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Chapter 3 - USING THE EMULATOR (cont'd.)

C H A P T E R 1

I N T R O D U C T I O N

THE DIMENSION COPROCESSOR CONCEPT

Application software is the most important component of any microcomputer system. Previously, the microcomputer's operating system and processor dictated the available choice of software for a given application. The Dimension Coprocessor System enables you to choose from a larger variety of programs and operating systems. By using coprocessors and a technique known as emulation, the DIMENSION 68000 can be made to run programs written for many machines.

The Dimension 6512 Coprocessor enables a large library of programs and operating systems, that are written for the Apple][Plus, to be run on the DIMENSION 68000 Computer. Emulation software and a dedicated 6512 microprocessor (which is similar to the 6502 microprocessor) along with your DIMENSION 68000 enables you to take advantage of many of the quality programs written for Apple DOS 3.3, Apple Pascal, or the Apple][Plus in general.

USER SUPPLIED SOFTWARE, A PART OF THE COPROCESSOR SYSTEM

To utilize the 6512 Coprocessor requires the purchasing of an operating system and/or purchasing (or writing) the programs necessary to perform the application that is desired. Operating systems such as Apple DOS 3.3, PRODOS, or Apple Pascal are available from many computer dealers, as well as many application programs that are specific to your needs. The 6512 Coprocessor system, when combined with a powerful operating system and with the necessary application programs, becomes a valuable addition to your DIMENSION 68000 computer system.

Computer users, with libraries of Apple][Plus software, can move up to the power of the DIMENSION 68000 without losing their investment in software. Most custom programs that are written for Apple Pascal or that are written for Apple DOS 3.3, with either Applesoft BASIC or with Integer BASIC, will run without change on the 6512 Coprocessor with the Apple][Plus Emulator.

Even many programs, that load directly into the computer memory without any operating system at all, will run with no change. Most of these programs are copy protected and could not be changed -- if changes were required.

MANUAL USAGE

The information contained in this manual documents the 6512 Coprocessor and the procedures required for its use as an Apple][Plus Emulator. In order to fully apply the Coprocessor System, additional information about the operating system and the programs to be used may be required. In most cases, adequate documentation for the experienced user is included with the purchase of those programs. For the neophyte however, the purchase of tutorial materials is strongly recommended.

The following symbols will be presented throughout this manual to aid understanding:

** Suggestions, reminders and helpful hints will be noted by a ** symbol.

*** WARNING *** indicates a possible source of danger to you, your equipment, or your software.

<CR> or (no <CR>) Indicates when the RETURN key should (or should not) be pressed.

(^) Indicates when a CONTROL character should be typed. "Ctrl" stands for CONTROL. As an example, (^C) is typed by holding the "Ctrl" key down, pressing the "C" key, releasing the "C" key and finally releasing the "Ctrl" key.

Computer screen responses will look like this example:

Micro Craft Operating System - CP/M 68K copyright DIGITAL RESEARCH Inc. 1983
Bios version X.X Copyright Micro Craft Corp. 1983, 1984

In this manual, entries that are to be made are shown in the context of the entire line as it is displayed on the screen. The part that you are to enter is shown in **bold characters.**

BEFORE YOU BEGIN...

If you are unfamiliar with the DIMENSION 68000 computer, you should refer to the "DIMENSION 68000 System User's Guide" that is supplied with your unit. Installation and operation, of your computer system, is described in detail. You should be familiar with the machine before you attempt to install the Coprocessor hardware and software.

If you are new to the CP/M 68K operating system, the "CP/M 68K User's Guide" supplied with your DIMENSION 68000 explains the CP/M 68K operating system commands and syntax. This manual refers to certain CP/M 68K commands in order to install the 6512 Coprocessor software.

C H A P T E R 2

I N S T A L L A T I O N

INSTALLATION OF YOUR 6512 COPROCESSOR

If you are familiar with the DIMENSION 68000 and the basic commands of the CP/M 68K operating system, then you are ready to begin installation of your 6512 Coprocessor circuit board. This chapter explains how to install your Dimension 6512 Coprocessor circuit board into your DIMENSION 68000 computer system.

PACKAGE CONTENTS

Your 6512 Coprocessor System contains the following:

1) A 6512 Coprocessor and Apple][Plus Emulator Reference Manual
   Part number 680-0002-100
2) A 6512 Coprocessor Circuit Board
   Part number 200-0002-001
3) A MASTER EMULATION diskette
   Part number 300-0008-100
4) A FILER diskette with FILER documentation
   Part number 300-0007-100
5) An Apple format diskette labelled "Apple Emulation Utilities"
   Part number 300-0009-100
6) A Product Registration/Warranty Card
   Part number 600-0014-103

If any of the above items are missing, contact your dealer for replacement.

SYSTEM REQUIREMENTS

In order to install your 6512 Coprocessor System, the following equipment and materials will be required:

1) A DIMENSION 68000 with a minimum of 256K memory
2) A Dimension 6512 Coprocessor circuit board
3) Two - 40 Track, 5 1/4 inch, disk drives
4) A video monitor
5) A Dimension "SYSTEM 1" or other CP/M 68K System Master diskette
6) A Master Emulation diskette
7) Blank diskettes
8) A #2 (medium) Phillips head screwdriver

In addition to the above, an Apple operating system or application program for the 6512 Coprocessor/Apple][Plus Emulator is required to use the unit, but is not necessary for installation or for initial checkout. Operating systems such as Apple DOS 3.3, PRODOS, or Apple Pascal and application programs may be purchased from your computer dealer.

The FILER diskette, that is included with your 6512 Coprocessor system, is one such application program that is included for your use.

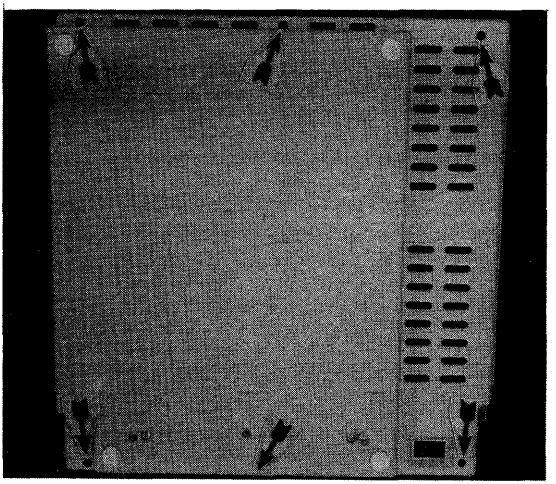
COPROCESSOR CIRCUIT BOARD INSTALLATION

In order to install the 6512 Coprocessor circuit board in the DIMENSION 68000, the top cover, of the SYSTEM UNIT, will need to be removed. Then you must plug the 6512 Coprocessor board into one of the expansion connectors. Finally the top cover is replaced.

Remove any diskettes from the disk drives and move other loose objects from around the machine. Disconnect the Video Monitor and monitor cable and set them aside. Disconnect the power cord from the DIMENSION 68000 back panel and unplug it from the wall. It is not necessary to disconnect the keyboard, but remove any cables or items which restrict the movement of the machine.

The top cover of the SYSTEM UNIT is attached, to the bottom cover, by 6 screws that are recessed into the bottom cover and that are fixed into the case to prevent the screws being lost. To remove the top cover, the following steps are recommended:

- TURN OFF the DIMENSION 68000 system.
- DISCONNECT the power cord from the Dimension SYSTEM UNIT.
- MOVE the unit to the edge of the table or desk so that it is sitting with one side (left or right) facing you.
- IDENTIFY the 3 holes under the overhang of the upper portion of the unit by kneeling.
- Use a #2 Phillips screwdriver (the shank of the screwdriver must be at least 3 1/2 inches long) to LOOSEN the screws. The screws will NOT fall out, but you will be able to tell, by the feel, when they are loose.
- When all 3 screws are loose, TURN THE UNIT so that you can reach the 3 screws on the other side and LOOSEN THEM. When all of the screws have been loosened, then the top cover of the housing can be lifted off to expose the inside of the DIMENSION 68000.
- REMOVE the top cover carefully and be sure to PLACE IT where it will not fall, get scratched, or be stepped on. (As a separate piece, the top cover is not nearly as rugged as the assembled unit.)



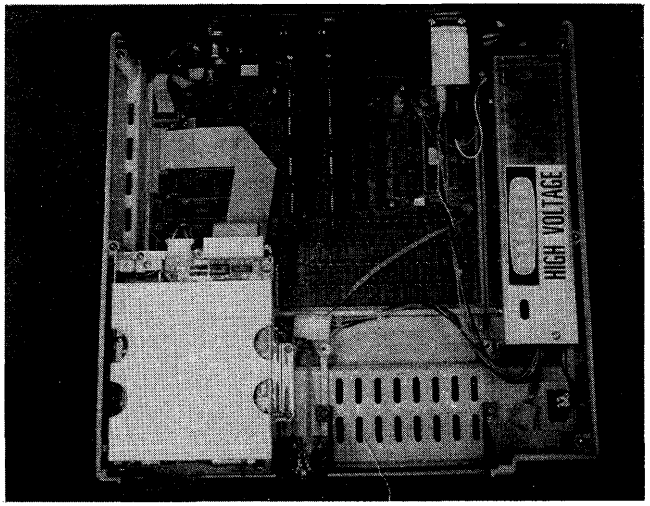
PLUGGING IN THE 6512 COPROCESSOR CIRCUIT BOARD

*** WARNING ***

Static Electricity can damage sensitive computer components.

Before touching anything inside the case or the 6512 circuit board, double check to make certain that the power cord is disconnected and the power switch is off. Touch the metal power supply case (located to the right of the unit) with both hands. This action will prevent static discharge and damage to the system compohents.

Installation of the 6512 Coprocessor circuit board can now be performed. Find the expansion connectors on the DIMENSION 68000 MAIN PC BOARD or motherboard. These connectors are located along the rear of the unit and are described in detail in the "DIMENSION 68000 System Reference Manual". Your computer may already have some boards installed. We suggest you use the connector closest to the left, as shown in the illustration below, but you may choose any of the connectors. When you have decided, remove the metal or plastic locking tab behind that expansion connector being careful to note how it was installed.



Choose an expansion connector for the 6512 board

*** WARNING ***

The 6512 Coprocessor circuit board is shipped in an anti-static plastic envelope. Make certain that you discharge any static that may be stored in your body before removing the circuit board from the protective bag. Save this bag.

