Professional™ 300 series

CP/M-80® User's Guide
Diskette System

digital

First Edition

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Preface

INTENDED READER

This manual is intended for first-time users running CP/M-80® on the Professional 325 diskette system. (CP/M is a registered trademark of Digital Research Inc.) You do not need to know how to program to use this manual. Your Professional can run the CP/M operating system when the Z80 board and CP/M applications software are installed. If you are the first user of a newly installed system, refer to the *Professional 300 Series User's Guide for Diskette System* before reading this manual.

MANUAL STRUCTURE

Chapter 1 introduces you to the Professional's CP/M. Chapter 1 also tells how to use CP/M menus, start operating sessions, end operating sessions, and copy your PRO-CP/M-80 SYSTEM DISKETTE.

Chapter 2 explains various CP/M operations and gets you started using CP/M. It provides practice examples of some of the basic CP/M commands. Try the exercises provided throughout this chapter to practice using the CP/M operating system.

Chapter 3 describes the CP/M commands. This chapter is a reference section for all CP/M commands except those used for creating separate diskette areas for multiple users, assembly language programming, and debugging.

Chapter 4 discusses what to do if you have a problem with the Professional or CP/M. It tells you how to isolate the problem, and what to do to correct it.

Appendix A describes the error messages that may occur while you are working with CP/M.

Appendix B explains some special system calls that can be used with the Professional CP/M application. (Note: Appendix B should be used by assembly language programmers only.)

CONVENTIONS USED IN THIS GUIDE

- In examples of dialogue between you and the Professional, what the Professional displays is shown in black. What you type is shown in red.
- <RETURN> means that you must press the RETURN key on your keyboard.
- The term "application diskette" refers to the diskette that is labeled "PRO-CP/M-80 APPLICATION DISKETTE."
- The term "system diskette" refers to the diskette that is labeled "PRO-CP/M-80 SYSTEM DISKETTE."

INFORMATION SOURCES FOR ADVANCED CP/M USERS

This guide tries to answer questions likely to be posed by beginning users who want to run CP/M applications programs available from many software vendors. Such programs cover an extremely wide range—from number manipulation to business planning to word processing. Because users of such programs need little specific computer knowledge, this guide concentrates on those aspects of the Professional and CP/M that are useful for running applications programs and handling the data that such programs produce. The CP/M commands used in file creation and maintenance are covered in detail, as are those that direct input and output to external devices.

The CP/M software for assembling and debugging programs is not covered in this guide. Digital Research, however, produces a CP/M manual that includes detailed information on the CP/M assembler, debugger, and related programs. Readers who want to write assembly-language programs should obtain this manual by ordering:

CP/M Operating System Manual, Digital Research, P.O. Box 579, Pacific Grove, California, 93950.

The advanced CP/M user may also find the following books useful.

Thom Hogan, *Osborne CP/M User Guide*, Osborne/McGraw Hill, Berkeley, California, 1981

Rodnay Zaks, *The CP/M Handbook with MP/M*, Sybex Inc., 1980

Contents

CHAPTER 1 GETTING STARTED WITH CP/M

Introducing CP/M 3
Preparing Your Professional for CP/M 4
Using Menus 5
The HELP Key 5
The MAIN SCREEN and EXIT Keys 6
The CP/M Main Menu 7
Initialize CP/M Diskette 8
Configure I/O Devices 10
Start CP/M 13
Checking Your Directory 15
Ending a Session with CP/M 15
Copying Diskettes 16

CHAPTER 2 GETTING THINGS DONE WITH CP/M

Conversing with CP/M 21
Using the Keyboard with CP/M 22
Keys to Which CP/M Responds 22
Keys that CP/M Displays But Does Not Understand 25

Correcting Typing Errors in Command Lines 27
BS Key 27
DELETE Key 27
CTRL/X 28
CTRL/U 28
Error Messages 28
Error Conditions 29
Diskettes and Files 29
Storing Information on Diskettes 29
Using Diskettes 30
Using Commands and Files 30
File Names 31
Looking at the File Directory—The DIR Command 31
Changing the Currently Active Drive 32
Using File References 34
The CP/M Commands 35
Using CP/M Commands 36
Creating and Editing Files—The ED Command 36
Examining Files—The TYPE Command 41
Changing File Names—The REN Command 41
Getting Information About Files—The STAT Command 42
Copying Files—The PIP Command 43
Deleting Files—The ERA Command 44
Running Applications Programs 44

CHAPTER 3 THE CP/M COMMANDS

Introduction 47
DIR 50
ED 50
Starting an Editing Session 51
The Text Buffer Versus the Diskette File 51
Routine Editing Operations 52
The Character Pointer (CP) 53
Getting Text into the Buffer 53
Displaying Text 54
Deleting Text from the Buffer 55
Moving the Character Pointer 56
Moving Text from the Buffer to Diskette 57
Ending an Editing Session 58
Advanced Editing Operations 58

ERA 59
PIP 60
Command Mode 60
Program Mode 61
PIP Parameters 62
REN 64
STAT 65
Statistics on Files 65
File Access Attributes 66
Examples Using STAT on Files 66
Statistics on Devices 67
Examples of Using STAT on Devices 69
Transferring Files Between P/OS and CP/M—The FILEXFER Program 72
The FILEXFER Command 72
The EXIT Command 73
The COPY Command 73
The ECHO Command 75
The HELP Command 75
The NAME Command 76
SUBMIT 76
Examples Using SUBMIT 76
Command Files 77
Command Files that Require Additional User Input 79
TYPE 80

CHAPTER 4 WHAT TO DO IN CASE OF PROBLEMS

What Problems Are 83
How to Get Help 84
Some Common Trouble Symptoms and Their Cures 86

APPENDIX A ERROR MESSAGES

APPENDIX B SYSTEM CALLS

Retrieving System Information 98
Call to Specify P/OS File Names 98
Communications Calls 99

FIGURES

Figure 1-1: CP/M Main Help Menu 6
Figure 1-2: CP/M Main Menu 7
Figure 1-3: CP/M Diskette Initialization Menu 9
Figure 1-4: CP/M I/O Device Configuration Menu 10
Figure 1-5: CP/M Boot Screen 14
Figure 1-6: CP/M Directory 15
Figure 2-1: Applying a Write-Protect Tab 22
Figure 2-2: Tracks and Sectors on a Diskette 30
Figure 2-3: The ED Text Buffer 37

1

Getting Started with CP/M

Chapter 1

Getting Started with CP/M

INTRODUCING CP/M

CP/M is the Control Program for Microprocessors. Such a program is called an operating system because it governs all activities taking place in a computer. When you run CP/M applications on the Professional, they are under CP/M's control.

When you want the Professional to do something, you communicate with it by typing commands to CP/M on the keyboard. CP/M accepts commands for a variety of actions including:

- Listing the names of files on a diskette
- Copying the entire contents of diskettes
- Copying individual files
- Creating text files
- Displaying text files
- Printing files on a printer
- Deleting files
- Running programs

PREPARING YOUR PROFESSIONAL FOR CP/M

Before you use CP/M, you must first install the CP/M Z80 board and you must prepare the CP/M application diskette (labeled "PRO-CP/M-80 APPLICATION DISKETTE"). The *Professional 300 Series Installation Instructions for CP/M Module* manual contains instructions for installing the Z80 board. The *Professional 300 Series User's Guide for Diskette System* contains instructions for preparing diskettes.

You will want to set up CP/M on your Professional before you start a CP/M operating session. This chapter describes:

- How to use CP/M menus
- How to initialize CP/M diskettes
- How to start and end CP/M operating sessions
- How to back up your "PRO-CP/M-80 SYSTEM DISKETTE" (this diskette is referred to as the "system diskette" from now on)

You will find it helpful to read through this chapter and use the examples provided before you begin to run CP/M applications programs and manipulate files.

> **NOTE:** Before you do the examples provided in this chapter, see the *Professional 300 Series User's Guide for Diskette System* for instructions on how to handle and use diskettes.

USING MENUS

Your CP/M application includes several menus that help you organize your CP/M files and use certain CP/M capabilities. You will always use at least one of the menus—the CP/M Main Menu—each time you use CP/M. You will use the other CP/M menus whenever you need to do specific tasks, but you will not necessarily use them every time you enter a CP/M operating session. The menus allow you to do the following tasks:

- Start CP/M processing
- Initialize diskettes so they can be used for CP/M processing
- Configure I/O devices

The HELP Key

When you are not sure what to do, press HELP. You can press HELP from any CP/M menu. Information will appear to aid you. Help is available to you from the menus only. Once you start a CP/M operating session, you can no longer press the HELP key to display a help message.

You can press HELP in several different situations:

1. First, you can display general information about each CP/M menu. To do so, press HELP while the pointer is resting above the list of menu options. Press RESUME to return to the menu you were using.
2. Second, you can display the CP/M Main Help Menu, which allows you to choose from a list of Help topics. To do so, press HELP from the CP/M Main Menu when the pointer is resting above the list of menu options. The Help for CP/M Application Menu is displayed. Now press NEXT SCREEN. The CP/M Main Help Menu (Figure 1-1) is displayed. From it you can choose the topic for which you want further information. After you have displayed the information that you want, press RESUME to return to the CP/M Main Menu, or press PREV SCREEN to redisplay the CP/M Main Help Menu.

3. Third, you can display specific information about the options on each menu. Simply move the pointer to the option you want and press HELP. Press RESUME to return to your original work. (If you press HELP for any options on the CP/M Main Menu, you can also press PREV SCREEN to display the CP/M Main Help Menu.)

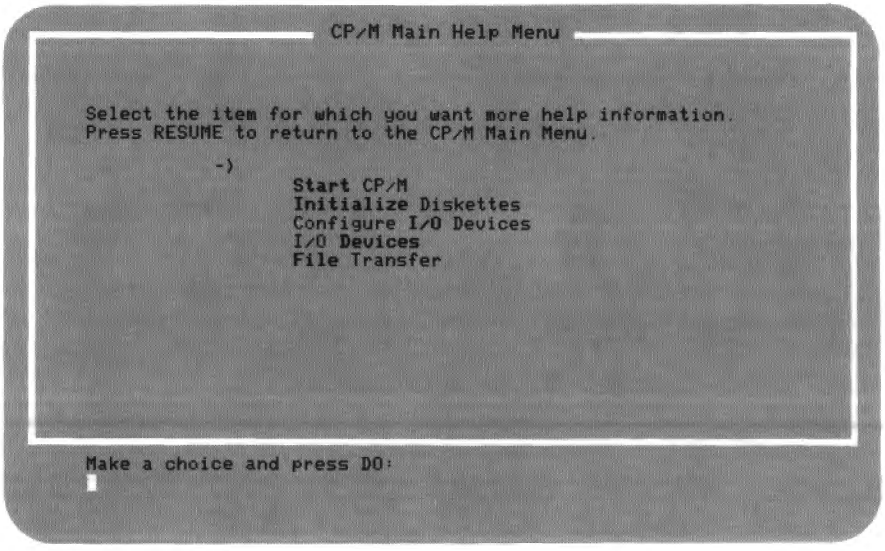


Figure 1-1
CP/M Main Help Menu

The MAIN SCREEN and EXIT Keys

While you are working with the CP/M Main Menu, pressing the MAIN SCREEN and EXIT keys redisplays the DIGITAL logo and ready prompt. You can then either turn the power off or insert another application diskette. If you press MAIN SCREEN from any CP/M menu **(except the CP/M Main Menu),** the CP/M Main Menu is redisplayed. If you press EXIT from any CP/M menu **(except the CP/M Main Menu),** the next higher menu appears.

The CP/M Main Menu

When you want to use CP/M, you must first display the CP/M Main Menu on your screen. The procedure below tells you how to do this. (Keep the *Professional 300 Series User's Guide for Diskette System* handy for a detailed description of the start-up procedure.)

1. Insert the P/OS system diskette into drive slot 1.
2. Turn the Professional on by pressing the power switch to the "1" position. After a minute or so, the DIGITAL logo and the Professional's ready prompt are displayed.
3. Remove the P/OS system diskette from drive slot 1. Insert the CP/M application diskette into drive slot 1 and press **RESUME**. Some messages indicating that the application is being located appear on your screen. After a few moments, the Professional displays the CP/M Main Menu (Figure 1-2).

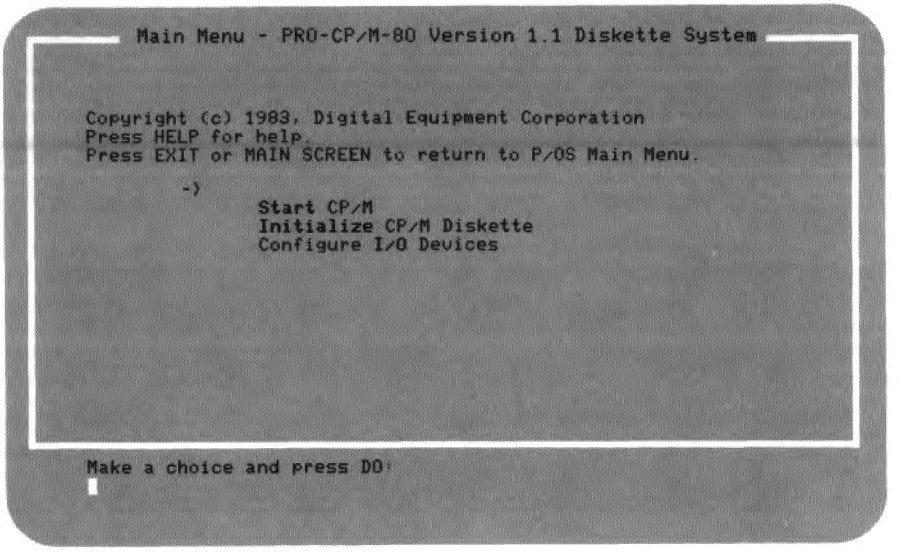


Figure 1-2
CP/M Main Menu

Look at the CP/M Main Menu that is displayed on your screen now. This menu lists three options that allow you to perform different tasks with CP/M. The sections below describe the three options on the CP/M Main Menu.

Normally, when you begin a CP/M operating session, you only need to choose "Start CP/M" from the CP/M Main Menu. The first time that you use CP/M, however, you must work with the other options on the CP/M Main Menu to initialize diskettes and configure I/O devices. After you have set up your diskettes and I/O devices, you can begin a CP/M operating session simply by selecting "Start CP/M" from the CP/M Main Menu. The sections below are therefore organized so that the "Start CP/M" option is described last.

Initialize CP/M Diskette

First, look at the "Initialize CP/M Diskette" option on the CP/M Main Menu.

Before you use any diskettes for the first time, you must initialize them.

> **CAUTION:** The initialization procedure erases the contents of your diskette. Before you initialize diskettes, make sure you have backed up any files you want to save onto other diskettes.

Move the pointer to "Initialize CP/M Diskette" or type the boldface letters. Press DO. The CP/M Diskette Initialization Menu appears (Figure 1-3).

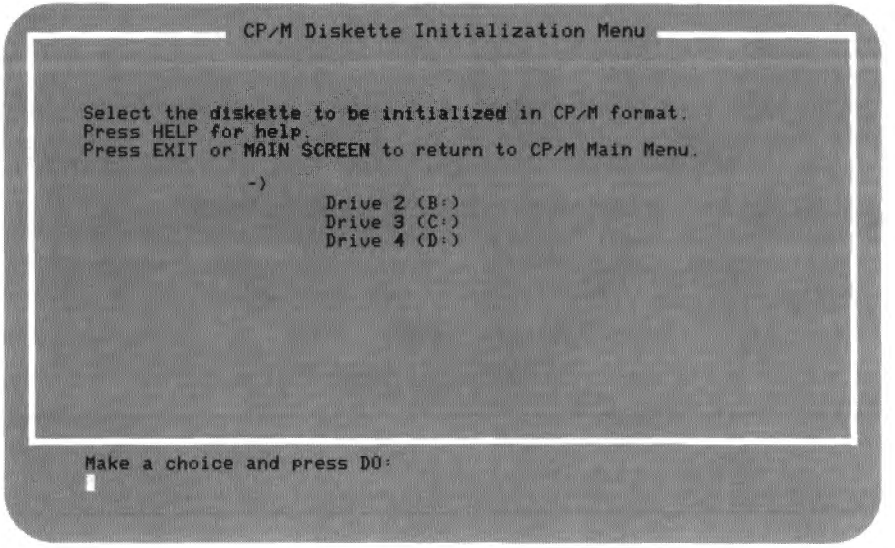


Figure 1-3
CP/M Diskette Initialization Menu

The menu allows you to initialize CP/M diskettes in drive slots 2, 3, or 4. To initialize a diskette, insert that diskette into a diskette drive. Then select from the menu the drive that contains the diskette to be initialized and press **DO**. The system displays the following message:

```
CAUTION: Initializing will destroy all data on the diskette

Press DO to initialize diskette
Press CANCEL to return to menu
```

If you press **DO**, the system displays:

```
Initializing diskette ....
```

The system then redisplays the CP/M Diskette Initialization Menu with the following message at the bottom of the screen:

```
Diskette initialized
```

If you press **CANCEL**, the CP/M Diskette Initialization Menu is redisplayed. The diskette is not initialized, and no message appears at the bottom of the screen.

Press DO to initialize the diskette. Then press EXIT or MAIN SCREEN to return to the CP/M Main Menu.

Diskettes that have been initialized for CP/M processing cannot be used for P/OS processing. Likewise, diskettes that have been initialized for P/OS processing cannot be used for CP/M processing. Make sure that you label your diskettes carefully so that you can distinguish CP/M diskettes from P/OS diskettes.

Configure I/O Devices

The third selection listed on the CP/M Main Menu is "Configure I/O Devices." You use this selection to name files that will allow you to transfer information between P/OS and CP/M.

