

Introduction to the HP 82900A CP/M® System

HP-86/87

CASH FLOW ANALYSIS

YEAR:	3	4	5
SHIP			
TOTAL GROSS	9600	116160	127776
- Operating	2500	3250	33275
Net Operating			103951.1
- Interest			31865
- Depreciation			20000
Taxable Income			4.1

Net Operating Inc. 71000
- Prin.&Int. Pmt. 38002

Cash Flow Bef. Tax 72348
- Income Tax 669.2 98000 34.44

Cash Flow Aft. Tax 25478.8 29563.2 44464.66

INT. ON RETURN

Sale Proceeds After Tax:
Discount Rate:

Cash Flow Aft. Tax (Init. Invest. in Year 0)	-100000	25478.8	29563.2
Net Present Value	-77844.5	-55490.5	-330
IRR (Percent)	-74.5212	-31.41	

HP 82900A CP/M® SYSTEM
 HEWLETT-PACKARD
 MADE IN U.S.A.



**Introduction
to the
HP 82900A CP/M[®] System**

HP-86/87

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Introduction to CP/M

What is CP/M?

CP/M stands for "Control Program for Microcomputers." As the name indicates, CP/M controls and directs the many and varied tasks performed by today's sophisticated microcomputers. These tasks include:

- Accessing files from a disc.
- Loading programs into memory.
- Executing program instructions.
- Controlling the CRT display.
- Interpreting keyboard input.
- Operating a peripheral printer.

All these tasks are directed by the computer operating system. The CP/M operating system actually comprises several subprograms or sequences of instructions which exchange information with each other and with the outside world (peripheral disc drives, printers, and most importantly, you). CP/M's versatility stems from the fact that most of these subprograms need not be altered when reconfiguring CP/M for different types of microcomputers. It is therefore easily transported between different microcomputer systems as long as:

1. The CPU or central processing unit is one of the compatible types (8080, 8085, or Z-80A®).
2. The system includes at least one disc drive (certain CP/M features require a minimum of two disc drives).

Since your HP Series 80 Personal Computer is not based on one of the CP/M compatible microprocessors, an accessory "CP/M module" is provided with the HP 82900A CP/M System. This plug-in module contains all the necessary hardware to implement the CP/M operating system. It can be installed in any one of the four module ports on your computer. A copy of the CP/M operating system, version 2.2, resides on the 5¼-inch flexible disc provided with your CP/M system. Unlike your integral or "native mode" operating system, which resides in permanent memory and is active at power-on, CP/M must first be loaded from disc before taking control of the computer. This procedure, known as "bootstrap" loading, is discussed in section 2. Unless the CP/M system is loaded from disc, your computer remains in "native mode," operating normally, and is unaffected by the CP/M plug-in module.

Application Programs

The versatility of CP/M has made it an attractive system for companies producing *application programs* or *software*. Keep in mind, however, that most CP/M software is machine specific. That is, an application program written for one type of CP/M computer is not necessarily compatible with another type of CP/M computer. Application programs used with your computer system must be disc-formatted for the HP system.

If your main objective in using the HP CP/M system is for operating application programs, you will need to know only a few things about CP/M. Step-by-step instructions are presented in section 2 in the sequence necessary to get CP/M and your software “up and running.” You may also want to learn more about the CP/M system and make use of some features relevant to your application programs. For example, you might want to:

- Obtain a directory listing of disc files.
- Erase unwanted files.
- Copy files between discs.
- Rename files.
- List a file on the CRT or system printer.
- Obtain statistics on files.

These features are all accessible with only an elementary understanding of the CP/M system. They are discussed in section 3 at a level appropriate for the beginning CP/M user.

Programming With CP/M

The CP/M System has many features that are not discussed in this manual. Most of these features are related to assembly language programming and the technical aspects of CP/M. This information is presented in the *HP 82900A CP/M System Reference Manual* and the *HP 82900A CP/M System Pocket Guide* and is also available in many books and user guides written about CP/M. A bibliography is provided in the *HP 82900A CP/M System Reference Manual* which lists some of these additional references.

Whether you are an operator or a programmer, read the installation and set-up instructions presented in section 2 of this manual. The remainder of the manual may also serve as a review of some elementary CP/M features for the experienced programmer.

Compatibility With Other Series 80 Products

The HP 82900A CP/M System is compatible only with the HP-86/87 Personal Computer. Since CP/M is a disc-resident operating system, a peripheral disc drive is required to implement the system with your computer. The minimum CP/M system requires a single disc drive, but some fundamental utilities (copying files between discs, for example) require at least two disc drives. The disc drive devices that are compatible with the HP 82900A CP/M System are:

- HP 82901M and HP 82902M Flexible Disc Drives (5¼-inch flexible discs).
- HP 9895A Flexible Disc Memory (8-inch flexible discs).
- HP 9134A Winchester Disc (5¼-inch hard disc).
- HP 9135A Winchester Disc (5¼-inch hard disc plus 5¼-inch flexible disc).
- HP 9130A Flexible Disc Drive (5¼-inch flexible discs, HP-86 only).

Although your system is available only on 5¼-inch disc, it can be copied onto an 8-inch disc, as explained in section 2. This operation requires both a 5¼-inch disc drive and an 8-inch disc drive.

In addition, CP/M can be used to operate the following types of system printers:

- HP-IB printers for HP Series 80 Personal Computers.
- Parallel printers for HP Series 80 Personal Computers.
- HP printers using the HP 82939A Serial Interface (XON/XOFF and hardware handshaking only).

There are some major differences between native mode and CP/M mode operations. Your CP/M system *cannot*:

- Operate HP-IB devices other than printers and disc drives (for example, plotters and instruments).
- Operate BCD or GPIO interface devices.
- Operate serial input devices.
- Perform CRT graphics operations.

In addition, you cannot transfer disc files between native mode and CP/M mode; native mode programs operate only with the native mode operating system and CP/M programs operate only with the CP/M operating system.

The enhancement features provided by Series 80 accessory ROMs are not accessed by the CP/M system; for convenience you may want to remove the ROM drawer from your computer before using the CP/M system.

The accessory HP 82907A, HP 82908A, and HP 82909A memory modules (32K, 64K, and 128K) do not provide additional user memory to the CP/M system. The amount of user memory available with CP/M is fixed at approximately 56K bytes. However, accessory memory modules do expand the size of the print buffer for CP/M printing operations. The CP/M print buffer provides a spooling capability, up to the available memory, that allows you to print data while using the system for other tasks.

Syntax Guidelines

The syntax for CP/M commands is presented in the same manner as syntax for BASIC statements and commands. The following conventions apply:

<code>DOT MATRIX</code>	Items in <code>DOT MATRIX</code> are CP/M commands that must be entered exactly as shown, except that lowercase letters can be substituted for uppercase letters. CP/M interprets all letters as uppercase.
<code>[]</code>	Brackets are used to enclose optional items.
<i>italics</i>	Items in <i>italics</i> are alphanumeric command inputs that must be included in the command (unless enclosed by brackets).
<i>stacked items</i>	When items are placed one above the other, one and only one must be chosen.
<code>...</code>	An ellipsis placed after an item or a series of items enclosed by brackets indicates that the item or the contents of the brackets may be repeated.

Getting Started

Unlike your integral computer operating system, which resides in permanent memory, the CP/M system must be loaded from disc each time it is used. This section provides step-by-step instructions for implementing CP/M with your computer. However, before continuing you should be familiar with the material in your computer's introductory manual explaining set-up procedures for your computer and peripheral devices. Since CP/M requires a minimum of one, and for some features, two disc drives, you must connect these peripherals before using the CP/M system. When your computer and peripherals, including disc drive(s), and a system printer, if desired, are set-up and operable, proceed with the instructions in this section.

