programs or to change the group; or to exit the Shell program completely.

Once you are familiar with the programs supplied with the Shell, you can add your own, using the Group and Program commands. Adding groups and programs allows you to run all your programs, such as a word processor or spreadsheet, from within the Shell.

You return to the Start Programs screen where the programs are listed by pressing F10 again.

Running a Program

Try out the Shell by running one of the programs in the Main Group. The Change Colors option changes the colors of the menus seen in the Shell program. It is an elementary example of a program running under the Shell. Once you have completed the following steps, you return to the Start Programs screen in preparation for another program selection.

Step 1: Use the down-arrow key to highlight the option Change Colors (see fig. 10.3).

Step 2: Press the Enter key to start the Change Colors program. Your screen looks like figure 10.4.

Alternatively, point to the Change Colors option with the mouse and press the left mouse button once.

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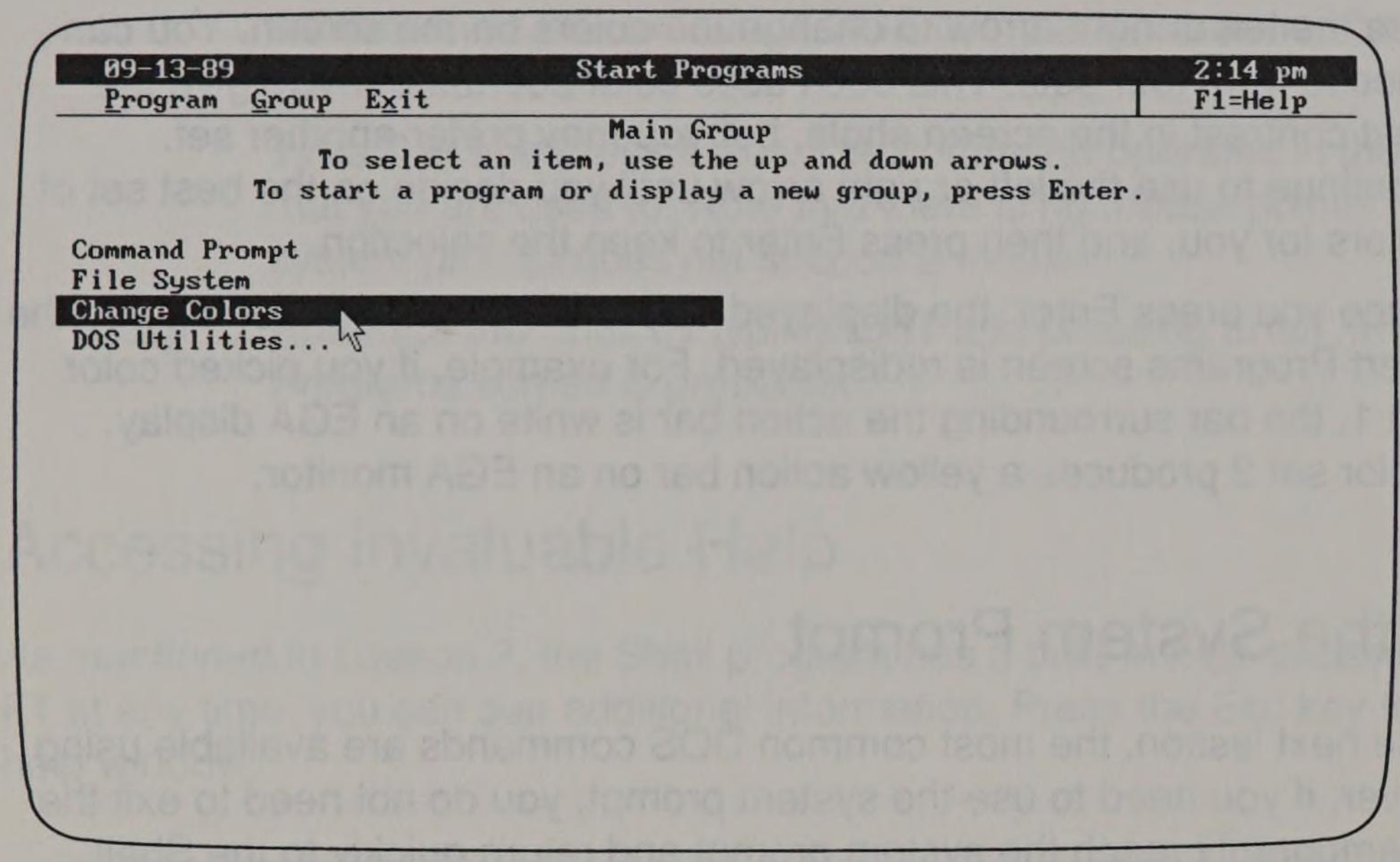


Fig. 10.3. *Selecting the Change Colors option.*

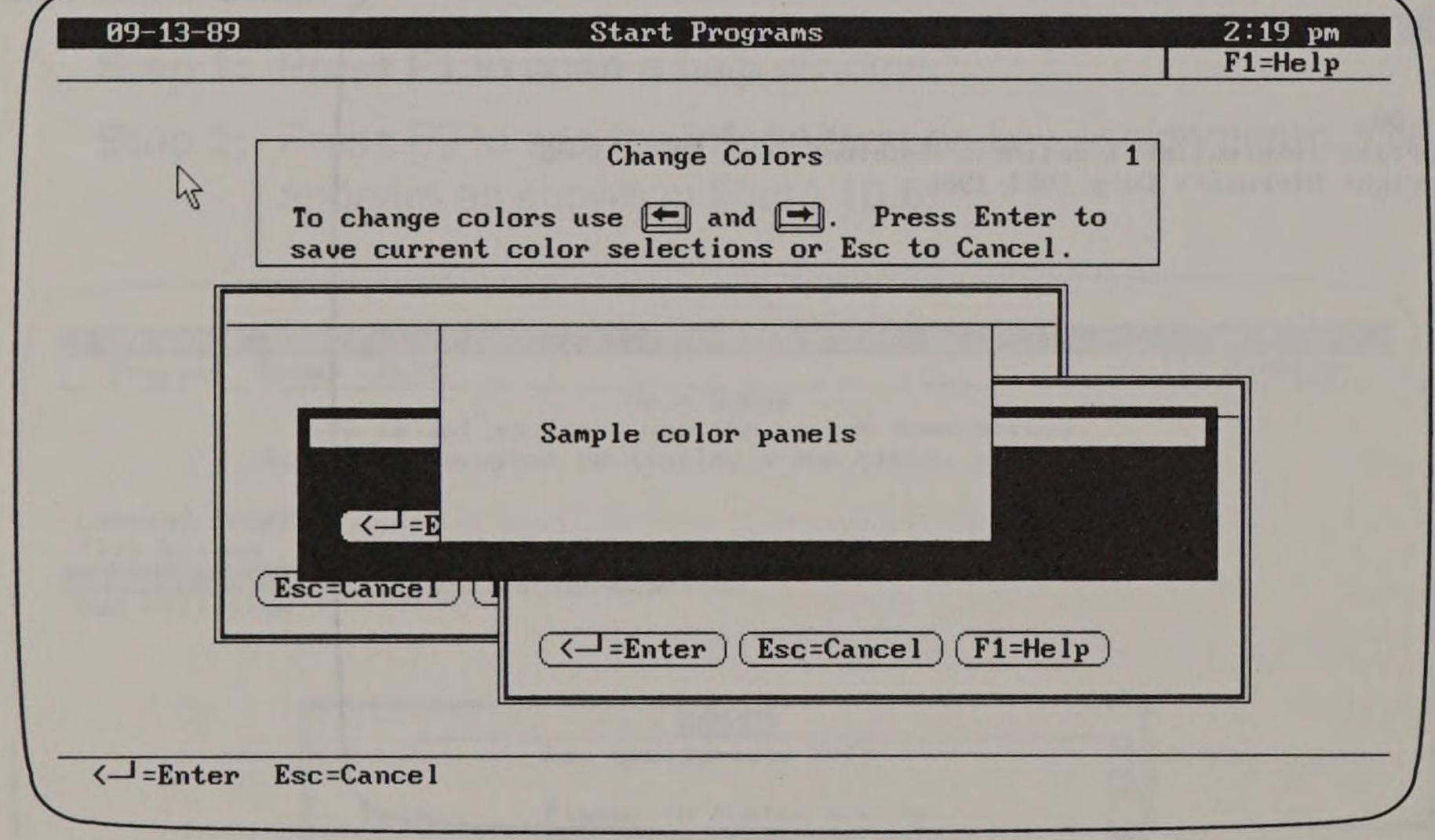


Fig. 10.4. *The Change Colors window.*

Notice the number in the top right corner of the Change Colors window. In figure 10.4, this is a `1`, meaning that the first color set is currently selected.

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Step 3: Use the left or right arrow to change the colors on the screen. You can choose from four sets. This book uses color set number 1 to give the best contrast in the screen shots, but you may prefer another set. Continue to use the left or right arrow until you decide on the best set of colors for you, and then press Enter to keep the selection.

Once you press Enter, the displayed colors are set into the Shell, and the Start Programs screen is redisplayed. For example, if you picked color set 1, the bar surrounding the action bar is white on an EGA display. Color set 2 produces a yellow action bar on an EGA monitor.

Reaching the System Prompt

As you see in the next lesson, the most common DOS commands are available using the Shell. However, if you need to use the system prompt, you do not need to exit the Shell. You can temporarily reach the system prompt and return quickly to the Shell.

Step 1: Use the arrow keys to highlight the Command Prompt option and press Enter. The system prompt appears (see fig. 10.5).

```
When ready to return to the DOS Shell, type EXIT then press enter.


IBM DOS Version 4.00
          (C)Copyright International Business Machines Corp 1981, 1988
          (C)Copyright Microsoft Corp 1981-1986

C:\DOS>
```

Fig. 10.5. *The system prompt from the DOS Shell.*

The system prompt is not the only item displayed. The version of DOS is displayed above the system prompt. The top line shows you that you are still in the Shell program. However, this line may scroll off the top of the

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screen when you execute a DOS command, so remember how to get back to the Shell.

Type **DIR** and press Enter. The command operates in the same manner that you are used to. Note that there is no mouse pointer, because the system prompt does not support a mouse.

Step 2: Return to the Shell by typing **EXIT** and pressing Enter. The Start Programs screen is presented.

Accessing Invaluable Help

As mentioned in Lesson 2, the Shell program has a built-in help system. By pressing F1 at any time, you can see additional information. Press the Esc key to remove the help window.

Using the Keyboard

This exercise uses the Shell's help feature to get information about the keys you can use in the Shell.

Step 1: Press F1 to open a help window.

Step 2: Press F9 to see the information on key assignments. Your screen appears as shown in figure 10.6.

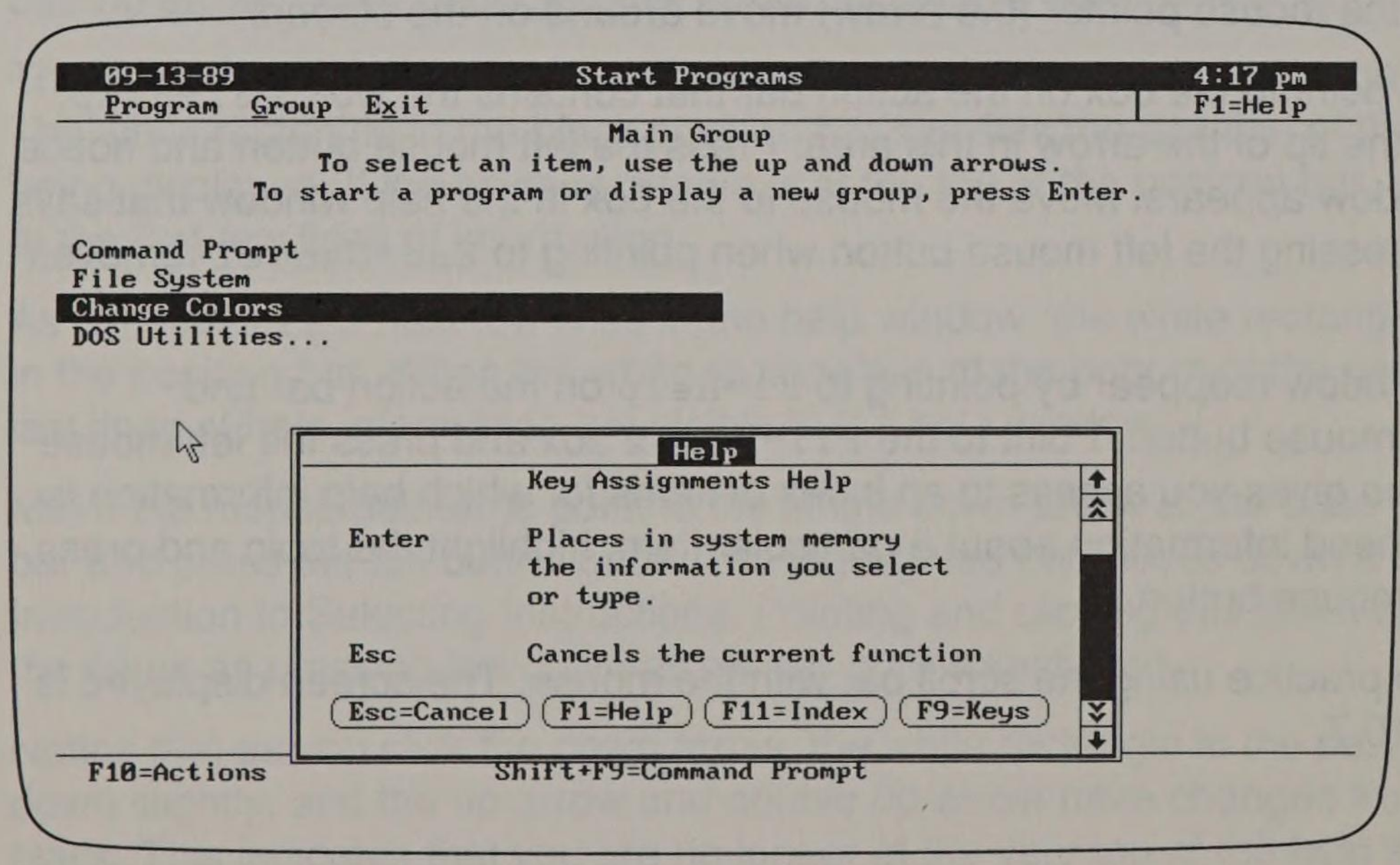


Fig. 10.6. *The help window.*

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The two keys described in the help window are two you already know. The Enter key selects an item, such as Exit from the action bar or Change Colors from the program list. The Esc key, which you used in Lesson 2 to remove the help window, cancels the current action.

The F1 key is important to remember, because it can give you help at any time. The help it gives will vary, depending on where you are in the Shell program when you press the key. This is known as *context-sensitive* help. Use the arrow keys to explore the key assignments further.

When you are finished, return to the Start Programs screen by pressing Esc twice. The first time you press Esc, the original help window reappears; the second time you press Esc, the window is removed from the screen. You can see the effect of context-sensitive help by moving the cursor to a different position on the screen and selecting help again.

Press the down-arrow key once to highlight File System, the second item on the list of programs. Now press the F1 key again and notice the change in the help information. Press the Esc key to remove this help window.

Using the Mouse To Select

Even if you do not have a mouse, you should still read this section because all the actions described can also be performed from the keyboard.

You can use the mouse to access the help windows. Move the mouse around on the desk and watch the mouse pointer (the arrow) move around on the screen.

With the mouse, point to the box on the action bar that contains the words `F1=Help`. You must place the tip of the arrow in this area. Press the left mouse button and notice that the help window appears. Move the mouse to the box in the help window that says `Esc=Cancel`. Pressing the left mouse button when pointing to `Esc=Cancel` removes the help window.

Make the help window reappear by pointing to `F1=Help` on the action bar and pressing the left mouse button. Point to the `F11=Index` box and press the left mouse button. This action gives you access to an index of items for which help information is available. If you need information about a particular item, highlight the topic and press Enter or the left mouse button.

Use this index to practice using the scroll bar with the mouse. The screen displayed is shown in figure 10.7.

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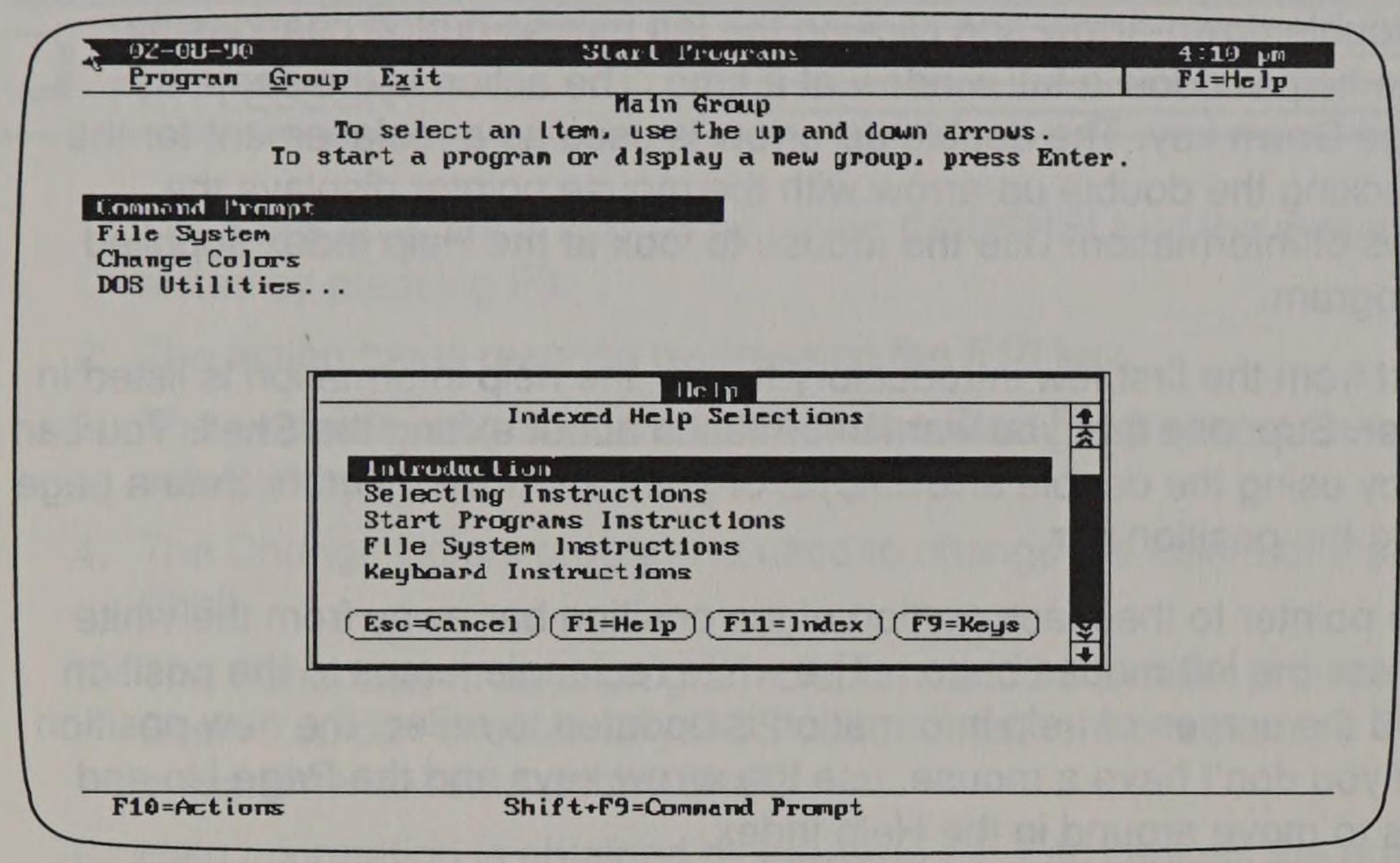


Fig. 10.7. *The Help Index window.*

Using the Mouse To Scroll

At the right side of the help window is the scroll bar. There are five areas in a scroll bar: up arrow, down arrow, double up-arrow, double down-arrow, and the position bar.

These elements are used to change your view of the information in the help window. The white rectangle in the black position bar signifies the position of the information being displayed. If the white rectangle is at the top of the position bar, you are looking at the first few lines of information.

As you look at the next few lines in the help window, the white rectangle moves lower in the position bar. When the white rectangle is at the bottom of the position bar, the last lines of help information are visible in the help window.

Move the mouse pointer to point to the single down-arrow at the base of the scroll bar and press the left button once. The highlighted bar moves down a line from Introduction to Selecting Instructions. Pointing and clicking this down-arrow box is the same as pressing the down-arrow key on the keyboard.

Notice that as you click the down arrow, the white rectangle in the position bar moves down slightly, and the up arrow and double up-arrow have changed from shaded to black. This indicates that you are no longer at the very top of the help screen, and you can use the up arrow to move up in the list.

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Pointing to the double down-arrow and clicking the left mouse button changes the information in the help window a full window at a time. The action is the same as pressing the Page Down key. The double up-arrow is used as a replacement for the Page Up key. Clicking the double up-arrow with the mouse pointer displays the previous few lines of information. Use the mouse to look at the Help Index supplied with the Shell program.

Notice that, apart from the first few introductory topics, the help information is listed in alphabetical order. Suppose that you want information about exiting the Shell. You can reach this topic by using the double arrow keys, or you can move by more than a page at a time by using the position bar.

Move the mouse pointer to the black portion of the position bar away from the white rectangle and press the left mouse button. The white rectangle jumps to the position just selected, and the screen of help information is updated to reflect the new position in the help list. If you don't have a mouse, use the arrow keys and the Page Up and Page Down keys to move around in the Help Index.

Another way to gain access to different lines of the help information involves using the mouse in a slightly different way. The technique is commonly referred to as "dragging the mouse." You point to the item to be selected, press and hold the left mouse button, and move the mouse to a new position. When in the new position, you let go of the mouse button.

Drag the mouse on the position-bar portion of the scroll bar to alter your current view of the help information. Move the mouse pointer to the white rectangle in the scroll bar. Press and hold the left mouse button; a dashed rectangle appears. As you drag the mouse to a new place in the position bar, the dashed rectangle moves with the mouse pointer. The dashed rectangle shows the new position for the white rectangle and consequently indicates how far from the beginning of the Help Index list you want to move.

When you have practiced moving around on the screen with the mouse and scroll bar, either press Esc twice to return to the Start Programs screen, or use the mouse to point to the `Esc=Cancel` box and press the left mouse button twice.

The exercises at the end of this lesson make further use of the mouse to access different parts of the help information available. Lesson 11 covers the DOS Utilities supplied with the Shell program.

If you are not going to continue with Lesson 11 immediately, press the F3 key to exit the Shell program before you turn off your computer.

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SUMMARY OF CONCEPTS FOR LESSON 10

1. The Shell program is started by typing **DOSSHELL** at the system prompt and is exited by pressing F3.
2. The action bar is reached by pressing the F10 key.
3. The available programs are listed on the Start Programs screen and are selected by highlighting and pressing Enter.
4. The Change Colors program is used to change the colors of the screen in the Shell.
5. The Command Prompt program displays a DOS system prompt from within the Shell. You can execute any DOS commands from this prompt. Type **EXIT** and press Enter to return to the Shell.
6. Help information is obtained by pressing F1. Esc cancels the previous action.
7. Items are selected by moving the mouse pointer and pressing the left mouse button.
8. The scroll bar is used to display different areas of information.

For Further Reference

If you would like to read further about the DOS Shell, consult *Using DOS*, by David Solomon (Que Corporation, Carmel, IN, 1989).

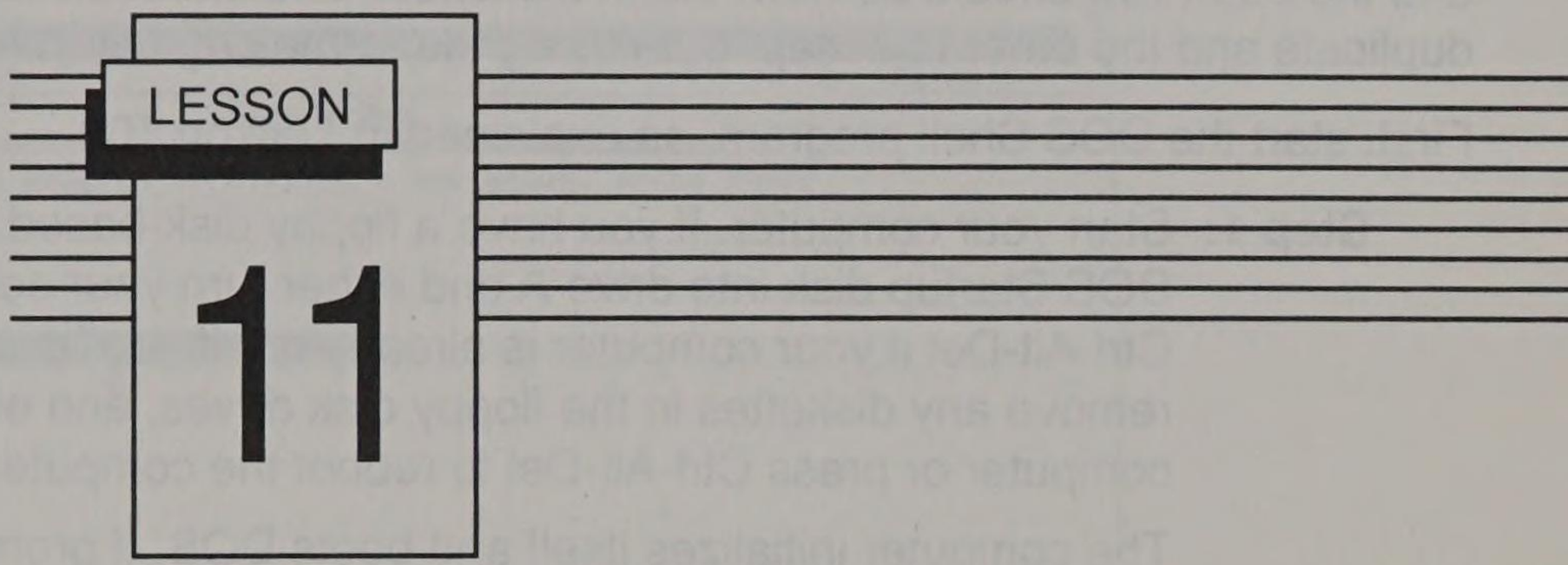
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SUMMARY EXERCISES FOR LESSON 10

1. What single key is used to exit the Shell program?
2. What single key is used to get additional information on a topic?
3. What single key is used to access the action bar?
4. What is the space bar key used for?
5. What information can you gain about using the Ctrl-Home key combination?
   Hint: look in the Help Index under Keyboard Instructions.

Appendix C provides the answers to these questions.

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DOS Utilities

This lesson, the second in the exploration of the DOS Shell, introduces you to the procedures for performing various disk-manipulation tasks. With the utilities provided by the DOS Shell, you can use menu selections to carry out a wide range of operations previously available only at the DOS prompt.

Programs Immediately Available

The DOS Shell provides a different user interface from the DOS command prompt. At any time, all the available commands and programs are listed on the screen. The Main Group of programs includes the DOS Utilities option, which provides access to six commonly used DOS Utilities. Lesson 13 covers the backup and restore features of the DOS Shell found in the DOS Utilities section.

In this lesson you learn how to do the following:

- Change the date and time with DOS Shell
- Create an exact duplicate of a diskette using Shell
- Compare two diskettes using Shell
- Prepare a disk to accept data using Shell

Preparing for the Lesson

For the exercises, you will need several diskettes. One should contain data programs, such as one of your working copies of the DOS diskettes or your Que lesson disk,

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and the other two should be new, blank diskettes. One blank diskette will be used to duplicate and the other to accept data using the formatting utility.

First, start the DOS Shell program, as explained in Lesson 10:

Step 1: Start your computer. If you have a floppy disk-based system, place the DOS Startup disk into drive A and either turn your computer on or press Ctrl-Alt-Del if your computer is already on. If you have a hard disk, remove any diskettes in the floppy disk drives, and either turn on your computer or press Ctrl-Alt-Del to reboot the computer.

The computer initializes itself and boots DOS. If prompted by the computer, check the date and time, correcting them if necessary. Depending on how your machine is configured, you see either the system prompt (`A>` or `C>`) or the initial Shell program screen. If you are at the initial Shell program screen, you can skip Step 2.

Step 2: If you are at the system prompt and have a floppy-based system, remove the DOS Startup disk and insert the disk containing the Shell program. Hard disk owners have the program already available. From the system prompt, type **DOSSHELL** and press Enter to start the Shell. The initial Shell program screen appears after a few seconds.

Changing the Group

The Main Group options are listed in the initial DOS Shell screen. The Command Prompt and Change Colors options were covered in Lesson 10. The File System option is covered in Lesson 12. The final option in the Main Group list is the DOS Utilities... option.

The ellipsis after the word `Utilities` is an indication that when you select this option, instead of actually starting a program, you are given another list of options to choose from.

This new list of options is referred to in the Shell program as a *new group*. Move the mouse pointer to the DOS Utilities... line and press the left mouse button, or use the down arrow key. When the DOS Utilities... option is highlighted, the screen looks like figure 11.1.

Pressing Enter selects the highlighted option, and the screen shown in figure 11.2 appears.

The group name at the center top of the screen, below the action bar, changes from Main Group to DOS Utilities... and a new list of available options appears.

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```
10-02-89                    Start Programs                    8:38 am
Program  Group  Exit                                          F1=Help
                              Main Group
          To select an item, use the up and down arrows.
          To start a program or display a new group, press Enter.

Command Prompt
File System
Change Colors
DOS Utilities...

F10=Actions                 Shift+F9=Command Prompt
```

Fig. 11.1. *The DOS Utilities... option.*

```
10-02-89                    Start Programs                    8:43 am
Program  Group  Exit                                          F1=Help
                              DOS Utilities...
          To select an item, use the up and down arrows.
          To start a program or display a new group, press Enter.

Set Date and Time
Disk Copy
Disk Compare
Backup Fixed Disk
Restore Fixed Disk
Format

F10=Actions  Esc=Cancel  Shift+F9=Command Prompt
```

Fig. 11.2. *The screen displayed after the option is selected.*

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Setting the Date and Time

Lesson 2 introduced the DATE and TIME commands that can be used from the DOS system prompt. The current settings for the date and time are used by DOS when files are created on your computer. Using the correct date and time allows you to be organized in your use of the computer. By always setting the date and time, you can find files more easily. For example, you can find the memo you wrote last Thursday by using the directory command and examining the date and time for the files.

The current settings for date and time appear at the top of the Shell screen. The date is in the top left corner, and the time is in the top right corner.

The Shell allows you to change the date and time with a single command. To do so, first be certain the Set Date and Time option is highlighted. (Use the arrow keys if necessary.) Then press Enter to adjust the date and time. The screen shown in figure 11.3 appears.

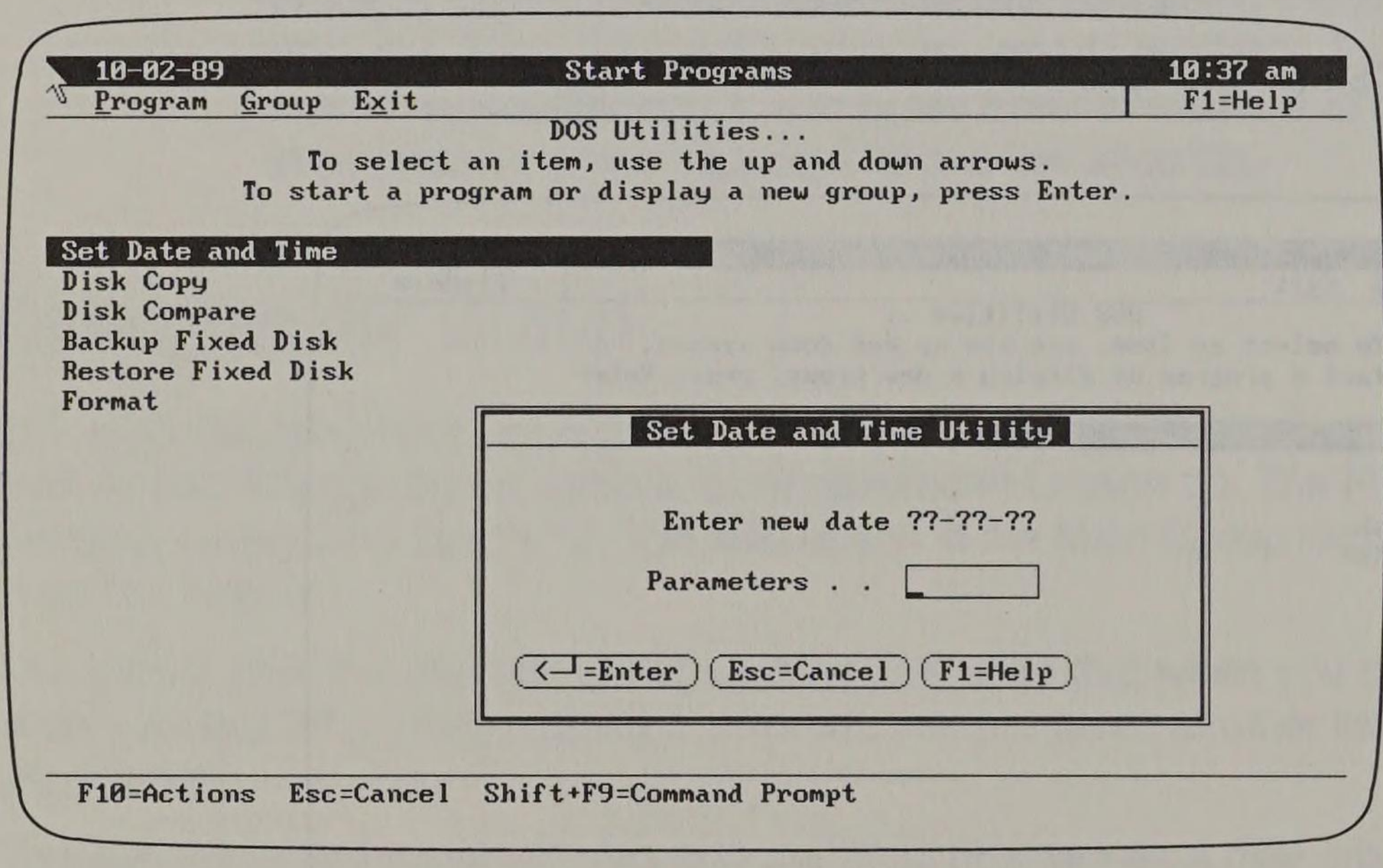


Fig. 11.3. *The Set Date and Time Utility window.*

The additional window on the screen, entitled `Set Date and Time Utility`, lists the format necessary for entering the date by using question marks. The month, day, and year are separated by hyphens.

You enter the new date using hyphens to separate the various elements. As you type, the characters appear in the box labeled `Parameters`.

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Before continuing, notice the `F1=Help` and `Esc=Cancel` boxes in the window. If you need more information on what to type in the `Parameters` box, you can press F1, or point to the `F1=Help` box with the mouse and press the left mouse button, to reach the context-sensitive help. If you decide not to change the date or time, you can press the Esc key or point to the `Esc=Cancel` box and press the left mouse button.

Step 1: Type **12-15-90** and press Enter to change the date to December 15, 1990.

If the month is one of the first nine months in the year, you can type a one-digit or two-digit number for the month (for example, May is 05 or 5). Similarly for the day, if the day of the month has a value less than 10, you can type the single digit or add a preceding zero.

The screen shown in figure 11.4 appears.

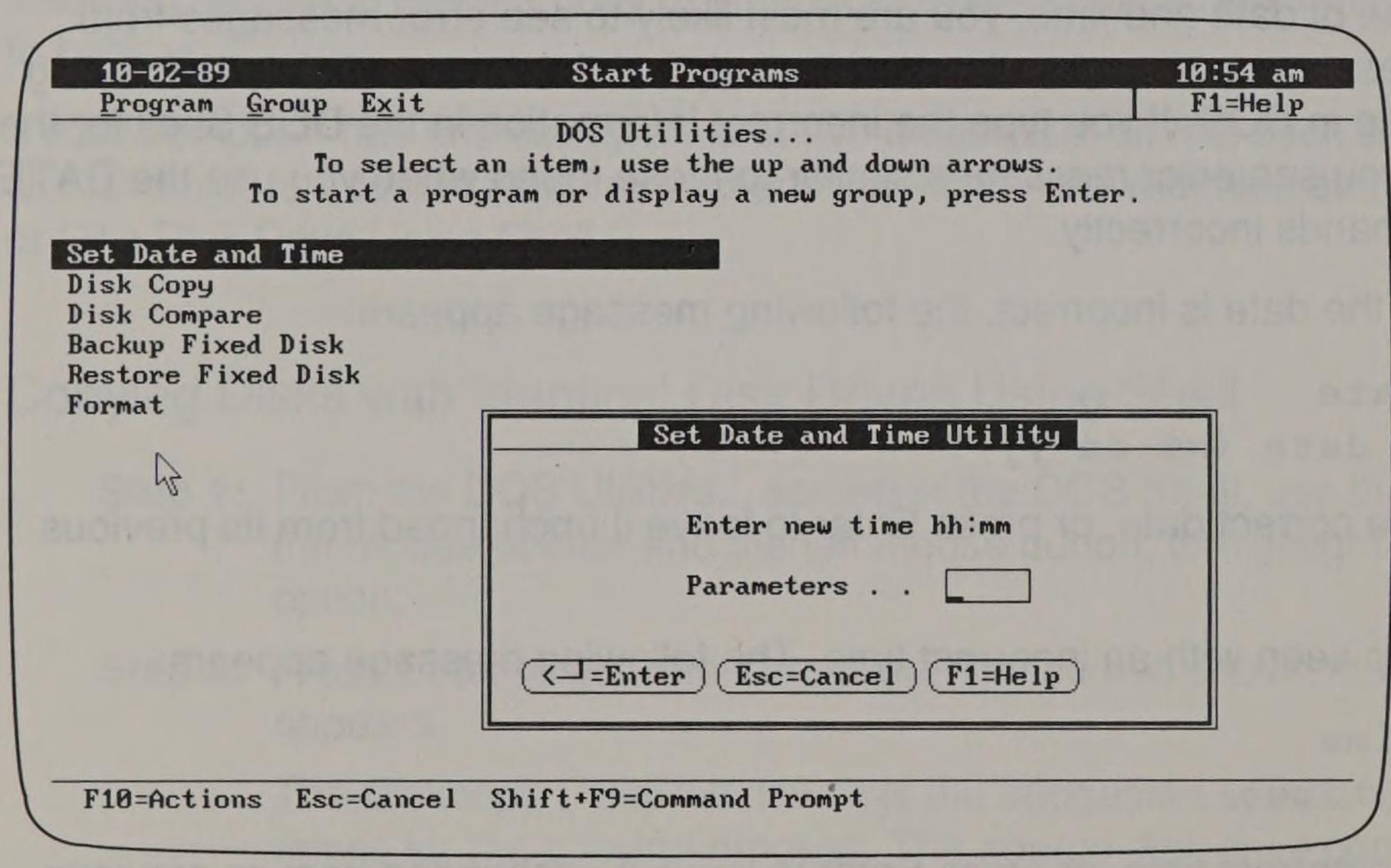


Fig. 11.4. *Changing the time.*

Step 2: Type **11:00** and press Enter to change the time to 11 A.M.

The Shell screen disappears and the screen shows the message