From the CP/M Main Menu, move the pointer to "Configure I/O Devices" or type the boldface letters. Press DO. The CP/M I/O Device Configuration Menu appears (Figure 1-4).

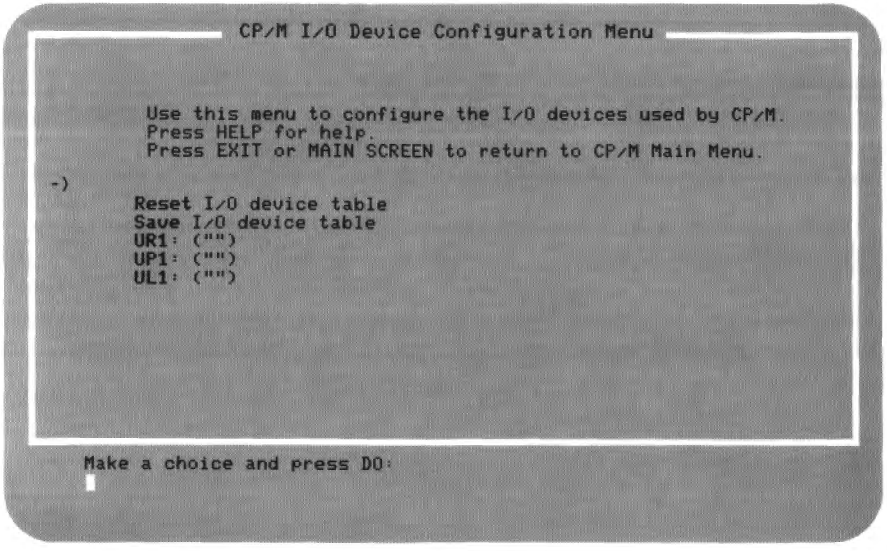


Figure 1-4
CP/M I/O Device Configuration Menu

First look at the last three options on the menu. These are:

- UR1:
- UP1:
- UL1:

UR1, UP1, and UL1 are the names of the devices that CP/M lets you configure. After you configure a device, the volume, directory, and file name that you assign to the device appear inside the parentheses beside the device name.

UR1, UP1, and UL1 are devices that you can configure to move information back and forth between CP/M and P/OS. The first device, UR1, enables you to transfer files from P/OS to CP/M. The second device, UP1, enables you to move files from CP/M to P/OS. The third device, UL1, also enables you to transfer files from CP/M to P/OS. In other words, UR1 is used for sending input to CP/M. UP1 and UL1 are used for sending output from CP/M.

You will find it easiest to think of UR1, UP1, and UL1 as files to which you can send information. When you configure UR1, UP1, and UL1, you are actually assigning them file names.

When you choose UR1 from the CP/M I/O Device Configuration Menu, one of two menus appear:

1. If you have inserted a P/OS diskette that contains some ASCII or text files in drive slot 2, the File Selection Menu appears. You can choose the name for UR1 from this menu. You can also press the ADDTNL OPTIONS key to display an Additional Options Menu.
2. If you have not inserted a P/OS diskette in drive slot 2, or if you have inserted a P/OS diskette that contains no files, the Additional Options Menu appears. The Additional Options Menu is described in more detail in the *Professional 300 Series User's Guide for Diskette System.*

When you choose UP1 or UL1 from the CP/M I/O Device Configuration Menu, the Name a File Form appears. You can either enter a file name and let CP/M assign the file type, or you can press the ADDTNL OPTIONS key to display an Additional Options Menu. The Additional Options Menu is described in more detail in the *Professional 300 Series User's Manual for Diskette System.*

Configure UR1 now. Insert a P/OS diskette that contains some ASCII (text) files in drive slot 2. Move the pointer to UR1 or type the boldface letters. Press **DO**. The File Selection Menu appears.

For practice, create a new file called USERTEST.TRY for UR1. Press the **ADDTNL OPTIONS** key. The Additional Options Menu appears.

Select "Use extended file name." Press **DO**. The Extended File Name screen appears. Type DISKETTE2:[USERFILES]USERTEST.TRY and press **DO**. The CP/M I/O Device Configuration Menu reappears. (Notice that the name of UR1 is now USERTEST.TRY. It is stored in the USERFILES directory on DISKETTE2.)

Now look at the first two options on the menu. These options are:

- Reset I/O device table
- Save I/O device table

Look at the "Save I/O device table" option first.

"Save I/O device table" saves the file names for all three devices exactly as you named them while using the CP/M I/O Device Configuration Menu. After you have chosen the file names that you want to remain for the devices, you select this option so that the names that you assigned become permanent.

Note that when you select "Save I/O device table," you automatically save the file names for all three devices. You cannot save just one or two of the device names.

The other option, "Reset I/O device table," allows you to change the device names back to the names that you assigned when you last selected "Save I/O device table."

You have set up a file name for UR1. To save that name, move the pointer to "Save I/O device table" or type the boldface letters. Press **DO**. After a few seconds, the system redisplays the CP/M I/O Device Configuration Menu. (In this exercise, you named only UR1. When you select "Save I/O device table," you save UR1's new name, and you save the original names for UP1 and UL1.) Now press **EXIT** or **MAIN SCREEN** to return to the CP/M Main Menu.

Start CP/M

The "Start CP/M" option enables you to begin your CP/M operating session. Whenever you choose "Start CP/M" from the CP/M Main Menu, you must remove the application diskette from drive 1 and insert the system diskette before you can actually start working with CP/M. Follow the steps below to start your CP/M operating session.

1. Move the pointer to "Start CP/M" or type the boldface letters.
2. Press **DO**. The CP/M Boot screen (Figure 1-5) appears.
3. Remove the application diskette from drive 1 and insert the system diskette.
4. Press the **RESUME** key. The following message appears.

```
CP/M 2.2 for P/OS Version 1.1
Copyright (c) 1981, Digital Research, Inc.

A>
```

A> is a prompt that indicates that CP/M is ready to accept commands. CP/M can access up to four drives, so it always prompts you with the name of the drive it is currently accessing (A, B, C, or D) and a right angle bracket (>).

For example, if the current, or active, drive is Drive B (drive 2), CP/M displays:

```
B>
```

It waits for a command. You can issue commands to CP/M whenever it displays the prompt.

> **NOTE:** Drive A, Drive B, Drive C, and Drive D refer to drive slots 1, 2, 3, and 4, respectively.

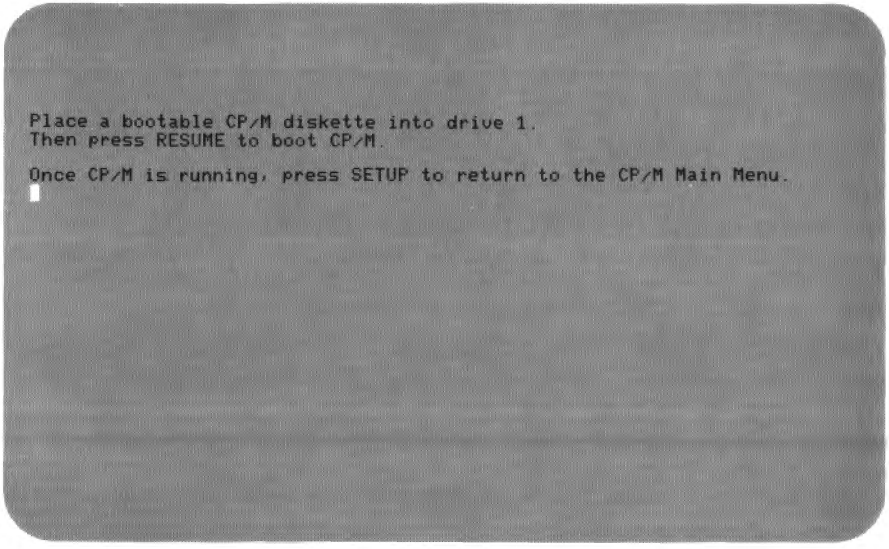


Figure 1-5
CP/M Boot Screen

CHECKING YOUR DIRECTORY

After you have performed the procedure described in the previous section, "Start CP/M," you should check your CP/M directory to make sure that your system diskette contains all the software included with your CP/M application option.

To do this, type DIR after the A> prompt. Then press the RETURN key. The system should display the contents of your system diskette. Check the names displayed against those listed in Figure 1-6. If you discover any omissions, contact your vendor.

```
A>DIR
A: ASM      COM : DDT     COM : DUMP     ASM : DUMP      COM
A: ED       COM : LOAD    COM : PIP      COM : STAT      COM
A: SUBMIT   COM : XSUB    COM : SYSGEN   COM : FILEXFER COM
A: MOVCPM   COM
A> ■
```

Figure 1-6
CP/M Directory

ENDING A SESSION WITH CP/M

Follow the procedure below to end a CP/M operating session.

1. At the prompt (in this case A>), press the SET-UP key. The system displays:

   ```
   CP/M cancelled on user request.

   Replace the CP/M diskette with the application diskette.
   Then press RESUME.
   ```

2. Remove the CP/M diskette that you are using from drive 1, and insert the CP/M application diskette. Press the RESUME key. The system displays the CP/M Main Menu.

3. Press EXIT. The DIGITAL logo and ready prompt are redisplayed. You can now insert a diskette for another application in drive 1 or turn the power off.

4. Make sure you remove the application diskette from drive 1 and put it away. Remove and put away any other diskettes that you have been using.

COPYING DISKETTES

As you use CP/M, you will want to make backup copies of your diskettes. By doing so, you will ensure that you have extra copies of your files in case files on your working diskettes become lost or damaged.

Before you start to use CP/M, you should copy your application and system diskettes. This will ensure that you have copies that you can use in case you accidentally lose or erase either diskette.

The procedure below tells you how to copy diskettes. You can copy any diskette, **except the system diskette,** by following the first 10 steps of the procedure. To copy the system diskette, follow all steps of the procedure, except for steps 8, 9, and 10.

This procedure assumes that you have the CP/M Main Menu displayed on your screen. When you do this procedure, you will type some commands so that CP/M can copy the diskette. These commands are discussed in later chapters. For now, however, you don't have to understand how they work.

> **CAUTION:** Press the RETURN key only when directed to do so. Otherwise, you may erase valuable information. You may, from habit, want to press RETURN each time you enter information during this procedure. Several steps in this procedure require you to enter information **without** pressing RETURN. To avoid any errors, do not press RETURN unless the instructions tell you to do so.

1. Initialize the diskette that you will be using as a copy. Insert the diskette **to which you want to copy** into drive slot 2 (Drive B) of the the system unit.

   Note that this procedure erases the files on the diskette in Drive B. You should therefore choose either a blank diskette or one that contains files that you want to erase.

   > **CAUTION: NEVER** INITIALIZE YOUR SYSTEM DISKETTE OR YOUR APPLICATION DISKETTE. If you do so, you will erase all the files on your diskette.

2. From the CP/M Main Menu, select "Initialize CP/M Diskette." Press DO. The CP/M Diskette Initialization Menu is displayed.

3. Move the pointer to Drive 2 (Drive B) and press **DO**. The system displays the following message:

```
CAUTION: Initializing will destroy all data on the diskette

Press DO to initialize diskette
Press CANCEL to return to menu
```

(Remember that the diskette in Drive B should be the diskette you will be using as a copy, NOT the diskette you are copying.)

4. Press **DO** again. For a few seconds, you will hear some activity in the diskette drive. Then the CP/M Diskette Initialization Menu is redisplayed with the following message at the bottom of the screen.

```
Diskette Initialized
```

5. Press **MAIN SCREEN** or **EXIT** to return to the CP/M Main Menu.

6. Move the pointer to "Start CP/M" and press **DO**.

7. Remove your application diskette from drive slot 1 (Drive A) and insert your system diskette. (Reminder: the diskette that you just initialized should still be in Drive B.) Press **RESUME**.

NOTE: If you are copying your system diskette, you should skip steps 8, 9, and 10.

8. At the prompt (A>), type:

```
A>PIP
```

and press **RETURN**. An asterisk (*), signifying that the PIP program is ready to accept commands, is displayed.

9. Remove the CP/M system diskette from Drive A and insert **the diskette that you want to copy.**

10. At the asterisk, type:

```
B:=A:*.*[OVR]
```

Press **RETURN**. The following message appears:

```
COPYING -
```

The files on the diskette you are copying are then listed on your monitor as they are copied. The copying process takes several minutes. After all files have been copied, the prompt (*) is redisplayed.

All files from Diskette A have been copied to Diskette B. You can now remove the diskette that you copied from Drive A, and reinsert the system diskette. Press **RETURN** to redisplay the prompt (A>).

11. **(System diskette only.)** Reminder: The system diskette should be in Drive A, and the diskette to which you are copying should be in Drive B. At the prompt (A>), type:

    A>PIP B:=A:*.*[OVR]

    and press RETURN. The following message appears:

    ```
    COPYING -
    ```

    The files on the system diskette are then listed on your monitor as they are copied. The copying process takes several minutes. After all files have been copied, the prompt (A>) is redisplayed.

12. At the A> prompt, type:

    A>SYSGEN

    Press RETURN. The following message is displayed:

    ```
    SYSGEN Version 2.0 for the Professional 300 Series
    Enter source drive name (or press RETURN to skip)
    ```

13. Type:

    A

    DO NOT PRESS RETURN. The following message appears:

    ```
    Source on A, then press RETURN
    ```

14. Press RETURN. The following message is displayed:

    ```
    Function complete
    Enter destination drive name (or press RETURN to reboot)
    ```

15. Type:

    B

    DO NOT PRESS RETURN. The following message appears:

    ```
    Destination on B, then press RETURN
    ```

16. Press RETURN. The following message appears:

    ```
    Function complete
    Enter destination drive name (or press RETURN to reboot)
    ```

17. Press RETURN. When the prompt (A>) is redisplayed, the system diskette has been copied onto the diskette in Drive B.

18. Remove the diskette from Drive B and label it as your backup system diskette. Because the CP/M files on the diskette are copyrighted, you should also mark the backup CP/M system diskette as follows:

    © 1981 Digital Research

2

Getting Things Done with CP/M

Chapter 2

Getting Things Done with CP/M

The Professional's CP/M is a useful tool for running applications programs. You can also use it to manipulate and store the data that such programs often require for input or produce as output. An applications program helps you perform a particular task, such as planning a budget or analyzing data. Many applications programs are available for use with the Professional and CP/M.

You can best learn CP/M by using it. This chapter explains various CP/M operations and provides practice examples. You can get a good idea of how CP/M works on your Professional by reading the rest of this chapter and trying the examples.

CONVERSING WITH CP/M

You converse with CP/M by typing commands when CP/M displays the prompt (A>). Whenever the A> prompt is displayed on your monitor, you are conversing with CP/M at "command level." In other words, you are talking directly to CP/M when you issue commands at the A> prompt.

Generally, after typing a command, you must press the **RETURN** key to tell CP/M that you want it to execute the command. Some CP/M programs display messages such as **CR** (for carriage return), or **RET** to indicate that you should press the **RETURN** key.

A few CP/M programs ask you questions requiring a single-character response. Some of these programs process your response as soon as you type it, without waiting for you to press **RETURN**. In such instances, you must be careful because a typing error could alter or destroy your software.

This guide alerts you to such programs, but your best protection against trouble is to write-protect diskettes where instructed to do so, and to keep copies of your software. You can protect any diskette from being written on by any program if you use the self-sticking write-protect tabs provided by the manufacturer. Apply these tabs as shown in Figure 2-1. This mechanism prevents the inadvertent destruction of data by you or anyone else. You can remove the write-protect tab at any time and return the diskette to its writable state.

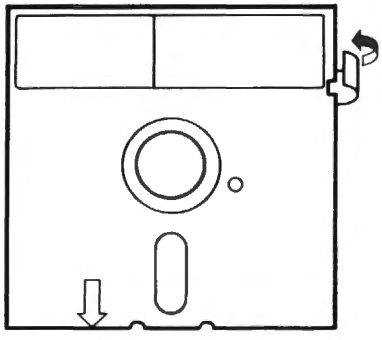


Figure 2-1
Applying a Write-Protect Tab

USING THE KEYBOARD WITH CP/M

As you use your CP/M application, you will discover that the keys on your Professional's keyboard sometimes have different functions than they do when you are working in P/OS. This section summarizes how CP/M interprets the keys as you type them.

Keys to Which CP/M Responds

SET-UP—This key is used to end a CP/M operating session. (See "Ending an Operating Session" in Chapter 1.)

SET-UP is also used if the keyboard becomes locked (the WAIT light is on) and nothing you type is entered. Pressing SET-UP is the only way to clear this condition. When you press SET-UP, you also exit from CP/M.

HOLD SCREEN—This key keeps the screen display from changing so that you can read what is on it. Your Professional will not display any new text after you press HOLD SCREEN once. When you press HOLD SCREEN, the HOLD light on the keyboard lights.

You can release the screen in two different ways. First, if you want to see the rest of the file, press **HOLD SCREEN** again. The HOLD light goes out, and the remainder of the file is displayed.

Second, if you wish to exit from the file, press any key except for the following:

HOLD SCREEN
PRINT SCREEN
SET-UP
SHIFT
COMPOSE CHARACTER
CTRL
LOCK

The A> prompt is redisplayed. (Some keys will produce extra characters that are displayed beside the A> prompt. Simply delete the characters and continue processing.)

COMPOSE CHARACTER—This key is used to enter 8-bit characters. (For more information about 7- and 8-bit characters, see the *Professional 300 Series Terminal Subsystem Manual*, order number AA-N623B-TK.)

If you inadvertently press **COMPOSE CHARACTER** when you are entering 7-bit characters, press <⌫ to cancel it. (If you do not press <⌫, the terminal beeps after the second keystroke. You can then continue typing.)

RETURN, **LF** (LINE FEED), and **ENTER**—The **RETURN**, **LF**, and **ENTER** keys do the same thing. Use them to mark the ends of commands that you issue to CP/M, and to indicate the end of a line when you are using ED, the text editor.