*** ANOTHER WARNING ***

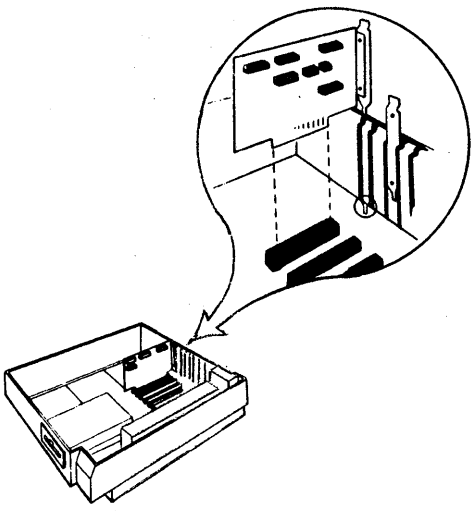
When handling the circuit board, be careful not to touch the gold connector at the edge of the board. Oil and moisture from your fingers could contaminate the connector and create a poor electrical connection.

Remove the circuit board from its protective bag and note the serial number of the board. It is located on the circuit board along the metal locking tab.

** Record the serial number on the warranty card and in your records now. This way you will not need to disassemble the machine later.

The 6512 Coprocessor circuit board may be inserted into any available motherboard expansion connector. When inserting the metal locking tab into the rear panel, make certain that the lower tip is inserted into the cutout at the bottom of the rear panel. The upper portion of the tab will then be able to slide into the panel.

The motherboard connector will offer some resistance to the seating of the circuit board. With firm, but gentle, pressure, press down on the circuit board until it is firmly seated in the motherboard expansion connector. Both the front and the back of the board should seat completely.



PUTTING THE COVER BACK ON

Re-install the top cover of the DIMENSION 68000 by placing the top half of the case back onto the bottom half. The top cover fits smoothly over the disk drives in the front and around the back panel in the rear. Press the top half of the case until complete contact is made against the bottom half. Using the method described previously, re-install the cover screws being careful not to cross thread them. Tighten each screw until it is "finger tight." Do not overtighten.

Reconnect any cables that you removed earlier. In particular, be sure that the video monitor is connected. This process is explained in more detail in the "DIMENSION 68000 System User's Guide".

TURNING THE POWER ON TO TEST THE SYSTEM

In this step we will turn on the power and verify that the 6512 Coprocessor Circuit Board is installed properly. Put a copy of the "SYSTEM 1" diskette into disk drive A:. Be sure that there is a write protect sticker over the write protect cutout on the right side of the "SYSTEM 1" diskette. Turn the lever on the front of disk drive A: clockwise until it points down. This closes the disk drive on to the diskette. DO NOT FORCE THE LEVER. If it will not turn easily, re-insert the diskette and try again.

** When this manual says, "insert the diskette ..." or "put the diskette in ... ," it is assumed that you will turn the lever on the diskette drive to close it. Forgetting to do this will not harm your computer or the diskette but the computer will not be aware that the diskette is in place.

If you DO NOT have a BACKUP COPY of the "SYSTEM 1" diskette, refer to the "DIMENSION 68000 System User's Guide" - Appendix B and make one before proceeding.

The "SYSTEM 1" diskette is in drive A:. If there are any diskettes in diskette drive B: (or drive C:, or drive D:), then remove them at this time.

If the DIMENSION 68000 computer has never been turned ON, refer to the "DIMENSION 68000 System Reference Manual" for connection and for initial tests. If the system has been used prior to Coprocessor installation, then you may proceed with the instructions to reconnect the power cord and switch the unit on.

Turn on the video monitor and check both ends of the video cable.

The power switch should be off. Plug in the power cord. If the switch is ON you will see the red light on the reset button come on. Turn OFF the power switch immediately.

Allow enough time for the video monitor to warm up. Then turn the power switch on. First the red light on the reset button will come on. Then the following message will be displayed.

Welcome to the Realm
of
Dimension Computing
by
Micro Craft Corporation

At the same time the red light, on drive A:, will come on as drive A: begins spinning. Finally, the screen will clear and the following message and prompt will be displayed.

```
Micro Craft operating system- CP/M 68K Copyright DIGITAL RESEARCH Inc. 1983
Bios version X.X Copyright Micro Craft Corp. 1983, 1984
      last revised mm/dd/yy

A>
A>
```

If the first message does not appear, then check the following items.

Is the power cord connected at both ends?
Is the video monitor plugged in and turned on?
Is the video monitor connected to the DIMENSION 68000?
Is the brightness control on the video monitor turned up?

If the above items seem to check out, then turn the power off, remove the top cover, and re-check the installation of the 6512 Coprocessor circuit board. Make certain that the Coprocessor circuit board is seated firmly. If you still experience difficulty, remove the 6512 Coprocessor circuit board, and consult your dealer.

If the second message does not appear, check the following items.

Is the lever on drive A: closed (down)?
Is the "SYSTEM 1" diskette in drive A:?
Is the diskette in drive A: a good copy?

Again, if these things seem to check out, then turn off the power, remove the top cover, and re-check the installation of the Dimension 6512 Coprocessor circuit board. Make certain that the 6512 Coprocessor circuit board is seated firmly. If you still experience difficulty, remove the 6512 Coprocessor circuit board, and consult your dealer.

DISKETTE BACKUP, COPROCESSOR SYSTEM MASTER CREATION

The system software for your 6512 Coprocessor system is supplied on an EMUALTION MASTER distribution diskette. To properly and efficiently utilize the 6512 Coprocessor, requires the creation of a Coprocessor SYSTEM MASTER diskette from an MASTER EMULATIO diskette.

The CP/M 68K operating system and other useful programs will be installed as you create your Coprocessor SYSTEM MASTER diskette. These programs will; simplify making additional WORK copies of your Coprocessor SYSTEM MASTER diskette, enable your backup work copies to be "booted", and ease installation of the Coprocessor software.

Your Coprocessor SYSTEM MASTER will be used later for the installation of the emulation software. The creation of a Coprocessor SYSTEM MASTER diskette is essential before you proceed with system startup. DO NOT use ANY original or MASTER EMULATION diskette as a work copy. An error on your part or a malfunction in your DIMENSION 68000 Computer (no matter how rare either may occur) could damage the diskette you are using, even with the write protect sticker in place. To obtain a replacement from your dealer is expensive and much more inconvenient than the making of a copy from the "master" that you have stored in your desk.

** If you are not familiar with the CP/M 68K operating system you may wish to refer to the "DIMENSION 68000 System User's Guide" and the "CP/M 68K User's Guide" that is supplied with your DIMENSION 68000 before proceeding.

Creation of the Coprocessor SYSTEM MASTER diskette is performed under the CP/M 68K operating system. Make certain that a copy of the "SYSTEM 1" diskette is in drive A:. Turn off the DIMENSION 68000 (if it is on). Wait 5 to 10 seconds and turn it back on. This will "boot" the system. "Booting" the system loads the CP/M 68K Operating System into the computer memory.

When CP/M 68K is initially loaded, the following information will be displayed:

```
icro Craft operating system- CP/M 68K Copyright DIGITAL RESEARCH Inc. 1983
ios version X.X Copyright Micro Craft Corp. 1983, 1984
      last revised MM/DD/YY

>
>
```

FORMATTING A DISKETTE

It is recommended that you format your diskettes in the Micro Craft 40 Track Standard format. If you need instructions on formatting a diskette, there are detailed instructions in the "DIMENSION 68000 System User's Guide".

INSTALLATION OF CP/M 68K AND UTILITIES

Now you will need to create a "bootable" backup diskette from the formatted diskette that was created earlier. Leave the "SYSTEM 1" diskette in drive A: and the newly formatted (but really still blank) diskette in drive B:. Enter the following command to copy the contents of the "boot" track on the diskette in drive A: to the diskette in drive B:.

A>COPY BOOT A B<CR>

The system will respond:

```
Copy Ver 1.1

(^C to ABORT)
RETURN to copy BOOT from A to B
```

If the command was entered properly, press the "Retrn" key (<CR>) to continue. If it was not, type ^C (Ctrl and C) to return to CP/M 68K (with the A> prompt) and re-enter the "COPY BOOT A B" command.

When you press the "Retrn" key the system will respond:

```
*** Copying Tracks ***
      0
Copy complete
```

The system will then ask the following question.

```
Do you wish to repeat the copy? (Y/N)
```

To exit, enter the following response.

N<CR>

The system will return to CP/M 68K. showing the following prompt.

A>

The diskette in drive B: is now formatted and half-way "bootable". The next step is to install the CP/M 68K Operating System and the optional submit program. A submit program will be used in a later section to enable the system to automatically load the emulation programs.

To install the CP/M 68K operating system, enter the following command.

A>PIP B:=A:CPM.SYS[v]<CR>

** The [v] option [v]erifies the operation and should be included to make certain that the file was copied properly.

If the copy is sucessful, the system will return to CP/M 68K after 20 to 30 seconds and return the following prompt.

A>

If the prompt is not all that is printed at this point, an error message may indicate what the problem is. The "CP/M 68K Operating System User's Guide" explains more about the use of PIP and the possible error messages.

** If you experience difficulty, make certain that the PIP command was typed exactly as shown including the space.

To install the default (i.e. empty) submit program, enter the following command.

A>PIP B:=A:CPMCONF.SUB[v]<CR>

Again, the prompt should be returned.

A>

Before we begin the next step (creating a Coprocessor SYSTEM MASTER and the backup of the MASTER EMULATION diskette), an additional file will will need to be copied onto the newly created SYSTEM MASTER diskette in drive B:. This file, named PIP.68K, contains the program that will be used to copy the emulation programs. PIP has been used in the previous steps to copy the CP/M 68K operating system and submit files from drive A: to drive B:. PIP can also be used to copy the file containing itself.

To copy PIP onto the diskette in drive B, enter the following command.

A>PIP B:=A:PIP.68K[v]<CR>

And CP/M 68K will again respond with the prompt,

A>

The "bootable" CP/M 68K system diskette (with PIP installed) that has just been created in drive B:, is now ready for you to copy onto it the Apple][Plus Emulator software.

Log on to drive B:, by entering the command.

A>B:<CR>

The system will respond with the following prompt.

B>

Remove the "SYSTEM 1" diskette from drive A:. Insert the original MASTER EMULATOR diskette into drive A:. Make sure that a write protect sticker is in place over the write protect cutout on the right side of this original MASTER EMULATOR diskette.

To backup the MASTER EMULATOR diskette in drive A:, its contents are copied onto the new diskette that is in drive B:, by this command.

B>PIP B:=A:APPLE.68K[ov]<CR>

Then this command is issued.

B>PIP B:=A:ADDLF.68K[ov]<CR>

Make certain that you include the [o] (letter O) option or your Emulation Coprocessor [o]bject files may not be copied correctly.

After each copy, the system will respond with:

B>

To verify that the preceding file has been copied and is now on drive B:, enter the following command.

