

EPSON[®]

**Using
CP/M-80[™]**

With the Epson QX-10[™]

EPSON[®]
USING CP/M-80[™]
with the
EPSON QX-10[™]

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Introduction

CP/M® is an operating system for microcomputers. There are several different versions of CP/M. CP/M-80™ is the one that operates on the QX-10™.

Depending on what you read or whom you talk to, the letters *C*, *P*, and *M* stand for *Control Program Monitor*, *Control Program for Microcomputers*, or *Control Program for Microprocessors*. In any case, all these titles are a bit misleading, because CP/M-80 isn't just *one* program. It's a *set* of programs. Together, these programs control all activities taking place in your computer.

Through CP/M-80, you can instruct your QX-10 to:

- Create and edit files on a disk*
- Erase files from a disk
- Copy files from one disk to another
- Display text files on the terminal
- Print files on a printer
- Run programs.

This manual takes a "learn by doing" approach. It is intended for newcomers to CP/M-80 and focuses on teaching the basics of using CP/M-80 to operate the QX-10.

*In this manual, *disk* applies to both hard disks and floppy disks, and floppy disks are also called *diskettes*.

It presents all the information you need to put your QX-10 to work:

- Chapter 1 tells you how to back up your system diskette and how to prepare blank diskettes for use on the QX-10. It also provides background information on CP/M-80 basics.
- Chapter 2 describes the CP/M-80 *resident commands* in detail and offers practical exercises on their use.
- Chapters 3 through 6 teach you how to use four of the CP/M-80 *transient commands*.
- Chapters 7 through 9 teach you all about the three QX-10 *utilities*,* COPYDISK, SETUP, and INDEXER.
- Chapter 10 describes the unique hardware and software features available on the QX-10. This chapter will help you decide how to make the best use of the SETUP utility.
- Finally, refer to the Appendixes for the Bibliography, Glossary, and system-level information.

When you have finished using this manual as a tutorial, you'll find that it is also a valuable reference manual for questions regarding CP/M-80 and the QX-10.

Programmers with burning questions about CP/M-80 should go straight to the source and consult the Digital Research CP/M® *Operating System Manual*. Novices who want an introduction to the inner workings of CP/M-80 would probably enjoy the *Osborne CP/M® User Guide* by Thom Hogan.

Note to Hard Disk Users: If you have a Comrex™ ComFiler™ hard disk system, read your user guide for preliminary installation instructions. Then review the Drive Assignment Option of the SETUP utility (Chapter 8) for final installation instructions. Your hard disk won't be accessible through CP/M-80 until you complete both installation procedures.

*A *utility* is a program that enables programmers and users to perform certain functions, such as copying, erasing, and editing files.

Chapter 1

First Things First

Before learning how CP/M-80 works with the QX-10, it's important to spend a little time in preparation. You've already read the *QX-10 Operations Manual*, and if you have a Comrex ComFiler, you've also read your hard disk user's guide—right? The next step is to put a write protect tab* on the notch in the system diskette.

Now, *back up* (copy) the system diskette. Your CP/M-80 system diskette contains six practice files. Because this manual will teach you to delete some of the practice files and change the names of others, be sure to use a backup copy of your system diskette, not the original system diskette, as you practice. Then if you'd like to go through the step-by-step practice sessions more than once, you can always make another backup copy of the original system diskette.

Copying the CP/M-80 Diskette

Diskettes are easily damaged—by magnetism, extreme temperatures, dirt, etc. You should immediately get into the habit of making backup copies. Even if you have a hard disk system, you'll always *initialize* (start) the system from the system diskette, and you should always initialize with a backup diskette.

Make *two* copies. To do this, you'll need two blank diskettes and your CP/M-80 diskette. If you only have one blank diskette and you're anxious to get started, use it to make one backup copy before

*A write protect tab is a small piece of opaque adhesive that fits over the notch in a diskette. When a diskette has a write protect tab in place, the computer can read it, but can't write any data to it.

going any further. One backup copy is the absolute minimum requirement. Two copies are preferable to one.

Making a master copy

1. Switch on your QX-10. You'll see this message in the center of the screen:

INSERT DISKETTE

2. As illustrated in Figure 1-1, hold the label end of your CP/M-80 diskette, with the notch (now covered by a write protect tab) to the left, and insert the diskette into the LEFT drive. *Don't touch the exposed areas of the diskette.*
3. Push the drive release button in, as shown.

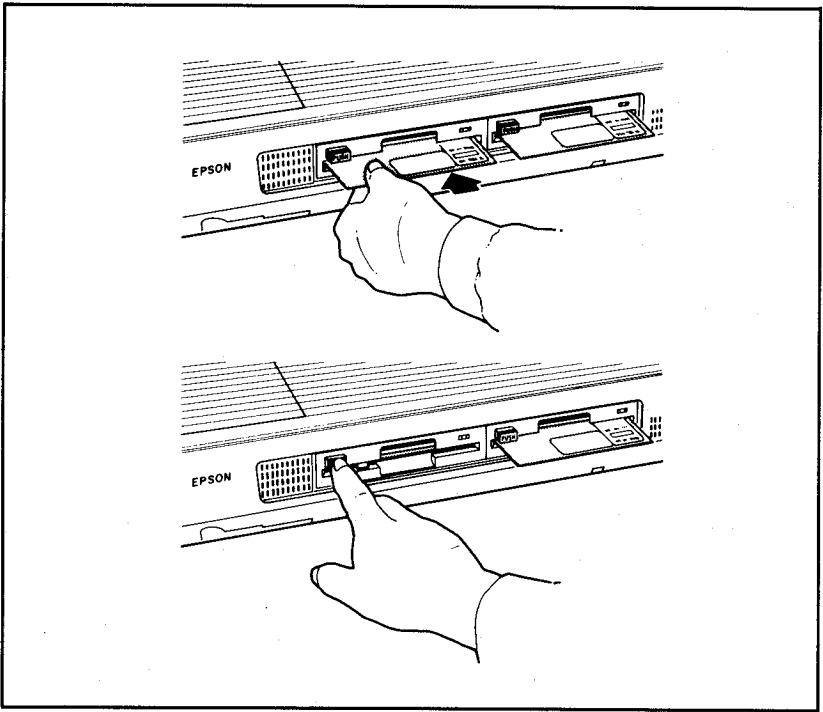


Figure 1-1. Inserting a diskette

4. Insert a blank diskette into the RIGHT drive and push the drive release button in.

When the system is loaded, the screen displays the drive assignments and this symbol:

A>

The > symbol is the *CP/M prompt*. It's always preceded by a letter, which represents the drive that CP/M-80 is currently using—in this case, drive A. The prompt invites you to issue a command to tell your QX-10 what to do.