BS (BACKSPACE) and <⌫ (DELETE)—The **BS** and <⌫ keys erase errors. When you press either of these keys, the character to the left of the cursor is erased and the cursor moves one space to the left. CP/M lets you erase characters until you reach the A> prompt. When you reach the A> prompt, however, CP/M ceases to respond to these keys. You cannot erase the prompt or any characters on the lines above the prompt.

When you are working with ED and some other CP/M applications, the <⌫ key works slightly differently. When you press <⌫, the character to the left of the cursor is erased from memory, but CP/M echoes the erased character on the screen. If you erase a series of characters using the <⌫ key, you may find the display on your screen to be confusing. You can redisplay the line with its corrections by typing **CTRL/R**.

CTRL—The CTRL key is typed simultaneously with a letter key to generate a special form of the letter called a control code. CP/M recognizes the control codes listed below.

This guide documents such combinations as CTRL/X to indicate that you should simultaneously press the CTRL key and some other letter (in this case, X). Such combinations are called control characters. When typed, some control characters are displayed on the screen before causing any action to occur, and some are not. A control character that is displayed appears as a caret (^) followed by the letter you typed. For example, when you type CTRL/C to reset the system, the screen displays it as ^C before resetting the system.

Control Code	*Function*
CTRL/C	Resets the system. (This is sometimes called a "warm start" or a "warm boot.")
CTRL/E	Permits you to start a new line while deferring execution of the preceding line.
CTRL/H	Works the same as the BS (BACKSPACE) key.
CTRL/J	Works the same as the LF (LINE FEED) key.
CTRL/M	Works the same as the RETURN and ENTER keys.
CTRL/P	Echoes screen display on the current LST: device until you type CTRL/P a second time or until a warm start occurs. (This is not the same as the PRINT SCREEN key.) Chapter 3 discusses the CP/M devices in greater detail.
CTRL/R	Redisplays the current line with corrections.
CTRL/S	Keeps the screen display from changing so you can read what is on it. To display the remainder of the file, type CTRL/S again, or type any letter or number key on the keyboard (do not use the auxiliary keypad to type a number).
CTRL/U	Erases the current line from CP/M's memory, displays a # sign, moves the cursor to the next line, and waits for further input. The line image stays on the screen.

CTRL/X	Works the same as CTRL/U but erases the line image from the screen.
CTRL/Z	Ends input from the keyboard when using ED. Indicates the end of a string when using PIP.

Keys that CP/M Displays but Does Not Understand

CP/M does not understand the following keys:

1. Any keys in the editing keypad
2. The four keys at the top of the auxiliary keypad (PF1–PF4)
3. The special function keys in the top row, except for HOLD SCREEN, SET-UP, ESC, BS, LF, and PRINT SCREEN (if your Professional is attached to a local printer).

If you press any of these keys, CP/M displays some characters but takes no further action. Although CP/M itself does not understand these keys, some applications programs do. The way an applications program responds to these keys depends on the program.

The keys in the editing keypad display the following characters:

Key	*Display*	
	7-bit mode	*8-bit mode*
FIND	^[[1~	CSI1~
INSERT HERE	^[[2~	CSI2~
REMOVE	^[[3~	CSI3~
SELECT	^[[4~	CSI4~
PREV SCREEN	^[[5~	CSI5~
NEXT SCREEN	^[[6~	CSI6~
↑	^[[A	CSIA
↓	^[[B	CSIB
→	^[[C	CSIC
←	^[[D	CSID

The four keys at the top of the auxiliary keypad display the following characters:

Key	*Display*	
	7-bit mode	*8-bit mode*
PF1	^[OP	SS3P
PF2	^[OQ	SS3Q
PF3	^[OR	SS3R
PF4	^[OS	SS3S

The special function keys in the top row display the following characters:

Key	*Display*	
	7-bit mode	*8-bit mode*
HOLD SCREEN	Pressed once, holds screen display; pressed twice, releases the hold	Same as 7-bit mode
PRINT SCREEN	Prints the screen; invisible if you have no printer	Same as 7-bit mode
SET-UP	"CP/M cancelled on user request; Press RESUME to return to CP/M Main Menu"	Same as 7-bit mode
BREAK	^[[13~	CSI13~
F5	^[[15~	CSI15~
INTERRUPT	^[[17~	CSI17~
RESUME	^[[18~	CSI18~
CANCEL	^[[19~	CSI19~
MAIN SCREEN	^[[20~	CSI20~
EXIT	^[[21~	CSI21~
ESC	Understood as ESC	Same as 7-bit mode
BS	Understood as BS	Same as 7-bit mode
LF	Understood as LF	Same as 7-bit mode
ADDTNL OPTIONS	^[[26~	CSI26~

HELP	^[[28~	CSI28~
DO	^[[29~	CSI29~
F17	^[[31~	CSI31~
F18	^[[32~	CSI32~
F19	^[[33~	CSI33~
F20	^[[34~	CSI34~

CORRECTING TYPING ERRORS IN COMMAND LINES

If you mistype a command or type the wrong command, and you notice the error before pressing RETURN, you can make corrections in several ways. The following sections describe the various methods of making corrections.

BS Key

The BS key in the top row of function keys is the BACKSPACE key. Pressing the BS key erases the last character you typed from CP/M's memory and from the screen, and moves the cursor back a space. (The cursor is the blinking symbol on your screen. It will be either a rectangle (▮) or an underscore (_)). For example, type:

```
A>PROFESSIONSK
```

Now press the BS key twice. The characters K and S disappear, leaving you with PROFESSION. Type:

```
A>PROFESSIONAL
```

The screen displays PROFESSIONAL. Now press the BS key 12 times to erase PROFESSIONAL.

DELETE Key

The DELETE key is the ⌫ key located above the RETURN key. If you are at command level, you erase the character to the left of the cursor when you press the ⌫ key. (At command level, the ⌫ key works the same way that BS works.)

> **NOTE:** The ⌫ key does not work this way when you use some applications, such as the editor (ED). If you press the ⌫ key while using these applications, the character to the left of the cursor is deleted from memory, but the deleted character is echoed at your screen. You might find it easier to use the BS key when editing.

CTRL/X

CTRL/X erases the entire command line back to the prompt. For example, type:

```
A>PERSONAL OFFICE COMPUTER
```

Now type CTRL/X by holding down the CTRL key and then pressing the letter X. The entire line is erased, and only the prompt remains.

CTRL/U

CTRL/U cancels the current command line and allows you to begin again on the line below. The line remains visible on the screen, but is deleted from memory. To see how CTRL/U works, type:

```
A>THIS IS FUN
```

Now type CTRL/U by holding down the CTRL key and pressing the letter U. The system displays a # sign at the end of the line. The cursor then moves to the next line, but the A> is not redisplayed:

```
A> THIS IS FUN#
```

You erased the words "THIS IS FUN" from memory when you typed CTRL/U, but you did not erase them from the screen. When the cursor moves to the next line, you can enter a CP/M command just as you would if the cursor were beside the prompt.

ERROR MESSAGES

When CP/M displays its prompt, it is waiting for you to type a command. If you type something that CP/M does not understand, it displays an error message. For example, if you type:

```
A>TIPE <RETURN>
```

when you mean to issue the TYPE command, CP/M displays the message:

```
TIPE?
```

The error message means that CP/M does not recognize the command.

Error messages can occur for a variety of reasons. For example, you get an error message if you type a command incorrectly, if the command is not a valid CP/M command, or if CP/M lacks some information it needs to process the command. It is not possible to anticipate all the conditions that can cause error messages. However, if you get an error message you can:

- Check for spelling errors and then retype the command correctly if you find any errors.
- Check the list of commands at the beginning of Chapter 3 to determine whether or not the command you typed is a valid CP/M command.
- Check to see if your system diskette is in Drive A.
- Refer to the discussion of the command in Chapter 3.

ERROR CONDITIONS

Sometimes the system issues an error message, but it does not redisplay the A> prompt. If this happens, you can take one of two actions:

- Type CTRL/C to reset the system. When you type CTRL/C, the A> prompt is redisplayed. This is called a "warm start" or "warm boot."
- Press SET-UP. Then remove the diskette from Drive A and insert the application diskette. Press RESUME to exit to the CP/M Main Menu.

DISKETTES AND FILES

CP/M handles a broad spectrum of information including programs, text, and data. Information is organized in the form of files, and the files are stored on diskettes. You might find it helpful to think of the information contained on a diskette as being similar to the folders contained in a file cabinet.

Storing Information on Diskettes

The computer stores and retrieves files by referring to tracks and sectors on a diskette (see Figure 2-2). Professional diskettes have 80 tracks (numbered 0 through 79), each composed of 10 sectors. Sectors store blocks of bytes, each byte representing one character such as a letter, a digit, or a symbol. Because each sector has a unique location on the diskette, the computer can find a particular sector on a particular track and store information in it or retrieve information from it.

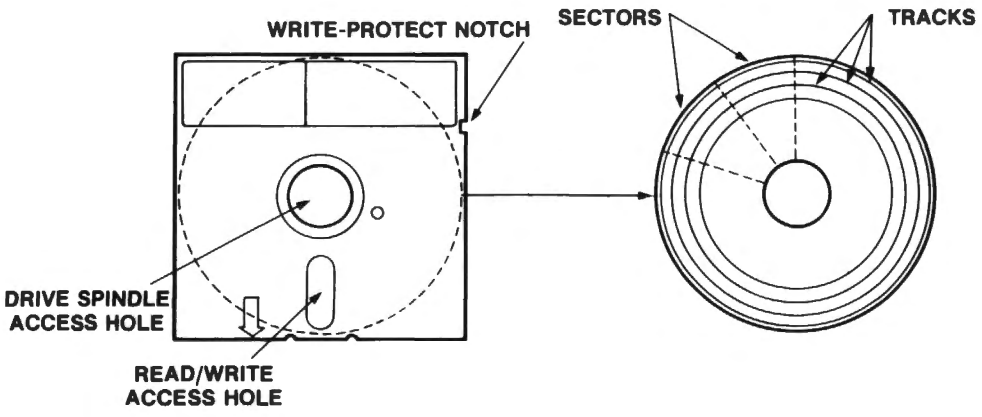


Figure 2-2
Tracks and Sectors on a Diskette

Using Diskettes

Because information on a diskette can be corrupted by accident, human error, or temperature and humidity, it is important to copy or "back up" diskettes. Thus, you generate working copies and store the originals, or master diskettes, as insurance against corrupted files.

Chapter 1 describes how to back up diskettes. If you have not already done so, copy and label the system diskette and the application diskette according to the procedure in Chapter 1. Other diskettes that contain programs, the data generated by programs, or text should be copied periodically.

You may occasionally install a diskette that does not seat itself properly on the drive hub as you close the drive door. This can cause unreliable operation resulting in data loss or inaccessible data. To guard against this, always insert the diskette carefully, pushing it gently back in the drive as far as it can go. Shut the drive door securely. If you encounter any difficulty inserting the diskette or closing the drive door, remove the diskette and try again.

Using Commands and Files

When you issue a command, you usually have to include a file specification. The file specification tells CP/M the file to which the command applies and the file's location (that is, the drive that contains the diskette on which the file resides). If you do not specify a drive name, CP/M assumes the file is on the diskette in the current drive.

File Names

CP/M files have a "first" name, called the file name, and an optional "last" name, called the file type (or extension). The file name and file type are separated by a period. The following conventions apply to file names:

- A file name and type can include any combination of letters, numbers, and printable symbols except for any characters generated by the COMPOSE CHARACTER key and the characters shown below:

  < > . , ; : = * ? [ ] |

- The file name must be separated from the file type by a period.
- A file name can include from one to eight characters.
- A file type can include from zero to three characters. File types are often used to denote a class of files. For example, the file type .COM identifies CP/M programs that you can run by typing the file name.

Following are some examples of valid file names:

XYZ.COM	X.Y	1
GAMMA.RAY	1.1	GAMMA
GAMMA.1	X	PAY-ROLL.+

Looking at the File Directory—The DIR Command

Each diskette that contains files also contains a file directory. Just as a telephone directory identifies what subscribers exist and where they can be found, the diskette directory tells CP/M what files exist on a given diskette. To obtain information about the contents of a diskette, examine its directory by using the DIR command. To see what is on a diskette, type:

```
A>DIR <RETURN>
```

The Professional displays all the files on the diskette:

```
A>DIR
A: ASM      COM : DDT     COM : DUMP      ASM : DUMP      COM
A: ED       COM : LOAD    COM : PIP       COM : STAT      COM
A: SUBMIT   COM : XSUB    COM : SYSGEN    COM : FILEXFER  COM
A: MOVCPM   COM
A>
```

The files are displayed without a period between the file name and file type, but you must always include the period when creating and referring to files. Note that files on each line in the directory are separated from one another by a colon (:).

The DIR command lists the contents of the currently active diskette. To examine the contents of another diskette, specify its drive name. For example, to examine the contents of a diskette on Drive B, first make sure there is an initialized diskette in the drive, then type:

```
A>DIR B: <RETURN>
```

CP/M lists the contents of the diskette on Drive B.

If there are no files on the initialized diskette when you issue the DIR command, CP/M replies:

```
NO FILE
```

If no diskette is loaded in the drive that you specify, or the drive door is open, the system issues the following message:

```
A)DIR B:
? I/O error attempting to mount disk foreign, I/O status = 375
  Device not ready
Bdos Err On B: Select
```

If this happens, type CTRL/C to redisplay the A prompt. Then insert an initialized diskette in the drive, close the door, and retype the command. CP/M will then display the directory for the selected drive.

Changing the Currently Active Drive

Unless you type a drive name when you issue a command, CP/M assumes that the files upon which you want the command to act reside on the diskette in the currently active drive. The current drive is sometimes called the default drive, and commands are said to default to the current drive.

There are two ways of making commands apply to other drives:

1. Specify the drive name with the command, as you did when you examined the directory on Drive B. This method is useful when you want to do something briefly on another drive and then continue working on the current one.
2. Specify another drive name as the currently active one before you issue the command. (See the example below.) This method is more convenient if you want to work on the other drive for a length of time, perhaps to run a program and store its results on the diskette on that drive.

Any time the CP/M prompt is displayed, you can access a different drive by typing the drive name (A, B, C, or D) followed by a colon (:). **If there is an initialized diskette in that drive,** then that drive becomes active, and CP/M displays the appropriate prompt.

To access Drive B before issuing the DIR command, **be sure there is an initialized diskette** in Drive B. Type:

```
A>B: <RETURN>
```

CP/M displays:

```
B>
```

Drive B becomes the current drive. If you now issue a command without specifying a location, the command defaults to Drive B. For instance, type:

```
B>DIR <RETURN>
```

to get a directory of the diskette on Drive B. If the diskette in Drive B contains some files, then a directory of those files is displayed on your screen.

Now get a directory of the diskette on Drive A. Type:

```
B>DIR A: <RETURN>
```

The directory of the diskette on Drive A appears.

You can use DIR to determine whether a specific file resides on any given diskette. For example, to find the FILEXFER.COM file, which is on the diskette in Drive A, specify the location and the name of the file. Type:

```
B>DIR A:FILEXFER.COM
```

CP/M displays:

```
A: FILEXFER COM
```

Switch back to Drive A by typing:

```
B>A: <RETURN>
```

CP/M again accesses Drive A and displays its prompt:

```
A>
```

Using File References

A file reference identifies a particular file or group of files on a diskette. CP/M recognizes references to two kinds of file names, unambiguous and ambiguous. An unambiguous file name identifies a specific file such as FILEXFER.COM or PIP.COM. An ambiguous file name identifies one or more files. Ambiguous file names are useful when, for example, you are searching for a file whose exact name you have forgotten, or when you want a command to act on several files at once.

You use an ambiguous reference by substituting a question mark (?) or an asterisk (*) for parts of an unambiguous file name. Because they can replace actual characters, these symbols are sometimes called wildcards. The question mark replaces individual characters in the same position as the question mark. For example, give the DIR command followed by an S, seven question marks, and the file type .COM. Type:

```
A>DIR S???????.COM <RETURN>
```

CP/M lists all files on the diskette in Drive A that start with S and have a file type of .COM.

The asterisk matches any unspecified remainder of a file name or file type. For this reason, typing:

```
A>DIR *.COM <RETURN>
```

causes CP/M to list all files (on Drive A, the current drive) with a file type of .COM.

If you type:

```
A>DIR *.* <RETURN>
```

you get a list of all files on the diskette in Drive A.

This is the same as typing:

```
A>DIR <RETURN>
```

Note that while a file name cannot contain a question mark (?) or an asterisk (*), a file reference can.

THE CP/M COMMANDS

CP/M recognizes two kinds of commands, resident and transient. Resident commands are built into CP/M. You will not see them in the directory, but the programs for them are part of the CP/M operating system. Any time the system is running, these commands are in memory, and you can use them. The resident commands are:

DIR	Displays a directory.
ERA	Deletes a file or files from a diskette.
REN	Renames a file.
SAVE	Saves portions of memory in a diskette file (not covered in this manual).
TYPE	Displays the contents of a file.
USER	Creates separate diskette areas for multiple users (not covered in this manual).

Transient commands are not usually in memory when CP/M is running. Because the programs for them are longer than those for the resident commands, transient commands exist as files on a diskette and must be brought into the computer's memory before they can be used. The files for transient commands have the file type .COM. If such a file is on the diskette in the current drive, you can invoke it by typing the file name without the file type. (For example, you invoke the program PIP.COM by typing PIP.) Otherwise, you must find which diskette it is on, load the diskette in a drive, and specify that drive when you type the file name. Alternatively, you can copy the file to the current diskette if space permits. Examples of transient commands that you will use most frequently are:

ED	Allows you to create and modify text files.
PIP	Allows you to copy files.
STAT	Provides information about files and diskettes.
FILEXFER	Allows you to copy files between P/OS diskettes and CP/M diskettes.