```
Press any key to continue...
```

When the DOS message says `Press any key to continue`, it really means, "Press *almost* any key." If you press the Shift, Alt, Caps Lock, Num Lock, or Scroll Lock key, DOS ignores your action and continues to wait. If you press the system reset keys (Ctrl-Alt-Del), your computer

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reboots; so don't press that combination unless you really want a system reset.

Press, for example, the space bar or Enter to continue; the DOS Utilities screen reappears.

Knowing what the Shell program is actually doing can give you a better understanding of the messages displayed by the various Shell commands.

The Shell program is only a "shell" around DOS and is not a replacement for the DOS commands. When you instruct the Shell to perform a command, such as setting the date and time, the Shell gives the appropriate instructions to DOS to perform the commands. Messages such as `Press any key to continue...` are DOS messages and are not generated by the Shell program.

This means that any error messages generated may come from either the Shell or DOS. In the case of date and time, you are most likely to see error messages from DOS. These messages are curt and not particularly helpful. Lesson 2 detailed setting the date and time in DOS. If you type the incorrect information in the DOS Shell for the date and time, you see error messages similar to those found when you use the DATE and TIME commands incorrectly.

If the format for the date is incorrect, the following message appears:

```
Invalid date
Enter new date (mm-dd-yy):
```

You can type the correct date, or press Enter to leave it unchanged from its previous setting.

A similar result is seen with an incorrect time. The following message appears:

```
Invalid time
Enter new time:
```

You can type the correct time, or press Enter to leave it unchanged from its previous setting.

Note that in the same way as with the DATE and TIME commands, the Shell program cannot tell if a date entered is accurate. It can only tell if it is valid. If you type **99** as the year and it isn't 1999, the date is accepted.

Copying Disks

In Lesson 3, the importance of copying disks and files was discussed. The DOS version of DISKCOPY was introduced. Lesson 7 covered the COPY command. Remember that copying disks and files is the only way to protect your data. If you lose

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a piece of information, the backup can supply a replacement file or disk. Because disks can contain many files, the loss of a single disk can result in the loss of a large quantity of work.

Copying a Disk from the Shell

The Disk Copy command in the Shell makes an exact copy of another disk. The command requires that the source and destination disks be the same size and capacity. The Shell command activates the DOS DISKCOPY command, and, once started, operates in the same way as if you had typed the command at the system prompt.

If your computer has two identical floppy disk drives, go through the steps in the following section to make a copy of your DOS system disk or any other disk you want to back up.

If your computer has one floppy drive or two unidentical drives, such as an HD and a DSDD drive, turn to this lesson's section "Copying Disks with Nonidentical Disk Drives or One Disk Drive Using Shell."

Copying Disks with Identical Disk Drives Using Shell

Step 1: From the DOS Utilities... screen in the DOS Shell, use the arrow keys, or the mouse pointer and the left mouse button, to highlight the Disk Copy option.

Step 2: Press Enter to activate the option. The screen shown in figure 11.5 appears.

The Diskcopy Utility window lists the suggested source and destination drives for the copying process. The *source disk drive* contains the original disk, and the destination *disk drive* contains the new blank diskette.

Step 3: Press Enter to accept the drive allocation of A: for the source and B: for the destination.

The Shell program now transfers control over to DOS, which runs the DISKCOPY command using the parameters (a: and b:) supplied from the Shell. The following prompt appears:

```
Insert SOURCE diskette in drive A:
Insert TARGET diskette in drive B:
Press any key to continue...
```

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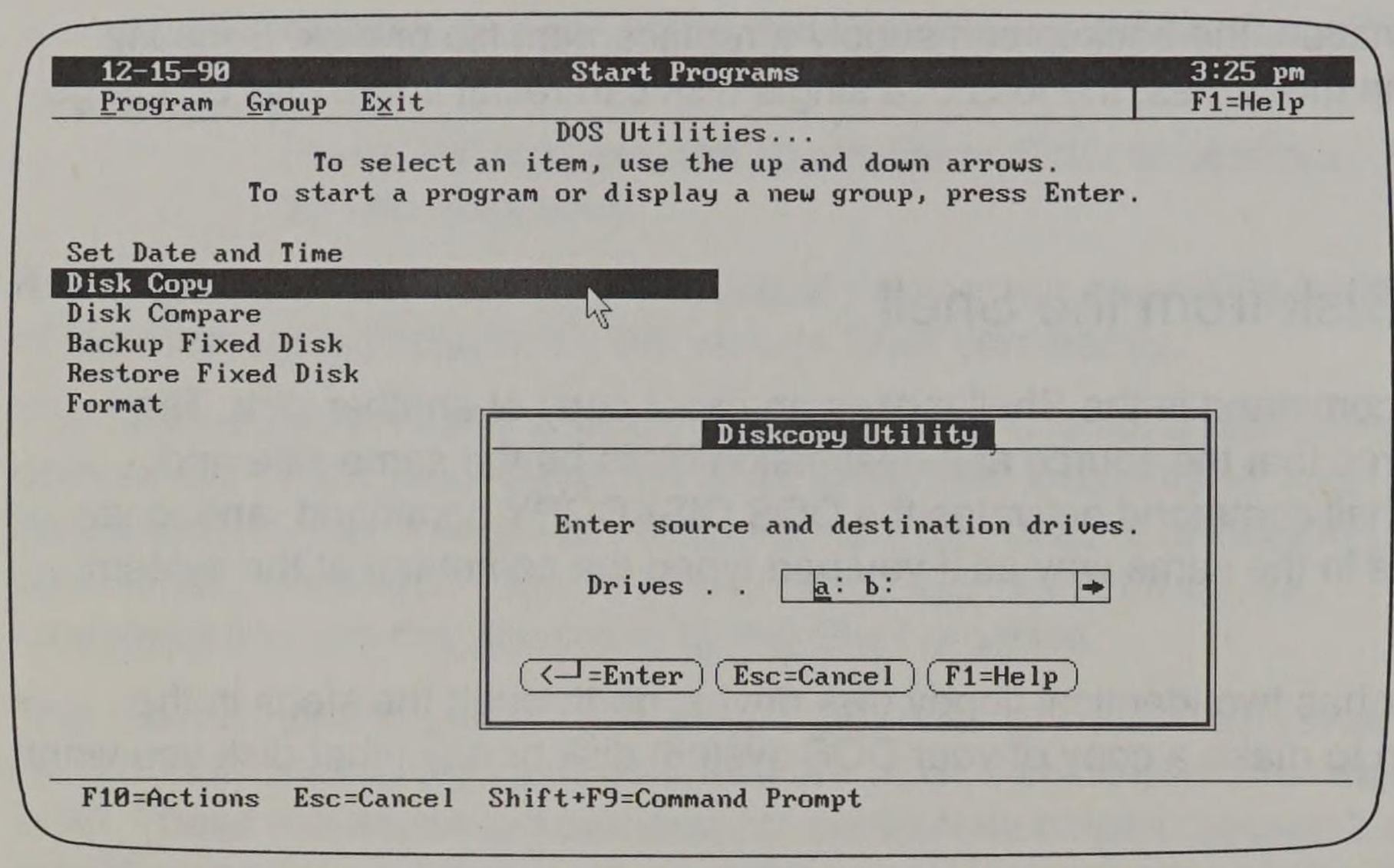


Fig. 11.5. *The Diskcopy Utility.*

If you don't have a hard disk, remove the Shell disk from drive A and insert the disk to be replicated (say, the Que lesson disk). Insert the blank disk in drive B. If you have a hard disk, you don't need to remove the Shell disk, because the Shell program is on your hard disk.

Step 4: Press a key, such as the space bar or Enter key, to start the copying process.

If your disk drives are not identical, an error message is displayed. Disk drive incompatibility is usually found only on the IBM AT or PS/2 or compatibles. If this error appears, press N to exit the copy program and follow the instructions in "Copying Disks with Nonidentical Disk Drives or One Disk Drive Using Shell," later in this lesson.

Most disk drives are identical. Within 10 to 50 seconds, the light on drive A goes out, and the light on drive B comes on. The percentage of the disk that has been formatted is displayed. This value increases as the process continues until it is 100 percent complete.

The `Formatting while copying` message tells you that DOS is preparing your blank disk to hold the information to be transferred from the disk in drive A. While the data is being copied, the drive lights may go on and off a number of times, depending on the amount of RAM in your computer.

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After DISKCOPY has finished copying the disk, you see the message shown in figure 11.6, asking whether you want to copy another disk.

```
Copy complete

Copy another diskette (Y/N)?
```

Fig. 11.6. *The message shown after DISKCOPY is complete.*

Step 5: Answer N for No.

Notice that you do not have to press the Enter key after Y or N. The message `Press any key to continue` appears. When you press a key, the DOS Utilities. . . screen reappears.

Step 6: Remove the copy from drive B and label the disk. It is easier to take the time to label a disk as soon as it is created than it is to figure out later which unlabeled disk is which from a pile.

Now, you can remove from drive A the original disk, put it in its envelope, and store the disk in a safe place. This way, you can use the copy of the master rather than the original and save the master disk—just in case.

Copying Disks with Nonidentical Disk Drives or One Disk Drive Using Shell

Step 1: From the DOS Utilities... screen in the DOS Shell, use the arrow keys, or the mouse pointer and the left mouse button, to highlight the Disk Copy option.

Step 2: Press Enter to activate the option. The screen shown in figure 11.7 appears.

The Diskcopy Utility window lists the suggested source and destination drives for the copying process. The *source disk drive* is the drive that contains the original disk. The *destination disk drive* is the drive that contains the new blank disk.

Because you only have one disk drive of a particular type, the disk-copying process uses one drive, rather than two. The source and destination drives must be the same.

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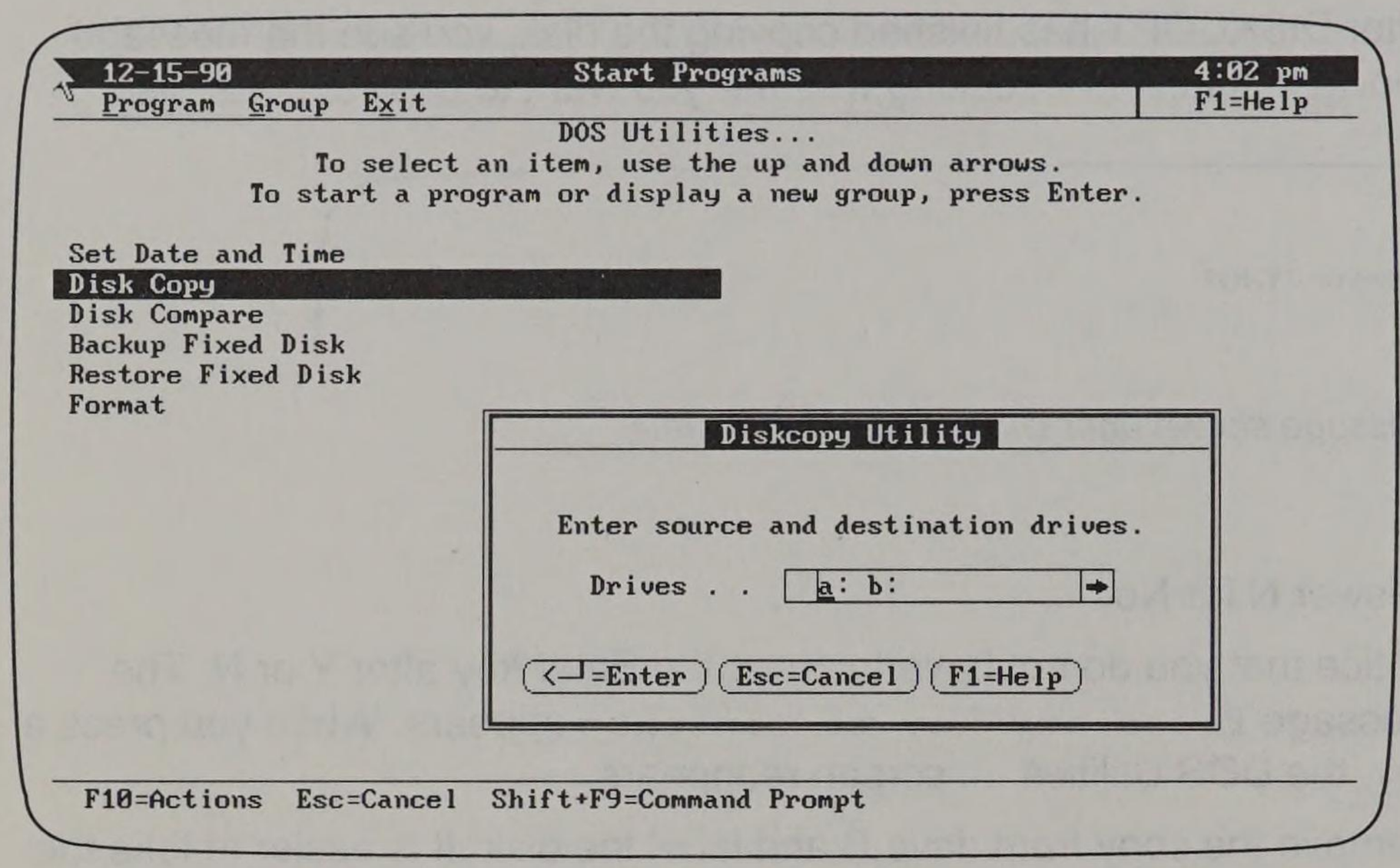


Fig. 11.7. *Copying disks with DISKCOPY.*

Step 3: Use the right arrow key to move along the line to the letter *b*. When the underline character is beneath the *b*, type **A** to make the destination disk drive the same as the source. Press Enter when the alteration is complete.

The Shell program now transfers control over to DOS, which runs the DISKCOPY command using the parameters (a: a:) supplied from the Shell. The following prompt appears:

```
Insert SOURCE diskette in drive A:
Press any key to continue...
```

If you don't have a hard disk, remove the Shell disk from drive A and insert the disk to be replicated (say, the Que lesson disk). If you have a hard disk, you don't need to remove the Shell disk, because the Shell program is on your hard disk.

Step 4: Press a key, such as the space bar or Enter key, to start the copying process.

A message similar to the following appears:

```
Copying 40 tracks
9 Sectors/Track, 2 Side(s)
```

If the disk you are copying is a different type from the one used in this book, you see displayed a different number of tracks and sectors per track.

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Notice that the light on your disk drive comes on. In 10 to 30 seconds, you see the following message instructing you to insert the target disk:

```
Insert TARGET diskette in drive A:
Press any key to continue...
```

Step 5: Take the original disk out of the drive, put in a blank disk, close the door, and press a key.

As with the DISKCOPY command entered directly from the DOS system prompt, you may be asked to swap source and destination disks several times during the copy process. Although repetitive, the process is elementary if you keep clear which is the source disk and which is the target. Computers with more memory and smaller capacity disks require less disk swapping.

Step 6: When the copying process is complete, the message seen in figure 11.6 appears.

When you have copied all the disks you want, press N for No. The `Press any key to continue...` prompt appears. Pressing Enter or the space bar, for example, returns you to the DOS Utilities. . . screen in the DOS Shell.

Step 7: Remove the copied disk from the disk drive and label the disk. It is easier to take the time to label a disk as soon as it is created than it is to decide which disk is which in a pile of unlabeled disks.

Using the Disk Compare Utility

Now that you have created two identical disks, you can use the Disk Compare utility to compare them. This utility uses the DISKCOMP command that you can type at the DOS system prompt. Consequently, some of the messages shown are supplied by DOS rather than by the Shell program and are not necessarily more helpful to you.

The Disk Compare utility, which is similar to the Disk Copy utility, requires that the source and destination disks be the same size and capacity. The Shell command activates the DOS DISKCOMP command. Once started, the Shell operates as if you had typed the command at the system prompt.

If your computer has two identical floppy disk drives, go through the steps in the following section to compare two disks.

If your computer has one floppy drive or two unidentical drives, such as an HD (high density) and a DSDD (double-sided, double density) drive, turn to “Comparing Disks with Nonidentical Disk Drives or One Disk Drive Using Shell,” later in this lesson.

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Comparing Disks with Identical Disk Drives Using Shell

Step 1: From the DOS Utilities... screen in the DOS Shell, use the arrow keys, or the mouse pointer and the left mouse button, to highlight the Disk Compare option.

If you have just started the Shell program, follow the steps in "Changing the Group" earlier in this lesson to reach the DOS Utilities screen.

Step 2: Press Enter to activate the option. The screen shown in figure 11.8 appears.

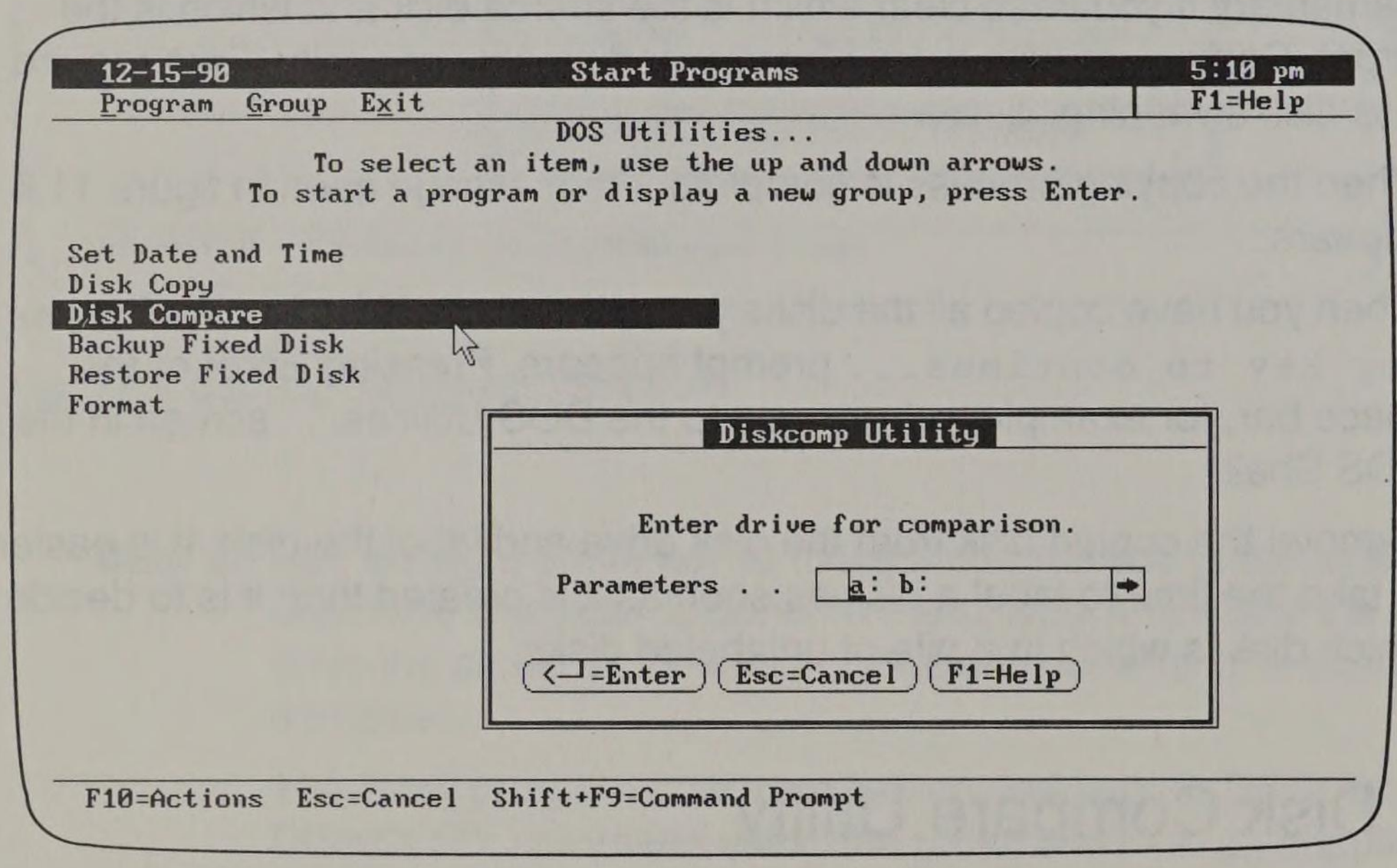


Fig. 11.8. The Diskcomp Utility window.

The Diskcomp Utility window lists the drives for the comparison. The first disk drive is the drive that contains the first copy of the disk, and the second disk drive is the drive that contains the second copy.

Step 3: Press Enter to accept the drive allocation of A: for the first disk and B: for the second disk.

The Shell program now transfers control over to DOS, which runs the DISKCOMP command using the parameters (a: b:) supplied from the Shell. The following prompt appears:

```
Insert FIRST diskette in drive A:
Insert SECOND diskette in drive B:
Press any key to continue...
```

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If you don't have a hard disk, remove the Shell disk from drive A and insert the first disk to be compared. Insert the second disk in drive B. If you have a hard disk, you don't need to remove the Shell disk, because the Shell program is on your hard disk.

Step 4: Press a key, such as the space bar or Enter key, to start the comparison.

If your disk drives are not identical, an error message is displayed. Disk-drive incompatibility is usually found only on the IBM AT or PS/2 or compatibles. If this error appears, press N to exit the comparison program and follow the instructions found in "Comparing Disks with Nonidentical Disk Drives or One Disk Drive Using Shell," later in this lesson.

Most disk drives are identical. Within 10 to 50 seconds, the light on drive A goes out, and the light on drive B comes on. The number of tracks, sectors per track, and the number of sides being compared are displayed. These values vary, depending on the type of disk being compared.

As the disks are compared, the drive lights may go on and off a number of times, depending on the amount of RAM in your computer.

After DISKCOMP has finished comparing the disks, you see the following message, asking whether you want to compare another disk:

```
Compare OK
Compare another diskette (Y/N) ?
```

Step 5: Answer N for No.

Notice that you do not have to press the Enter key after Y or N. The message `Press any key to continue` appears. When you press a key, the DOS Utilities. . . screen reappears.

The Disk Compare program stops before any detailed comparison is done if the disks are not the same type. The following message appears in this situation:

```
Drive types or diskette types not compatible
Compare process ended
Compare another diskette (Y/N) ?
```

This message indicates one of two things. If the drive types are identical, the disks were not formatted at the same density and are consequently not identical. If the drive types are different, follow the subsequent instructions and compare the disks by using a single disk drive.

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Comparing Disks with Nonidentical Disk Drives or One Disk Drive Using Shell

Step 1: From the DOS Utilities... screen in the DOS Shell, use the arrow keys, or the mouse pointer and the left mouse button, to highlight the Disk Compare option.

Step 2: Press Enter to activate the option. The screen shown in figure 11.8 appears.

The Diskcomp Utility window lists the suggested drives for the comparison. The first disk drive should contain the first disk, and the second disk drive should contain the second disk.

Because you only have one disk drive of a particular type, the disk-comparison process uses one drive, rather than two. The first and second drives must be the same.

Step 3: Use the right-arrow key to move along the line to the letter *b*. When the underline character is beneath the *b*, type the letter **A** to make the second disk drive the same as the first. Press Enter when the alteration is complete.

The Shell program now transfers control over to DOS, which runs the DISKCOMP command using the parameters (a: a:) supplied from the Shell. The following prompt appears:

```
Insert FIRST diskette in drive A:
Press any key to continue...
```

If you don't have a hard disk, remove the Shell disk from drive A and insert the first disk to be compared. If you have a hard disk, you don't need to remove the Shell disk, because the Shell program is on your hard disk.

Step 4: Press a key, such as the space bar or Enter key, to start the comparison.

A message similar to the following appears:

```
Comparing 40 tracks
9 Sectors/Track, 2 Side(s)
```

If the disk you are comparing is a different type from the one used in this book, you see displayed a different number of tracks, and sectors per track.

Notice that the light on your disk drive comes on. In 10 to 30 seconds, you see the following message instructing you to insert the second disk:

```
Insert SECOND diskette in drive A:
Press any key to continue...
```

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Step 5: Take the first disk out of the drive, put in the second disk, close the door, and press a key.

As with the DISKCOMP command entered directly from the DOS system prompt, you may be asked to swap source and destination disks several times during the comparison. If you can remember which is the first disk and which is the second, the process is simple, although repetitive. Computers with more memory and smaller capacity disks require less disk swapping.

Step 6: When the comparison is complete, the following message appears:

```
Compare OK
Compare another diskette (Y/N) ?
```

When you have compared all the disks you want, press N for No. The `Press any key to continue...` prompt appears. Press Enter or the space bar to return you to the DOS Utilities. . . screen in the DOS Shell.

Formatting Disks Using the Shell

The DOS FORMAT command was introduced in Lesson 4. This lesson now shows you how to activate the same command using the Shell program. As with disk copying and comparing, the Shell program transfers the parameters you supply to the appropriate DOS command: in this case the FORMAT command.

Note the cautions that apply to this utility. They are the same as for the FORMAT command. The formatting procedure erases everything on the disk being formatted. A blank disk, of course, has nothing to erase; but if you format a disk that has been used, everything stored on that disk is erased—whether you want it to be or not. So be careful not to format a disk containing files you want to keep. Once again, make sure that all your disks are labeled clearly.

Use the correct type of disk for your disk drive. DOS does not support the wrong type of disk in a 1.2M minifloppy or 1.44M microfloppy disk drive. DOS does support a lower-density disk in a higher-density drive, but not a higher-density disk in a lower-density drive.

If you have two disk drives, follow the steps outlined in the next section to format or erase disks.

If you have one disk drive, with or without a hard disk, follow the steps in “Using a Microcomputer with a Hard Disk or One Disk Drive,” later in this lesson.

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Using a Microcomputer with Two Disk Drives

You should be at the DOS Utilities. . . screen of the Shell program. See the first sections of this lesson for instructions on reaching this screen.

Step 1: From the DOS Utilities. . . screen, use the arrow keys, or the mouse pointer and the left mouse button, to highlight the Format option.

Step 2: Press Enter to activate the option. The screen shown in figure 11.9 appears.

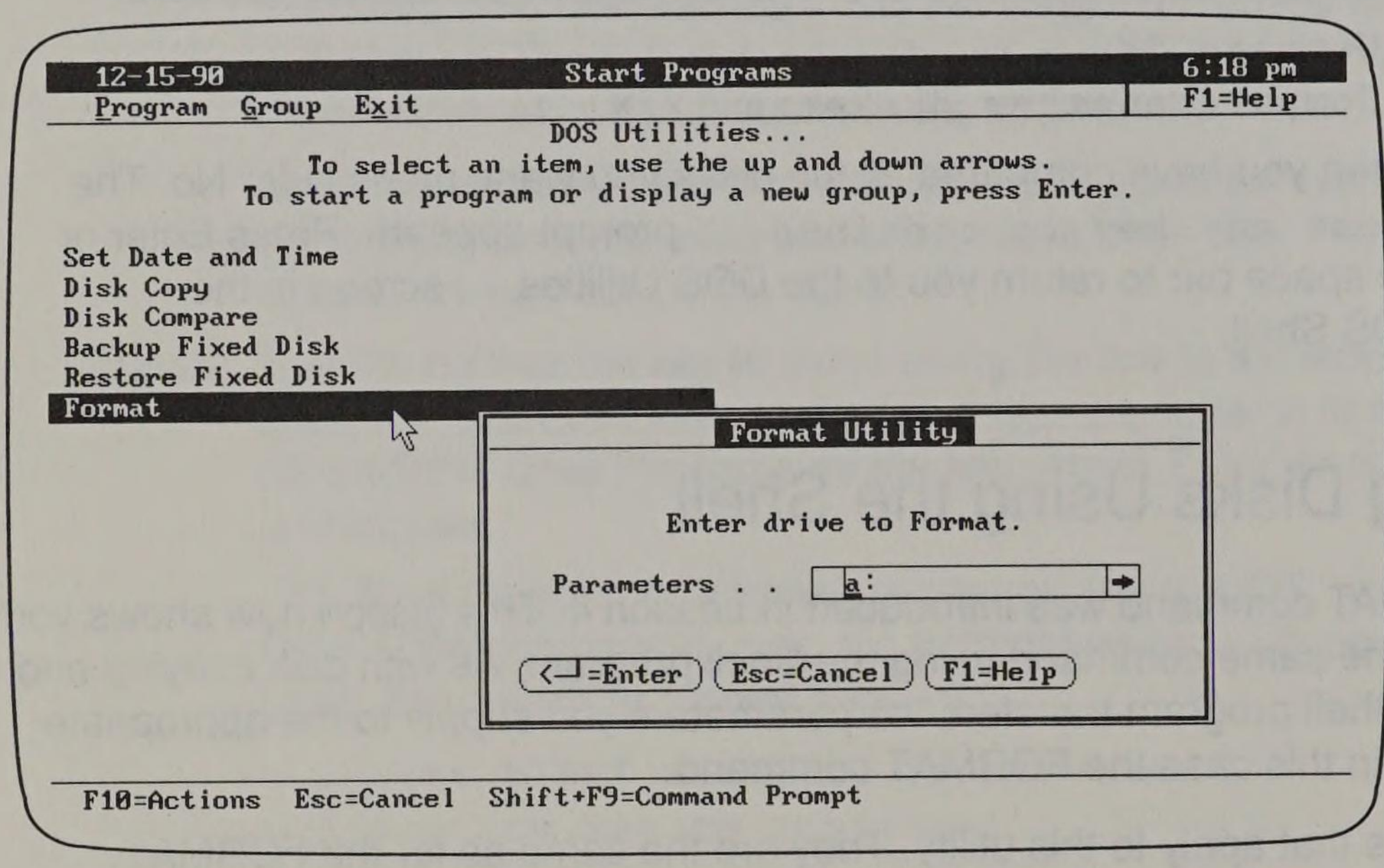


Fig. 11.9. *The Format Utility window.*

Step 3: Make certain that the drive to be used for the formatting process is drive B. The box labeled `Parameters` should show `b:`. If the box shows `a:`, as in figure 11.9, type **B** to change the drive for formatting.

In Lesson 4, you used switches in association with the FORMAT command. If you need to add switches, you can add these to the `Parameters` box after the drive letter and colon.

Step 4: Press Enter to activate the utility.

On the screen, you see the message shown in figure 11.10.

```
A>FORMAT B:/S/V
Insert new diskette for drive B:
and strike ENTER when ready
```

Fig. 11.10. *The message displayed after FORMAT is entered.*

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Step 5: Insert the disk to be formatted into drive B and press the Enter key.

The red light on drive B comes on, and you see the following message:

```
1 percent of disk formatted
```

The percentage of the disk that has been formatted is displayed as the format process proceeds. The number 1 increases to 100 during formatting.

After 20 to 40 seconds, you see the following message:

```
Format complete
```

If the formatting was successful, DOS prompts you to type a label for the disk. Type up to 11 characters as a name for the disk and press Enter.

The disk drive continues to spin for a few more seconds. Then DOS tells you how much information the disk can hold, how much space is being used, and how much space is left. The number of allocation units on the disk and the size of an allocation unit is also displayed. (An *allocation unit* is the smallest cluster of information that can be stored on a disk.)

What you see depends on the system you have. The byte count depends on the type of disk and disk drive you are using.

DOS V4.0 assigns a serial number to each disk you format. The current date and time (according to DOS) is used with a special algorithm to produce the serial number.

Sometimes, you see the message `bytes in bad sectors`, which means that DOS has found parts of the disk that cannot be used to store information. The available space is reduced by the number on this line.

Other times, at the beginning of formatting, you may see the message `Invalid media or track 0 bad—disk unusable`. This message means that the disk cannot be used at all.

If you have a disk with a bad sector, you can have your dealer replace the disk, or you can use the disk with less storage space. Defective disks with a bad 0 track must be replaced or thrown away. Before you do either, though, try reformatting the disk. Some disks do not format properly the first time, but they may format with a second try.

When you see the following message, you have two options: to terminate the formatting session—with an N for No—or to format another (or reformat the same) disk— with a Y for Yes:

```
Format another (Y/N)?
```

Answer Y if you want to try again to format a disk with a bad sector or if you want to format another disk. If you're reformatting a disk with a bad sector, take the disk partially out of the drive, reinsert the disk, close the

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door, and press a key. If you want to format another disk, remove the formatted disk and place the next one to be formatted into drive B; then repeat Step 5.

Because you can format an unlimited number of disks with one format command, you save time by formatting a large number of disks at once. That way, you'll always have a supply of formatted disks ready to use.

Step 6: Press N for No when you do not want to format another disk. You do not have to press the Enter key. The message `Press any key to continue...` is displayed.

Step 7: Press Enter or the space bar, for example, and the DOS Utilities. . . screen of the Shell program screen reappears.

Using a Microcomputer with a Hard Disk or One Disk Drive

Formatting destroys all data on a disk. You must be extremely careful when you use this command, especially if your system has a hard disk. Hard disks contain large amounts of data that may be difficult to replace if the disk is formatted accidentally. Be careful to specify only drive A or B when you format. If you do accidentally specify your hard disk, you receive an extra warning message.

To format a disk on a computer with a hard disk or one disk drive, follow these steps:

Step 1: Make sure that the DOS Utilities. . . screen is on the display. The first section of this lesson explains how to display this screen.

Step 2: Use the arrow keys, or the mouse pointer and the left mouse button, to highlight the Format option.

Step 3: Press Enter to activate the option. The screen shown in figure 11.9 appears.

Step 4: Make certain that the drive to be used for the formatting process is drive A. The box labeled `Parameters` shows `a:`. The drive used for formatting can be changed by typing a new drive letter.

In Lesson 4, you used switches in association with the FORMAT command. If you need to add switches, add them to the `Parameters` box after the drive letter and colon.

Step 5: Press Enter to activate the utility.

After you enter the format command, the red light on the disk drive comes on. Then you see the message shown in figure 11.11.

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```
A>FORMAT A:/S/V
Insert new diskette for drive A:
and strike ENTER when ready
```

Fig. 11.11. *The message displayed after FORMAT is entered.*

Step 6: Take the Shell disk out of drive A, put the disk to be formatted into the drive, and press the Enter key.

The red light on drive A comes on, and you see the following message:

```
1 percent of disk formatted
```

If the formatting was sucessful, DOS prompts you to type a label (of up to 11 characters) for the disk.

The percentage of the disk that has been formatted is displayed as the format process proceeds. The number 1 increases to 100 during formatting.

After 20 to 40 seconds, you see the following message:

```
Format complete
```

The disk drive continues to spin for a few more seconds. Then DOS tells you how much information the disk can hold, how much space is being used, and how much space is left. The number of allocation units on the disk and the size of an allocation unit are also displayed. (An *allocation unit* is the smallest cluster of information that can be stored on a disk.)

What you see depends on the system you have. The byte count depends on the type of disk and disk drive you are using.

DOS V4.0 assigns a serial number to each disk you format. The current date and time (according to DOS) is used with a special algorithm to produce the serial number.

Sometimes, you see the message `bytes in bad sectors`, which means that DOS has found parts of the disk that cannot be used to store information. The available space is reduced by the number on this line.

Other times, at the beginning of formatting, you may see the message `Invalid media or track 0 bad—disk unusable`. This message means that the disk cannot be used at all.

If you have a disk with a bad sector, either have your dealer replace the disk, or use the disk with less storage space. Defective disks with a bad 0 track, however, must be replaced or thrown away. Before you do either, though, try reformatting the disk. Some disks do not format properly the first time, but they may format with a second try.

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When you see the following message, you have two options: to terminate the formatting session—with an N for No—or to format another (or reformat the same) disk— with a Y for Yes:

```
Format another (Y/N)?
```

Answer Y if you want to try again to format a disk with a bad sector or if you want to format another disk. If you're reformatting a disk with a bad sector, take the disk partially out of the drive, reinsert the disk, close the door, and press a key. If you want to format another disk, remove the formatted disk and place the next one to be formatted into drive A; then repeat Step 6.

You can format an unlimited number of disks with one Format command, so you may save time by formatting a large number of disks at once. That way, you'll always have a supply of formatted disks ready to use.

Step 7: Press N for No when you do not want to format another disk. You do not have to press the Enter key. The message `Press any key to continue...` is displayed.

Step 8: Press Enter or the space bar, for example, and the DOS Utilities. . . screen of the Shell program screen reappears.

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SUMMARY OF CONCEPTS FOR LESSON 11

1. The DOS Utilities menu is a second group of programs available with the Shell.
2. The DOS Utilities options are an alternative method of invoking comparable DOS commands from a menu rather than from the system prompt.
3. The date and time stored in the computer can be set with the Date and Time utility.
4. An exact duplicate of a disk can be created by using the Disk Copy utility.
5. Two disks can be compared to see if they are identical by using the Disk Compare utility.
6. Disks can be formatted by using the Format utility.