B>DIR B:<CR>

The system should display the following directory:

```
B: CPM      SYS : CPMCONF  SUB : PIP      68K : APPLE    68K : ADDLF    68K
B>
```

Install a write protect sticker on the new Coprocessor SYSTEM MASTER diskette to prevent accidental erasure. This diskette should be used for installation, copies, and all future system maintenance. The original Distribution Diskette should be stored in a safe place, away from your computer. It should only be used to restore your Coprocessor SYSTEM MASTER if it is damaged or lost.

You should make several copies of the new Coprocessor SYSTEM MASTER diskette at this time. Save the first Coprocessor SYSTEM MASTER away with the original MASTER EMULATION diskette. Now you will not need to repeat the whole installation process in case your work copy is ruined in some way.

** Children, animals, magnets, and most electric appliances are natural enemies of the information on your diskettes. Keep them away from your master diskettes.

** Appendix B of the "DIMENSION 68000 System User's Guide" describes how to make backup copies of diskettes.

At this point your Coprocessor SYSTEM MASTER diskette is ready to be used in the further installation process that is outlined in later sections.

CREATING A TURN-KEY EMULATION DISKETTE

If you wish to dedicate your DIMENSION 68000 and 6512 Coprocessor System as an Apple][Plus Emulator you will want to create a TURN-KEY EMULATOR DISKETTE from a copy of your Coprocessor SYSTEM MASTER.

** A turn-key system using a submit file is recommended for "emulation only" diskettes to prevent the operator from being required to enter or learn CP/M 68K commands.

This section explains how to create a submit file to tell CP/M 68K that you want to perform Apple][Plus Emulation when your DIMENSION 68000 is first turned on. This makes the diskette with the submit file and the Apple][Plus Emulator programs a TURN-KEY EMULATOR diskette.

A turn-key system has the advantage of requiring a minimum of operator intervention at the CP/M 68K command level. Users who are not familiar with the DIMENSION 68000 or the CP/M 68K operating system do not have to learn the necessary commands to start Apple][Plus Emulation.

A "turn-key" system allows you to begin emulation immediately upon turning on the power switch of your DIMENSION 68000. The term "turn-key" is used because some, older, computers used a locking "key" to turn the power on. A "turn-key" system would begin running immediately upon "turning the key" on. Your Dimension 68000 has a simple ON-OFF switch for that purpose, but the term "turn-key" is still with us.

When the submit file in the following example is installed, all that is required to begin emulation is that the operator take out the diskettes that are in the drives and insert the diskettes that have the Apple][Plus format when the Emulator Welcome Menu indicates that it is time to do so.

There is a file, named CPMCONF.SUB, that is on the Coprocessor SYSTEM MASTER, on the copies of the Coprocessor SYSTEM MASTER, on the "SYSTEM 1" diskette, and on the copies of the "SYSTEM 1" diskette. When the power is turned on, or a disk is "booted", the CP/M 68K operating system is loaded. The first action of CP/M 68K (upon being loaded) is to examine the submit file, named CPMCONF.SUB, to see what further action should be taken.

The CPMCONF.SUB file on your Coprocessor SYSTEM MASTER diskette and the copies made from it does not contain any instructions. When CP/M 68K is loaded, control is passed immediately back to the operating system by the submit file and the A> prompt is returned.

The CPMCONF.SUB submit file on your work diskettes may be modified to "type" commands for you and to load the APPLE][Plus Emulation program for you.

** If you have any questions regarding the use of submit files or have a diskette which has already been modified, refer to the "CP/M 68K User's Guide" supplied with your DIMENSION 68000.

To enter commands into the CPMCONF.SUB file, the ED text (ED)itor utility on your CP/M 68K System Master diskette will be used.

** Documentation of ED, the text editor utility, is contained in your "CP/M 68K User's Guide".

The Coprocessor SYSTEM MASTER work diskettes, that you have created, are the diskettes that you should use to install the submit file.

- PUT the diskette, on which you wish to install the submit file, into drive B:.
- REMOVE the write protect sticker from this diskette temporarily.
- PUT a "SYSTEM 1" diskette copy, that contains the file ED.68K, into drive A:.
- LOG ON to drive A:, if necessary, by entering the following command.

B>A:<CR>

The system will then display the prompt:

A>

** If you make a typing mistake, while in ED, you may press the Back-Space key to delete the last character.

To load the ED program and to edit the CPMCONF.SUB file on the Coprocessor SYSTEM MASTER in drive B:, enter the following command.

A>ED B:CPMCONF.SUB<CR>

ED will display it's normal prompt character, which is a colon.

:*

To Append to the existing CPMCONF.SUB file and to Insert the new commands, enter the following commands.

```
:*500A<CR>
:*I<CR>       (Note: you should not type spaces before the <CR>)
```

ED will return:

```
1:
```

Type the filename of the emulation program followed by any options that you wish to use. For the Apple][Plus Emulator, you should enter the following.

```
1:APPLE +R +P -8 -M +L<CR>
```

*** The options shown here are the same as the default options. You may want to use different options. Either way you can still set the options from the keyboard before booting the first Apple diskette.

The ED program will respond with the following prompt.

```
2:
```

To end the entering information using the ED program, enter the following command.

```
2:^Z(No <CR>)     (CONTROL Z, NO RETURN)
```

The ED program will return the following prompt.

```
:*
```

To exit the ED program, enter the following command.

```
:*E<CR>
```

The ED program will then save the modified submit file onto the diskette in drive B:.

** The name of the original, empty submit file will be changed to CPMCONF.BAK.

The CP/M system will then display the following prompt.

```
A>
```

The previous operations are summarized below:

```
A> ED B:CPMCONF.SUB<CR>          edit CPMCONF.SUB file on drive B:
   :* 500A<CR>                   append existing submit file
   :* I<CR>                      insert new information
  1:  APPLE +R +P -8 -M +L<CR>   filename of desired emulation program
  2:  <^Z><CR>                   <^Z> CONTROL-Z to finish
   :* E<CR>                      Exit ED

A>
```

The modified submit file on drive B:, may now be used to load the Apple][Plus Emulation program when you turn on the power with the "turn-key" Emulator diskette in drive A:.

Put the write protect sticker back on the turn-key diskette in drive B:.

Submit files have many other powerful applications. To learn more about submit files, refer to the "CP/M 68K User's Guide".

** CP/M 68K submit files cannot be used or have control after the emulation mode is entered. But the "HELLO" program on an Apple DOS 3.3 diskette can be used in a similar manner. Consult your Apple DOS 3.3 reference manual for more details on using "HELLO" programs when you are starting up. The program SYSTEM.STARTUP, under Apple Pascal, is also used in the same way.

C H A P T E R 3

U S I N G T H E E M U L A T O R

USING THE 6512 COPROCESSOR AS AN APPLE][PLUS EMULATOR

To use the 6512 Coprocessor as an Apple][Plus Emulator operating under Apple DOS 3.3, PRODOS, Apple Pascal, or some of the stand-alone programs, will require either a Coprocessor SYSTEM MASTER diskette or a Turn-key Emulator diskette. Either type of diskette will require that the 6512 Coprocessor Software must be installed.

If you do not have a Coprocessor SYSTEM MASTER diskette or a Turn-Key Emulator diskette, then you need to make one at this time. DO NOT use the original EMULATION MASTER distribution diskette. Information on making copies of the EMULATION MASTER diskette and on creating a Turn-Key diskette is contained in the previous chapter.

The Dimension 6512 Coprocessor software will emulate an Apple][Plus equipped optionally with a printer card, serial card, 80-column display card, disk controller, special Micro Craft Mass Storage Unit and a lower case keyboard and display adapter.

EMULATION HARDWARE INTERFACE CONFIGURATION

The 6512 Coprocessor Emulation software supports the following Apple][Plus interface "cards" and peripherals:

(1) 16 K memory card (for a total of 64 K of RAM memory)
(2) Disk][Disk Drives
(1) Parallel Printer Interface
(1) 80 Column Display Card
(1) Asynchronous Serial Interface (to be released)
(1) Micro Craft Mass Storage Device
(1) lowercase keyboard and display adapter
(4) Game Controller or (2) Joystick Ports

*** If the DIMENSION 68000 system has more than two diskette drives, only drives 1 and 2 (the A: and B: drives) will be directly available during emulation.

*** The Apple][Plus Emulator requires that drives A: and B: are both 40 Track diskette drives.

INSTALLATION OF EMULATION PROGRAMS

The procedure, for installation of the emulation software, is determined by the intended application of the DIMENSION 68000 and the 6512 Coprocessor System.

If it is desired to use the DIMENSION 68000 exclusively as an Apple][Plus Emulator, then it will be preferable to use a Turn-key Emulator diskette, as previously described.

If it is desired to use the DIMENSION 68000 to emulate the Apple][Plus only on an occasional basis, then it will be preferable to use a Coprocessor SYSTEM MASTER diskette, as previously described.

If it is desired to use the DIMENSION 68000 to emulate the Apple][Plus and also operate under CP/M 68K, then it will be preferable to move a copy of the emulation software to a work copy of the "SYSTEM 1" diskette, as described below.

MOVING EMULATION PROGRAMS ONTO A DIMENSION "SYSTEM 1" DISKETTE

Make certain that it is a WORK COPY of the "SYSTEM 1" diskette that is being used, and that it is in drive A:. (The procedure for copying the "SYSTEM 1" diskette is in the APPENDIX titled BACKING UP in the "DIMENSION 68000 System User's Guide".) Also, make sure that a copy of the Emulation Master diskette is in drive B:. And, make sure that CP/M 68K is loaded. The system will be displaying the following prompt:

A>

Use the PIP program to copy the APPLE Emulation software from drive B: to the CP/M 68K System Disk in drive A:, by entering the following command.

A>PIP A:=B:APPLE.68K[ov]<CR>

** Be sure to include all spaces as well as the [ov] options. The letter O option copies [O]bject files to insure that all of the emulation program file is copied correctly.

The system should return this prompt when the copy operation is finished.

A>

If the A> prompt is not all that is returned, read the error message and check the typing of the command line. If that fails, "re-boot" and try again.

** It is possible that some files may have to be removed from the "SYSTEM 1" diskette before there will be room for the Apple][Plus Emulation program, APPLE.68K. Use the CP/M 68K command **ERA** to remove files.

The 6512 Coprocessor Emulation program is now on the "SYSTEM 1" diskette. To check the diskette directory (in order to make certain that the file APPLE.68K is present), enter the following command.

A>DIR A:<CR>

Other programs, originally on the diskette, will also be shown in the directory. If the file APPLE.68K is present, then the "SYSTEM 1" diskette is ready to be used for emulation.

USING YOUR EMULATOR

The application of the Dimension 6512 Coprocessor System as an Apple][Plus Emulator requires an APPLE compatible operating system (such as Apple DOS 3.3, PRODOS, or Apple Pascal or a stand-alone application program (such as Visi-Calc or Apple Writer][). You will need an operating system and/or application software before the 6512 Coprocessor can be used. Your dealer can provide assistance with selecting the best software for your application.