The remainder of this chapter introduces a variety of the CP/M commands in the form of examples that you can practice at your terminal. However, the chapter does not provide extensive information about the commands, nor does it cover every one. For detailed information on each CP/M command, refer to Chapter 3.

Using CP/M Commands

Saving information in electronic files requires some understanding of how files are created, stored, and used. It is equally important to know what operations can be performed on files to make the most efficient use of diskette space and to aid in the transfer of information between diskettes.

To see how various commands affect files, use the examples below to create a test file on the system diskette. If the system diskette is write-protected, remove the write-protect tab. Then load the system diskette in Drive A. (If you have not copied the system diskette yet, do so according to the instructions in Chapter 1, before you try any of the following procedures.)

Creating and Editing Files—The ED Command

Aside from running programs, you may want to write reports, memos, or letters and store them in files. Files of this sort are called text or ASCII files because they consist of ordinary characters: letters, numbers, and symbols such as punctuation marks. However, not all files are text files. Some files exist in forms understandable only to the computer. These have various names such as machine language, binary, or executable files. All of the programs for CP/M's transient commands are stored in this form.

To create a file, invoke ED, the CP/M editor. An editor is a program for creating new text files or for modifying old ones. The following example demonstrates elementary editing commands. First, the example creates a new text file, which contains intentional errors. Next, the example shows you how to move around in the text and fix the errors.

Create the file TEST.TXT by typing:

```
A>ED TEST.TXT <RETURN>
```

When you type the command, ED allocates an area in memory called the text buffer, which serves as a temporary workspace (see Figure 2-3). At the end of the editing session, ED transfers the file from the text buffer to the diskette and frees the area in memory. If no other file with the name TEST.TXT exists on the diskette, ED informs you that you have made a

```
NEW FILE
```

and creates the file TEST.TXT on the diskette, along with a temporary file called TEST.$$$. Both are empty. ED also prompts you with a colon (:), a space, and an asterisk (*), signifying it is ready to accept commands:

```
: *
```

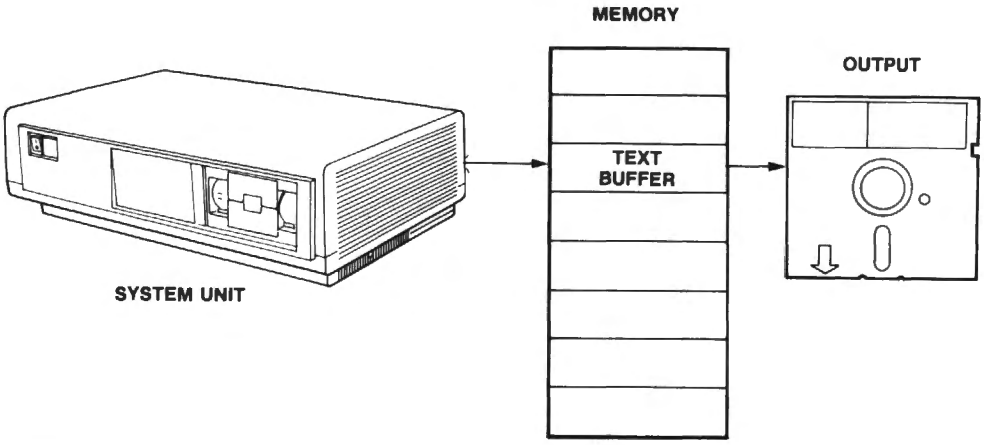


Figure 2-3
The ED Text Buffer

Tell ED you want to insert text by typing:

```
: *I <RETURN>
```

ED gives you a blank line, numbered 1, and accepts all subsequent input as new text until you type CTRL/Z. Each time you press RETURN, ED gives you another numbered line. The line numbers help you locate information when you want to make changes, but they do not exist in the file when the editing session is over:

```
1:
```

Insert the text printed in red in the following example, typing everything exactly as you see it. The text contains intentional errors for you to fix later. If you make additional errors, correct them using BS or CTRL/X if you can, or just leave them for the time being.

```
A>ED TEST.TXT
NEW FILE
     : *I
    1: THIS REPORT OUTLINES COSTS FOR
    2: LABORATORY MICEE AND EQUIPMENT USED
    3: EXPERIMENTALLY FOR
    4: IN EXPERIMENTS DURING JANUARY.
    5:
```

Typing CTRL/Z signals ED that you are through inserting text, and causes ED to display its prompt (: *), which means it is waiting for further commands. Now you can correct errors and insert additional text. To help you move around in the buffer and locate portions of the text that require change, ED provides a character pointer, called the CP. This is an imaginary arrow that marks where you are in the buffer. The CP will always be located:

- Before the first character in the buffer, or
- After the last character in the buffer, or
- Between two characters.

When you finish inserting text, the CP is at the bottom of the text buffer; that is, after the last character in the last line. It may help to think of the text buffer as a page in a book. Move the CP to the beginning of the buffer (page) by pressing:

```
: *B <RETURN>
```

ED displays:

```
1: * ▮
```

to indicate that the CP is now at the beginning of the buffer. From anywhere in the buffer, you can always reach the beginning by pressing B, or the end by typing –B.

If you move to the end of the buffer, ED displays:

```
: * ▮
```

to signal that it is at the end and is awaiting further commands.

Use the T (Type) command to display lines from the buffer. Pressing T causes ED to display the current line starting from wherever the CP is currently located. Typing 0T (use a **zero**, not the letter O) causes ED to display the line from the beginning to the CP. You can easily display the whole line by typing 0TT. If you want ED to display the whole buffer, move the CP to the beginning of the buffer, then type:

```
1: *#T <RETURN>
```

ED displays the entire contents of the buffer.

Although ED just displayed the whole buffer, the CP is still at the top of the buffer (that is, before the first character in line 1). Line 2 in the file contains a misspelling. MICEE should be MICE. Use the S command to make ED search for and correct the misspelled word. Type:

```
1: *SMICEE<CTRL/Z>MICE<CTRL/Z><RETURN>
```

ED moves the CP to the word MICEE and replaces it with the word MICE. Now examine the line to confirm that ED made the change. Remember that the CP is located in the middle of the line, after the word MICE. To display the whole line, use the 0TT command. Type:

```
2: *0TT <RETURN>
```

The corrected line is displayed.

Sometimes it is necessary to delete entire lines from the file. Line 3, for example, is extraneous and should be removed. The L command tells ED how many lines forward or backward in the buffer to move the CP. Pressing L moves it one line ahead; typing 2L moves it two lines ahead, typing −2L moves it two lines back, and so on. Because the CP is positioned in the middle of line 2, you should move it to the beginning of line 3. Then type out line 3 to confirm it is really the line you want to delete. To do this, type:

```
2: *LT <RETURN>
```

ED moves the CP ahead one line and displays:

```
3: EXPERIMENTALLY FOR
3: * ▮
```

indicating that the CP is positioned at the beginning of line 3.

Note that the T command does not change the position of the CP. Use the K (Kill) command to delete the line. Press:

```
3: *K <RETURN>
```

ED displays:

```
3: * ▮
```

To confirm that the line was deleted, use the B command to move the CP to the beginning of the buffer. Then use the #T command to display the entire contents of the buffer. Press:

```
3: *B <RETURN>
1: *#T <RETURN>
```

ED displays the buffer. The extraneous line has been deleted, and all the lines have been renumbered.

The entire editing sequence is shown below.

```
A>ED TEST.TXT
NEW FILE
   : *I
  1:  THIS REPORT OUTLINES COSTS FOR
  2:  LABORATORY MICEE AND EQUIPMENT USED
  3:  EXPERIMENTALLY FOR
  4:  IN EXPERIMENTS DURING JANUARY.
  5:
   : *B
  1: *#T
  1:  THIS REPORT OUTLINES COSTS FOR
  2:  LABORATORY MICEE AND EQUIPMENT USED
  3:  EXPERIMENTALLY FOR
  4:  IN EXPERIMENTS DURING JANUARY.
  1: *SMICEE^ZMICE^Z
  2: *0TT
  2:  LABORATORY MICE AND EQUIPMENT USED
  2: *LT
  3:  EXPERIMENTALLY FOR
  3: *K
  3: *B
  3: *#T
  1:  THIS REPORT OUTLINES COSTS FOR
  2:  LABORATORY MICE AND EQUIPMENT USED
  3:  IN EXPERIMENTS DURING JANUARY.
  1: *
```

End the editing session by using the E (Exit) command. This tells ED you are finished and want to save the file on diskette. Press:

```
1: *E <RETURN>
```

When you exit the ED program, CP/M displays its prompt. Type:

```
A>DIR <RETURN>
```

Look at the directory to confirm that the files TEST.TXT and TEST.BAK are there. TEST.BAK is a **backup copy** of the file, containing the previous version. Because you just created a new file, there is no previous version, and TEST.BAK is empty. However, when you make future edits, the previous version becomes TEST.BAK and the new version becomes TEST.TXT. This feature ensures that you always have the last version of the file as well as the next-to-the-last version. (Refer to the ED command in Chapter 3 for more information about backup files.)

Examining Files—The TYPE Command

Text files (files composed of printable characters) can be displayed on the screen by the TYPE command. Use the command to examine TEST.TXT and TEST.BAK:

A>TYPE TEST.TXT <RETURN>

CP/M displays the contents of TEST.TXT on the terminal as shown below. Notice that the line numbers are gone.

```
A)TYPE TEST.TXT
THIS REPORT OUTLINES COSTS FOR
LABORATORY MICE AND EQUIPMENT USED
IN EXPERIMENTS DURING JANUARY.

A)
```

When you use TYPE to display a long file, you may find that it scrolls too quickly for you to read it. In that case, you can temporarily halt the scrolling by pressing the HOLD SCREEN key. To resume the display, press the HOLD SCREEN key again.

Now type the contents of TEST.BAK:

A>TYPE TEST.BAK <RETURN>

Because there is nothing in the file, there is nothing to display. The prompt is displayed and CP/M waits for another command.

Changing File Names—The REN Command

It is a good idea, when creating a file, to give it a name that will help you remember what is in the file. TEST.TXT is very general and gives no clue as to the file's contents. Because the report is supposed to enumerate operating expenses for the month of January, it might be better to call it something like COSTS.JAN.

The REN command lets you change the name of a file. To change the name of TEST.TXT to COSTS.JAN, type:

A>REN COSTS.JAN = TEST.TXT <RETURN>

Now use the DIR command to confirm that the change was made. (Note that TEST.TXT is no longer in the directory, but TEST.BAK is.)

If you change the name of a file, be sure to rename the backup file as well. In this case, change TEST.BAK to COSTS.BAK. Type:

A>REN COSTS.BAK=TEST.BAK <RETURN>

You can issue another DIR command, if you want, to verify that the backup file was also renamed.

```
A>REN COSTS.JAN=TEST.TXT
A>DIR
A: TEST     BAK : ASM      COM : DDT      COM : DUMP     ASM
A: DUMP     COM : ED       COM : LOAD     COM : PIP      COM
A: STAT     COM : SUBMIT   COM : XSUB     COM : COSTS    JAN
A: SYSGEN   COM : FILEXFER COM : MOVCPM   COM
A>REN COSTS.BAK=TEST.BAK
A>DIR
A: COSTS    BAK : ASM      COM : DDT      COM : DUMP     ASM
A: DUMP     COM : ED       COM : LOAD     COM : PIP      COM
A: STAT     COM : SUBMIT   COM : XSUB     COM : COSTS    JAN
A: SYSGEN   COM : FILEXFER COM : MOVCPM   COM
A>
```

Getting Information About Files—The STAT Command

As its name suggests, the STAT command provides statistics on files, such as the amount of space (in bytes) they occupy on a diskette. STAT can also tell you how much free space (unused bytes) is on a particular diskette. Get some information about the current diskette by typing:

A>STAT <RETURN>

STAT should return a message similar to the one shown below. The message indicates that the diskette is read/write; that is, the diskette can be both read from and written to. The message also indicates that some number of bytes (318K in this example) of unused space remains on the diskette. You will recall from the discussion of storing information on diskettes that a byte is the amount of memory required to store a single character (1K byte equals 1024 bytes).

```
A>STAT
A: R/W, Space: 318k
A>
```

Now get some information about COSTS.JAN. Type:

A>STAT COSTS.JAN <RETURN>

Your screen will show information similar to that shown below. (This is only an example. You may get different numbers, but the form of the message should be the same.)

```
A>STAT COSTS.JAN
 Recs  Bytes  Ext Acc
Bytes Remaining On A: 318k
A>
```

Rec means *record.* CP/M builds files by stringing records together, each of which contains 128 bytes. *EXT* means *extent.* An extent is a block of records. The term *Acc* refers to the file's *access attribute*, which indicates whether the file is a read-only file or a read-write file. In this case, the file can be read from and written to. STAT also informs you that the file resides on Drive A, and that Drive A has 318K bytes of free space.

Copying Files—The PIP Command

The PIP (Peripheral Interchange Program) command enables you to create copies of a file, either on the current diskette or on another diskette. Such copying is useful if you want to change a file without altering the original, or if you want to make a backup copy of the file on another diskette. Backup copies provide protection in case of accidental damage to the original diskette, or in case you accidentally delete the original file. PIP also enables you to send files to printers and other devices connected to the Professional.

To see how PIP works, make a copy of COSTS.JAN on a diskette in Drive B. Load an initialized diskette in Drive B. Type:

```
A>PIP B:COSTS.JAN=A:COSTS.JAN <RETURN>
```

This command copies COSTS.JAN on Drive A to COSTS.JAN on Drive B.

When you type the PIP command, you must include the drive name whenever it differs from the currently active drive. In the example above, Drive A was the currently active drive. You were copying a file to a diskette in Drive B, so you had to specify Drive B in the command (B:COSTS.JAN). Because the file you were copying already existed on Drive A, however, you could have issued the same command as follows:

```
A>PIP B:COSTS.JAN=COSTS.JAN <RETURN>
```

Now examine the directory of Drive B to verify that the copy was made. Type:

```
A>DIR B: <RETURN>
```

COSTS.JAN should appear in the directory. Also examine the directory of Drive A. COSTS.JAN is there, too.

```
A)DIR B:
B: COSTS   JAN
A)DIR A:
A: COSTS   BAK : ASM      COM : DDT     COM : DUMP    ASM
A: DUMP    COM : ED       COM : LOAD    COM : PIP     COM
A: STAT    COM : SUBMIT   COM : XSUB    COM : COSTS   JAN
A: SYSGEN  COM : FILEXFER COM : MOVCPM  COM
A)
```

When you copy a file, you can, if you want, give the copy a different name from the original. For instance, to make a copy of COSTS.JAN and call the copy REPORT.JAN, type the following command:

```
A>PIP REPORT.JAN=COSTS.JAN <RETURN>
```

Examining the directory will show both files. The files are identical in content but different in name.

```
A>PIP REPORT.JAN=COSTS.JAN
A>DIR A:
A: COSTS    BAK : ASM      COM : DDT      COM : DUMP     ASM
A: DUMP     COM : ED       COM : LOAD     COM : PIP      COM
A: STAT     COM : SUBMIT   COM : XSUB     COM : COSTS    JAN
A: REPORT   JAN : SYSGEN   COM : FILEXFER COM : MOVCPM   COM
A>
```

CAUTION: If you copy a file and give it the name of a file that already exists, the existing file is deleted and replaced with the new one as soon as the copy operation is complete.

Deleting Files—The ERA Command

Eventually, space on a diskette becomes scarce as you continue to create text files or to generate data by running programs. Therefore, it becomes necessary from time to time to free space by deleting files that are no longer needed. The ERA command erases those files which you no longer need. For example, to delete REPORT.JAN, type:

```
A>ERA REPORT.JAN <RETURN>
```

RUNNING APPLICATIONS PROGRAMS

CP/M is a popular operating system because many applications programs have been written to run under it. These programs have been developed by many companies, and you will probably be using some of them. Because procedures for running such programs can vary, you will have to consult the documentation that comes with the programs for detailed operating instructions. In general, however, CP/M makes it easy to run an applications program. Usually an applications program has the file type .COM, and you can invoke it simply by typing its name.

3

The CP/M Commands

Chapter 3

The CP/M Commands

INTRODUCTION

This chapter describes two types of CP/M commands: resident and transient.

Resident commands are built into the CP/M operating system. You will not see them in the directory, but any time the system is running, these commands are in memory, and you can use them. Once you start a CP/M operating session, you can remove the system diskette from Drive A and still use any of the resident commands. This is possible because resident commands are loaded into the Professional's memory when you start an operating session.

Transient commands are not usually in memory when CP/M is running. Because the programs that execute them are longer than those for resident commands, transient commands exist as files on a diskette and must be brought into the computer's memory before they can be used. Transient commands reside on the system diskette and are visible in the directory as files of the type .COM. Each time you invoke a transient command, CP/M reads the named file from the diskette into memory and then proceeds to execute the computer instructions contained in the file.

You need not keep transient commands as permanent parts of the operating system. You can copy the transient command files you want to use to other diskettes. Thus, you can build working diskettes using only those transient commands you expect to use frequently—and release diskette space for programs and data. (The PIP command, discussed in this chapter, enables you to copy files from one diskette to another.)

To use transient commands, you must insert the system diskette (or a working diskette that you have created that contains the commands you want to use) in Drive A before you type the command.

Both resident and transient commands are issued by typing the command name in uppercase or lowercase or even in a mixture of the two. (This guide illustrates all commands in uppercase, but you need not follow that practice.) CP/M requires that you terminate each command by pressing the RETURN key. Here is an example:

```
A>FILEXFER <RETURN>
```

Certain CP/M transient commands contained on your system diskette are associated with assembly language programming and debugging—an area of the Professional CP/M application intentionally omitted from this guide.

