APPLI-CARD™

for the

APPLE /// COMPUTER

Version 1.0

Installation and User's Manual

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TRADEMARKS

DISCLAIMER

WARRANTY

Personal Computer Products, Inc., offers an unconditional 90 day warranty on the APPLI-CARD for the Apple ///. For 90 days from the date of purchase, Personal Computer Products, Inc., will repair or replace any defective APPLI-CARD at no charge to the purchaser. When requesting warranty service, please include the serial number. Please follow these steps when requesting warranty service.

1. Complete the Personal Computer Products, Inc., Warranty Registration Card and return it to Personal Computer Products, Inc. Once your completed card is received, processing a request for warranty service can be made promptly.

2. If you believe your APPLI-CARD is defective, you should first call Personal Computer Products, Inc., to obtain a Return Merchandise Authorization (RMA). Merchandise will not be effectively processed without having first obtained an RMA number prior to returning the merchandise.

3. You should then send the APPLI-CARD and its *original disk,* postage prepaid, to Personal Computer Products, Inc. Please be sure your name, return address and telephone number are enclosed with the APPLI-CARD, as well as a complete description of the symptoms observed. Personal Computer Products, Inc., will either repair or replace your APPLI-CARD and return it to you.

Your request for warranty service may be delayed if you do not complete the Warranty Registration Card or if you send your APPLI-CARD directly back to Personal Computer Products, Inc., without having obtained a Return Merchandise Authorization.

PREFACE

". . . You can't please all the people all the time" was probably one of the most intelligent remarks a President of the United States ever made. The saying holds true for computer documentation as well.

Although we have attempted to make this manual readable to all, it may be too basic for some and too complicated for others. If you have a good working knowledge of computers, you may need only to read the chapters and sections that pertain to installing and using the APPLI-CARD. Those new to computers are advised to read this entire manual, plus the *CP/M Primer* included with this package. One assumption we have made, however, is that you have at least a fair working knowledge of the Apple /// Computer: You need this knowledge in order to grasp the most basic commands and usage of the APPLI-CARD.

If time is precious to you, you may not find it feasible to read through this entire manual. Deciding what to read and what not to read is up to you. For your convenience, the outline following the Table of Contents will give you an overview of the information in each chapter.:

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INTRODUCTION

Plug an APPLI-CARD into one of the peripheral slots inside your Apple /// and something magical happens. Your machine suddenly becomes two computers. Your favorite Apple programs still run, nothing changes there. But drop in a program designed for a Z80-based computer, and your Apple speaks the language fluently.

This Manual will show you how to get the most out of your "Two Computers" but, first things first. Make sure your APPLI-CARD System is complete by checking the contents of the package you purchased against the following list:

APPLI-CARD PACKAGE CONTENTS

Your APPLI-CARD CP/M System includes:

APPLI-CARD Circuit Board
APPLI-CARD Manual
CP/M Primer
Diskette (recorded on two sides and called a "Flippy")
  Side one: APPLI-CARD CP/M Master Disk
  Side two: CP/M UTILITIES Disk
APPLI-CARD SOS UTILITIES Disk
WordStar Manual
WordStar Disk

A Warranty Registration Card
Digital Research License Agreement Card
PCPI Copyright Notice

If you are missing any part of your APPLI-CARD System, please contact your dealer.

CHAPTER 1: INSTALLATION

This chapter gives complete instructions for installing your APPLI-CARD in the Apple /// computer. Reading this chapter is a must. This chapter discusses the following items:

1. Handling Precautions.

2. What You Need.

3. APPLI-CARD Slot Assignment.

4. Installation Steps.

GETTING READY

HANDLING PRECAUTIONS

Always turn off the power on your computer before removing or replacing any electrical or electronic device. Otherwise, you may damage the computer or create a shock hazard.

Hold the APPLI-CARD circuit board by the edges to prevent contamination of the gold plated fingers by skin oil and to avoid damaging the components on the card.

Installing the APPLI-CARD circuit board is easy. Mistakes can happen, so please read the following instructions carefully. Improper installation can damage both the APPLI-CARD and your Apple computer.

Before you start, make sure you have at least the following minimum requirements:

WHAT YOU NEED

One 128K (minimum) Apple /// Computer, Two Disk Drives (two 5 1/4 inch Floppy Disk Drives, or one Floppy Disk Drive and one PROFILE Hard Disk), Four Blank Diskettes

APPLI-CARD-CP/M MASTER DISK
APPLI-CARD CP/M UTILITIES DISK
APPLE /// SYSTEM UTILITIES DISK
APPLI-CARD SOS UTILITIES DISK

APPLI-CARD SLOT ASSIGNMENT

APPLI-CARD mounts in any peripheral connector slot in the Apple /// Computer. We suggest that you place the card in Slot 2.

INSTALLATION STEPS

PREPARING APPLE ///

STEP 1 Set the Apple /// power switch to the OFF position.

STEP 2 Turn all external power switches (monitor, drives, printer, etc.) to OFF.

STEP 3 Disconnect all power cables from the wall outlets.

STEP 4 Disconnect all cables from the back of the computer, including power cords and peripheral cables.

STEP 5 Remove everything from the top cover of the computer.

REMOVING COVER

STEP 6 Tilt the Apple /// onto its back side.

STEP 7 The cover is attached by two quarter-turn captive screws under the lower left and lower right corners of the face of the Apple ///. Use a medium flat-blade screwdriver to turn the screws one-quarter turn counter-clockwise.

STEP 8 Gently return the Apple /// to its upright position. Slide the top cover forward, then remove by lifting straight up.