Since your present task is to copy the CP/M-80 diskette, you will be entering the command that instructs the QX-10 to do that for you. The command is COPYDISK.

Note: You cannot use COPYDISK to copy data from or to a hard disk. Use the CP/M-80 transient command PIP, described in Chapter 4, to copy data to or from a hard disk.

5. Press **COPYDISK**—the third key from the left in the top row of keys on your keyboard. The screen displays:

```
                MAIN OPTION LIST
1 - Format and Erase a Diskette
2 - Copy the Contents of One Diskette to Another
3 - Create an Application Program Diskette
E - EXIT TO CP/M
ENTER OPTION ==>
```

6. Press **2**. The screen displays:

```
STATUS      COPY OPTION LIST
LEFT       Location of Diskette to be Copied FROM
RIGHT      Location of Diskette to be Copied TO
ALL        1 - Copy All, System or Data Tracks
           COPY COMMAND LIST:
           S - START COPY OPERATION
           E - EXIT TO MAIN MENU
ENTER OPTION ==>
```

Take a look at the STATUS column. The words *LEFT* and *RIGHT*, which always represent the two diskette drives, display.

7. Press **S** to START COPY OPERATION. The screen displays this message:

```
Mount diskette to be 'Copied FROM' in LEFT drive Mount
diskette to be 'Copied TO' in RIGHT drive This
operation will erase the contents of the diskette in
RIGHT drive.
```

```
DO YOU WANT TO CONTINUE? (Y/N):
```

8. Press **Y** to start the copy procedure. If you've changed your mind and don't want to make a copy right now, you can bail out by pressing **N** instead.

It takes a few minutes to make the copy. The system first *formats* the diskette in the RIGHT drive (hang on—we'll discuss formatting as soon as you've made your backup copies), then copies the contents of the diskette in the LEFT drive to the diskette in the RIGHT drive.

The message *Reading Track - Writing Track*, followed by the number of the track being copied, displays until all 40 (0 - 39) tracks are read and written.

In a few moments, the screen displays:

```
ENTER OPTION ==>
```

This means that the copy procedure is complete and it's safe to remove the diskettes from the diskette drives.

9. Remove the original system diskette from the LEFT drive and put it away in a safe place. It should be stored at room temperature, and kept away from electrical appliances.
10. Now remove the copy you have just made from the RIGHT drive, place a write protect tab on the notch, and label the diskette *CP/M-80 MASTER Copy*.

Making a working copy

Use the copy you have just made of your CP/M-80 system diskette to make another copy.

1. Insert the CP/M-80 MASTER Copy into the LEFT drive and push the drive release button in.
2. Insert a blank diskette into the RIGHT drive and push the drive release button in.
3. Press **S** to start the copy operation once again, then press **Y** to verify that you do wish to begin.
4. When the copy procedure is complete, press **E** twice—once to return to the COPYDISK Main Option List and once again for a display of the A) prompt.
5. Remove the CP/M-80 MASTER Copy from the LEFT drive and store it in a safe place—preferably *not* in the same place as you've stored the original CP/M-80 diskette. This is added insurance that you'll always have a good master system diskette.
6. Now remove the copy you have just made from the RIGHT drive and label it *CP/M-80 WORKING Copy*. Use this diskette in your day-to-day work with the QX-10.
7. Insert the CP/M-80 WORKING Copy into the LEFT drive and push the drive release button in.
8. While holding down the **CTRL** key, press **C**.

Note: Use **CTRL/C** every time you insert a different diskette into one of your diskette drives. We'll explain why when we tell you about control codes, later in this chapter.

Formatting a Blank Diskette

Your QX-10 can't record data on a diskette until the diskette is formatted. An analogy may help you understand formatting.

Suppose a company has just hired a group of people to staff a new department in the company building. The new employees all show up for work bright and early one Monday morning—but there's a problem. There are no walls dividing the space into offices!

The empty space in the department is like a blank, unformatted data diskette. The new employees are like *bits* and *bytes** of data with no place to go. And putting up walls to create offices for the employees is comparable to formatting a diskette.

If you could see the magnetized surface of one side of a diskette in the QX-10 format, it would look something like the illustration in Figure 1-2:

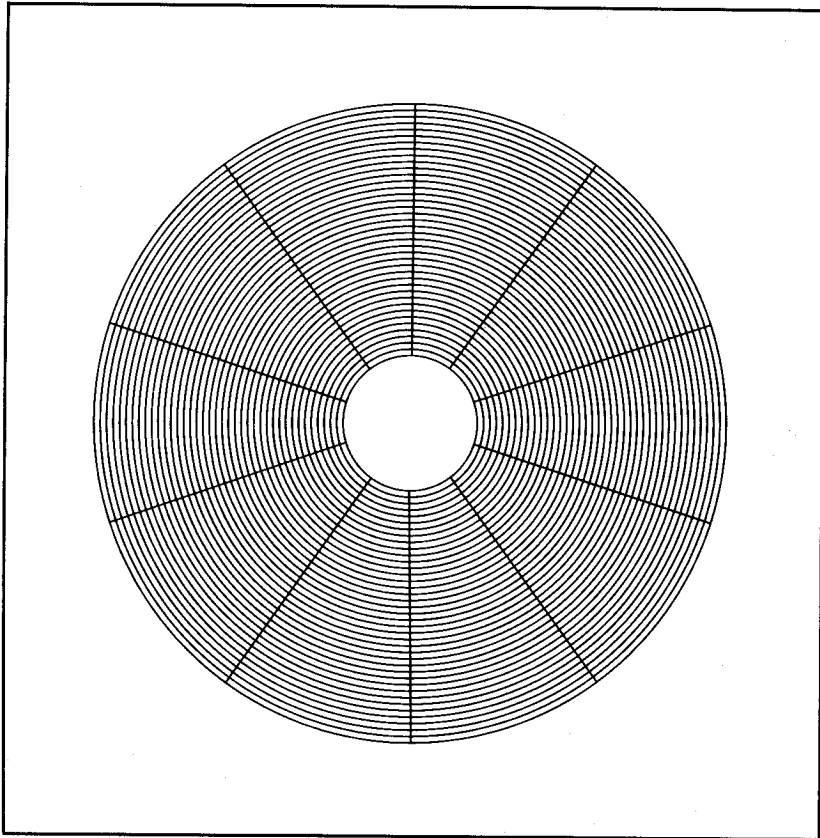


Figure 1-2. QX-10 formatted diskette (one side)

*A bit is the smallest piece of information that a computer can deal with, and a bit must be either 0 or 1. Bits are grouped into bytes. A byte, which consists of eight bits, is one unit of memory and is large enough to contain a single character (letter, digit, or symbol).