The resident and transient CP/M commands provided by your CP/M system diskette are listed below. Transient command names are preceded by an asterisk (*) to distinguish them from names of resident commands.

Command	*Function*
*ASM	Runs ASM.COM, an assembly program (not covered in this guide).
*DDT	Runs DDT.COM, a CP/M program-debugging utility program (not covered in this guide).
DIR	Lists file names in the directory.
*DUMP	Runs DUMP.COM, CP/M's file-examining utility program (not covered in this guide).
*ED	Runs ED.COM, the CP/M text-editing program.
ERA	Erases or deletes a file.
*FILEXFER	Runs FILEXFER.COM, a program that transfers files between P/OS and CP/M.

*LOAD	Runs LOAD.COM, a program that converts files from HEX format into executable .COM files (not covered in this guide).
*MOVCPM	Runs MOVCPM.COM, a utility program that allows users to create versions of CP/M for systems with different memory allotments from that of the Professional (not covered in this guide).
*PIP	Runs PIP.COM, the Peripheral Interchange Program (for transporting files from one system device to another).
REN	Renames a file.
SAVE	Permits user to save portions of memory in a diskette file (not covered in this guide).
*STAT	Runs STAT.COM, a CP/M program that provides information about and certain controls over diskette, terminal, and printer allocations.
*SUBMIT	Runs SUBMIT.COM, which permits the execution of multiple, previously generated commands.
*SYSGEN	Runs SYSGEN.COM, which facilitates copying new systems (not covered in this guide).
TYPE	Displays the contents of a text file on the terminal.
USER	Permits creation and use of separate diskette areas for multiple users (not covered in this guide).
*XSUB	Runs XSUB.COM, a subset of SUBMIT.COM. Permits line input to programs that are invoked by SUBMIT (not covered in this guide).

Detailed information about the commands covered in this guide follows.

DIR

The DIR (directory) command displays the names of files on a diskette. This command can be typed alone, or it can be accompanied by file specifications, diskette drive specifications, or both.

```
DIR <RETURN>
```

lists all files on the currently active diskette. It is the same as the command DIR *.* <RETURN>. (For information about using the wildcard specifiers, "*" and "?," see "Using File References" in Chapter 2.) Following are some examples of valid DIR commands.

DIR X.Y <RETURN>	Displays the directory of the file X.Y.
DIR X?Z.C?M <RETURN>	Displays the directory of all files with three-letter names that begin with X and end with Z and three-letter extensions that begin with C and end with M.
DIR *.COM <RETURN>	Displays a directory of all files with a .COM extension.

The file name can be preceded by a drive name. The following DIR commands cause CP/M to list a directory of files on a specific drive. (If you don't specify a drive with the DIR command, CP/M automatically lists the directory of the currently active drive.)

DIR B: <RETURN>	Displays the directory of all files on the diskette in Drive B.
DIR A:X.Y <RETURN>	Displays the directory of the file X.Y on Drive A.
DIR B:*.C?M <RETURN>	Displays the directory of all files on the diskette in Drive B that have a three-letter extension that begins with C and ends with M.

ED

The ED command runs ED.COM, a program that lets you create and modify text files. ED is a *line-oriented editor*. That is, its primary focus is a single line within the text. If you want information about more than the line on which you are currently working, you must issue commands to display the lines above and below your present location. This distinguishes ED from the *screen-oriented editors* usually used by word-processing systems. These editors show you the context in which you are working by automatically displaying a full screen of up-to-date text each time you change your working location.

If you intend to use your Professional's CP/M extensively to create and modify large documents, you should contact your dealer for information about one of the screen editors or word-processing programs currently available to run under CP/M. If, however, you expect to create only short text files, ED may be adequate.

The following sections provide you with the basic facts about ED. If you have never run this program before, you may find it helpful to do the sample session on ED in Chapter 2 before you read these sections.

Starting an Editing Session

To get started, type the ED command together with an unambiguous file name and file type. For example:

```
A>ED TEST.TXT <RETURN>
```

If TEST.TXT does not exist, ED will open a file of that name and then will display:

```
NEW FILE
:*
```

The asterisk is ED's prompt character. It indicates that the program is waiting for a command. At this point you have a variety of options that will be discussed later in this section. First, however, you need to learn some basics.

The Text Buffer Versus the Diskette File

When you begin creating a document by typing characters for ED to process, those characters are initially stored in the Professional's memory. This allows you to make any necessary changes before ED transfers the file to a diskette. Because memory can be quickly and easily altered, ED puts all the text it can in memory before it requires any transfers to diskette.

The portion of memory that ED allocates for this temporary storage task is called the text buffer. In the Professional, ED's text buffer has room for about 39,000 characters. (This amounts to about 13 pages of single-spaced text.)

When you invoke ED with a new file name, it not only opens a text buffer in memory, but also creates two new files on the diskette—in this example, TEST.TXT and TEST.$$$. Both are empty. When you exit from the editing session, ED automatically does the following:

- Renames TEST.TXT to TEST.BAK
- Moves text from the buffer into TEST.$$$
- Renames TEST.$$$ to TEST.TXT

TEST.BAK thus becomes a backup copy containing the previous version of the file. If you create a new file and there is no previous version, TEST.BAK is empty. However, when you make future revisions, the previous version becomes TEST.BAK and the new version becomes TEST.TXT.

This feature ensures that you always have both the last version and the next-to-the-last version of the file.

Routine Editing Operations

Most of your work with ED can be done easily if you familiarize yourself with the following concepts, discussed in the remainder of this section:

- The character pointer (CP)
- Commands for getting text into the buffer
- Commands for displaying text
- Commands for deleting text from the buffer
- Commands for moving the character pointer
- Commands for transferring text from the buffer to diskette
- Commands for ending an editing session

> **NOTE:** In the following sections, the letter "n," when used with a command, stands for a number that you choose to type together with the command. The word "string" refers to a word or group of words that you wish to manipulate by issuing the command.

The Character Pointer (CP)

The majority of operations that ED performs on text in the buffer are done with reference to the character pointer, called the CP. This is an imaginary arrow that marks where you are in the buffer. It sits either before the first character in the buffer, behind the last character in the buffer, or between two characters in the buffer. You always insert text to the immediate right of the CP, and you display text forward or backward from the CP.

Getting Text into the Buffer

The following commands put text into the buffer.

Command	*Function*
nA <RETURN>	Appends lines from diskette file to buffer. Moves n lines. (#A moves maximum number of 65,535 lines; 0A moves lines until file is totally transferred or until the buffer is half full.)
I <RETURN>	Enters insert mode. All subsequent text goes into the buffer until you type **CTRL/Z**. If V is selected (see following), each new line is assigned a number (which does not go into the buffer), **BS**, **CTRL/H**, **CTRL/R**, **CTRL/U**, and **CTRL/X** perform the same erase functions as in the CP/M monitor. The ⌫ key erases the character to the left of the cursor from memory and echoes the character on your screen. (If you use the ⌫ key, you can type **CTRL/R** to redisplay the line with corrections.)
Istring <CTRL/Z>	Inserts the characters composing the string to the right of the CP; no **RETURN** is appended.
Istring <RETURN>	Inserts the characters composing the string and a **RETURN** to the right of the CP.

Displaying Text

The following commands display text in the buffer.

Command	*Function*
nT/ – nT <RETURN>	Types lines. If n is positive, displays n lines after the CP. If n is negative, displays n lines before the CP. If the CP is in the middle of a line, 0T displays the text from the beginning of the line to the CP, and T displays the text from the CP to the end of the line. Thus, 0TT displays the whole line.
n/ – n <RETURN>	Moves forward or backward n lines and displays the line found. (If n is positive, the CP moves forward. If n is negative, the CP moves backward.)
V/ – V <RETURN>	Controls the form of the ED display. The normal display mode numbers the lines on the screen. These numbers, combined with ED's prompt symbol, take up space on the left side of the screen. The presence of the numbers prohibits formatting lines longer than 72 columns. However, invoking – V eliminates line numbering and permits displaying lines up to the full 80 columns provided by the terminal.

Deleting Text from the Buffer

The following commands delete text from the buffer.

Command	*Function*
nD/ – nD <RETURN>	Deletes the n characters after or before the CP. (If n is positive, the n characters after the CP are deleted. If n is negative, the n characters before the CP are deleted.)
nK/ – nK <RETURN>	Deletes the n lines after or before the CP. (If n is positive, the n lines after the CP are deleted. If n is negative, the n lines before the CP are deleted.) If the CP is in the middle of a line, 0K will delete all characters to the start of the line; –1K will delete those characters and all characters on the preceding line. Similarly, K or 1K will delete all characters between the CP and the beginning of the next line (including the **RETURN** that separates the lines).

Moving the Character Pointer

The following commands move the CP.

Command	*Function*
B/–B <RETURN>	Moves the CP to the beginning or to the end of the buffer. (B moves the CP to the beginning of the buffer. –B moves the CP to the end of the buffer.)
nC/–nC <RETURN>	Moves the CP n characters either forward or backward. (If n is positive, the CP moves forward. If n is negative, the CP moves backward.)
nL/–nL <RETURN>	Moves the CP n lines forward or backward.
: <RETURN>	Moves the CP to the beginning of the text buffer and displays the first line in the file.
n:	Moves the CP to the beginning of line number n.
:m <RETURN>	Defines the end of a range. For example, :22T would type from the present location through the end of line 22; 3::25T would move the CP to the beginning of line 3 and type the buffer from that point through the end of line 25.
nP/–nP <RETURN>	Moves the CP forward and backward n pages, then displays each page.
nFstring <CTRL/Z> <RETURN>	Finds, in the current buffer, the nth occurrence of a specified string of characters after the current CP position. Leaves the CP at the end of character string.
nNstring <CTRL/Z> <RETURN>	Finds the nth occurrence of the specified string of characters after the current CP position, even if that string is not contained in the current buffer. If this occurrence cannot be found in the current buffer, ED writes the buffer to the output file, reads in and searches the next buffer and so on until the string is found or the end of the file is reached.

nSstring <CTRL/Z> substitute <CTRL/Z> <RETURN>
Starting at the current CP position, finds all occurrences on n lines of the specified string of characters, and replaces each with the specified substitute string.

nJstring <CTRL/Z> insert <CTRL/Z> terminate <CTRL/Z> <RETURN>
Starting at the current CP position, finds n occurrences of the specified string, places the insert string after each occurrence, and deletes all characters up to (but not including) the terminate string.

NOTE: Because RETURN terminates a search string, you cannot use RETURN as a character within the search string. If you need to include RETURN in a search string, use CTRL/L to represent it.

Moving Text from the Buffer to Diskette

The following commands move text from the buffer to a diskette file.

Command	*Function*
nW <RETURN>	Writes n lines from the buffer to the temporary file and deletes those lines from the buffer. Always begins with the first line in the buffer. If you replace n with a pound sign (#), the entire buffer is written to the diskette. If n is 0, writing is done until the buffer is only half full.
H <RETURN>	Moves the file into the temporary file and redisplays the : * ED prompt. In doing so, ED, in effect, performs the E (Exit) command (described below) followed by an ED filename command. The result is quick protection against operator error or equipment failure.

Ending an Editing Session

The following commands end an editing session.

Command	*Function*
E <RETURN>	Ends the editing session; copies the buffer and all remaining source file data to the temporary file; changes the source file type to .BAK; changes the temporary file type to that of the original source file. Returns to the CP/M prompt.
O <RETURN>	Returns to the original state of the source file, discarding any edits made in the current session. ED asks "O-(Y/N)?" before it proceeds, because all changes made during the current session will be discarded.
Q <RETURN>	Quits the editing session. Leaves the source file unchanged and deletes the temporary file. ED asks "Q-(Y/N)?" before it proceeds because all changes made during the current session will be discarded.

Advanced Editing Operations

The following commands are somewhat more complex and specialized than the routine commands just covered. You will probably not use the advanced commands on a regular basis, although they may occasionally be very useful.

Command	*Function*
nX <RETURN>	Transfers a block of text (the n lines following the CP) to a temporary file (X$$$$$$$$.LIB) called the block move file. If that file has previously been written into during the current session, the present block will be added to what the file already contains. Because you can read from this file (with the R command), this procedure allows you to move lengthy text passages from one location to another.
R <RETURN>	Reads the block move file (see the X command, above) into the buffer to the left of the CP.

Rname <RETURN>	Reads a previously created file called name.LIB into the buffer to the left of the CP. If you have boilerplate text that you routinely repeat, this command enables you to create it once and access it when needed. (You can create .LIB files with ED in the same way that you create any other files.)
U/–U <RETURN>	Converts all lowercase alphabetic input (from the keyboard or the source file) to uppercase. When U is negative, no conversion occurs.
0V <RETURN>	Displays two numbers, the first identifying the free bytes left in the buffer, the second identifying the total size of the buffer.

ERA

The ERA (erase) command erases a file or a group of files from a diskette directory and frees diskette space so that you can use it again. The following examples show several different cases of legal ERA commands. (For information about the use of the wildcard specifiers, "*" and "?," see "Using File References" in Chapter 2.)

Erase the file EXAMPLE.DOC from Drive A (the currently active drive):

```
A>ERA EXAMPLE.DOC <RETURN>
```

Erase all files on Drive A with the name GONE:

```
A>ERA GONE.* <RETURN>
```

With Drive A as the currently active drive, erase all the files with the type .BAS from the diskette in Drive B:

```
A>ERA B:*.BAS <RETURN>
```

Erase all files from Drive B (Drive A is the currently active drive). If you do this, make sure that the diskette in Drive B contains files that you do not wish to keep.

```
A>ERA B:*.* <RETURN>
ALL (Y/N)?Y <RETURN>
```

PIP

The PIP command invokes PIP.COM, the CP/M Peripheral Interchange Program, which you can use to copy files from one system device to another. PIP allows you to transfer files between diskette drives, to output files to printers and other devices connected to the serial ports on the rear of the system unit, and even to create a file directly from the keyboard.

The following discussion covers PIP as it is used in normal file transfer and maintenance. PIP has several attributes, however, that are primarily designed for programmers or unusual CP/M applications. In the interest of simplicity, these have not been covered in this section.

PIP can be invoked in either of two forms. For simple transfers that can be specified on one line, you can use PIP in what is called *command mode*. For more complex transfer operations, you will probably find *program mode* more convenient. These two modes are described next.

Command Mode

In command mode you type PIP, then a space, then a description of what you wish to do—destination first, then an equals sign (=), then the source. Following are some examples of using PIP in command mode to manipulate files.

Copy an existing file to a new file:

```
A>PIP ABC.NEW=XYZ.OLD <RETURN>
```

This command makes a copy of XYZ.OLD and gives it the name ABC.NEW. Both files are on Drive A, the currently active drive. The file, XYZ.OLD, is unaffected by the operation.

PIP allows the mixing of drives in one transfer specification and also allows multiple source files to be merged into one destination file. Create a new file on Drive B by merging two existing files on Drive A, the currently active drive:

```
A>PIP B:ABC.NEW=DEF.OLD,XYZ.OLD <RETURN>
```

This command copies DEF.OLD and XYZ.OLD from Drive A into a new file on Drive B, called ABC.NEW. (Note that when you use PIP to copy more than one file into a new file, PIP copies the files in the order that you specify when you type the command. PIP reads the source file specifications that you type from left to right and transfers them to the destination file in the order in which they are encountered.)

Wildcard specifiers are acceptable to PIP. (For information about the use of the wildcard specifiers, "*" and "?," see "Using File References" in Chapter 2.)

```
A>PIP A:=B:*.COM
```

PIP copies all files with a file type of .COM from Drive B to Drive A.

PIP copies files from a diskette to an external device.

```
A>PIP LST:=TEST.TXT
```

This command copies the file, TEXT.TXT, to the current list device. If this is a printer, PIP causes the file to be printed.

> **NOTE:** Typing PIP CON:=TEXT.TXT is equivalent to typing TYPE TEXT.TXT because CON: is the logical device name for the monitor. (Logical and physical devices are covered in more detail in "Statistics on Devices" later in this chapter.)

Program Mode

You can also read the program PIP.COM into memory and run it. Simply type PIP **RETURN**. When you do this, PIP.COM is loaded into the Professional's memory and started. It displays an asterisk (*), then waits for you to specify a transfer operation and then press **RETURN**. If you want, you can remove the CP/M diskette when the * is displayed. (If you press **RETURN** without specifying a transfer operation, you will exit the PIP program, and the CP/M prompt will be redisplayed.) Following is an example of a possible PIP sequence.

```
A>PIP <RETURN>
*B:TEX3.TXT=A.TEX1.TXT,B:TEX2.TXT <RETURN>
* <RETURN>
A>
```

The first line calls and runs PIP.COM. PIP displays its prompt at the head of the second line. Here, the user types the command to merge the files TEX1.TXT (from Drive A) and TEX2.TXT (from Drive B) into TEX3.TXT (on Drive B). PIP performs this operation and redisplays the prompt. The user exits the PIP program by pressing **RETURN**.

PIP Parameters

PIP allows you to modify the action of any transfer by the inclusion of several symbols, which are called parameters. PIP parameters are single characters (or single characters followed by arguments), which are inserted between brackets ([ ]) at the end of the transfer command, as shown below.

```
A>PIP B:=FILENAME.TYP[E] <RETURN>
```

Several parameters can be combined in one set of brackets with no delimiting punctuation. When one or more parameters are thus included in a PIP command line, PIP's normal action will be modified as indicated in the following table.