INSTALLING

STEP 9 Locate the peripheral connector slots at the rear of the Apple ///. Slot 2 is the second slot from the left when you are facing the computer keyboard.

STEP 10 Orient the APPLI-CARD so that the card edge connector is closest to the back of the chassis. Ensure proper seating of the card by gently rocking it as you push it into the slot.

REPLACING COVER

STEP 11 Replace the top cover by lowering it straight down over the Apple. The holes on the under- side of the cover should fit over the two captive screws.

STEP 12 Tilt the Apple onto its back side again.

STEP 13 Use the screwdriver to tighten the captive screws by pushing in while turning them one- quarter turn.

RESTORING POWER

STEP 14 Reconnect the power and peripheral cables to the computer.

STEP 15 Replug the cables into the electrical outlets.

STEP 16 Turn on the power switches.

INSTALLATION COMPLETE

INSTALLATION OF THE APPLI-CARD IS NOW COMPLETE.

CHAPTER 2:
SYSTEM CHECKOUT AND OPERATION

This chapter explains how to back up the software for your APPLI-CARD System. It explains how to boot the APPLI-CARD System and check the operation of the APPLI-CARD Operating System (a modified version of CP/M for APPLI-CARD use).

BACKING UP THE APPLI-CARD DISKS

One diskette supplied with your APPLI-CARD System is a "flippy" disk, with information written on both sides.

APPLI-CARD CP/M MASTER DISK

Side one is your bootable **APPLI-CARD CP/M MASTER** disk, which contains the CP/M Operating System.

CP/M UTILITIES DISK

Side two is your **CP/M UTILITIES** disk. It is not bootable.

APPLE /// UTILITIES DISK

Use the **Apple /// System Utilities** disk to make backup copies of your master disks. (See *Apple Owners Guide,* 'the Filer', "Operations on Devices", volume copy [copies all tracks on disk], pages 85-88)

Make two copies of each side of each disk (your APPLI-CARD CP/M MASTER, CP/M UTILITIES, and SOS Utilities disks). This will give you a working copy and a backup copy. Use the working and backup copies and store the original diskettes in a safe place.

LOADING APPLI-CARD CP/M

Loading (or booting) APPLI-CARD CP/M is very simple:

STEP 1 Insert your working copy of the **APPLI-CARD CP/M MASTER** disk into drive A: (the built-in floppy drive).

STEP 2 Turn ON the Apple /// by pushing the Apple power switch, or, if the power switch is already ON, press the control (CTRL) button and the reset button at the same time, <**CTRL- RESET**>. The APPLI-CARD CP/M System will load automatically.

The disk drive will make the normal booting sounds. You will see an Apple /// SOS message displayed on the monitor screen, followed by a LOAD DRIVERS message in the upper left hand corner. This will indicate that the APPLI-CARD System is initializing.

Completion of the bootstrap process will be evidenced by a display similar to the following:

```
CP/M Ver. 2.2
(C) Digital Research, Inc.
PCPI ver. 1.0
(C) Personal Computer Products, Inc.

A>
```

NOTE: In this manual, press the RETURN key when you see: <**RETURN**>, the word RETURN in bold capital letters enclosed by angle brackets. Most commands and statements entered from the keyboard require that the <**RETURN**> key be pressed after the command is typed.

The control key, CTRL on most keyboards, is represented by the caret symbol (^). This key is *always* used in conjunction with another key. ^**C** means that the letter C is pressed while depressing the control key.

The prompt **A>** indicates that the APPLI-CARD CP/M System is now ready to accept a command. The A in the prompt indicates that all operations will occur on the A drive unless you tell the system otherwise. If you wanted to operate on the B drive you would type **B:** and **<RETURN>**. You would then see:

```
B>
```

This signifies that all operations are performed on the B drive. This assumes, of course, that you have a second drive connected to your system.

CHECKOUT CP/M

Checking out the new installation is very simple.

STEP 1 Type **DIR <RETURN>**. You should see a directory similar to the following:

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

A>
```

The files on your disk may not appear in this order.

NOTE: The APPLI-CARD CP/M DRIVERS file on this disk supports 4 floppy disks and a printer. If you want to use a PROFILE hard disk, use the INSTALL program (see chapter 4) to connect and configure the hard disk device driver, then save the altered configuration to the disk. (See chapter 5, page 1, for the device drivers contained in the SOS.DRIVER file on the boot disk.)

STEP 2 Remove the **APPLI-CARD CP/M MASTER** disk from drive A:. Insert the working copy of **APPLI-CARD UTILITIES** disk in drive A:. Type **^C**, then type **DIR <RETURN>**. The display should look like this:

```
A>DIR
A: INSTALL COM : INSTALL 001 : INSTALL 002 : INSTALL 003
A: INSTALL 004 : PCPICPM COM : DLDRIVER COM: HDBINT DVR
A: CHRINT  DVR : BLKINT  DVR :


A>
```

NOTE: The order of the files on your disk may differ from that shown above.

IN CASE OF DIFFICULTY

You have now completed the test of your APPLI-CARD. If you have any problems in booting your system, recheck your APPLI-CARD installation.

COMMON SOS ERROR MESSAGES

Error #27 I/O Error	Hardware failure.
Error #2B Device write protected	Remove write protect tab on floppy disk.
Error #44 Path not found.	Cannot find CPM1 or CPM2 on ProFile. Check SOS directory for entry.
Error #45 Volume not found.	Cannot find ProFile. Be sure the ProFile power switch is on.

(See *Apple /// SOS Reference Manual,* Volume 2, Appendix D, for more information on SOS error messages.)

FOR FURTHER HELP

If you experience difficulty, check the trouble-shooting guide in Appendix D. If the problem persists, contact your dealer. Your dealer may contact Personal Computer Products, Inc., for further help, if needed.

CHAPTER 3:
THE APPLI-CARD
CP/M OPERATION SYSTEM

This chapter contains an explanation of the notations used in the APPLI-CARD CP/M Operating System, a short description of the control keys used in CP/M, and an introduction to CP/M commands.

NOTATION CONVENTION

SCREENS

You will see full and partial screen representations which will be surrounded by a dark border. These are examples of information you should see. Your display may differ somewhat from the given screen display. For instance:

```
A>DIR
```

PROMPTS

In the text you will see, for example "The prompt is:" followed by

Enter drive:

You will see the exact wording of the prompt, shown in **bold face type**, followed by your expected response.

TYPE

Step 5 Type **A:DRIVERS <RETURN>**

STEP N

Step 5 shows the response you should make to the prompt. It also indicates that you should press the return key after you have entered the driver file name. Step 5 is just one step in a given procedure.

<RETURN>

Most commands and statements entered from the keyboard require that the **<RETURN>** key be pressed after the command is typed. Press the **<RETURN>** key when you see the word RETURN, in boldface capital letters, enclosed in angle brackets. The Directory command would look like this: **DIR <RETURN>**.

<CRTL-K>

The control key, CTRL on most keyboards, is represented by the caret symbol ^. This key is *always* used in conjunction with another key. For example, **^K** means that the control key *and* the letter K are pressed simultaneously.

<ESC>

The escape key is represented by **<ESC>**. This key is used alone, or in conjunction with other keys. The notation **<ESC> ^D** means: press the escape key, and then the control key *and* the letter D simultaneously.

CP/M DISKS

CP/M refers to disk drives by *letters* - drive name letters that are immediately followed by a colon. The CP/M drive **A:** designation refers to the first disk drive in the system. Your system supports drives **A:** through **D:** in CP/M, which correspond to **.D1** through **.D4** in SOS.

CONTROL KEYS

PRINTING

SCROLLING

The control keys described in this section are used to communicate directly with the APPLI-CARD CP/M Operating System and are the same as those used with standard CP/M 2.2. Unless you are going to do assembly language programing you will probably use only the **^C** - Terminate program and warm boot, **^P** - Turn OFF/ON printer (a toggle switch), and **^S** - Stop screen scrolling. These control codes are used *without* a **<RETURN>**.

CONTROL KEY	DESCRIPTION
^C	Terminates program or warm boots the operating system or permits writing to a newly inserted disk.
^E	Places cursor on a new line. (The command is not accepted until <**RETURN**> is pressed.)
^H	Backspaces (same as the back arrow key: <-).
^J	Inserts line feed. Can be used to terminate a command line.
^M	Same as <**RETURN**>.
^P	Directs screen output to the printer. A second ^P discontinues output to the printer.
^R	Retypes the current command line.
^S	Pauses the video display. A second ^S causes the display to resume.
^U	Deletes the current line. The cursor appears on the next line down.
^X	Deletes the current line. The cursor appears at the beginning of the current line.
^Z	Ends input. This control key is used by some of the CP/M "transient" commands.

Table 3-1: CP/M Control Codes

CP/M COMMANDS

This section offers a short overview of the CP/M commands used with the APPLI-CARD. A more in-depth look is provided by the *CP/M Primer* included with this package. A list of additional reference materials on CP/M and its utility programs is shown in Appendix E.

APPLI-CARD uses Digital Research's CP/M 2.2 Operating System. It includes all of the CP/M commands **except** FORMAT, COPY, SYSGEN, and MOVCPM.

CP/M has two types of commands: resident and transient. The difference between the two is that resident commands are actually part of the CP/M Operating System and always available. Transient commands are read from a CP/M disk, executed, and then discarded.

RESIDENT COMMANDS

The following table shows the CP/M resident commands.

COMMAND	DESCRIPTION
DIR	Displays a list of the files in the directory of the currently logged disk drive.
TYPE	Displays the contents of a file. (Must be a text or ASCII file.)
REN	Renames a file on a disk.
ERA	Erases a file or files from a disk.
SAVE	Saves an image of memory on a disk.

Table 3-2: Resident CP/M Commands

EXAMPLES OF RESIDENT COMMANDS

The prompt for the following examples will be:

A>

1) If you enter **DIR B: <RETURN>** You will see a directory listing of all files on the B drive. If your entry was **DIR <RETURN>**, you would see a directory listing of the files of the current default drive A.

2) If you type **TYPE filename.extension <RETURN>** where **filename.extension** is the name of a file stored on the default disk, you will see on the screen a listing of the file called **filename.extension**. Press any character to terminate the listing.

3) If you type **REN new-filename = old-filename <RETURN>**

   CP/M will change the name of the file named **old-filename** to **new-filename.**

4) If you type **ERA filename <RETURN>**

   CP/M will erase the file named **filename** from the current default drive.

5) If you enter **SAVE n filename <RETURN>**

   CP/M will write n pages of program memory to the disk under the name **filename**.

TRANSIENT COMMANDS

Transient commands reside as files on CP/M disks and are distinguished by a **.COM** extension. It should be noted that not all .COM files are CP/M transient commands: They may be actual application programs.

> For example: WS.COM is a file containing the WordStar application program.

The following table lists the transient CP/M commands and gives a short description of their functions.

