The CP/M CARD™
User's Guide

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Foreword

The CP/M CARD™ package contains a printed circuit board and diskettes containing computer software. Using Digital Research's CP/M Plus™ operating system, also called CP/M® 3, on Advanced Logic Systems' CP/M CARD gives you a more versatile and powerful Apple II ® computer system.

Take an inventory of the contents of your CP/M CARD package. You should find the following items:

- the CP/M CARD printed circuit board
- the CP/M CARD software diskettes
- the CP/M CARD User's Guide
- the CP/M 3 Operating System User's Guide
- the CBASIC® Language Reference Manual
- the GSX-80™ Graphics Extension Programmer's Guide

In addition to these items, there are four documents dealing with licensing, registration, and warranty. After installing the CP/M CARD, please take some time to read the documents that are supplied with your Advanced Logic Systems product. These documents include:

- a Digital Research Licensing Agreement
- Digital Research Registration Cards
- an Advanced Logic Systems Licensing Agreement
- an Advanced Logic Systems User Warranty/Registration Card

After you have read the Digital Research and Advanced Logic Systems licensing agreements, please complete the Digital Research and Advanced Logic Systems registration cards and return them. These registrations put your warranty in effect, and place you on our mailing lists for update information.

This manual, the CP/M CARD User's Guide, teaches you how to install and operate the CP/M CARD. It assumes that you have access to an Apple II or Apple II Plus® and that you are familiar with its operation.

Section 1 introduces the CP/M CARD and briefly defines the hardware, software, and technical manuals that make up the product. It explains how to install the hardware and the conventions that describe the CP/M CARD commands and operation.

Section 2 explains the fundamentals of the CP/M 3 operating system. It tells you how to initialize your system, make back-up diskettes, and use CP/M 3 commands to operate the Apple II computer.

Section 3 provides descriptions of the Advanced Logic Systems utilities that supplement the CP/M 3 software provided by Digital Research. Instructions for operating each utility program are included.

Section 4 discusses the installation of the WordStar® word processing program. This section also discusses how WSMAKER modifies WordStar during installation. WordStar is available from Advanced Logic Systems.

Section 5 describes the CP/M CARD hardware. The two-bank organization of the CP/M CARD's 64K on-board memory and system memory is discussed. This section also explains interaction between the Z80B® and Apple 6502 processors, and hardware protocol for peripheral slot locations.

Appendix A is a glossary of terms pertaining to the CP/M 3 operating system and the CP/M CARD.

This manual describes the CP/M CARD firmware Version 1.0, and the CP/M CARD software Version 3.0.

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Section 1
Installing Your CP/M CARD

This section introduces you to the CP/M CARD, a product of Advanced Logic Systems, called ALS throughout the rest of this manual. The instructions contain the general function of each hardware and software component. At the end of this section, there is a description of the conventions used to describe the CP/M CARD.

We recommend that you read this manual thoroughly before attempting to install and operate our product. Do not install the CP/M CARD before reading the installation instructions in Sections 1.4 through 1.4.3.

Caution: failure to install the CP/M CARD properly can result in damage to the printed circuit card and/or the Apple II hardware.

1.1 The CP/M CARD Hardware

The CP/M CARD makes a Z80B microprocessor part of your Apple II system. It contains the circuitry required to run the CP/M 3 operating system. The CP/M CARD promotes low power consumption and high reliability.

1.2 Software Components

The CP/M CARD software is composed of the CP/M 3 operating system, the CBASIC language, the GSX-80 graphics extension, utilities from Digital Research, and utilities supplied by ALS.

CP/M, Control Program for Microprocessors, is a widely used operating system for Z80B-based computer systems. Installation of CP/M 3 on your Apple II means a broad range of new applications programs, including business management and word processing programs, are available to you.

CBASIC is a comprehensive and versatile programming language for developing software. CBASIC combines the power of a structured, high-level language with the simplicity of BASIC to provide a serious development tool that is easy to learn and easy to use.

GSX-80 is a logical extension to the operating system that provides graphic input and output functions through standard calling procedures. It simplifies the addition of graphic devices such as tablets, joysticks, and printers.

The Digital Research utilities include program development tools such as an assembler, debugger, and basic utilities to copy files and manage disk storage.

The majority of ALS utilities make your CP/M 3 operating system more convenient to use. Most are menu-driven programs that let you perform complex file and system management by simply selecting a menu option. (Section 3 describes the ALS utilities.)

1.3 Technical Manuals

The technical manuals included in the CP/M CARD package provide you with the information you need to operate the CP/M CARD with your Apple II computer system. Keep your manuals near your Apple II for easy reference.

A HELP utility is included on the CP/M CARD diskettes. The HELP README command gives you a description of changes and additions that have occurred to the hardware and the software since the last revision of the manuals.

The CP/M CARD User's Guide introduces you to the different parts of your CP/M CARD package. It tells how to install your CP/M CARD, introduces you to CP/M 3, defines unique CP/M CARD utilities, describes how to install WordStar, and presents hardware details.

The CP/M 3 Operating System User's Guide introduces you to the CP/M 3 operating system and tells you how to use it. It elaborates on the general concepts presented in The CP/M CARD User's Guide, and presents a detailed reference section on all the CP/M 3 commands.

The CBASIC Language Reference Manual covers three main topics: CBASIC language definition, machine dependencies, and the compiler and interpreter.

The GSX-80 Graphics Extension Programmer's Guide introduces you to GSX-80, a logical extension to a microcomputer operating system. This manual tells you about the Graphic Device Operating System (GDOS), Graphics Input/Output System (GIOS), the GSX Loader, and the loadable device drivers.

1.4 Installation

This section tells you the requirements and step-by-step procedure for installing the CP/M CARD into your Apple II computer system.

1.4.1 Installation Requirements

The CP/M CARD is an expansion for the Apple II computer system. As such, it requires the following equipment to function:

- an Apple II or Apple II Plus computer with at least 48K RAM
- two disk drives
- a video monitor

We also suggest an ALS Smarterm II[T.M.] 80x25 Display Board, and a printer with the ALS Dispatcher[T.M.] or PrinterMate[T.M.] interface, if you intend to use word processing, accounting, and business applications software that are currently available.

1.4.2 Peripherals and Slot Usage

The CP/M CARD implementation of CP/M 3 obeys Apple's established hardware protocol. Peripheral cards manufactured by Apple Computer, Inc. and many other manufacturers are supported.

The Apple II has eight peripheral slots located at the back of its motherboard (see Figure 1-1). Use the configuration in Table 1-1 for maximum system flexibility.