Parameter	*Effect*
B	Performs a block mode transfer. PIP copies data into a buffer until **CTRL/S** is typed. PIP transfers that data from the buffer and then copies more data.
Dn	Deletes characters that extend past column n (counted from the last **RETURN** as characters are transmitted). Use this parameter to shorten long lines being sent to a narrow printer or console device. (Devices are discussed in more detail later in this chapter.)
E	Echoes (displays) all transfer operations on the console device as they occur. (This is a useful option only for text files.)
F	Removes form feeds (page breaks) from the file. (You can use the P parameter simultaneously to insert new page breaks with a different number of lines per page. See Pn below.)
Gn	Copies the file from user area n.
H	Checks the data for proper hexadecimal format, then transfers the hexadecimal data. (Do not use with I parameter.)
I	Checks the data for proper hexadecimal format. Ignores ":00" records. (Do not use with H parameter.)
L	Translates uppercase characters to lowercase.
N	Adds line numbers to each line transferred to the destination, starting at 1 and incrementing by 1. Leading zeroes are suppressed and the number is

	followed by a colon. If you specify N2, leading zeroes are included, and a tab is inserted following the number. If T is set (see the "Tn" entry in this list), the tab is expanded according to its specification.
O	Transfers an object (nontext) file. Necessary for transferring program or binary data (but not .COM) files.
Pn	Inserts form feeds (page breaks) after every n line. If n = 1 or is omitted, form feeds occur every 60 lines. If the F parameter is used simultaneously, form feed suppression occurs before the new form feeds are inserted.
Qstring <CTRL/Z>	Quits copying from the source device or file when a specified string of characters (terminated by CTRL/Z) is encountered. Allows partial files to be copied. (Can be used with the S parameter to define a file segment that begins after the beginning of the source file and terminates before the end.) PIP must be entered in program mode if lowercase character strings are to be matched.
R	Copies system files.
Sstring <CTRL/Z>	Starts copying from the source device or file when the character string (terminated by CTRL/Z) is found. PIP must be in program mode, if lowercase character strings are to be matched.
Tn	Expands tabs to every nth column during the transfer of characters.
U	Translates lowercase characters to uppercase characters during the transfer.
V	Verifies that data has been copied correctly by rereading after the write operation. (This option works only if the transfer is to a diskette file.)
W	Overwrites a file that is set to read/only status. (Read/only status is discussed in the section that covers the STAT command.)
Z	Sets the parity bit to zero.

The following are examples of valid PIP commands that specify parameters in the file transfer.

```
A>PIP B:XX.TXT=A:RH.TXT[V] <RETURN>
```

This PIP command transfers XX.TXT from Drive A to Drive B and verifies that the transfer is correct.

Notice that in the example above, A is the active drive. Therefore, you could rewrite this command as PIP B:XX.TXT=RH.TXT[V] <RETURN>. If the file you are copying is on the diskette in the active drive, you do not have to specify the drive name with that file. Likewise, if the new file is to be created on the diskette in the active drive, you do not have to specify the drive name when you name the new file.

```
A>PIP LST:=DATA.MAY[NT8U] <RETURN>
```

This PIP command transfers DATA.MAY to the LST: device. While doing so, it numbers each line, expands tabs to every eighth column, and translates lowercase alphabetics to uppercase.

REN

The REN (Rename) command allows you to change the names of diskette files. The command form is REN NEWNAME.TYP=OLDNAME.TYP, where "NEWNAME" and "OLDNAME" are unambiguous file names that can also contain drive specifications. The following example changes the file name REPORT.JAN to COSTS.JAN.

```
A>REN COSTS.JAN=REPORT.JAN <RETURN>
```

You can precede either or both file names with a drive name; however, there are some rules:

- If you specify a drive name for the new name in the command line (COSTS.JAN), then the file for the old name in the command line (REPORT.JAN) is assumed to be on the diskette in that drive.
- If you specify a drive name for both files, you must specify the same drive name in both cases.

The following example changes the name REPORT.JAN to COSTS.JAN in Drive B.

```
A>REN B:COSTS.JAN=REPORT.JAN <RETURN>
```

The next example also changes the name REPORT.JAN to COSTS.JAN in Drive B.

```
A>REN B:COSTS.JAN=B:REPORT.JAN <RETURN>
```

STAT

The STAT command displays statistics for and permits certain controls over diskette files and system physical and logical devices. The following discussion will first concentrate on how STAT is used to get information about and change the status of files, then on how STAT can be used with devices.

This section covers STAT as it is used in normal CP/M operation. STAT has several attributes, however, that are primarily designed for programmers or unusual CP/M applications. In the interest of simplicity, these have not been covered in this section.

Statistics on Files

STAT commands perform the following operations on files.

- Display the amount of free space (in bytes) and the attributes of all diskettes used since the last start.
- Display the amount of free space on a specified diskette.
- Display the size and attributes of a single file or a group of files.
- Assign file access and/or directory attributes to a single file or group of files.

File Access Attributes

An R/O (read-only) file can be accessed only for reading. It cannot be changed or erased.

An R/W (read-write) file can be read, changed, and erased. R/W is the normal (default) attribute for CP/M files.

STAT's terms are defined as follows:

- Recs = Records = 128-byte units by which CP/M stores data.
- Bytes = Bytes = Basic storage unit (8 bits).
- Ext = Extents = Storage unit by which CP/M organizes data.
- Acc = file access attribute = R/W (read-write); R/O (read-only).
- K = kilo = 1024 bytes.

Examples Using STAT on Files

The examples in this section show you how to issue various commands using STAT. The examples also show the types of responses you get from CP/M when you issue STAT commands. The CP/M responses are intended only as examples. The statistics for your diskette will probably be different than the statistics shown in these examples.

The following examples use Drive A as the currently active drive. You can use STAT commands to access any drive on your system that contains an initialized diskette.

Display the attributes and amount of free space (in bytes) on the diskettes in all drives accessed since the last start:

```
A>STAT <RETURN>

A: R/W, Space: nK
B: R/O, Space: nK
```

Display the amount of free space (in bytes) for the diskette in Drive A:

```
A>STAT A: <RETURN>

Bytes Remaining on A: 100K
```

Display the amount of space (in records, bytes, and extents) occupied by the file TEST.TXT:

```
A>STAT TEST.TXT <RETURN>

Recs  Bytes  Ext  Acc
  24     3K    1  R/W A:TEST.TXT
Bytes Remaining on A:  100K
```

Display the amount of space occupied by each file with the type .TXT:

```
A>STAT *.TXT <RETURN>

Recs  Bytes  Ext  Acc
  24     3K    1  R/W A:TEST.TXT
  12     2K    1  R/W A:NEXT.TXT
Bytes Remaining on A:  100K
```

Assign the attribute R/O to TEST.TXT:

```
A>STAT A:TEST.TXT $R/O <RETURN>
```

STAT replies:

```
TEST.TXT SET TO R/O
```

TEST.TXT is now set to read-only. It can be read but not written into or erased. This protection will be maintained until you change it again with STAT.

Assign the attribute R/W to TEST.TXT:

```
A>STAT TEST.TXT $R/W <RETURN>
```

STAT replies:

```
TEST.TXT SET TO R/W
```

TEST.TXT can now be both read from and written into. Attributes can be assigned to groups of files with wildcards. For example:

```
A>STAT B:*.* $R/O <RETURN>
```

sets all files on Diskette B to read-only.

Statistics on Devices

The Professional routinely communicates with three kinds of physical devices: the monitor, the keyboard, and the diskette drives. In addition, it can communicate with devices that you connect to it, such as printers, modems, and external computers. This communication takes place through a two-level access system involving logical and physical device names.

A logical device name identifies one of four generic processing functions:

Name	*Function*
CON:	This is the user console device. It interacts with CP/M, accepting input from a keyboard and displaying output on a video screen or paper.
RDR:	This device receives information (input only)
PUN:	This device sends information (output only).
LST:	This device lists information (output only).

Each logical device name can be associated (by means of STAT) with any one of several physical devices. CP/M allows 11 physical devices. This group is listed below.

Name	*Physical Device*
TTY:	Console
CRT:	Undefined
UC1:	Undefined
PTR:	Undefined
PTP:	Undefined
UR1:	File
UR2:	Undefined
UP1:	File
UP2:	Undefined
LPT:	Printer port
UL1:	File

You can communicate with physical devices (usually by means of PIP) by invoking either their physical or their logical names. The valid physical-to-logical device assignments are as follows.

Logical Device	*Physical Device*	*Default*
CON:	TTY:, CRT:, BAT:, UC1:	TTY:
RDR:	TTY:, PTR:, UR1:, UR2:	TTY:
PUN:	TTY:, PTP:, UP1:, UP2:	TTY:
LST:	TTY:, CRT:, LPT:, UL1:	TTY:

BAT: is a pseudophysical device. The name stands for batch processor. If BAT: is assigned to be the console device, CON:, then input comes from the current RDR: device, and output goes to the current LST: device.

STAT commands perform the following operations on physical and logical devices.

- Display the current physical devices and their connections to the logical devices.
- Assign physical devices to logical devices.
- Display diskette characteristics.
- Assign a temporary read-only status to a diskette drive.
- Display the possible physical-to-logical device assignments.

Examples of Using STAT on Devices

The examples in this section show you how to issue various commands using STAT. The examples also show the types of responses you get from CP/M when you issue STAT commands. The CP/M responses are intended only as examples. The statistics for your diskette will probably be different than the statistics shown in these examples.

Display the current physical-to-logical device assignments:

```
A>STAT DEV: <RETURN>

CON: is TTY:
RDR: is TTY:
PUN: is TTY:
LST: is TTY:
```

Display the possible physical-to-logical device assignments:

```
A>STAT VAL: <RETURN>

Temp R/O Disk: d:=R/O
Set Indicator: d:filename.typ $R/O $R/W $SYS $DIR
Disk Status  : DSK: d:DSK
User Status  : USR:
Iobyte Assign:
CON: = TTY: CRT: BAT: UC1:
RDR: = TTY: PTR: UR1: UR2:
PUN: = TTY: PTP: UP1: UP2:
LST: = TTY: CRT: LPT: UL1:
```

The lines above convey the following information:

- To create a temporary read-only drive, type

  STAT d:=R/O <RETURN>

  ("d" = drive name).

- To change the attributes of a file or files, type

  STAT x:filename.type $atr <RETURN>

  ("atr:" is one of the attributes, R/O, R/W, SYS, or DIR)

- To see the storage characteristics of drive x, type

  STAT x:DSK: <RETURN>

  ("x" is the name of the drive in question; "STAT DSK: <RETURN>" requests characteristics of all drives accessed since the last warm start.)

- To see the current user status, type

  STAT USR: <RETURN>

- "Iobyte Assign:" introduces a list of possible physical-to-logical device assignments.

The following examples use Drive A as the currently active drive. You can use STAT commands to access any drive on your system that contains an initialized diskette.

Assign the physical device TTY: to the logical device CON:

```
A>STAT CON:=TTY: <RETURN>
```

Assign the physical device CRT: to the logical device LST:, and the physical device TTY: to the logical device RDR::

```
A>STAT LST:=CRT:,RDR:=TTY: <RETURN>
```

Display the characteristics of the diskette in drive A:

```
A>STAT A:DSK: <RETURN>

   A: Drive Characteristics
1368: 128 Byte Record Capacity
 171: Kilobyte Drive Capacity
  64: 32 Byte Directory Entries
  64: Checked Directory Entries
 128: Records/ Extent
   8: Records/ Block
  36: Sectors/ Track
   2: Reserved Tracks
```

Assign a temporary read-only status to the diskette in Drive A:

```
A>STAT A:=R/O <RETURN>
```

Using STAT to write-protect a diskette is probably not advisable, because such protection is retained only in computer memory and is nullified when you restart the operating session. Some CP/M commands (PIP, for example) execute a warm start each time they return control to CP/M, so the protection is liable to disappear unexpectedly.

Write-protecting files is a more reliable procedure than write-protecting diskettes, because the diskette is actually modified (the write-protect bit associated on the diskette with the file in question is set). This modification persists through warm and cold starts until the protection is nullified by:

```
STAT drv:name.typ $R/W <RETURN>
```

Until a protected file is set back to read/write status, any effort to erase, rename, or overwrite it (with PIP) will result in an error message.

TRANSFERRING FILES BETWEEN P/OS AND CP/M—THE FILEXFER PROGRAM

When you are working with CP/M, you will probably want to transfer files back and forth between CP/M and P/OS. Your Professional's CP/M allows you to do this with a file transfer program called FILEXFER. When you use FILEXFER, you type some simple commands and you specify the file that you want to transfer. The FILEXFER program then uses the UR1 and UP1 devices to transfer the file.

> **NOTE:** CP/M allows you to transfer only ASCII files between P/OS and CP/M. You **cannot** transfer binary files.

When you use the FILEXFER program, you must place a CP/M initialized diskette in Drive A. The P/OS initialized diskette can be in Drive B, C, or D. The FILEXFER program includes six commands to help you transfer files. They are:

- FILEXFER
- EXIT
- COPY
- ECHO
- HELP
- NAME

Each of these commands is discussed in this section.

In the previous chapter, you created a CP/M text file called COSTS.JAN. You will be using your COSTS.JAN file to practice transferring files in the examples below.

The FILEXFER Command

The FILEXFER command allows you to enter the FILEXFER program from the CP/M prompt. At the A prompt type:

```
A>FILEXFER <RETURN>
```

CP/M displays:

```
P/OS - CP/M File Copy Program
Version 1.00
*
```

The asterisk (*) indicates that you are talking to the FILEXFER program. If you want, you can remove the system diskette when the * is displayed. You can issue any of the following five FILEXFER commands (EXIT, COPY, ECHO, HELP, and NAME) whenever the asterisk is displayed.

The EXIT Command

The EXIT command allows you to leave the FILEXFER program. At the asterisk, type:

```
*EXIT
```

Then press **RETURN**. The A> prompt is redisplayed. You have exited from the FILEXFER program.

The COPY Command

The COPY command allows you to copy files between P/OS and CP/M. Return to the FILEXFER program to practice the COPY command. Now try to copy your COSTS.JAN file to a P/OS diskette in Drive B.

> **NOTE:** Do not reference or access the drive that contains the diskette to which you are copying before you run the FILEXFER program.

(The CP/M diskette that contains the COSTS.JAN file should be in Drive A. An initialized P/OS diskette should be in Drive B.) At the asterisk, type:

```
*COPY DISKETTE2:[USERFILES]TRANSFER.DOC/PRO=COSTS.JAN
```

Then press **RETURN**. The file is copied within several seconds. Then the asterisk is redisplayed. You have now copied your COSTS.JAN file from your CP/M directory into the USERFILES directory on the P/OS diskette. You have named your P/OS file "TRANSFER.DOC."

Note that when you type this command line, you must refer to the drive that contains the P/OS diskette as DISKETTE2:, DISKETTE3:, or DISKETTE4:, instead of B:, C:, or D:. Drive A can never hold a P/OS diskette for the purpose of file transfer, so you refer to it as A:.

You can check the directory on the P/OS diskette to see that the new file, TRANSFER.DOC, is there. To do this, type EXIT at the asterisk and press **RETURN**. Then, at the A> prompt, press the **SET-UP** key. When you are prompted to do so, remove the diskette from Drive A and insert the application diskette. Then press **RESUME**. The CP/M Main Menu is redisplayed.

Press **EXIT** to return to the the ready prompt. Remove the application diskette from Drive A. Insert your P/OS System Services Diskette and press **RESUME**. Choose "File Services" from the Services Menu. The File Services Menu appears.

Select "Specify new current directory" from the File Services Menu. The Directory Selection Menu appears. Choose the directory to which you copied the file (in this case, choose USERFILES). The File Services Menu reappears.

Select "Show current directory." You will see TRANSFER.DOC, the CP/M file that you transferred to P/OS, listed there. Press **EXIT** to return to the File Services Menu. If you want to check the file, you can choose "Display File" from the File Services Menu.

Now restart your CP/M operating session and return to the FILEXFER program to continue practicing the COPY command. Type FILEXFER at the A> prompt and press **RETURN**.

Now try to transfer your TRANSFER.DOC file on the P/OS diskette in Drive B to an initialized CP/M diskette in Drive A. (Make sure you have placed a CP/M initialized diskette in Drive A before you type the command.) At the asterisk, type the following command.

```
* COPY TEST.CPM = DISKETTE2:[USERFILES]TRANSFER.DOC/PRO
```

Press **RETURN**. The file is copied within several seconds. Then the asterisk is redisplayed.

You have now copied the TRANSFER.DOC file from USERFILES directory on your P/OS diskette onto the CP/M diskette in Drive A and named it TEST.CPM.

You can check the directory of the CP/M diskette to see that the TEST.CPM file is there. At the asterisk, type EXIT and press **RETURN**. Then type DIR at the A> prompt. The directory for Drive A is displayed, and the new file, TEST.CPM, is listed there.

Now that you have used the FILEXFER program to transfer files, go back to the CP/M I/O Device Configuration Menu to see how it has changed. At the A> prompt, press **SET-UP**. Replace the diskette in Drive A with the application diskette and press **RESUME**. The CP/M Main Menu is redisplayed.

Move the pointer to "Configure I/O devices," and press DO. When the CP/M I/O Device Configuration Menu is displayed, you will notice that the names for UP1 and UR1 have changed. UP1, which transferred the COSTS.JAN file to P/OS and named it TRANSFER.DOC, is now called TRANSFER.DOC. UR1, which transferred the TRANSFER.DOC file from P/OS, is also called TRANSFER.DOC.

> **CAUTION:** The COPY command copies to whatever file name you specify on the destination diskette. If you are copying a file to CP/M and a file with the same name already exists on the CP/M diskette, it will be replaced by the new file **without comment.** If you are copying a file to P/OS and a file with the same name already exists, a new version of the P/OS file is created **without comment.**

The ECHO Command

When you use the ECHO command, the files that you request to be transferred from P/OS to CP/M will be displayed on your screen as they are being transferred. ECHO acts like a toggle switch. That is, if you type ECHO once, the ECHO capability is turned on. If you type ECHO a second time, the ECHO capability is turned off.