COMMAND	DESCRIPTION
STAT	Gives the status of the CP/M System parameters and disk drive capacities.
PIP	Peripheral Interchange Program. Used for transfer of single or multiple files between CP/M devices (usually disk drives).
DUMP	Displays the contents of a file in a hexadecimal format.
ED	CP/M File Editor. Used for editing text or ASCII files (most often used for editing short assembly language source files).
ASM	CP/M 8080 Assembler.
LOAD	CP/M Relocating Loader. Used with ASM to produce machine language programs.
DDT	Dynamic Debugging Tool. Used to debug machine language programs and routines.
SUBMIT	Used to allow CP/M to accept input from a text file as if it came from the keyboard.

Table 3-3: Transient CP/M Commands

EXAMPLES OF TRANSIENT COMMANDS

The assumed prompt for the following examples will be:

A>

1) If you enter **PIP A:=B:filename <RETURN>**

   PIP will transfer the file **filename** from drive B to drive A.

2) If you enter **PIP B:=A:*.xxx <RETURN>**

   PIP will transfer all files with the extension **.xxx** from the disk in drive A to the disk in drive B. The multiple file transfer is specified by use of the *, a wild card. Consult your *CP/M Primer* (page 26) for more on wild cards.

3) If you enter **STAT B:*.* <RETURN>**

   STAT will display all the files on drive B along with the size and the Read Only or Read/Write status of each file. The free space remaining on the disk is displayed at the end of the file list.

4) If you enter **STAT A:DSK: <RETURN>**

   You will display the statistics of disk drive A: its capacity, bytes/record, records/block, and sectors/track.

   Consult the *CP/M Primer* (page 39) for more information.

5) If you enter **SUBMIT filename <RETURN>**

   CP/M will read the file **filename** and execute each line of this file as if it were entered at the console. Consult the *CP/M Primer* for more information on this powerful feature.

NOTE

The remainder of the Transient Commands are used mainly in assembly language programming, and are beyond the scope of this manual.

CHAPTER 4:
CP/M, APPLI-CARD UTILITIES AND PROGRAMS

Most Z80-based computers use the CP/M Operating System — an operating system that the Apple normally can't use. CP/M has enjoyed a popularity that has helped it to become the de facto standard in the microcomputer industry; in fact, there are more than 2,000 CP/M programs currently available. With the APPLI-CARD, the Apple can use almost all of these 2,000 CP/M-based programs.

The heart of the APPLI-CARD is its Z80 microprocessor which takes over the data-handling job from the 6502 microprocessor inside your Apple ///. The APPLI-CARD has its own 64K Random Access Memory (RAM) with room to add 64K more. The APPLI-CARD uses the Apple /// as an input/output processor to control the use of its keyboard, video display, disk drives, and other devices. Appendix A gives a brief technical overview of the APPLI-CARD. Appendix B provides the details of how to alter the standard device assignments within CP/M.

APPLI-CARD CP/M BOOTSTRAP DISK

The APPLI-CARD CP/M boot disk uses a special format which contains both a SOS directory and a CP/M directory. The SOS directory contains only those SOS files needed to boot, with the remainder of the disk space reserved for use by CP/M. The file SOS.INTERP contains the CP/M operating system, and other software needed to communicate with SOS devices.

Only the Apple /// CP/M boot disk must use this special format; other disks need only be formatted before being used to write CP/M data files and programs.

INSTALL UTILITY PROGRAM

CP/M drivers are programs which allow the CP/M operating system to control the keyboard, console, floppy disk drives, hard disk drive, printer, and other peripheral devices. Additionally, some drivers allow CP/M to communicate with the Apple /// Operating System, SOS, and various SOS drivers.

The Install utility permits you to modify the CP/M drivers to fit your particular system's requirements. To run the INSTALL utility, the following files are required:

- INSTALL. COM - The Install program.
- INSTALL.001 - Overlay.
- INSTALL.002 - Overlay.
- INSTALL.003 - Overlay.
- INSTALL.004 - Overlay.
- PCPICPM - The CP/M Operating System.
- DLDRIVER - This file is used to move drivers from the CP/M drivers file to the Apple /// .
- CHRINT, BLKINT, HDBINT - These files are the connection (drivers) between SOS and CP/M for character and block data.

NOTE: All of the above files may be found on the CP/M Utilities Disk.

INVOKING INSTALL PROGRAM

Installation of CP/M drivers is performed in the following manner:

STEP 1 Insert the **APPLI-CARD CP/M MASTER** disk into drive A, and press <**CTRL-RESET**>. You will see the CP/M prompt:

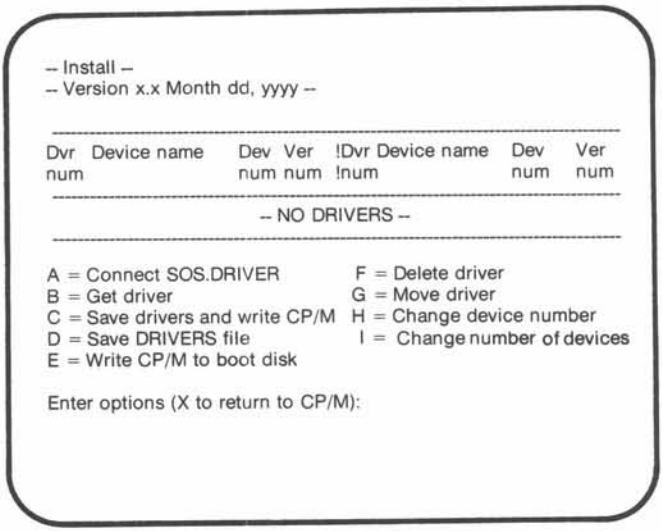
A>

STEP 2a Either insert the **CP/M UTILITIES** disk in drive B, then enter **B:** <**RETURN**>

or

STEP 2b Remove the **APPLI-CARD CP/M MASTER** disk from drive A, and insert the **CP/M UTILITIES** disk in drive A, then press **^C.**

STEP 3 Type **INSTALL** <**RETURN**>. You will then see the screen:



STEP 4 Type **A** (the A option on the menu: Connect SOS.DRIVERS). This reads the SOS.DRIVERS file into the Install program. The prompt is:

```
Enter drive:
```

STEP 5 Type the letter designation of the drive in which the **APPLI-CARD CP/M MASTER** disk resides, usually A.

STEP 6 After a few moments, a menu similar to the following will appear:

```
CHARACTER DEVICES          BLOCK DEVICES
-----------------------------------------------------
  *.CONSOLE                ! *.D1
  *.PRINTER                ! *.PROFILE
  *.AUDIO                  !
  *.RS232                  !
* = not connected
Configure which device?
```

For each device driver you wish to connect, enter its name from the list presented in the menu. For example, to connect the printer driver enter .PRINTER <**RETURN**>.

STEP 7 After selecting a driver to connect, you will see a screen which identifies your selection and supplies information about it, including certain default parameters and the options C (Connect), D (Disconnect), and Q (Quit without change). Enter C if you want to connect the driver displayed.

After connecting all drivers you desire, enter <**RETURN**> in response to the "Configure which device?" prompt, followed by a space. After a brief pause, INSTALL will return to display the main menu as shown above in STEP 3. The menu will be changed to reflect the names of the SOS drivers you selected.

NOTE

THE CONSOLE AND THE BUILT-IN DRIVE A (.D1) ALREADY HAVE A DEVICE DRIVER CONNECTED IN THE DEFAULT DRIVERS FILE. DO NOT CONNECT THESE TWO DEVICES HERE, UNLESS YOU HAVE MADE SOME MODIFICATION TO THE DRIVER.

ADDING OTHER DEVICE DRIVERS

The B option on the menu in STEP 3 allows you to install drivers for devices which do not have standard SOS drivers or to modify a CP/M DRIVERS file which has previously had SOS drivers connected. Selecting the B option will cause INSTALL to respond:

```
Enter file name <RET>:
```

Enter the name of the driver or drivers file you wish to load, for example, B:NONSTD.DVR or A:DRIVERS.

CHANGING DRIVER CONFIGURATION

You now have the option to change, delete, or move drivers, or change device number, by selecting options F through I on the Install menu.

For example, you might:

- Delete the RS232 serial port driver from the drivers file, which would disconnect this device while you were in CP/M. Type F at the Install menu and you will see the DELETE DRIVER menu, from which you will type the driver number for the device .RS232, followed by a <RETURN>. INSTALL will reply with:

  Are you sure (Y or N):

  to which you should enter Y if you really want to delete this driver. This will delete the RS232 port driver and return you to the Install menu.

- Move a driver, which alters the order of the drivers on the disk. You would type G from the Install menu.

- Change a device number, which changes the letter designation of the device. Type H from the Install menu.

- Change the number of devices, which will change the total number of mass storage devices that a driver will control. The default value is 2. If you had four floppy disk drives, you would type I from the Install menu, enter the driver number to change, and <RETURN>. INSTALL will indicate the current number of devices and prompt for a new value.

CAUTION:

DO NOT ALLOW THE NUMBER OF DEVICES TO EXCEED THE NUMBER OF DEVICES THE DRIVER WILL SUPPORT, OR THE SYSTEM WILL MALFUNCTION.

SAVING THE NEW DEVICE CONFIGURATION

After you have configured the drivers to your satisfaction, you must save them by selecting options C through E in the Install Program. Option C is normally used.

- Option C - *Save Drivers and Write CP/M.* This option is the one normally used to write the drivers to the file called DRIVERS and to write the file called PCPICPM to the file called SOS.INTERP on the boot disk.

- Option D - *Save Drivers File.* This option saves the Drivers file, and allows you to rename the file with a name such as B:DRIVERS. This will permit you to put this Drivers file on another disk (B). This option is not normally used.

- Option E - *Write CP/M.* This option writes the file PCPICPM into the file SOS.INTERP on the boot disk. This option is not normally used.

CHAPTER 5:
INITIALIZING THE PROFILE HARD DISK AND NEW BOOTABLE DISKETTES

This chapter will discuss the steps necessary to use the functions available from utilities on the **APPLI- CARD SOS UTILITIES** disk: Allocating space on a ProFile hard disk for use by CP/M, and creating new CP/M bootstrap disks after changing the contents of the SOS.DRIVER file.

LOADING THE APPLI-CARD SOS UTILITIES MENU

The **APPLI-CARD SOS UTILITIES** disk is a separate disk which runs independently of CP/M and other Apple /// disks you may have. To obtain the **APPLI-CARD SOS UTILITIES** menu display, insert the **APPLI-CARD SOS UTILITIES** disk into drive .D1 and press <**CTRL-RESET**>. After a few moments of disk activity, the following menu display will appear:

```
PCPI APPLI-CARD Apple /// Utilities - Version 1.0

P)  ProFile hard disk initialization
C)  CREATE a bootable CP/M disk
?)  HELP
X)  Exit program