1.4.3 Installation Procedure

Installing the CP/M CARD takes only a few minutes and requires no special tools. Follow these steps:

1. Turn **off** power to your Apple II, using the system power switch located at the left rear corner of the computer.

2. Remove the cover of the Apple II by pulling up on its back edge until the fasteners are released. Then slide the cover backwards and off.

3. Locate peripheral slots 0 through 7 on the Apple motherboard (see Figure 1-1). Remove the CP/M CARD from its wrapping. Plug the CP/M CARD into slot 4 (or 7).

   Caution: make sure that the card is aligned so that all pins are in the socket. Misalignment of the connector can damage the CP/M CARD and/or the Apple II hardware when power is applied.

4. Check all connections. Replace the cover to the Apple II by sliding it forward and snapping it back into place at the rear. This completes the installation of the CP/M CARD for an Apple II.

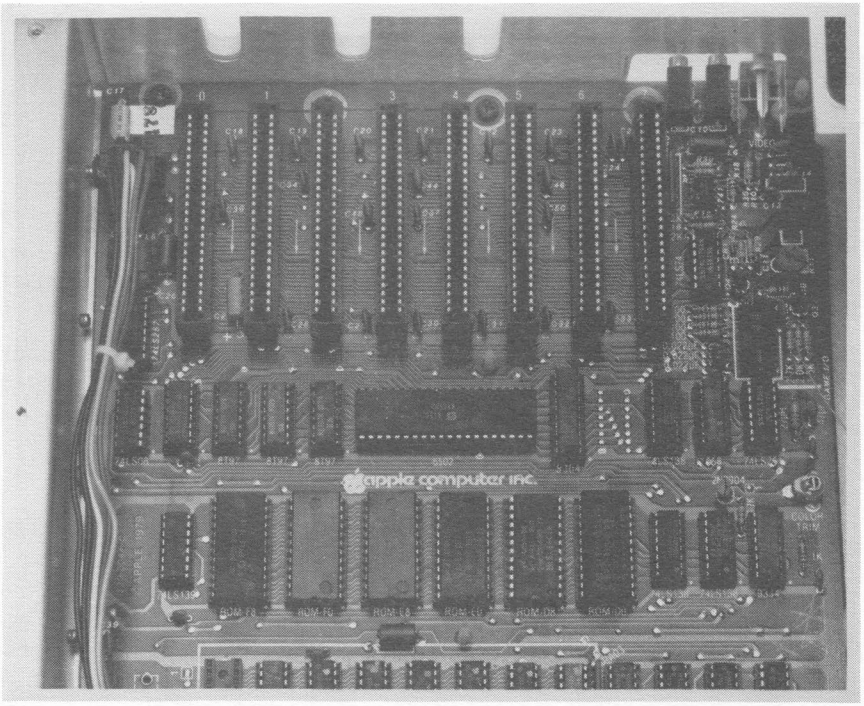

Figure 1-1. Apple II Peripheral Slots

Table 1-1. Apple II Peripheral Slot Usage

Slot Number	Peripheral Card
0	optional ADD-RAM card
1	Dispatcher or PrinterMate printer interface
2	general purpose or optional Dispatcher
3	optional Smarterm II 80x25 display card
4	the CP/M CARD
5	general purpose
6	Apple disk controller
7	unassigned, the CP/M CARD, or optional ALS Color II T.M.

1.5 Conventions Used in this Manual

To learn to successfully operate the CP/M CARD, you must understand the conventions this manual uses to describe the CP/M CARD commands:

- Command keywords are shown in upper-case letters.
- Any input that the user types is in **boldface.**
- To end a CP/M 3 command line, you must press the RETURN key (see Section 2.5). CP/M 3 cannot read your command until you press RETURN.
- A hyphenated command indicates that the characters to the left and right of the hyphen are pressed simultaneously. For example, the command

  CTRL-C

  means that you should press the CTRL key and C simultaneously. Please note that the program messages displayed on your monitor screen represent the CTRL key as an up-arrow ^. CTRL-C and ^C have identical meanings.
- Extra spaces have been inserted in commands involving the CTRL and ESC key. These spaces are shown only to increase legibility and should not be typed as part of the command.

End of Section 1

Section 2
CP/M 3 Fundamentals

This section gives an overview of the CP/M 3 operating system as it is used with the CP/M CARD. This section describes how to bring up your Apple II system in CP/M 3 and how to perform a warm boot. In this section, you learn how to make back-up diskettes of your software, and see examples of the most important CP/M 3 file management commands.

2.1 Initializing the System

The process that applies power to the computer and transfers an operating system into computer memory is called system initialization or a cold boot. When you initialize your system using the CP/M CARD software diskettes, it automatically performs an additional function: the operating system executes the ALS HELLO program. HELLO lists all files contained on the diskette and gives you a menu of operations for your selection. Follow these steps to initialize your system.

1. Insert the diskette containing the CP/M CARD software into your primary disk drive unit, but do not close the disk drive latch.

2. Turn on power to the monitor, printer, and Apple II.

3. Close the disk unit latch. You should hear the disk turning as it transfers the operating system into computer memory. If no transfer occurs, one of the following three prompts appears on your monitor screen. You must take the appropriate action.

   - If *, then type **6 CTRL-K**
   - If >, then type **PR#6**
   - If], then type **PR#6**

   After a successful system initialization, the monitor screen clears and displays the following message:

```
                    THE CP/M CARD
            { 112K CP/M 3.0 for the Apple II }
                    Copyright <c> 1982
                  Advanced Logic Systems

          THE FOLLOWING PROGRAMS ARE ON THIS DISKETTE:

A: ADUMP     CBASIC  DSKCOPY  ED     HELP  MON65  STAT    WSMAKER
A: APPMAKER  DDT     DUMP     HELLO  LOAD  PIP    SUBMIT  XSUB
A: ASM
                    ____________________

                      OTHER FILES ON DISK:

A: DUMP    .ASM


YOU HAVE THE FOLLOWING OPTIONS:

1. EXECUTE ONE OF THE ABOVE LISTED PROGRAMS
2. BACKUP YOUR DISKETTES
3. HELP
4. RUN WORDSTAR
5. RUN SUPERCALC
6. RUN CONDOR
7. REMOVE THIS MENU
8. EXIT TO CP/M

YOUR CHOICE?
```

Note: this is only a representation of what appears on your monitor screen and is subject to change. Condor T.M. , Supercalc T.M. , and WordStar are available from ALS.

If you do not see this screen display after a few seconds, open the disk unit latch, and turn off the computer and peripherals. Check that the CP/M CARD has been installed properly and that all connections are correct.

2.2 Making a Back-up Diskette

The first thing that you should do after initializing your system is make working copies of the CP/M CARD software diskettes. You should save you distribution diskettes as your masters. Then in case of disaster, you can make new working copies.