The concentric circles, which resemble grooves on a record, are *tracks*. The tracks are divided into *sectors* by lines radiating out from the center of the diskette. When you format a diskette, you organize it (electronically, not physically) into tracks and sectors so that data can be assigned to specific addressable locations. This makes it possible for CP/M-80 to store and retrieve data.

Now, format a blank diskette. The format procedure is much like the procedure for copying a diskette.

1. Insert a blank diskette into the RIGHT drive of your QX-10 and push the drive release button in.
2. Press **COPYDISK**. The screen displays:

```
                MAIN OPTION LIST
1 - Format and Erase a Diskette
2 - Copy the Contents of One Diskette to Another
3 - Create an Application Program Diskette
E - EXIT TO CP/M
ENTER OPTION ==>
```

You'll probably recognize this as the screen you worked with when you copied your CP/M-80 diskette. But notice that this time we've highlighted Option 1, Format and Erase a Diskette, instead of Option 2.

3. Press **1**. The screen displays:

```
STATUS          FORMAT OPTION LIST
RIGHT           1 - Location of Diskette to be formatted
                FORMAT COMMAND LIST
                S - Start FORMAT Operation
                E - EXIT to Main Menu
                ENTER OPTION ==>
```

4. Press **S** to start the **FORMAT** operation. The screen displays this message:

```
Mount diskette in RIGHT drive.  
This operation will erase the contents of the diskette  
in RIGHT drive.  
DO YOU WANT TO CONTINUE? (Y/N):
```

This message is here to remind you that whenever you format a diskette, any data currently stored on it will be erased.

5. Press **Y** to verify that you're ready to format the diskette. The message *Formatting Track*, along with the number of the track currently being formatted, displays until all 40 tracks (tracks 0-39) have been formatted. When the format operation is complete, the screen displays:

```
ENTER OPTION ==>
```

6. Press **E** twice—once to return to the **COPYDISK** Main Option List and once again for a display of the **A** prompt.
7. Remove the diskette from the **RIGHT** drive and label it *FORMATTED*. Now there's no chance you'll confuse it with blank, unformatted diskettes.
8. Insert the *FORMATTED* diskette back into the **RIGHT** drive and push the drive release button in.

CP/M-80 Basics

The best way to learn CP/M-80 is to use it, and you'll begin doing that in the next chapter. But first, here's a little background information to help you get started.

CP/M-80 and memory

When CP/M-80 moves into your QX-10's memory, it divides itself into five distinct areas:

The *Base Page*, located at the bottom of memory, contains all the data that CP/M-80 needs to monitor what's happening in the computer. For example, the **IOBYTE**—a reserved byte of memory that

keeps a record of the printers, modems, and other physical devices that are part of your computer system—inhabits this area.

TPA stands for *Transient Program Area*. It's the part of memory in which application programs—programs like accounts receivable, order entry, and word processing—execute and store data while in operation.

The *CCP* is the *Console Command Processor*. It's the part of memory that stands directly between you and your QX-10. The CCP allows you to tell your QX-10 what you want it to do next. The A) prompt is visible evidence of the CCP's presence.

BDOS is the *Basic Disk Operating System*. BDOS handles all transactions that relate to the information on a disk. It reads and writes logical records from or to disks via the BIOS and assigns files to specific addressable (and therefore retrievable) disk locations.

You won't see the addresses that BDOS assigns to your files unless you explore the inner workings of CP/M-80 and the QX-10. Such exploration goes beyond the scope of this manual.

BIOS is short for *Basic Input/Output System*. It's the part of CP/M-80 that communicates directly with all the physical devices that make up the computer system. The system BIOS must be customized for every make of computer because every make is unique.

Changing disk drives

Look at the screen. The symbol A) means two things:

- The system (CP/M-80) is waiting for you to tell it what to do, and
- The system is using drive A.

Whenever you power on or press **RESET**, CP/M-80 automatically uses (logs onto) drive A and displays the A) prompt.

There will be times when you'll want the system to use drive B or some other drive. Here's how to log onto a different drive.

1. After the A) prompt, type:

B:

2. Press **RETURN**. You'll see this on the screen:

B)

This means that CP/M-80 is now using drive B. You have successfully switched disk drives, and the system will continue to read from drive B (the new default drive) until you log onto another drive.

In fact, let's get back to drive A now.

1. After the B> prompt, type:

A:

2. Press **RETURN**. The system is now logged on to drive A, and the screen displays the A> prompt:

A>

Correcting typing errors

Press the backspace key (<X>) once to back up one space and erase one character from the screen and from memory. Press it twice to erase two characters, three times to erase three, and so on.

On the HASCI™ keyboard (the one that came with your QX-10), the delete key is marked (X). Press the delete key to delete a character and *echo* it to the screen.

When a character is echoed to the screen, it displays again—for example, if the screen displays *hello* and you press the delete key five times, you'll see this: *helloolleh*. The word *hello* is now followed by its mirror image, which indicates that it has been deleted from memory.

Using control codes

Look at the keyboard. You'll see a key on either side marked **CTRL**. This is the *Control* key. When you use it in combination with certain other keys, CP/M-80 will perform special functions for you.

Throughout this manual, the ^ symbol is used to represent the **CTRL** key. So this—**^C**—means "hold the **CTRL** key down, then press **C**."

^C—You've already used **^C**. Always type **^C** after you remove a diskette from a disk drive and insert another diskette into the same drive. If you don't, the system may generate this error message:

```
BDOS ERROR ON DRIVE X: READ ONLY
```

Pressing **^C** generates a *warm boot*, which partially initializes the system and lets CP/M-80 know that you've changed diskettes.

Note: A *cold boot* initializes the entire system and occurs when you power on or press **RESET**. If you press **RESET** at the wrong time—for example, while the system is writing data to a disk—you can damage the disk. We recommend using the **RESET** button sparingly, and *never* when a disk drive light is ON.