For Further Reference

If you would like to read further about the Shell DOS Utilities, consult *Using DOS*, by David Solomon (Que Corporation, Carmel, IN, 1989), Chapter 14.

SUMMARY EXERCISES FOR LESSON 11

1. Using the Shell, prepare a new disk for data storage.
2. Using the Shell, create an exact duplicate of PRAC DISK 1.

Appendix C gives the answers to these exercises.

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LESSON

12

Using the Shell File System

The Shell's best feature is its File System program. This program provides a method of managing your files by selecting items from a list, rather than typing at the system prompt. Many actions, such as moving and copying, are done in a similar fashion, making the File System easy to use.

In this lesson you learn how to do the following:

- Access and leave the File System
- Select a disk drive for viewing files
- Select a directory for viewing files
- Select files in the File System
- Copy, move, rename, and delete files

Although you can use the Shell program on a computer that has only floppy disk drives, you are unlikely to create or use diskettes that have hierarchical directories. This lesson includes instructions for both types of computers (those with and without a hard disk). For this lesson, use the Que lesson disk supplied with this workbook. Make sure that you use a backup copy, however, rather than the original disk. Lessons 3 and 11 show how to duplicate a disk in DOS and the Shell, respectively.

Starting the Shell

As explained in Lesson 10, you start the Shell program in the following way:

Step 1: Start your computer. If you have a floppy disk-based system, place the DOS Startup disk into drive A and either turn on your computer, or if

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your computer is already on, press Ctrl-Alt-Del. If you have a hard disk, remove any disks in the floppy disk drives and either turn on your computer or press Ctrl-Alt-Del to reboot the computer.

The computer initializes itself and boots DOS. If prompted by the computer, check the date and time, correcting them if necessary. Depending on how your machine is configured, you see either the DOS prompt (`A>` or `C>`), or the initial Shell program screen. If you are at the initial Shell program screen, you can skip Step 2.

Step 2: If you are at the system prompt and have a floppy-based system, remove the DOS Startup disk and insert the disk containing the Shell program. Hard disk owners have the program already available. From the system prompt, type **DOSSHELL** and press Enter to start the Shell.

Starting the File System

At the Main Group screen of the Shell program, use the down-arrow key, or the mouse pointer and the left mouse button, to highlight the File System option (see fig. 12.1).

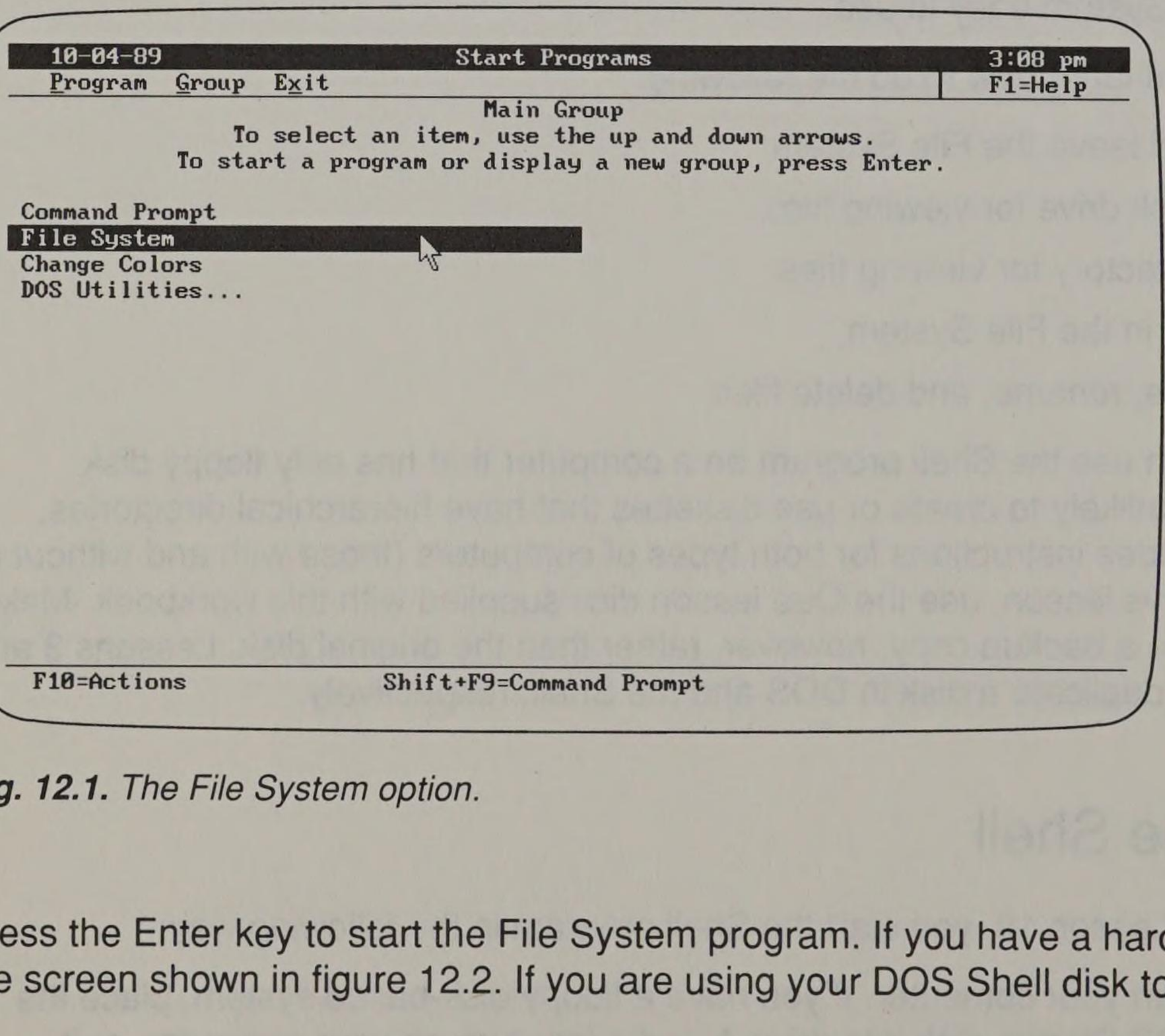


Fig. 12.1. *The File System option.*

Press the Enter key to start the File System program. If you have a hard disk, you see the screen shown in figure 12.2. If you are using your DOS Shell disk to boot the

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computer, the screen lists the contents of the DOS Shell disk in drive A instead of listing the drive C contents.

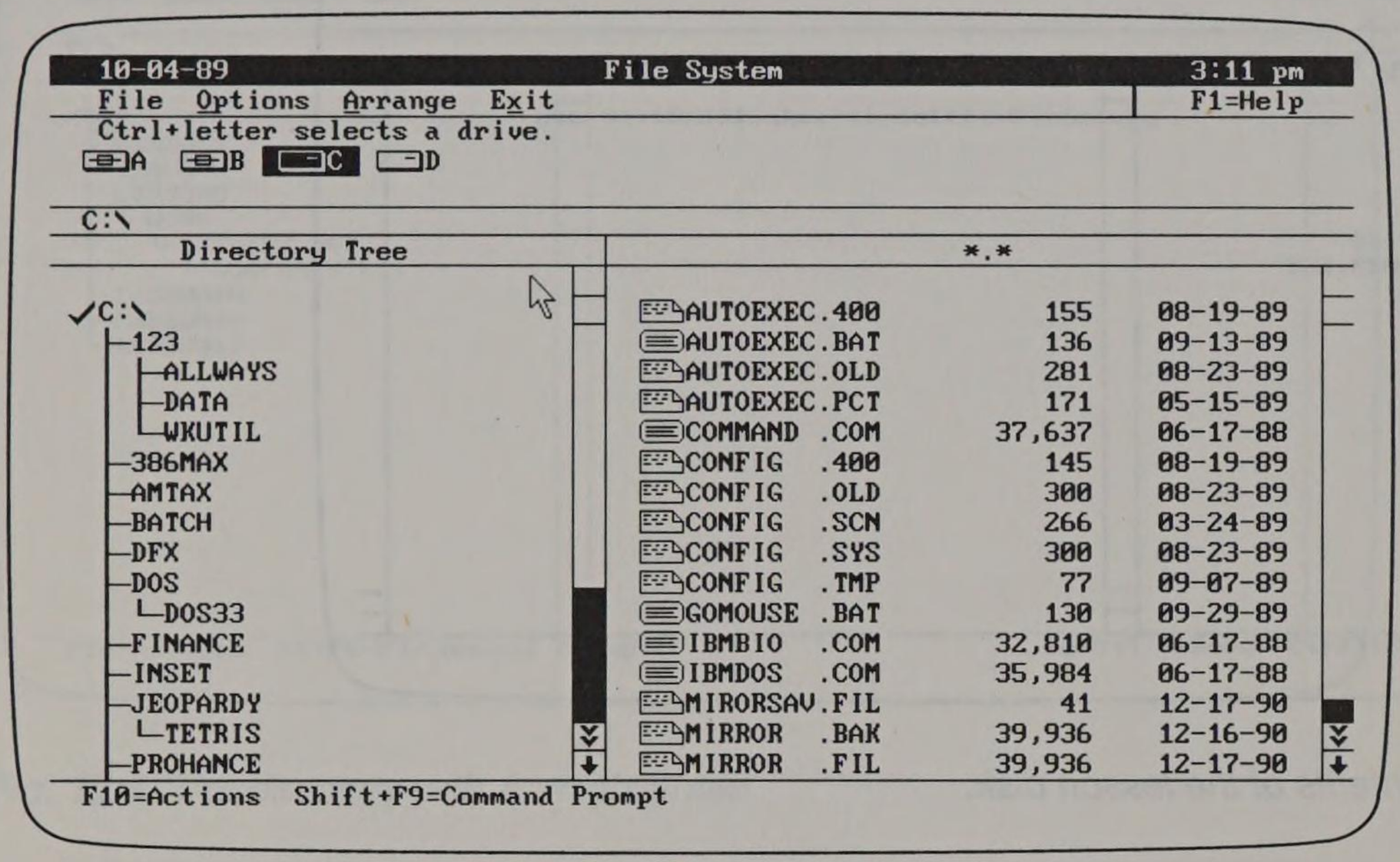


Fig. 12.2. *The screen shown when File System is active.*

Listing the Lesson Disk

Insert the copy of the lesson disk that you made in Lesson 11 into drive A. If you don't have a hard disk, remove the DOS Shell disk first. Once the lesson disk is inserted, press the key combination Ctrl-A (press and hold the Ctrl key and tap the letter A key) to see a directory of the lesson disk. To achieve the same result with the mouse, point to the small icon with the letter A next to it. This icon is located beneath the action bar at the top of the screen. The resulting screen looks like figure 12.3.

The screen is split into three main areas. The top section shows the various drives on the computer. The logo next to the diskette drive is reminiscent of a diskette drive, and the logos next to the other drives, shown in figure 12.3, are meant to represent hard disks and their drive lights.

Note that drive B appears below the action bar, even if it doesn't physically exist. If you ask for a directory of drive B and you don't have a drive B, you see a directory of drive A.

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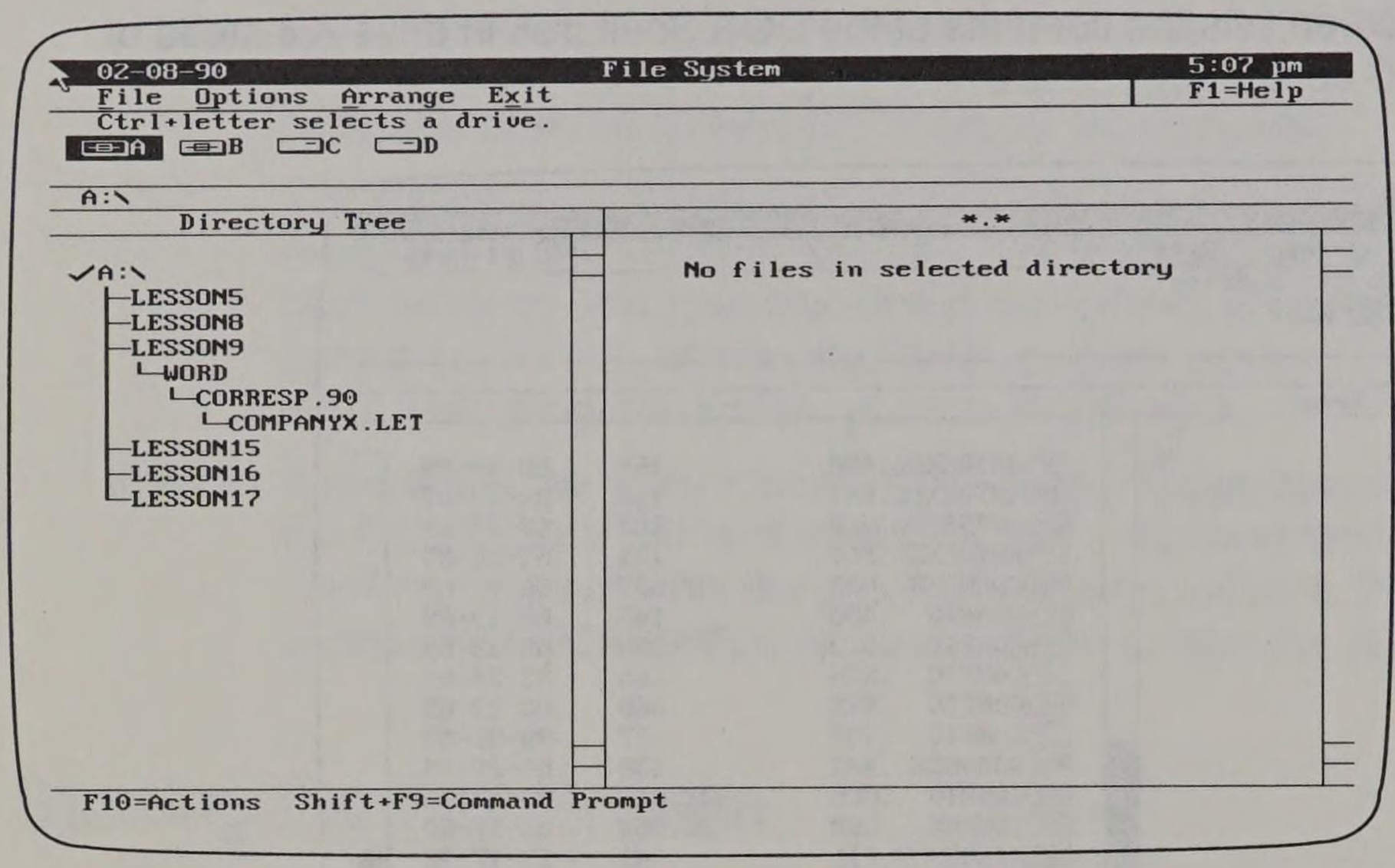


Fig. 12.3. *The contents of the lesson disk.*

The left section of the main part of the screen shows the tree structure of the drive. The current directory is indicated by the check mark next to the directory name. The title *.* appears at the top of the main part of the screen on the right, indicating that beneath is a list of all of the files in the current subdirectory. In figure 12.3, the current directory is the root directory of drive A, in which there are no files.

The three sections of the screen are separate. If you are in one area of the screen, the arrow keys can be used to point to each item in that area.

For example, you can use the arrow keys to highlight a different drive name. To move to another section of the screen, use the Tab key. Pressing the Tab key once moves you to the Directory Tree section, and pressing Tab again moves you to the file-listing section. Practice using the Tab key to move to the various sections.

You also can use the mouse to point to a different section or item. The mouse is faster than the keyboard method, because instead of having to press Tab to reach the appropriate section and then using the arrow keys to highlight a choice within that section, you can just point to the item of choice and press the left mouse button.

Press the Tab key until the `A:\` in the Directory Tree section is highlighted. (You can use the mouse if you prefer.) The screen appears as shown in figure 12.4.

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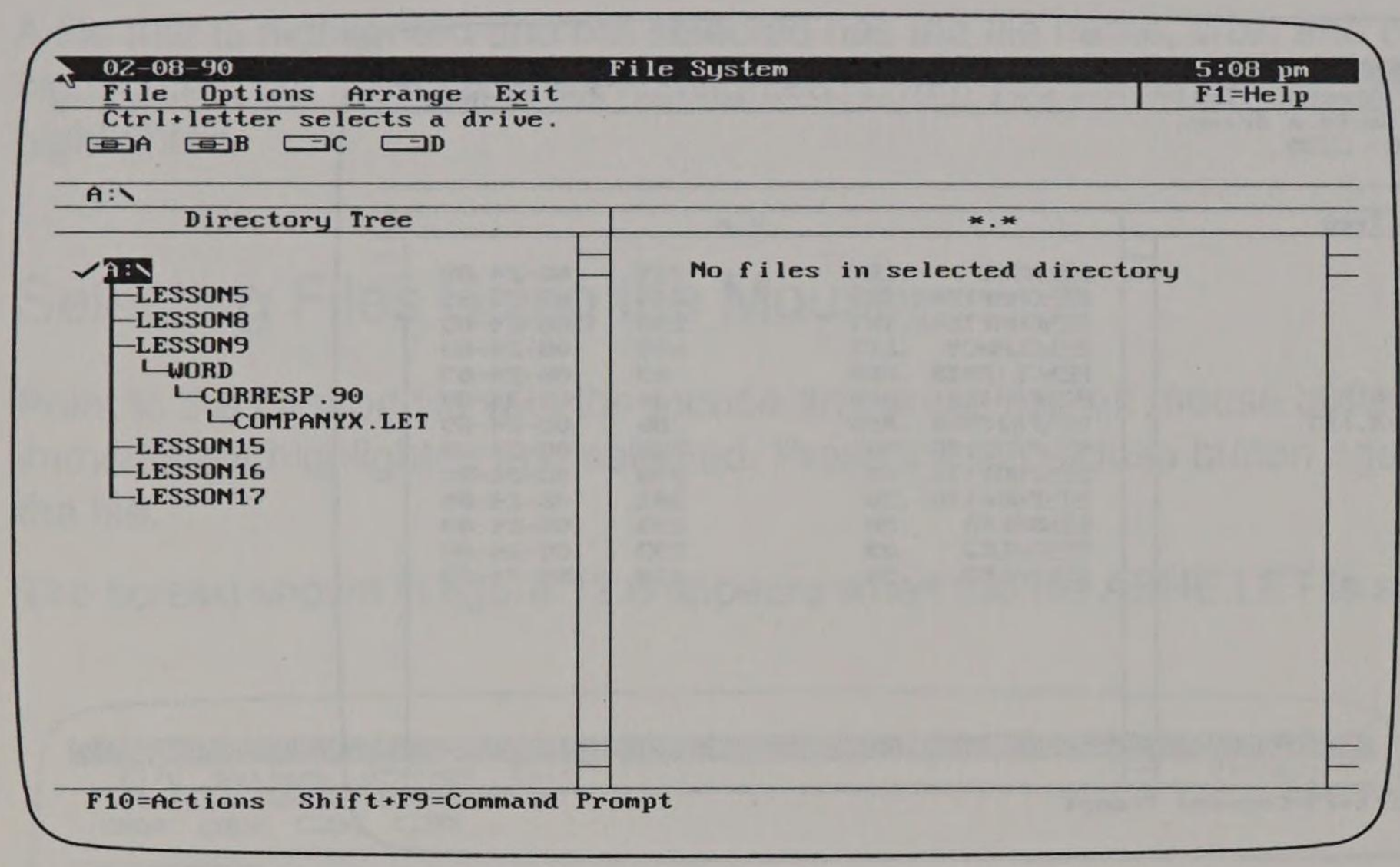


Fig. 12.4. *The directory with A:\ highlighted.*

Changing the Current Listed Directory

To see a file listing for the LESSON5 subdirectory, press the down-arrow key once to highlight LESSON5, and press Enter to change the current directory.

To use the mouse instead of the keyboard, move the mouse pointer to the word LESSON5 and press the left mouse button. The screen changes (see fig. 12.5).

The check mark moves from being next to the drive letter to the LESSON5 subdirectory. In the right section of the screen is a list of the files in the subdirectory. This listing is similar to a directory listing, with one additional feature. The icon to the left of a file name indicates the type of file. In the case of the lesson disk, all the files are the same type. They are text files, and the icon represents a piece of paper with text on it and the top right corner of the page turned over.

Figure 12.2 shows the other icon used to identify files. Executable files (those with a file name extension of COM or EXE) and batch files (those with a file name extension of BAT) have a different icon. The File System does not actually check the file's contents. It assigns the executable icon if the file extension is COM, EXE, or BAT, and the text file icon to all other files. By conforming to the file-naming conventions, you can avoid confusing text files with executable files in this listing.

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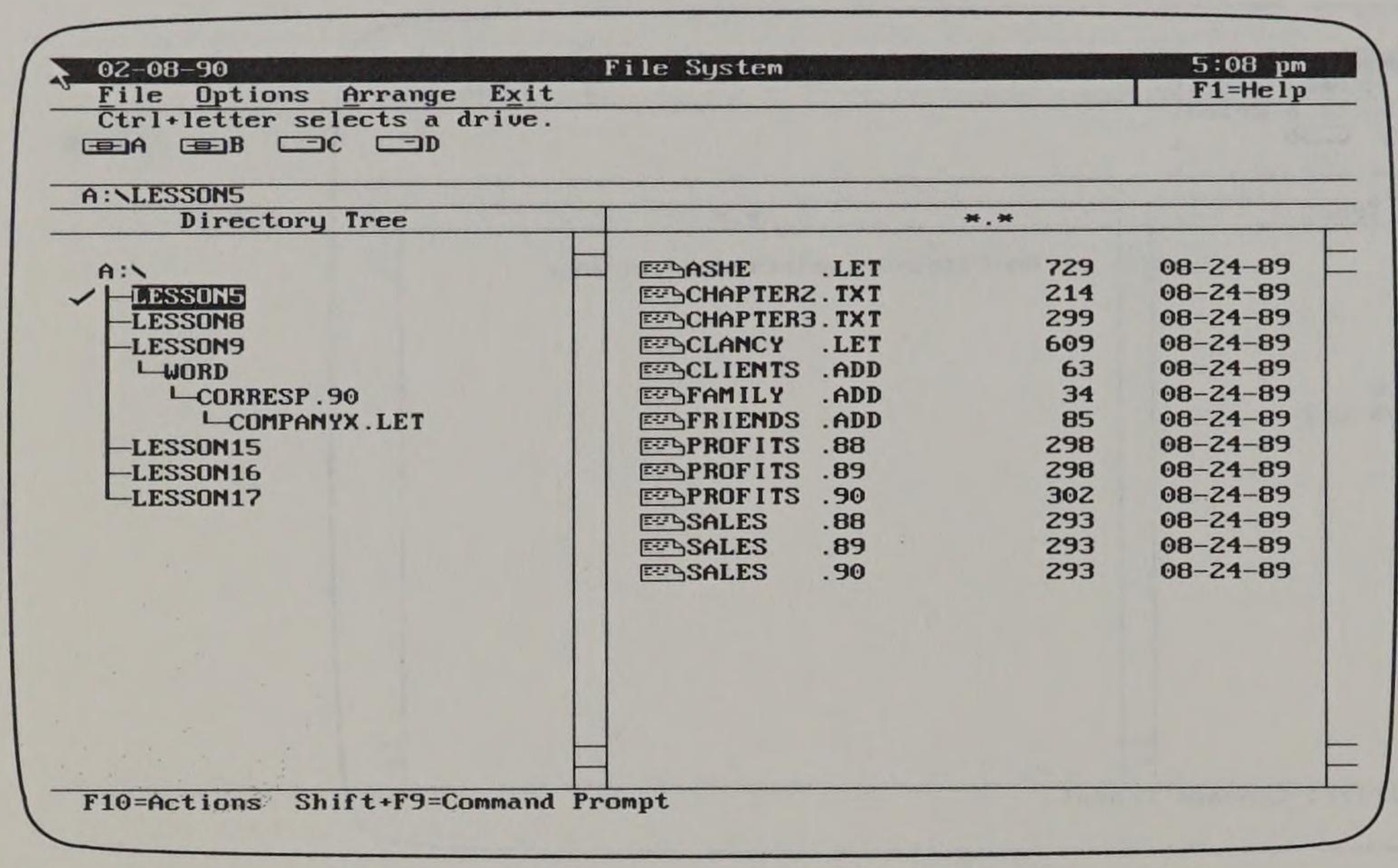


Fig. 12.5. *A subdirectory listing of A:*

In the LESSON5 subdirectory, none of the files is executable, and all are labeled as text files. Notice that the scroll bars are present in both lower sections of the screen. These bars operate in the same way as discussed in Lesson 10. On a disk with a more extensive tree structure or a larger number of files in a subdirectory, you can use the scroll bar to reach information not on the screen.

Selecting Files from the Listing

To perform actions such as copying or renaming files, you must select the files from the directory listing. Performing this selection procedure is similar for all of the different actions: highlight all the files you are interested in, and then select the files.

Selecting Files Using the Keyboard

Press the Tab key to reach the file-listing section. To select a file, use the arrow keys to highlight the desired file and press the space bar. Press the space bar a second time to deselect the file.

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A file that is highlighted and not selected has the file name, size, and creation date highlighted, but the icon is not highlighted. When you select the file, the icon becomes highlighted.

Selecting Files Using the Mouse

Point to the desired file with the mouse and press the left mouse button. The file is immediately highlighted and selected. Press the left mouse button again to deselect the file.

The screen shown in figure 12.6 appears when the file ASHE.LET is selected.

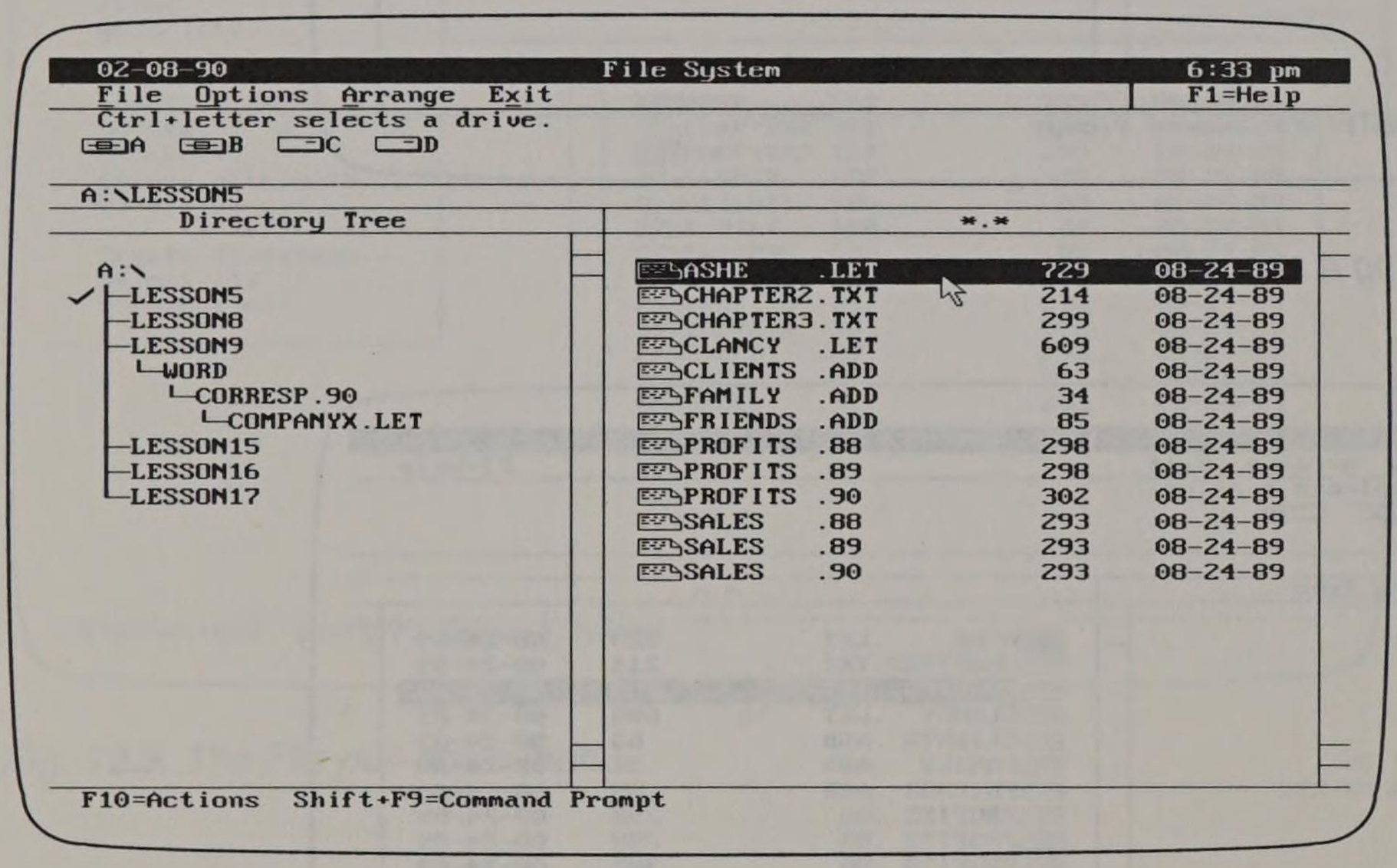


Fig. 12.6. *The file listing with ASHE.LET selected.*

Move the mouse pointer to CHAPTER3.TXT and press the left mouse button to select the second file. The screen shown in figure 12.7 appears. Notice that the file ASHE.LET is still selected, as the icon adjacent to the file name is highlighted.

Press the left mouse button or the space bar to deselect the file CHAPTER3.TXT. The icon portion of the file's listing is no longer highlighted (see fig. 12.8).

Using the "point and shoot" method, you can highlight a file individually. When you select all the files you need, you can perform functions such as copy or rename. These commands are explained later in the lesson.

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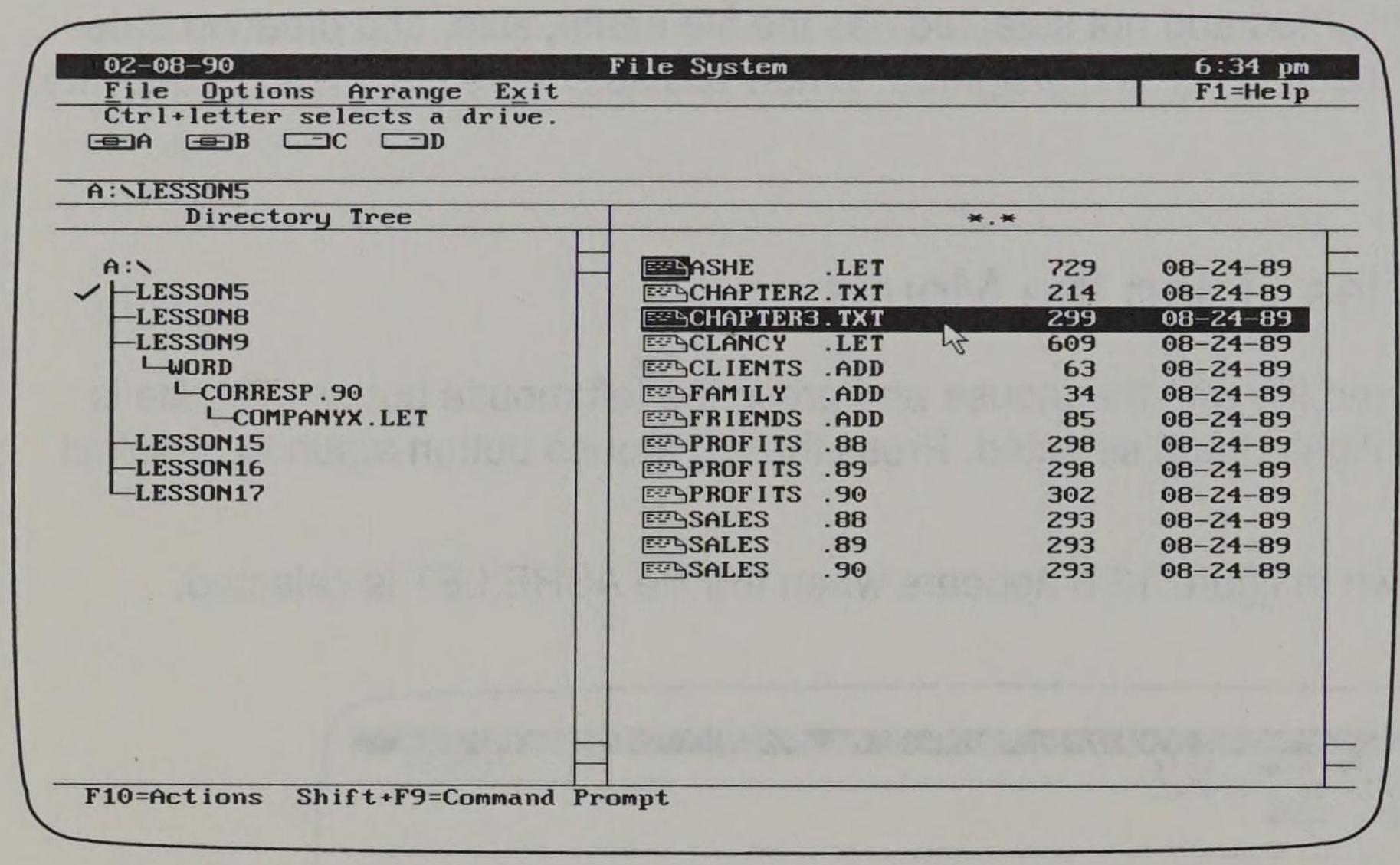


Fig. 12.7. *Selecting a second file.*

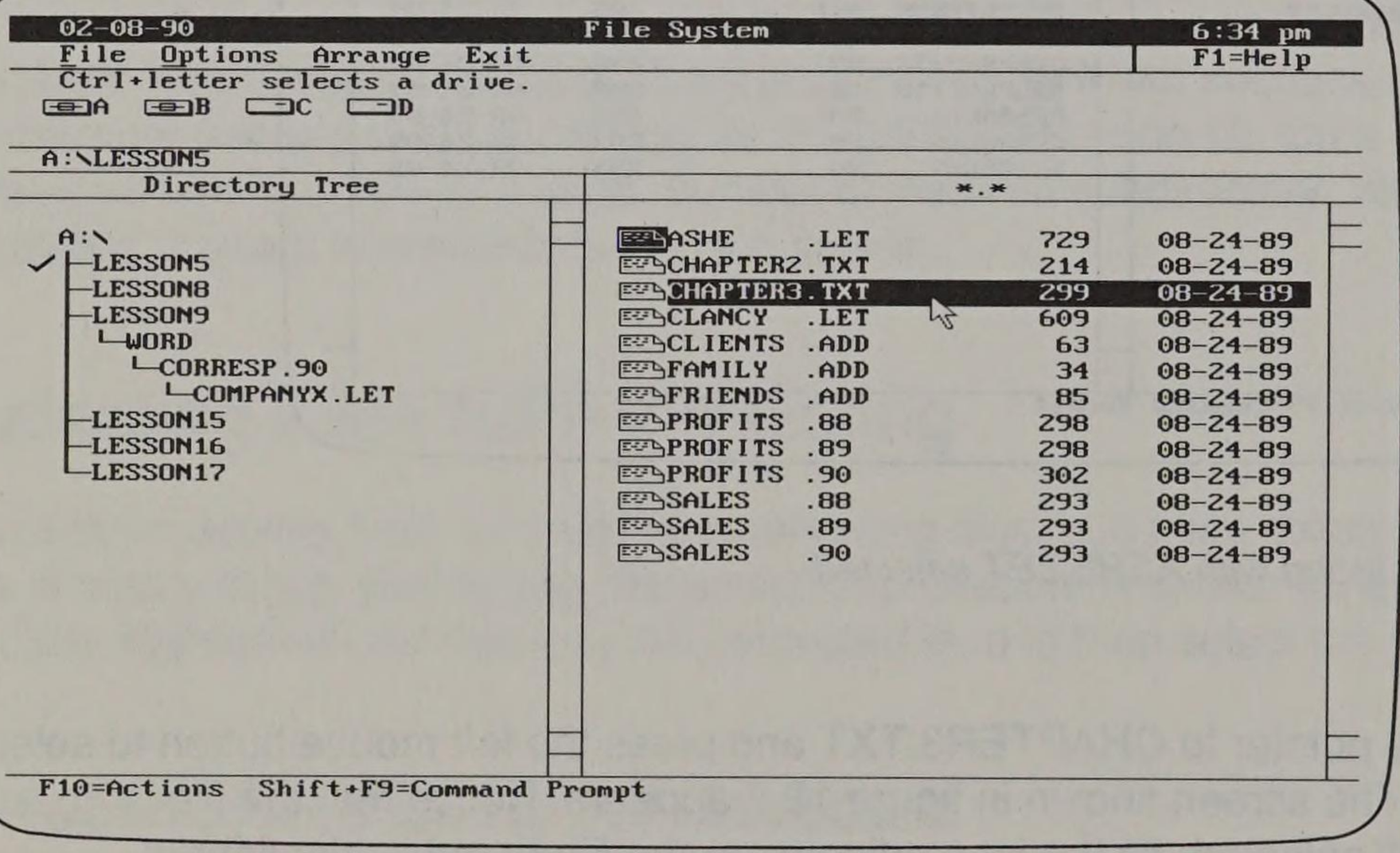


Fig. 12.8. *Deselecting a file.*

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Selecting and Deselecting All Files

In some cases, you may want to perform a command, such as copy, on all the files in a subdirectory. The File System has commands to select or deselect all the files in a subdirectory.

Use the mouse to point to the the word `File` on the action bar . If you are using the keyboard, press F10 and Enter to perform the same action. The File pull-down menu appears (see fig. 12.9).