Copy your software diskettes by using option 2 of the HELLO menu following these directions:

1. If you have just initialized the system, your master CP/M CARD software diskette is located in your primary disk drive A, and you should see the HELLO menu on your monitor screen:

   YOU HAVE THE FOLLOWING OPTIONS:

   1. EXECUTE ONE OF THE ABOVE LISTED PROGRAMS
   2. BACKUP YOUR DISKETTES
   3. HELP
   4. RUN WORDSTAR
   5. RUN SUPERCALC
   6. RUN CONDOR
   7. REMOVE THIS MENU
   8. EXIT TO CP/M

   Insert a blank diskette in your secondary disk drive B, making sure that the blank diskette is not write-protected. Select option 2 by typing:

   YOUR CHOICE? 2

2. The ALS utility program, DSKCOPY, loads into memory and displays this menu on the monitor screen:

   ALS DSKCOPY
   THIS PROGRAM COPIES FROM DRIVE A: TO DRIVE B:

   1. FORMAT AND COPY ENTIRE DISKETTE FROM DRIVE A: TO B:
   2. CREATE FORMATTED BLANK DISKETTE ON DRIVE B:
   3. FORMAT AND COPY SYSTEM TRACKS FROM DRIVE A: TO B:
   4. EXIT TO CP/M

3. Select option 1:

   SELECT YOUR OPTION: 1

   DSKCOPY prints the message:

   WARNING ANY FILES YOU MAY HAVE ON DISK B: WILL BE ERASED!

   PRESS ANY KEY TO STOP THE COPY OPERATION

4. Begin the copy operation by typing:

   ARE YOU READY (Y/N/^C): Y

   After DSKCOPY completes the transfer, it again displays the DSKCOPY menu.

5. Return to the CP/M 3 operating system by typing:

   YOUR CHOICE? **4**

   Remove your master CP/M CARD software diskette from the primary disk drive and store it. Place the copy diskette in the primary disk drive and type CTRL-C. Using your working diskette, you are ready to explore the CP/M 3 operating system.

Note: multiple software diskettes are included in your CP/M CARD package, follow the preceding steps to make back-up copies of each software diskette.

2.3 CP/M 3 System Prompt

Option 8 of the HELLO menu of operations gives control of your Apple II to the CP/M 3 operating system. The CP/M 3 prompt is a greater than sign, >, preceded by the CP/M 3 name for the default disk drive. For example,

```
A>
```

This is the CP/M 3 system prompt. The system prompt tells you that CP/M 3 is ready to read a command from your keyboard. In the preceding example, the prompt tells you that drive A is your default drive. This means that until you tell CP/M 3 to do otherwise, it looks for program and data files on the disk in drive A. On an Apple II with two drives, CP/M 3 can display either A> or B>.

2.4 Disk Drive Allocations

CP/M 3 identifies each disk drive of your Apple II system with a drive specifier, which includes the drive's letter name followed by a colon, for example, A:, B:, etc. Table 2-1 shows the placement of disk drives and their corresponding specifiers, slot numbers, and drive numbers.

Table 2-1. Placement of CP/M 3 Disk Drives

Drive	CP/M 3 Specifier	Slot Number	Drive Number
1st	A:	6	1
2nd	B:	6	2
3rd	C:	5	1
4th	D:	5	2

To change the default drive, simply enter the drive specifier next to the system prompt. In response, CP/M 3 changes the system prompt to display the new default drive:

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

2.5 CP/M 3 Commands

CP/M 3 performs certain tasks according to specific commands that you type at your keyboard. A CP/M 3 command line is composed of a command keyword, an optional command tail, and a carriage return keystroke. The command keyword identifies a command (program) to be executed. The command tail can contain extra information for the command, such as a filename or parameters. To end the command line, you must press the RETURN key. CP/M 3 cannot read your command until you press RETURN.

CP/M 3 converts keyboard commands entered in lower-case to upper-case. For example, you can type, dir to refer to a program called DIR by the system.

CP/M 3 recognizes two kinds of commands. Commands that identify programs in memory are called built-in commands. Commands that identify program files on a disk are called transient utility commands.

Six built-in commands and over twenty transient utility commands are included with CP/M 3. These commands are fully described in the CP/M 3 Operating System User's Guide.

You can add utilities to your system by purchasing CP/M 3-compatible application programs. If you are a programmer, you can also write your own utilities that operate with CP/M 3 using Digital Research languages and productivity tools.

2.5.1 Built-in Commands

Built-in commands are part of CP/M 3 and are always available for your use regardless of which disk you have in which drive. Built-in commands reside in memory as a part of CP/M 3 and therefore start executing more quickly than the transient utilities.

Some built-in commands have options that require support from a related transient utility. The related transient has the same name as the built-in and has a filetype of COM. This type of transient utility is only loaded when a built-in command line contains options that cannot be handled by the built-in command.

Table 2-2. Built-in Commands

Command	Function
DIR	Displays file specifications of all files in the directory except those marked with the SYS attribute.
DIRSYS	Displays file specifications of files marked with the SYS (system) attribute in the directory.
ERASE	Erases a file specification from the disk directory and release the storage space occupied by the file.
RENAME	Renames a disk file.
TYPE	Displays contents of an ASCII (character) file at your screen.
USER	Changes to a different user number.

CP/M 3 allows you to abbreviate the built-in commands as follows:

DIRSYS	DIRS
ERASE	ERA
RENAME	REN
TYPE	TYP
USER	USE

2.5.2 Transient Utility Commands

The transient utility commands execute programs that come into memory only when you request them. When you enter a command keyword that identifies a transient utility, CP/M 3 loads the program file from the disk and passes it any filenames, data, or parameters you entered in the command tail. Remember that many of these utilities are programming tools you might never need to use.

Table 2-3. Transient Utility Commands

Name	Function
DATE	Sets or displays the date and time.
DEVICE	Assigns logical CP/M devices CON, LST, and AUX to one or more physical devices, changes device driver protocol and baud rates, or sets console screen size.
DUMP	Displays a file in ASCII and hexadecimal format.
ED	Creates and alters character files.
GET	Temporarily gets console input from a disk file rather than the keyboard.
HELP	Displays information on how to use CP/M 3 commands.
HEXCOM	Uses the output from MAC to produce a program file.
INITDIR	Initializes a disk directory to allow time and date stamping.
LINK	Links REL (relocatable) program modules produced by RMAC (relocatable macro assembler) and produces program files.
MAC	Translates assembly language programs into machine code form.
PIP	Copies files and combines files
PUT	Temporarily directs printer or console output to a disk file.
RMAC	Translates assembly language programs into relocatable program modules.
SET	Sets file options including disk labels, file attributes, type of time and date stamping, and password protection.
SETDEF	Sets system options including the drive search chain.
SHOW	Displays disk and drive statistics.