^P—^P is a toggle (on again, off again). CP/M-80 automatically sends whatever characters you send to the screen to the current LST: device—usually the printer. You'll learn more about LST: in Chapter 3.

Use **^P** to instruct the system to transmit data to the printer; use **^P** again to instruct the system to stop transmitting data to the printer.

To see exactly how this works, make a printed copy of the drive A directory.*

1. Make sure your printer is turned ON, and that it is on-line.
2. After the A> prompt type **^P** (remember, hold the **CTRL** key down, then press **P**.)
3. Now type DIR (for directory).
4. Press **RETURN**. The printer prints a copy of the directory.
5. Use **^P** again, to instruct the system to stop transmitting data to the printer.

^S—This control code temporarily stops console output. If your screen is *scrolling* and approaching data that you need to examine, use **^S** and the scrolling will stop. This is a toggle, so to restart the scrolling, use **^S** again.

Other control codes are:

^E—Physical end of line: the carriage is returned, but the line is not entered into memory until the carriage return key is depressed.

^H—This control code backspaces one character position.

^J—Use **^J** to terminate current input with a line feed.

^M—This control code terminates current input with a carriage return.

*A directory lists the names of the files on a disk.

^U and **^X**—Use either of these control codes to delete the entire line typed at the console.

Understanding diskette files

Simply put, a file is a set of related data. In a computer, a file is a collection of text, data, or program instructions stored on a disk or diskette.

CP/M-80 files have a first name (*file name*) and an optional last name (*file type*). The file type is separated from the file name by a period. In this manual, the word *filename* stands for the full name of a file, whether it is a file name only or a file name and a file type.

A file type identifies files in a way that lets you know what a file is to be used for. For example, files that have the file type `.COM`, which stands for *COMMAND*, are transient commands.

As you create files, you will (of course) name them. Sometimes you'll want to use a file name only, and sometimes you'll want to use a file type too. You can name a file anything you like, as long as you follow these rules:

- A file name is one to eight characters long. If you use more than eight characters in a file name, CP/M-80 shortens it by deleting any characters after the eighth character.
- A file type is zero to three characters long. If you use more than three characters in a file type, CP/M-80 shortens it by deleting any characters after the third character.
- A file name and file type must be separated by a period.
- A file name and type can include any combination of the characters on your keyboard except:

`, : . ? * = [] < > TAB ;`

Some valid filenames are:

LETTER
STATUS.RPT
STEVE.2
CPM80.QX10

(Remember, CP/M-80 would shorten the `CPM80.QX10` filename, changing it to `CPM80.QX1.`)

Some invalid filenames are:

STATUS:MEM (: not valid)
SAM*2 (* not valid)

There are two main types of files on diskettes:

- *Text files* consist of related lines of text, such as a report, letter, or poem.
- *Programs* are disk files that consist of lines of instructions that your computer can understand and execute. A program is also called a *transient command*. Your system diskette comes with two types of transient commands: standard CP/M-80 transient commands and special QX-10 utility programs.

Here's what the files on your system diskette do:

- ED.COM, PIP.COM, STAT.COM, SUBMIT.COM and XSUB.COM are CP/M-80 transient commands. (*Every* file of the type .COM is a transient command.) We've devoted a special chapter to each of these files except for XSUB.COM, which is covered in the SUBMIT.COM chapter.
- COPYDISK.COM, SETUP.COM, and INDEXER.COM are QX-10 transient commands. Because they are not standard CP/M-80 transient commands, they are also described as *utilities*. Each one is covered in a chapter of its own.
- CPM2.SYS contains the system BIOS, BDOS, and the CCP.

WARNING: Never change, delete, or rename this file. If you do, CP/M-80 won't know what to do!

- MTERM.COM is the transient command that you'll use if you run the telecommunication package whose documentation accompanies this manual.
- MTERM.DAT is a data file associated with MTERM.
- The PRACTICE and TEMP files are text files that we've placed on the diskette for practice purposes.
- ASM.COM, DDT.COM, DUMP.COM, and LOAD.COM. For details about these files, refer to any of the CP/M-80 books listed in the Bibliography (Appendix A).

- RFILE.COM, MBASIC.COM, and RANTEST.BAS. Refer to *Microsoft™ Basic for the QX-10*, which you received with your QX-10, for information on these files.

Now you're prepared to begin using CP/M-80 with your QX-10.

Chapter 2

Resident Commands

Also described as “built-in” commands, resident commands go wherever CP/M-80’s CCP goes. The instant you initialize the system with your CP/M-80 system diskette,* the resident commands move into the computer’s memory.

There are six CP/M-80 resident commands. They are:

- DIR Displays the contents (directory) of a disk.
- ERA Erases a file.
- REN Renames a file.
- SAVE Saves parts of memory to a file (used primarily by assembly language programmers).
- TYPE Displays the contents of a text file on the screen.
- USER Changes the current user area.

Now let’s learn how to use the CP/M-80 resident commands.

Before you begin, make sure that your system diskette is in the LEFT drive and that the diskette you formatted in Chapter 1 is in the RIGHT drive.

DIR

Of all the CP/M-80 commands, DIR is the one you’ll probably use

*Remember, even if you have a hard disk system, you’ll *always* have to use the CP/M-80 system diskette to initialize the system.

most often. Its purpose is to make directories visible to you, so that you can determine whether or not a disk contains a particular file.

Requesting a complete directory

In Chapter 1, you made a printed copy of your CP/M-80 diskette directory. Use DIR again, to get the directory back on the display screen.

1. After the A> prompt, type:

```
DIR
```

2. Press **RETURN**.

Take special note of the PRACTICE and TEMP files. We've placed them on the system diskette for you to use as you learn the resident commands.

Now suppose you want to take a look at the drive B directory.

1. After the A> prompt, type:

```
DIR B:
```

2. Press **RETURN**. The screen displays:

```
A>DIR B:  
NO FILE  
A>
```

This message tells you two things:

- There are no files on the drive B disk yet.
- You are still logged onto drive A. When you typed DIR B: in the example above, you instructed CP/M-80 to *look* at the drive B directory and report back to you. You did not log onto drive B.

Remember, to log onto drive B you'd type B: and then press **RETURN**.

Requesting a specific file

Sometimes you'll know the name of the file you want but won't be able to remember which disk it's on. DIR can help you locate the file.

Let's pretend that you want to work with the file PRACTICE.1 and that you *think* it's on drive A, but you're not sure.