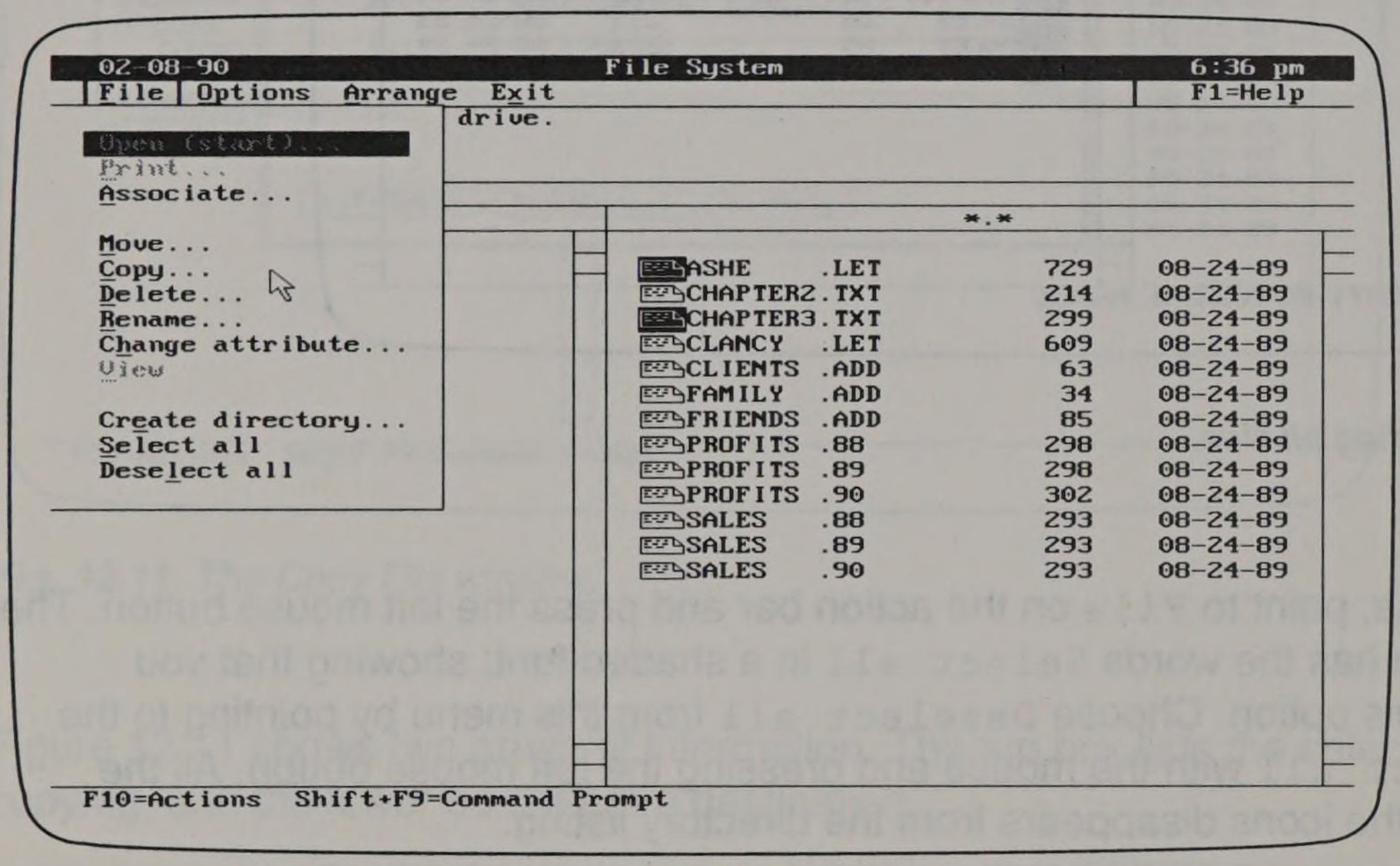


Fig. 12.9. *The File pull-down menu.*

The last two items on the menu are `Select all` and `Deselect all`. Notice that the `S` in `Select` and the `1` in `Deselect` are underlined. You can press the appropriate letter on the keyboard, S to select or L to deselect, to perform the respective action. Alternatively, using the mouse pointer you can point to the command and press the left mouse button.

With the File menu displayed, press S; the screen shown in figure 12.10 appears. All of the files have their icons highlighted, showing that they are selected.

In some cases, you may want to select most of the files in a directory. Using the Select all command and then deselecting the files you don't want to use may prove faster than selecting each file in turn.

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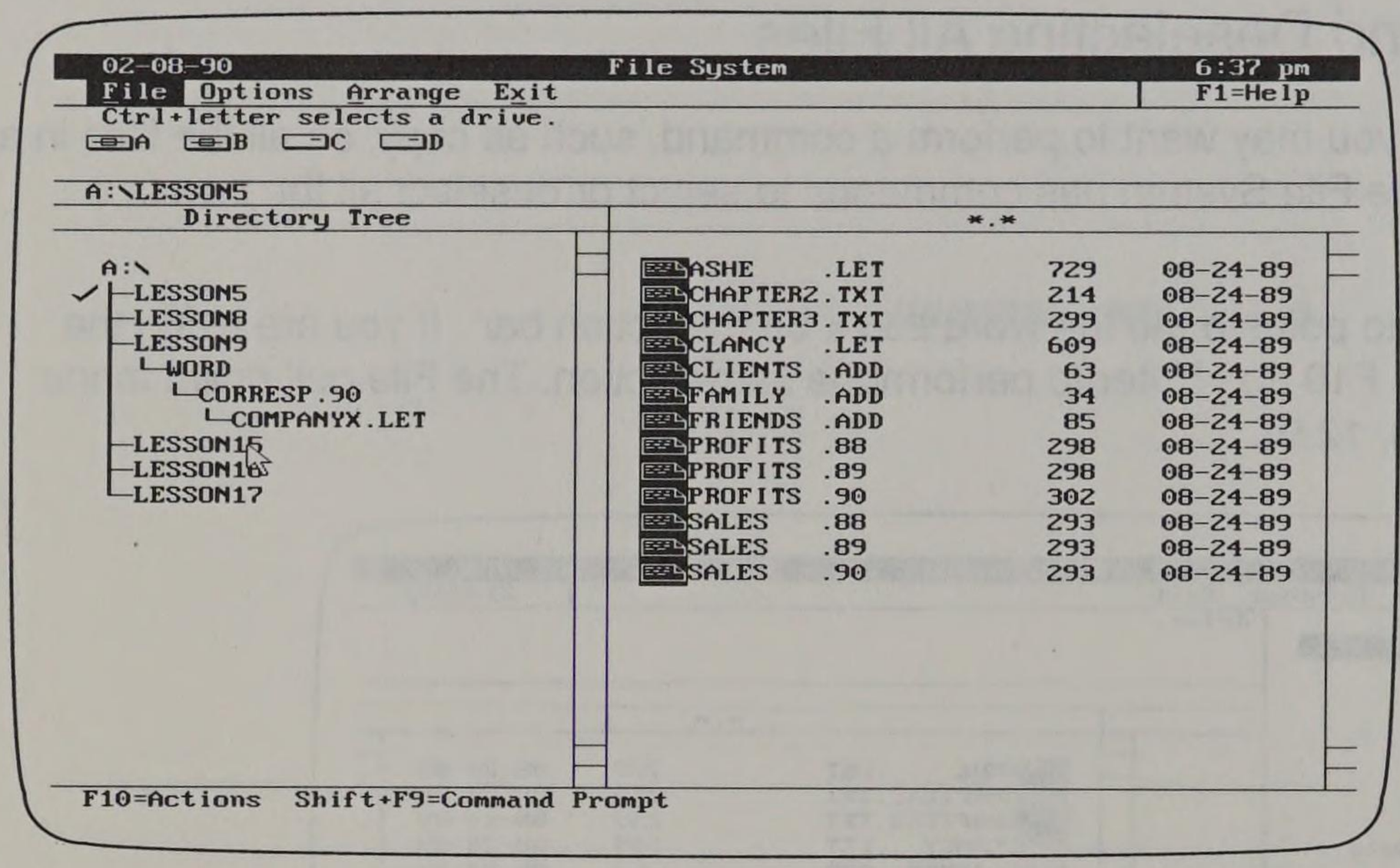


Fig. 12.10. *Selecting all files.*

Using the mouse, point to `File` on the action bar and press the left mouse button. The pull-down menu has the words `Select all` in a shaded font, showing that you cannot select this option. Choose `Deselect all` from this menu by pointing to the words `Deselect all` with the mouse and pressing the left mouse button. All the highlighting on the icons disappears from the directory listing.

Copying Files with File System

Now that you know how to select files in the File System, in this exercise you can practise your skills using the copy command.

When you copy files in the File System, you must select the files first. To copy CHAPTER3.TXT and ASHE.LET to the hard disk, highlight the two files. Point to CHAPTER3.TXT and press the left mouse button, and then point to ASHE.LET and again press the left mouse button.

Select the File menu by pointing to the word `File` on the action bar and pressing the left mouse button. The File menu options are displayed (see fig. 12.9).

Move the mouse pointer to point to the Copy option and press the left mouse button. Notice that, in the menu, Copy is followed by an ellipsis. This is similar to the ellipsis

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after DOS Utilities in the Main Group menu. The ellipsis indicates that further options can be reached by selecting the option. The screen shown in figure 12.11 appears.

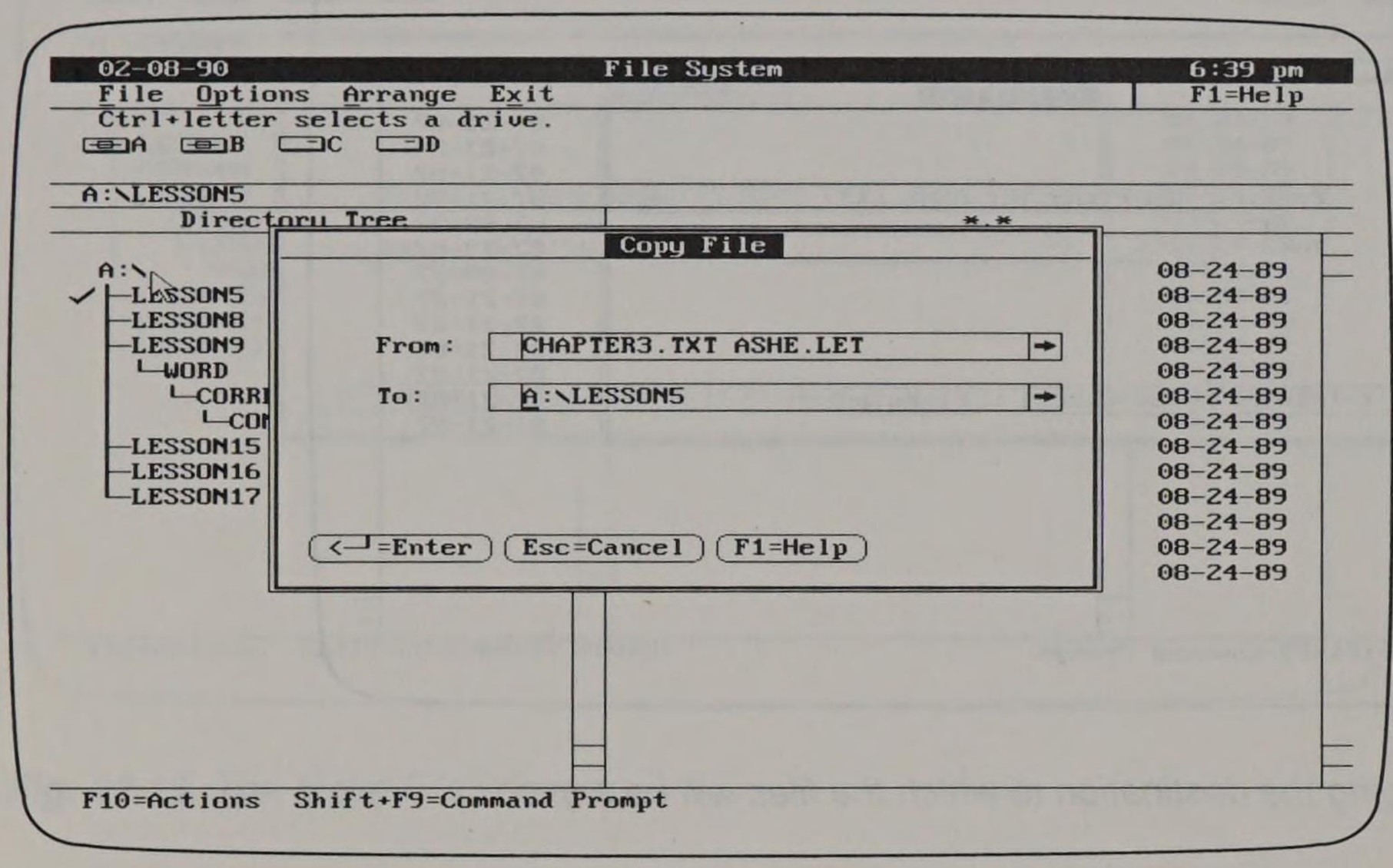


Fig. 12.11. *The Copy File window.*

Figure 12.11 shows two areas of information. The top box lists the selected files for copying, and the lower box offers a destination.

In this case, the destination is the current directory A:\LESSON5, because you haven't told the File System where to transfer the files. To put the files onto the hard disk in the root directory, type the following in the `To:` box:

C:

If you don't have a hard disk, substitute B: for C: in the destination position and put a formatted disk into drive B to accept the files.

Figure 12.12 shows the changed destination.

You also can enter a different destination or change the names of the files as you copy them by typing the appropriate information in the `To:` box. The syntax you use is the same for the COPY command covered in Lesson 7.

Press Enter to execute the command and copy CHAPTER3.TXT and ASHE.LET to the hard disk root directory.

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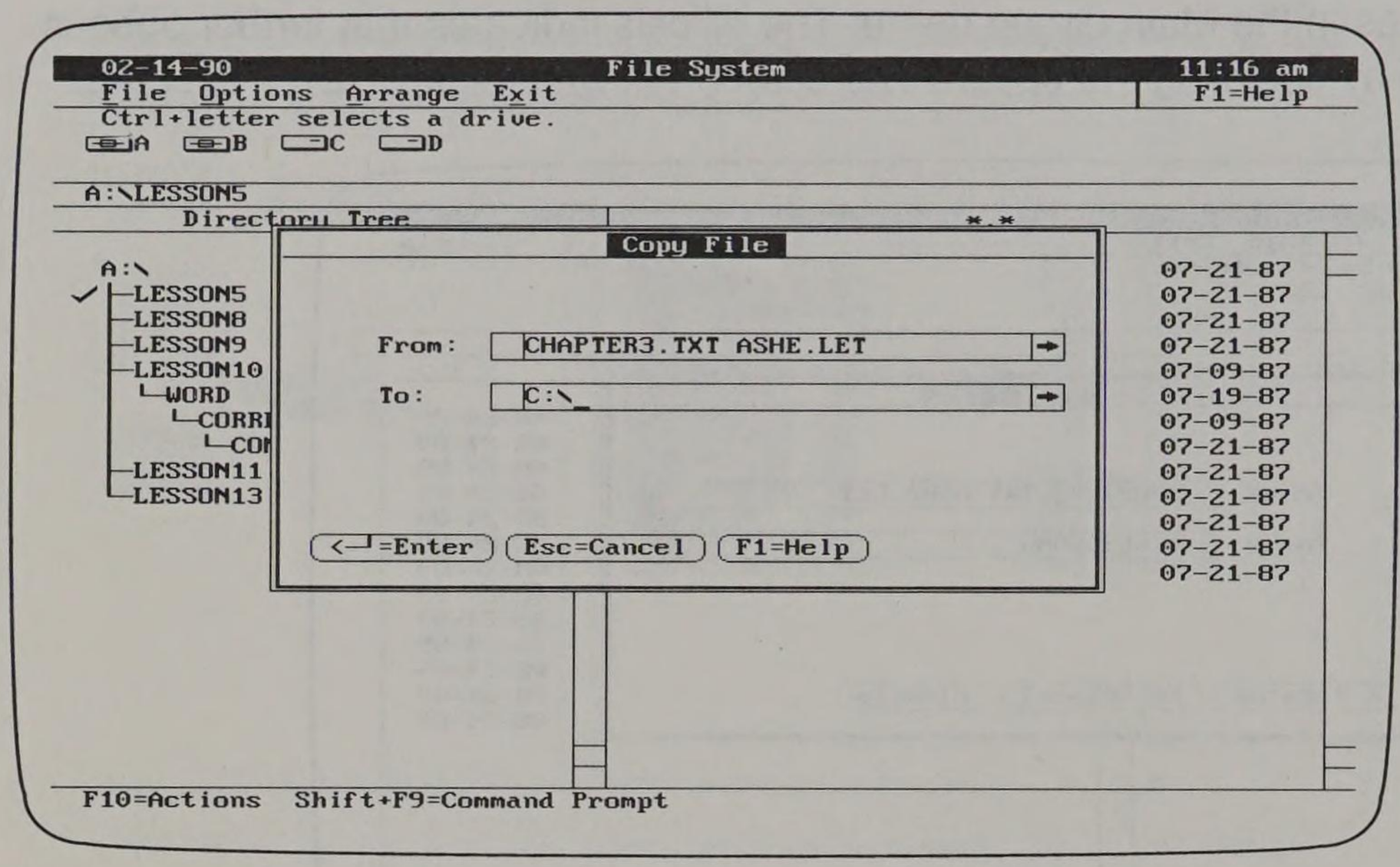


Fig. 12.12. *Changing the destination to which the files will be copied.*

Moving a File with File System

Remember that the copy command replicates the file. When the command is completed, you have two copies of the file. In the File System, you can actually move a file from one location to another. At the DOS system prompt, you can only perform this by issuing a COPY command followed by a DEL command.

To move files in the File System, first you must select the files you want to move. To move CHAPTER3.TXT and ASHE.LET to the hard disk, highlight the two files. Point to CHAPTER3.TXT and press the left mouse button, and then point to ASHE.LET and again press the left mouse button.

Select the File menu by pointing to the word `File` on the action bar and pressing the left mouse button. The screen shown in figure 12.9 appears.

Move the mouse pointer to point to the Move option, and press the left mouse button. The screen shown in figure 12.13 appears.

As with the copy command, a list of the selected files appears in the top box, and the destination for the files appears in the bottom box.

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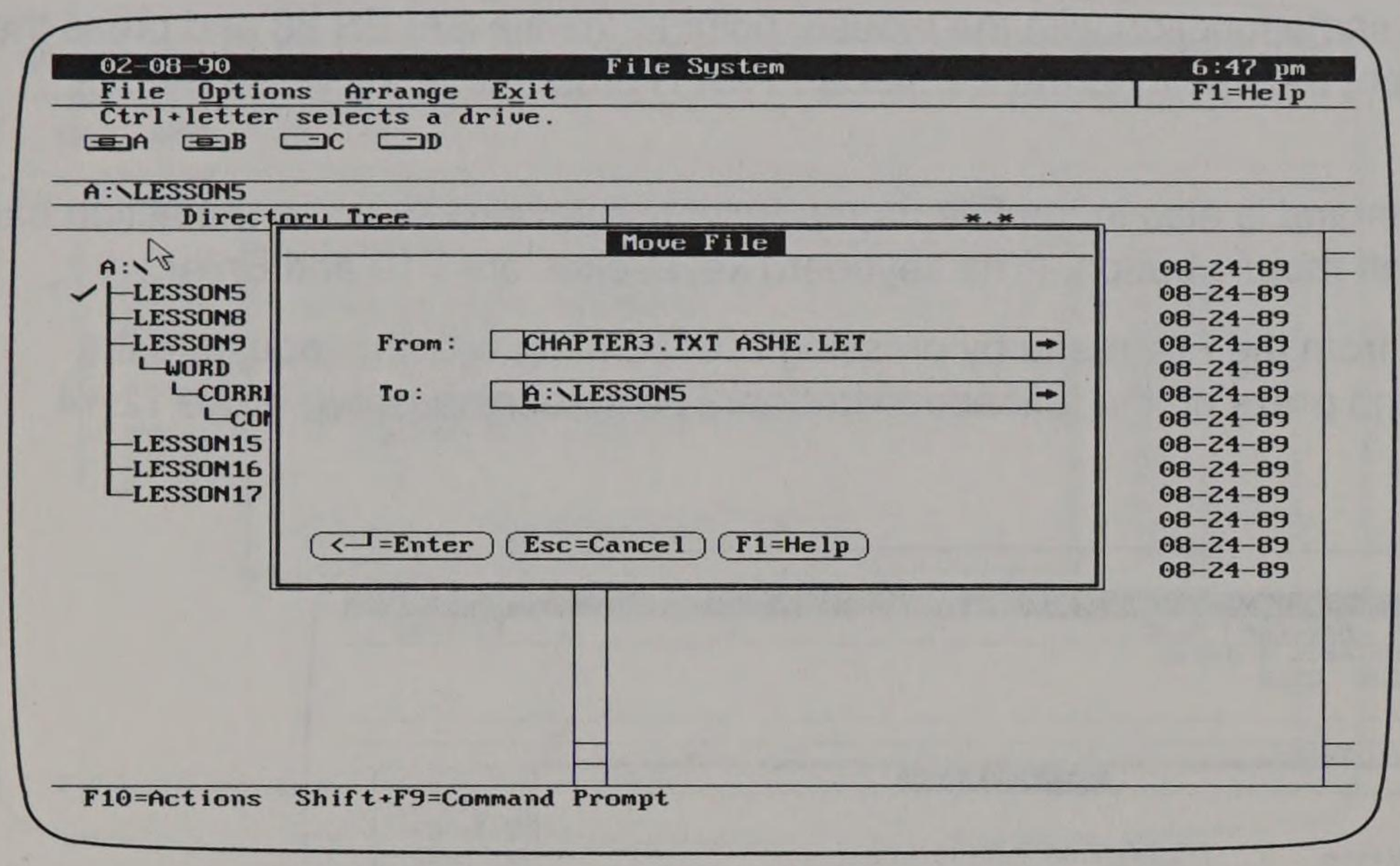


Fig. 12.13. *The Move File window.*

In figure 12.13, the destination is the current directory A:\LESSON5, because you haven't told the File System where to transfer the files. To put the files onto the hard disk in the root directory, type the following in the `To:` box:

C:

If you don't have a hard disk, substitute B: for C: in the destination position, and put a formatted disk into drive B to accept the files.

Press Enter to execute the command, moving CHAPTER3.TXT and ASHE.LET to the hard disk root directory. Notice that the lesson disk listing for drive A no longer includes the files CHAPTER3.TXT and ASHE.LET.

Deleting Files with File System

Files are deleted from the current directory in a fashion similar to the way they are copied or moved. You highlight the files and select the delete command.

Select the files SALES.88 and PROFITS.88 from the file listing. Using the keyboard, press Tab until the highlighted bar is on the top file in the listing (CHAPTER2.TXT). Use the down-arrow key to highlight the file named SALES.88 , and press the space bar to select it. Use the down-arrow key again to highlight PROFITS.88 , and press the space bar to select it.

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To perform the same function with the mouse, point to the file SALES.88 and press the left mouse button; then point to the file name PROFITS.88 and again press the left mouse button.

The delete command is also in the File menu. Point to the word `File` on the action bar and press the left mouse button. (The keyboard keystrokes are F10 and Enter.)

Choose Delete from the File menu by pressing D or pointing with the mouse to the Delete option and pressing the left mouse button. The screen shown in figure 12.14 appears.

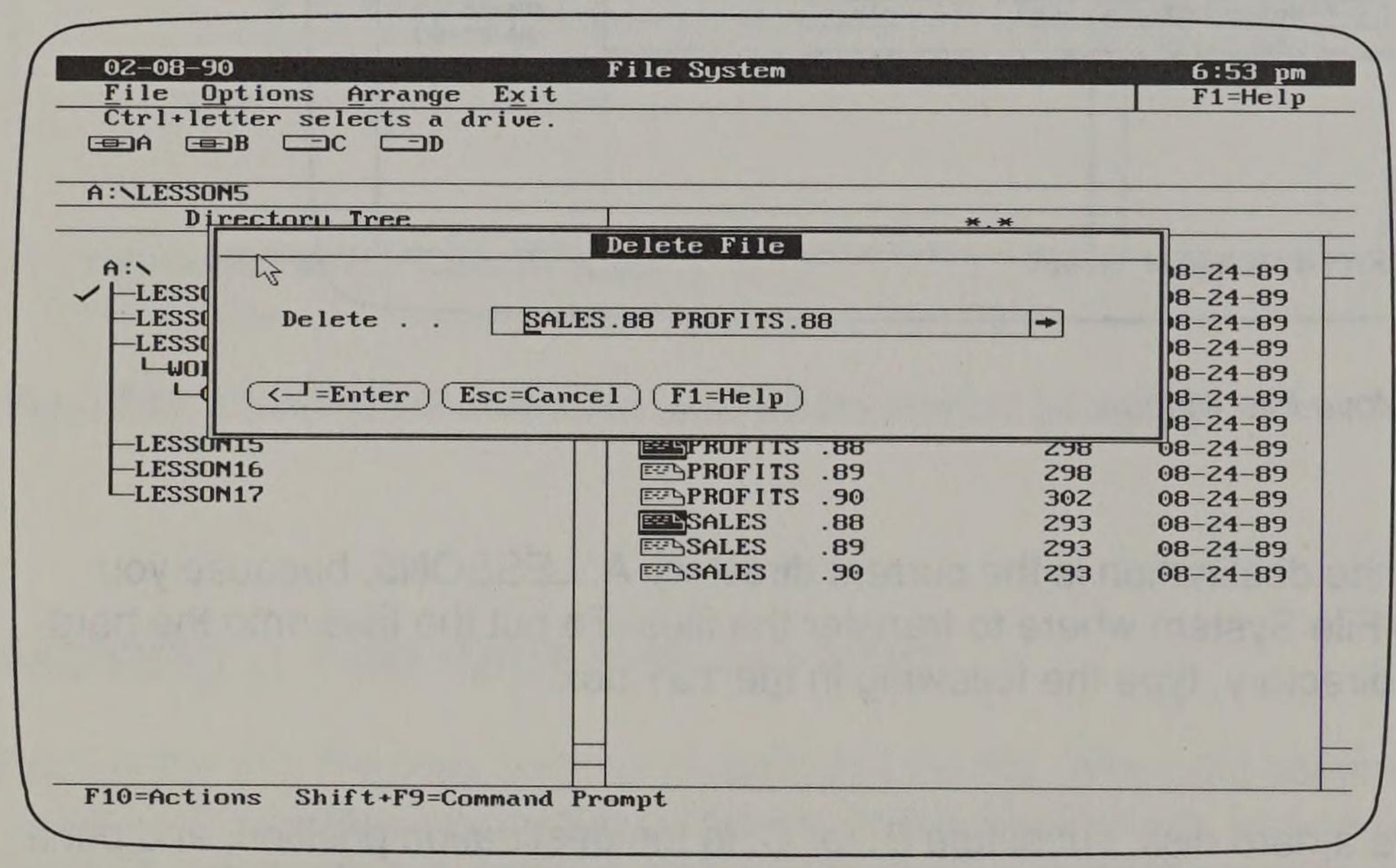


Fig. 12.14. *The Delete File window.*

Although there are no further options to choose, a window appears on the screen to act as security. The list of selected files appears in the `Delete` box. If desired, you can remove any of the files listed. However, because you are prompted before each file is deleted, you do not need to examine this list too extensively.

Press Enter to start the deletion process. The screen shown in figure 12.15 appears.

The first file to be deleted is listed. The highlighted bar appears on the option that will not delete the file. If you press Enter immediately, the file is not deleted and the next file name is shown. However, because you want to delete this file, use the down-arrow key to highlight option 2 and press Enter.

The file SALES.88 is deleted from the disk. The next highlighted file, PROFITS.88, is displayed in a similar box.

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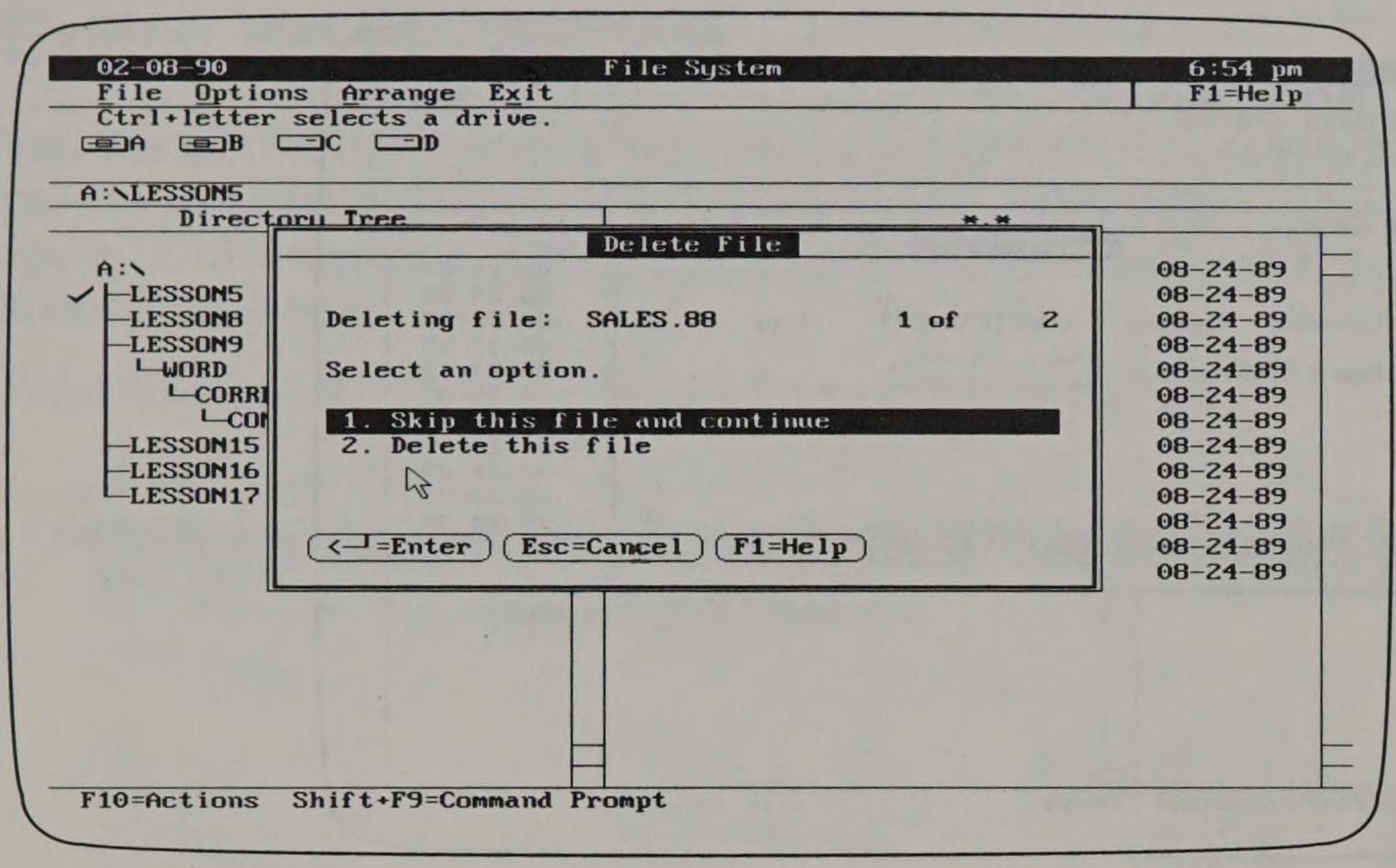


Fig. 12.15. *Options for deleting files.*

Select option 2 and delete PROFITS.88. The central window disappears, and the file listing screen is redisplayed.

The delete command includes several safeguards that help to ensure that you don't delete a file you mean to keep. However, this does make the process tedious.

Renaming a File with File System

The rename command operates similar to the delete command. Each selected file is displayed in turn, and you type the new name for the file. The following exercise renames the file CHAPTER2.TXT to CHAP2.TXT.

Select the file CHAPTER2.TXT from the file listing, and then choose the File menu. Point to the Rename option in the File menu and press Enter. The screen shown in figure 12.16 is displayed.

The current file name is shown in the top box. Because only one file is selected, the expression `1 of 1` appears after the file name. When two files are selected, the comparable expression is `1 of 2`.

The `New filename` box is where you type the new file name.

As with many of the commands in the File System, additional help is available when you are renaming files. Move the mouse pointer to the box labeled `F1=Help` in the Rename File window, and the screen shown in figure 12.17 appears.

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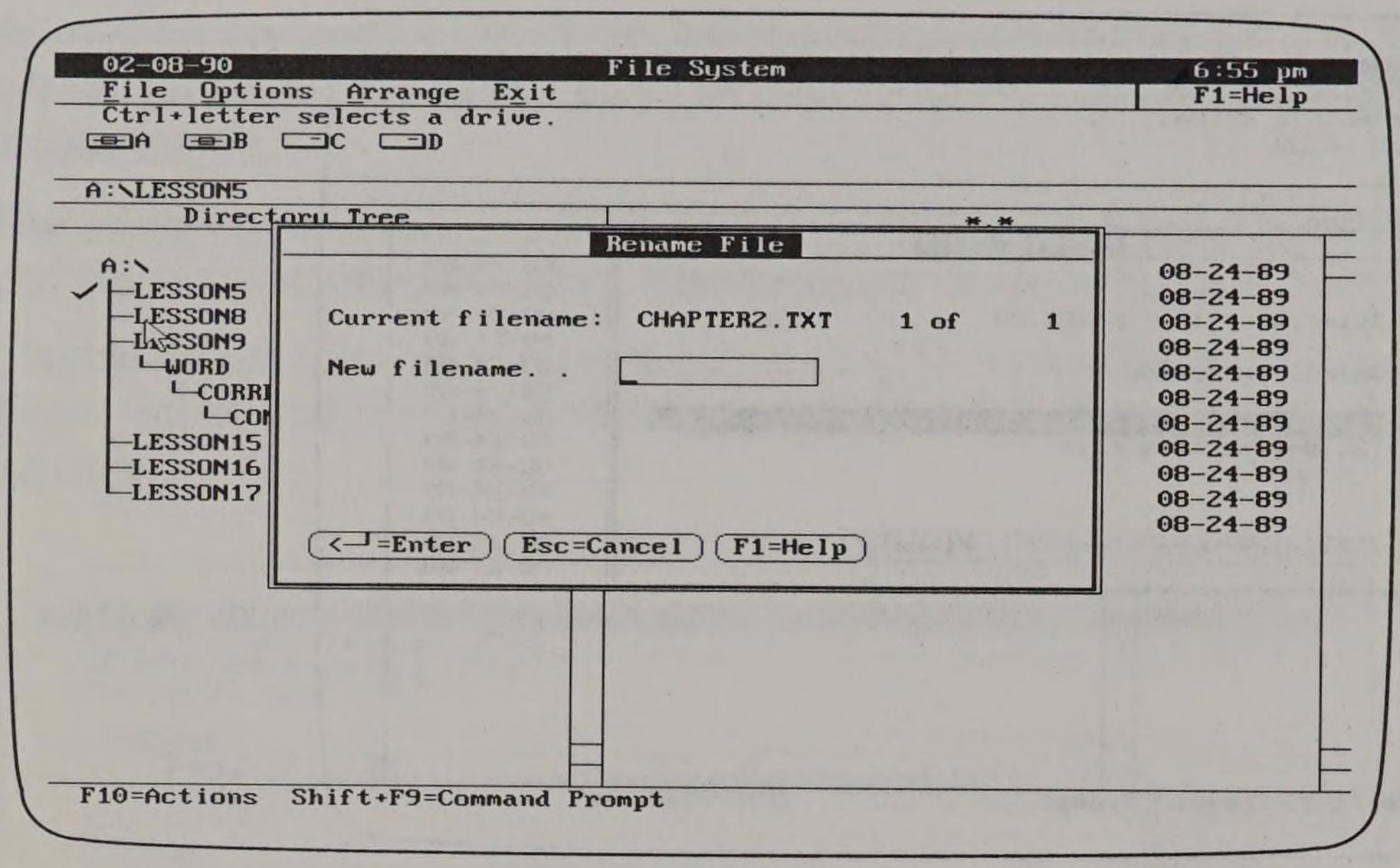


Fig. 12.16. The Rename File window.