CP/M Module Installation

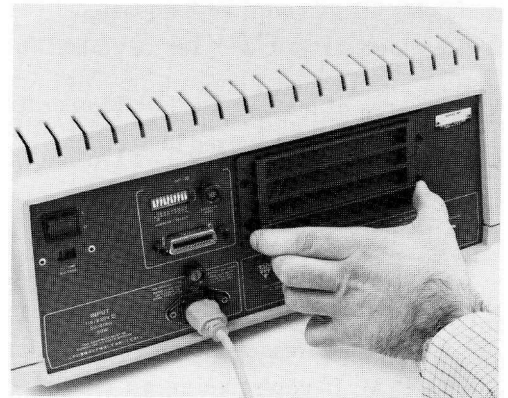
The CP/M module is installed in one of the four module ports on the rear of the computer. Before shipping, each port is covered with a removable protective cover. It is recommended that ports not in use be kept covered.

WARNING

Do not place fingers, tools, or other foreign objects into the module ports. Such actions may result in minor electrical shock hazard and interference with pacemaker devices worn by some persons. Damage to module port contacts and the computer's internal circuitry may also result.

The procedure for installing plug-in modules is as follows:

1. Turn off the computer and any connected peripheral devices. However, make sure the computer is plugged into a grounded (three-wire) ac outlet.
2. Remove the protective cover from any one of the unused ports, keeping the remaining unused ports covered. You do not need to remove any previously installed modules.

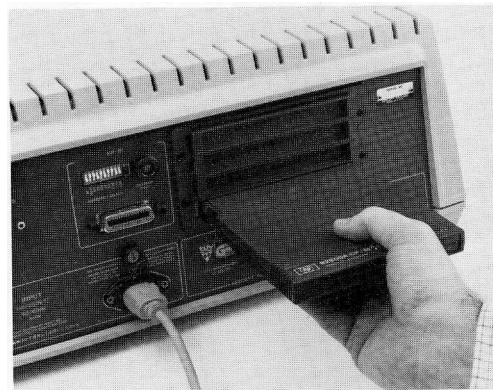


CAUTION

To ensure proper computer operation and to prevent damage to equipment:

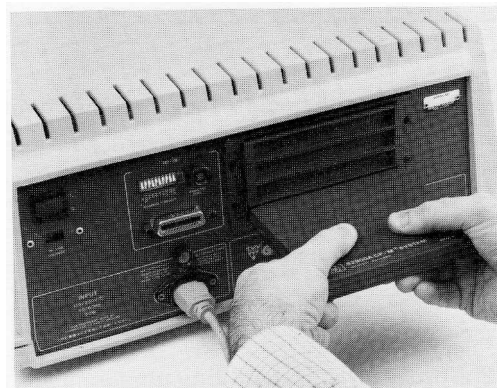
- Always switch off the computer and all peripherals before inserting or removing modules. Use only plug-in modules designed by Hewlett-Packard for your computer.
- Do not force a module into a port. The port tracks are keyed to prevent the module from being inserted upside down. Forcing an upside down module into a port could result in damage to the module or to the computer.

3. Line up the module with the port opening and gently slide the module into the port. When you feel a small amount of resistance, firmly press the module into the port until the module grips meet the side of the port. A slight side-to-side motion may be necessary to seat the module in the port.



The CP/M module is now installed. If you ever wish to remove the module, follow these instructions:

1. Turn off the computer and any connected peripherals.
2. Firmly grasp the module and pull it from the port. Side-to-side motion may be necessary to dislodge the module. When not in use, modules should be stored in their original container or in a box where they are protected from damage.
3. Replace the port cover.



The CP/M module will not interfere while your integral or “native mode” operating system is active. The computer is “aware” of the module only when CP/M is loaded and in control of the system.

Loading the CP/M System

The process of loading the CP/M operating system from disc into memory is referred to as “bootstrap loading.” It is also referred to in other CP/M literature as a “cold boot” or “cold start.”

To load your CP/M System:

1. Turn on your disc drive and insert the disc marked Hewlett-Packard CP/M System into DRIVE 0. If you’re using multiple disc drives, use DRIVE 0 of the device with the lowest interface select code and device address. This drive is the default mass storage location and is identified as drive “A” by CP/M. If you’re using an HP-86 and a disc drive connected via an HP 82937A HP-IB Interface

Module, the interface select code must be set to a value in the range 3 through 6. *Be sure that no other peripheral device (such as a printer) is identified by the same select code and device address as the default mass storage location.* (Hewlett-Packard printers are set to an address of 1 at the factory, so set the disc drive address to a value other than 1 if your printer and disc drive are connected via the same interface.)

2. With the CP/M module installed in one of the four module ports, turn on your computer.
3. After an initial self-test by the computer, the "A" (DRIVE 0) disc access light should come on, indicating disc activity. The CP/M system is being loaded into memory through a BASIC "Autost" program on the CP/M disc. In addition to loading CP/M (LOADBIN "CP/M"), the "Autost" program sets the page size to 24 lines (PAGESIZE 24), selects the printer address 701 (PRINTER IS 701), and specifies typewriter mode (FLIP). After approximately 20 seconds, your computer should display a message and the CP/M prompt A> to indicate that the system is ready to go.

```
61K CP/M Version 2.2
HP BIOS Version A   Revision 1.00

Copyright (c) 1982 by Hewlett Packard
Copyright (c) 1980 by Digital Research

A>
```

If the message and CP/M prompt are not displayed, refer to section 4 for information about maintenance and service.

Note: To return control to your integral or "native mode" operating system, simply turn off the computer, remove the CP/M system disc from the default drive, and turn the computer back on. *Do not attempt to remove a disc from a drive that is active.* You can also switch from "CP/M mode" to "native mode" by pressing the **RESET** key.

The CP/M prompt indicates that the system is now ready to accept input in the form of CP/M commands or program names. There are actually two types of CP/M commands—*built-in* commands and *transient* commands. The built-in commands are loaded with the operating system during the "cold start." Transient commands are loaded in memory only when requested by the user.

Along with the CP/M system commands, program names are also accepted as input by CP/M. These could be the names of programs assembled by the user or application software written for your CP/M system. *Before attempting to use any application software, read the remaining material in this section.* Some important prerequisites for using the CP/M system are discussed here, including the procedure for backing-up your CP/M system disc. This operation requires the use of two CP/M commands, **FORMAT** and **FIP**.

CP/M Commands

CP/M commands perform various functions, from basic disc management operations to assembling source code programs. Which CP/M commands you use will depend on your specific CP/M application. In this manual we will discuss the operator (as opposed to programmer) oriented CP/M commands. Most of

these are discussed in section 3, along with some other CP/M features. The **FORMAT** and **PIP** commands are discussed in this section along with the instructions for copying your CP/M system disc. The *HP 82900A CP/M System Reference Manual* discusses the CP/M commands that are used in programming applications.

Entering Commands

CP/M commands are entered in a similar fashion as native-mode commands. They are typed in from the keyboard in lowercase or uppercase letters. CP/M makes no distinction between lower and uppercase letters and interprets all letters as uppercase. The **(END LINE)** key is pressed after the command is entered, instructing the computer to begin execution.

Some of the native-mode key assignments are different while under CP/M control. For example, pressing the cursor up key produces a pound sign (#) on the CP/M display instead of moving the cursor upwards as in native mode. The only display editing key that retains its native mode function is **(BACK SPACE)**. The **(BACK SPACE)** key can be used to move the cursor backwards through the command line, deleting characters along the way. In addition to the display editing keys, CP/M also alters the special function keys and some other native mode key assignments. Refer to page 39 for a listing of the special CP/M mode key assignments.