1. After the A> prompt, type:

```
DIR PRACTICE.1
```

2. Press **RETURN**. The screen displays:

```
A: PRACTICE.1  
A>
```

This indicates that the file PRACTICE.1 is on the drive A disk and that the system is waiting for your instructions.

Now let's see what happens when you hazard a guess that the drive B disk contains the PRACTICE.2 file.

1. After the A> prompt, type:

```
DIR B:PRACTICE.2
```

2. Press **RETURN**. The screen displays:

```
NO FILE  
A>
```

This tells you that there's no file by the name of PRACTICE.2 on the drive B disk. Notice too that you are still logged onto drive A.

Searching the directory with a wildcard

If you've ever played cards, you probably know what a wildcard is. When the dealer says, "The joker is wild," players who get a joker can call it anything they want. So, three aces plus a Joker make four aces.

CP/M-80 has two characters (? and *) that are known as *wildcards*. They have this name because, like the joker in a game of cards, you can give them any meaning you wish. Wildcards are *ambiguous*—that is, they don't have one specific meaning. On the other hand, the filenames on your disks *do* have one specific meaning. They are *unambiguous*.

There's an important difference between the two CP/M-80 wildcards. The ? represents only one character, just as the joker represents only one playing card. The *, on the other hand, is more powerful than either the ? or the joker. It represents groups of characters.

Pretend that there's a particular file you need to work with, and that you remember the file type is .COM. But you can't remember the file name. Use a wildcard to search the drive A directory for files of the type .COM.

1. After the A> prompt, type:

```
DIR *.COM
```

2. Press **RETURN**. The screen displays a listing of all the .COM files. This doesn't exactly solve your problem, but it does narrow your search considerably.

Now suppose you not only remember that the file type is .COM, but also that the file name is only three or four characters long. This time, you can use the other wildcard.

1. After the A> prompt, type:

```
DIR ????.COM
```

2. Press **RETURN**. The screen displays only those files that have the file type .COM *and* file names no longer than four characters.
3. If you also remember that this very short file begins with the letter E, you can type this (try it):

```
DIR E???.COM
```

4. Press **RETURN**. There will be only one file on the screen. Obviously, it's the one you're looking for; it's called *ED.COM*.

ERA

WARNING: Exercise great caution when you use this command. It erases files from your disks. There is no way to restore a file that you have erased.

Try out ERA by erasing the PRACTICE.1 file.

1. After the A> prompt, type:

```
ERA PRACTICE.1
```

2. Press **RETURN**. Instantly, the A> prompt displays, indicating that the file has been erased and that the system is waiting for your next command. To make sure that ERA worked properly, check the directory with DIR. PRACTICE.1 will no longer be listed.

Now use a wildcard to delete a group of files. The files TEMP.1, TEMP.2 and TEMP.3 are dispensable, so practice on them.

1. After the A> prompt, type:

```
ERA TEMP?.*
```

2. Press **RETURN**. The A> displays, indicating that the files have been erased and the system awaits your next command.
3. Take a look at what you've just done by typing DIR after the A> prompt and pressing **RETURN**. Note that all the TEMP files have been deleted.

REN

Now practice renaming a file, to find out how REN works.

1. After the A> prompt, type:

```
REN PRACTICE.1=PRACTICE.2
```

What you're doing is changing the name of PRACTICE.2 to *PRACTICE.1*. It's important to note that with the REN command, the *new* filename (in this case, *PRACTICE.1*) precedes the *old* filename (in this case, *PRACTICE.2*). So, with REN, NEW=OLD. You should also note that CP/M-80 doesn't allow you to have two files with the same name on one disk.

2. Press **RETURN**. The system makes the requested change and displays the A> prompt on the screen. To verify that the correct change was made, type DIR after the A> prompt and check the directory.

SAVE

Assembly language programmers use SAVE to save some of the contents of memory as a program file on a disk or diskette. If you only use CP/M-80 to run application programs that you buy at your com-

puter store, you might never use SAVE at all. For more information about SAVE, refer to one of the CP/M books listed in the Bibliography.

TYPE

Use the TYPE command to view the contents of a file on your display screen.

1. After the A> prompt, key in:

```
TYPE PRACTICE.1
```

2. Press **RETURN**. The following verse displays on the screen:

```
'Twas brillig, and the slithy toves,  
Did gyre and gimble in the wabe:  
All mimsy were the borogroves,  
And the mome raths outgrabe.*
```

USER

This command allows you to change to one of 16 (0 - 15) distinct logical areas for files on your disks. USER is helpful when disks have multiple users who work with different files.

As a single user, you may wish to maintain separate user areas (especially if you have a hard disk) to control the length and complexity of directory listings.

Every time you cold boot the system, user area 0 is assumed and it will be assigned to any files you create during that session. To assign some other user area to a file, simply type USER and the user area you wish to assign to the file you are about to create. For example, to assign user area 2 to a file,

1. After the A> prompt, type:

```
USER 2
```

*From the poem "Jabberwocky," by Lewis Carroll.

2. Press **RETURN**. Any file(s) you create now will be considered a part of user area 2.
3. Now use DIR to check the directory. The message *NO FILE* displays.

You know that there are files on the drive A disk. But remember, all those files are associated with user area 0. There are *NO FILES* in user area 2, because you haven't created any yet. To return to user area 0,

1. After the A> prompt type:

```
USER 0
```

2. Press **RETURN**. Now when you use the DIR command, you'll see the directory of all the files associated with user area 0.

To learn how to copy files into user areas 1 - 15, review Chapter 9, which describes the QX-10 utility INDEXER. Refer specifically to the INDEXER commands C (Copy File) and M (Copy Tagged File).

Now that you have some idea about how to use the resident commands, you have taken the first step toward working with CP/M-80. The next step is to learn about transient commands. These are covered in the next four chapters.

Chapter 3

STAT

STAT is an abbreviation of the word *statistics*. Most of the time, you'll use STAT to check the size of files on your disks or to find out how much space remains on a disk.

But STAT has other uses too. This transient command takes a variety of forms, some of which may surprise you.