Table 2-3. (continued)

Name	Function
SID	Helps you check out your programs and interactively correct programming errors.
SUBMIT	Automatically executes multiple commands.
XREF	Produces a cross-reference list of variables used in an assembler program.

2.6 CP/M 3 Filenames

CP/M 3 filenames can be from one to eight characters. When you make up a filename, try to let the name tell you something about what the file contains. For example, if you have a list of customer names for your business, you could name the file,

```
CUSTOMER
```

so that the name gives you some idea of what is in the file.

As you begin to use your Apple II computer with CP/M 3, you will find that find that files fall naturally into categories. To help you identify files belonging to the same category, CP/M 3 allows you to add an optional one- to three-character extension, called a filetype, to the filename. When you add a filetype to the filename, separate the filetype from the filename with a period. Try to use three letters that tell something about the file's category. For example, you could add the following filetype to the file that contains a list of customer names:

```
CUSTOMER.NAM
```

When CP/M 3 displays file specifications in response to a DIR command, it adds blanks to short filenames so that you can compare filetypes quickly. The filetype COM identifies a CP/M 3 executable program. The filetype BAK identifies a backup file. Do not use the BAK filetype in naming original files.

We recommend that you create filenames and filetypes with letters and numbers only. Do not use the characters listed in Table 2-4, you can use the under bar, _, the dollar sign, $, and the pound sign, #.

Table 2-4. CP/M 3 Special Characters

Character	Meaning
< = , !	file specification delimiters
| > [ ]	
tab space	
carriage return	
:	drive delimiter in file specification
.	filetype delimiter in file specification
;	password delimiter in file specification
* ?	wildcard characters in an ambiguous file specification
< > & !	option list delimiters
| \ + -	
[ ]	option list delimiters for global and local options
( )	delimiters for multiple modifiers inside square brackets for options that have modifiers
/ $	option delimiters in a command line
;	comment delimiter at the beginning of a command line

2.7 CP/M 3 Comparison with Apple DOS Version 3.3

Table 2-5 lists some of the CP/M 3 commands that you have encountered in this section and their Apple DOS equivalents. Notice that not all CP/M 3 and DOS commands are identical in function. However, we include them to give a convenient reference point for learning CP/M 3.

Table 2-5. CP/M 3 Comparison with Apple DOS Version 3.3

CP/M 3 Commands	Apple DOS Commands
DIR	CATALOG
DIR B:	CATALOG, D2
REN NEWNAME.TYP=OLDNAME.TYP	RENAME OLDNAME, NEWNAME
ERA FILENAME.TYP	DELETE FILENAME
FILENAME	RUN FILENAME
B:FILENAME	RUN FILENAME, D2
RESET (button)	PR#6 OR 6 CTRL-K

End of Section 2

Section 3
CP/M CARD Utilities

In addition to the CP/M 3 operating system and associated utilities from Digital Research, the CP/M CARD software diskettes contain several programs prepared by ALS. These programs make CP/M 3 more convenient for Apple II owners. This section describes the ALS utility programs in the CP/M CARD software package.

3.1 ADUMP

The ADUMP program displays data stored on diskette in hexadecimal and ASCII formats. The ADUMP menu of options allows a programmer to examine disk data for a total file or for a single sector of a file. The data is given in 16-byte lines preceded by the absolute byte address. The corresponding ASCII characters are printed to the right of the data display as shown in Figure 3-1. Execute ADUMP following these steps:

1. Insert the CP/M CARD software diskette in drive A.

2. Insert the diskette you want to examine in drive B.

3. Execute the program by typing:

   A>ADUMP FILENAME.TYP

   If the drive containing the diskette to be examined is not the default drive, precede the filename with the disk drive letter. For example,

   A>ADUMP B:FILENAME.TYP

   The screen displays the ADUMP menu of options including the following:

   1. DUMP ENTIRE FILE
   2. DUMP SINGLE SECTOR
   3. EXIT TO CP/M

   TYPE SELECTION (1-3)

4. Select an option by typing the number corresponding to it.

   If you select option 1, the program displays all sectors in hexadecimal and ASCII formats. The display can be interrupted with CTRL-S for examination.

   If you select option 2, the program requests:

   WHAT SECTOR NUMBER (IN HEX)?

   Enter the sector number in hexadecimal format followed by a carriage return. Then the sector data displays.

   Select option 3 to exit from the ADUMP program and return system control to the CP/M 3 operating system.

```
A>adump b:modapp.com

1. DUMP ENTIRE FILE
2. DUMP SINGLE SECTOR
3. EXIT TO CP/M

TYPE SELECTION (1-3):1

      SECTOR #   00 00
0000  C3 00 03 00 00 00 FF 00 C3 23 01 C3 2C 01 C3 37 C......C#.C,.C7
0010  01 C3 3B 01 C3 3F 01 C3 47 01 C3 50 01 C3 4F 01 .C;.C?.CG.CP.CO.
0020  C3 51 01 11 52 01 0E 09 CD 05 00 C9 3E 03 32 AE CQ..R...M..I>.2.
0030  E0 3E 11 32 AE E0 C9 3A AF E0 C9 32 AF E0 C9 3A `>.2.`I:/`I2/`I:
0040  AE E0 E6 01 FE 01 C9 3A AE E0 E6 02 FE 02 C9 C9 .`f.~.I:.`f.~.II
0050  C9 C9 46 4F 52 20 41 50 50 4C 45 20 49 49 20 20 IIFOR APPLE II
0060  57 2F 41 4C 53 20 53 45 52 49 41 4C 20 43 41 52 W/ALS SERIAL CAR
0070  44 0D 0A 24 45 52 49 41 4C 20 43 41 52 44 0D 0A D..$ERIAL CARD..

      SECTOR #   00 01
0080  24 21 7A 11 CD 00 F3 E6 02 FE 02 C1 D1 E1 C9 C9 $!z.M.sf.~.AQaII
0090  C9 C9 46 4F 52 20 41 50 50 4C 45 20 49 49 20 20 IIFOR APPLE II
00A0  57 2F 41 4C 53 20 53 45 52 49 41 4C 20 43 41 52 W/ALS SERIAL CAR
00B0  44 0D 0A 24 00 00 00 00 00 00 00 00 00 00 00 00 D..$............
00C0  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
00D0  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
00E0  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
00F0  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
```

Figure 3-1. ADUMP Data Display

3.2 APPMAKER

This program creates a working diskette for an application program or a file disk. APPMAKER formats a diskette automatically placing the software most often used with an application program on the diskette: HELLO, DSKCOPY, and PIP. Execute APPMAKER by following these steps:

1. Insert the CP/M CARD software diskette in drive A and a blank diskette in drive B. Give system control to the CP/M 3 operating system; you should see the CP/M 3 prompt, A>, on the monitor screen.