(Press the letter of the desired option):
```

If you do not know exactly what you want to do at this point, press **?** to receive a brief explanation of each of the functions available from this menu. If you wish to exit from this menu program to return to CP/M or another Apple /// system, press **X**.

If you wish to allocate space on your ProFile hard disk for CP/M volumes, press **P** to select the ProFile initialization utility. Proceed to the section below, which describes the detailed steps necessary to create CP/M volumes on the ProFile.

If you wish to create a new Apple /// CP/M bootable diskette, press **C** to select the CP/M boot disk initialization utility. See the second section following below, which describes the detailed steps to create new bootable CP/M disks.

PROFILE CP/M VOLUME INITIALIZATION

The ProFile initialization utility is used to allocate space on the ProFile hard disk for exclusive use by CP/M. In this space you can store programs and files under CP/M control.

Files written to the ProFile CP/M volumes are accessible only from within CP/M; the SOS files which constitute the CP/M volumes are accessible from SOS only as complete files. No direct access to CP/M files from SOS is possible.

CP/M VOLUME SIZE

The space available on the hard disk may be allocated to one or two CP/M disk volumes. The minimum and maximum sizes of each CP/M volume are 257 and 32,767 blocks, respectively.

CHANGING VOLUME SIZES

Changing the size of the ProFile volumes requires that you copy all CP/M files from each volume to be changed onto diskette before you change the volume size. Use the CP/M PIP utility to copy the files to diskette, then, using the Apple /// System Utilities, delete files CPM1 and/or CPM2. Follow the procedures in later sections of this chapter to allocate CP/M volumes with the desired size.

APPLI-CARD/ SOFTCARD/ PROFILE/ COMPATIBILITY

If you are upgrading to an APPLI-CARD from the MICROSOFT SoftCard, you may not need to reinitialize your ProFile. To determine whether reallocation of ProFile space is necessary, do the following steps:

STEP 1 Insert the Apple **SOFTCARD /// CP/M MASTER** disk in drive A and press **<CTRL-RESET>**.

STEP 2 Type **STAT x:DSK: <RETURN>**, where "**x:**" is the drive designation of each ProFile CP/M volume (e.g., A:, B:, etc.). You will see a display similar to:

```
    x : Drive Characteristics
65536 : 128 Byte record Capacity
 8192 : Kilobyte Drive Capacity
  128 : 32 Byte Directory Entries
    8 : Checked Directory Entries
1024: : Records/ Extent
  128 : Records/ Track
    2 : Reserved Tracks
```

STEP 3 Remove **SOFTCARD /// CP/M MASTER** disk and insert the **APPLI-CARD CP/M MASTER** disk. Then press <**CTRL-RESET**>.

STEP 4 Type **STAT x:DSK:** <**RETURN**>, as in Step 2 above. You will see:

```
    x : Drive Characteristics
65536 : 128 Byte record Capacity
 8192 : Kilobyte Drive Capacity
  128 : 32 Byte Directory Entries
    8 : Checked Directory Entries
1024: : Records/ Extent
  128 : Records/ Track
    2 : Reserved Tracks
```

You do not need to reallocate ProFile CP/M volumes if line number 4 on the APPLI-CARD disk display agrees with line number 4 on the SOFTCARD disk display. If the **"32 Byte Directory Entries"** do not agree, you will need to transfer all of the CP/M files that were created with your SoftCard Profile combination onto floppy disks. Then reload them onto your ProFile disk after you reallocate CP/M volume space, using the **APPLI-CARD SOS UTILITIES** disk.

ALLOCATING PROFILE CP/M VOLUME SPACE

Use the following procedure to allocate space on the ProFile hard disk for CP/M volumes:

STEP 1 After entering P on the Apple /// APPLI-CARD UTILITIES menu, you will see:

```
CREATE PROFILE CP/M VOLUME
Device name of hard disk: .PROFILE
```

STEP 2 Press <**RETURN**>. You will see the following messages:

```
Reading bit map . . .
Free space on disk: NNNN blocks
CP/M volume number: 1
```

NNNN will be the number of available blocks on your ProFile.

STEP 3 Enter the volume number and <**RETURN**>, where the volume number is 1 or 2.

You will see:

```
No. of blocks to reserve
```

STEP 4 Enter the number of blocks (which must be less than the free space on disk) and <**RETURN**>. The next messages will be:

```
Creating .PROFILE/CPM1 . . .
.PROFILE/CPM1 created successfully
```

NOTE: Select block number between 257 and free space block number (one block equals 512 bytes).

STEP 5 Repeat steps 2 through 4 to create CP/M volume 2, if you wish a second ProFile CP/M volume.

CREATING NEW CP/M BOOTABLE DISKS

You may need to create a new bootable **APPLI-CARD CP/M MASTER** disk when you initially configure your system, or after you make a change to the configuration of your system (i.e., added/deleted or changed the specifications of a peripheral device or the location of a peripheral device). The CP/M disk initialization utility writes the following information on your modified **APPLI-CARD CP/M MASTER** disk:

- The latest configuration information.
- SOS.INTERP - Apple /// APPLI-CARD CP/M operating system.
- CPMDIR - CP/M directory data.
- CPMSYS - Write protected CP/M system files.
- SOS.KERNEL - Apple /// SOS operating system.
- SOS.DRIVER - Apple /// SOS device drivers.

PROCEDURE FOR TWO FLOPPY DRIVES

Use the following procedure to create an APPLI-CARD **MASTER** disk when you have two or more floppy disk drives:

STEP 1 After entering **C** on the APPLI-CARD Utilities menu, you will see:

```
CREATE APPLI-CARD BOOT DISK
```

STEP 2 Place a blank disk in drive B (external mini-floppy drive), on Drive A: if you only have a single mini-floppy drive (see following section for initial steps).

If the disk in drive A does not contain the SOS Boot program, you will see the following prompt:

```
PUT BOOTABLE SOS DISK IN .D1 THEN <ret>
```

NOTE: <**ret**> means <**RETURN**>

STEP 3 The prompt is:

```
Enter drive name for NEW CP/M FILE BOOT DISK: .D2
```

STEP 4 Either press <**RETURN**> or enter the correct drive name in the form **.D2**, which is drive B (i.e., .D1 = A, and .D3 = C . . . .). You will see the message:

```
Put mini disk in drive .d2 (B) and <RETURN>
```

If the disk you have inserted is not blank you will see the prompt:

```
The disk is not empty.
Do you wish to format (Y/N)?
```

STEP 5 Type **Y**, and you will see the message:

```
DESTROY <file name> (Y/N)?
```

If you enter **N**, you will be taken back to step 2. If you enter **Y**, you will erase and format the disk, and will then see the message:

```
NEW VOLUME NAME: SOSCPM1
```

STEP 6 Press <**RETURN**>, and you will see the following messages:

```
formatting . . .
Writing SOS boot code
Reserving space for CP/M directory
Enter SOS Kernel source pathname:  .D1/SOS.KERNEL
```

STEP 7 Press <**RETURN**>

If the disk in drive A does not contain the boot code, you will see the message:

```
PUT BOOTABLE SOS DISK IN DRIVE A THEN <RETURN>
```

STEP 8 The following messages will be displayed:

```
Transferring from .D1/SOS.KERNEL
Enter SOS Driver source pathname: .D1/SOS.DRIVER
```

STEP 9 Press <**RETURN**>. The following messages will be displayed:

```
Transferring from .D1/SOS Driver
Reserving space for Appli-Card system
Reserving file space for CP/M . . .
Initialization successful
xxx blocks reserved for CP/M files
xxx blocks reserved for SOS files
```

Number of blocks reserved depends on the size of the SOS.DRIVERS (one SOS block = 512 bytes).

NOTE:

THE INSTALL PROGRAM MUST BE USED TO CREATE AN APPLI- CARD CP/M DRIVERS FILE. (SEE CHAPTER 4)

PROCEDURE FOR ONE FLOPPY DRIVE

Use the following procedure to create an **APPLI-CARD CP/M MASTER** disk when you have at least one floppy disk drive and a ProFile hard disk:

Before bootstrapping the **APPLI-CARD SOS UTILITIES** disk, you must first insert the **APPLE /// SYSTEM Utilities** disk and press <**CTRL-RESET**>. When the utilities menu appears, copy the files SOS.KERNEL and SOS.DRIVER from your **APPLI-CARD SOS UTILITIES** disk to the ProFile hard disk. Then insert the **APPLI-CARD SOS UTILITIES** disk, press <**CTRL-RESET**>, and follow the procedure for two mini-floppy drives, using .D1 and .PROFILE instead of .D2 and .D1 as shown.

APPENDIX

APPENDIX A
TECHNICAL OVERVIEW

HARDWARE

The APPLI-CARD is a Z80-based microcomputer processor card designed for the Apple computer. It contains the following hardware:

- Z80B (6 MHz) processor
- 64K RAM memory
- Parallel port for communicating with the Apple microprocessor
- 2K ROM memory
- Port decoding circuitry
- Eight sockets for additional 64K RAM memory

The Z80 in the APPLI-CARD and the 6502 in the Apple run simultaneously at their full rated speeds and communicate via a parallel port. This allows for very high speed data transfer between the two microprocessors. No time is wasted in switching from one processor to the other as in other Z80 cards. The APPLI-CARD operates under the CP/M Operating System and gives the user approximately 56K of RAM memory space (TPA) for execution of application programs.

APPLI-CARD CP/M MASTER DISK FORMAT - The APPLI-CARD CP/M MASTER disk looks like a standard CP/M Apple mini disk to the CP/M Operating System, but to the SOS Operating System it looks like a standard SOS mini disk. This is possible because the operating systems use different directory locations. Using SOS block numbers, the SOS root directory is found at blocks 2-6 (block 6 is the volume bit map) and the CP/M directory starts at block 24 (track 3).

Examination of the boot disk under CP/M (use STAT *.*) reveals a hidden, read-only file, SYSFILE.SOS. This file reserves space on the disk for SOS and it contains the necessary files to boot SOS and CP/M (SOS.KERNEL, SOS.INTERP and SOS.DRIVER).

CP/M reserves the first three tracks for the CP/M system and boot code. This area would normally be accessed during cold and warm boots; however, since the APPLI-CARD CP/M warm boots from memory, this space can be used for the SOS Operating System.

In the SOS directory, the APPLI-CARD CP/M MASTER disk has two locked files, CPMDIR and CPMSYS, which reserve space for CP/M. CPMDIR is 8 blocks long and reserves space for the CP/M directory. The CP/M directory is only 3 blocks long, but since the sector interleave for the two operating systems is different, all space is reserved on a track by track basis. The 5 blocks on the track not used for directory space are not lost and are used by CP/M for file storage space. CPMSYS is a write-protected SOS file which reserves the remainder of the diskette space for CP/M files.

NOTE:

The SOS files CPMDIR and CPMSYS do not have the standard SOS file format and once made cannot be accessed by SOS. To remove these files you must reformat the entire diskette.

The CP/M system and 6502 command processor are saved in the file SOS.INTERP which is loaded and executed during the SOS boot process. The command processor contains mini drive and console interface drivers which talk to the hardware through SOS device calls.

The mini drivers are part of the SOS.KERNEL. These drivers are patched at boot time with an Apple CP/M compatible interleave table. The patcher code searches the kernel for the original table then replaces it. This scheme will allow compatibility with future versions of the kernel.

<table>
<tr><th>Track</th><th>SOS View</th><th>CP/M View</th></tr>
<tr><td>0</td><td>Booter &
directory</td><td rowspan="3">System Tracks</td></tr>
<tr><td>1</td><td rowspan="2">SOS files</td></tr>
<tr><td>2</td></tr>
<tr><td>3</td><td>CPMDIR</td><td>Directory</td></tr>
<tr><td>4
.
.
18</td><td>SOS files</td><td>SOSSYS</td></tr>
<tr><td>19
.
.
34</td><td>CPMSYS</td><td>CPM Files</td></tr>
</table>

Table A-1: APPLI-CARD CP/M MASTER DISK STRUCTURE

APPENDIX B
BIOS USE OF I/O BYTE

This appendix describes how the I/O byte is used by the BIOS. The I/O byte is located at address 0003 and is changed either by the STAT program or directly by an applications program. It should be noted that, although the I/O byte supports only five different devices, the command structure has been set up to support a total of 16 devices. The extra devices are available only by directly calling the Apple I/O processor. The following shows the relationship between logical devices (CON:, RDR:, PUN:, and LST:) and the physical device names.

bits	0 1	2 3	4 5	6 7
	CON:	RDR:	PUN:	LST:

CONSOLE, CON: = bits 0 and 1
- 0 = TTY: for input and output (character device 0)
- 1 = CRT: for input and output (character device 3)
- 2 = BAT: for batch mode use CRT: for input and output (character device 3); also use LST: for output
- 3 = UC1: for input and output (character device 1)

READER, RDR: = bits 2 and 3
- 0 = TTY: as input (character device 0)
- 1 = PTR: as input (character device 2)
- 2 = UR1: as input (character device 1)
- 3 = UR2: as input (character device 4)

PUNCH, PUN: = bits 4 and 5
- 0 = TTY: as output (character device 0)
- 1 = PTP: as output (character device 2)
- 2 = UP1: as output (character device 1)
- 3 = PU2: as output (character device 4)

PRINTER, LST: = bits 6 and 7
- 0 = TTY: for input and output (character device 0)
- 1 = CRT: for input and output (character device 3)
- 2 = LPT: for input and output (character device 1)
- 3 = UL1: for input and output (character device 4)

APPENDIX C
TROUBLESHOOTING GUIDE

PROBLEM	SOLUTION
1. CP/M won't boot; disk drive starts and stops by itself.	1. Make sure the APPLI-CARD is snugly in place.
2. Software will not boot.	2. SOS Operating System needs to be placed on each diskette you wish to be bootable (see CPMINIT in Chapter 4).
3. Can't access PROFILE.	3. Check device drivers installation (Get drivers option or Connect SOS.DRIVER.)
4. Error #10 Device not found and Error #11 Invalid device number.	4. Make sure CP/M DRIVERS file and and SOS.DRIVERS contain the same device drivers.
5. Error #25 Resources not available.	5. Two devices are trying to use the the same port.
6. Error #27 I/O Error	6. Hardware failure.
7. Error #2B Device write protected	7. Remove write protect tab on mini disk.
8. Error #44 Path not found.	8. Cannot find CPM1 or CPM2 on ProFile. Check SOS directory for entry.
9. Error #45 Volume not found.	9. Cannot find ProFile, be sure the ProFile power switch is on.

APPENDIX D
SUGGESTED READING

"An Introduction to CP/M Features and Facilities," Digital Research, Inc.

"CP/M User's Guide," Digital Research, Inc.

"CP/M Assembler (ASM) User's Guide," Digital Research, Inc.

"CP/M Dynamic Debugging Tool (DDT) User's Guide," Digital Research, Inc.

"Pocket Guide to CP/M," Thomas A. Dwyer/Margot Critchfield, Addison - Wesley Publishing Company, Inc.

GLOSSARY

A

ASM: CP/M 8080 Assembler.

C

^C: Terminates a program or warm boots the operating system or permits writing to a newly inserted disk.

D

DDT: Dynamic Debugging Tool. Used to debug machine language programs and routines.

DIR: Displays a list of the files in the directory of the currently logged disk drive.

DUMP: Displays the contents of a file in a hexadecimal format.

E

^E: Places cursor on a new line. (The command is not accepted until <**RETURN**> is pressed.)

ED: CP/M File Editor. Used for editing text or ASCII files (most often used for editing short assembly language source files.)

ERA: Erases a file or files from a disk.

H

^H: Backspaces (same as the back arrow key ←).

J

^J: Inserts line feed. Can be used to terminate a command line.

L

LOAD: CP/M Relocating Loader. Used with ASM to produce machine language programs.

M

^M: Same as <**RETURN**>.

P

^P: Directs what is on the screen to the printer. A second **^P** discontinues output to the printer.

PIP: Peripheral Interchange Program. Used for transfer of single or multiple files between CP/M devices (usually disk drives).

R

^R Retype the current command line.

REN: Renames a file on a disk.

S

^S: Pauses the video display. A second **^S** causes the display to resume.

SAVE: Saves an image in memory on a disk.

STAT: Gives the status of the CP/M System parameters and disk drive capacities.

SUBMIT: Used to allow CP/M to accept input from a text file as if it came from the keyboard.

T

TYPE: Displays the contents of a file. (Must be a text or ASCII file.)

U

^U: Deletes the current line. The cursor appears on the next line down.

X

^X: Deletes the current line. The cursor appears at the beginning of the current line.

Z

^Z: Ends input. This control key is used by some of the CP/M "transient" commands.

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