Checking Diskette Format

There are many possible disk formats in the computer world. You can use STAT to determine the precise format of QX-10 diskettes, hard disks, and the *foreign* (non-QX-10) diskettes listed in Table 8-3.*

1. After the A> prompt, type:

```
STAT A:DSK:
```

2. Press **RETURN**. For a QX-10 diskette, the screen displays:

```
A: Drive Characteristics
3040: 128 Byte Record Capacity
380: Kilobyte Drive Capacity
128: 32 Byte Directory Entries
128: Checked Directory Entries
256: Records/ Extent
16: Records/ Block
80: Sectors/ Track
2: Reserved Tracks
```

*To use STAT with a foreign diskette format, first use SETUP (Chapter 8) to set the RIGHT drive to the appropriate format.

The categories remain constant, but the numbers change from disk to disk. For example, if you have a Comrex ComFiler, the screen displays:

A:	Drive Characteristics
39040:	128 Byte Record Capacity
4880:	Kilobyte Drive Capacity
1024:	32 Byte Directory Entries
0:	Checked Directory Entries
128:	Records/ Extent
16:	Records/ Block
64:	Sectors/ Track
2:	Reserved Tracks

Checking Diskette Statistics

You can use STAT to check and/or change a disk's *access attribute* and to find out how much space remains on the disk.

1. After the A) prompt, type:

```
STAT
```

2. Press **RETURN**. A message something like this displays:

```
A: R/W, Space: 112k
```

The *R/W* in the example above stands for *Read/Write*, which is this disk's current access attribute. *R/W* means that you may access the files on this disk both to read them and write to them. *R/W* is the *default* disk access attribute.

The other piece of information that STAT provides for current disk status, *Space*, tells you how much room remains for files. The 112k in the example indicates that there are 112k bytes of space remaining on the diskette. Since $1k=1024$ bytes, or characters, this means that 114,688 bytes remain on the disk ($1024 \times 112k$). This is equivalent to about 38 pages of single-spaced, typewritten text.

The number of bytes remaining on a disk varies as you add and delete files.

If you use the STAT command after logging onto a drive other than A, the screen displays the disk statistics for all the drives you have

logged onto. If you haven't logged onto a particular drive, STAT won't display statistics for it.

Let's say you've logged onto drives A and B. When you type STAT after the A) prompt, you'll see something like this:

```
A: R/W, Space: 112K
B: R/W, Space: 206K
```

Checking Drive B Statistics

Let's say you haven't logged onto drive B yet. By not specifying the disk drive, you direct STAT to check the statistics for the default drive A. But what if you want to see the drive B statistics? It's very simple.

1. After the A) prompt, type:

```
STAT B:
```

2. Press **RETURN**. The screen displays a message that looks something like this:

```
Bytes remaining on B: 154k
```

You may have noticed that this time STAT didn't provide the file access attribute, so you have no way of knowing whether the disk is R/W or R/O. STAT only provides the R/W or R/O information for a drive other than A if:

- You have logged onto another drive since the last cold or warm boot, or
- You are logged onto a drive other than A when you run STAT.COM. This assumes that the STAT.COM file is on the disk in question.

Changing Disk Access Attributes

If you'd like to protect the contents of a disk from being written over, you can change the disk access attribute to R/O, or *Read Only*.

1. After the A) prompt, type:

```
STAT A:=R/O
```

2. Press **RETURN**, and that's all there is to it. You have just changed the access attribute of the drive A disk to R/O. Check it out.

3. After the A> prompt, type:

```
STAT
```

4. Press **RETURN**. You'll see something like this:

```
A:R/O, Space: 112k
```

Note that the disk access attribute has changed to R/O. Now if you attempt to write to any of the files on this disk, the system responds by displaying an error message.

A disk with the R/O access attribute is like a diskette with a write protect tab—but there's an important difference. The R/O is temporary. It will change back to R/W with the next cold boot.* Try this out.

1. Press **RESET**.

2. After the A> prompt, type:

```
STAT
```

3. Press **RETURN**. The screen displays the statistics for the drive A disk, and the access attribute is R/W.

Checking File Statistics

You can use STAT to check the statistics for a single file, or for a group of files, just as easily as you use STAT to check disk statistics.

Statistics for one file

Assume now that you want to check the statistics for a file on the drive A disk. Any file will do. Practice with the STAT.COM file.

1. After the A> prompt, type:

```
STAT STAT.COM
```

*If you apply a write protect tab to the notch in a R/W diskette, STAT will report that the diskette is R/W, but you still won't be able to write to it.

2. Press **RETURN**. The screen displays:

```
Recs Bytes   Ext   Acc
   41   6k    1   R/W  A:STAT.COM
Bytes Remaining on A: 102k
A>
```

This is a lot of information. Take a closer look at it, piece by piece.

Recs. CP/M-80 stores data in 128-byte *records*. This particular file consists of 41 records.

Bytes. Remember, a *byte* is one character, digit, or symbol, and 1k equals 1024 bytes. The number of characters, digits, or symbols making up this file is 41×128 , or 5248. Because CP/M-80 allocates disk space in blocks of 2K, this file containing 5248 bytes takes up 6K of space on the disk.

EXT. There is one *extent* (one directory entry) for this file.

ACC. An abbreviation for *access*. This is the file access attribute. The entry under this heading will always be R/W (for Read/Write) or R/O (for Read Only).

A:STAT.COM. The disk and filename. This simply reminds you that you are logged onto drive A and that the file under scrutiny is STAT.COM.

Statistics for a group of files

Now use the wildcards * and ? to check the statistics for groups of files.

1. After the A> prompt, type:

```
STAT *.COM
```

2. Press **RETURN**. The screen lists the statistics for all files on the drive A disk with the file type .COM.

3. Now type:

```
STAT *.*
```

4. Press **RETURN**. The screen lists the statistics for all files on the drive A disk.

Changing File Access Attributes

Earlier in this chapter, you learned to change the file access attribute of a *disk* from R/W to R/O. In this section, you'll learn to change the access attributes of *files*.

First, let's review the two file access attributes, R/W and R/O, which are mutually exclusive.

R/W and R/O

R/W stands for *Read/Write* status. It means that the file can be both written to and read. R/W is the default file access attribute.

R/O stands for *Read/Only* status. It means that the file may only be read. It has the same effect on the one file as applying a write protect tab to the notch of a diskette has on all files on the diskette. The change remains in effect only until you reboot the system.

Here's how to make the PRACTICE.3 file R/O.

1. After the A> prompt, type:

```
STAT PRACTICE.3 $R/O
```

2. Press **RETURN**. The screen displays:

```
PRACTICE.3 set to R/O
```

3. To return the file to R/W from R/O, after the A> prompt, type:

```
STAT PRACTICE.3 $R/W
```

4. Press **RETURN**.

You can also use wildcards to set files to R/O status. Say, for example, you wish to protect all the .COM files on your disk.