The "FILER" disk, that is included with the 6512 Coprocessor, has on it the Apple DOS 3.3 operating system. The "FILER" diskette can be used to bring the DIMENSION 68000 into the Apple][Plus environment.

BEFORE YOU BEGIN...

During emulation, the DIMENSION 68000 assumes the personality of an Apple][Plus. System operation, in the emulation mode, is determined by the application program and the operating system. It will be necessary to refer to the information provided with the programs for documentation on the operation of those programs.

When in the emulation mode, the system will expect an Apple format disk containing either an Apple DOS 3.3 operating system, a PRODOS operating system, or an Apple Pascal operating system, or a stand-alone application program for the Apple][Plus. Until the file APCODE.O is created, it will be required to start the Apple][Plus Emulator with an Apple System Master diskette. The "FILER" diskette can also be used until the APCODE.O file is created.

CP/M 68K diskettes will not be read during emulation.

LOADING EMULATION PROGRAMS

The Apple][Plus Emulator program is loaded by CP/M 68K. When CP/M 68K finishes loading the program, the system is converted to the emulation mode.

There are two ways to begin Apple][Plus Emulation. These two ways are the same from the point of view of the computer, but you may find one of them to be preferable. The first way is to use a "bootable" CP/M 68K systems diskette with the Apple][Plus Emulator installed as a turn-key program.

The second way is to begin the Apple][Plus Emulator directly from the keyboard while in CP/M 68K. A copy of the Coprocessor SYSTEM MASTER diskette is used to begin Apple][Plus Emulation in this way. If a turn-key system is being used, put the Emulator turn-key diskette into drive A: and "boot." (Either turn on the power switch on the DIMENSION 68000 or if power is already on, press the RESET button on the DIMENSION 68000 front panel and then enter: BT (no <CR>)). Just ignore the things that flash across the screen.

If Turn-key Emulator diskette is NOT being used or if it is NOT desirable to "re-boot" the system, make certain that CP/M 68K is loaded. Disable the Spooler and Ramdisk if they are enabled. (Use the commands: RAMDISK Ø and SPOOL Ø to disable them.) Log on to the drive that contains the 6512 Coprocessor emulation software. If it is installed on a "SYSTEM 1" diskette, then it should be in drive A:. If an Emulator diskette is specified, then it may be in any available drive as long as the drive is specified.

As an example, if the system is logged on to drive A: and the software is on drive B:, the system will display the following prompt.

A>

To log on to drive B, enter the following command.

A>B:<CR>

The system will then display the prompt:

B>

To load the APPLE Emulator program and begin emulation, after logging on to the drive with the Emulator software, enter the following command.

B>APPLE +R +P -S -8 -M +L<CR>

** The drive, on which the software is located, may also be specified and the Emulator program may be started without changing the default drive by entering, for example: B:APPLE +P -S -8 -M +L<CR>.

*** A different set of options (than those shown above which are the default options) may be entered or the options may be left off entirely. (Enter: APPLE<CR>) Either way, you may wish to change the options, from the keyboard, before "booting" the first Apple disk.

RUNNING THE EMULATOR

When the Apple][Plus Emulator is started, then the system will return this message on the 80x24 screen display:

```
                Micro Craft Dimension 68000
               Apple ][+ Emulation, Ver x.x

                  Your configuration is:

enable/disable Slot    Contents                    Active

  <F10>          0   16K Language Card              Yes
  <F1>           1   Parallel Printer Card          Yes
  <F2>           2   reserved for Serial Card       No
  <F3>           3   80 Column Display Card         No
  <F4>           4   - empty -                      No
  <F5>           5   - empty -                      No
  <F6>           6   2 Apple Disk II's              Yes
  <F7>           7   Mass Storage Unit             No

  <F8>           Lower Case Keyboard and Display   Yes

  <F9>    Enter CP/M 68K Drive to Load APCODE.O
<Retrn>   Boot "Apple System Master" or "Filer" in drive A:
<Break>   Return to CP/M 68K

Which:
```

The system is now in the emulation mode. At this point, with the Welcome Menu displayed, the function keys (<F1> to <F10>, on the left side of the keyboard) can be used to enable (or disable) the various emulation options. Programs running under the Apple][Plus Emulator will be able to access only "active" options.

To begin using the DIMENSION 68000 and the 6512 Coprocessor system as an Apple][Plus, insert an APPLE format diskette in drive A:. There are two different messages that may appear in the above prompt describing which kind of Apple diskette you need to use in drive A:. If the message on the line marked with <Retrn> asks for an "Apple System Master" or for a "Filer", then you MUST use an Apple DOS 3.3 System Master diskette or the "FILER" diskette that comes with the Emulator. A System Master diskette will be requested, only if the file APCODE.O has NOT been created on the Apple][Plus Emulator program diskette.

The file APCODE.O contains certain information that allows the "booting" process to proceed faster. Also, the information stored in the APCODE.O file may be needed by the operating system and the application programs. In order to respect certain information that is proprietary to Apple Computer, Inc., the Micro Craft Corporation cannot send an EMULATION MASTER distribution diskette with the APCODE.O file already in place.

If the above prompt asks for "any Apple format disk", then any Apple format diskette may be used. If instead of getting the above message, the following message is received.

*** APPLE Emulator Card not installed ***

The 6512 Coprocessor circuit board is either not installed properly or it is not functioning. If it is certain that installation is correct, then contact your dealer for assistance.

If instead of getting the "not-installed" message, that is shown above, the following message is received.

***Usage: APPLE {+|-}U {+|-}R {+|-}P {+|-}S {+|-}8 {+|-}M {+|-}L {+|-}4

Then there was a typing error in the command line that was entered to start the program. Retype the command line with the correct parameters or change the command in the CPMCONF.SUB file on the turn-key emulation diskette that was used to start the Emulator.

If instead of getting the messages above, the following prompt is received.

*** APPLE Emulator requires 155K of memory--minimum ***

One of three things is probably causing the problem:

- The DIMENSION 68ØØØ does not have the minimum 256K memory.
- The "SYSTEM 1" diskette or other boot diskette is configured for 128K Bytes of memory (with the "SYS128" program). Use either the "SYS256" program, the "SYS384" program, or the "SYS512" program to change the memory configuration.
- The RAMDISK or SPOOL has been left in memory and they take up enough memory to leave 154K or less. Disable both the RAMDISK and the SPOOL by using the RAMDISK Ø<CR> and the SPOOL Ø<CR> commands.

Correct the problem and try starting the Apple][Plus Emulator again.

After the Apple format diskette or Apple System Master diskette is put in drive A:, press the Return key. If the Emulator software cannot read the APPLE format disk, then drive A: (or D1) will keep on spinning (as evidenced by the red light above the drive staying on).

If the disk does keep spinning, then either the diskette is defective or an Apple DOS 3.3 System Master (or "FILER" diskette) was NOT supplied when a System Master was asked for.

Normally, the disk drive will be making sounds and eventually Applesoft BASIC (or the application program) will manifest itself on the screen. The screen is now that of an Apple][Plus. The 25th line will display the following message.

Apple][+ Emulation Ver x.x

This indicates the type of computer that the DIMENSION 68000 is currently acting like. (When a computer will emulate the Apple][Plus, the IBM PC, the Kaypro II, and other computers, as well as having its own CP/M 68K, it is necessary to have a message telling what kind of emulation is being performed.) The 25th line does not interfere with the normal display that is on the screen.

Use the DIMENSION 68000 in Apple][Plus Emulation mode exactly as if it were an Apple][Plus. You will probably want to click the CAPS LOCK key since a normal Apple][Plus does not have lower case letters on its keyboard.

LEAVING THE EMULATION MODE

This section explains how to reset, exit, and restart emulation.

*** WARNING ***

> NEVER exit emulation or press RESET without first saving any files or data being worked on. If emulation is exited or if the system is RESET without saving the data, the data will be lost. Pressing Ctrl-Alt-Del or RESET on the DIMENSION 68000 while running Apple][Plus Emulation is the same as pressing Ctrl-RESET on an Apple][Plus Computer.

The DIMENSION 68000 may be reset from the front panel pushbutton, which is refered to as the reset-button. The reset-button will work in all situations. However, the reset-button is designed for EMERGENCY situations in which no other method of restoring order to the program will work.

The Apple][Plus Emulator may also be reset by pressing the **Ctrl**, **Alt**, and Del keys all at the same time. This is only available when the Apple][Plus Emulator is trying to read a key from the keyboard. It is designed to be used in situations that are less drastic than the reset-button.

After pressing the reset-button or **Ctrl-Alt-Del** the Apple][Plus Emulator allows you to choose one of three options. These can be seen in the prompt given on the screen in 40 column display mode, after pressing the reset-button on the front panel of the DIMENSION 68000:

```
RESET has been pressed

   Key          Result

 <Break>   Return to CP/M 68K
 <Retrn>   Continue Apple Emulation
  <F1>     Save APCODE.O (see manual)

  Which:
```

To remain in the emulation mode press the RETURN key.

When return is pressed after any reset, the Apple][Plus Emulator will act like an Apple][Plus after the Ctrl-RESET keys have been pressed. The Apple][Plus Emulator is reset. Some programs (eg. Super Disk Copy) effectively ignore this. Some programs (eg. VISICALC) go to a special state allowing only the saving of the data and an exit. Some programs (eg. any Applesoft program) will lose any data but the program is intact. And some programs (eg. many copy protected games and Apple Pascal) will attempt to "reboot" the program, thus losing both the program and the data. Consult the documentation for the programs and operating system being used to know exactly what the results will be.

To return to CP/M 68K press the BREAK key.

Pressing the Break key after any reset will end the Apple][Plus Emulator. The system will go back to CP/M 68K. Make certain that the Apple format diskettes are removed and CP/M 68K format diskettes are inserted.

To create the file APCODE.O press the F1 key.

The file APCODE.O contains certain information that allows the "booting" process to proceed faster. The APCODE.O file is described below.

** When Emulation is exited, make certain that a CP/M 68K format diskette is re-installed.

** Of course, the most obvious way to exit Emulation is to turn off the power to your DIMENSION 68000. This is like turning off the power switch on the Apple][Plus.

CREATING AND USING THE FILE APCODE.O

Creating the APCODE.O file will allow a wider variety of Apple format diskettes to be "booted" directly when beginning emulation. Without the APCODE.O file, it will be necessary to "boot" an Apple DOS 3.3 System Master diskette (or the "FILER" diskette) before using any other Apple format diskette. After "booting" from the System Master, a PR#6<CR> may then be entered to "boot" the other diskette.