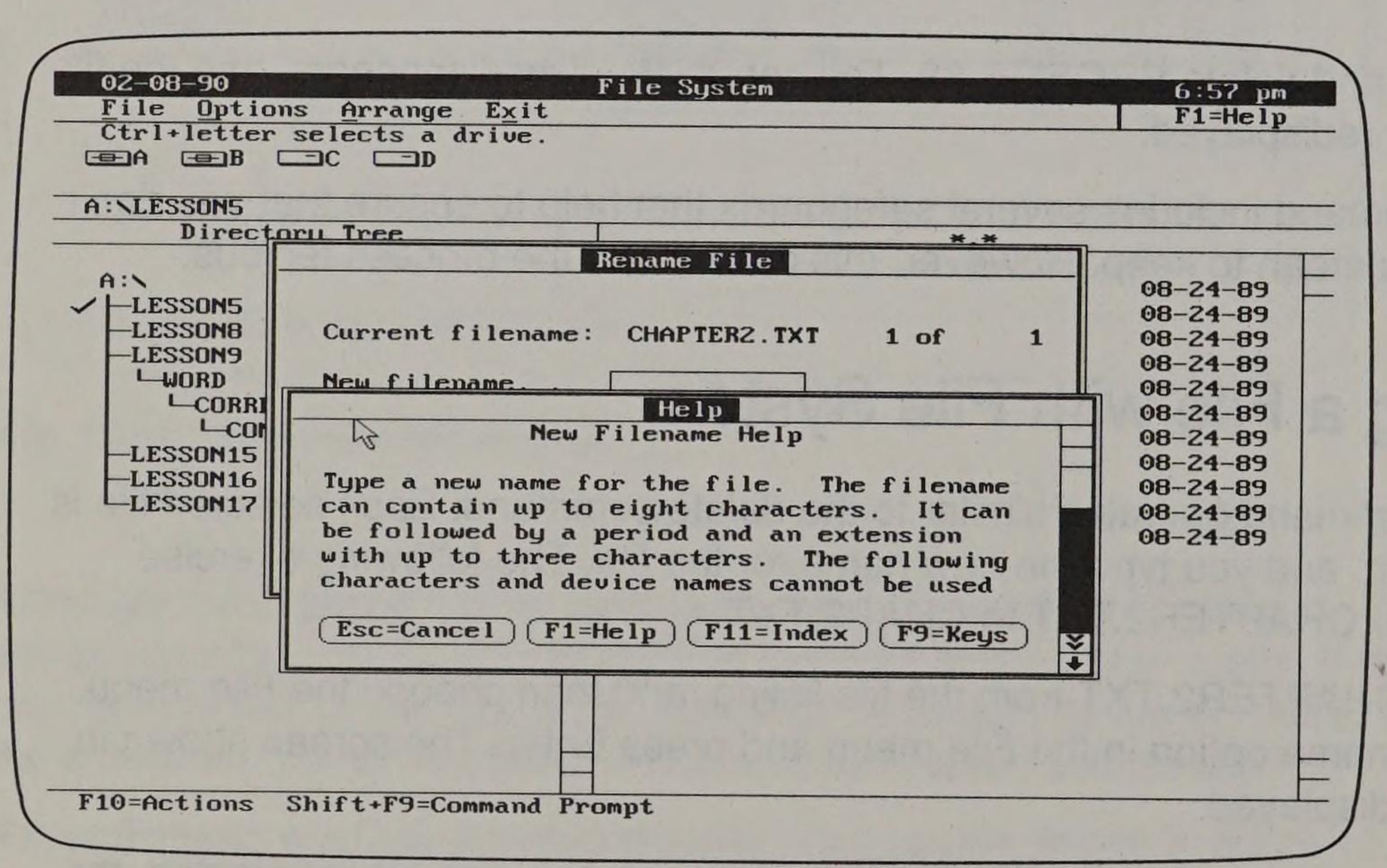


Fig. 12.17. A help window for renaming files.

The information provided in the help window is context-sensitive, just like the other help windows investigated in Lesson 10. The help window provides further information about the rename command. When you have finished examining this information, press Esc to remove the help window.

To change the file name to CHAP2.TXT, type **CHAP2.TXT** and press Enter. The file listing shows the changed name.

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Exiting the File System

You can exit the File System at any time by pressing F3. To exit by using the mouse, point to `Exit` on the action bar and press the left mouse button. The screen shown in figure 12.18 is displayed. Press Enter to confirm your decision, and you return to the Main Group screen.

Press F3 again to leave the Shell program and return to DOS.

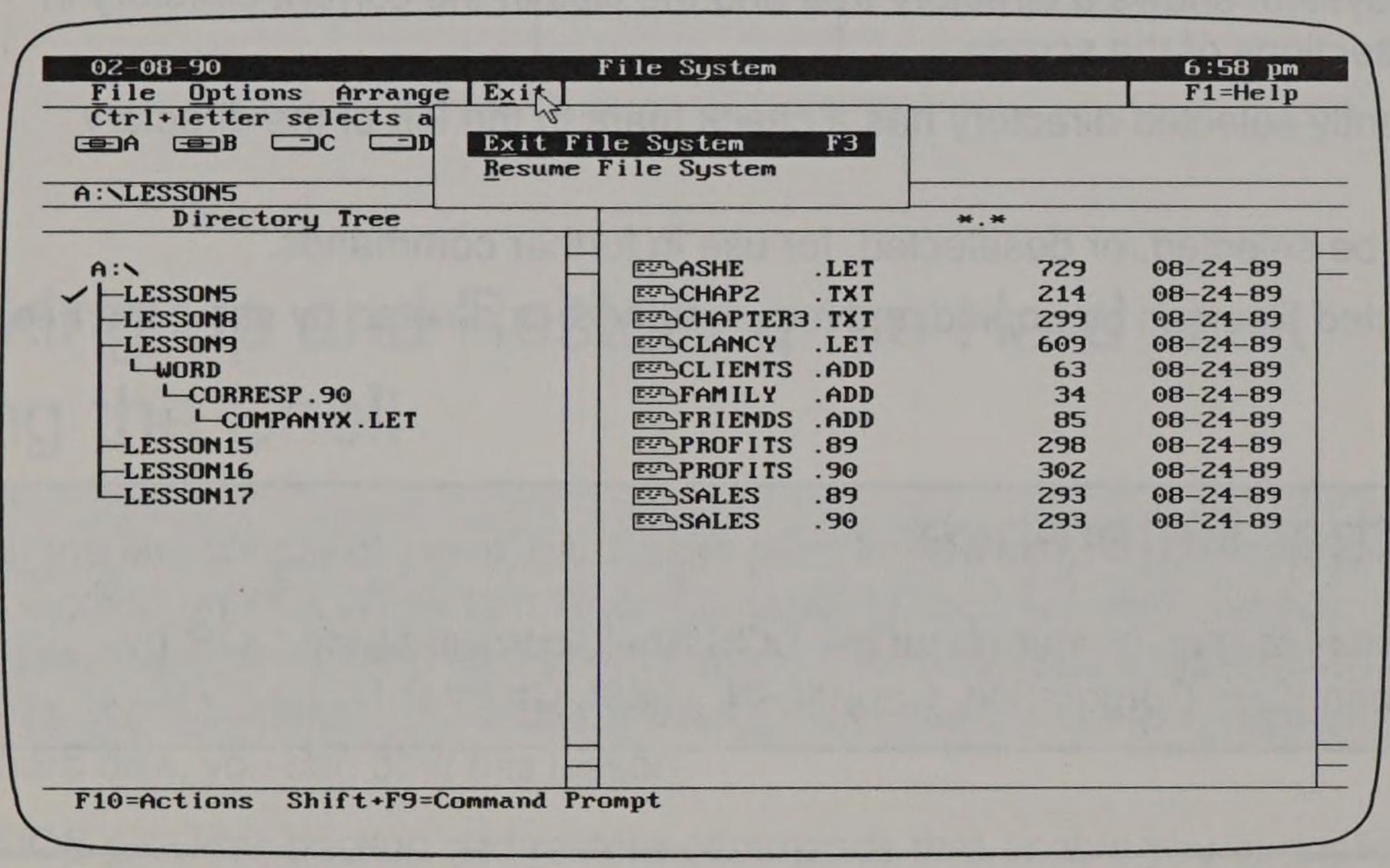


Fig. 12.18. *The Exit menu.*

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SUMMARY OF CONCEPTS FOR LESSON 12

1. The Shell supplies a program called the File System that gives a graphical method of managing files. Most selections are made by pointing to an item with the mouse pointer and pressing a mouse button. Keys can be used as an alternative.
2. The File System shows a directory tree and the files in the current directory in different sections of the screen.
3. The currently selected directory has a check mark to the left of the directory name.
4. Files can be selected, or deselected, for use in further commands.
5. The selected files can be copied, moved, renamed, or deleted by using the File menu.

For Further Reference

If you would like to read further about the DOS Shell, consult *Using DOS*, by David Solomon (Que Corporation, Carmel, IN, 1989), Chapter 14.

SUMMARY EXERCISES FOR LESSON 12

For these exercises, use the DOS Shell and the copy of the lesson disk that you made in Lesson 11.

1. Copy all the files with the extension ADD from the \LESSON5 subdirectory to the \LESSON9\WORD subdirectory.
2. Move the file SALES.90 from the \LESSON5 subdirectory to the root directory.
3. Rename the file SALES.90 that you moved to the root directory to SALES90.RPT.
4. Delete the file SALES90.RPT.

Appendix C gives the answers to these exercises.

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LESSON

13

Backing Up and Restoring the Hard Disk Using the Shell

In the last couple of years, hard disks (also known as fixed disks) have become more common on PCs. Their large storage capacity is convenient and economical. However, just as keeping backups of any information on a diskette is important, keeping a backup of the data on a hard disk is also important. If you do not have a hard disk, you can omit this lesson.

DOS provides backup and restore commands that enable you to duplicate all information on a hard disk onto diskettes. This process is streamlined with the DOS Shell. Lesson 14 covers the DOS backup and restore commands for various versions of DOS. In DOS V4.0, the command is slightly more advanced. This lesson deals with the Shell backup and restore utilities.

In this lesson, you learn how to do the following:

- Back up a hard disk using the Shell
- Restore files to a hard disk using the Shell

Backing Up the Hard Disk Using the Shell

Backing up and restoring are two opposite parts of the same process. *Backing up* means copying onto floppy disks the files stored on your hard disk; *restoring* means copying the files from the floppy disk backups onto the hard disk. Although you should

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use the Backup Fixed Disk utility frequently, you need to use Restore Fixed Disk only when you lose all or some information from your hard disk. You should not have to use the restore feature often.

Preparing To Use the Backup Utility

If your disks have not been previously formatted, DOS V4.0 formats them during the backup procedure. But allowing DOS to format disks during backup slows the procedure down, because you must wait for each disk to be formatted. It may be more convenient, instead, if you prepare the disks in advance by using the format command. If you miscount the number of formatted disks you need, you only have to slow the process down for the last couple of disks.

Another reason to format the disks yourself is to discover any bad sectors or other disk-related problems. This practice helps you ensure that you have a sufficient amount of total disk space for the backup.

Even if you don't preformat the disks, you should still make sure that you have sufficient disks to perform the backup. How to approximate the number you need is described below.

Lesson 11 discusses how to format disks using the Shell Format utility. As you format the disks, add a paper label to the disk cover so that you can use a sequential system. For example, you may choose to label the first disk BACKUP DISK #1, and continue with a simple numbering scheme. Leaving room on the label to add the dates as you use this set of disks is also convenient, because you can use these disks more than once. However, using the backup procedure overwrites any information previously written on the disks.

Determining the Number of Disks Needed for Backup

The number of disks needed for backup depends on the amount of information you want to back up. For every 10 megabytes of disk space, you need approximately twenty-nine 360K minifloppy disks, nine 1.2M minifloppy disks, fifteen 720K microfloppy disks, or eight 1.44M microfloppy disks. You can approximate how many disks you need.

If you want to back up a few files or a directory, follow these steps:

Step 1: Get a directory of the hard disk by typing the following at the system prompt:

```
DIR C:
```

Step 2: Add the number of bytes for the files you want to copy.

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Step 3: Divide this number by the size of your floppy disk; for example, divide by 362,496 if you're using double-sided, double-density disks. Round the answer to the next highest whole number.

The result is the number of disks you need for the backup process. Because the backup option stores a little more than just the hard disk files on the disks, you should prepare one or two additional disks in case you need them.

If you want to back up most or all of a hard disk, follow these steps:

Step 1: Run a check disk to determine how full the hard disk is. Type the following at the system prompt:

CHKDSK C:

Step 2: Subtract the free disk space from the total disk space.

Step 3: Divide this figure by the amount each floppy disk holds (for example, 362,496 bytes if you're using double-sided disks). Round the answer to the next highest whole number.

This figure gives you the approximate number of disks you need to back up your hard disk. The approximation is usually close, and it's not worth the time to figure the number more accurately.

A more accurate figuring also would have to take into account the following facts:

1. DOS does not back up directories; it backs up only the files in a directory. Directory space does not have to be accounted for when you figure the number of disks you need. Therefore, if you use the approximation method, you overestimate the amount of space you need.
2. DOS V4.0 does not save the DOS system files or COMMAND.COM on the backup set. The CHKDSK command includes the space these files take in the hard disk's space characteristics, but you don't need the space on the backup disks.
3. DOS V4.0 creates two files on each floppy's root directory to hold the backup disk's number, the date of backup, paths, file names, and other information. These files are called BACKUP.XXX and CONTROL.XXX.

As you can see, the first and second facts decrease the number of bytes used, and the third fact increases the number of bytes used. All in all, the two sets of facts offset each other, so the approximation formulas work well enough to help you determine with reasonable accuracy the number of disks you need. To ensure that you have enough disks for backup, format a few extra disks. For every 29 formatted double-density disks on hand, you can back up 10 megabytes of data. Once your disks are prepared, you're ready to use the backup utility.

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Starting the Backup Procedure

First, start the DOS Shell program, as explained in detail in Lesson 10:

Step 1: Start your computer by removing any disks in the floppy disk drives, and either turn on your computer or press Ctrl-Alt-Del to reboot the computer.

The computer initializes itself and boots DOS. If prompted by the computer, check the date and time, correcting them if necessary. Depending on how your machine is configured, you see either the DOS prompt (`A>` or `C>`), or the initial Shell program screen. If you are at the initial Shell program screen, you can skip Step 2.

Step 2: At the system prompt, type **DOSSHELL** and press Enter to start the Shell. The initial DOS Shell screen appears after a few seconds.

Step 3: Change to the DOS Utilities group, as covered in Lesson 11: Move the mouse pointer to the DOS Utilities... line and press the left mouse button, or use the down-arrow key. Press Enter to display the options for the DOS Utilities group.

Use the down-arrow key, or the mouse pointer followed by the left mouse button, to highlight the Backup Fixed Disk option. (Remember, some suppliers of DOS, in particular IBM, refer to a hard disk as a *fixed disk*, because it is not removable from the machine.) The screen shown in figure 13.1 appears.

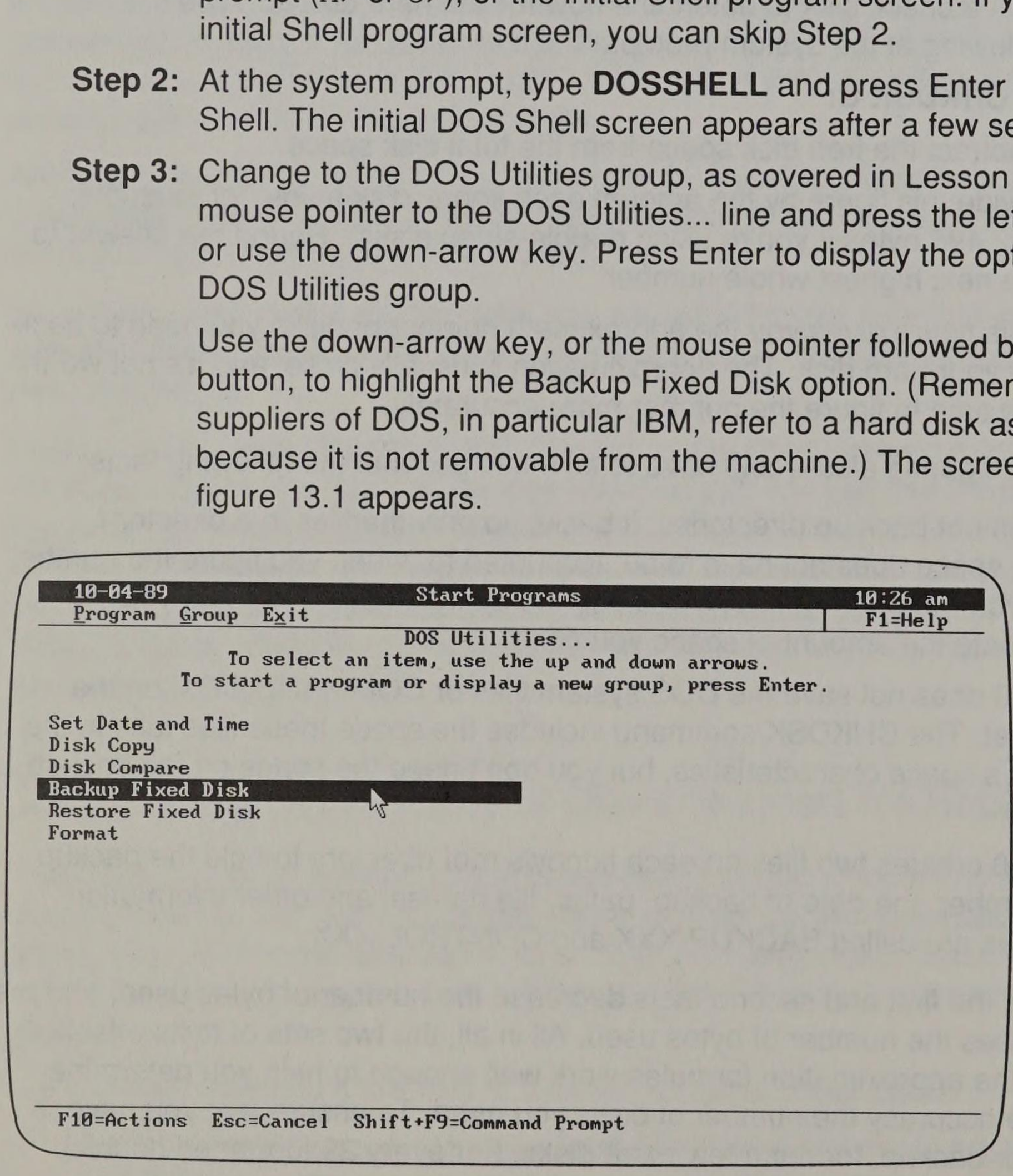


Fig. 13.1. *The Backup Fixed Disk option.*

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Press the Enter key to select the Backup Utility. The screen shown in figure 13.2 appears.

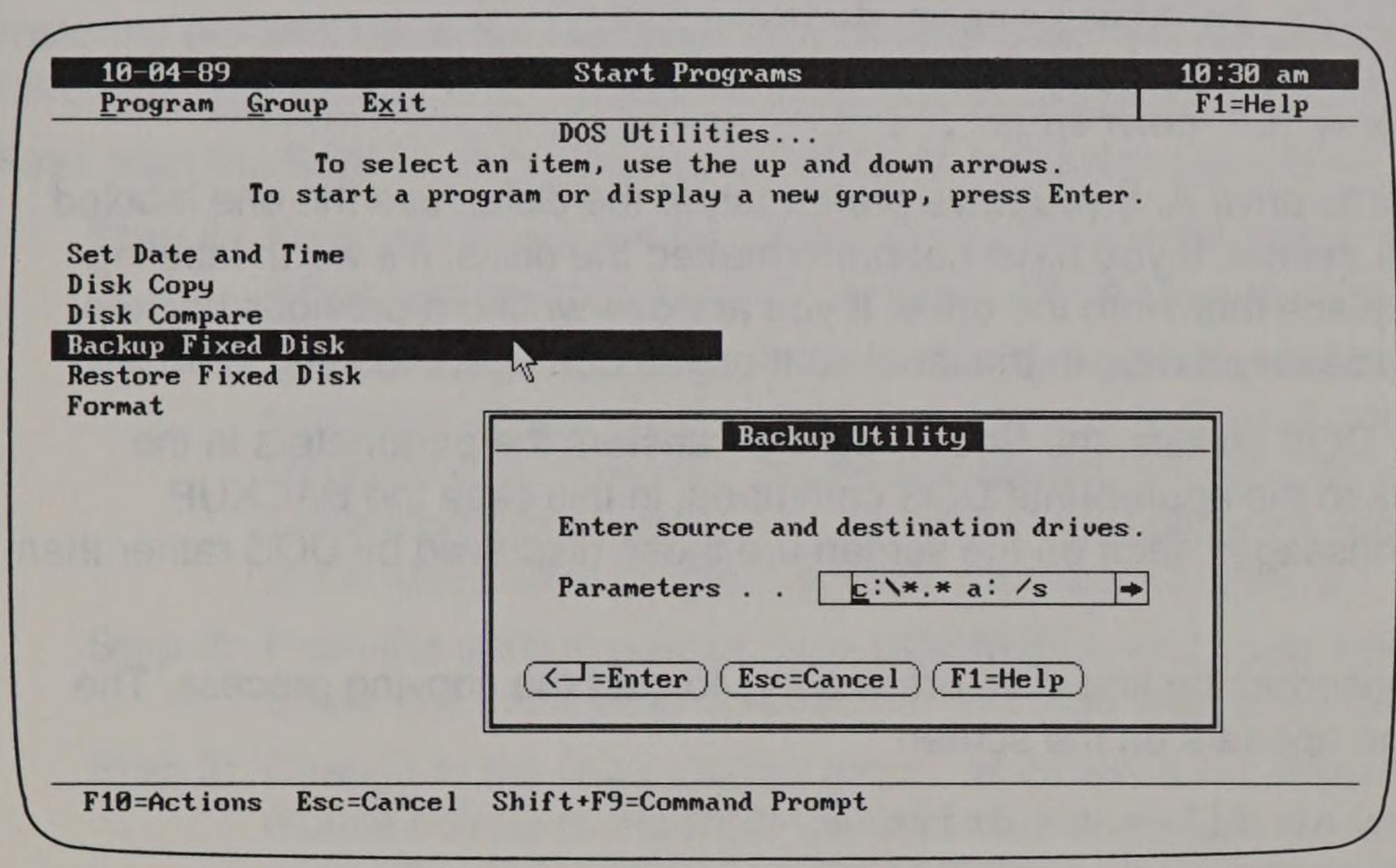


Fig. 13.2. *The Backup Utility window.*

As with the other DOS utilities, the window that appears on the screen includes some parameters. These are suggested options for the command. Figure 13.2 shows the most commonly used option set for the backup command, and this set is supplied automatically when you select the utility. If you accept it by pressing Enter, all the files on drive C and all the files in subdirectories on drive C are copied to drive A.

Other options can be chosen. For example, if you have two disk drives, you can change drive C to drive D by typing **D** in place of the C on the screen.

The other options available with the backup utility include such items as backing up only modified files or files created after a particular date. These advanced options are discussed in Lesson 14, where the system prompt is used to back up the hard disk. If desired, you can add these options to the `Parameters` box. However, the default options are used in the majority of situations.

Backing Up the Hard Disk from Shell

After checking that the `Parameters` box includes the line

```
c:\*.* a: /s
```

press the Enter key to start the backup procedure.

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The following message appears on the screen:

```
Insert backup diskette 01 in drive A:
WARNING! Files in the target drive
A:\ root directory will be erased
Press any key to continue . . .
```

Put the first disk into drive A. If you have preformatted the disks, use the one labeled as the first disk in the set. If you have not preformatted the disks, it's worth labeling them before you place them into the drive. If you are overwriting a previous backup set, be sure to add today's date to the label so that you don't get the sets confused.

As with the other DOS utilities, the Shell program transfers the parameters in the `Parameters` box to the appropriate DOS command, in this case the BACKUP command. The messages seen on the screen are those displayed by DOS rather than the Shell.

When you have inserted the first disk, press a key to start the copying process. The following message appears on the screen

```
*** Backing up files to drive A: ***
Diskette Number: 01
```

A list of the files being copied is displayed.

DOS displays a prompt to insert the subsequent disks when it has filled the current disk in drive A. Insert each disk when prompted, and press a key to allow DOS to transfer the data. Once all the data is copied onto the disks, the process is completed and the following message appears:

```
Press any key to continue . . .
```

Press a key to redisplay the Shell's DOS Utilities. . . screen.

If you use in the backup procedure a disk that has not been preformatted, DOS automatically formats it. DOS uses its own FORMAT command for this portion of the process. You must type N, meaning no, when the following message appears:

```
Format another (Y/N)?
```

Keep your backup sets in a safe place. At least two backup sets are recommended. Depending on the importance of the data on your disk, you need to back up very frequently, or rarely. Each time you back up, use the backup set that you didn't use last time. This way you have a second, slightly older set that you can use if one set proves defective.

Backing up your hard disk is not useful in itself. It is insurance against your hard disk failing, or you deleting the contents of the hard disk. Without the restore utility, the backup is worthless.

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Restoring Backup Files Using Shell

The Restore Fixed Disk utility is the opposite of the Backup Fixed Disk Utility. The restoring process takes the files from your backup disks and replaces the files onto the hard disk. The operation of the restore utility is very similar to the backup utility.

First, start the DOS Shell program, as explained in detail in Lesson 10:

Step 1: Start your computer by removing any disks in the floppy disk drives, and either turn on your computer or press Ctrl-Alt-Del to reboot the computer.

The computer initializes itself and boots DOS. If prompted by the computer, check the date and time, correcting them if necessary. Depending on how your machine is configured, you see either the system prompt (`A>` or `C>`), or the initial Shell program screen. If you are at the initial Shell program screen, you can skip Step 2.

Step 2: From the system prompt, type **DOSSHELL** and press Enter to start the Shell. The initial DOS Shell screen appears after a few seconds.

Step 3: Change to the DOS Utilities group, as covered in Lesson 11: Move the mouse pointer to the DOS Utilities... line and press the left mouse button, or use the down-arrow key. Press Enter to display the options for the DOS Utilities group.

Use the down-arrow, key or the mouse pointer followed by the left mouse button, to highlight the Restore Fixed Disk option. (Remember, some suppliers of DOS, in particular IBM, refer to a hard disk as a *fixed disk* because it is not removable from the machine.) The screen shown in figure 13.3 appears.

Press the Enter key to select the restore utility. The screen shown in figure 13.4 appears.

The window that appears on the screen includes the following parameters:

```
a:  c:\*.*  /s
```

If you accept the given options by pressing Enter, all the files on the backup set of disks to be put into drive A are transferred to drive C. Any subdirectories stored with the backup set are kept, and the appropriate files are placed into subdirectories on the hard disk.

As with the backup utility, you can choose other options. These more advanced options are discussed in Lesson 14, where the RESTORE command is used at the system prompt. If you want to change any options, alter the contents of the `Parameters` box before continuing. The advanced options available correspond with the options available with the backup utility. You can, for example, restore files created after a particular date, or from a particular subdirectory.

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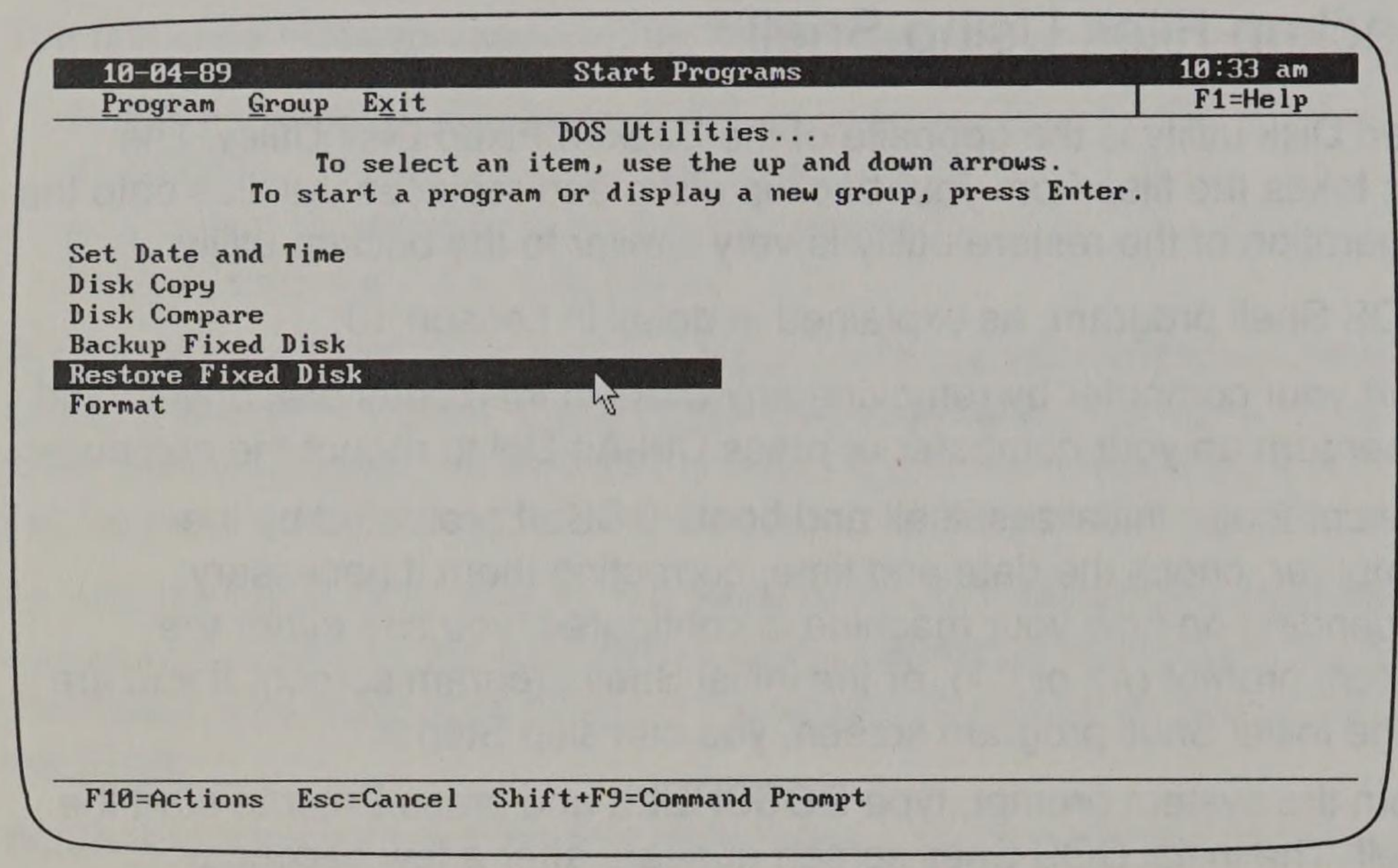


Fig. 13.3. *The Restore Fixed Disk option.*

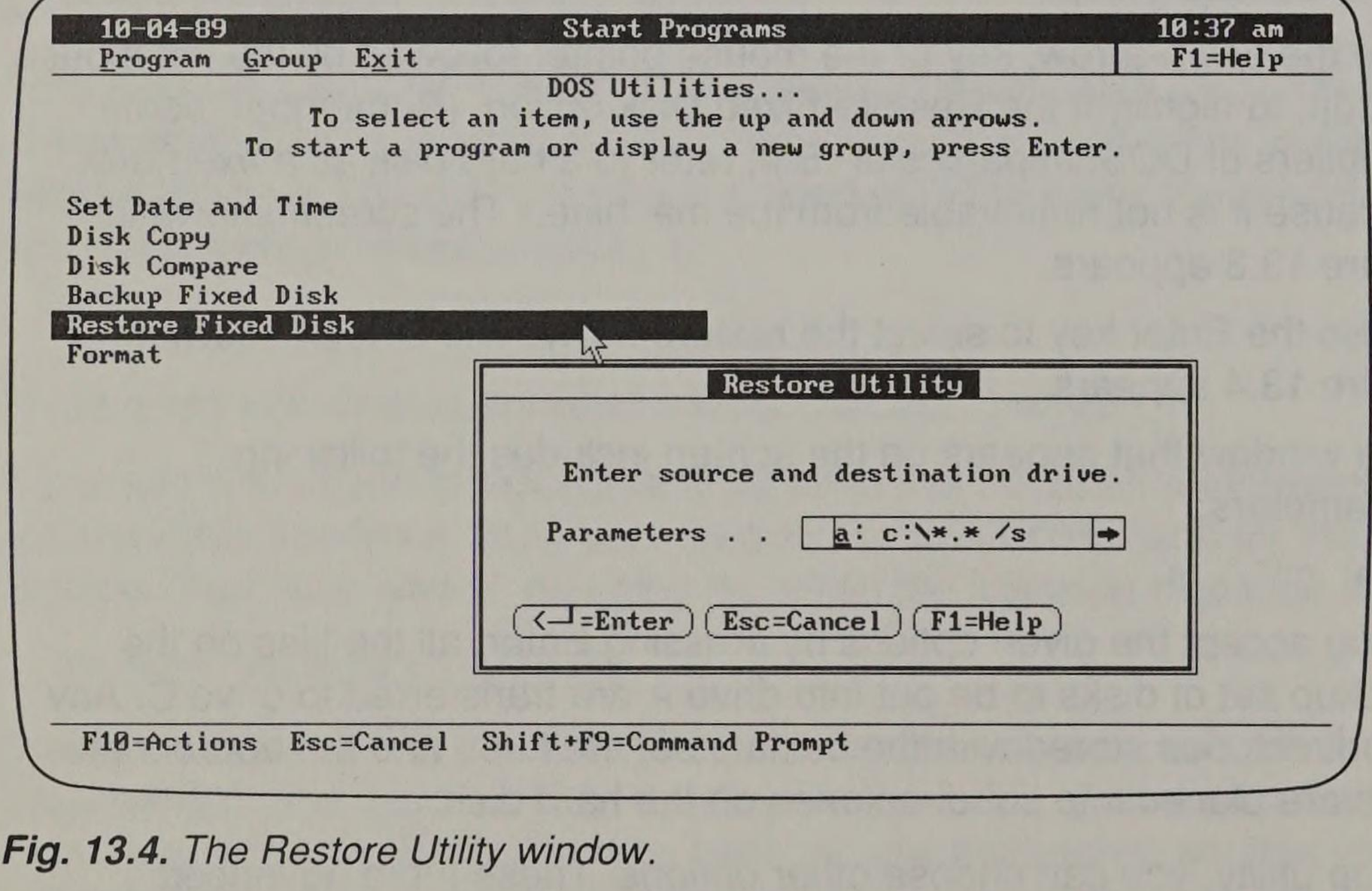


Fig. 13.4. *The Restore Utility window.*

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Restoring the Hard Disk from Shell

After checking that the `Parameters` box includes the line

```
a: c:\*.* /s
```

press the Enter key to start the restore procedure.

The following message appears on the screen:

```
Insert backup diskette 01 in drive A:
Press any key to continue . . .
```

Put the first disk of the backup set into drive A.

As with the other DOS utilities, the Shell program transfers the parameters in the `Parameter` box to the appropriate DOS command, in this case the RESTORE command. The messages seen on the screen are those displayed by DOS rather than the Shell.

When you have inserted the first disk, press a key to start the copying process. A message similar to the following appears on the screen:

```
*** Files were backup 10-04-1989 ***
*** Restoring files from drive A: ***
Diskette Number: 01
```

A list of the files being copied is displayed.

DOS displays a prompt to insert the subsequent disks when it has finished copying the files from the current disk in drive A. Insert each disk when prompted and press a key to allow DOS to transfer the data. Once all the data is copied from the disks, the process is completed, and the following message appears:

```
Press any key to continue . . .
```

Press a key to redisplay the Shell's DOS Utilities. . . screen.

When you are restoring files, you must always start with the first backup disk of the set and work sequentially through the set, even if you are restoring only a few files. DOS prompts you when you need to change disks.

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SUMMARY OF CONCEPTS FOR LESSON 13

1. The backup and restore utilities enable hard disk users to create on floppy disks backup files of the hard disk and then to replace the files from the backup copies to the hard disk.
2. Files on the hard disk should be backed up frequently so that information is not lost.
3. The Shell program simplifies the use of the DOS BACKUP and RESTORE commands by providing a sequence of commonly used parameters.
4. All the advanced options for these commands can be added to the `Parameters` box of the Backup Utility and Restore Utility windows. Lesson 14 discusses these advanced options.

For Further Reference

If you would like to learn more about backing up and restoring the hard disk, consult *Using DOS*, by David Solomon (Que Corporation, Carmel, IN, 1989), Chapter 10.

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SUMMARY EXERCISES FOR LESSON 13

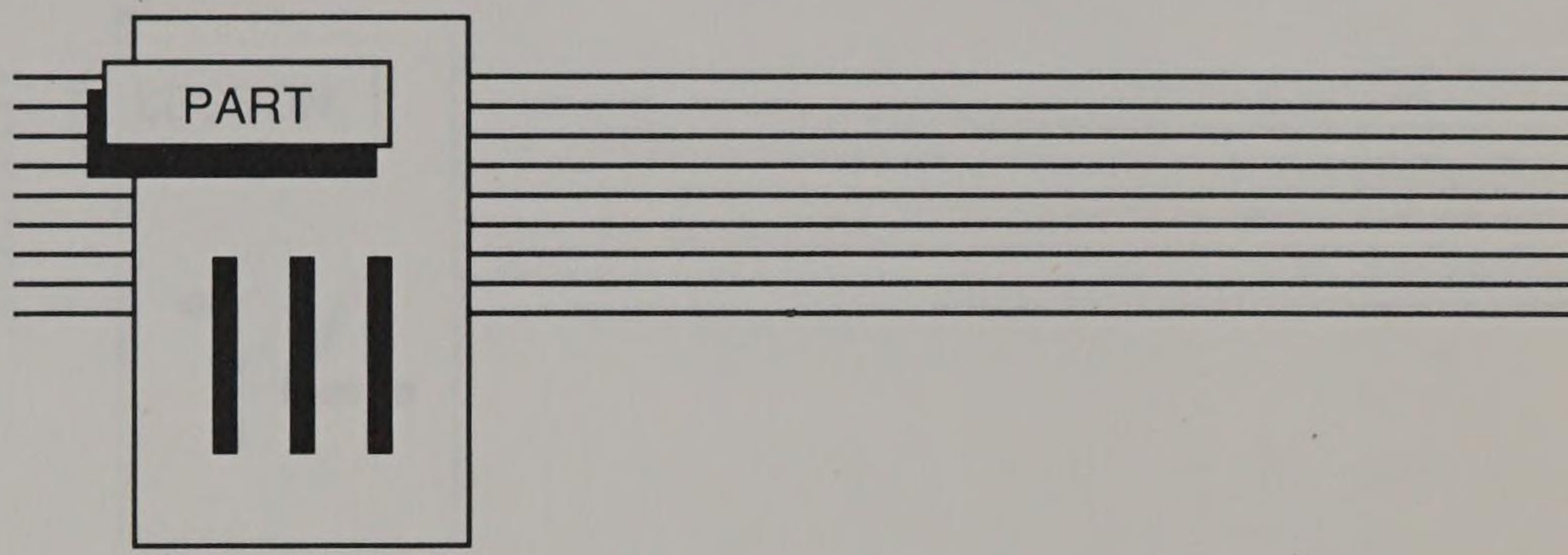
For these exercises, you must first copy the files with the ADD extension from the Que lesson disk to your hard disks root directory. Refer to Lesson 12 to copy these files from \LESSON5 to the root directory of your hard disk. Once you have successfully copied the files, continue with these exercises.

1. Back up all the files that have the extension ADD from the root directory of your hard disk to disk drive A.
2. Delete from the root directory of the hard disk all the files that have the extension ADD.
3. Restore to the root directory of the hard disk the backup files with the extension ADD.