CP/M does provide you with command line editing capabilities by assigning special functions to some control characters. Control characters are produced by pressing the **(CTRL)** key and the specified character key simultaneously. For example, to produce the control E character, press the **(CTRL)** key and the **(E)** key at the same time. The symbol “^” is commonly used to indicate the **(CTRL)** key; “^E” would then represent the control E character. The CP/M control characters used for command editing are listed below. There are three additional CP/M control characters (^C, ^P, and ^S) which are also listed along with their specific functions.

CP/M Control Characters

Character	Function
Line Editing Control Characters	
^E	Allows you to type a longer command line than the CRT display's line length (80 columns). The cursor goes to the next line, but the command is not executed until the (END LINE) key is pressed. This feature is used for entering long commands. CP/M allows up to 127 characters in a single command.
^H	Same function as the (BACK SPACE) key.
^J	Starts execution of the command and moves the cursor to the next line (line feed).
^M	Starts execution of the command and moves the cursor to the beginning of the command line (carriage return). Same function as the (END LINE) key.
^R	Lists the current command line, as interpreted by the system, on the next line. This feature is useful for checking an edited command.
^U	Deletes the current command line. The cursor moves to the next line, and a pound sign (#) is displayed to indicate a new command can be entered.
^X	Backspaces the cursor to the beginning of the command line, deleting the line.

Character	Function
General Purpose Control Characters	
^C	Halts execution of any CP/M command and reloads the CP/M operating system. This is equivalent to a system reset, and is also referred to as a "warm boot" or "warm start."
^P	Copies future data typed and displayed on the CRT to the current list device. When CP/M is "booted-up," the list device is the printer at the address 701 (unless otherwise specified in the autostart program). The data is sent to both the list device and the CRT display. If ^P is pressed again, the data listing is halted. A system reset (^C) also halts the data listing.
^S	Stops output to the CRT display, temporarily. If ^S is pressed again, the display of data continues.

Note: Some CP/M control codes have different functions during execution of application programs. The functions described above are always active whenever the CP/M prompt is displayed, indicating that CP/M has control of the system.

Example: Enter the CP/M command `DIR` (lists the currently logged disc directory). Experiment with some of the editing control characters and when finished, press `END LINE`. CP/M will access the current disc (A in the example below) and list the file directory on the CRT display. The output below shows the file directory for the CP/M system disc.

```
A>DIR
A: DDT          COM : SUBMIT    COM : DUMP      ASM : ASM      COM
A: DUMP         COM : XSUB     COM : ED       COM : LOAD     COM
A: STAT        COM : PIP      COM : FORMAT   COM
```

Now repeat the `DIR` command, but press ^S while the command is executing (you'll have to be quick). Screen output halts temporarily, and continues when ^S is pressed again.

If you make an error while entering a CP/M command and try to execute an invalid or nonexistent command or program, CP/M notifies you by listing the invalid command input followed by a question mark.

Disc Drive Identifier

When entering *transient* or *disc-resident* CP/M commands, you can include an optional drive identifier in the command, indicating on which disc the command is located. The drive identifier is not necessary when the command is located on the currently logged drive (the current drive is indicated by the letter A, B, C, ... in the CP/M prompt). The drive identifier is used only with disc-resident commands and programs and not with CP/M built-in commands since they are loaded with the system.

The CP/M system assigns a drive letter to each accessible drive on your system. If your system includes one dual disc drive device (for example, an HP 82901M Flexible Disc Drive), then CP/M assigns the letter A to drive 0 and the letter B to drive 1. The maximum number of possible drives is 16, corresponding to the letters A through P. Disc drives are assigned letters according to the value of their two-digit interface select code—device address. This number is just the first two digits of the *mass storage unit specifier*, or *msus*. If you are unfamiliar with the *msus* and other mass storage operations, refer to your computer's operating and programming manual, and the documentation accompanying your disc drive device. Briefly, the *msus* is a character string that combines an interface select code, a mass storage device address, and the drive number.

The lowest select code—device address is assigned the letters A, B, C, and D, corresponding to drives 0, 1, 2, and 3. The next lowest select code—device address is assigned E, F, G, and H and so on. Four letters are assigned to each unique select code—device address, one letter for each possible drive at that address.

As an example, the table below shows the CP/M drive letter assignments for two master HP-IB disc drive devices with the indicated select codes and device addresses.

Sample CP/M Drive Identifiers

Select Code	Device Address	Drive Number			
		0	1	2	3
6	1	A	B	C	D
7	0	E	F	G	H

Additional disc drive devices would be ranked according to their two-digit select code—device address, and assigned the corresponding letter for each drive number.

In order to specify the location of a CP/M transient command or program, the optional drive identifier is inserted in front of the CP/M transient command or program name, and separated by a colon.

Examples:

A>B:FORMAT Instructs the system to load the command FORMAT from disc B and execute.
 A>C:PROG1 Instructs the system to load the program PROG1 from disc C and execute.

Remember, if the command or program is on the current drive, there's no need to include the drive identifier.

By entering the drive identifier and colon without a command, it is also possible to change the currently logged disc drive. The system responds with a new CP/M prompt, identifying the new current drive identifier. This operation is analogous to changing the *msus* in the native mode MASS STORAGE IS statement.

```
A>B:
B>
```

Copying the CP/M System Disc

Before attempting to use your CP/M system with any application program or software, you should copy the CP/M system disc onto a back-up disc. The original copy should then be stored in a safe place and used only for making copies. This is to prevent accidental erasure or destruction of the original system disc, which, if not properly backed up could make your system inoperative, causing some unnecessary delay. The procedure for copying the CP/M system disc is described below. Backing up the system disc does not require much time and is the only insurance you'll have against future delays associated with replacing your CP/M system disc.

CAUTION

Do not store HP BASIC programs on the CP/M system disc. Do not purge any files from the CP/M system disc. If written to, or purged, the entire contents of the CP/M system disc could be lost. Keep your CP/M discs and HP BASIC discs labeled, and in separate locations.

Your system disc contains both the CP/M operating system and the disc-resident commands that are a part of CP/M. These two parts of CP/M require different copying operations. Before copying any CP/M files to a new disc, this disc must first be formatted for the CP/M system. This operation is analogous to initializing disc media (`INITIALIZE`) in native mode, and is accomplished using the CP/M `FORMAT` command. In the HP 82900A CP/M System, the `FORMAT` command is also used to copy the CP/M operating system file to the formatted disc. The `FORMAT` command enables you to generate a new, functional system disc, which includes the CP/M operating system and binary and BASIC autostart programs that allow you to boot-up and implement CP/M. `FORMAT` cannot be used for copying transient commands and other CP/M programs; this task requires the `PIP` utility. Copying your CP/M system disc, therefore, is a two-step operation. First, `FORMAT` is used to create a new system disc. Then, `PIP` is used to copy the CP/M transient commands to the formatted disc. `PIP` is also used for copying other CP/M application programs and disc files.

Copying the CP/M System File (FORMAT)

Before using the `FORMAT` command to copy the CP/M System File, the CP/M system must be in control of your computer. If you haven't already done so, load the system by following the instructions on page 11. The CP/M prompt `A>` indicates that the system is operating and ready to accept command input.

The general form of the `FORMAT` command is:

```
[x:]FORMAT
```

The `x` parameter represents the optional CP/M drive identifier; this parameter may be omitted if the `FORMAT` command file resides on the currently logged drive. The `FORMAT` command is typed in following the CP/M prompt; the system goes out to the specified or current disc and loads the `FORMAT` program. `FORMAT` begins executing and displays the following prompt, including the three `FORMAT` options:

```

HP CP/M Diskette Formatter

Version 1.0   Revision date: 01/28/82

Copyright (c) 1982 by Hewlett Packard

Formatting options:

1) Create a CP/M data diskette
2) Create a CP/M system diskette
3) Copy CP/M system to existing diskette

Select one (or press <END LINE> to exit):

```

The **FORMAT** options are used to select one of three **FORMAT** operations.