2. Execute APPMAKER by typing the command:

   A>**APPMAKER**

   The program displays the message:

   ALS USER DISK UTILITY

   PLACE A BLANK DISKETTE IN DRIVE B:

   PROGRAM IS READY TO FORMAT AND COPY

   WARNING ANY FILES YOU MAY HAVE ON DISK B: WILL BE ERASED!

3. Respond positively by typing:

   ARE YOU READY (Y/N/^C): **Y**

4. After the transfer is complete, remove the CP/M 3 software diskette from drive A, and replace it with the utility diskette from drive B.

5. Transfer your applications program to the utility diskette by typing:

   A>**PIP A:=B:*.*[V] (cr)**

   Remember that the brackets surrounding V are special characters available using the Smarterm II 80-column video card. Omit [V] option if you do not have an 80-column video card.

After APPMAKER copies and verifies your applications program, place the original applications diskette in a safe place with your other original diskettes. Use the utility diskette in drive A as your new working diskette.

3.3 DSKCOPY

The DSKCOPY program formats and copies diskettes in a single operation. This program permits copying from the diskette in drive A to drive B only. DSKCOPY is a menu-driven program with three options. Option 1 formats the diskette in drive B and copies the entire contents of the drive A diskette to drive B. Option 2 formats the diskette in drive B and copies the operating system only. Option 3 copies the operating system on the drive B diskette. Other files stored on the diskette are kept intact.

Although DSKCOPY is a CP/M 3 program, it copies any 16-sector diskette that is not copy-protected. Therefore, you can use DSKCOPY on Apple DOS Version 3.3 and Pascal formatted diskettes. Execute DSKCOPY by following these steps:

1. Initialize the system and place the diskette containing DSKCOPY in drive A.

2. Type the command:

   A>DSKCOPY

   The DSKCOPY program loads into computer memory displaying the message:

```
ALS DSKCOPY
THIS PROGRAM COPIES FROM DRIVE A: TO DRIVE B:

1. FORMAT AND COPY ENTIRE DISKETTE FROM DRIVE A: TO B:
2. CREATE FORMATTED BLANK DISKETTE ON DRIVE B:
3. FORMAT AND COPY SYSTEM TRACKS FROM DRIVE A: TO B:
4. EXIT TO CP/M


SELECT YOUR OPTION:
```

3. Insert the source diskette in drive A and a blank or scratch diskette in drive B.

4. Type the number corresponding to the operation you want to complete followed by a carriage return. Each option displays prompting messages to guide you through the option. Please note that options 1 and 2 destroy all files residing on the diskette in drive B in the course of their operation. All options ask for confirmation before starting by displaying the message:

   ```
   READY? (Y/N/^C):
   ```

   Type Y and a carriage return to begin the operation. Typing N and a carriage return terminates the program and returns control to the CP/M 3 operating system. CTRL-C returns to the operating system.

5. After an option has been completed, DSKCOPY again displays its menu. Select option 4 when you want to return to the CP/M 3 operating system level.

3.4 HELLO

CP/M 3 calls the HELLO program during system initialization. HELLO automatically executes the following functions:

- Displays the contents of the default disk in a user-oriented format.
- Provides a menu of operations currently available to you.

HELLO automatically displays the contents of the default disk in a user-oriented format. First, HELLO displays all executable (COM) files alphabetically. Then HELLO displays an alphabetical list of remaining filenames and their filetypes. Finally, a menu of operations currently available is provided. Menu options include:

1. EXECUTE ONE OF THE ABOVE LISTED PROGRAMS
2. BACKUP YOUR DISKETTES
3. HELP
4. RUN WORDSTAR
5. RUN SUPERCALC
6. RUN CONDOR
7. REMOVE THIS MENU
8. EXIT TO CP/M

If you select option 1, the program requests the program name. Type your program choice. The program executes automatically.

Option 2 calls the ALS DSKCOPY utility, a menu-driven program that provides a convenient means of making diskette back-ups.

Options 3 through 7 are self-explanatory.

Option 8 gives system control to the CP/M 3 operating system which then displays the operating system prompt.

3.5 MON65

This utility gives the machine language programmer an entrance to the 6502 monitor for program examination and debugging. Execute MON65 following these steps:

1. Insert the CP/M CARD software diskette in drive A.

2. Type the following command:

   A>MON65

   The screen display switches to 40-column mode, and the Apple II monitor prompt, *, is displayed.

3. To return control to CP/M 3 type:

   ***^Y**

   MON65 is intended for experienced system programmers.

End of Section 3

Section 4
WSMAKER

The WSMAKER program does a one-step installation of the WordStar word processing program. The WSMAKER program automatically performs the installation procedure described in the WordStar manual. It also installs enhancements for the ALS Smarterm II 80-column video card. Both WordStar and Smarterm II are available from ALS.

4.1 WSMAKER Execution

To produce an applications diskette that takes full advantage of the CP/M CARD's features follow these steps:

1. Insert the CP/M CARD software diskette in drive A and a blank diskette in drive B. Make sure that the system is under CP/M 3 control. You should see the A> prompt displayed on the monitor screen.

2. Create a utility diskette in drive B by typing the command:

   A>**APPMAKER**

   The APPMAKER program displays a caution message on the monitor screen and asks for confirmation to create a utility diskette in drive B. Type Y to indicate that you are ready to create the utility diskette. APPMAKER transfers the CP/M 3 operating system and a set of file management utilities to the drive B diskette.

3. After control is returned to the operating system, type the command:

   A>**WSMAKER**

   WSMAKER displays the following message on the monitor screen:

   WORDSTARMAKER
   (c) 1982 als

   THIS PROGRAM WILL READ WSU.COM FROM DISK A: AND PRODUCE AN ALS VERSION OF WORDSTAR ON DISK B: CALLED WS.COM.

   REMOVE THE DISKETTE THAT IS NOW IN THE A: DISK DRIVE AND INSERT YOUR MASTER DISK CONTAINING WSU.COM IN THE A: DISK DRIVE.

TYPE RETURN WHEN YOU ARE READY (TYPE X TO EXIT NOW WITHOUT DOING ANYTHING)

4. Insert the WordStar distribution diskette in drive A and press a carriage return. WSMAKER creates a WS.COM file on the utility diskette in drive B. Use this diskette as your working copy of the WordStar program.