Appendix C gives the answers to these exercises.

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Enhancing Your DOS Skills

The four lessons in this section introduce the more experienced DOS user, who is already familiar with the basic DOS functions presented in Part I, to some of the more advanced DOS functions. In this section, you learn to do the following:

- Back up the hard disk in Lesson 14
- Set up batch files in Lesson 15
- Customize DOS in Lesson 16
- Use I/O redirection and piping in Lesson 17

Many of these functions have been designed especially for hard disk users. Floppy disk users, however, can perform most of the operations.

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LESSON

14

Backing Up and Restoring the Hard Disk

In previous lessons, you learned how to back up whole disks and individual files stored on disks by using the DISKCOPY and COPY commands. But how do you back up a hard disk, which can hold thousands of files? Hard disks present certain problems, one of which is how to back them up. If you worked through Lesson 13, you learned how to backup the hard disk using the DOS Shell. This chapter will, then, be a review for you, and will show you how to backup and restore from the system prompt.

In this lesson, you learn to do the following:

- Back up a hard disk
- Restore files to a hard disk

Backing up and restoring are two opposite parts of the same process. *Backing up* means copying onto floppy disks the files stored on your hard disk; *restoring* means copying the files from the floppy disk backups onto the hard disk. Although you should use BACKUP frequently, you need to use RESTORE only when you lose all or some information from your hard disk. You should not have to use RESTORE often.

Backing Up the Hard Disk

Successfully backing up a hard disk is a somewhat more complex and time-consuming process than backing up a floppy disk, but it is well worth the time and effort. To make the procedure more manageable, divide it into three phases:

1. Preparing the disks
2. Writing the command statement
3. Backing up the hard disk

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Preparing the Disks

In earlier versions of DOS, the BACKUP command was not as sophisticated as it is now. Beginning with Version 2.0 and before Version 3.3, you needed to format the disks that would hold the backup data before starting the backup. If you didn't format sufficient disks, you had to stop the backup, format disks, and restart the process. This section on preparing disks is especially important for those who are using early DOS versions.

DOS V3.3 formats the disks during the backup process if you invoke the command with the /F switch. If your disks have not been previously formatted, DOS V4.0 automatically formats them during the backup procedure. But allowing DOS to format disks during backup slows the procedure down, because you must wait for each disk to be formatted. It may be more convenient if you prepare the disks in advance by using the FORMAT command. If you miscount the number of formatted disks you need, you only have to slow the process down for the last couple of disks.

You may want to format the disks yourself, however, to discover any bad sectors or other disk-related problems. This practice helps you ensure that you have a sufficient amount of total disk space for the backup.

The first phase in the backup process is preparing the disks that store information from the hard disk. Before you begin to back up, you need enough formatted disks to hold all the information stored on your hard disk. Once the backup process starts, you won't want to stop and find more disks. If you stop the backup process before it is completed, you may have to start over from the beginning. Adequate planning in this phase lays a good foundation for the success of the backup process.

Guidelines for Formatting Disks for Backup

Lesson 4 explains how to format disks with the FORMAT command. When formatting disks for the backup process, though, follow these guidelines:

1. Don't use the /S switch with the FORMAT command. When preparing disks for the backup process, you want the maximum storage space possible, so don't take up storage space by placing the operating system, DOS, on the disks. (Remember that DOS takes up more than 40,000 bytes of space.) You can place a volume label on the disks if you like. Volume labels do not take up storage space on the disk.
2. Label each disk with a paper label as you format it. Create a labeling system with which you are comfortable. For example, start with number 1 and number each disk sequentially. If you are using several boxes of disks, label each box with a letter. In this case, write both the letter and the number on the label of each disk. Label your boxes to help keep your disks in order. Misplacing a disk you need to restore your hard disk can be very frustrating.

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Determining the Number of Disks Needed for Backup

The number of disks that you need for backup depends on the amount of information to be backed up. For every 10 megabytes of disk space, you will need approximately twenty-nine 360K minifloppy disks, nine 1.2M minifloppy disks, fifteen 720K microfloppy disks, or eight 1.44M microfloppy disks. You can approximate how many disks you need.

If you want to back up a few files or a directory, follow these steps:

Step 1: Get a directory of the hard disk by typing the following at the system prompt:

DIR C:

Step 2: Add the number of bytes for the files you want to copy.

Step 3: Divide this number by the size of your floppy disk; for example, divide by 362,496 if you're using double-sided double-density disks. Round the answer to the next highest whole number.

The result is how many disks you need for the backup process. Because BACKUP stores a little more than just the hard disk files on the disks, you should prepare one or two additional disks in case you need them.

If you want to back up most or all of a hard disk, follow these steps:

Step 1: Run a checkdisk to determine how full the hard disk is. Type the following at the system prompt:

CHKDSK C:

Step 2: Subtract the free disk space from the total disk space.

Step 3: Divide this figure by the amount each floppy disk holds (for example, 362,496 bytes if you're using double-sided disks). Round the answer to the next highest whole number.

This figure gives you the approximate number of disks you need to back up your hard disk. The approximation is usually close, and it's not worth the time to figure the number more accurately.

A more accurate figuring also would have to take into account the following facts:

1. DOS does not back up directories; it backs up only the files in a directory. Directory space does not have to be accounted for when you figure the number of disks you need. Therefore, if you use the approximation method, you overestimate the amount of space you need.
2. DOS V3.3 and V4.0 do not save the DOS system files or COMMAND.COM on the backup set. The CHKDSK command includes the space these files take in

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the hard disk's space characteristics, but you don't need the space on the backup disks.

3. DOS V3.3 and V4.0 create two files on each floppy's root directory to hold the backup disk's number, the date of backup, paths, file names, and other information. These files are called BACKUP.XXX and CONTROL.XXX.
4. If the /L option is used in the DOS V3.3 or V4.0 BACKUP command, additional information is stored in a root directory file called BACKUP.LOG. This file contains information about the date and time of the backup.

As you can see, the first and second facts decrease the number of bytes used, and the third and fourth facts increase the number of bytes used. All in all, the two sets of facts offset each other, so the approximation formulas work well enough to help you determine with reasonable accuracy the number of disks you need. To ensure that you have enough disks for backup, format a few extra disks. For every 29 formatted double-sided double-density disks on hand, you can back up 10 megabytes of data. Once your disks are prepared, you're ready to write the BACKUP command statement.

Writing the BACKUP Command Statement

The format of the BACKUP command is as follows:

BACKUP *d1:path\filename.ext d2:*/S/M/A/D:*mm-dd-yy*/T:*hh:mm:ss*/F
/L:*d:path\filename.ext*

This statement consists of these parts:

1. *BACKUP* is the command.
2. *d1:* is the hard disk to be backed up.
3. *path* is the directory path you want to back up.
4. *filename.ext* is the name(s) of the file(s) you want to back up. Wild cards are acceptable.
5. *d2:* is the name of the floppy disk to receive the backup files.
6. */S* is a switch that tells DOS to back up all subdirectories, starting with the current or specified directory on the hard disk and working downward. If you start with the root directory, DOS backs up all subdirectories; in other words, if you use /S and start with the root directory, you can back up the whole disk. If you start with a subdirectory rather than a root directory, you back up all the files in the chain of subdirectories for that side of the directory tree, but you do not back up the whole hard disk.

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7. */M* is a switch that backs up all files modified since they were last backed up. Use this switch to choose which files you want backed up. The /M tells DOS to back up only files that have been changed. What happens to unchanged files on the backup disks? They are erased unless you use the next switch: /A.
8. */A* is a switch that adds the file(s) to be backed up to the files already on the specified disk drive. This switch is essential when using /M if you don't want unmodified files erased.
9. */D* is an alternative switch to those already listed. This switch allows you to specify a date, and it tells DOS to back up any file that has been changed on or after that date. (The format for the date is mm-dd-yy.) You should always answer the date and time prompts when you boot DOS so that you can use this feature.
10. */T* is similar to /D. /T allows the backup of files created on or after a specified time. The /T option was added starting with DOS V3.3. The format for the time is hh:mm:ss.
11. */F* is a switch unique to DOS V3.3; /F formats the backup disks if they have not yet been formatted.
12. */L* is a switch that creates a log file containing the date and time of the backup. DOS creates in the root directory a default file called BACKUP.LOG.
13. *d:path\filename.ext* is the optional name (directory, path, and file name) for the BACKUP.LOG file.

The switches used in the backup process are summarized in table 14.1.

Table 14.1
BACKUP Switches

/A	Adds files to an existing backup disk series and leaves the existing backup files intact.
/D:date	Selects files based on the date.
/F	Formats the destination floppy as part of the BACKUP procedure in V3.3. V4.0 automatically formats the floppy if needed.
/L	Creates a file in the root directory indicating the date and time of the backup procedure.
/M	Selects files whose contents have changed since the last BACKUP command backed them up.
/S	Tells DOS to back up all subdirectories.
/T	Selects files based on the time (V3.3 and V4.0).

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When you first back up a hard disk, back up the entire disk. The command statement for this operation is as follows:

```
BACKUP C:\ A:/S/L/F
```

This command tells DOS to back up the files in the root directory and any subdirectories, to create a backup log, and (for DOS V3.3) to format the backup disks if they have not been formatted. The files are backed up on floppy disks in drive A. If you are not using DOS V3.3, omit the /F.

Systematically Backing Up the Hard Disk

If you are a hard disk user, you need to develop a system for backing up your files. For example, you can keep three complete sets of disks for backup, with each set containing enough disks to store all the information from the entire hard disk. Then, once a month, back up the whole disk, using the first set of disks. This task is easiest to do on the same day each month so that backup becomes a matter of routine. When you back up the whole disk, make sure that verification is on by entering **VERIFY ON** at the system prompt. This command ensures that your backup files are recorded properly.

Every day, or every few days, back up the hard disk using the /D option. Remember that the /D option works only for users who faithfully enter the date and time every time they boot DOS. Be sure to enter date and time whenever you boot. Alternate the second and third sets of disks for this procedure. (The third set is a safety feature. If you have a problem with a disk in the second set, you can always go to the third set. Although the two sets are not identical, they are close enough to prevent you from losing a whole month's work.)

The date you give for /D should be the date on which you backed up the entire hard disk. That way you create a backup file for each file that has been changed since you backed up the entire hard disk.

Although backing up the entire hard disk takes more time and effort than other backup procedures, the trouble is worth it when you consider what you would have to do if you lost a whole hard disk of files.

Restoring Backup Files

The RESTORE command is the opposite of the BACKUP command. RESTORE transfers the files from your backup disks to your hard disk. The format of the RESTORE command is similar to that of the BACKUP command:

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RESTORE *d1: d2:path\filename.ext* /S/P/B:*mm-dd-yy*/A:*mm-dd-yy*/M /N /L:*hh:mm:ss*/E:*hh:mm:ss*

This statement consists of these parts:

1. *RESTORE* is the command.
2. *d1:* is the floppy disk drive holding the backup disk(s).
3. *d2:* is the hard disk drive—if the hard disk is the current drive, you can omit this part.
4. *path* is the optional path to the directory to receive the restored files. The current directory for the hard disk is used if you don't specify a path.
5. *filename.ext* is the name(s) of the file(s) you want to restore. If you don't specify a file name, all files are restored.
6. */S* is a switch that restores files in this directory and all other subdirectories beyond it. This switch is identical to BACKUP's /S.
7. */P* is a switch that displays a prompt asking whether a read-only file or a file that has been changed since the last backup should be restored.
8. */B* (new with V3.3) is a switch that restores files created or modified on or *before* a specified date. The format you use is mm-dd-yy.
9. */A* (new with V3.3) is a switch that restores files created or modified on or *after* a specified date. The format you use is mm-dd-yy.
10. */M* (new with V3.3) is a switch used to restore files modified or deleted since the last backup.
11. */N* (new with V3.3) is a switch used to restore files that no longer exist.
12. */L* (new with V3.3) is a switch used to restore files saved or altered on or *later* than a specified time. The time is given as hh:mm:ss.
13. */E* (new with V3.3) is a switch used to restore files that were saved or altered on or *earlier* than a specified time. The time is given as hh:mm:ss.

When you are restoring files, you must always start with the first backup disk of the set and work sequentially through the set, even if you are restoring only a few files. DOS prompts you when you need to change disks.

Table 14.2 shows the switches available with the RESTORE command.

Table 14.2
RESTORE Switches

/S	Restores all files in the specified directory and all other subdirectories beyond it.
/P	Prompts the user that the file should be restored if it has been marked as read only or has been changed since the last backup.

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Table 14.2—continued

/N	Only restrores files that are no longer on the hard disk. This switch is useful if hard disk files were deleted accidentally and need to be restored from backups (new in DOS V3.3).
/M	Does the same as /N but also restores files that have changed since the backup (new in DOS V3.3).
/B:date	Restores all files created or modified on or *before* the specified date. This switch uses the DATE command format.
/A:date	Restores all files created or modified on or *after* the specified date. This switch uses the DATE command format.
/E:time	Restores all files modified at or *earlier* than the specified time. This switch uses the TIME command format.
/L:time	Restores all files modified at or *later* than the specified time. This switch uses the TIME command format.

Another alternative to backing up files from your hard disk based on the date and time of creation is to back up certain subdirectories, or specific file names. The following graphics show three examples of selectively backing up your hard disk.

BACKUP C:*.DOC A:/S

```
    CONFIG.SYS
    AUTOEXEC.BAT
    (Hidden files)
  DOS
    COMMAND.COM
    TREE.COM
    FORMAT.COM
    ETC_ETC.ETC.
  TEMP
    TAXFORMS.DOC
  KEEP
    MYFILE.TXT
    SALESREP.TXT
    SPEECH.DOC
    SPEECH.BAK
    LETTERS
      MOMS.LET
  MISC
    MYFILE.MEM
    SPEECH.DOC
```

Backup all files on drive C: with DOC extensions.

BACKUP C:\KEEP*.* A:/S

```
    CONFIG.SYS
    AUTOEXEC.BAT
    (Hidden files)
  DOS
    COMMAND.COM
    TREE.COM
    FORMAT.COM
    ETC_ETC.ETC.
  TEMP
    TAXFORMS.DOC
  KEEP
    MYFILE.TXT
    SALESREP.TXT
    SPEECH.DOC
    SPEECH.BAK
    LETTERS
      MOMS.LET
  MISC
    MYFILE.MEM
    SPEECH.DOC
```

Backup all files in \KEEP and its subordinate subdirectories. (In this case, \KEEP\LETTERS.)

BACKUP C:\DOS A:

```
    CONFIG.SYS
    AUTOEXEC.BAT
    (Hidden files)
  DOS
    COMMAND.COM
    TREE.COM
    FORMAT.COM
    ETC_ETC.ETC.
  TEMP
    TAXFORMS.DOC
  KEEP
    MYFILE.TXT
    SALESREP.TXT
    SPEECH.DOC
    SPEECH.BAK
    LETTERS
      MOMS.LET
  MISC
    MYFILE.MEM
    SPEECH.DOC
```

Backup all files in the DOS directory only.

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Backing Up and Restoring: Special Cases

The preceding sections explained how to back up an entire hard disk or individual files on the disk and how to restore files to the hard disk. Back up your files frequently and regularly.

In addition to routine backup, you may want to use the backup and restore procedures in two other special instances: when you reorganize your hard disk and when you have heavy fragmentation of the hard disk.

Reorganizing a hard disk involves copying many files to different directories. The task may also involve creating new directories, deleting unused directories, and deleting old copies of files. After you reorganize the hard disk, be sure to back it up.

Fragmentation means that a file is not stored contiguously on the surface of the hard disk. After you have deleted and added information to a file several times, a file can be scattered across the entire hard disk. Although this fragmentation does not hurt DOS or the files, DOS must work harder to retrieve a file because the recording heads must move across the disk several times to read the file. As a result, the hard disk performs less efficiently.

To solve the fragmentation problem, back up the entire hard disk, reformat it, and then restore the files. Formatting erases all files and directories from the hard disk. As you restore each file and subdirectory, the information is stored on consecutive sectors. This arrangement improves the performance of the hard disk.

When you're ready to carry out this procedure, follow these steps:

Step 1: Format a floppy disk with the operating system (/S). Copy the following programs from the *DOS Working Disk* to this disk:

BACKUP.COM
FORMAT.COM
RESTORE.COM

If these three files are already on the hard disk, you may copy these files to the floppy disk instead of using the *DOS Working Disk*.

Step 2: Prepare a sufficient number of disks to hold the information from the hard disk. See the earlier sections "Preparing the Disks" and "Determining the Number of Disks Needed for Backup" for help in determining the number of disks you need.

Step 3: Enter the command **VERIFY ON**.

Although this command almost doubles the time required for backup, you want to be sure that all files are recorded correctly and completely before you erase the hard disk.

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Step 4: Back up the hard disk. If BACKUP.COM is stored on your hard disk, make the directory in which BACKUP.COM is stored the current directory. Type the following at the system prompt and press Enter:

```
BACKUP C:\ A:/S
```

If you're using BACKUP.COM from a floppy disk, precede the command with the name of the disk drive. For example, type the following at the system prompt and press Enter:

```
A:BACKUP C: \ A: /S
```

Step 5: When prompted, put your #1 disk into drive A and press any key to begin the backup process.

The BACKUP program prompts you when another disk is needed until the whole hard disk has been backed up. Coordinate the numbers on the labels of the backup disks with the numbers the program assigns. This practice makes the disks easy to store and use.

If you get an error message from the floppy disk drive, abort the program and reformat the offending disk. If any bad sectors show up, do not use that disk. Format a new disk to replace the bad one, and restart the backup procedure. You cannot afford errors in this process. If you overlook errors, you're likely to lose information.

Step 6: Reformat the hard disk.

Before reformatting, be sure that you have a good backup copy of all the files on the hard disk; if you don't have good backup, you will lose information.

To reformat, put into drive A the floppy disk containing DOS, FORMAT.COM, and RESTORE.COM (and BACKUP.COM if you copied it to the disk).

Make A the current drive by typing **A:**. Then enter the following:

```
FORMAT C:/S/V
```

This command tells DOS to reformat the hard disk and to add the operating system and a volume label.

Step 7: To restore the hard disk, type the following at the system prompt and press Enter:

```
RESTORE A: C:\ /S
```

This command tells DOS to start at the root directory of the hard disk drive and restore all the files in this directory and in all subdirectories.

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Remove the DOS and program disk from drive A, insert the #1 backup disk, and press any key. As RESTORE prompts you, change disks until you have restored all files. You know you are finished when the system prompt reappears.

Step 8: Turn off VERIFY by typing the command **VERIFY OFF** and pressing Enter.

This procedure of backing up the entire hard disk, erasing it, and restoring it takes from 30 minutes to an hour, depending on how much information is stored on your hard disk. Once you're finished with the procedure, you not only have a hard disk with files that are not fragmented, but also a set of backup disks that can be used as your monthly backup.

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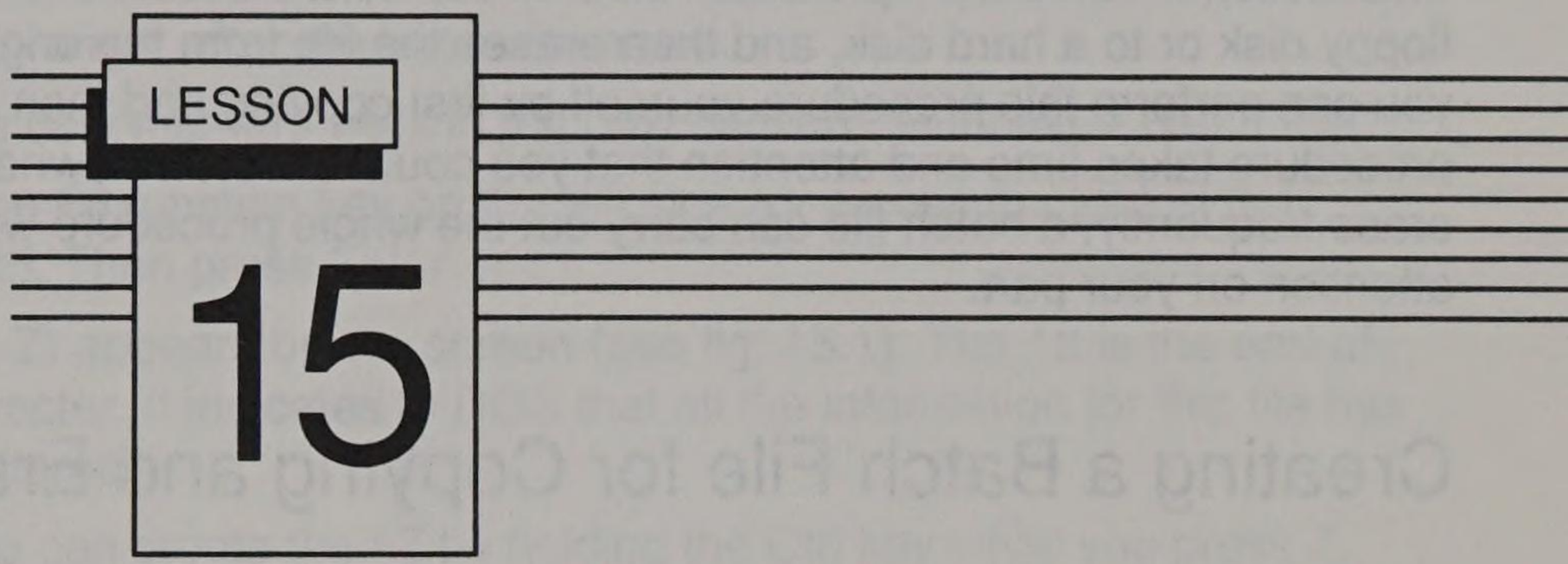
SUMMARY OF CONCEPTS FOR LESSON 14

1. BACKUP and RESTORE are complementary commands that enable hard disk users to create on floppy disks backup files of the hard disk (BACKUP) and then to replace the files from the backup copies to the hard disk (RESTORE).
2. Files on the hard disk should be backed up frequently so that information is not lost. Furthermore, BACKUP and RESTORE can be used when you want to reorganize the files on the hard disk or when files have become fragmented.

For Further Reference

If you would like to learn more about backing up and restoring the hard disk, consult *Using DOS*, by David Solomon, (Que Corporation, Carmel, IN, 1989), Chapter 10.

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Creating Batch Files

A *batch file* is a series of DOS commands placed in a file on a disk. When instructed, DOS executes the commands in the file, one line at a time, treating these commands as if they were typed individually from the keyboard. In other words, creating a batch file is another way of making DOS do the work for you.

Batch files are convenient and save time. You create a batch file only once, but it can be executed any number of times. After you get a batch file to run correctly, it runs without further adjustment. Moreover, after you start a batch file, you can ignore it until it has finished, unless you use a command in your batch file that requires your intervention (to change disks in a backup procedure, for example).

In this lesson, you learn how to do the following:

- Create a batch file
- Run a batch file
- Understand AUTOEXEC.BAT

Creating a Batch File

You can create a batch file to tell DOS to carry out almost any routine series of steps. You can create batch files that carry out procedures—from the simple and routine to the complex and time-consuming. The process of creating the batch file itself is relatively easy; in fact, the procedure is no more difficult than creating any other type of file. The tricky part is knowing what to put into the file once you've created it—that is, knowing how to communicate to DOS what you want it to do for you.

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This lesson creates a simple batch file that copies a file from one floppy disk to another floppy disk or to a hard disk, and then erases the file from the original disk. Although you can perform this procedure yourself by first copying and then erasing, such a procedure takes time and attention that you could devote elsewhere. If you copy and erase frequently, a batch file can carry out the whole procedure with minimal effort and attention on your part.

Creating a Batch File for Copying and Erasing

Step 1: If you have two floppy disk drives, place PRAC DISK 1 into drive A and PRAC DISK 2 into drive B; then boot DOS.

If you have one floppy and one hard disk drive, place PRAC DISK 1 into the floppy disk drive and boot DOS. Be sure to substitute C: for B: in the following steps.

Step 2: Type **COPY CON C&E.BAT** and press Enter.

This command creates the batch file C&E.BAT by using the COPY command to record what is typed on the screen (also called the console—CON).

When you name batch files, follow the rules for file names when you assign the root name. The extension of a batch file name is always BAT.

Note: You can create the batch file by using the COPY command, as Step 2 explains. You also can use either the EDLIN line editor, as you did in the exercise in Lesson 5, or your own text editor or word processor in nondocument or DOS text mode.

After you press Enter, the system prompt does not reappear.

Step 3: Now type the next two lines, pressing Enter after each line:

```
COPY  A:%1  B:%2
ERASE  A:%1
```

The first line tells DOS to copy the designated file, represented by %1, from the disk in A to the disk in B (or C if you have a hard disk). Then the command tells DOS to erase the file from the disk in drive A.

In the commands just given, %1 and %2 represent additional information, or *parameters*, used by the batch file. The percent sign (%) is called a *marker*; it tells DOS where to use the parameters when the batch file is run. The marker is always followed by a number from 0 to 9. The 10 markers (%0 to %9) tell DOS to substitute whatever is typed on the

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command line for the markers. The % marker is the first item typed at the system prompt, after the batch file name.

You see how markers work in the next section, "Running a Batch File."

Step 4: Press the F6 function key on the left side (or across the top) of the keyboard. Then press Enter.

^Z (Ctrl-Z) appears on the screen (see fig. 15.1). The ^Z is the end-of-file character. It indicates to DOS that all the information for this file has been entered.

You also can create the ^Z by holding the Ctrl key while you press Z.

```
A>COPY CON C&E.BAT
COPY A:%1 B:%2
ERASE A:%1
^Z
        1 File(s) copied

A>
```

Fig. 15.1.*The end-of-file character.*

You have just created a simple batch file that copies and erases—and does all the work for you. You can run this batch file whenever you want to copy and erase.

Guidelines for Creating a Batch File

1. Use the DOS COPY command; EDLIN, the DOS line editor; or another text editor to create the batch file. If you use a word processor, make sure that it is in the programming or nondocument mode.
2. The root name of a batch file can be one to eight characters long and must conform to the rules for creating file names.
3. The file name extension must be BAT.
4. The root name of the batch file should not be the same as that of a program file (COM or EXE) in the current directory or the same as a DOS internal command, such as COPY or DATE.
5. Any valid DOS commands can be entered into a batch file. The parameter markers (%0 to %9) and the batch subcommands also may be entered.
6. To use the percentage sign (%) in a command, such as for a file name, enter the percent sign twice (%%). For example, if a file name is 50%SALE.MMO, then to use this file name in a batch file, you would type 50%%SALE.MMO This rule does not apply to the parameter markers (%0 to %9).

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Running a Batch File

Once you have created your batch file, running it is relatively simple. The general format for running batch files is as follows:

d:filename parameters

This statement consists of these parts:

1. *d:* is the optional disk drive holding the batch file
2. *filename* is the root name for the batch file
3. *parameters* is additional information to be used by the batch file

To run a batch file, simply type its root name and any parameters needed. (You do not need to include the extension BAT.) When DOS finds the specified batch file, DOS executes each command, one at a time. The specified parameters are substituted for the markers (represented by %, as in %1 and %2) when the command is executed.

To run the batch file C&E.BAT to copy and erase the file ASHE.LET from PRAC DISK 1, follow these steps:

Step 1: Put PRAC DISK 1 into drive A and PRAC DISK 2 into drive B, and then boot DOS. (Hard disk users should put *DOS Working Disk* into drive A and boot.)

Step 2: Type **C&E ASHE.LET.**

In this statement, *C&E* is the name of the batch file without the extension, and *ASHE.LET* is the parameter represented by the marker %1.

DOS ignores the second parameter (%2) if you do not specify anything for that parameter. In this case, if you do not specify a new file name for %2, DOS copies the file onto the other disk under the same file name. If you want to change the name of the file when it is copied to the other disk, you can specify the second parameter (%2), as in this example:

C&E ASHE.LET ASHE1.LET

Step 3: Press Enter.

Your screen looks like figure 15.2.

```
A>C&E ASHE.LET

A>COPY A:ASHE.LET B:
        1 File(s) copied

A>ERASE A:ASHE.LET

A>
A>
```

Fig. 15.2. *The C&E batch file in operation.*

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Step 4: Check the directories of drives A and B (or C, if you're using a hard disk). The file ASHE.LET should no longer be listed on the disk in A; the file should, however, be listed among the files in the B (or C) directory.

You have just run a batch file for copying and erasing. You can keep this batch file and run it whenever you want to carry out this same procedure with other files.

Note for hard disk users: When you construct a batch file in this way, you can use a path name as the second parameter and copy the file from the floppy disk to a different directory on the hard disk. Suppose, for example, that you want to copy ASHE.LET into your CORRESP.90 directory. You type the following command:

```
C&E  ASHE.LET  \WORD\CORRESP.90
```

Because CORRESP.90 is a directory name, DOS knows to copy ASHE.LET into the directory called CORRESP.90 instead of the current directory.

The copy and erase batch file (C&E.BAT) can be found on the lesson disk in the subdirectory named LESSON15.

Guidelines for Running Batch Files

1. If you do not specify a disk drive name, the current disk drive is used.
2. To run a batch file, type its root name without the extension (BAT).
3. If the batch file is not in the current directory of the disk drive, DOS searches the directories specified by the PATH command to find the batch file.
4. DOS carries out each command in the batch file, one line at a time. The specified parameters are substituted for the markers (%0 through %9). A batch file may contain up to 10 parameters, one of which is the batch file name.

Using Batch Subcommands

A number of different subcommands are available for use in batch files. These subcommands are listed and described briefly in table 15.1.

Once you understand the principles behind creating and running batch files, you can use any of these subcommands by themselves or in combination with each other so that they do the hard work for you. In addition, you can include DOS commands—such as COPY, CHKDSK, and others—in batch files.

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Table 15.1
The Batch Subcommands

Subcommand	*Description*
ECHO	Turns on or off the display of batch commands and can display a message on the screen
FOR..IN..DO	Allows the use of the same batch command for several files
GOTO	Jumps to the line after a label in the batch file
IF	Allows conditional execution of a command
SHIFT	Shifts the command-line parameters one parameter to the left
PAUSE	Halts processing until a key is pressed; can display a message
REM	Keeps comments in a batch file from being displayed

Creating an AUTOEXEC.BAT File

An AUTOEXEC.BAT file is a special kind of batch file. Any disk that contains DOS (has been formatted with /S) and AUTOEXEC.BAT, upon booting DOS, will automatically carry out all commands contained in the AUTOEXEC.BAT file. In other words, an AUTOEXEC.BAT file does even more of the work for you than a regular batch file does. In addition to executing the commands for you, AUTOEXEC.BAT runs automatically when you start your computer. You can execute this file at other times by typing AUTOEXEC while the disk containing the file is in the current disk drive.

You can create your own AUTOEXEC.BAT file to start your own program. Name this file AUTOEXEC.BAT and put it on your DOS master disk or your hard disk in the root directory.

To create a batch file that automatically lists the directory when you boot from disk, follow these steps:

Step 1: Put a formatted disk containing the operating system into A. (For example, you can use PRAC DISK 1.) Boot DOS.

Step 2: Create the AUTOEXEC.BAT file by typing **COPY CON A:\AUTOEXEC.BAT** and pressing Enter.

Step 3: Type **DIR /W** and press Enter.

Step 4: Press F6 (or Ctrl-Z) and press Enter to save the batch file.

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To see how this AUTOEXEC.BAT file runs, reboot the computer by pressing Ctrl-Alt-Del. The command automatically executes the directory command.

If you want to use this file on your hard disk, add the DIR /W command to the end of any existing AUTOEXEC.BAT file on your hard disk. If no AUTOEXEC.BAT exists, you can copy the file over. However, any existing AUTOEXEC.BAT should only be erased if you are certain that you don't need its contents.

Guidelines for AUTOEXEC.BAT Files

1. The file must be called AUTOEXEC.BAT and must reside in the root directory of the boot disk.
2. The contents of the AUTOEXEC.BAT file conform to all the rules for batch files.
3. When DOS is booted, the AUTOEXEC.BAT file is executed automatically.

Further uses for AUTOEXEC.BAT are covered in Lesson 16, "Customizing DOS."

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SUMMARY OF CONCEPTS FOR LESSON 15

1. A batch file is a disk file that contains commands DOS executes in the same way that it carries out commands entered from the keyboard. A batch file is a way of making DOS work for you.
2. A batch file can be created to carry out any series of routine DOS commands. The root name of the batch file follows the conventions of other file names. The extension must be BAT.
3. Parameter markers (represented by %) and batch subcommands also can be entered in a batch file. The batch subcommands are ECHO, FOR..IN..DO, GOTO, IF, SHIFT, PAUSE, and REM.
4. To run a batch file, type its root name and the necessary parameters. DOS then executes, one at a time, every command in the file.
5. An AUTOEXEC.BAT file is a special kind of batch file that executes automatically when you start your computer.

For Further Reference

If you would like further information about batch files and the batch subcommands, consult *Using DOS*, by David Solomon (Que Corporation, Carmel, IN, 1989), Chapter 12.

SUMMARY EXCERISE FOR LESSON 15

For an exercise, create a batch file that will clear the screen and display a directory of a disk in drive A, one screenful at a time.

Appendix C gives the batch file for this exercise.

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LESSON

16

Customizing DOS

In previous lessons, you learned the basics of DOS. You learned how to use hierarchical directories, how to use EDLIN to create files, and how to issue many important commands. Moving beyond these fundamental techniques, you are now ready to customize DOS, making it easier and more productive to use. Customization is especially helpful to users of hard disks and high-capacity microfloppies, which hold many files and subdirectories. Minifloppy disk users also may find DOS customization techniques helpful.

In this lesson, you learn how to do the following:

- Create an informative system prompt
- Use the PATH and APPEND commands
- Write a customized AUTOEXEC.BAT file
- Determine the version of DOS in use
- Use EDLIN editing features
- Create a CONFIG.SYS file
- Install device drivers
- Use CHKDSK to correct errors on your disks

Changing the System Prompt

In Lesson 9, you learned how to use the change directory (CHDIR or CD) command to move between the root directory and subdirectories. You can become confused easily

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when you use this command because you may forget how to invoke the subdirectories. The solution to this problem is to customize the system prompt so that it provides an informative "signpost."

The system prompt is more useful if it provides information not only on the drive you are using, but on the subdirectory as well. For example, if you are in the root directory, the prompt can display `A:\>`, and a subdirectory called WORD can display the customized prompt, `A:\WORD>`.

To change your system prompt, use the lesson disk, which contains subdirectories, and follow these steps:

Step 1: If you have a microcomputer with two drives, place your *DOS Working Disk* into drive A and lesson disk into drive B. Boot DOS.

If you are using a hard disk, boot DOS from your hard disk. Place the lesson disk into drive A and substitute A for the B drive.

Step 2: Notice the system prompt, which appears as `A>` (or `C>` if you are using a hard disk). Change the prompt by typing **PROMPT pg** and pressing Enter.

Observe the new system prompt, `A:\>`, which provides information that you are using drive A (`A:`) and that the root directory (`\`) is being used.

Step 3: To examine the system prompt in a subdirectory, switch to drive B, and then change directories.

Type **B:** and press Enter; then type the following and press Enter again:

CD\LESSON9\WORD\CORRESP.90

Notice that the system prompt has changed to `B:\LESSON9\WORD\CORRESP.90>`, which provides information about both the drive and subdirectory in use. The drive and subdirectory in use are also called the *default drive and directory*.

PROMPT is an internal command and can be changed at any time. Table 16.1 shows the $parameters (called *meta-strings*) that can be used with prompt.

Table 16.1
Meta-strings for Use with the PROMPT Command

Meta-string	*Displayed information or result*
$_	Carriage return/line feed (moves the cursor to the beginning of the next line)
$b	The vertical bar character (|)
$d	The current date
$e	The Esc character

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Table 16.1—continued

Meta-string	*Displayed information or result*
$g	The greater than sign (>)
$h	The backspace character (moves the cursor one space to the left)
$l	The less-than sign (<)
$n	The current drive name
$p	The current drive and path
$q	The equal sign (=)
$t	The current time
$v	The DOS version

Getting More Flexibility with the PATH and APPEND Commands

Many DOS commands need to be accessed from the default drive and directory. If you have a two-drive computer, the commands must be executed from the root directory of the *DOS Working Disk*. The PATH command provides an alternative that allows other directories to be connected to the default drive. A good example of this problem and a means to circumvent it is demonstrated in the steps that follow:

Step 1: Make sure that you have changed the system prompt and that it displays `B:\LESSON9\WORD\CORRESP.90`.

Step 2: Type **DIR** and press Enter.

Examine the screen to see whether CHKDSK.COM is in the directory. You will see that it is not.

Step 3: Attempt to use the CHKDSK program by typing **CHKDSK** and pressing Enter.

The error message `Bad command or file name` indicates that DOS has not found the CHKDSK program. You attempted to use a program that was on another disk and directory. You were denied access to CHKDSK because it was not in the default path, B:\LESSON9\WORD\CORRESP.90.

Just think of the convenience of using DOS commands from any subdirectory. Life is easier when you don't have to execute DOS commands from the A:\ prompt. (Some commands, such as CLS, COPY, DATE, DELETE, ERASE, RENAME, and TIME are always available regardless of the drive and path you are using.)

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Step 4: Fortunately, DOS provides the PATH command to connect other drives and subdirectories to the default drive. Connect the A:\ DOS files by creating a path to the default drive:

Type **PATH A:** and press Enter.

You have created a path to the A:\ root directory to access your DOS programs. The PATH command works on any file that is in the "pathed" directory and that uses a COM, EXE, or BAT extension.

Note to hard disk users: On many hard disks, users have installed DOS utilities, such as CHKDSK, in a subdirectory on the hard disk. The subdirectory may be \DOS or \BIN. And, if you installed DOS V4 on your hard disk, the installation program created \DOS and copied all of your DOS utility programs to that subdirectory. In this case, type **PATH C:\DOS** to have access to your DOS utilities.