FORMAT Option	Result
1	Creates a CP/M formatted disc with a blank directory. Any existing files are erased. Discs must be formatted before storing CP/M files. This option does not copy the operating system and is used only for initializing a CP/M disc.
2	Creates a CP/M system disc. The disc is first formatted (as in option 1), then the operating system, including the BASIC autostart and binary programs, is copied to the disc. This option is used to copy the CP/M system onto a new disc, creating a functional back-up system disc (not including disc-resident commands). As with option 1, any existing files are erased.
3	Copies the CP/M system, including the BASIC autostart and binary programs, without disturbing any existing files. The disc is not formatted as in options 1 and 2. This option provides a means for copying the system to a CP/M formatted disc without erasing the existing files.

To back-up your system disc onto a new, unformatted disc, select **FORMAT** option 2 by pressing the **2** key on the numeric keypad. The **FORMAT** program continues, and displays a series of prompts which ask for the location of the disc to be formatted (the new, unformatted disc) the source disc (the original CP/M system disc), and the destination disc (the new CP/M system disc). In the following example, the source disc was located in drive A. The new, unformatted disc was placed in drive B. After formatting the drive B disc, the system was copied from drive A to drive B.

```

Select one (or press <END LINE> to exit): 2

Which disk drive will you use to format?
(or press <END LINE> to exit) : B

Insert diskette to be formatted in drive B, and press any key.

Formatting in progress...

Formatting complete.

Which drive will the source diskette be on?
(or press <END LINE> to exit)  A

Place source diskette on drive A:, and press any key.

Which drive will the new system diskette be made on ?
(or press <END LINE> to exit)  B

Place destination diskette on drive B:, and press any key.

System generation complete

```

When the new system disc is completed, the **FORMAT** program instructs you to insert the CP/M system disc in drive A and press any key. This returns control back to the system by performing a system reset or “warm start.”

Copying Directory Files (PIP)

After copying the CP/M operating system to a new disc, you will also want to back-up the CP/M transient command files. The **PIP** command is used for this and other types of file transfer operations. **PIP** is discussed here only as it pertains to copying your CP/M system disc. For further information regarding file transfers and **PIP**, refer to section 3.

In order to back-up the CP/M command files provided on the system disc, you will need at least two disc drives. The procedure is as follows:

1. With the CP/M system loaded, and logged onto drive A (indicated by the prompt **A>**), place the original CP/M system disc provided with your system into drive A.
2. Place the new, formatted disc containing a copy of the CP/M operating system (obtained by using **FORMAT** option 2) into drive B.
3. Execute the following **PIP** command:

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

The **B** parameter indicates the destination for the file transfers, the **A** parameter indicates the source. The ***.*** parameter specifies that all files are transferred from the source to the destination. The **CV** parameter specifies that the “verify” option is performed during the file transfers.

The PIP program is loaded from disc A and begins copying all of the directory files on disc A to disc B.

```
A>PIP B:=A:*. *[V]
```

```
COPYING -
DDT.COM
SUBMIT.COM
DUMP.ASM
ASM.COM
DUMP.COM
XSUB.COM
ED.COM
LOAD.COM
STAT.COM
PIP.COM
FORMAT.COM
```

```
A>
```

The CP/M prompt `A>` indicates the copying operation is complete. The disc in drive B should be an exact copy of the original CP/M system disc. Check by loading the CP/M system with your back-up disc and execute `DIR` to insure that the CP/M commands are all present.

Copying CP/M to an 8-Inch Disc

If you wish to use your CP/M system with an 8-inch disc drive, you must first copy the system from the 5¼-inch disc provided with your system to an 8-inch disc. This requires both a 5¼-inch disc drive as well as an 8-inch disc drive. The procedure is just the same as copying between 5¼-inch discs.

1. Connect the 5¼-inch and 8-inch drive units to your computer. Be sure the device addresses are set differently and that the 5¼-inch drive has the lower address. Load the CP/M system from the default 5¼-inch drive.
2. When the system is loaded, use the `FORMAT` command to format and copy the operating system to the 8-inch disc (`FORMAT` option 2). The drive identifier for the 8-inch disc is determined by the *msus*, just as with the 5¼-inch drive. If for example, the *msus* for your 5¼-inch drive is "D700," and "H710" for the 8-inch drive, then the corresponding drive identifiers are "A" (5¼-inch) and "E" (8-inch).
3. When the `FORMAT` program is complete, use the `PIP` command with the appropriate drive identifiers to copy the CP/M transient commands from the 5¼-inch disc to the 8-inch disc. If for example, the 5¼-inch drive identifier is "A," and the 8-inch drive identifier is "E," the `PIP` copy command would be `PIP E:=A:*. *[V]`.

Assigning Printer and Page Size

Your CP/M system is capable of sending output to a system printer. When CP/M is initially "booted-up" from your system disc, the system printer is selected through the `PRINTER IS 701` statement. If your printer is located at a different address, you can change the boot-up address by editing the BASIC

autostart program located on the CP/M system disc. CP/M also boots up with the page size set to 24 lines per screen (PAGESIZE 24). If desired, you can specify 16 lines per screen (PAGESIZE 16) by editing the autostart program.

The autostart program on the CP/M system disc is actually what loads the CP/M system, and enables your computer to communicate with the hardware components provided in the CP/M module. When your computer is turned on it searches for a program named "Autost" on the default disc drive, and if found, loads and executes it. The "Autost" program on the CP/M system disc performs the following sequence of operations.

1. Specifies the alpha display page size (PAGESIZE 24).
2. Specifies the system printer address (PRINTER IS 701).
3. Sets the keyboard to typewriter mode whereby shifted keys produce uppercase letters and unshifted keys produce lowercase letters (FLIP).
4. Loads the binary program "CP/M" which enables your computer to communicate with the Z-80A CPU located in the CP/M module (LOADBIN "CP/M"). This binary enables the Z-80A to take control of your computer and load the CP/M operating system from disc.

The "Autost" program is an HP BASIC program, and can be accessed only when your computer is operating in native mode. Return to native mode by pressing the **RESET** key. To load the "Autost" program, execute:

```
LOAD "Autost"
```

The default drive light will turn on while the computer loads the autostart program. Now press the **LIST** key to obtain a listing of the CP/M "Autost" program.

```
10 PAGESIZE 24
20 PRINTER IS 701
30 FLIP
40 LOADBIN "CP/M"
50 END
```

The system printer address, alpha display page size, and keyboard mode can be changed by editing the autostart program. Store the edited autostart program by executing:

```
STORE "Autost"
```

When CP/M is booted-up, the page size, printer address, and FLIP settings will be as specified.

If you execute CAT while in native mode, you will see that there are two other files besides the "Autost" program on your disc.


```

CAT
[ Volume ]: HFCP/M
Name      Type   Bytes  Recs
CP/MSYS   DATA   256    1021
Autost    PROG    256      5
CP/M      BPGM    256    25

```

The binary program "CP/M" is loaded while the autostart program is executing, and enables the loading and operation of the CP/M system. The large data file named "CP/MSYS" contains the CP/M operating system and transient commands provided with your system. *Do not attempt to make changes to either of these files; if altered, your CP/M system disc will not function properly.*

Note: It is possible to implement the CP/M system without loading and executing the "Autost" program, by executing `LOADBIN "CP/M"`. When loaded, this binary automatically boots-up the system without any further action on your part. It is possible therefore, to specify the printer address and other boot-up conditions normally performed by the autostart program from the keyboard, and then load CP/M by executing `LOADBIN "CP/M"`.