4.2 WSMAKER Modifications

This section describes the modifications made by WSMAKER to WordStar during installation. Table 4-1 lists the changes required that allow WordStar to function with the Smarterm II video card.

Table 4-1. Modifications for WordStar with a Smarterm II

Location	New Value	Function
101 102	08 2D	Jump around I/O table patches
ERAEOL: ERAEOL:+1	01 1D	Erase to end of line
LINDEL: LINDEL:+1	01 06	Line delete
LININS: LININS:+1	01 05	Line insert
IVON: IVON:+1	01 0F	Inverse video on
IVOFF: IVOFF:+1	01 0E	Inverse video off

Table 4-2 lists changes to the standard WordStar installation making WordStar easier for the first time user.

Table 4-2. Modifications for WordStar

Location	New Value	Function
ITHELP:	02	Set the initial help level to suppress the main menu.
NITHLF:	00	Help message at sign-on.
ITITOG:	00	Start with insert mode off.
INITWF:+1	00	Start with justification off.
ITPOPN:	FF	Auto page numbers off.

End of Section 4

Section 5
Hardware Description

The CP/M CARD is an efficient implementation of a large CP/M system for the Apple II computer. Its high speed and large memory capabilities make it particularly well suited to business or educational uses where its increased capabilities allow more useful work to get done in a day. Its six megahertz Z80B executes 158 instructions, including all 78 of the 8080/8085 processor, allowing access to the largest collection of software available today.

5.1 External Interface

The CP/M CARD connects to your Apple II computer as a Direct Memory Access (DMA) device, and takes command of the Apple II memory, and Input/Output devices whenever necessary, by synchronizing those transfers to the Apple II. You can use the Z80B microprocessor that is on your CP/M CARD or the Apple 6502 microprocessor to control Apple peripheral devices. Each microprocessor has advantages and disadvantages in handling different peripheral devices.

The Z80B uses the 6502 to control all input/output. This allows full use of the code in Read-Only Memories (ROMs) that peripheral manufacturers provide on their cards, and also allows the Z80B to run at six megahertz. In special cases, the Z80B can directly control a peripheral device for maximum flexibility. Your Apple II motherboard, and any peripheral devices plugged into it, run with timing that limits the speed of the Z80B to two megahertz during the instant that it directly controls them.

5.2 Memory Allocation

The CP/M CARD adds an additional 64K of memory to your Apple II system. Memory is divided into two banks: 0 and 1. Bank 0 stores keyboard, printer, and disk buffers, I/O drivers, the Console Command Processor (CCP), display screens, part of the BDOS, and other information that is essential to system operation. Bank 1 contains most of the Transient Program Area (TPA) and provides the bottom 56K of the 64K memory for application software and data.

A common memory area contains the BIOS and part of the BDOS and is accessible from both memory banks. Application programs can also use part of the common area. Figure 5-1 shows the memory allocation for the system.

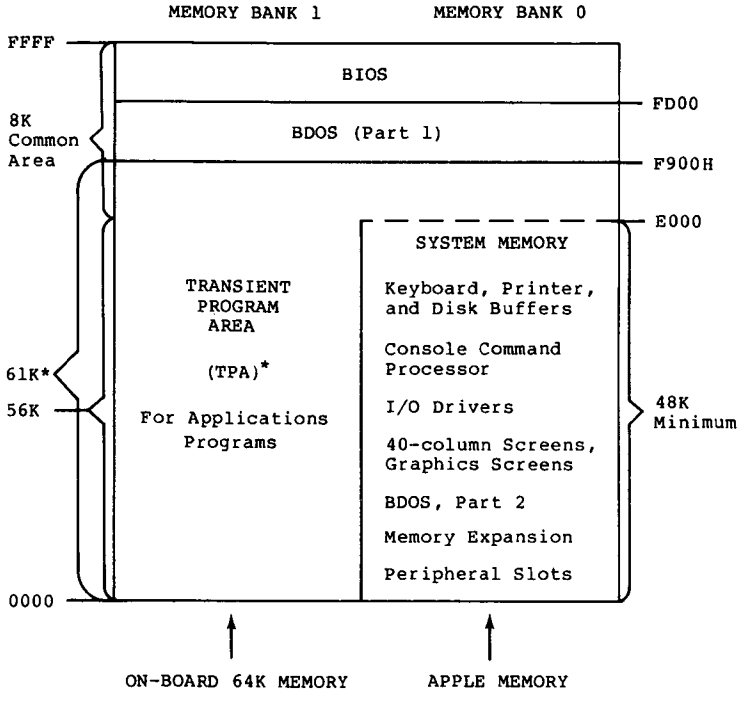

Figure 5-1. System Memory Map

The Z80B automatically switches between Banks 0 and 1 whenever necessary. The system uses an output instruction to write a 0 to select Bank 0, or 1 to select Bank 1 in I/O location 0F0H. See Figure 5-1.

5.3 Direct Memory Access

Some Apple peripheral cards, high-speed disks in particular, use direct control of the hardware to perform data transfers. Because the CP/M CARD follows standard Apple Direct Memory Access protocol, these cards can be operated as usual without Z80B interference.

5.4 Interrupts

The Z80B processor on the CP/M CARD receives two types of interrupts:

- an interrupt from the real-time clock that resides on the CP/M CARD
- an interrupt from an I/O device of the Apple motherboard

If the Z80B receives an interrupt from an I/O device (one of the cards in the Apple peripheral slots) the interrupt is sent to the Apple 6502 for standard processing. Z80B handles interrupts with the RST 30 instruction, which does not interfere with program debuggers. The operating system handles interrupts automatically, freeing you from having to program the interrupt system.

5.5 Turning the Z80B On and Off

In some applications, you might want to turn off Z80B processing and run a 6502 subroutine. A write instruction from either the 6502 or the Z80B to the CP/M CARD's slot location toggles the Z80B to its opposite state. When either processor sends this write instruction, the Z80B turns off if it is on, or on if it is off. With the Z80B turned off, the 6502 processor can run a subroutine without interference from the Z80B.