Try the ECHO command while transferring a P/OS file to CP/M. Restart your CP/M operating session and return to the FILEXFER program. At the asterisk, type ECHO. A message is displayed that tells you the ECHO is now on. Another asterisk is then immediately displayed. At the second asterisk, type:

```
*COPY ECHO.TST = DISKETTE2:[USERFILES]TRANSFER.DOC/PRO
```

Then press RETURN. The TRANSFER.DOC file is transferred to CP/M and named ECHO.TST. While the file is being transferred, it is displayed at your screen.

The HELP Command

The HELP command displays a help screen that describes the FILEXFER commands and how to use the COPY and NAME commands. You can see the help screen by typing HELP at the asterisk.

The NAME Command

The NAME command allows you to configure UR1, UP1, and UL1 with file names, without ending your CP/M operating session and returning to the CP/M menus. This command allows you to assign names to devices. (See "Statistics on Devices" for more information on devices.) For example, suppose you are sending the output from a file to a device that has been set equal to UL1. If you use the NAME command to name UL1 "MYFILE.UL1," then all output will be sent to the file called "MYFILE.UL1."

Rename the UR1 device as USERTEST.UR1. At the asterisk, type:

```
*NAME UR1=[USERFILES]USERTEST.UR1 <RETURN>
```

The UR1 device now corresponds to the P/OS file called USERTEST.UR1. You can check this by returning to the CP/M Main Menu and selecting "Configure I/O devices."

SUBMIT

The SUBMIT command runs SUBMIT.COM, which allows you to execute previously generated sequences of CP/M commands stored in a file of the type .SUB. SUBMIT, therefore, permits you to accomplish very complex tasks in one command sequence.

The .SUB file, sometimes referred to as a command file, can include both self-contained commands and commands that must be completed by keyboard input. The latter capability allows you to specify which files, drives, or devices are to be involved at the time you run the command file.

Before you use SUBMIT, you must create a file with the file type .SUB, which contains the sequence of CP/M commands to execute. When you invoke SUBMIT, it looks for the .SUB file and creates on Drive A a second file, $$$.SUB, into which it writes the commands contained in your .SUB file. It then executes those commands one at a time, deleting the $$$.SUB file when it has finished. This means that there must be some free space on the diskette in Drive A and that the diskette cannot be write-protected.

Examples Using SUBMIT

SUBMIT has two forms—one in which it executes command files containing only complete commands, the other in which it executes command files that require you to supply certain processing information when you issue the SUBMIT command.

Command Files

This section contains two examples of using the SUBMIT command to execute command files that contain complete commands.

Example 1: First create a small text file using ED, and name the file MY.TXT. (You can type any text you want in the file). Then use ED to create the file SHOW.SUB, which contains the following CP/M commands:

```
DIR *.TXT
PIP B:=A:*.TXT
DIR A:
DIR B:
```

Now execute SUBMIT. (Make sure there is an initialized diskette in Drive B.) Type:

```
A>SUBMIT SHOW <RETURN>
```

CP/M creates a new file called $$$.SUB, which contains the four commands in SHOW.SUB. This process is shown below. (Note that if your diskette contains any other files with a .TXT extension, they too will appear wherever the MY.TXT file appears.)

```
A>ED MY.TXT
NEW FILE
     : *I
    1: THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG.
    2:
     : *E
A>ED SHOW.SUB
NEW FILE
     : *I
    1: DIR *.TXT
    2: PIP B:=A:*.TXT
    3: DIR A:
    4: DIR B:
    5:
     : *E
A>SUBMIT SHOW
A>DIR *.TXT
A: MY       TXT
A>PIP B:=A:*.TXT
COPYING -
MY.TXT
A>DIR A:
A: COSTS   BAK : ASM      COM : DDT      COM : DUMP     ASM
A: DUMP    COM : ED       COM : LOAD     COM : PIP      COM
A: STAT    COM : SUBMIT   COM : XSUB     COM : COSTS    JAN
A: MY      BAK : MY       TXT : SHOW     BAK : SHOW     SUB
A: $$$     SUB : SYSGEN   COM : FILEXFER COM : MOVCPM   COM
A>DIR B:
B: COSTS   JAN : MY       TXT
A>
```

Example 2: Create the following file, called SUBEX.SUB.

```
STAT
ED SAMPLE.TXT
TYPE SAMPLE.TXT
STAT
```

Now type:

```
SUBMIT SUBEX <RETURN>
```

When SUBEX.SUB executes, STAT displays the amount of free space left on the diskette in the active drive. Next, ED is invoked and you must create a new file, SAMPLE.TXT. (To create the new file, follow the ED procedures described in this chapter. After you create the file, you must exit it so that SUBEX.SUB can continue processing.)

When you exit ED, TYPE displays the contents of SAMPLE.TXT. Then STAT displays the amount of free space left on the diskette in the active drive. Finally, the A> prompt is redisplayed. The complete sequence is shown below.

```
A>ED SUBEX.SUB
NEW FILE
     : *I
    1:  STAT
    2:  ED SAMPLE.TXT
    3:  TYPE SAMPLE.TXT
    4:  STAT
    5:
     : *E
A>SUBMIT SUBEX
A>STAT
A: R/W, Space:310k
a>ED SAMPLE.TXT
NEW FILE
     : *I
    1:  THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG.
    2:
     : *E
A>TYPE SAMPLE.TXT
THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG.
A>STAT
A: R/W, SPACE: 308K
A>
```

Command Files that Require Additional User Input

You can execute command files (those containing commands that require additional input when you issue the SUBMIT command) by typing the SUBMIT command in the following format:

"SUBMIT name par1 par2 parn"

where "parn" is user input information (command parameters) that SUBMIT will accept. You can specify drive name, file name, file type, and PIP parameters as SUBMIT parameters.

The parameter strings will be inserted wherever the placeholder symbols $1, $2, $3, and so on, occur in the command file. The first parameter string to be typed after the name of the SUBMIT file will be inserted in place of all occurrences of the $1 placeholder symbol, the second string in place of all occurrences of the $2 symbol, and so on.

> **NOTE:** The $ character is used only as part of a placeholder symbol in your .SUB file. Therefore, if you want an actual $ character to be placed in your file, you must type it twice ($$).

Parameter strings must be separated by a space and no other punctuation.

Example: Use ED to create the following file, called TRANSFER.SUB:

```
PIP $2:=$1:$3.* <RETURN>
STAT $2:$3.* <RETURN>
```

The symbols $1, $2, and $3 are placeholders for which SUBMIT will substitute arguments that you will provide when you invoke the command, and the colons and asterisks are literal additions that SUBMIT will append to those arguments—thus:

```
SUBMIT TRANSFER B A MY <RETURN>
```

With the aid of TRANSFER.SUB, SUBMIT will substitute B for $1, A for $2, and MY for $3. In addition it will append a colon to B and A, separate the first two parameters in the first line with =, and append .* to MY. The result will be equivalent to having issued the following commands:

```
PIP A:=B:MY.* <RETURN>
STAT A:MY.* <RETURN>
```

> **NOTE:** Format your .SUB files along the patterns just illustrated so that the user invoking SUBMIT is not required to include a period or colon within a parameter even to separate a file name from a file type.

For example:

```
A>SUBMIT TASK TEST.DOC <RETURN>
```

would result in an error because the period between TEST and DOC would be interpreted as a parameter separator rather than as a character in a single parameter.

To abort the execution of a command file, press either **BS** or  , or type **CTRL/H**.

TYPE

The TYPE command displays the contents of a file containing printable characters on the current console device. (Note that if your console device is TTY: and you wish to have a printed record of a file you are about to display with TYPE, typing **CTRL/P** will cause console displays to be echoed on a printer connected to the printer port.) The basic form of the command is:

```
A>TYPE X.Y <RETURN>
```

where "X" and "Y" represent an unambiguous file name and file type. You can also specify a drive name if the file you want to see is not on the current diskette:

```
A>TYPE B:X.Y <RETURN>
```

Press **HOLD SCREEN** to temporarily stop the display; press it again to continue. Press any other key to abort the display.

4

What to Do in Case of Problems

Chapter 4

What to Do in Case of Problems

WHAT PROBLEMS ARE

For a computer user, problems are any behavior on the part of the machine that does not conform to the user's expectations. Problems occur because an electronic component has failed, because an essential connection has been broken, because a program has undetected errors (called "bugs"), because a file copy has become corrupted, or because the user has asked for inappropriate or impossible operations to be performed.

From this follows the first rule of troubleshooting: when a problem occurs, double-check to make sure you didn't cause it. If an operation seems to fail, reread the documentation covering that operation to make sure you haven't omitted an essential argument or skipped a command. Then try the operation again, carefully checking each step to make sure you invoke all required commands, arguments, and references.

Once you satisfy yourself that your command or commands are not at fault, think about the symptoms and try to deduce a possible explanation. If, for example, you suddenly begin having trouble with an applications program that seemed to work properly in the past, recopy the program from your master diskette and try again. Flexible diskettes are fragile both physically and magnetically. A crease in the diskette's cover or a dent or a fingerprint on the diskette surface is all it takes to convert a reliable data storage device into a source of frustration and anxiety.

HOW TO GET HELP

In general, problems with your Professional or with CP/M can be broken into two categories:

1. Problems that you can find and eliminate on your own.
2. Problems that require assistance from one or more of the vendors from whom you acquired your hardware and software system components.

Where you go for assistance will depend on whether the problem is with software or hardware.

- □ If you encounter software problems, contact the vendor who sold you the applications program with which you are having trouble.
- □ If you encounter hardware problems, contact your Digital representative or your Professional vendor.

It will be up to you to isolate which of these sources you should contact. This discrimination usually is not as complicated as it might seem. Clearly, if a new applications program cannot be copied or loaded without error, you have received it either in a corrupted state or in the wrong format. In either case, return it to the vendor for replacement.

If a new applications program loads and runs properly up to a point and then fails, make sure that it isn't expecting a device that you don't have (a printer, for example)—or that it doesn't require you to redefine a logical device. If none of these explanations fit, there are two possible offenders—a "bug" in the applications program or incompatibility between your version of CP/M and the applications program. In either case, your best bet is to contact the applications program vendor and see what he or she recommends. The chances are good that other users have already had the same problem. If that is the case, the vendor probably can tell you immediately how to fix it.

The odds are small that you will uncover an undetected bug in CP/M itself. CP/M is one of the most widely used operating systems in the world today. As a result, most of its unpredictable quirks have been found and corrected. Nevertheless, if CP/M behaves consistently in ways contrary to the definitions and examples in this book—and if these peculiarities cannot be corrected by recopying your system diskette—contact your Digital representative or the vendor from whom you purchased your CP/M application.

Before you contact a software vendor on any shortcoming, however, you should first confirm the reliability of your hardware. Your Professional contains an internal self-test program that runs every time the Professional power switch is turned on. If you receive any error message when you turn your system on, refer to Chapter 3 of the *Professional 300 Series Owner's Manual* for instructions on how to proceed.

If you cannot use your CP/M application, try to diagnose the problem with your Self-Starting System Test diskette. (Chapter 3 of the *Professional 300 Series Owner's Manual* describes this procedure.) If your system fails these diagnostics, contact your Professional vendor or Digital representative and have the problem corrected before drawing any conclusions about the reliability of any piece of software.

SOME COMMON TROUBLE SYMPTOMS AND THEIR CURES

Not all correctable troubles with your system are caused by improperly understood system or applications program commands. Some originate in easily correctable switch, connector, keyboard, or monitor conditions. The following table identifies some trouble sources that you may encounter at one time or another—particularly if your Professional is shared by several people.

Symptom	*Possible Cause*	*Cure*
No response from monitor (no characters on screen, no cursor)	Professional power switch is off	Turn power switch on
Ready prompt appears on screen at powerup, but pressing the keys on the keyboard has no effect	Keyboard is disconnected	Connect keyboard
Nothing visible on screen after 45 seconds of warmup	Screen brightness is set too low	Increase screen brightness
CP/M does not run and you receive an "I/O error attempting to mount disk foreign..." error message when you select "Start CP/M" from the CP/M Main Menu	(1) No diskette in specified drive, (2) drive door is not closed, (3) or unreadable or non-system diskette is installed	Install CP/M system diskette in specified drive
CP/M or applications program suddenly seems to go dead; keyboard operations do not echo on terminal	HOLD SCREEN function or CTRL/S has been activated	Press a letter or number key

Appendix A

Appendix A

Error Messages

Occasionally when you use CP/M you will receive error messages. Depending on the type of error message you receive you can take one of the following actions:

1. You can always press **SET-UP**, remove the current diskette from Drive A, insert the application diskette in Drive A, and press **RESUME** to return to the CP/M Main Menu. This is not usually the most efficient action to take, but it works for all error messages. In just a few cases, it is the only way for you to correct the error condition.
2. For most messages you can type **CTRL/C** to return to the A> prompt and continue processing.
3. For some messages, you can type any key on the keyboard to return to the A> prompt to continue processing.

The list below contains the error messages that you are most likely to see in the course of CP/M processing. Included in the list is a brief description of the meaning of each error message as well as some instructions on how to recover from the error condition. The list does not contain all CP/M error messages. For convenience, the error messages are presented in alphabetical order.

Bdos Err On drv: Select

This message indicates that you specified a drive name other than A or B. You can type any key to return to the A> prompt unless you tried to change the currently active drive. If you tried only to change the currently active drive, then you must press SET-UP, remove the current diskette from Drive A, insert the application diskette into Drive A, and press RESUME to recover from this error condition.

BREAK 'n' AT
:

This message occurs when you are using the ED command. It indicates that you issued a command to which ED could not respond. ED displays the first character that it cannot interpret on the line at which the problem occurred. The ED prompt is automatically redisplayed. You can enter the ED command that you want at the ED prompt to continue your editing session.

? Cannot create UP1 file, RMS error code = nnn

This message occurs when the diskette is full or when you specify an invalid file name for UP1. Press CTRL/C to return to the A> prompt.

? Cannot OPEN UR1 file, RMS error code nnn

This message means that the file name that you have specified for UR1 is invalid or does not exist. Press CTRL/C to return to the A> prompt.

CANNOT WRITE: dev:

This message indicates that you tried to write to a read-only device. For example, you tried to output data to PTR:. The A> prompt is automatically redisplayed after this message.

CP/M cancelled on user request

Press RESUME to return to CP/M Main Menu

This message appears when you press the SET-UP key. Remove the current diskette from Drive A. Insert the application diskette into Drive A and press RESUME to return to the CP/M Main Menu.

Diskette is not a bootable CP/M system diskette

Press RESUME to return to CP/M Main Menu

This message appears if you try to start a CP/M operating session with any diskette other than your system diskette inserted in Drive A. Press RESUME, insert your system diskette in Drive A, and start the operating session again.

DISKETTE OR DIRECTORY FULL

This message occurs under the following circumstances:

- You typed ED **RETURN** without specifying a file name and file type.
- There is no room left on the diskette to accept data being written from the current ED buffer.
- There is no room left in the diskette directory area to enter another file specification. (CP/M allows a maximum of 128 entries in a diskette directory.)

Before you start an editing session, make sure that the current diskette has room for the text you plan to add or create. (Type STAT drv: **RETURN** to find out how much free space is left on a given diskette.) Remember that both the .BAK and the .TXT files must be stored on the same diskette.

When you receive the "DISKETTE OR DIRECTORY FULL" message, the A> prompt is automatically redisplayed.

DISKETTE WRITE ERROR: filename

This message occurs when you are using PIP. It indicates that the current copying operation requires more space than is available on the destination diskette. The transfer is automatically aborted, and the A> prompt redisplayed.

drv:name.typ?

This message indicates that you specified a nonexistent file name and/or file type or that you specified an ambiguous file name. The A> prompt is automatically redisplayed.

? Error creating UL1: file, RMS status = nnn/nnn

This message is displayed when the diskette is full or when you specify an invalid file name. Press **CTRL/C** to return to the A> prompt.

Error On Line 001 No 'SUB' File Present

This message indicates that the command file name specified in the SUBMIT command cannot be found. The A> prompt is automatically redisplayed.

FILE EXISTS

This message is displayed when you use the REN command to specify an already existing file name as the new name for a file. When this happens, CP/M aborts the rename operation and redisplays the A> prompt.

```
** FILE IS READ/ONLY **
                    : *
```

This message occurs if you try to use ED to access a file that was set (by STAT) to read-only status. Type **CTRL/C** to return to the A> prompt.

```
? Forced LPT output failed, I/O status = 375
  Device not ready
```

This message occurs if you attempt to send data to the LPT: device when the LPT: device is off-line.

```
INVALID ASSIGNMENT
```

This message indicates that, while using STAT, you tried to make an assignment prohibited by the assignment table (as shown by STAT VAL:). The A> prompt is automatically redisplayed.

```
INVALID FILE INDICATOR
```

This message indicates that you made a typing error while using STAT or tried to set files to a state other than R/W or R/O. The A> prompt is automatically redisplayed.

```
INVALID FORMAT: string
```

This message indicates that you mistyped a logical or physical name (string). For example, *string* would appear as LIST: if you typed PIP LIST:name.typ instead of PIP LST:name.typ. The A> prompt is automatically redisplayed after this message.

```
? I/O error attempting to mount disk foreign, I/O status code = 375
  Device not ready

Bdos Err on drv: Select
```

This message indicates that either there is no diskette in the requested drive or the drive door is not closed. Correct the problem and press any key to continue.

```
NO FILE
```

This message indicates that the specified file(s) could not be found on the selected diskette. The A> is automatically redisplayed on the line beneath the message.

NO FILE: =drv:NAME.TYP

This message occurs when you use the PIP command. It indicates that the specified file could not be found on the specified diskette. The A> prompt is automatically redisplayed.

QUIT NOT FOUND: =drv:name.typ[Qxxx]

This message indicates that the Q parameter has been invoked, but the string (xxx) specifying the quitting point could not be found. The A> prompt is automatically redisplayed.