The Print Buffer

Data that is routed to the system printer is sent to a temporary storage location or *print buffer* to enable your system to perform other operations while the printer is printing. The available memory for print buffering includes all but 12K bytes of your computer's built-in RAM plus any additional memory provided by one or more accessory HP 82907A, HP 82908A, or HP 82909A memory modules (32K, 64K, or 128K).

To control the print buffering operations provided with your computer, there are two special key assignments that are active when the CP/M system is in control. These are the **PAUSE** key and the **STEP** or shift **PAUSE** key. The function of these keys while under CP/M control is described below.

Print Buffer Control Keys

Key	Function
PAUSE	Halts printing of data from the print buffer. If pressed again, printing continues, undisturbed.
STEP	Erases the current contents of the print buffer.

Recall that the control P character (^P) is used to instruct the system to send future data to the system printer and, if pressed a second time, to stop sending output to the printer. The print buffering action is active while the system printer is engaged by the ^P character or when files are sent to the printer using the PIP command.

Using Your Application Programs

CP/M application programs are loaded and executed in the same manner as the standard CP/M transient commands. Like PIP and STAT, and the other CP/M transient utilities, CP/M application programs are disc files. CP/M makes no distinction between transient command files and executable program files. The COM file extension indicates that the file is a command or an “immediately executable” program.

The HP 82900A CP/M System appears to standard CP/M software as a 61K CP/M system, version 2.2, with 56K bytes of user memory. Only application software that is HP disc-formatted is compatible with your system.

Before using a CP/M application program, the CP/M system must first be loaded and in control of your computer. The CP/M prompt indicates that the system is ready for input in the form of CP/M commands or program names. The program name is typed in following the CP/M prompt. An optional drive identifier is included before the program name if the program disc is located in a drive other than the current drive.

Example:

A>B:WS Loads the program WS from disc B and begins execution.

Many CP/M application programs require little knowledge of the CP/M system, and for most, the material that you’ve just read will be sufficient. Some programs will alter keyboard assignments and other standard CP/M features. Be sure to read the documentation provided with any software that you purchase for more information about operating application programs. If you are interested in learning more about the CP/M system, continue reading the material in this manual.

Fundamental CP/M Features

This section discusses some of the fundamental CP/M features that are used in routine operation of application software and in more advanced programming applications. The topics include:

- CP/M file referencing conventions.
- CP/M built-in commands.
- File and device transfers (PIF).
- Obtaining statistics on files (STAT).

Most of the material in this section describes the different features related to CP/M disc file management. Since CP/M is a *disc-based* operating system, these features are used routinely in many CP/M applications. The features presented here are only a subset of the entire list of CP/M features. The technical aspects of CP/M relating to programming applications are discussed in the CP/M reference manual.

CP/M File Referencing

CP/M organizes the information on your flexible discs as a collection of *files*. For each disc CP/M maintains a directory of these files which is updated when files are added, erased, or renamed. Files are referenced on each disc through the file directory.

Each CP/M file reference consists of three parts: a drive identifier, a file name, and a file extension. The drive identifier is optional.

file reference = [*drive identifier* ;] *file name* . *file extension*

The optional drive identifier is a letter (A through P) that indicates on which drive the file is located. If the file is located on the currently logged drive, the drive identifier can be omitted; the currently logged drive is indicated by the CP/M prompt (for example, `A>` indicates the current drive is A). The file name and file extension are used to reference a single file (*unambiguous* file reference) or multiple files (*ambiguous* file reference) from the chosen disc. A few examples of unambiguous file references are listed below, followed by a discussion of file names, file extensions, and ambiguous file references.

Examples:

`A:CINDY-C.TXT`

References the file on disc A named CINDY-C with extension TXT.

`B:REPORT`

References the file on disc B named REPORT with no extension.

`E:REPORT`

References the file on disc E named REPORT with no extension.

`PROG1.ASM`

References the file named PROG1 with extension ASM located on the currently logged disc.

CP/M File Names

File names can be any character string from one to eight characters in length, but cannot include any of the following characters:

< > . , ; ' = [] * ?

In addition, the file name cannot include any of the CP/M control characters (for example ^C) or any embedded spaces.

Since CP/M does not distinguish between lower and uppercase letters, file names in lowercase are interpreted as uppercase.

Here are some examples of valid and invalid CP/M file names.

Valid CP/M File Names

```
testfile
TESTFILE
TeStFiLe
DATA1
YES!
1+2+3+4
MONTH-YR
```

The first three valid file names are all interpreted as the name TESTFILE, since CP/M converts all lowercase letters to uppercase.

Invalid CP/M File Names.	Explanation
TESTFILE2	Too many characters; maximum allowed is eight.
2+2=4	Contains the invalid character =.
250,000	Contains the invalid character ,.
NEW YORK	Contains a space.

CP/M File Extensions

When referencing an existing file, the file extension must be included in the reference. However, when creating a new file reference (for example with the REN command), the file extension need not be specified. The extension is very useful for identifying a file's purpose or content, and can prevent mistakes which might result from ambiguities in a file name. The maximum number of characters allowed in the file extension is three. The file extension may not include any control characters or any of the following special characters:

< > . , ; ' = [] ? *

Some of the more commonly used file extensions are shown below.

File	Description
ASM	Assembly language source file.
BAK	Back-up file.
BAS	BASIC program source file.
COM	A command or directly executable program file.
DAT	ASCII data file.
DOC	Document file.
HEX	File containing hexadecimal object code.
PRN	Printer list file.
SUB	Command file used for the SUBMIT operation.
TXT	Text file.
\$\$\$	Temporary file or file which was not properly saved, and therefore unusable.

Some of these file extensions are automatically assigned by the system during different file operations. For example, the ASM command takes an assembly language source file (*file name* .ASM) and creates a hexadecimal object code file (*file name* .HEX) and a program listing file (*file name* .PRN). In addition to these standard file extensions, you can create your own file extensions using any group of one to three valid characters.

Note: CP/M transient commands are identified by the file extension COM, however the COM extension is not included when loading a CP/M command or other directly executable program files. For example, to load and execute the PIP command, type in PIP not PIP.COM. When referencing (as opposed to loading and executing) a COM extension file, it is necessary to include the extension in the command file reference. For example, when copying a command file, the COM extension is included in the file reference (A>PIP B:=FORMAT.COM).

Ambiguous File References

The example file references shown on page 23 each refer to a single, clearly identified file. These file names and extensions are *unambiguous* in that they reference one unique file. CP/M also allows you to include more than one file in a single reference, and replace all or part of a file name or extension with *ambiguous* characters. Both these features are accessed by including *wild card* characters in the file reference. The two *wild card* or *ambiguous* CP/M file reference characters are * and ?.

- * The asterisk is used to represent an ambiguous file name or extension, and replaces all or part of the name or extension in the file reference.
- ? The question mark represents a single ambiguous character within a file name or extension.

Examples:

<code>B:*. *</code>	References all files located on disc B.
<code>A:OREGON.*</code>	References all files on disc A with the name OREGON, regardless of the file extension.
<code>*.TXT</code>	References all files with the extension TXT located on the currently logged disc, regardless of the file name.
<code>E:PROG??*.ASM</code>	References all files on disc E with a four, five, or six-letter name beginning with PROG, and with the extension ASM.
<code>B:??.*</code>	References all files on disc B with a one or two-letter name, regardless of the file extension.
<code>WS*.TXT</code>	References all files on the current disc that start with the letters WS and have the extension TXT.