1. After the A> prompt, type:

```
STAT *.COM $R/O
```

2. Press **RETURN**. Your .COM files now have the R/O status. Change them back to R/W status with the next step.

3. After the A> prompt, type:

```
STAT *.COM $R/W
```

There are two other file attributes that come with STAT, and they are also mutually exclusive.

SYS and DIR

If a file has the SYS attribute, it won't display in the disk directory. Set a file to SYS.

1. Type:

```
STAT PRACTICE.3 $SYS
```

2. Press **RETURN**.

3. Use the DIR command to check that PRACTICE.3 no longer shows in the disk directory.

DIR is another default attribute for files.* Files with this attribute display in the directory. Now reset the file to the DIR attribute.

1. After the A> prompt, type:

```
STAT PRACTICE.3 $DIR
```

2. Press **RETURN**.

3. Check that PRACTICE.3 has been restored to the directory.

Checking Device Assignments

Your computer has several *physical devices* attached to it. Some of the physical devices attached to your QX-10 are the display screen, printer, and disk drives.

Through STAT, you can attach more—or different—physical devices to your QX-10. *Don't attempt to do this unless you thoroughly understand what you're doing.* In fact, feel free to skip over this section if you're content to leave the physical devices just as they are.

*Note that DIR used alone is a resident command, while \$DIR used with STAT is a file attribute.

Here's a list of physical devices that are acceptable to CP/M-80:

- CRT: Cathode ray tube (display screen)
- PTR: Teletype input device (keyboard)
- PTP: Teletype output device (video display)
- LPT: Parallel printer (parallel port)
- TTY: Teletype device (console)
- UC1: User defined console (output, through serial port)
- UL1: User defined list device (output, through serial port)
- UP1: User defined punch #1 (output, through serial port)
- UP2: User defined punch #2 (output, through serial port)
- UR1: User defined reader #1 (input, through serial port)
- UR2: User defined reader #2 (input, through serial port)
- BAT: Batch processor (receives input from the current RDR: logical device and sends output to the current PUN: logical device)

CP/M-80 groups these physical devices according to what they do and gives a name to each type of function. As it turns out, the physical devices on CP/M-80's list fall into four different functional categories. Each of these categories is called a *logical* device.

Here's a list of the CP/M-80 logical devices.

- CON: Console. An input/output device, CON: accepts input from a keyboard and displays output on a display screen or prints it out on paper.
- RDR: Reader. An input device, RDR: sends information to the computer. Your keyboard is an example.
- PUN: Punch. An output device, PUN: receives information from the computer. A printer is a PUN: device.
- LST: List. An output device, LST: lists information, either by displaying it on a screen or by printing it out on paper.

Each of the CP/M-80 logical device names may be applied to one of four different CP/M-80 physical devices. The STAT VAL: command displays these possible logical-to-physical device assignments. To view these assignments.

1. After the A) prompt, type:

```
STAT VAL:
```

2. Press **RETURN**. The screen displays:

```
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:
```

When you receive your QX-10, certain logical-to-physical device assignments are already in effect. You can use another form of the STAT command to find out what those assignments are.

1. After the A) prompt, type:

```
STAT DEV:
```

2. Press **RETURN**. You'll see this on the screen:

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

This information on current device assignments is contained in the *IOBYTE*, a reserved byte of memory that keeps track of the printers, modems, and other peripheral devices attached to your computer.

Changing Device Assignments

CP/M-80's adaptability to a variety of physical devices makes it possible for you to change or add to the physical devices that your system is set up for when it's new.

If you change a physical device, you may also have to change the IOBYTE so that correct information is available to the system. Use the STAT command to make changes of this type.

For example, the system is set up to operate a parallel printer. Thus, the LST: device is LPT:. If you have a serial printer, attach it to the serial port *and* redirect LST: output to the serial port instead of to the parallel port.

1. After the A>prompt, type:

```
STAT LST:=UL1:
```

2. Press **RETURN**.

The new device assignment goes into effect. (You can use STAT DEV: to check this.)

Now (unless you really *do* have a serial printer) reassign your LST: device to the parallel port.

1. After the A>prompt, type:

```
STAT LST:=LPT:
```

2. Press **RETURN**.

Chapter 4

PIP

PIP stands for *Peripheral Interchange Program*. It has two main functions:

1. To copy files on disk, and
2. To transmit data from your computer to a selected peripheral—i.e., a physical device, such as a printer.

If you have the standard two-drive system, make sure you have inserted a formatted diskette into the RIGHT drive before reading any further.

Copying Files with PIP

You'll use PIP most often when you need to copy files from one disk to another. You can also use PIP to make a backup copy of a file on the same disk or to create a new file by merging existing files.

Copying a file to another disk

1. After the A> prompt, type:

```
PIP B:PRACTICE.1=A:PRACTICE.1
```

This tells PIP to copy the PRACTICE.1 file, which is located on the drive A disk, to the drive B disk.

Notice that the disk to be copied TO is listed FIRST.

2. Press **RETURN**. The drive lights alternate flashing on and off as the contents of the PRACTICE.1 file are copied to the drive B disk.

After the file is copied, the lights stop flashing and the A> prompt reappears.

3. To make sure PIP copied the file, check the directory of the drive B disk. After the A> prompt, type:

```
DIR B:
```

4. Press **RETURN**. The screen displays:

```
B:PRACTICE.1  
A>
```

This indicates that you have successfully copied the PRACTICE.1 file and that CP/M-80 is waiting for your next command.

By the way, if you check the directory for the drive A disk, you'll find that PRACTICE.1 is still there. You didn't *move* the file—you *copied* it.

Copying a group of files to another disk

Do you remember using wildcards (? and *) to erase groups of files earlier in this manual? You're going to use the CP/M-80 wildcards again—this time to copy files from one disk to another.

Now copy all files with a file name of four or fewer characters and of the type .COM from the drive A disk to the drive B disk.

1. After the A> prompt, type:

```
PIP B:=A:????.COM
```

2. Press **RETURN**. The drive lights alternate flashing on and off and the names of the files you requested appear on the screen as PIP copies them.
3. When the lights stop flashing and you see the A> prompt on the screen, check the drive B directory to verify that the files were copied correctly.