IS APCODE.O ALREADY THERE

There are two ways to check if the APCODE.O file has been created. One way is to put an Apple][Plus EMULATION MASTER diskette copy into drive B:. Put a "SYSTEM 1" diskette into drive A:. Turn on the DIMENSION 68000 computer. To see what files are on the Emulator diskette, enter the following command.

A>DIR B:<CR>

The list of files, displayed on the screen, will look something like the following.

```
: APPLE    68K : CPM      SYS : CPMCONF  SUB : PIP      68K : APCODE   0
: ADDLF    68K
>
```

Each name has two parts. The colons (:) separate the different file names. APCODE.O is the rightmost name in the example shown above. The names shown on the screen will probably be different from the names shown in the example. The name that is being looked for is APCODE.O, which will appear without the period (.), as above. If APCODE.O is in the directory list, then the file already exists.

A second way to determine if the file APCODE.O is present on the Emulator diskette is to start the Emulator program. When the Emulator welcome display appears, there are two possible messages at the bottom of the screen.

If the APCODE.O file is NOT present, then the message at the bottom of the message will say the following.

```
   <F9>   Enter CP/M 68K Drive to Load APCODE.O
<Retrn>   Boot "Apple System Master" or "Filer" in drive A:.
```

If the APCODE.O file IS present, then the message at the bottom of the message will say the following.

```
<Retrn>  Boot any Apple format disk in drive A:.
```

The two versions, of the complete messages, are shown below.

Version 1 (a diskette without APCODE.O):

```
            Micro Craft Dimension 68000
           Apple ][+ Emulation, Ver x.x

              Your configuration is:

enable/disable Slot    Contents                  Active

  <F10>         0   16K Language Card             Yes
  <F1>          1   Parallel Printer Card         Yes
  <F2>          2   reserved for Serial Card      No
  <F3>          3   80 Column Display Card        No
  <F4>          4   - empty -                     No
  <F5>          5   - empty -                     No
  <F6>          6   2 Apple Disk II's            Yes
  <F7>          7   Mass Storage Unit             No

  <F8>        Lower Case Keyboard and Display    Yes

  <F9>   Enter CP/M 68K Drive to Load APCODE.O
<Retrn>  Boot "Apple System Master" or "Filer" in drive A:
<Break>  Return to CP/M 68K

Which:
```

Version 2 (a diskette with APCODE.O):

```
            Micro Craft Dimension 68000
           Apple ][+ Emulation, Ver x.x

              Your configuration is:

enable/disable Slot    Contents                  Active

  <F10>         0   16K Language Card             Yes
  <F1>          1   Parallel Printer Card         Yes
  <F2>          2   reserved for Serial Card      No
  <F3>          3   80 Column Display Card        No
  <F4>          4   - empty -                     No
  <F5>          5   - empty -                     No
  <F6>          6   2 Apple Disk II's            Yes
  <F7>          7   Mass Storage Unit             No

  <F8>        Lower Case Keyboard and Display    Yes


<Retrn>  Boot any Apple format disk in drive A:
<Break>  Return to CP/M 68K

Which:
```

The message specifically asks for an Apple System Master or for <F9> to allow entering a CP/M 68K disk drive name if it does not find the file APCODE.O.

CREATING APCODE.O

If it is determined that the APCODE.O file is not on the Emulator diskette, these steps show how to put it on the diskette.

- Start the Apple][Plus Emulator. The welcome message will appear.
- Put an Emulator System diskette copy (with NO write protect sticker) in drive B:.
- Put an Apple DOS 3.3 System Master diskette, or the "FILER" diskette, in drive A: and press the RETURN key. In a few seconds, Apple DOS 3.3 will be loaded and it will display the Applesoft] prompt.
- Press the <Ctrl>, <Alt>, and <Del> keys simultaneously. The following message will be displayed.

```
RESET has been pressed

   Key          Result

 <Break>   Return to CP/M 68K
 <Retrn>   Continue Apple Emulation
  <F1>     Save APCODE.O (see manual)

  Which:
```

Press the F1 key. It is in the top lefthand corner of the DIMENSION 68000 keyboard. A new message will be added to the one already on the screen:

```
========================================

Saving information to APCODE.O:

   Key          Result

 <Break>   Return to Menu Above
             (does NOT leave Emulator)
 <Retrn>   Use Default Drive - X:
 OR enter CP/M 68K Drive A: to P:
    and press <Retrn>

  Which:
```

The drive that the program wants to use to save the file APCODE.O will be specified in the line that says the following.

<Retrn> Use Default Drive - X:

The letter X (above) will be replaced by either the letter A or the letter B.

Assuming that the DIMENSION 68000 system was just "booted", drive A: will be shown.

APCODE.O must be saved on a CP/M 68K format disk. If the above instructions are followed, an Emulator System diskette copy will be in drive B:, with no write protect sticker. To save APCODE.O on this diskette, enter the following command.

B:<CR>

The light on drive B: will come on as it spins to save the file. If the file is saved correctly then you will again see the prompt:

```
RESET has been pressed

   Key          Result

 <Break>   Return to CP/M 68K
 <Retrn>   Continue Apple Emulation
  <F1>     Save APCODE.O (see manual)

  Which:
```

Press the Break key (located in the top righthand corner of your DIMENSION 68000 keyboard) and the CP/M A> prompt, showing that the system is back to CP/M 68K, will be seen.

Put the write protect sticker back on the Emulator diskette that is in drive B:. Now using this diskette (or copies of it), the Apple][Plus Emulator will not require an Apple DOS 3.3 System Master diskette to be "booted" before other program diskettes.

The file APCODE.O can also be copied to other diskettes using the PIP command (with the [ov] options).

WHAT IF THERE ARE PROBLEMS SAVING APCODE.O

If the computer detects a write protect sticker on the diskette it is trying to put APCODE.O onto, the a message, that is similar to the following one, will be displayed.

```
Write Protect Error

Retry (R) or Abort (esc)
```

Remove the diskette from drive B:, (its OK, even if the drive is still spinning) take the write protect sticker off the diskette, and return the diskette to the same drive. When that is completed, take the Retry option. APCODE.O should then be saved immediately.

If the computer detects a defective place on the diskette that it is trying to put APCODE.O onto, a message, that is similar to the following one, will be displayed.

```
Sector Write Error - xxxx

Retry (R) or Abort (esc)
```

Assuming that you have a CP/M 68K diskette in drive B:, there is no way to recover from this error (due to a problem with CP/M 68K itself). Taking the **Retry** option can be attempted, but this seldom helps. Just press the reset-button on the front panel of the DIMENSION 68000 and then press <Break> to exit the emulator. Any undamaged files will need to transfered to a good diskette.

If the computer has other problems in saving the file APCODE.O, the following prompt will be displayed.

```
A disk ERROR was detected while saving

Check these things: (among others)

 Is there room on the disk you chose?
 Is this a CP/M 68K disk? (Not Apple)
 Did you choose a valid drive?

Press Space Bar when you finish reading
```

Check the things shown in the list on the screen. There must be 32K of free space on the diskette. (The STAT command in CP/M 68K will show the amount of free space on a diskette.) The diskette in drive B: should NOT be an Apple format diskette. It SHOULD be a CP/M 68K format diskette. The Emulator System diskette copy is a CP/M 68K diskette. Check that "B" and the <Retrn> key is what was typed.

Correct any problems with the diskette in drive B:.

Press the space bar and the system will display the prompt asking for the <F1> key to be pressed to try to save again. If there is still trouble, create another Emulation System diskette and try the whole process again. If there is still trouble, contact your dealer for help.

WHAT IS SAVED IN APCODE.O

APCODE.O contains certain information that allows the "booting" process to proceed faster. Also, the information stored in APCODE.O may be needed by the programs and the operating system on the computer. In order to respect certain information that is proprietary to Apple Computer, Inc., the Micro Craft Corporation cannot send an EMULATION MASTER distribution diskette with APCODE.O already in place.

THE MASS STORAGE UNIT (MSU)

The Mass Storage Unit (MSU) is a software device that allows Applesoft BASIC programs (running under the Apple][Plus Emulator) to be able to save and recall text files from CP/M 68K format diskettes. In concept, the MSU is a device that is in slot 7 of the Apple][Plus Emulator. Any CP/M disk, A: through P:, can be accessed by means of the MSU.

** Before full use can be made of the Mass Storage Unit, the "DIMENSION 68000 System User's Guide" and the "CP/M 68K Operating System User's Guide" should be read, in order to learn more about text files, file names, drive names, and diskette DIRectories under CP/M 68K.

** This section assumes that you have some familiarity with BASIC and with Apple DOS 3.3. Consult your dealer for help in choosing and help in purchasing the appropriate materials.

** To perform the exersizes in this section you will need to start your Apple][Plus Emulator at this time.

** Most of the sample programs that are shown in this section are on the "Apple Emulation Utilities" diskette that is supplied with the Apple][Plus Emulator System.

** Be careful to differentiate between CP/M 68K format diskettes and Apple format diskettes. In the DIMENSION 68000, the same disk drives drives read and write both types of diskettes. But, when the computer is expecting one kind of diskette the other type is not acceptable.

SEQUENTIAL TEXT FILES IN DOS 3.3 AND CP/M 68K

A text file is a series of fields stored on disk. A field is a sequence of characters that ends with a carriage return (on Apple DOS 3.3 diskettes) or a carriage return and line feed (on CP/M 68K diskettes).

A T in the file-type column of an Apple DOS 3.3 catalog identifies a text file. In CP/M 68K there is no definite way of knowing which files are text files. Usually, the extension (the part of the file name after the period (.)) of a file will indicate that it is a text file. Some common extensions for text files are .SUB, .S, and .TXT. Common extensions for non-text files are .68K, .O, .REL and .SYS. Text files can be listed using the CP/M 68K TYPE command.

A CP/M 68K text file is a series of fields of various lengths. Each successive field immediately follows the carriage return and line feed (CRLF) characters that end the preceeding field. Each time the MSU writes to or reads from a sequential-access text file, the MSU starts with the first field in the file and accesses the fields in sequence, one field after another.

Text files store strings of ASCII code (that is, text). For example, the figure below shows how a text file would be stored:

Character:	8	Ø	CR	LF	a	n	d	CR	LF	7	CR	LF	y	e	a	r	s	CR	LF	EOF
ASCII:	38	3Ø	ØD	ØA	61	6E	64	ØD	ØA	37	ØD	ØA	79	65	61	72	73	ØD	ØA	1A
File Byte #:	Ø	1	2	3	4	5	6	7	8	9	1Ø	11	12	13	14	15	16	17	18	19
Field #:	Ø				1					2			3							

Notice these things about the way the characters are stored:

- CR stands for the carriage return character.
- LF stands for the line feed character.
- The ASCII values are represented in hexadecimal numbers and reflect the fact that the the character codes are written by CP/M 68K to the diskette with the high-order bit clear.
- EOF stands for the end of file character (^Z) and marks the end of the CP/M 68K file. (The MSU never returns the ^Z to a program.)