The wild card characters are often used with file references in CP/M commands. For example, in copying all of the files from the CP/M system disc to a back-up disc, the PIP command is used with the * wild card character:

<code>A>PIP B:=A:*. * [V]</code>	Loads the PIP command and copies all directory files on disc A to disc B. The file names and extensions for the copied disc B files are the same as the original disc A files. The verify option [V] is employed during the PIP copy operation.
---	---

Note: Ambiguous file references cannot be used in every situation where a file reference is required in a CP/M command. Some CP/M operations require you to reference a single, unique file.

CP/M Built-In Commands

CP/M provides you with seven built-in commands that are used for file management operations. Many of the commands require file references as input. Ambiguous file references (those that include one or more wild card characters * or ?) are denoted by the abbreviation *afr* and unambiguous file references are denoted by the abbreviation *ufr*.

Obtaining a File Directory (DIR)

The DIR command is used for displaying the contents of the current or specified disc file directory. It can also be used to verify the existence of one or more files on the current or specified disc. The DIR listing includes the disc identifier, file name, and file extension. The directory is displayed on the CRT or listed on the system printer (the printer must first be engaged by a ^P or a STAT command device assignment). When DIR displays more than one file reference, the file references are separated by colons, four references to a line.

```

x:
DIR [ufr]
afr

```

The **DIR** command actually provides you with four different directory options.

1. **DIR** When executed without parameters, **DIR** displays a listing of the files contained in the directory for the currently logged disc.

Example:

A>DIR Displays the file directory for disc A.

2. **DIR x:** When executed with a disc identifier followed by a colon, **DIR** displays a listing of the files contained in the disc *x* directory.

Example:

A>DIR B: Displays the file directory for disc B.

3. **DIR ufr** When executed with an unambiguous file reference, **DIR** first checks to see if the file with the specified name and extension exists on the indicated or current disc. If the file is there, **DIR** displays the file reference; if the file is not found, **DIR** displays **NO FILE**.

Examples:

A>DIR ALEXIS.TXT Checks the disc A file directory for the file ALEXIS.TXT. If found, **DIR** displays the file reference; otherwise **DIR** displays **NO FILE**.

A>DIR B:WAVEFTN.ASM Checks the disc B file directory for the file WAVEFTN.ASM, and if found, displays the file reference; if not found, **DIR** displays **NO FILE**.

4. **DIR afr** When executed with an ambiguous file reference, **DIR** checks to see if the file(s) is listed in the indicated or current disc directory. **DIR** checks for any file name or extension that fits the ambiguous reference and displays all the qualified file references; if none are found, **DIR** displays **NO FILE**.

Examples:

A>DIR B:*.COM Checks the disc B file directory for any files with the extension **COM** and displays all qualified file references. Displays **NO FILE** if none are found.

E>DIR ????.TXT Checks the current disc E directory for any one-, two-, or three-letter file names with extension **TXT**. All qualified file references are displayed; **NO FILE** is displayed if none are found.

Erasing Files (ERA)

The **ERA** command erases the specified file(s) from the indicated or current disc. The file reference is removed from the directory, and the contents of the file are permanently lost. Valid **ERA** inputs include both ambiguous and unambiguous file references. *Caution is advised when erasing files using an ambiguous file reference.* Be sure that you are only erasing unwanted files and not files that you wish to keep.

ERA <i>ufr</i> ERA <i>afr</i>
--

Examples:

```
A>ERA B:WORDS.DOC
```

Erases the file WORDS.DOC located on disc B.

```
A>ERA WORD?.DOC
```

Erases all files with a four or five-letter name beginning with WORD and with the extension DOC, located on the current disc (disc A in this case).

If you attempt to erase all files on a disc (ERA *. *), the system responds with the following prompt:

```
ALL (Y/N)?
```

Type in N **END LINE** if you want to abort the erase operation, or Y **END LINE** if you want to erase all files on the current or specified disc.

Renaming Files (REN)

The REN command assigns a new file name and extension to an existing file reference. Both the new and old file references must be unambiguous. You cannot rename a file from one disc to another disc or rename a file to a name that is already listed in the file directory. If the drive identifier is omitted from the new file reference, the current drive is assumed.

```
REN new ufr=old ufr
```

The new file reference appears to the left of the equal sign, the old file reference appears to the right.

Example:

```
A>REN REVTEST.DOC=TEST.DOC
```

Renames TEST.DOC to REVTEST.DOC on disc A.

An example of an invalid REN command would be:

```
A>REN BADONE.TXT=B:GOODONE.TXT
```

The new and old file references refer to different discs, making this REN command invalid. The drive identifier for the new file reference is omitted and therefore assumes the current drive (A in this case).

Storing Memory on Disc (SAVE)

The SAVE command saves one or more 256-byte pages of the CP/M user memory by storing an image of this memory in a disc file. This command is used by programmers for saving a specified portion of memory. For a full explanation of this command refer to the CP/M reference manual.

Listing Files (TYPE)

Displays the contents of a file on the CRT or printer (the printer must be assigned by the STAT command or engaged with a ^P control character). The file must consist of printable characters that can be produced on the CRT or, if engaged, the system printer. Only unambiguous file references are acceptable as TYPE input. To stop/ start a TYPE command listing, press ^S.

```
TYPE ufr
```

Example:

```
A>TYPE RED.BAS
```

Lists the file RED.BAS from disc A.

Changing User Number (USER)

The **USER** command allows you to log onto a particular area of all accessible discs. This is used in applications where several users might share the same disc, and want to access files from their portion of the disc. After a cold start, the user number is set to 0. The CP/M transient command files are accessed through user number 0 on the system disc. The parameter *n* specifies the user number, and must be an integer in the range 0 through 15. For most applications, the user command is not utilized.

```
USER n
```

Example:

```
A>USER 2
```

Logs onto the disc A area accessed through user number 2.

Changing the Current Drive (x:)

The CP/M drive identifier has already been discussed along with file references and other CP/M commands. To change the current drive, the new drive identifier letter is entered with a colon following the CP/M prompt. The system responds by displaying the new prompt containing the new drive identifier.

```
x:
```

Example:

```
A>B:
```

Changes the current drive from A to B. The system responds with the new prompt B>.

File and Device Transfers (PIP)

The **PIP** (Peripheral Interchange Program) command is the CP/M disc-resident utility that is used to copy individual files from one disc to another, combine files, and copy files to other peripheral devices, such as the printer. The **PIP** command can be executed either as a single line command, or as a program. An optional drive identifier (*x:*) can be placed in front of the **PIP** command to specify from which drive the command is loaded.

```
[x:]PIP[destination=source[Options]][, source[Options]]...
```

When entered without parameters, **PIP** responds as a program, and displays an asterisk prompt. The **PIP** destination, source, and option parameters are entered following the asterisk in the same format as shown above. **PIP** processes the input and performs the transfer operation. After processing the program input, **PIP** responds with another * prompt. More input can be entered following the * as before, or the **PIP** program can be terminated by pressing **END LINE** or ^C (warm start).

Valid PIP destination parameters include: disc identifiers, unambiguous file references, and logical or physical device names. Valid PIP source parameters include: unambiguous file references, ambiguous file references, disc identifiers, and logical or physical device names. The PIP options are used to implement special operations during PIP file and device transfers. Several PIP options can be entered for a single PIP transfer. The options are placed after the source parameter and enclosed by brackets `[]`. Four types of PIP transfer operations are discussed below. For a more complete discussion of the PIP command, including the PIP options, refer to the CP/M reference manual.

Copying a Single File

An individual file can be copied to another disc drive or to the same disc drive under a different name using the PIP command. The PIP source for such a transfer would be an unambiguous file reference, the PIP destination would be either an unambiguous file reference or a drive identifier. If the destination is a drive identifier, the copied file keeps the same name as the source file. Whenever the drive identifier is excluded from a file reference, PIP assumes the current drive. The original file is unaltered during the PIP copy operation.