RX-50 read error, I/O status = nnn

Followed by:

Parity Error on Device

or

File Processor Device Read Error

or

Device not ready

These messages indicate that an unreadable diskette has been encountered in the named drive. You can type any key to return to the A> prompt unless you tried to change the currently active drive to the drive that contains the damaged diskette. If you tried only to change the currently active drive, then you must press **SET-UP**, remove the current diskette from Drive A, insert the application diskette into Drive A, and press **RESUME** to recover from this error condition. (For example, if you typed A>B:, and Drive B contained a damaged diskette, then you must press **SET-UP**, remove the current diskette from Drive A, insert the application diskette into Drive A, and press **RESUME** to recover from this condition.)

? RX-50 write error, I/O status = 364
Write attempt to locked unit

Bdos Err On B: Bad Sector

This message means that you tried to write to a diskette that is protected by a write-protect tab. Type **CTRL/C** to return to the A> prompt. (You will have to remove the write-protect tab from the diskette before you can write to it.)

START NOT FOUND: =drv:name.typ[Sxxx]

This message occurs when you are using PIP. It indicates that the S parameter has been invoked, but the string (xxx) specifying the starting point could not be found. The A> prompt is automatically redisplayed.

? The CP/M softcard must be present to run CP/M

This message indicates that you have not yet installed your Z-80 board or that the Z-80 board is not correctly installed. Press **SET-UP**, remove the current diskette from Drive A, insert the application diskette, and press **RESUME** to end the CP/M operating session. Return to the ready prompt and turn the system off before you install your Z-80 board.

? Time-out waiting for results of Z-80 self-test

This message occurs if your Z-80 board has a hardware problem. Press **SET-UP**, remove the current diskette from Drive A, insert the application diskette, and press **RESUME** to end the CP/M operating session. Contact your vendor.

Z-80 halted at PC = nnnn. Registers at HALT:

```
AF  = nnnn  BC  = nnnn  DE  = nnnn  H   = nnnn
A'F' = nnnn  B'C' = nnnn  D'E' = nnnn  H'L' = nnnn
IX  = nnnn  IY  = nnnn  IR  = nnnn  SP  = nnnn
```

Press RESUME to return to CP/M Main Menu

This message occurs if the program has executed a HALT instruction. Remove the current diskette from Drive A. Insert the application diskette into Drive A, and press **RESUME** to return to the CP/M Main Menu.

? Z-80 self-test has failed, error status code = nnn

This message occurs if your Z-80 board has a hardware problem. Press **SET-UP**, remove the current diskette from Drive A, insert the application diskette into Drive A, and press **RESUME** to end the CP/M operating session. Contact your vendor.

Appendix B

Appendix B

System Calls
Assembly Language Programmers Only

The Professional's CP/M includes some additional system calls for assembly language programmers. These system calls are added at the end of the BIOS function table. The first system call retrieves system date and time information. The second system call allows assembly language programmers to design programs in which users can specify P/OS file names for the UR1, UP1, and UL1 devices. (The NAME command in the FILEXFER program performs this task. With the system call, assembly language programmers can incorporate the NAME command into other programs.) Finally, a group of system calls allow you to design communications programs.

RETRIEVING SYSTEM INFORMATION

The following parameters describe the call to retrieve system information. This call is added at BIOS + 33H.

Enter routine:
- Register C—Request code
  - 1—Date/Time
  - 2—System serial information
- Register HL—Address of buffer to store response

Exit routine:
- HL–Pointer to buffer containing:
  - Request 1—8 bytes
    1) Year-1900
    2) Month
    3) Day
    4) Hour
    5) Minute
    6) Second
    7) Tick
    8) Ticks/Second
  - Request 2—6 bytes of system serial number
    Low order byte first

CALL TO SPECIFY P/OS FILE NAMES

The following parameters describe the call to specify P/OS file names for the UR1, UP1, and UL1 devices. The call is added at BIOS + 36H.

Enter routine:
- Register C—Request code
  - 1—Specify UR1 file name
  - 2—Specify UP1 file name
  - 3—Specify UL1 file name
- Register HL—Pointer to buffer. First byte of buffer is the length of the file specification string that follows. (Note that the string must be a valid P/OS file specification.)
  - Byte 1—number of bytes in specification
  - Bytes 2 through n + 1—bytes of the specification itself

COMMUNICATIONS CALLS

The following parameters describe the communication calls that are supported by the latest version of CP/M for the Professional 300.

Communication Status

This call is added at location BIOS + 39H.

Input parameters:
None

Output parameters:
A = Status
00H—No character available.
FFH—Character available.

Communication Input

This call is added at location BIOS + 3CH.

Input parameters:
None

Output parameters:
A = Character read.

Communication Output

This call is added at location BIOS + 3FH.

Input parameters:
A = Character to transmit.

Output parameters:
None

Communication Control

This call is added at location BIOS + 42H.

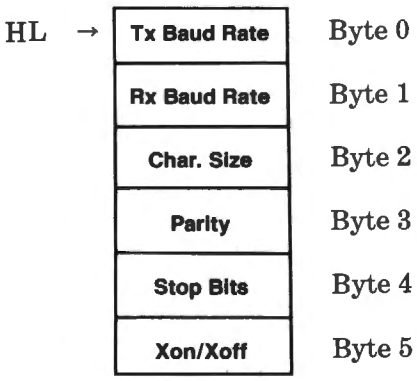
Input parameters:

C = Function code.
- 0—Assign and configure channel.
- 1—Save channel characteristics.
- 2—Restore channel characteristics.
- 3—Send break.

HL = Address of Communication Control Block. (See figure below.)

Output parameters:

A = Status returned.
- 00H—Successful in performing command.
- FFH—Failed to perform command.



Byte 0—(See table)
Byte 1—(See table)
Byte 2—5 to 8 bits/character
Byte 3—0 = Odd, 1 = Even, 2 = No Parity
Byte 4—1,2 Stop Bits
Byte 5—0 = Xon/Xoff, 1 = Clear to Send

Communication Control Block

Value	*Baud Rate*	*Value*	*Baud Rate*
01H	50	0AH	1800
02H	75	0BH	2000
03H	110	0CH	2400
04H	134.5	0DH	3600
05H	150	0EH	4800
06H	200	0FH	7200
07H	300	10H	9600
08H	600	11H	19200
09H	1200		

Communication Baud Rate Table

Index

Index

⌫ key, 23, 27
ADDTNL OPTIONS key, 27
Ambiguous file references, 34
Application diskette, ii, 4, 7, 13, 15, 16-17
  copying, 16-17
Applications programs, 44, 83-86
Applying a write-protect tab, 22
Arguments
  PIP, 62-63
Arrow keys, 25
ASM command, 48
ASM.COM, 48
Assemble command, 48
Assembly language programs
  information about, iii
Assignments
  device, 68
Auxiliary keypad keys, 25, 26

Backing up diskettes, 16-18, 30
Backing up files, 44, 52
BACKSPACE key, 23
BAK files, 52
BAT:, 69
BREAK key, 26
BS key, 23, 26, 27
Buffers
  text, 38
  using ED with, 58
Bytes, 29, 42-43

CANCEL key, 26
Changing file names, 41-42, 49, 64-65
Character pointer
  ED, 38-39, 53-54
  moving, 56-57
Checking directory, 15
COM files, 47
Command level, 21
Command mode
  PIP, 60-61
Commands
  advanced ED, 58-59
  ASM, 48
  CP/M, 3, 21, 35-36, 47
  DDT, 48
  DIR, 15, 31-33, 34, 35, 48, 50
  DUMP, 48
  ED, 35, 36-40, 48, 50-59
  ERA, 35, 44, 48, 59
  FILEXFER, 35, 48, 72-76
  for ending ED, 40
  issuing, 21, 30
  LOAD, 49
  MOVCPM, 49
  PIP, 35, 43-44, 49, 60-64
  REN, 35, 41-42, 49, 64-65
  resident, 35, 47
  SAVE, 35, 49
  STAT, 35, 42-43, 49, 65-71
  SUBMIT, 49, 76-80
  SYSGEN, 49
  transient, 35, 47-48
  TYPE, 35, 41, 49, 80
  USER, 35, 49
  using, 35, 47-48
  XSUB, 49

Commands used with FILEXFER, 72-76
COMPOSE CHARACTER key, 23
CON:, 68, 69
Configuring I/O devices, 10-13
Control Keys, 24-25
  CTRL/C, 24
  CTRL/E, 24
  CTRL/H, 24
  CTRL/J, 24
  CTRL/M, 24
  CTRL/P, 24
  CTRL/R, 24
  CTRL/S, 24
  CTRL/U, 24
  CTRL/X, 25
  CTRL/Z, 25
COPY
  with FILEXFER, 73-75
Copying diskettes, 16-18
Copying files, 35, 43-44, 48, 60-64
CP, 38, 39, 53
  moving, 56-57
CP/M
  Boot Screen, 14
  commands, 3, 21, 35-36, 47
  default drive, 32
  definition of, 3
  error messages, 29
  file names, 31
  file references, 34
  installing, 4
  prompt, 13, 21
Creating files, 36, 52
CRT:, 68, 69
CTRL/C, 24, 29
CTRL/E, 24
CTRL/H, 24
CTRL/J, 24
CTRL/M, 24
CTRL/P, 24
CTRL/R, 24
CTRL/S, 24
CTRL/U, 24, 28
CTRL/X, 25, 28
CTRL/Z, 25

DDT command, 48
DDT.COM, 48
Debugging
  information about, ii-iii
Debugging command, 48
Default drive, 32
DELETE key, 23, 27
Deleting files, 35, 44, 48, 59
Device assignments, 69
Devices
  configuring, 10-13
  logical, 68-69
  physical, 68-69
DIR command, 15, 31-33, 34, 35, 48, 50
DIR examples, 50
Directories
  displaying, 31-32, 48, 50
Directory
  checking, 15
Diskettes, 29-30
  Application, ii, 4, 7, 13, 15, 16-17
  backing up, 16-18, 30
  copying, 16-18
  initializing, 8-10
  inserting, 30
  storing information on, 29-30
  System, ii, 7, 13, 16-18
  using, 30
  write protecting, 22
Display commands
  ED, 54
DO key, 27
Drives
  changing currently active, 32
DUMP command, 48
DUMP.COM, 48

ECHO
  with FILEXFER, 75
ED
  advanced editing, 58-59
  ending an editing session, 40, 58
  getting text into the buffer, 53
  inserting text, 37
  moving text from buffers, 57
  routine editing, 52
  text buffer, 36, 51
  the CP, 38, 39, 53, 56
ED and large documents, 51
ED buffer
  getting text into, 53
ED command, 35, 36-40, 48, 50-59

ED display commands, 54
ED examples, 51
ED prompt, 36, 51
ED sample session, 36-40
ED text deletion, 55
ED.COM, 48
Editing files, 36-40, 50-59
Editing keypad keys, 25-26
Editors
  line versus screen, 50
Ending an ED session, 40, 58
Ending an operating session, 15
ENTER key, 23
ERA command, 35, 44, 48, 59
ERA examples, 59
Erasing errors, 23, 27-28
Erasing files, 48, 59
Error conditions, 29
Error messages, 89-94
  CP/M, 28-29
  responding to, 89
ESC key, 26
Examples
  DIR, 50
  ED, 51
  ERA, 59
  PIP, 60-62, 64
  REN, 64-65
  STAT, 66-67
  STAT on devices, 69-71
  SUBMIT, 76-80
EXIT
  with FILEXFER, 73
EXIT key, 6, 26
Extent, 43

F5 key, 26
F17 key, 27
F18 key, 27
F19 key, 27
F20 key, 27
File access attributes, 66
File extensions, 31
File names
  changing, 41-42, 49, 64-65
  creating, 31
File types, 31
Files, 29-31
  ambiguous, 34
  backing up, 44, 52
  .BAK, 52
  .COM, 47
  copying, 35, 43-44, 60-64
  creating, 36, 52
  deleting, 35, 44, 48, 59
  displaying, 41, 49
  editing, 36-40, 50-59
  erasing, 48, 59
  getting statistics on, 42-43
  inserting text in, 37
  renaming, 35, 41-42, 49, 64-65
  searching for, 34, 48
  .SUB, 76
  transfer between CP/M and P/OS, 11, 48, 72-76
  transferring, 35, 43-44, 49, 60-64
  unambiguous, 34
  UR1:, UP1:, and UL1: as, 11
  valid names for, 31
FILEXFER
  COPY with, 73-75
  ECHO with, 75
  EXIT with, 73
  HELP with, 75
  NAME with, 76
FILEXFER command, 35, 48, 72-76
FILEXFER commands, 72
FILEXFER.COM, 48, 72
FIND key, 25
Function keys, 26-27

HELP
  with FILEXFER, 75
HELP
  getting, 84
HELP key, 5-6, 27
HOLD light, 23
HOLD SCREEN key, 22-23, 26

I/O devices
  configuring, 10-13
Initializing CP/M diskettes, 8-10
INSERT HERE key, 25
Inserting diskettes, 30
Inserting text in a file, 37
Installing CP/M application, 4
INTERRUPT key, 26
Issuing commands, 21, 30

Keys
ADDTNL OPTIONS, 27
arrow, 25
auxiliary keypad, 25-26
BACKSPACE, 23
BREAK, 26
BS, 23, 26, 27
CANCEL, 26
COMPOSE CHARACTER, 23
Control, 24
CTRL, 24
CTRL/C, 24, 29
DELETE, 23, 27
DO, 27
editing keypad, 25-26
ENTER, 23
ESC, 26
EXIT, 6, 26
F5, 26
F17, 27
F18, 27
F19, 27
F20, 27
FIND, 25
function, 26-27
HELP, 5-6, 27
HOLD SCREEN, 22-23, 26
INSERT HERE, 25
INTERRUPT, 26
LF, 23, 26
LINE FEED, 23
MAIN SCREEN, 6, 26
NEXT SCREEN, 5, 25
PF1, 26
PF2, 26
PF3, 26
PF4, 26
PREV SCREEN, 5-6, 25
PRINT SCREEN, 26
REMOVE, 25
RESUME, 5-6, 26, 29
RETURN, 23
SELECT, 25
SET-UP, 22, 26, 29
◁X| , 23, 27
◁X| with some applications, 27
Keys to which CP/M responds, 22

LF key, 23, 26
LINE FEED key, 23
Line-oriented editors, 50
LOAD command, 49
LOAD.COM, 49

Logical devices, 68-69
LPT:, 68-69
LST:, 68-69

MAIN SCREEN key, 6, 26
Menus
CP/M I/O Device Config., 10
CP/M Main, 5, 7
CP/M Main Help, 6
Initialize CP/M Diskette, 9
using, 5
Messages
CP/M error, 28-29
MOVCPM command, 49
MOVCPM.COM, 49
Moving text with ED, 57

NAME
with FILEXFER, 76
Naming files, 31
NEXT SCREEN key, 5, 25

Operating session
ending, 15
starting, 13
Operating system
definition of, 3

Parameter strings
with SUBMIT, 79
Parameters
PIP, 62-63
PF1 key, 26
PF2 key, 26
PF3 key, 26
PF4 key, 26
Physical devices, 68-69
PIP
program mode, 61
PIP arguments, 62-63
PIP command, 35, 43-44, 49, 60-64
PIP command mode, 60-61
PIP examples, 60-62, 64
PIP parameters, 62-63
PIP.COM, 49
PREV SCREEN key, 5-6, 25
PRINT SCREEN key, 26
PRO-CP/M-80 APPLICATION DISKETTE, 4
PRO-CP/M-80 SYSTEM DISKETTE, 4
Problems
cures, 86
definition, 83
symptoms, 86
what to do about, 83-86

Program mode
  PIP, 61
Programs
  applications, 44, 83-86
Prompt
  CP/M, 13, 21
  ED, 36, 51
Protecting diskettes, 22
PTP:, 68-69
PTR:, 68-69
PUN:, 68-69

RDR:, 68-69
Record, 43
Referring to files, 34
REMOVE key, 25
REN command, 35, 41-42, 49, 64-65
REN examples, 64-65
Renaming files, 35, 41-42, 49, 64-65
Reset I/O device table, 13
Resident commands, 35, 37
RESUME key, 5-6, 26, 29
RETURN
  function of, 48
RETURN key, 23
Routine editing with ED, 52

SAVE command, 35, 49
Save I/O device table, 12
Screen-oriented editors, 50
Searching for files, 34, 48
Sectors, 29-30
SELECT key, 25
SET-UP key, 22, 26, 29
Starting a CP/M operating session, 13
STAT
  command, 35, 42-43, 49, 65-71
  examples, 66-67, 69-71
  file access attributes, 66
  on devices, 67-71
  statistics on files, 42-43, 65-67
  write-protecting with, 71
string, 52
SUB files, 76
SUBMIT
  aborting execution, 80
  additional user input with, 79-80
SUBMIT command, 49, 76-80
SUBMIT examples, 76-80
SUBMIT parameter strings, 79
SUBMIT.COM, 49
SYSGEN command, 49
SYSGEN.COM, 49
System calls, 97
System diskette, ii, 7, 13, 16-18
  copying, 16-18

Text
  inserting in a file, 37
Text buffer
  ED, 36, 51
Text deletion
  ED, 55
Tracks, 29-30
Transferring files, 35, 43-44, 49, 60-64
Transient commands, 35, 47-48
TTY:, 68-69
TYPE command, 35, 41, 49, 80

UC1:, 68-69
UL1:, 11, 68-69
  as a file, 11
Unambiguous file references, 34
UP1:, 11, 68-69
  as a file, 11
UP2:, 68-69
UR1:, 11, 68-69
  as a file, 11
UR2:, 68-69
USER command, 35, 49

Warm boot, 29
Warm start, 29
Wildcards, 34
Word processing programs, 50-51
Write protecting diskettes, 22
Write protection with STAT, 71
Write-protect tab
  applying, 22

XSUB command, 49
XSUB used with SUBMIT, 49



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