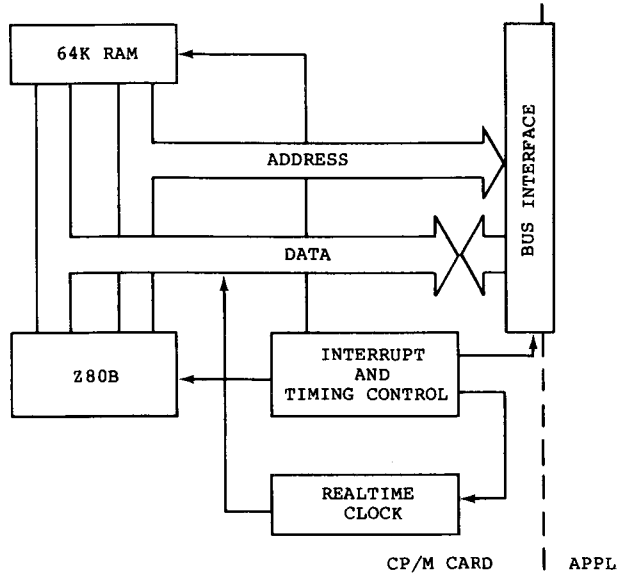

Figure 5-2. Hardware Block Diagram

5.6 Protocol for Peripheral Slots

The CP/M CARD dedicates the following peripheral slots in its hardware protocol:

- Slot 0 is for the ADD-RAM memory expansion card.
- Slot 1 is the Dispatcher or PrinterMate printer interface card.
- Slot 3 is the Smarterm II 80-column video card.

If your system is equipped with any of the preceding accessory cards, they should be installed in the suggested slot locations. The CP/M CARD accommodate any other Apple-compatible accessory in the remaining peripheral slots. However, because of the protocol restrictions found in Apple Pascal and other software, the peripheral configuration defined in Table 1-1 is recommended.

End of Section 5

Appendix A
User's Glossary

ambiguous filename: Filename that contains either of the CP/M 3 wildcard characters, ? or *, in the primary filename or the filetype or both. When you replace characters in a filename with these wildcard characters, you create an ambiguous filename and can easily reference more than one CP/M 3 file in a single command line.

applications program: Program that solves a specific problem. Typical applications programs are business accounting packages, word processing (editing) programs, and mailing list programs.

argument: Symbol that indicates a place into which you can substitute a number, letter, or name to give an appropriate meaning to a command line.

ASCII: American Standard Code for Information Interchange is a standard code for representation of numbers, letters, and symbols. An ASCII text file is a file that can be intelligibly displayed on the video screen or printed on paper.

attribute: File characteristic that can be set to on or off.

back-up: Copy of a disk or file made for safe keeping, or the creation of the back-up disk or file.

bit: Switch in memory that can be set to on (1) or off (0). Bits are grouped into bytes.

block: Area of disk.

bootstrap: Process of loading the operating system into memory. Sometimes called a cold start.

buffer: Area of memory that temporarily stores data during the transfer of information.

built-in commands: Commands that permanently reside in memory. They respond quickly because they are not accessed from a disk.

byte: Unit of memory or disk storage containing eight bits.

character: Letter, numeral, or symbol that is on the keyboard.

cold boot: See **bootstrap.**

command: Elements of a CP/M 3 command line. In general, a CP/M 3 command has three parts: the command keyword, the command tail, and a carriage return keystroke.

command file: Series of coded machine executable instructions stored on disk as a program file, invoked in CP/M 3 by typing the command keyword next to the system prompt on the console. CP/M 3 command files generally have a filetype of COM. Files are either command files or data files. Same as a command program.

command keyword: Name that identifies a CP/M 3 command, usually the primary filename of a file of type COM, or a built-in command. The command keyword precedes the command tail and the carriage return in the command line.

command syntax: Statement that defines the correct way to enter a command. The correct structure generally includes the command keyword, the command tail, and a carriage return. A syntax line usually contains symbols that you should replace with actual values when you enter the command.

command tail: Part of a command that follows the command keyword in the command line. The command tail can include a drive specification, a filename and/or filetype, and options or parameters. Some commands do not require a command tail.

concatenate: Term that describes one of PIP's operations that copies two or more separate files into one new file in the specified sequence.

console: Primary input/output device. The console consists of a listing device such as a screen and a keyboard through which the user communicates with the operating system or applications program.

control character: Nonprinting character combination that sends a simple command to CP/M 3. Some control characters perform line-editing functions. To enter a control character, hold down the CONTROL key on your terminal and strike the character key specified.

CRT: Cathode Ray Tube. The tube commonly referred to as the picture tube or monitor screen.

cursor: One-character symbol that can appear anywhere on the console screen. The cursor indicates the position where the next keystroke at the console will have an effect.

data file: Nonexecutable collection of similar information that generally requires a command file to manipulate it.

default: Currently selected disk drive and/or user number. Any command that does not specify a disk drive or a user number references the default disk drive and user number. When CP/M 3 is first invoked, the default disk drive is drive A, and the default user number is 0, until changed with the USER command.

delimiter: Special characters that separate different items in a command line. For example, in CP/M 3, a colon separates the drive spec from the filename. A period separates the filename from the filetype. Brackets separate any options from their command or filespec. Commas separate one item in an option list from another. All the preceding special characters are delimiters.

directory: Portion of a disk that contains descriptions of each file on the disk. In response to the DIR command, CP/M 3 displays the filenames stored in the directory.

DIR attribute: File attribute. A file with the DIR attribute can be displayed by a DIR command. The file can be accessed from the default user number and drive only.

disk, diskette: Magnetic media used to store information. Programs and data are recorded on the disk in the same way that music is recorded on a cassette tape. The term diskette refers to smaller capacity removable floppy diskettes. Disk can refer to a diskette, a removable cartridge disk or a fixed hard disk.

disk drive: Peripheral device that reads and writes on hard or floppy disks. CP/M 3 assigns a letter to each drive under its control. For example, CP/M 3 can refer to the drives in a four-drive system as A, B, C, and D.

display: Visual presentation appearing on a monitor (or CRT) screen.

editor: Utility program that creates and modifies text files. An editor can be used for creation of documents or creation of code for computer programs. The CP/M 3 editor is invoked by typing the command ED next to the system prompt on the console.

executable: Ready to be run by the computer. Executable code is a series of instructions that can be carried out by the computer. For example, the computer cannot execute names and addresses, but it can execute a program that prints names and addresses on mailing labels.

execute a program: Start a program executing. When a program is running, the computer is executing a sequence of instructions.

FCB: See **File Control Block.**

file: Collection of characters, instructions, or data stored on a disk. The user can create files on a disk.