Step 5: Type **CHKDSK** and press Enter.

Now the CHKDSK program can be executed to provide you with disk information. The PATH command continues to operate until you reboot or reuse the PATH command, even if you use the CHDIR or CD command to change directories.

Several directories can be specified in the path. For instance, if you have a word processing program on B:\WORD, you can include the word processor in your path with DOS by typing **PATH A:\;B:\WORD;**. Remember to separate the paths with semicolons. Although not essential, it is advisable to end a path specification with a semicolon too. Then if you install an application program (for example, a word processor) that adjusts the path, it will be successful. Some installation programs don't bother to add the semicolon and give you an erroneous path.

You can customize DOS to include the PROMPT and PATH command by adding these commands to an AUTOEXEC.BAT file, which executes commands automatically when you boot your DOS disk.

The APPEND command, new in DOS V3.3, allows you to specify an additional list of subdirectories for DOS to search. This command is used for files that are not programs; that is, they do not have the extension COM, EXE, or BAT. APPEND is used in a similar way to the PATH command. You type **APPEND** followed by a list of directories for DOS to examine. Each path name can include the drive and should be separated from the next path name by a semicolon.

For example, to have DOS search for a file in the \LESSON9\WORD\CORRESP.90 directory of the B drive, you type the following and press Enter:

APPEND B:\LESSON9\WORD\CORRESP.90

Note: The PATH command is used by DOS to search for program files; APPEND is used to search for other files, such as data files.

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Writing a Customized AUTOEXEC.BAT File

You can customize the *DOS Working Disk* to initialize the computer automatically. For example, AT and PS/2 users can bypass the date and time booting prompts. This bypassing forces DOS to use the date and time stored in internal computer clocks with a battery-backup system. Users of other computers may want to include the DATE and TIME commands in the AUTOEXEC.BAT file to avoid recording the wrong date and time.

You can program further customization that requires DOS to use the PATH, APPEND, and PROMPT commands. Other DOS commands may be included also to provide even more flexibility. Customize DOS as described in the following steps.

Note to hard disk users: If you have an AUTOEXEC.BAT file in the root directory of your hard disk, type **REN C:AUTOEXEC.BAT AUTOEXEC.HLD** and press Enter. Later, when you have finished this lesson, type **DEL C:\AUTOEXEC.BAT** and press Enter. Then type **REN C:\AUTOEXEC.HLD AUTOEXEC.BAT** and press Enter. Again, substitute A for B in the drive designations in this lesson.

Step 1: Return to the A:\ directory. Make sure that the *DOS Working Disk* is in drive A.

Type **A:** and press Enter.

Type **CD** and press Enter again.

Notice that the system prompt displays `A:\>`

Step 2: A quick and easy method to create a batch file is to use the COPY CON command described in Lesson 15. To begin writing your program, type the following and press Enter:

COPY CON AUTOEXEC.BAT

DOS creates a new file on your *DOS Working Disk*, calling the file AUTOEXEC.BAT. Your keystrokes are added to this file until you finish by pressing the F6 (^Z) key.

Step 3: Skip this step if you are using a computer system with an automatic clock. Other system users, however, should now type **DATE** and press Enter.

Next, type **TIME** and press Enter again.

Step 4: Create a path to your DOS files by typing **PATH A:** and pressing Enter.

If you are using a hard disk, and your utilities are in C:\DOS, then type **PATH C:\DOS**.

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Step 5: If you are using a DOS version before to V3.3, omit this step. Other users should create a data path by typing the following and pressing Enter:

APPEND B:\LESSON9\WORD\CORRESP.90;

Step 6: To customize the system prompt, type **PROMPT pg** and press Enter.

Step 7: To display the version of DOS that has been booted, type **VER** and press Enter.

VER is a DOS command that provides information about the DOS version number being used.

Step 8: Finish your program by pressing F6, the function key that records a Ctrl-Z, and then press Enter.

Step 9: Test your new AUTOEXEC.BAT program by rebooting your computer. A screen similar to the one in figure 16.1 should appear, depending on whether you entered the DATE and TIME command in Step 3 and the APPEND command in Step 5. (Your screen may differ with different versions of DOS.)

```
A>DATE
Current date is Fri  2-09-1990
Enter new date (mm-dd-yy): 2-9-90

A>TIME
Current time is  9:47:31.51
Enter new time: 9:48

A>PATH A:\

A>APPEND B:\LESSON9\WORD\CORRESP.90

A>PROMPT $P$G

A:\>VER

MS-DOS Version 3.30

A:\>
```

Fig. 16.1. *The screen after rebooting.*

Using EDLIN Editing Features

The final touch for customizing your AUTOEXEC.BAT file is to prevent miscellaneous screen displays from being flashed on the screen. The following steps teach you how to edit a file for further DOS customization:

Step 1: Use the EDLIN program to edit the AUTOEXEC.BAT program that you customized:

Type **EDLIN AUTOEXEC.BAT** and press Enter.

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Step 2: Examine the contents of the AUTOEXEC.BAT file being edited:

Type **L** (for list) and press Enter.

The screen shown in figure 16.2 is displayed.

```
End of input file
*L
        1:*DATE
        2: TIME
        3: PATH A:\
        4: APPEND B:\LESSON9\WORD\CORRESP.90
        5: PROMPT $P$G
        6: VER
*
```

Fig. 16.2. *The AUTOEXEC.BAT file.*

Step 3: Type **1I** (for Insert on line 1) and press Enter.

Type **ECHO** and press Enter.

This entry is an incomplete command, which you correct in Step 6.

Step 4: Press the F6 function key, and then press Enter.

Step 5: Examine the revised AUTOEXEC.BAT by listing the program:

Type **L** and press Enter.

A screen similar to figure 16.3 appears.

```
End of input file
*L
        1:*DATE
        2: TIME
        3: PATH A:\
        4: APPEND B:\LESSON9\WORD\CORRESP.90
        5: PROMPT $P$G
        6: VER
*1I
        1:*ECHO
        2:*^Z
*L
        1: ECHO
        2:*DATE
        3: TIME
        4: PATH A:\
        5: APPEND B:\LESSON9\WORD\CORRESP.90
        6: PROMPT $P$G
        7: VER
*
```

Fig. 16.3. *The revised AUTOEXEC.BAT file.*

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Examine the listing; the ECHO command is missing the OFF parameter.

Step 6: Type **1** and press Enter.

Press the F3 key, press the space bar once, type **OFF**, and press the Enter key.

You have just corrected the first line of your program to read `ECHO OFF`. This correction adds the ECHO OFF command to your program; ECHO OFF prevents some DOS commands from displaying on-screen.

Step 7: Exit the EDLIN program by typing **E** and pressing Enter.

The E command saves your new AUTOEXEC.BAT file.

Step 8: Reboot the system. Observe the differences between the new screen display in figure 16.4 and the previous screen display in figure 16.1.

```
A:\>ECHO OFF
Current date is Fri  2-09-1990
Enter new date (mm-dd-yy): 2-9-90
Current time is  9:57:40.25
Enter new time: 9:57

MS-DOS Version 3.30
A:\>
```

Fig. 16.4. *The screen display after rebooting the system.*

Another important EDLIN command is the line delete command. If you need to delete a line, simply provide the number followed by the letter D, and then press Enter. For example, if you want to delete the ECHO OFF command, type **1D** at EDLIN's * prompt and press Enter.

Creating a CONFIG.SYS File

DOS provides a means for altering your system through a CONFIG.SYS file. You can add configuration commands that attach new hardware devices, create RAM disks, set the number of buffers and files that can be accessed by DOS, and change the keyboard and video display for an international character set.

You can use a configuration file like the one created in the following steps if your computer system has a minimum of 256K memory. Use the CHKDSK command to determine how much memory you have in your computer system. If you have less than 256K of memory, you may want to skip this section of the workbook.

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Step 1: Return to the A:\ directory by typing **A:** and pressing Enter.

Type **CD** and press Enter again.

Notice that the system prompt is A:\>.

Step 2: Now create the CONFIG.SYS file:

Type **COPY CON CONFIG.SYS** and press Enter.

Step 3: Many popular computer programs require a greater number of buffers and files than the DOS default configuration provides. The BUFFERS command determines the amount of information that can be held in memory before the information must be recorded onto the disk. The FILES command sets the number of files that can be used at one time.

Type **BUFFERS=16** and press Enter.

Type **FILES=20** and press Enter.

The BUFFERS and FILES statements not only enable you to use a greater range of commercial software programs, but they also help your system operate more efficiently.

You may want to alter the BUFFERS and FILES statements. If you are using a database program, for example, set the number of buffers to 20. If you are using a program that displays an error message something like `Too many files open`, try increasing the number of files from 20 to 25.

Step 4: A *device* is a hardware peripheral or software program that can link itself to the DOS operating system. A software program called ANSI.SYS is a DOS file that provides for extended screen and keyboard control. Although ANSI.SYS is on your root directory, the program can be accessed only through a device statement in the CONFIG.SYS file. To add ANSI.SYS to your configuration file, type **DEVICE=ANSI.SYS** and press Enter.

Step 5: To terminate the COPY CON command, press the F6 function key, and then press Enter.

The CONFIG.SYS file becomes active the next time you boot your computer.

Step 6: Using the TYPE command, examine the contents of CONFIG.SYS:

Type **TYPE CONFIG.SYS** and press Enter.

Compare your listing with what you see in figure 16.5.

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```
A:\>COPY CON CONFIG.SYS
BUFFERS=16
FILES=20
DEVICE=ANSI.SYS
^Z
        1 File(s) copied

A:\>TYPE CONFIG.SYS
BUFFERS=16
FILES=20
DEVICE=ANSI.SYS

A:\>
```

Fig. 16.5. *The CONFIG.SYS file.*

The configuration file you have created can make many of the programs designed for your computer easier to use. To make the CONFIG.SYS file active, you must reboot your computer.

You will find copies of the AUTOEXEC.BAT file and CONFIG.SYS file on the lesson disk in a subdirectory called \LESSON16.

Using the External CHKDSK Command To Check Your Disk

Earlier in this lesson, you used the external command CHKDSK to demonstrate the PATH command. This section actually uses this command to check a disk.

In Lesson 4, you learned the FORMAT command, which prepares a new disk for accepting data. Although you refer to the data on the disk as being a single entity, (as in "a file"), the actual contents of the file may be located in several areas of the disk.

In some cases, a part of the data may be lost by DOS. This usually happens when you turn off the computer without exiting a program (or there is a power interruption). Always save the files you are working on and exit any programs by getting back to the system prompt before you turn off the computer.

Accidents do happen, however, and CHKDSK may help you to find lost portions of files. This exercise starts by running the CHKDSK command on a normal disk.

Step 1: Insert your *DOS Working Disk* in drive A and boot the computer, or boot from your hard disk. Insert a practice disk (for example, PRAC DISK 2) into drive B.

If you are using a hard disk, place your *DOS Working Disk* into drive A and boot DOS. Make sure that you are in the root directory of the hard

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disk by typing **CD C:**. In the following steps, substitute C (or the appropriate drive letter) for the B drive.

Step 2: Use the DIR command on the disk in drive A to make sure that the CHKDSK program is available by typing the following and pressing Enter:

DIR A:CHKDSK.COM

Step 3: Check the disk in drive B by typing the following and pressing Enter:

CHKDSK B:

If you are using PRAC DISK 2 in drive B, you see a screen similar to the one in figure 16.6. If you have a hard disk and perform a CHKDSK on drive C, your screen looks more like figure 16.7.

The actual numbers you see may vary, but you see the total size of your disk and the size of information that it currently holds. On PRAC DISK 2 there are 3 hidden files—one for the volume label, and two system files. This disk does not have subdirectories. Look at figure 16.7 to see how subdirectories affect the displayed list.

```
A:\>CHKDSK B:

Volume PRAC DISK 2 created Aug 31, 1989 3:09a

   362496 bytes total disk space
    53248 bytes in 3 hidden files
    39936 bytes in 15 user files
   269312 bytes available on disk

   655360 bytes total memory
   551152 bytes free

A:\>
```

Fig. 16.6. The screen display for drive B.

```
A:\>CHKDSK C:

Volume HARD DISK C created Jan 15, 1989 3:48p

 22212608 bytes total disk space
    73728 bytes in 4 hidden files
    83968 bytes in 32 directories
 18884608 bytes in 972 user files
     2048 bytes in bad sectors
  3168256 bytes available on disk

   655360 bytes total memory
   551152 bytes free

A:\>
```

Fig. 16.7. The screen display for drive C.

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Using CHKDSK To Correct a Disk

If DOS has lost track of some of the data on a disk, you won't get the same response from the CHKDSK command that you saw in the preceding section. This section gives an example of the way to recover from a problem found by CHKDSK. In most cases, the data you recover is not usable, and all you gain is the free space. However, if the lost information is the only copy of critical material, you may feel differently about its value.

CHKDSK is an excellent way of checking your disks. If you start seeing errors regularly, and you are certain that you are exiting all programs before you turn off the computer, the disk may be wearing out, or the disk drive may need servicing.

Figure 16.8 shows the display given by CHKDSK when it is run on a satisfactory copy of PRAC DISK 2. Figure 16.9 shows the same disk when it has developed a problem and CHKDSK is run again.

```
A>CHKDSK B:

Volume PRAC DISK 2 created Aug 31, 1989 3:09a

   362496 bytes total disk space
    53248 bytes in 3 hidden files
    39936 bytes in 15 user files
   269312 bytes available on disk

   655360 bytes total memory
   551152 bytes free

A>
```

Fig. 16.8. *Tplay shown when CHKDSK finds no problems.*

```
A>CHKDSK B:

Volume PRAC DISK 2 created Aug 31, 1989 3:09a

Errors found, F parameter not specified.
Corrections will not be written to disk.

A:\COMMAND.COM
   Allocation error, size adjusted.

2 lost clusters found in 1 chains.
Convert lost chains to files  (Y/N)? n

     2048 bytes disk space
          would be freed.

   362496 bytes total disk space
    53248 bytes in 3 hidden files
    37888 bytes in 15 user files
   269312 bytes available on disk

   655360 bytes total memory
   551152 bytes free
```

Fig. 16.9. *The display shown when CHKDSK finds a problem.*

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The second time CHKDSK was run, errors were found on the disk. The program was started by typing **CHKDSK** and the drive name. This command just examines the disk and does not make changes, even if errors are found on the disk.

CHKDSK has an optional parameter (/F) that actually writes changes on the disk. Because this alters the data on the disk, you shouldn't use this switch the first time you execute the command. Use the switch as a last resort.

In figure 16.9, CHKDSK found that the program COMMAND.COM had become corrupted. The position on the disk of the various parts of the file wasn't normal. In fact, CHKDSK found that the file size in the directory didn't match the amount of space used on the disk for this file. Consequently, CHKDSK wants to alter the size of the COMMAND.COM file. When it similarly calculated the rest of the disk, it found it had some data left over that it doesn't know what to do with. These were reported as two lost clusters in one chain.

You may think CHKDSK ought to be able to match the lost clusters with the file that seemed too short. However, CHKDSK has no way of telling where these clusters belong in the file. Consider a situation in which two files are the wrong length. If CHKDSK altered them, you may end up with two mixed-up files that didn't work.

In this example, another copy of the file COMMAND.COM is needed. Also, the lost clusters of data must be recovered so that the lost area of the disk can be used again.

By typing **CHKDSK B: /F**, the "fixing" parameter is used. Figure 16.10 shows the result. This time, when prompted `Convert lost chains to files (Y/N)?`, type **Y** so that the data can be recovered. The statistics of the disk now show a recovered file.

```
A>CHKDSK B: /F

Volume PRAC DISK 2 created Aug 31, 1989 3:09a
A:\COMMAND.COM
   Allocation error, size adjusted.

2 lost clusters found in 1 chains.
Convert lost chains to files  (Y/N)? y


   362496 bytes total disk space
    53248 bytes in 3 hidden files
    37888 bytes in 15 user files
     2048 bytes in 1 recovered files
   269312 bytes available on disk

   655360 bytes total memory
   551152 bytes free

A>
```

Fig. 16.10. *The result of the new CHKDSK command.*

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When another CHKDSK is done to see if any more problems exist on the disk, the recovered file is listed as a user file, and there don't appear to be any more problems. The display is shown in figure 16.11.

Using the DIR command gives the result shown in figure 16.12. The length of COMMAND.COM has been shortened from 25307 bytes to 23552 bytes. The recovered file is called FILE0000.CHK and is 2048 bytes long. If more chains were found, CHKDSK would assign the names FILE0001.CHK, FILE0002.CHK, and so on to the additional chains.

```
A>CHKDSK B:

Volume PRAC DISK 2 created Aug 31, 1989 3:09a

   362496 bytes total disk space
    53248 bytes in 3 hidden files
    39936 bytes in 16 user files
   269312 bytes available on disk

   655360 bytes total memory
   551152 bytes free

A>
```

Fig. 16.11. *The disk after problems have been resolved.*

```
A>DIR B:

 Volume in drive A is PRAC DISK 2
 Directory of  A:\

COMMAND  COM    23552   3-17-87  12:00p
FILE0000 CHK     2048   8-31-89   3:33p
CHAPTER3 TXT      299   8-24-89   2:38p
CLIENTS  ADD       62   8-24-89   2:35p
FAMILY   ADD       33   8-24-89   2:36p
FRIENDS  ADD       85   8-24-89   2:37p
CHAPTER2 TXT      213   8-24-89   2:37p
ASHE     LET     1024   8-24-89   2:38p
CLANCY   LET      609   8-24-89   2:38p
SALES    81       292   8-24-89   2:39p
SALES    82       292   8-24-89   2:39p
SALES    83       292   8-24-89   2:39p
PROFITS  81       298   8-24-89   2:39p
PROFITS  82       298   8-24-89   2:39p
PROFITS  83       302   8-24-89   2:40p
C&E      BAT       28   8-30-89   3:50p
       16 File(s)    269312 bytes free

A>
```

Fig. 16.12. *Using the DIR command.*

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At this point, you can see the contents of the CHK file. Type **TYPE FILE0000.CHK** to display the file on the screen. If the contents are a program rather than text, you won't be able to make sense of the result, the screen is likely to show lots of strange characters, and the computer will beep a lot.

However, if the file is text, you can see the contents scroll across the screen. If you recognize the contents, check the validity of the file that is supposed to contain this material. If you have a backup copy, use that rather than the current copy that is possibly corrupted. If, in the exceptional case, FILE0000.CHK contains the only copy of precious material, make a copy of it, and then try to rescue what you can by using your word processor or EDLIN.

In this example, the contents of FILE0000.CHK are part of the COMMAND.COM program and are not useful in their present form. Use the DEL command to remove FILE0000.CHK, and use the COPY command to put a new copy of COMMAND.COM on the disk.

CHKDSK is a useful checking command that all users should know how to use in its basic form (without any switches). Once problems are found on a disk, the more advanced features can be used. An appreciation that these features exist, even if you don't feel confident enough to use them, will allow you to get help before vital data is irretrievably lost. If you see errors when you use the CHKDSK command, do something about them.

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SUMMARY OF CONCEPTS FOR LESSON 16

1. DOS customization can create a more user-friendly and powerful system.
2. The PROMPT command provides a "signpost" to help you find your way around hierarchical file structures.
3. The PATH command provides links to other directories, which can access the programs contained in them. APPEND enables DOS to search for nonprogram files.
4. You can process commands automatically. Customized commands can be added into an AUTOEXEC.BAT file or into a CONFIG.SYS file, depending on the type of command.
5. The CHKDSK command can be used as a checking device for your disks. In its "fixing" mode it can recover data from a disk.

For Further Reference

If you would like to learn more about customizing DOS, consult *Using DOS*, by David Solomon, (Que Corporation, Carmel, IN, 1989), Chapter 14.

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SUMMARY EXERCISES FOR LESSON 16

1. Create a CONFIG.SYS file that sets 20 buffers and 25 files.
2. Create an AUTOEXEC.BAT file that shuts off echo to the screen, clears the screen, asks for the date and time, sets a path to the root directory of drive A, and runs CHKDSK.

Appendix C shows the correct CONFIG.SYS file and AUTOEXEC.BAT files for these exercises.

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LESSON

17

I/O Redirection and Piping

Redirection of input and output (I/O redirection) and *piping* are features that make DOS operate somewhat like the UNIX operating system. With the redirection feature, you can get input from sources other than the keyboard and direct output to sources other than the video display monitor. Piping, an extension of redirection, occurs when the output from one program becomes the input for another.

In this lesson, you learn how to do the following:

- Redirect input and output
- Pipe
- Use filters

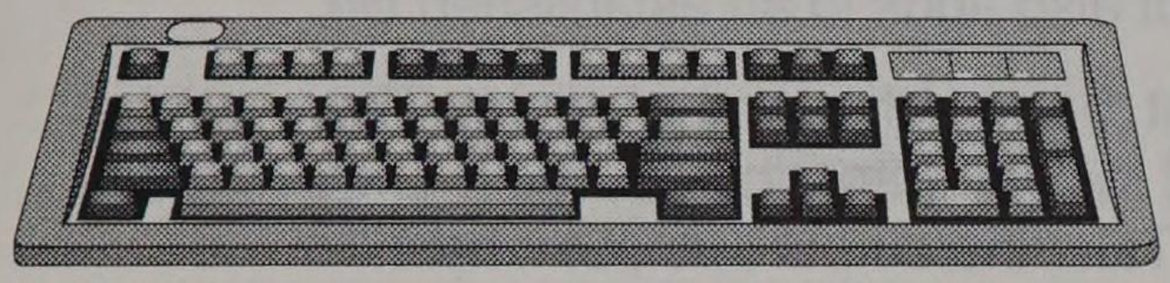
Redirection of Input and Output

The standard device for entering information (standard input) is the keyboard. Likewise, the standard piece of hardware for receiving information that has been stored (standard output) is the video screen. With I/O redirection, you are able to tell DOS to change the source or destination normally used for input (I) or output (O). When you redirect I/O, you tell DOS to get characters from somewhere other than the keyboard or to display information somewhere other than the video screen. For example, you can tell DOS to get characters from a disk file and to "display" them on a printer.

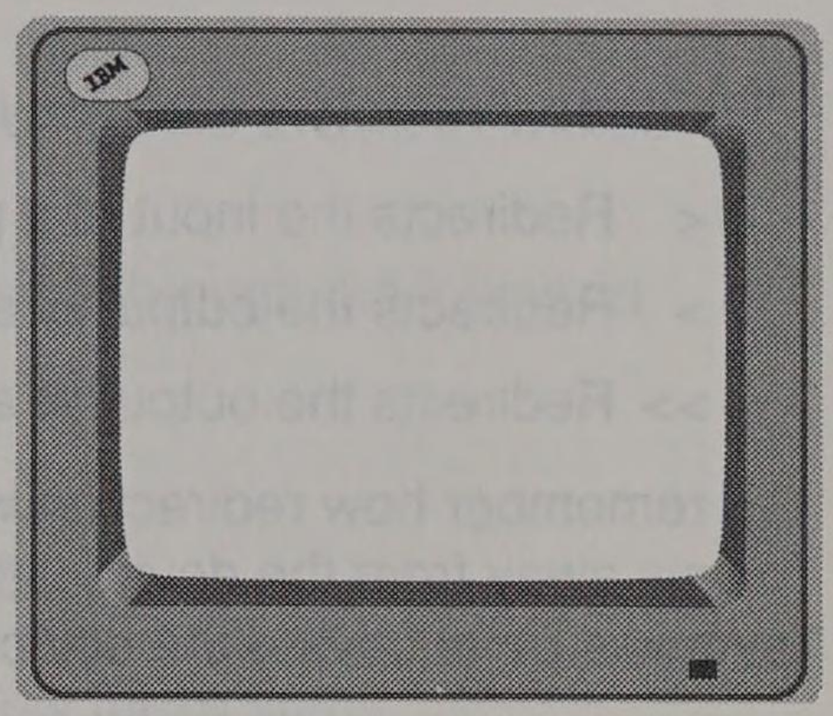
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Some devices send input and receive output, and some send and receive both. Other devices can be used for input only (the keyboard) or output only (the video display or printer).

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Keyboard

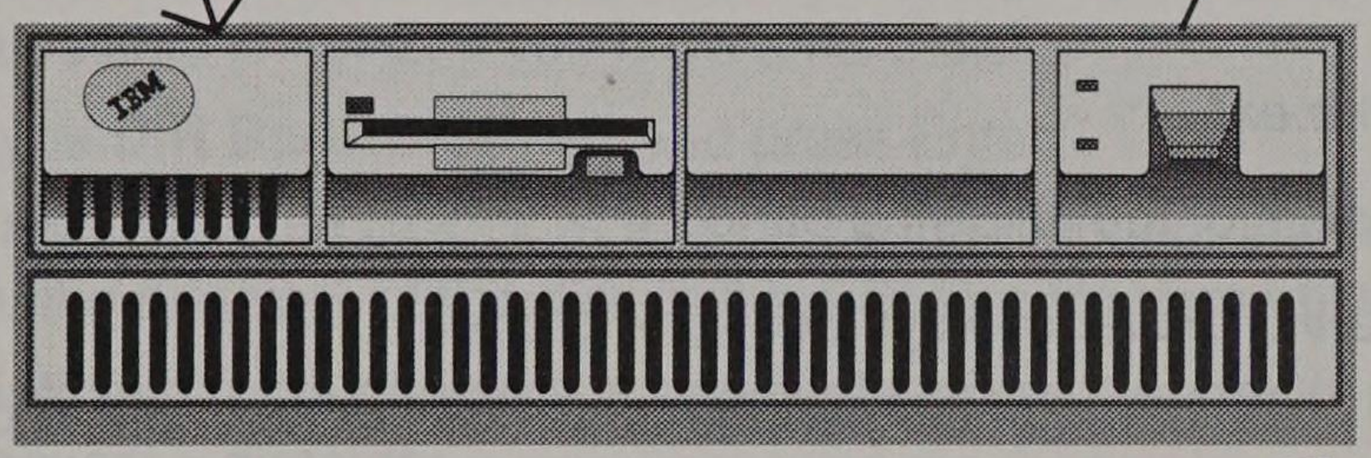


Display

Input

Output

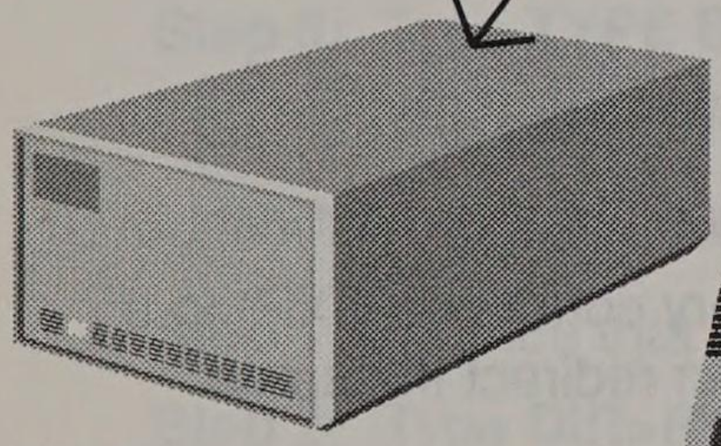
System Unit



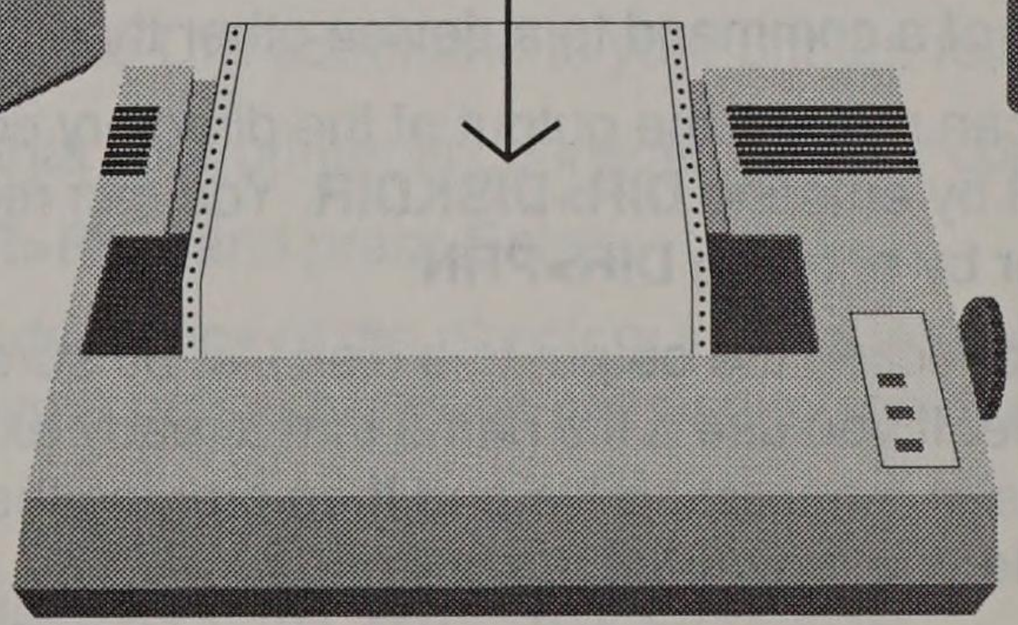
Input and Output

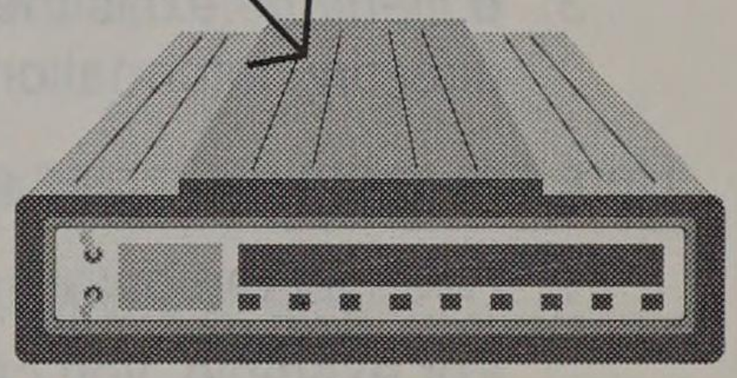
Output

Input and Output



Disk drive





Modem

COM1

COM2

Printer

PRN

LPT1 } If more than one printer.

LPT2 }

The standards for input and output. The keyboard is used for input and the video display for output of prompts and messages.

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The three characters involved in the process of redirection are as follows:

< Redirects the input of a program

> Redirects the output of a program

>> Redirects the output of a program but also adds to an established file

To remember how redirection works, look at the way the symbols point. The < symbol points away from the device and says, "Get the input from here." The > and >> symbols point toward the device and say, "Take the output and put it here."

These symbols can be used only at the DOS system prompt or in batch files. The format for these symbols is as follows:

symbol devicename

or

symbol d:filename.ext

This statement consists of the following parts:

1. s*ymbol* is the I/O redirection symbol: <, >, or >>.
2. *devicename* is the name of the peripheral device (for example, a printer, modem, console, or video screen) to which or from which you are directing input or output.
3. *d:filename.ext* is the name of the disk drive and the name of the file you are directing information to or from.

Here are some examples of what you can do with I/O redirection:

1. Redirect the output of a command to a device other than the video screen.

   For example, you can redirect the output of the directory command (DIR) to a file called DISKDIR by entering **DIR>DISKDIR**. You can redirect the same output to the printer by entering **DIR>PRN**.

   Note: If you are redirecting the output to a disk file, be sure to assign a unique name to the new file. If you use a file name that already exists on the disk, DOS erases the contents of the existing file and then creates the new file. You lose the contents of a file you may want to save.

2. Redirect the input from one source to another.

   For example, you can redirect input from the disk file ANSWERS to the disk file MYPROG by entering **MYPROG<ANSWERS**. In this case, MYPROG gets its input from ANSWERS without any additional commands.

3. Redirect the output to an existing file without erasing the original contents.

   For example, by entering **DIR>>DISKDIR**, you can add an additional copy of the directory to the DISKDIR file you created. The command appends the

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output of the directory command (DIR) to the end of the file DISKDIR without first erasing the original contents of the file.

You can try a few simple examples of redirection by working through the following examples.

Output to a Device Other Than the Screen

To redirect output of the DOS DIR command to a file, follow these steps:

Step 1: Put your *DOS Working Disk* into drive A and boot DOS.

Step 2: If you have two floppy disk drives, put PRAC DISK 1 into drive B. If you have a hard disk, the files you need are stored in drive C. (Remember to substitute C: for B: if you have a hard disk.)

Step 3: Type **DIR B:>B:DISKDIR** and press Enter.

This command tells DOS to redirect the output of the DIR command (that is, the directory of the disk in drive B) to a file named DISKDIR.

Notice that the directory is not displayed as it normally is when you request a directory.

Step 4: Type **DIR B:** and press Enter.

Note that a new file name has been added: DISKDIR.

Step 5: Type **TYPE B:DISKDIR** and press Enter.

The contents of the file—the directory—are displayed on-screen.

To redirect the output of the DIR command to your printer, follow these steps:

Step 1: Be sure that your printer is connected to your computer and turned on.

Step 2: Type **DIR>PRN** and press Enter.

DOS sends a copy of the directory in drive A (unless you specify another drive) to your printer but does not display the directory on the screen.

Output to an Existing File without Erasing the Original Contents

Step 1: Type **TYPE B:DISKDIR>PRN** and press Enter.

In this command, you are asking DOS to redirect the contents of DISKDIR to the printer. You can use the printout to compare the results with those of Step 3.

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Step 2: Type **DIR B:>>B:DISKDIR** and press Enter.

This command tells DOS to append the output from the DIR command to the DISKDIR file without first erasing the contents of the file.

Step 3: Type **TYPE B:DISKDIR>PRN** and press Enter.

Compare this printout with the one you printed in Step 1. Notice that the new directory has been added to the existing file without deleting the original contents of the file.

Piping

Piping is creating a computer-made line, or pipe, between two programs so that the output of the first program becomes the input for the second program. Technically, piping uses automatic redirection to chain together two or more programs. The symbol for piping is the vertical bar (|). On most keyboards, this key is located above the Enter key in the main QWERTY portion. On the keyboard it looks like a colon made up of two vertical dashes, but most printers produce a solid vertical line for this character.

Like redirection, you can use piping only from the DOS system prompt. Furthermore, because you cannot use piping after a program has been run, you must pipe when you enter the command to run the program.

To understand piping better, work through the examples shown in this lesson. Each example introduces a different filter and shows how piping works.

Filters

A *filter* is a program that performs some manipulation on the stream of characters that come one character after another from the standard input and go to the standard output. A filter takes data from the standard input, modifies it, and then sends the data to the standard output (screen). This modification is called *filtering*.

Three filters that come with DOS are used with redirection and piping in this lesson:

MORE	Displays a screenful of input (23 lines) and the message `--More--`, and then waits for a keystroke
FIND	Locates a *string* (a series of alphanumeric characters), optionally displays lines with or without the string, and prints the specified line with line numbers
SORT	Sorts in either ascending or descending order

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The MORE Filter

The MORE filter displays one screen of information taken from standard input and then displays the message `--More--`. When you press a key, MORE displays the next screenful of information, and so on, until you've viewed the whole output.

In a sense, MORE acts like the /P switch (Lesson 6), which, when used with the directory (DIR) command, displays only one screen of file names at a time.

To see how MORE works with piping, follow these steps:

Step 1: Place your *DOS Working Disk* into drive A and boot DOS, or boot from the hard disk. Place the lesson disk in drive B.

Step 2: Type **TREE B: | MORE** and press Enter.

In this statement, *TREE* is the command; *MORE* is the filter; and |, a vertical bar, is the pipe character. The statement tells DOS to send the output of TREE through the MORE filter—that is, to display 23 lines at a time. Your screen looks similar to figure 17.1.

```
DIRECTORY PATH LISTING

Path: \LESSON5

Sub-directories:  None


Path: \LESSON8

Sub-directories:  None


Path: \LESSON9

Sub-directories:  WORD


Path: \LESSON9\WORD

Sub-directories:  CORRESP .90
-- More --
```

Fig. 17.1. *The result of the MORE filter.*

Step 3: Press a key to display each new screen until you've viewed the whole directory.

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The FIND Filter

The FIND filter locates from the designated files all the lines that match or do not match a specified string. In addition, FIND can display both the lines and the line numbers of the string locations.

FIND can be used as a normal DOS utility, or it can receive its input through a pipe. These lessons will show how FIND can be used.

The syntax for FIND is as follows:

FIND /V/C/N "*string*" *filename.ext*

This statement consists of the following parts:

1. *FIND* is the command
2. */V/C/N* are switches
3. *string* is the text that you wish to find
4. *filename.ext* is the file to be searched

Three switches are useful with FIND:

/V Displays all lines that do not contain the string

/C Counts the number of times the string occurs in the file but does not display the lines

/N Displays the line number in front of each line that matches the string

FIND without a switch displays all lines that contain the specified string.

FIND is especially useful if you want to find a string in a long file, which would be difficult to search line by line—for example, a key word or phrase, a misspelling that you wish to correct throughout a text, or all the data in a particular category in a database or a spreadsheet.

To see how FIND works as a normal DOS utility, follow these steps:

Step 1: Put into drive A your *DOS Working Disk* and the lesson disk in drive B.

If you are using floppy disks, type **CD B:\LESSON 17**. If you are using a hard disk, place the lesson disk in drive A and type **COPY A:\LESSON17*.* C:**. Then replace the lesson disk in drive A with the *DOS Working Disk*.

Step 2: Type **TYPE B:ADDRESS.90** and press Enter.

This command tells DOS to display the contents of the ADDRESS.90 file, which in this case should consist of three addresses. One of these addresses should be your own if you completed Lesson 8 (see fig. 17.2).

Step 3: Type **TYPE B:MYNAME.ADD** and press Enter.

This command tells DOS to display the contents of the MYNAME.ADD file, which should list your name and address (see fig. 17.3).

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```
A>TYPE B:ADDRESS.90
SHEILA C. EWING
QUE CORPORATION
11711 N. COLLEGE AVE.
CARMEL, IN 46032

DAVID P. EWING
102 DELMAR WAY
INDIANAPOLIS, IN 46250

DR. BARTHA BINET
PSYCHOLOGY DEPARTMENT
BOX 1333
NORTH CAROLINA STATE UNIVERSITY
RALEIGH, NC 27902

A>
```

Fig. 17.2. The contents of ADDRESS.90.

```
A>TYPE B:MYNAME.ADD
SHEILA C. EWING
QUE CORPORATION
11711 N. COLLEGE AVE,
CARMEL, IN 46032
A>
```

Fig. 17.3. The contents of MYNAME.ADD.