The program needs to open any text file before it tries to put anything into it or get anything from it. After the program is finished working with a file, the program must close it. For these starting and ending tasks, use the MSU commands CP/MOPENO#, CP/MOPENI# and CP/MCLOSE#.

When a text file is open, an Applesoft BASIC program can print new lines to the file or read (retrieve) lines from it. To add information to a text file, use the MSU command CP/MPRINT# and the BASIC statement PRINT. To retrieve information from a text file, use the MSU commands CP/MINPUT# and CP/MLINEINPUT# along with the BASIC statements INPUT and GET.

Arguments will have to be added to these commands (and to the other MSU commands) to indicate, to the MSU, which drive and which file is to be accessed.

FIELDS IN A CP/M 68K TEXT FILE

A CP/M 68K text file, as accessed by the MSU, is like a scroll that contains an unlimited number of lines of text. With one of these files, as with a scroll, it is necessary to search line by line to locate a particular text line. There are no pages to make the search faster.

The basic unit of a text file is the field. A field can be compared to a line of text on the Dimension (or Apple Emulator) screen. Both, the field and the line of text are character strings (series of characters) that end with End-of-Line characters. A line on the Apple screen ends with a CR character and a field in a CP/M 68K text file ends with the CRLF characters. To understand how to create a field in a text file, look at how the PRINT statement of Applesoft BASIC sends a field to the screen.

** At this time, you should be in Applesoft BASIC under the Apple][Plus Emulator.

When the BASIC statement **PRINT "Hi, there. " : PRINT "How are you. "** <CR>, is entered, BASIC puts a carriage return character at the end of the word "there". This is because there is no semi-colon (;) after the second quotation mark. The word "How" is seen at the front of the next line. Two fields are printed.

When the BASIC statement **PRINT "Hi, there. "; : PRINT "How are you. "** <CR>, is entered there is no carriage return character after the word "there". The word "How" comes right after the word "there" on the same line. In this case, there is only one field printed.

The two examples above could be used, in a program, to write either a line to the screen or a field into a file. Remember, the semi-colon (;) tells BASIC not to write a carriage return character at the end of a line (or a field). If a longer line (field) is to be written or if the line (field) is to be continued later, use the semi-colon at the end of the PRINT statement.

Applesoft programs will function just fine with simply a carriage return at the end of each field. If the text files generated, with the MSU, are going to be used in other CP/M 68K programs, then indicate to the MSU that the line feed character needs to be added on outputs and that the line feed character needs to be removed on inputs. The BASIC statement POKE 1279,10 will cause this to happen after the POKE is executed.

Notice how the following BASIC program creates several fields in a file. It is important to see the way the fields relate to each other in the text file. (The symbol <CRLF> is used to indicate the carriage return and line feed characters that mark the end of each field (line).) (This program is on the "Apple Emulator Utilities" diskette.)

```
1000 PRINT "Micro Craft"
1010 PRINT "Dimension"
1020 PRINT "Dallas"
1030 PRINT "Texas"
1040 PRINT "USA"
```

The text file, that was created, contains 44 characters in 5 fields of various lengths. On the screen, lines 1000 through 1040 look like this:

```
Micro Craft
Dimension
Dallas
Texas
USA
```

Here is how the characters would be stored in a text file:

```
Characters: Micro Craft<CRLF>Dimension<CRLF>Dallas<CRLF>Texas<CRLF>USA<CRLF>

Field #: 0                1              2            3          4
```

** The first field is number zero so five fields are numbered from zero to four.

Here is a sample program to create a text file named LIST.S on drive B: and place lines in the file. The lines are a listing of the program itself. (This program is on the "Apple Emulator Utilities" diskette.)

```
1000 REM PROGRAM TO LIST ITSELF ON A CP/M 68K FILE

1010 EX$ = CHR$ (5) : REM EX$ IS CONTROL-E

1020 CALL 50944: REM ENGAGE THE MASS STORAGE UNIT

1030 POKE 1279,10: REM USE CRLF INSTEAD OF JUST CR

1040 PRINT EX$;"CP/MOPENO#1B:LIST.S": REM OPEN LIST.S ON DRIVE B
       AND CREATE IT IF IT DOESN'T EXIST. CREATE A NEW COPY IF IT DOES
       EXIST AND REMOVE THE OLD COPY.

1050 PRINT EX$;"CP/MPRINT#1":REM PREPARE LIST.S FOR WRITING

1060 LIST : REM SEND THE PROGRAM LISTING TO LIST.S

1070 PRINT EX$;"CP/MCLOSE#1":REM CLOSE THE FILE LIST.S
```

This program does the following things.
- engages the Mass Storage Unit (line 1020) and uses the <CRLF> form of line ending.
- directs the MSU to open the LIST.S file on drive B: for output (line 1040).
- uses CP/MPRINT# so that LIST.S is written to (line 1050).
- gives the BASIC statement LIST (line 1060).
- closes LIST.S (line 1070).

Notice that LIST is a BASIC statement and is not an MSU command. All MSU commands are preceeded by a control-E , CHR$(5), character.

The CP/MPRINT# command redirects all output to the file. Because of this, the LIST statement places the lines of the program, one by one, into LIST.S instead of sending them to the screen.

Enter the program, in Applesoft BASIC under the Apple][Plus Emulator, into the computer. Then put a formatted CP/M 68K diskette in drive B: (or drive 2 in Apple terminology). To run the program, enter the following command.

RUN<CR>

This executes the program, which puts the text file named LIST.S on the diskette in drive B. After the program stops running, the Applesoft prompt character] will be displayed on the screen. The Apple DOS 3.3 command CATALOG cannot be used to look at the list of files on a CP/M 68K diskette, instead use the following command.

CALL 50944 : PRINT CHR$(5);"CP/MCATALOG#B:"<CR>

This will cause a list of the files on the diskette in drive B: to list on the screen. The entry for the file LIST.S should be seen.

If the program is not already saved on a diskette, it would be well to SAVE this program, to an Apple DOS 3.3 diskette, at this time. After exiting from the Emulator and returning to CP/M 68K, the program will no longer be in the computer memory.

To exit from the Apple][Plus Emulator, press the Ctrl-Alt-Del keys and then press the Break key. When you see the CP/M A> prompt, then ENTER the following command.

A>TYPE B:LIST.S<CR>

The Applesoft program, that was entered under Apple][Plus Emulation, will be listed on the screen. Of course, CP/M 68K uses 80 character lines, so the letters on the screen will look somewhat different.

You have just created your first CP/M 68K file using the Mass Storage Unit of the Apple][Plus Emulator and Applesoft BASIC.

ENTERING AND READING TEXT WITH THE MASS STORAGE UNIT (MSU)

The Mass Storage Unit (MSU) handles the lines of input and output similarly to the way these are handled by Apple DOS 3.3. Chapter 3 of the "Apple II DOS Programmers Manual for II, II+, //e" (Apple Part Number A2L2Ø12) covers the way Apple DOS handles input and output. This manual is available from Apple Computer Dealers.

Some notes are in order:

- To output a double-quotation mark you must use a sequence like this:

  ```
  1ØØØ PRINT "This is a double quote -->";CHR$(34);"<--"
  ```

  Which will print, or send to the active file--DOS or MSU:

  This is a double quote -->"<--

- A semi-colon on the end of a PRINT statement will leave the field unended and the next PRINT statement will continue where the first PRINT statement left off in the same field (line).

- An INPUT A$ statement with an active CP/MINPUT# command will read everything in a line up to a carriage return, comma (,) or colon (:) into the string variable A$. With the comma or the colon the message EXTRA IGNORED will appear on the screen. Any characters after and including the comma or colon will NOT be read by this or future INPUT statements. The MSU command CP/MLINEINPUT# solves some of this problem.

- Use multiple GET statements to read information that cannot be read with an INPUT statement. GET can read any character at all, including commas and colons. However, multiple GET statements are almost always slower than an INPUT statement.

- An INPUT A$ statement will read at most 239 characters. If the line coming from the CP/M 68K file is longer than 255 characters, INPUT will cancel the whole line and start over at that point. It is best not to try to read long lines with the BASIC input statement.

The following example reads input from a CP/M 68K file named LIST.S in drive B:. The characters are simply echoed on the screen. (This program is on the "Apple Emulator Utilities" diskette.)

```
1000 REM PROGRAM TO READ USING THE MSU

1010 CALL 50944 : REM HOOK IN THE MSU

1020 POKE 1279,10 : REM REMOVE LF AFTER CR

1030 EX$ = CHR$(5) : REM CONTROL-E

1040 PRINT "THE FILE LIST.S:" : PRINT : REM HEADER ON SCREEN

1050 PRINT EX$;"CP/MOPENI#2B:LIST.S" : REM OPEN THE EXISTING FILE

1060 PRINT EX$;"CP/MINPUT#2" : REM ENGAGE INPUTTING

1070 ONERR GOTO 1100 : REM TO HANDLE THE END OF FILE

1080 GET A$: PRINT A$; : GOTO 1080 : REM READ AND PRINT ...

1090 REM THERE IS NO LINE 1090 NEEDED

1100 PRINT : PRINT EX$;"CP/MCLOSE#" : REM CLOSE ALL OPEN CP/M FILES
```

** A note of caution is in order when using the GET statement to read from a CP/M 68K file. Just as in Apple DOS, the GET statement may not leave the program at the front of a line. That will cause the next Apple DOS or MSU command to be ignored. If this is happening, include an extra PRINT statement before the PRINT EX$;... commands to the MSU.

COMMANDS USED WITH MASS STORAGE UNIT (MSU) FILES

This section describes the MSU commands used within Applesoft BASIC to access CP/M 68K text files. Notice that all but three of these commands must be used in deferred execution, all except CALL 50944, POKE 1279,0, and POKE 1407,X. None of the other commands can be used directly from the keyboard.

"Deferred execution" means that the commands are required to be used inside a PRINT statement and preceeded by a control-E, CHR$(5), character. Notice that this allows all or part of the command, including the file number or file name, to be drawn from string variables.

Here are three, equivalent, programs to list the directory of a CP/M 68K diskette in drive B:.

Example 1:

```
1000 CALL 50944 : REM ENGAGE MSU

1020 PRINT CHR$ (5);"CP/MCATALOG#B:"
```

Example 2:

```
1000 CALL 50944

1010 EX$ = CHR$ (5) : DR$ = "B:" : REM SET UP PARTIAL STRINGS

1020 PRINT EX$;"CP/MCATALOG#";DR$
```

Example 3:

```
1000 CALL 50944

1010 EX$ = CHR$ (5) : CD$ = "CP/MCATALOG#B:"

1020 PRINT EX$;CD$ : REM HERE ITS ALL IN STRING VARIABLES
```

** While Apple DOS 3.3 has only one OPEN command, the MSU has two. CP/MOPENI# is used to open a file and do INPUT. CP/MOPENO# is used to open a file and do OUTPUT.