Examples:

<code>A>PIP B:=ED.COM[CV]</code>	Copies the file <code>ED.COM</code> from disc A to disc B. The file appears in the disc B directory as <code>ED.COM</code> . The <code>[CV]</code> option is employed during the copy operation.
<code>B>PIP JNK.TXT=A:DEGO.TXT</code>	Copies the file <code>DEGO.TXT</code> from disc A to disc B. The file appears in the disc B directory as <code>JNK.TXT</code> .
<code>A>B:PIP</code>	Loads the PIP program from disc B.
<code>*PROG1.BAK=PROG1.ASM</code>	Copies the disc A file <code>PROG1.ASM</code> onto the same disc under the new name <code>PROG1.BAK</code> .
<code>*PROG2.BAK=PROG2.ASM</code>	Copies the disc A file <code>PROG2.ASM</code> onto the same disc under the new name <code>PROG2.BAK</code> .

Copying Several Files

By using an ambiguous file reference as the source parameter in the PIP command, several files can be copied at once.

Example: Assume that disc B contains the following files:

```
FILEA.NAM
FILEB.NAM
FILEC.NAM
BARB.LIS
GRADE.TXT
NEXT.NAM
```

To copy the three files `FILEA.NAM`, `FILEB.NAM`, and `FILEC.NAM` from disc B to disc A enter:

```
A>PIP A:=B:FILE?.NAM
```

To copy all files on disc B with the file extension NAM to disc A enter:

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

To copy all files on disc B to disc A enter:

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

Combining Files

To combine more than one source file into a single destination file, the multiple source files are placed in the PIP command and separated by commas. Each source file is processed separately, so it is possible for each to be on a different disc. The new destination file is constructed from the source files in the order you entered them in the command.

Examples:

```
A>PIP B:NEWFILE.ASM=ONE.ASM,
E:TWO.ASM,B:THR.ASM
```

Combines the files ONE.ASM from disc A, TWO.ASM from disc E, and THR.ASM from disc B creating the single file NEWFILE.ASM on disc B.

```
A>B:PIP
```

Loads the PIP command from disc B.

```
*BOOK.TXT=SEC1.TXT,PRO1.PRN,
SEC2.TXT
```

Combines the disc A files SEC1.TXT, PRO1.PRN, and SEC2.TXT creating the single file BOOK.TXT on disc A.

Note: When copying files to an existing file, PIP first creates a temporary file with the same file name as the destination but with the extension \$\$\$\$. If the copy operation is successful, the old version of the file is deleted and the temporary file is renamed (by PIP) to the destination reference. The disc must have enough space to hold the temporary file for the copy operation to be successful.

Copying to Devices

PIP allows you to copy files to and from physical and logical devices connected to your system. A complete discussion of physical and logical devices is presented in the CP/M reference manual. The discussion presented here is aimed at simple device transfers such as routing a disc file to the CRT or system printer.

Your CP/M system supports one source device (the console or keyboard) and two destination devices (the CRT and the system printer). CP/M recognizes the source and destination devices by a three letter device name.

Device	PIP Device Name
Keyboard Input (source)	CON:
CRT Output (destination)	CON:
Printer Output (destination)	LST:

In order to copy a file to a device, the destination device name is used as the destination parameter in the PIP statement. The source file reference must be an unambiguous file reference. Multiple sources can be included in a single PIP command; they must be separated by commas and are copied in the order they appear in the command.

Examples:

```
A>PIP CON:=B:BILLS.JUN
```

Copies the file BILLS.JUN located on disc B to the CON: (CRT) device. The file is listed just as it is stored on disc.

```
B>PIP LST:=PARA1.DOC,  
PARA2.DOC,PARA3.DOC
```

Copies the disc B files PARA1.DOC, PARA2.DOC, PARA3.DOC to the LST: (system printer) device. The files are listed in the order they appear in the PIP command.

File Status (STAT)

The STAT command is used to provide statistics on disc files, and to change the status of a file or a group of files to “read-only.” Read-only status means that data can be read from but not written to the file or group of files. STAT is also used to report statistics on device assignments, implement logical and physical device mapping, and assign “system” status to disc files. These STAT operations are discussed in the CP/M reference manual.

The general form of the STAT command for file status operations is:

```
[x:]STAT  x:  
          ufr [$R/O]  
          afr [$R/W]
```

The optional drive identifier in front of the STAT command indicates the location of the STAT command file, and may be omitted if STAT is located on the current drive. The optional \$R/O and \$R/W parameters must be separated from the file reference by a space.

When used in file status operations the STAT command includes one of the following: a drive identifier (x:), an unambiguous file reference (ufr), or an ambiguous file reference (afr). The STAT operation is performed on the specified file (ufr), set of files (afr), or the entire disc (x:). The type of STAT operation performed depends on what appears after the file reference or drive identifier. There are three possibilities:

1. \$R/O The read-only file attribute sets the file or group of files to read-only status, preventing the writing of new data into the file or files. Read-only status is permanent until changed by another STAT command with the attribute \$R/W.
2. \$R/W The read-write file attribute sets the file or group of files to read-write status. Unless otherwise specified, all files can normally be written to; this attribute is used to change files from read-only status back to their original read-write status.
3. When the optional file attribute parameter is omitted, the STAT command performs a listing of statistics on the specified file, set of files, or disc.

The STAT file attributes provide a means of changing the default read-write file status, if for example, you wanted to protect a file or group of files against accidental writing. The STAT command cannot

protect your disc from erasure resulting from formatting operations (FORMAT). A read-only or read-write file status change is permanent until another STAT command changes it again.

When the optional \$R/O and \$R/W file attributes are not included, the STAT command lists the following file and disc statistics:

Recs: The number of 128-byte records allocated to the file.

Bytes: The number of kilobytes (K) allocated to the file.

Ext: The number of logical extents occupied by the file. Each logical extent consists of 16K bytes of disc space for 5¼-inch discs and 32K bytes of disc space for 8-inch discs.

Acc: The file access attribute, R/W or R/O.

Bytes Remaining On X: The number of kilobytes of unused storage remaining on the disc. The letter X is replaced with the appropriate drive identifier.

If STAT is executed without parameters (A>STAT), it lists the number of kilobytes remaining on all discs accessed since the last warm or cold start.

When the STAT input is a drive identifier, the number of bytes remaining on the disc is the only statistic that is displayed. If one or more files are input, all of the above statistics are displayed. Multiple file statistics are listed in columns, with the corresponding file reference to the far right.

Examples:

A>STAT *.COM \$R/O

Sets all files on disc A with extension COM to read-only status. Files remain read-only until changed by a STAT command specifying the \$R/W attribute.

A>STAT *.COM \$R/W

Sets all files on disc A with extension COM to read-write status.

B>A:STAT SECRET.JNK \$R/O

Loads STAT from disc A and sets the disc B file SECRET.JNK to read-only status.

A>STAT *.COM

Provides statistics on all disc A files with extension COM. The corresponding output for the CP/M system disc is shown below.

A>STAT *.COM

Recs	Bytes	Ext	Acc	
64	8k	1	R/W	A:ASM.COM
38	5k	1	R/W	A:DDT.COM
4	1k	1	R/W	A:DUMP.COM
52	7k	1	R/W	A:ED.COM
23	3k	1	R/W	A:FORMAT.COM
14	2k	1	R/W	A:LOAD.COM
58	8k	1	R/W	A:PIP.COM
41	6k	1	R/W	A:STAT.COM
10	2k	1	R/W	A:SUBMIT.COM
6	1k	1	R/W	A:XSUB.COM
Bytes Remaining On A: 192k				

Maintenance and Service

Maintenance

The CP/M system module and disc do not require maintenance. However, there are several areas of caution that you should note. They are:

WARNING

Do not place fingers, tools, or other foreign objects into the plug-in ports. Such actions may result in minor electric shock hazard and interference with some pacemaker devices. Damage to plug-in port contacts and the computer's internal circuitry may also result.