File Control Block: Structure used for accessing files on disk. Contains the drive, filename, filetype, and other information describing a file to be accessed or created on the disk.

filename: Name assigned to a file. A filename can include a primary filename of 1-8 characters and a filetype of 0-3 characters. A period separates the primary filename from the filetype.

file specification: Unique file identifier. A complete CP/M 3 file specification includes a disk drive specification followed by a colon (d:), a primary filename of 1 to 8 characters, a period, and a filetype of 0 to 3 characters. For example, b:example.tex is a complete CP/M 3 file specification.

filetype: Extension to a filename. A filetype can be from 0 to 3 characters, separated from the primary filename by a period. A filetype can tell something about the file. Certain programs require that files to be processed have certain filetypes.

floppy disk: Flexible magnetic disk used to store information. Floppy disks come in 5 1/4- and 8- inch diameters.

format: Operation performed on a diskette that divides the diskette into tracks and sectors and creates a disk directory.

graphics: Mode of computer operation in which pictorial images are displayed on the CRT.

hard disk: Rigid, platter-like, magnetic disk sealed in a container. A hard disk stores more information than a floppy disk.

hardware: Physical components of a computer.

hardware protocol: Set of conventions governing the timing and format of data transmission.

hex file: ASCII-printable representation of a command (machine language) file.

hexadecimal notation: Notation for the base 16 number system using the symbols 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, and F to represent the sixteen digits. Machine code is often converted to hexadecimal notation because it can be easily represented by ASCII characters and printed on the console screen or on paper.

input: Data going into the system, usually from an operator typing at the terminal or by a program reading from the disk.

interface: Object that allows two independent systems to communicate with each other, as an interface between hardware and software in a microcomputer.

I/O: Abbreviation for input/output.

inverse video: Mode of video display where dark characters appear on a light field.

keyword: See **command keyword.**

kilobyte: 1024 bytes denoted as 1K. 32 kilobytes equal 32K. 1024 kilobytes equal one megabyte, or over one million bytes.

list device: Device such as a printer onto which data can be listed or printed.

logical: Representation of something that might or might not be the same in its actual physical form. For example, a hard disk can occupy one physical drive, and yet you can divide the available storage on it to appear to the user as if it were in several different drives. These apparent drives are the logical drives.

megabyte: Over one million bytes; 1024 kilobytes. See **byte** and **kilobyte.**

menu: List of program options in which any option can be selected by entering its alphanumeric character.

menu-driven: Program in which the user selects functions from a menu.

microprocessor: Silicon chip that is the Central Processing Unit (CPU) of the microcomputer.

monitor: device that displays information sent from the computer or the keyboard.

motherboard: Large printed circuit card on the Apple II into which other printed circuit cards can be plugged.

operating system: Collection of programs that supervises the execution of other programs and the management of computer resources. An operating system provides an orderly input/output environment between the computer and its peripheral devices.

option: One of many parameters that can be part of a command tail. Use options to specify additional conditions for a command's execution.

output: Data that the system sends to the console or disk.

parallel interface: hardware component that transmits or receives data bits on more than one line simultaneously.

parameter: Value in the command tail that provides additional information for the command. Technically, a parameter is a required element of a command.

peripheral devices: Devices external to the CPU. For example, terminals, printers, and disk drives are common peripheral devices that are not part of the processor, but are used in conjunction with it.

physical: Actual hardware of a computer. The physical environment varies from computer to computer.

primary filename: First 8 characters of a filename. The primary filename is a unique name that helps the user identify the file contents. A primary filename contains 1 to 8 characters and can include any letter or number and some special characters. The primary filename follows the optional drive specification and precedes the optional filetype.

printed circuit card (board): Insulated material with conductive strips into which electronic components are inserted.

program: Series of specially coded instructions that performs specific tasks when executed by a computer.

prompt: Characters displayed on the video screen to help the user decide what the next appropriate action is. A system prompt is a special prompt displayed by the operating system. The system prompt indicates to the user that the operating system is ready to accept input. The CP/M 3 system prompt is an alphabetic character followed by an angle bracket. The alphabetic character indicates the default drive. Some applications programs have their own special system prompts.

RAM: Random Access Memory. Memory from which the computer can access any location in any order.

Read-Only: Attribute that can be assigned to a disk file or a disk drive. When assigned to a file, the Read-Only attribute allows you to read from that file but not change it. When assigned to a drive, the Read-Only attribute allows you to read any file on the disk, but prevents you from adding a new file, erasing or changing a file, renaming a file, or writing on the disk. The SET command can set a file or a drive to Read-Only. Every file and drive is either Read-Only or Read-Write. The default setting for drives and files is Read-Write, but an error in resetting the disk or changing media automatically sets the drive to Read-Only until the error is corrected. Files and disk drives can be set to either Read-Only or Read-Write.

Read-Write: Attribute that can be assigned to a disk file or a disk drive. The Read-Write attribute allows you to read from and write to a specific Read-Write file or to a any file on a disk that is in a drive set to Read-Write. A file or drive can be set to either Read-Only or Read-Write.

record: Collection of data. A file consists of one or more records stored on disk. An CP/M 3 record is 128 bytes long.

RO: See **Read-Only.**

RW: See **Read-Write.**

sector: Portion of a disk track. There are a specified number of sectors on each track.

serial interface: Hardware component that transmits or receives data bits on a single data line.

software: Specially coded programs that transmit machine-readable instructions to the computer, as opposed to hardware, which is the actual physical components of a computer.

source file: ASCII text file that is an input file for a processing program, such as an editor, text formatter, or assembler.

syntax: Format for entering a given command.

system attribute: File attribute. You can give a file the system attribute by using the SYS option in the SET command. A file with the SYS attribute is not displayed in response to a DIR command; you must use DIRS. If you give a file with user number 0 the SYS attribute, you can read and execute that file from any user number on the same drive. Use this feature to make your commonly used programs available under any user number.

system initialization: To apply power to the computer and computer peripherals, and load an operating system into computer memory.

system prompt: Symbol displayed by the operating system indicating that the system is ready to receive input. See **prompt.**

system tracks: Space on a formatted diskette reserved for the operating system.

terminal: See **console.**

toggled command: Command used as a switch to either activate or deactivate a function.

track: Concentric rings dividing a disk. There are 77 tracks on a typical eight-inch floppy disk.

turn-key application: Application designed for the noncomputer-oriented user. For example, a typical turn-key application is designed so that the operator needs only to turn on the computer, insert the proper program disk, and select the desired procedure from a selection of functions (menu) displayed on the screen.

upward-compatible: Term meaning that a program created for the previously released operating system (or compiler, etc.) runs under the newly released version of the same operating system.

user number: Number from 0 to 15 assigned to a file when it is created. User numbers can organize files into sixteen file groups.

utility: Tool. Program that enables the user to perform certain operations, such as copying files, erasing files, and editing files. Utilities are created for the convenience of programmers and users.

version: Number or letter identifying the revision level of a printed circuit card or software package.

warm boot: Process by which the operating system is reinitialized.

wildcard characters: Special characters that match certain specified items. In CP/M 3 there are two wildcard characters, ? and *. The ? can be substituted for any single character in a filename, and the * can be substituted for the primary filename or the filetype or both. By placing wildcard characters in filenames, the user creates an ambiguous filename and can quickly reference one or more files.

End of Appendix A

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