The CALL 50944 "command"

Before using any MSU commands, a program must execute the **CALL 50944** statement. This activates the MSU by changing the input and output "hooks" used by Apple DOS 3.3 to point to the MSU programs. The number 50944 is the same as the hexadecimal number $C700 , which is the memory location that is allocated to the board in slot 7.

NOTE: Do not use PR#7 to try to activate the MSU. It will not have any adverse effects, but it will not work, either.

It is best to think of **CALL 50944** as a magic MSU command that must be done before any other MSU commands are allowed. The best place to put the CALL 50944 statement is on the first line of your program.

** This command is not used inside a PRINT statement with a preceeding control-E (CHR$ (5)) character.

** The CALL 50944 command initializes the MSU just as though a POKE 1279,10 command and a POKE 1407,0 command had been issued.

The POKE 1279,1Ø and POKE 1279,Ø "commands"

This command addresses the problem of the "extra" or "missing" line feed character in text files.

Applesoft BASIC will normally send only a carriage return (<CR>) character at the end of any PRINT statement that does not end with a semicolon (;). Text files, in CP/M 68K, normally end each line with a carriage return character AND a line feed character (<CR><LF>).

** This command is not used inside a PRINT statement with a preceeding control-E, CHR$ (5), character.

To follow the Applesoft convention (<CR> only), then use the POKE 1279,Ø command immediately after the CALL 5Ø944 command.

To follow the CP/M 68K convention (both <CR> and <LF>), then use the POKE 1279,1Ø command immediately after the CALL 5Ø944 command.

** Normally, for reading all files that are not created by the MSU and for writing all files that are intended for other CP/M 68K programs to use, the CP/M 68K convention should be enabled (POKE 1279,1Ø). There is very little reason to use the Applesoft convention (POKE 1279,Ø).

** The CALL 5Ø944 command initializes the MSU just as though a POKE 1279,1Ø command and a POKE 1407,Ø command had been issued.

The POKE 1407,0 and POKE 1407,255 "commands"

The **POKE 1407,255** command will allow the full 8 bits of data to pass through the MSU. Applesoft BASIC PRINT statments always set the high bit of any characters printed to a "one." CP/M 68K text files must have the high bit clear, set to a "zero." Normally, by default, the high bit of any characters passed through the MSU will be cleared or set depending on where they are going. The **POKE 1407,0** command also sets the high bit to a "zero."

If it is necessary to pass the full 8 bits of each data byte through the MSU, then the programmer will be responsible for outputting or inputting the bytes with the correct high bit. This cannot be done with Applesoft BASIC.

The general outline of such a program is as follows.

1.) CP/MOPENI# or CP/MOPENO# in Applesoft BASIC
2.) CP/MINPUT# or CP/MPRINT# in Applesoft BASIC
3.) POKE 1407,255 : POKE 1279,0 in Applesoft BASIC
4.) CALL program from BASIC to a machine language program.
5.) JSR $C71A returns input byte in A.
    JSR $C72A sends A as the output byte.
6.) RTS to Applesoft BASIC after all bytes are transferred.
7.) CP/MCLOSE# to close CP/M file.
8.) END in Applesoft BASIC

This command is not for beginning programmers but allows sophisticated programmers to make use of CP/M 68K files for any data at all.

** The CALL 50944 command initializes the MSU just as though a POKE 1279,10 command and a POKE 1407,0 command had been issued.

The CP/MOPENI# "command" -- OPEN for INPUT only

Before reading from a text file, a program must open that file. When the program does open the file, the file is located in the directory on the CP/M 68K disk. Some of the DIMENSION 68000 memory is then allocated as a file buffer. The MSU also sets its internal pointers so that the first characters that are read are at the front of the text file.

Each file that is opened must be assigned a FILE NUMBER. Since only two files are allowed to be open at any one time, the file number must either be 1 or 2. The file number is used in subsequent MSU commands, such as CP/MINPUT# and CP/MCLOSE#, to identify which file is intended.

This is the general form of CP/MOPENI#:

CP/MOPENI#n[d:]filename[.ext]

#n - where n is either the number 1 or 2. This is the FILE NUMBER that is to be used for this particular file. Later references to this file will use this file number to distinguish between the two possible files that can be open. Apple DOS 3.3 does not use file numbers, but the various versions of MicroSoft BASIC all use a similar structure.

[d:] - The drive designation for the file that is being used. The drive designation is a letter of the alphabet from A: to P:. If this is omitted, the MSU uses the default (also called "logged on") drive as of the time the Apple][Plus Emulator was started. If the system had just been "booted", before starting the Apple][Plus Emulator, the default would be drive A:.

ilename - The name of the file that is being used. If the file does not exist, an error message will be generated. The filename is from 1 to 8 alphabetic and/or numeric characters. The first character must be alphabetic.

[.ext] - The extension portion of the CP/M 68K filename MUST be used, if the file has one. Not all files, however, have extensions. If the extension is present, then it must be from 1 to 3 alphabetic and/or numeric characters.

Below is an example program that shows how a string variable can be used to open a text file that has its name stored in the string variable.

```
1000 REM PROGRAM TO READ USING THE MSU

1010 CALL 50944 : REM HOOK IN THE MSU

1020 POKE 1279,10 : REM REMOVE LF AFTER CR

1030 EX$ = CHR$(5) : REM CONTROL-E

1033 PRINT "ENTER FILE NAME ENCLOSED IN QUOTES TO INCLUDE DRIVE NAME."

1035 INPUT "WHAT CP/M FILE TO LIST: ";N$

1040 PRINT "THE FILE ";N$ : PRINT : REM HEADER ON SCREEN

1050 PRINT EX$;"CP/MOPENI#1";N$ : REM OPEN THE EXISTING FILE

1060 PRINT EX$;"CP/MINPUT#1" : REM ENGAGE INPUTTING

1070 ONERR GOTO 1100 : REM TO HANDLE THE END OF FILE

1080 GET A$: PRINT A$; : GOTO 1080 : REM READ AND PRINT ...

1090 REM THERE IS NO LINE 1090 NEEDED

1100 PRINT : PRINT EX$;"CP/MCLOSE#" : REM CLOSE ALL OPEN CP/M FILES
```

Now the program will ask for the name of a file to list to the screen. An Applesoft INPUT statement (eg. line 1035) will not allow a colon (:) to be in the string that is being inputted. If the response, to the INPUT statement, is enclosed in double quotation marks, then the colon will be accepted.

The CP/MOPENO# "command" -- OPEN for OUTPUT only

Before writing to a text file, a program must open that file. When the program does open a file, a place is allocated, in the directory on the CP/M 68K disk, for the file. Some of the DIMENSION 68000 memory is then allocated as a file buffer. The MSU also sets its internal pointers so that the first characters that are written will begin at the front of the text file.

Each file that is opened must be assigned a FILE NUMBER. Since only two files are allowed to be open at any one time, the file number must be either a 1 or a 2. The file number is used in subsequent MSU commands, such as CP/MPRINT# and CP/MCLOSE#, to identify which file is intended.

This is the general form of CP/MOPENO#:

CP/MOPENO#n[d:]filename[.ext]

#n - where n is either the number 1 or 2. This is the FILE NUMBER that is to be used for this particular file. Later references to this file will use this file number to distinguish between the two possible files that can be open. DOS 3.3 does not use file numbers, but the various versions of MicroSoft BASIC all use a similar structure.

[d:] - The drive designation for the file that is being used. The drive designation is a letter of the alphabet from A: to P:. If this is omitted, the MSU uses the default (also called "logged on") drive as of the time the Apple][Plus Emulator was started. If the system had just been "booted" before starting the Apple][Plus Emulator, the default would be drive A:.

ilename - The name of the file that is being used. If the file does not exist, then a new file will be created. If the file does exist, another copy of the file will be created and the old version of the file will be removed from the disk. The filename is from 1 to 8 alphabetic and/or numeric characters. The first character must be alphabetic.

[.ext] - Optionally, an extension may be included with the file name. Some suggested extensions are .TXT or .S to indicate that the file contains text. If the extension is present, then it must be from 1 to 3 alphabetic and/or numeric characters.

The following example program contains an example of the CP/MOPENO# command.

```
1000 REM PROGRAM TO LIST ITSELF ON A CP/M 68K FILE

1010 EX$ = CHR$ (5) : REM EX$ IS CONTROL-E

1020 CALL 50944: REM ENGAGE THE MASS STORAGE UNIT

1030 POKE 1279,10: REM USE CRLF INSTEAD OF JUST CR

1040 PRINT EX$;"CP/MOPENO#1B:LIST.S": REM OPEN LIST.S ON DRIVE B
     AND CREATE IT IF IT DOESN'T EXIST. CREATE A NEW COPY IF IT DOES
     EXIST AND REMOVE THE OLD COPY.

1050 PRINT EX$;"CP/MPRINT#1":REM PREPARE LIST.S FOR WRITING

1060 LIST : REM SEND THE PROGRAM LISTING TO LIST.S

1070 PRINT EX$;"CP/MCLOSE#1":REM CLOSE THE FILE LIST.S
```

The CP/MCLOSE# "command" -- CLOSE files

After a program has finished writing to or reading from a file, it must close the file. Closing every file properly ensures that all characters are written to the files and that the file number is free to be used again.

It is a good practice to close any file as soon as it is practical. Sometimes, this is not possible because closing and then reopening a file will move the program back to the start of the file.

This is the general form of CP/MCLOSE#:

CP/MCLOSE#[n]

n - which is either the number 1 or 2. This is the file number of the file that is to be closed. Use the number that was chosen as the file number when the file was opened with the CP/MOPENI# or with the CP/MOPENO# commands.

If the file number is left off, the MSU will close all files that are open.

Occasionally, a program will contain an error which causes it to stop before it closes the file or files that are open. When this happens, issue the close command from the keyboard. To close all open files, enter the following command.

] PRINT CHR$ (5);"CP/MCLOSE#"<CR>

Or, the file number of specific files that are to be closed can be included.

Note: It is a good idea to include an ONERR GOTO statement that GOes TO a part of the program that will close all of the CP/M files and all of the Apple DOS 3.3 files (by using the DOS CLOSE command) before ENDing the program.

The CP/MPRINT# "command" -- activate WRITE to a file

The CP/MPRINT# command tells the MSU which file to send any output characters to. The CP/MPRINT# command will remain in effect until the next MSU command. The CP/MPRINT# command must be used before the BASIC PRINT statement in order to place characters in a file. The CP/MPRINT# command can only be used after using the CP/MOPENO# command to open the file.