CAUTION

Always switch off the computer and any peripherals involved when inserting or removing modules. Use only plug-in modules designed by Hewlett-Packard specifically for your computer. Failure to do so could damage the module, the computer, or the peripherals.

CAUTION

If a module jams when inserted into a port, it may be upside down or designed for another computer. Attempting to force it may damage the computer or the module. Remove the module carefully and reinsert it.

CAUTION

Back-up your CP/M system disc, and use the back-up copy for all routine CP/M operations. Reserve the original disc for making copies. Failure to back-up the CP/M disc could make your system inoperative in the event that your system disc is accidentally destroyed, erased, or damaged.

Service

If at any time you suspect that your HP 82900A CP/M System is malfunctioning, either while loading the system or by a failure during operation, do the following:

1. Turn the computer off, reinsert the CP/M disc into the default drive, and attempt to load the system following the procedure on page 11. Be sure that the CP/M disc is inserted in the default drive, that the drive latch is closed, and that the default drive is properly connected to your computer.
 - If the system fails to "boot-up," repeat the procedure again, but with the module installed in a different port.
 - If the system fails to "boot-up," and displays the message CP/M SYSTEM CARD SELF-TEST ERROR, the CP/M system module requires service. If your computer displays Error 129 : MEDIUM or CP/M BOOT ERROR, the CP/M disc may be damaged.
2. If there are no error messages and the system still fails to "boot-up," verify that your computer is accessing the default drive by executing a CAT statement, or a LOAD "Autost" command.
3. To verify that your computer is operating properly, turn the computer and all peripherals off. Disconnect all peripherals and remove the CP/M module from the rear port. Turn the computer back on. If it does not respond or displays Error 23 : SELF TEST, the computer requires service.
4. Refer to Obtaining Repair Service for information about repair service for the malfunctioning device.

Obtaining Repair Service

Not all Hewlett-Packard facilities offer service for your computer. For information on obtaining service in your area, consult the service information included in the Service Information Sheet packaged with your computer, or contact your authorized HP Series 80 dealer or the nearest Hewlett-Packard sales and service facility.

If your CP/M system or computer requires repair, you can help assure efficient servicing by following these guidelines:

1. Leave the configuration of the computer exactly as it was at the time of the malfunction; any plug-in modules and flexible discs in use at that time should be kept in place.
2. Write a description of the malfunction symptoms for service personnel.
3. Save printouts or any other materials that illustrate the problem.
4. Have on hand a sales slip or other proof of purchase to establish warranty coverage period.

Serial Number

Each Series 80 computer carries an individual serial number plate on the rear panel. We recommend that owners keep a separate record of this number. Should your unit be lost or stolen, the serial number is often necessary for tracing and recovery, and for any insurance claims.

Hewlett-Packard does not maintain records of individual owners of Series 80 computers and unit serial numbers.

General Shipping Instructions

Should you ever need to ship your computer, be sure it is packed in a protective package to avoid in-transit damage. Use the original shipping case if possible. Shipping damage is not covered by the warranty. All customs and duties are the customer's responsibility. Hewlett-Packard recommends that the customer always insure shipments.

Warranty Information

The complete warranty statement is included in the information packet shipped with the HP 82900A CP/M System. Please retain this statement for your records.

If you have any questions concerning this warranty, please contact:

In the U.S.: One of the six Field Repair Centers listed on the Service Information Sheet packaged with your owner's documentation.

In other countries: Contact your nearest sales and service facility. If you are unable to contact that facility, please contact:

In Europe:

Hewlett-Packard
7, rue du Bois-du-Lan
P.O. Box
CH-1217 Meyrin 2
Geneva
Switzerland
Tel. (22) 82 70 00

Other countries:

Hewlett-Packard Intercontinental
3495 Deer Creek Rd.
Palo Alto, California 94304
U.S.A.
Tel. (415) 857-1501

Potential for Radio/Television Interference

The CP/M system module uses radio frequency energy and may cause interference to radio and television reception. The module has been type-tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of the FCC Rules. These specifications provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If the module does cause interference to radio or television, you can try to eliminate the interference problem by doing one or more of the following:

- Reorient the receiving antenna.
- Change the position of the computer with respect to the receiver.
- Move the computer away from the receiver.
- Plug the computer into a different outlet so that the computer and the receiver are on different branch circuits.

If necessary, consult an authorized HP dealer or an experienced radio/television technician for additional suggestions. You may find the following booklet, prepared by the Federal Communications Commission, helpful: *How to Identify and Resolve Radio-TV Interference Problems*. This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402, Stock No. 004-000-00345-4.

Special CP/M Key Assignments

Your computer has some special key assignments that are active when the CP/M system is in control. Some of these key assignments are implemented so that your computer functions properly in the ASCII character—oriented CP/M environment. Other key assignments, for example the **PAUSE** print buffer key, are implemented as special features of your system. Some of these key assignments may not be active while operating application programs or the CP/M transient utilities.

Key	Function
PAUSE	Halts printing of data from the print buffer. If pressed again, printing continues, undisturbed.
STEP	Erases the contents of the print buffer.
CONT	Sends the "Delete" character code (ASCII 127).
TR/NORM	Sends the "Escape" character code (ASCII 27).
END LINE	Sends the "Carriage Return" character code (ASCII 13).
BACK SPACE	Sends the "Back Space" character code (ASCII 8).

There are a number of keys on your computer's keyboard that lose their function when CP/M is in control. These keys are not a part of the standard CP/M system, and therefore lose their normal "native mode" assignment. They are:

KEY SPACE

K1),...,K14)

TEST

INIT

RESLT

LIST

PLIST

RUN

All of the display editing keys.

CP/M Error Messages

The following list of error messages is generated by the CP/M operating system. Refer to your computer's operating and programming manual for a complete list of its integral error messages.

CP/M Error Message	Error Condition
CP/M SYSTEM CARD SELF-TEST ERROR	The CP/M module has failed self-test and is either improperly installed or requires service.
CP/M BOOT ERROR	The CP/M operating system cannot be loaded. Causes include a faulty or improperly loaded system disc.
No operating system on drive A: Correct and press any key.	The disc in drive A is not a system disc or the A drive latch is open.
WARM BOOT FAILED	The system cannot be reset (warm boot). Causes include a faulty or improperly loaded system disc.
Sector read error on drive X. Press <END LINE> to ignore error or ^C to warm boot.	The data or program cannot be read from the disc located in the indicated drive. This is usually caused by a faulty disc, and sometimes requires a warm boot to reset the error condition. The letter X is replaced with the appropriate drive identifier.
Disk select error on drive X. Press <END LINE> to ignore error or ^C to warm boot.	An attempt was made to access a non-existent disc drive. This error sometimes requires a warm boot to reset the error condition. The letter X is replaced with the appropriate drive identifier.
Write to R/O disk error on drive X. Press <END LINE> to ignore error or ^C to warm boot.	An attempt was made to write to a disc that has not previously been logged in. The solution to this problem is to warm boot the system, which logs in all accessible drives. The letter X is replaced with the appropriate drive identifier.
Write to R/O file error on drive X. Press <END LINE> to ignore error or ^C to warm boot.	An attempt was made to write to a file that has read-only status. Ignoring this error by pressing END LINE causes the system to ignore the file's read-only status, allowing you to write data into the file. The letter X is replaced with the appropriate drive identifier.



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