Note: If you had wanted PIP to copy ALL files of the type .COM from drive A to drive B you would have used the other wildcard, *, like this:

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

Making a backup copy

When you have an important file on a disk and it's your only copy, you may want to duplicate it on the same disk.*

Try this out by making a backup copy of the PRACTICE.1 file.

1. After the A> prompt, type:

```
PIP PRACTICE=PRACTICE.1
```

Notice that you don't need to specify disk drives in this command. You're doing everything on drive A and PIP assumes the default drive, which is A.

2. Press **RETURN**. The drive lights alternate flashing on and off.
3. When the flashing stops and the A> prompt displays, check the drive A directory. Among the files listed in the directory, you'll see both PRACTICE.1 and PRACTICE, the contents of which are identical.

Copying a file to another disk and renaming the copy

Now let's say that you wish to copy a file from one disk to another, and that you'd like the copy to have a different name.

1. After the A> prompt, type:

```
PIP B:PRACTICE.2=A:PRACTICE.3
```

2. Press **RETURN**. The drive lights alternate flashing on and off as the PRACTICE.3 file in drive A is copied to drive B and given the name *PRACTICE.2*.
3. When the lights stop flashing and you see the A> prompt, check the directory for drive A, then for drive B. You'll see PRACTICE.3 in the drive A directory and PRACTICE.2 in the drive B directory.

Merging two or more files

To merge two or more text files, list the names of the files to be

*This is a nice option, but it's always better to back up your files on a separate disk. Then if an entire disk is wiped out, you still have another copy of the file.

merged, separating them by a comma. There is no comma after the last filename.

1. After the A) prompt, type:

```
PIP A:DOUBLE=PRACTICE,PRACTICE.3
```

2. Press **RETURN**.

The new file is DOUBLE. It consists of two files that are already on drive A—PRACTICE and PRACTICE.3.

Transmitting Data to Peripheral Devices

There may be times when you'll want to transmit the contents of a disk file to a peripheral device, such as a printer. You can do this with PIP.

1. Make sure the printer is turned on, and that it's on-line.
2. After the A) prompt, type:

```
PIP LST:=DOUBLE
```

3. Press **RETURN**.

The DOUBLE file prints out.

Changing File Values with PIP

PIP recognizes a variety of optional symbols and device names that, when selected, trigger specific changes within the files PIP is being used on. You can change the content and/or form of a file as you copy it or transmit it from one device to another.

How to use PIP special symbols

To use a PIP special symbol, enclose it in brackets and place it at the end of the command line.

For example, to change all uppercase characters to lowercase, you would type:

```
PIP LST:=PRACTICE.1[L]
```

This instructs PIP to transmit the data in the named file to the list device (usually a CRT screen or printer) and to change all uppercase characters to lowercase.

PIP allows you to use more than one of these value-changers at a time. You could, for example, change all uppercase characters to lowercase [L] and at the same time, add line numbers to lines of text [N]. After the A) prompt, type:

```
PIP LST:=PRACTICE[LN]
```

The file that is transmitted to the list device will change so that 1) every character is lowercase, and 2) every line is preceded by a number.

PIP special symbols

The PIP special symbols are as follows:

Symbols that change content

- | | |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| L | Changes uppercase letters to lowercase. |
| U | Changes lowercase letters to uppercase. |
| N | Adds line numbers to lines of text. |
| Dn | Deletes characters from the specified column number (n) through the ends of the lines of the file. You may want to use this to transmit data to a narrow printer or console when the complete text isn't needed. |
| Z | Strips off bit 7, the high-order bit, as PIP copies the file. This is invaluable when you need to transmit, to a 7-bit device, a text file that may have characters with the high bit set. It eliminates graphic characters in the text. |
| Stext^Z | Instructs PIP to start copying when it encounters a specified string of characters. This allows you to transmit <i>part</i> of a file, rather than the entire file.

You use this command with Qtext^Z (described next) to specify the starting and ending point of the data to be transmitted. |
| Qtext^Z | Instructs PIP to quit copying when it encounters a specified string of characters. This allows you to transmit part of a file, rather than the entire file. |

Note: If there are any lowercase letters in your selected character string, use the *command mode* of PIP with Stext^Z and Qtext^Z. The reason is that the CCP automatically converts all letters to uppercase. You therefore need to take control away from the CCP when searching for lowercase letters.

For example, to enter the command mode, after the A) type:

PIP

Press **RETURN**. The screen displays: *

Type:

```
CON:=PRACTICE.3[Ssounded^ZQlaughter^Z]
```

This instructs PIP to copy the words *sounded like laughter* from the PRACTICE.3 file to your display screen.

Press **RETURN**. The screen displays:

```
sounded like  
laughter  
*
```

Press **RETURN**, to exit PIP and get back to the A).

Symbols that change form

- F Removes page breaks from the file. Can be used with Pn [FPn] to establish new page breaks.
- Pn Inserts page breaks into a file, at line n. If only P is used or if n is 1, the page break will occur at line 60. Can be used with F [FPn] to establish new page breaks.
- Tn Changes tabs for the destination device.

Miscellaneous symbols

- V Verifies that a file copied from one diskette to another is an exact duplicate.

- O Transfers non-text files—i.e., files containing binary or program data. You *don't* need to use O with .COM files.

PIP special devices

In addition to the PIP special symbols, five commands expand the power of PIP. For lack of a better term, these commands are referred to as *special devices*.

The five PIP devices are:

1. PRN:

Serves basically the same function as LST: does, but also alters the format of the file being transmitted.

It transmits the file contents to the list device and automatically adds line numbers, changes the TAB character to spaces (PRN: assumes tab stops at every eighth column), and sends page ejects to the printer every 60 lines. Sample format:

```
PIP PRN:=PRACTICE.1
```

2. NUL:

Sends 40 *nulls* (ASCII code 0) to the device. When used with paper tape, NUL: produces a four-inch length of blank paper. May be used in data communications to slow down communication from a faster peripheral device to a slower one. Sample format:

```
PIP PUN:=NUL: ,PRACTICE.1
```

3. EOF:

Sends an end-of-file command (ASCII code ^Z) to the device. If you are transmitting data between two computers you may need EOF: to terminate the transfer. Sample format:

```
PIP PUN:=PRACTICE.1,EOF:
```

4. INP:

Special input device which can be patched into PIP. To use INP:, refer to any one of the many manuals currently available on the CP/M operating system.

5. OUT:

Special output device which can be patched into PIP. To use OUT:, refer to any one of the many manuals currently available on the CP/M operating system.