Step 4: Type **FIND "EWING" ADDRESS.90 MYNAME.ADD** and press Enter.

In this statement, you're asking DOS to find your last name wherever it occurs in both files (see fig. 17.4).

```
A>FIND "EWING" B:ADDRESS.90 B:MYNAME.ADD

---------- B:ADDRESS.90
SHEILA C. EWING
DAVID P. EWING

---------- B:MYNAME.ADD
SHEILA C. EWING

A>
```

Fig. 17.4. The lines in ADDRESS.90 and MYNAME.ADD that contain the last name "EWING."

Step 5: Type **FIND /V "EWING" MYNAME.ADD** and press Enter.

/V tells DOS to ask for all the lines in MYNAME.ADD that do not contain your name (see fig. 17.5).

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```
A>FIND /V "EWING" B:MYNAME.ADD

---------- B:MYNAME.ADD
QUE CORPORATION
11711 N. COLLEGE AVE,
CARMEL, IN 46032

A>
```

Fig. 17.5. The lines in MYNAME.ADD that do not contain the last name "EWING."

Step 6: Type **FIND /C "EWING" ADDRESS.90 MYNAME.ADD** and press Enter. /C tells DOS to count the number of lines with your name (see fig. 17.6).

```
A>FIND /C "EWING" B:ADDRESS.90 B:MYNAME.ADD

---------- B:ADDRESS.90: 2

---------- B:MYNAME.ADD: 1

A>
```

Fig. 17.6. The number of lines in ADDRESS.90 and MYNAME.ADD that contain the last name "EWING."

Step 7: Type **FIND /N "EWING" ADDRESS.90** and press Enter. /N numbers the lines in which your name is found (see fig. 17.7).

```
A>FIND /N "EWING" B:ADDRESS.90

---------- B:ADDRESS.90
[1]SHEILA C. EWING
[6]DAVID P. EWING

A>
```

Fig. 17.7. The line numbers of ADDRESS.90 that contain the last name "EWING."

These switches also can be used in various combinations with the FIND filter.

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FIND works basically the same with the pipe character as it does as a DOS utility. The one difference is that you do not have to specify a filename. What FIND searches through is piped through another command. Follow these steps to see how to use FIND with the pipe character:

Step 1: Make sure that the *DOS Working Disk* is in drive A.

Step 2: Type **DIR | FIND "COM"** and press Enter. Figure 17.8 shows that all files with the COM extension are displayed.

```
A>DIR | FIND "COM"
COMMAND  COM    37637   6-17-88  12:00p
DISKCOPY COM    10428   6-17-88  12:00p
FORMAT   COM    22923   6-17-88  12:00p
EDLIN    COM    14249   6-17-88  12:00p
CHKDSK   COM    17771   6-17-88  12:00p
BACKUP   COM    33754   6-17-88  12:00p
RESTORE  COM    40030   6-17-88  12:00p
MORE     COM     2166   6-17-88  12:00p
```

Fig. 17.8. *Using FIND with the pipe character.*

If there were a file called COMMON.DAT, it would be displayed also. The reason is that FIND would find COM in COMMON. FIND can be used in this way with the /V switch to display all files that do not have COM in their names.

The SORT Filter

The SORT filter is a general-purpose sorting program. SORT takes lines from the standard input, performs a sort on them, and then writes the lines to the standard output in either ascending or descending order.

Two switches may be used with SORT. /R sorts in reverse alphabetical order—Z to A. /+c starts sorting with the column number indicated. When you do not include a switch, the sort is done from the beginning of the file and is reported in alphabetical order.

To sort the directory of the *DOS Working Disk* and display it in reverse alphabetical order, follow these steps:

Step 1: Put the *DOS Working Disk* into drive A and boot DOS, or boot from the hard disk.

Step 2: Type **DIR | SORT /R** and press Enter.

Redirection of input/output and piping are very powerful tools. In combination with the MORE, FIND, and SORT filters, redirection and piping can be used to write many useful short programs.

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SUMMARY OF CONCEPTS FOR LESSON 17

1. I/O redirection and piping are two features that allow DOS to perform functions similar to those of the UNIX operating system.
2. Input redirection means that DOS can get input from sources other than the keyboard; output redirection means that DOS can direct output to sources other than the video display screen. The three symbols used to indicate redirection are <, >, and >>.
3. Piping is creating a computer-made link between two programs so that the output of the first program becomes the input for the second. The symbol for piping is the vertical bar |.
4. A filter is a program that takes data from the standard input, modifies it in some way, and then writes the data to the standard output.
5. Three filters are especially useful with redirection and piping. MORE displays one screenful of information at a time, FIND locates a string of characters, and SORT sorts a file in ascending or descending order.

For Further Reference

If you would like to read more about redirection and piping, consult *Using DOS*, by David Solomon (Que Corporation, Carmel, IN, 1989), Chapter 9.

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SUMMARY EXERCISES FOR LESSON 17

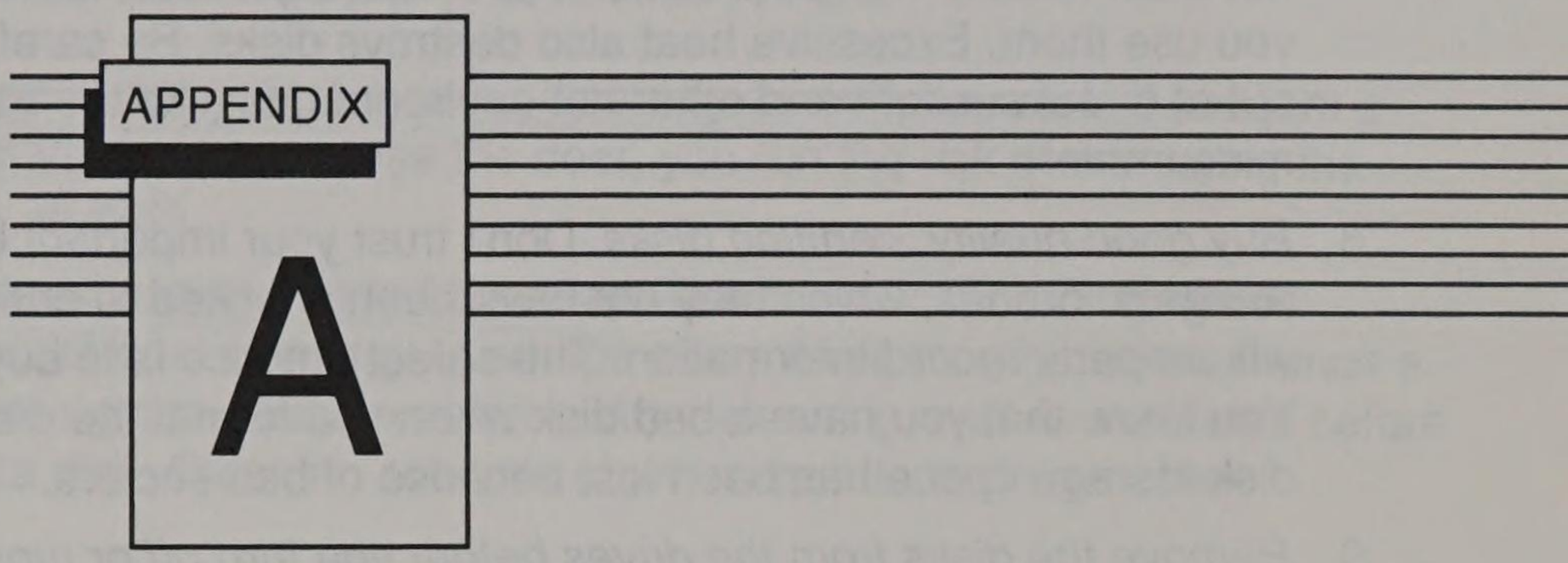
For these exercises, you should place your *DOS Working Disk* in drive A and PRAC DISK 1 in drive B. If you have a hard disk, place *DOS Working Disk* in drive A, and store your information on the hard disk, drive C.

1. Create a file called DRIVEA.DIR on drive B that contains a directory of *DOS Working Disk*.
2. Add another copy of the directory of *DOS Working Disk* to DRIVEA.DIR.
3. Display the file DRIVEA.DIR to the screen using MORE.
4. Find all the entries in DRIVEA.DIR that do not contain EXE.
5. Sort the entries in DRIVEA.DIR to a file DRIVEA.SRT on drive B.

Appendix C gives the correct answers for these exercises.

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Dos and Don'ts for Disks and Disk Drives

Dos for Floppy Disks

1. *Insert disks carefully into the disk drive*. The disk should slide into the disk drive, and in the case of minifloppy disks (5 1/4 inch), the drive door should close easily (the microfloppy [3 1/2 inch] disk drives do not have a drive door). Never try to force a disk into the drive.
2. *Store minifloppy disks in their protective envelopes when the disks are not being used*. An envelope prevents most dust and other contaminants from getting on the surface of a disk.
3. *Label every disk*. As soon as you format and begin to use a disk to store information, you should label the disk. Otherwise, you may erase or write over information you want to save.
4. *Back up disks frequently*. Very important information should be backed up daily; less important information should be backed up every two or three days. If you faithfully back up your disks and files, you are much less likely to lose your files completely.
5. *Store infrequently used disks and backup copies of disks away from your computer*. Keeping to a minimum the number of disks near your computer will help you manage your disks effectively.
6. *Store disks in a perfectly flat or vertical position*. Disks can bend or warp if they are not stored either vertically or perfectly flat.
7. *Keep your disks at a comfortable temperature*. Disks are sensitive to extreme temperatures. Cold disks become rigid and shrink slightly, and disk drives do

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not work reliably with cold disks. If your disks get cold, let them warm up before you use them. Excessive heat also destroys disks. Be careful to keep your disks out of direct sunlight and other hot environments (like the trunk of your car in midsummer).

8. *Buy good quality, certified disks*. Don't trust your important information to "bargain" brands, which may not have been checked to ensure that each disk will properly record information. The safest practice is to buy only certified disks. You know that you have a bad disk when you format the disk and find out that disk storage space has been lost because of bad sectors.
9. *Remove the disks from the drives before you turn off or move your computer*. If you leave your disk in the drive when you turn off your computer, there is a very slight chance that the disk drive will write garbage onto your disk. A more serious problem occurs if you move your computer without first removing the disks. When the disk drive door is closed, the recording heads are in contact with the surface of the disk. If the disk drive gets bounced around, the heads can scrape the disk and damage it.

Don'ts for Floppy Disks

1. *Don't touch the disk's magnetic surface*. Hold the disk by its protective jacket. If you touch the surface of the disk, oil from your fingers can interfere with the capability of the recording head to read and write information onto the disk.
2. *Don't put your disks near magnetic fields*. Do not keep a magnet near your disks; try to keep your disks away from strong magnetic fields, such as those generated by telephones and appliances with strong motors. Magnetic fields have the potential of "cleaning" your disks, thus destroying precious information.
3. *Don't keep your disks near potential contaminants*. Liquids; smoke and ashes from cigarettes, cigars, and pipes; food; and other similar contaminants can get on your disks and leave a residue that interferes with the capability of the recording head to store and retrieve information.
4. *Don't bend a disk*. If you crease the disk, the recording head will "jump over" the crease, and you will lose information.
5. *Don't let your disk get too full*. If your disk gets too full, you run the risk of losing information—especially if you're using a program, like WordStar, that generates backup copies.

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Dos and Don'ts for Floppy Disk Drives

1. *Do close the drive door carefully after inserting a minifloppy disk*. If you jam a disk into the drive and try to close the door, you run the risk of damaging the drive, the disk, or both.
2. *Don't clean the recording heads frequently*. The ceramic recording heads require only occasional cleaning—perhaps every three months, or even once a year. Overcleaning can cause problems. After cleaning, wait five minutes before inserting a data disk. Cleaning solvents must evaporate to prevent disk damage.
3. *Do be careful not to shock the disk drive*. Bumping or jarring the disk drive can cause several things to happen: the arm with the recording heads can be knocked out of place; the belt that makes the disk spin may fall off; the doors to the disk drives can break; or the plastic housing may crack or break.
4. *Do put the cardboard protector or an old floppy disk in the disk drive and close the doors when moving or shipping your drives for long distances*. If the disk drives receive many bumps and jolts in moving, the recording heads can bounce against each other and become damaged. A cardboard protector inserted into the drive protects the recording heads.
5. *Do have your disk drives serviced periodically*. Occasional preventive maintenance can keep a small problem from getting bigger.

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APPENDIX

B

Inserting a Floppy Disk into a Disk Drive

If you've never inserted a minifloppy (5 1/4 inch) or microfloppy (3 1/2 inch) disk into a disk drive, read through these simple directions before your first attempt.

Notice that each disk is stored in a paper or plastic envelope. The microfloppy, because it has a rigid case, is not always stored in an envelope. In addition, every brand-name disk carries a label, which is usually at the top left side of the disk. The labeled side is the front of the disk.

Remove the minifloppy disk from the paper envelope. The disk should gently slide out of the envelope. Notice that the disk itself is enclosed within a protective cover. Do not attempt to remove this cover.

With the front of the disk facing you and the label at the top, examine the disk. On some disks, several brown shiny areas show through the outer covering of the disk. These exposed areas are the recording surface of the disk itself. Touching these exposed areas with your fingers or any other objects may destroy your disk or cause it to lose information.

To insert the 5 1/4-inch disk into the disk drive, follow these simple steps:

Step 1: Open the door of the disk drive.

Step 2: Grasp the disk at the top, front side up.

Step 3: Gently slide the disk into the drive.

If the disk drive has a vertical opening, the front of the disk (the labeled side) should be facing left as you insert the disk. If the disk drive has a horizontal opening, the front of the disk (the labeled side) should be facing up as you insert the disk.

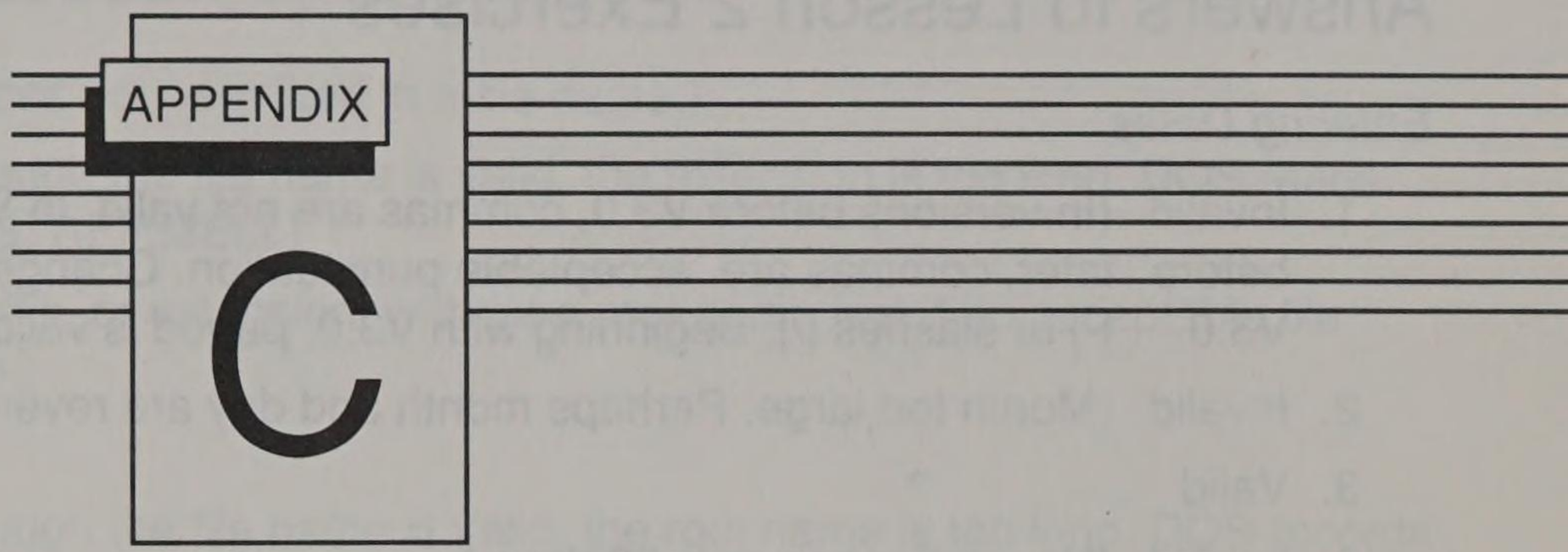
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Do not force the disk into the drive. If the disk does not go in easily, take it out and try again. Forcing the disk may cause it to bend or to be scratched.

Step 4: Once the disk has been inserted completely into the drive, close the drive door.

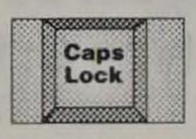
The procedure for inserting a microfloppy (3 1/2 inch) disk is similar, except the lever used to close the disk drive door doesn't exist. A button is used to eject the disk.

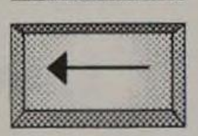
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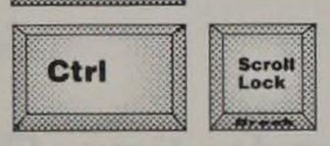


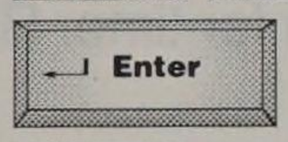
Answers to Exercises

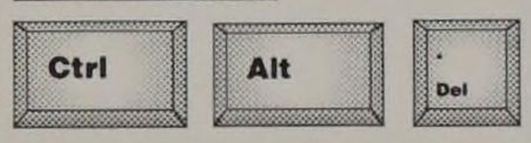
Answers to Lesson 1 Exercises

1. G  Caps Lock

2. D  Backspace

3. H  Ctrl-Scroll Lock, Ctrl-Break, or Ctrl-C

4. E  Enter

5. B  Ctrl-Alt-Del

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Answers to Lesson 2 Exercises

Entering Dates

1. Invalid before V3.0. (In versions before V3.0, commas are not valid. In V3.0 and later, commas are acceptable punctuation. Change commas to dashes [-] or slashes [/]. Beginning with V3.0, period is valid.)
2. Invalid (Month too large. Perhaps month and day are reversed; try 9/19/86.)
3. Valid
4. Invalid (November has only 30 days.)
5. Invalid (Spaces cannot be used to separate the parts of a date. Replace each space with a dash or slash.)

Entering Times

1. Invalid (A period cannot be used to separate minutes from seconds. A colon [:] must be used in place of this period.)
2. Invalid (Because DOS operates on a 24-hour clock, 9:18 P.M. must be entered as **21:18**. If you are using DOS V4, however, you may type **9:18p** to enter the time.)
3. Valid
4. Valid
5. Invalid (The slash is not an acceptable form of punctuation for time. Replace slash with a colon.)

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Answers to Lesson 5, Exercise A

1. Invalid (Spaces not permitted in a file name.)
2. Valid (Although the file name is valid, the extension is too long. DOS reads only STAFF.MEM.)
3. Invalid (A suffix, or extension, without a root name is not an acceptable file name.)
4. Valid
5. Valid (Although the file name is valid, the root name is too long. DOS records only the first eight characters of the root name and the extension: DOSWORKB.CH4.)
6. Invalid (? is not a valid character for assigning a file name. ? is a special wild-card character that takes on special meaning when used with a file name.)
7. Invalid (Although SALESVOL.BAK is a valid file name, the extension BAK should not be assigned by the user. Some applications—such as WordStar and EDLIN—assign this extension to backup files.)
8. Valid
9. Invalid (The character + is not valid in a file name.)
10. Valid

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Answers to Lesson 6 Exercises

If a disk is in drive B:

1. DIR B:
2. DIR B:/W
3. DIR B:/W and press Print Screen or Shift-PrtScr
4. TYPE B:*filename.ext*
5. DIR B:*.BAS
6. CHKDSK B:
7. CLS

If a disk is in drive A, either omit B: for drive B in each of the commands, or substitute A: for B:.

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Answers to Lesson 7 Exercises

1. After DOS is booted, put PRAC DISK 2 into drive A and PRAC DISK 1 into drive B. Enter **COPY B:CLANCY.LET** (Hard disk users should substitute C: for B:)
2. With PRAC DISK 1 in drive A, enter **COPY CHAPTER2.TXT WORKBOOK.TXT**
3. With PRAC DISK 2 in drive A and PRAC DISK 1 in drive B, enter **COPY B:SALES.88+B:PROFITS.88 A:S&P.88**
4. With PRAC DISK 2 in drive A and PRAC DISK 1 in drive B, enter **COPY B:SALES.* and COPY B:PROFITS.***

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Answers to Lesson 8 Exercises

With the DOS master disk in drive A and PRAC DISK 3 in drive B,

1. REN B:ASHE.LET ASHE1.LET

   REN B:CHAPTER2.TXT CHAPTER2

   REN B:MSTRLIST.ADD MAILING.LST (In this example, you should get a `Duplicate file name or File not found` message because the file name MAILING.LST already exists on this disk.)

   REN B:SALES.90 90SALES.FIG

2. ERASE (or DEL) B:ASHE1.LET

   B:CHAPTER2

   B:90SALES.FIG

   When you try to erase SALES.90, you get the message `File not found`, because you changed the name of this file. The file name SALES.90 no longer exists.

3. ERASE B:*.*

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Answers to Lesson 9 Exercises

1. Type the following at the A>, pressing Enter after each command:

   MD B:\MEMO

   MD B:\MEMO\DEPT1

   MD B:\MEMO\DEPT1\JOHN

2. From the A>, type **COPY PROFITS.* B:\MEMO\DEPT1\JOHN** and press Enter.
3. Type **TREE B:** and press Enter.
4. Type the following, pressing Enter after each command:

   B:

   CD \MEMO\DEPT1\JOHN

   DEL *.* (You will be asked `Are you sure (Y/N)?`. Answer Y)

   CD

   A:

   Notice that first, the current drive was changed to B. Then the CD command was used to change the drive, and the files were deleted. Finally, the current directory was changed back to the root directory of drive B, and drive A was made the current drive again. An easier way to remove the files from drive B would be to type **DEL B:\MEMO\DEPT1\JOHN*.*** and answer Y to the prompt `Are you sure (Y/N)?`.

5. Type the following commands, pressing Enter after each:

   RD B:\MEMO\DEPT1\JOHN

   RD B:\MEMO\DEPT1

   RD B:\MEMO

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Answers to Lesson 10 Exercises

1. F3
2. F1
3. F10
4. The space bar selects or deselects a file name. To find help information about this key, press F1 to get the help screen, F9 to see the list of keys. Then, using the PgDn and down-arrow keys, scroll through the list until you reach the entry for Spacebar.
5. The Ctrl-Home key combination will display the first screenful of information in a window. To find this information, press F1 to reach the help screen, F11 or Alt-F1 to see the Help Index. Use the down-arrow key to highlight the Keyboard Instructions item and press Enter. Then use the down-arrow key to scroll through the information until the Ctrl-Home key is mentioned.

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Answers to Lesson 11 Exercises

1. First, boot DOS. Then, from a system prompt, type **DOSSHELL** and press Enter to start the DOS Shell. From the Main Group screen, Select DOS Utilities, either by pressing the down-arrow key three times and pressing Enter, or pointing to DOS Utilities with the mouse and pressing the left mouse button.

   From the DOS Utilities ... screen, press the down-arrow key five times to highlight Format, and press Enter. If you have a mouse, point to Format and press the left mouse button. When the Format Utility window appears on the screen, type the drive that contains the disk to format and press Enter. Insert the disk to format in the appropriate drive, and when prompted again, press Enter.

2. First, boot DOS. Then, from a system prompt, type **DOSSHELL** and press Enter to start the DOS Shell. From the Main Group screen, Select DOS Utilities, either by pressing the down-arrow key three times and pressing Enter, or pointing to DOS Utilities with the mouse and pressing the left mouse button.

   From the DOS Utilities ... screen, press the down-arrow key one time to highlight Disk Copy and press Enter. If you have a mouse, point to Disk Copy and press the left mouse button. When the Diskcopy Utility window appears on the screen, type the drives that will be used and press Enter. If you have two floppy disk drives, type **A: B:**. If you have a hard disk, type **A: A:**. Press Enter. When the prompt appears to place the disk(s) in the drive(s), do so and press Enter.

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Answers to Lesson 12 Exercises

1. First, boot DOS. Then, from a system prompt, type **DOSSHELL** and press Enter to start the DOS Shell. From the Main Group screen, select File System by pressing the down-arrow key once, then Enter. If you have a mouse, point to File System and press the left mouse button.

   Insert your lesson disk in drive B and press Ctrl-B (insert the lesson disk in drive A if you have a hard disk, and press Ctrl-A). Press the Tab key to highlight the Directory Tree window, then press the down arrow key once to highlight \LESSON5. Press Enter. Alternatively, point to \LESSON5 with the mouse and press the left mouse button.

   When the \LESSON5 directory is displayed, press Tab to move to the directory window. Using the arrow keys, move to each of the files with the extension ADD, and press the space bar to select the files. If you have a mouse, point to each of the files and press the left mouse button.

   Press F10 to activate the menu, select File, then select Copy. When the Copy File window appears on the screen, type **\LESSON9\WORD** and press Enter.

2. From the File System, you should have \LESSON5 selected as the current directory. Using the arrow keys, move to the file SALES.90 and press the space bar. If you are using a mouse, point to the file SALES.90 and press the left mouse button. Press F10, then select File, then Move. When the Move File window appears on the screen, type **A:** after `To:` and press Enter.

3. From the File System, press the Tab key until the Directory Tree window is active. Use the arrow keys to highlight A:\, and press Enter. If you have a mouse, point to A:\ in the Directory Tree window and press the left mouse button.

   Press the Tab key to activate the directory listing. Press the space bar to select the file SALES.90. Activate the menu, pressing F10, then select File and Rename. When the Rename File window appears on the screen, type **SALES90.RPT** and press Enter.

4. From the File System, press the Tab key to highlight the file SALES90.RPT in the directory listing. Press the space bar to select the file. Activate the menu, pressing F10, then select File and Delete. When the Delete File window appears on the screen, press Enter, then select option 2, `Delete this file`, to delete the file.

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Answers to Lesson 13 Exercises

1. First, boot DOS. From a system prompt, type **DOSSHELL** and press Enter to start the DOS Shell. From the Main Group screen, select the DOS Utilities option, either by pressing the down-arrow key three times and pressing Enter, or by pointing to DOS Utilities with the mouse and pressing the left mouse button.

   From the DOS Utilities. . . screen, press the down-arrow key three times to highlight the Backup Fixed Disk option and press Enter. If you have a mouse, point to Backup Fixed Disk and press the left mouse button. When the Backup Utility window appears on the screen, type **C:*.ADD A:** and press Enter. When you see the prompt `Insert backup diskette 01 in drive A:`, place the first disk in drive A and press Enter.

   When the backup is finished, you return to the DOS Utilities. . . screen. Press the Esc key to return to the Main Group screen. Remove the disk from the disk drive and place it in a safe place.

2. From the Main Group screen, select the File System option either by pressing the down-arrow key one time and pressing Enter, or by pointing to File System with the mouse and clicking the left mouse button.

   Press the Tab key to activate the directory list window. Using the arrow keys, move the highlight bar to each file with the extension ADD and press the space bar to select the file. If you use a mouse, point to each file with the extension ADD and press the left mouse button.

   Press F10 to activate the menu. Select the File command, and then select Delete. When the Delete File window appears, press Enter. Press 2 to select the `Delete this file` option for each file to be deleted.

   When the files have been deleted, press F3 to leave the File System. You return to the Main Group screen.

3. Make sure that the DOS Shell is operating. From the Main Group screen, select the DOS Utilities option either by pressing the down-arrow key three times and pressing Enter, or by pointing to DOS Utilities with the mouse and pressing the left mouse button.

   From the DOS Utilities. . . screen, press the down-arrow key four times to highlight Restore Fixed Disk and press Enter. If you use a mouse, point to Restore Fixed Disk and press the left mouse button. When the Restore Utility window appears, type **A: C:*.ADD** and press Enter. When you see the prompt `Insert backup diskette 01 in drive A:`, place the first disk in drive A and press Enter.

   When the restore is finished, you return to the DOS Utilities. . . screen. Remove the disk from the disk drive and place it in a safe place.

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Answers to Lesson 15 Exercise

The batch file contains the following lines:

```
ECHO OFF
CLS
DIR A: /P
```

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Answers to Lesson 16 Exercises

1. To create the CONFIG.SYS file, type the following, pressing Enter after each line:

```
COPY CON CONFIG.SYS
FILES = 25
BUFFERS = 20
```

   Press F6 and Enter to save the file.

2. To create the AUTOEXEC.BAT file, type the following, pressing Enter after each line:

```
COPY CON AUTOEXEC.BAT
ECHO OFF
CLS
DATE
TIME
PATH A:\
CHKDSK
```

   Press F6 and Enter to save the file.

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Answers to Lesson 17 Exercises

1. Type **DIR > B:DRIVEA.DIR** and press Enter
2. Type **DIR >> B:DRIVEA.DIR** and press Enter.
3. Type **TYPE B:DRIVEA.DIR | MORE** and press Enter. Alternatively, you can type **MORE < B:DRIVEA.DIR** and press Enter.
4. Type **FIND /V "EXE" B:DRIVEA.DIR** and press Enter. Another way to accomplish this is to type **TYPE B:DRIVEA.DIR | FIND /V "EXE"** and press Enter.
5. Type **SORT < B:DRIVEA.DIR > B:DRIVEA.SRT** and press Enter. Here, SORT gets its input from the file B:DRIVEA.DIR. DOS, in turn, sends the output of the sort to B:DRIVEA.SRT. A second way to accomplish this task is to type **TYPE B:DRIVEA.DIR > B:DRIVEA.SRT** and press Enter.

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APPENDIX

D

DOS Commands by Purpose

If You Want To . . .	*Use*
Back up a hard disk	BACKUP
Concatenate files	COPY
Change the current directory	CHDIR (CD)
Change the current disk drive	d:
Change the date	DATE
Change the name of a file	RENAME (REN)
Change the time	TIME
Compare disks	DISKCOMP
Compare files	COMP
Copy between devices	COPY
Copy disks	COPY, DISKCOPY
Display the amount of memory	CHKDSK
Display the contents of a file	TYPE
Display the date	DATE
Display the files on a disk	DIR, CHKDSK, TREE
Display the free space on a disk	CHKDSK, DIR

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If You Want To . . .	*Use*
Display the subdirectories on a disk	TREE, CHKDSK
Display the time	TIME
Display the version of DOS	VER
Fix a file	CHKDSK, RECOVER
Locate a string in a file	FIND
Make a new directory	MKDIR (MD)
Move a file	COPY
Pause the display	Ctrl-S, MORE
Place the operating system on the disk	FORMAT, SYS
Pipe the output between programs	|
Prepare new disks	FORMAT
Prepare the hard disk	FDISK, FORMAT
Redirect the input of a program	<, |
Redirect the output of a program	>, >>, |
Remove a file	ERASE, DELETE (DEL)
Remove a directory	RMDIR (RD)
Restore a backed-up hard disk file	RESTORE
Clear the screen	CLS

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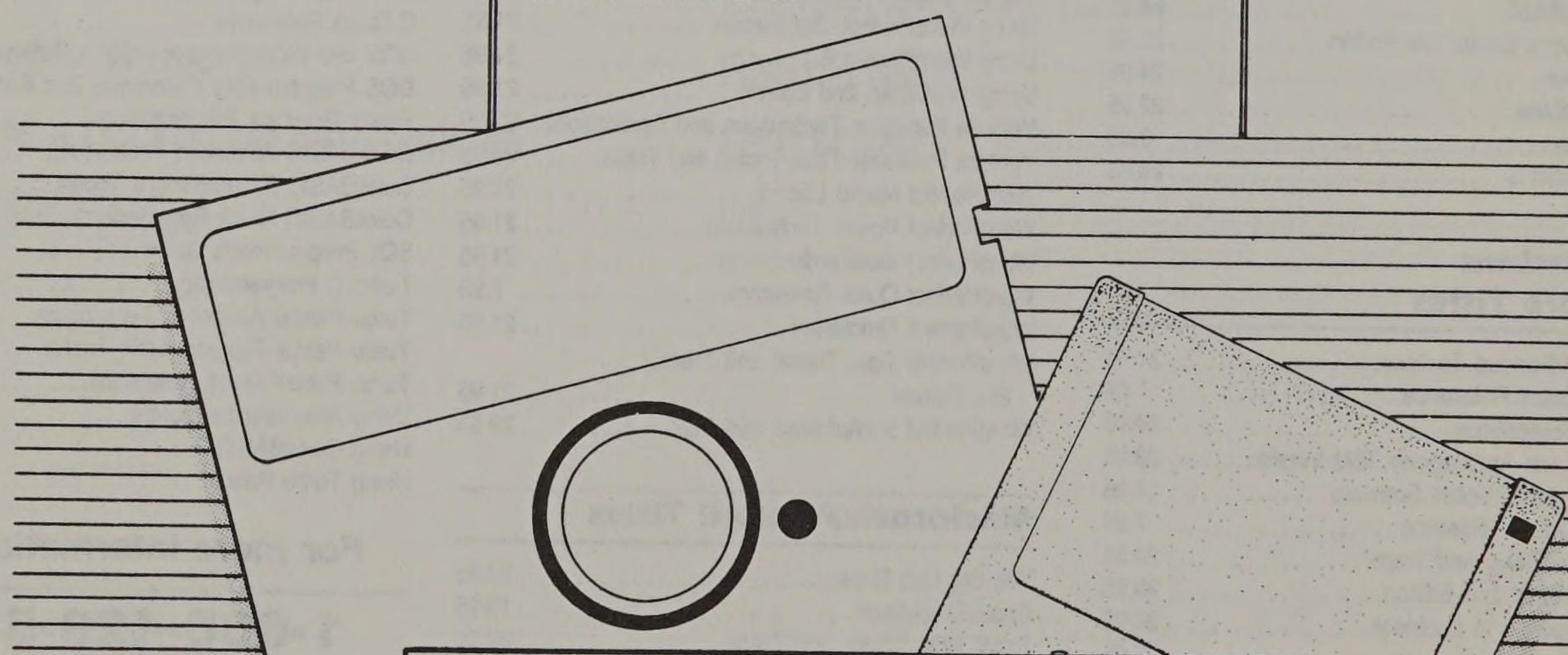
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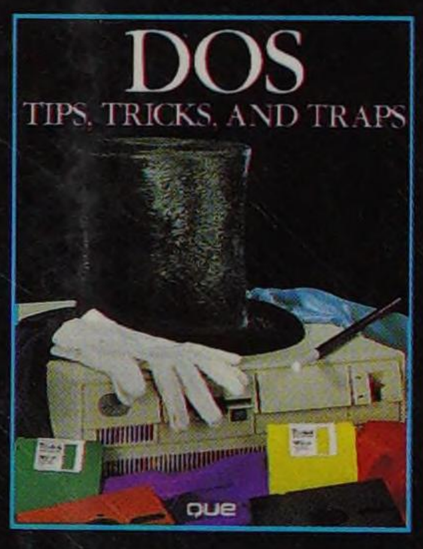
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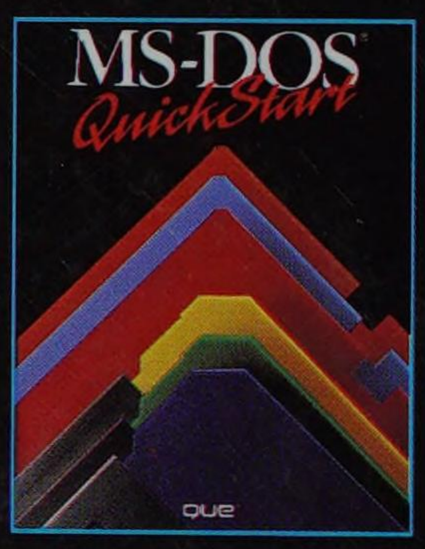
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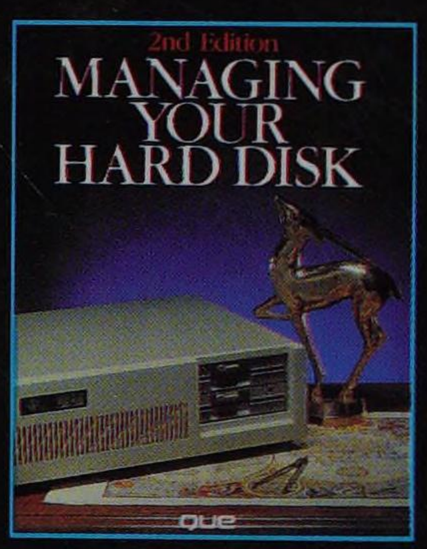
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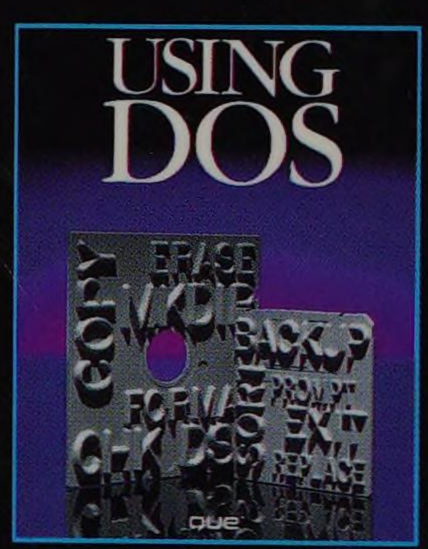
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