After a CP/MPRINT# command, all characters that would normally be printed on the screen are sent to the CP/M 68K text file. This includes the question mark prompt character for an INPUT statement and any error messages. Use ONERR GOTO to redirect any error messages.

This is the form of the CP/MPRINT# command:

CP/MPRINT#n

n - where n is either the number 1 or 2. This is the file number of the file that is to have characters sent to it. The file number is assigned in the CP/MOPENO# command, which must preceed this command.

If an ONERR GOTO statement is not included in the program and an MSU error, an Apple DOS error, or an Applesoft BASIC error occurs, the error message will become the last field in the CP/M 68K text file.

The CP/MINPUT# "command". -- activate READ from a file

The CP/MINPUT# command tells the MSU which file to read from. It will remain in effect until the next MSU command is given. Either the CP/MINPUT# command or the CP/MLINEINPUT# command must be issued before the INPUT statement or the GET statement can be issued in order to read the characters from the file.

The form of this command is:

CP/MINPUT#n

n - where n is either the number 1 or 2. This is the file number of the file that the characters are to be gotten from. The file number is assigned by the CP/MOPENI# command, which must preceed this command.

The Applesoft TRACE statement should NOT be used when CP/MINPUT# is active unless the EX$ variable has been defined to contain both a carriage return and a control-E. (CHR$ (13) + CHR$ (5)). Alternately an extra PRINT statement before the MSU command can be used to disable the CP/MINPUT# command.

The CP/MLINEINPUT# "command"

This command is similar to the CP/MINPUT# command. The only differences are that a subsequent INPUT statement will allow commas (,) and colons (:) to be inputted and any double quotation marks will turn into single quotation marks as they come in.

The form of this command is:

CP/MLINEINPUT#n

n - where n is either the number 1 or 2. This is the file number of the file that the characters are to be gotten from. The file number is assigned by the CP/MOPENI# command, which must preceed this command.

The Applesoft TRACE statement should not be used when CP/MLINEINPUT# is active unless the EX$ variable has been defined to contain both a carriage return and a control-E. (CHR$ (13) + CHR$ (5)). Alternately an extra PRINT statement can be included before the MSU command that disables the CP/MLINEINPUT# command.

An example:

```
1Ø9Ø PRINT EX$;"CP/MLINEINPUT#1" : REM #1 IS ALREADY OPENI'ED

11Ø0 INPUT A$
```

The input file contains the characters:

JULIETTE SAID: "ROMEO, ROMEO, WHEREFORE ART THOU ROMEO."

After line 11Ø0 is executed the value of the variable A$ would be the entire line with the double quotation marks converted to single quotation marks:

JULIETTE SAID: 'ROMEO, ROMEO, WHEREFORE ART THOU ROMEO.'

If the CP/MINPUT# command had been used in line 1Ø9Ø, the variable would have contained only these first few characters (up to the colon):

JULIETTE SAID

And the program would have printed the following message on the screen:

??EXTRA IGNORED

The CP/M# "command" -- deactivate READ or WRITE

This command has no effect other than to disable any CP/MINPUT#, CP/MLINEINPUT#, or CP/MPRINT# command that is active. The files are not closed, but no further input or output will come from or go to the files.

This command has the simple form:

CP/M#

The CP/MCATALOG# "command" -- list a diskette CATALOG

The CP/MCATALOG# command allows the names of the files on a designated CP/M 68K diskette to be listed. The file names and extensions are shown on the Apple][Emulator screen, or if the PR#1 command has been used to activate the printer, they will be printed.

This form of this command is:

CP/MCATALOG#d:

d: - where d is a letter between A: and P:. This specifies the drive that the catalog is to be produced for. If there is not a CP/M 68K diskette in that drive, the drive will spin until you insert one. This command cannot show the catalog for an Apple format disk.

** Note that the colon (:) after the drive name is required and that the drive A: through P: is required. There is no default drive.

COMMAND SUMMARY

CALL 50944

Engages the Mass Storage Unit (MSU) so that the other commands are recognized. This command must be issued before any others.

POKE 1279,10

Sets the MSU to use the CP/M 68K convention of marking the end of each line with both a carriage return character and line feed character (<CR><LF>), and sets the MSU to expect a <CR> and an <LF> to end each input line.

POKE 1279,0

Sets the MSU to use the Applesoft/DOS 3.3 convention of marking the end of each line with a single carriage return character (CR). The <LF> characters are NOT deleted on input.

POKE 1407,0

Sets the MSU to send only 7 bits of each byte transferred. Bytes sent to CP/M 68K have the high bit cleared and bytes arriving in the Apple][Plus Emulator will have the high bit set.

POKE 1407,255

Sets the MSU to send and receive all 8 bits of each byte transferred.

CP/MOPENI#n[d:]filename[.ext]

Opens a file so that the MSU can read from it. If the file does not exist, an error message is generated or the ONERR GOTO is taken. This command sets the file number that is used in subsequent commands that refer to the file.

CP/MOPENO#n[d:]filename[.ext]

Opens a file so that the MSU can write to it. If the file already exexists, it is deleted. A new file is created with that name, either way. This command sets the file number that is used in subsequent commands that refer to the file.

CP/MCLOSE#[n]

Tells the MSU that reading from or writing to a file is finished. Before ending, a program must close all of its files.

CP/MPRINT#n

Tells the MSU which file to write to. Use this command only after a CP/MOPENO# command. All PRINTed characters go to the file opened under this file number until the next MSU command.

CP/MINPUT#n

Tells the MSU which file to read from. Use this command only after a CP/MOPENI# command. All characters that are inputted with the INPUT or the GET statement come from the file that is opened using this specific file number, until the next MSU command.

CP/MLINEINPUT#n

Like CP/MINPUT# except that commas (,) and colons (:) can be inputted with an INPUT statement and all double quotation marks (") are converted to single quotation marks (').

CP/M#

Disables any CP/MPRINT#, CP/MINPUT#, or CP/MLINEINPUT# command that is active. Has no effect if there is none active.

CP/MCATALOG#d:

Displays the DIRectory of a CP/M 68K diskette. Lists both filenames and extensions. The drive is required.

** Remember: only CALL 50944, POKE 1279,X, and POKE 1407,X can be used from the keyboard. Also, all other commands must be given inside a PRINT statement, preceeded by a control-E character at the front of a line of output. These three commands are never used in the PRINT statement.

MOVER PROGRAMS TO TRANSFER FILES BETWEEN CP/M 68K AND APPLE DOS 3.3

There are several programs on the "Apple Emulation Utilities" diskette (included with the Apple][Plus Emulator) that allow the transfer of information from an Apple format disk to a CP/M 68K format disk or vice versa. Also, there is a program to help in converting Applesoft BASIC programs from their special, "tokenized", form into text files (type T) that are suitable for transferring with the other programs mentioned above.

If it is necessary to transfer files from Apple Pascal or from Apple CP/M to CP/M 68K, then you are responsible for moving the files (in the form of ASCII text) to an Apple DOS 3.3 diskette. Then, these programs can be used.

On the Emulator disk is a program to convert files from an unusable form (no <LF> characters) to a form that can be loaded into Unibasic with the Unibasic ALOAD command.

*** To use any of the mover programs within the Apple][Plus Emulator, the Mass Storage Unit (MSU) needs to be active. This is done with the <F9> key in the Apple][Plus Emulator welcome menu or with the +M parameter on the command line that starts the Emulator.

The mover programs can be accessed after entering the Apple][Plus Emulator and being in Applesoft BASIC. A copy of the "Apple Emulation Utilities" diskette should be in drive 1 (A:). To start the program, enter the following command.

```
]RUN MENU,D1
```

The following menu will be displayed.

```
                DIMENSION 68000
          TEXT FILE MOVE UTILITY PROGRAMS

        1.) CONVERT TEXT FILE TO CPM

        2.) CONVERT CPM FILE TO TEXT

        3.) CONVERT APPLEWRITER II FILE TO CPM

        4.) QUIT

            WHICH:
```

** CPM refers to CP/M 68K on the DIMENSION 68000 and not to Apple CP/M.

To transfer a file choose the option desired and type the corresponding key "1", "2" or "3". (The use of the fourth option is obvious.) It is NOT necessary to press <Retrn> after the number. The appropriate program will be loaded immediately.

The program will ask for the name of the DOS 3.3 text file that will be transferred or created. If a CATALOG listing of the Apple DOS 3.3 diskette is needed, insert the Apple diskette into either drive and enter D1<CR> or D2<CR>. (It is recommended that drive 1 (D1 or A:) be used for the Apple diskette to avoid complications.)

The program will also ask for the drive and for the name of the CP/M 68K file that is to be created or transferred. If a DIR listing of the CP/M 68K diskette is needed, then insert the CP/M 68K diskette into any disk drive and enter the disk drive letter designation (without the colon [:]) and then D<CR>. (It is recommended that drive B: (D2) be used for the CP/M 68K diskette).

*** The operator is responsible for making sure that the diskette is of the appropriate type for the drive chosen.

*** Before entering the Emulator, it may be desirable to use the RESET program (on the "SYSTEM 1" diskette) to set a drive to the appropriate format for the diskette that will be used. The Mover programs can transfer files to and from any diskette that "answers" acceptably to the CP/M 68K command DIR. It is usually worth while to do this before entering the Apple][Plus Emulator.

BOTH DISKETTES MUST BE IN PLACE BEFORE THE ANSWERING OF THE QUESTIONS, AS TO WHICH DISK IS WHERE, IS FINISHED. The transfer process will begin immediately after the last question is answered.

Read any messages on the screen when the program finishes its transfer. Any problems should be mentioned on the screen. Special note should be taken if the Emulator program exits directly to CP/M 68K. Particularly difficult problems for the Mover program to detect will do this. If this kind of problem has happened, then a message like the following will be displayed.

```
Disk Change Error on Drive B:

A>
```

This kind of message will appear IN THE MIDDLE OF THE SCREEN and possibly over the top of lines already on the screen. If this happens, try to correct the problem, according to the "CP/M User's Guide", after restarting CP/M 68K by "booting" the "SYSTEM 1" diskette (and possibly, to be safe, turning the DIMENSION 68000 power OFF).

MOVING TEXT FILES FROM CP/M 68K TO APPLE DISKETTES

Use the program "CP/M TO TEXT", on the "Apple Emulation Utilities" diskette, to move a file from a CP/M 68K formatted diskette, to an Apple DOS 3.3 formatted diskette. The Apple DOS 3.3 formatted diskette must have enough free space for the files that are to be transfered.

*** The Mass Storage Unit must be active when running this program. Use <F7> in the welcome message or the "+M" parameter in the command line used to start the Emulator.

This program is run from within the Apple][Plus Emulator, put your backup copy of the "Apple Emulation Utilities" diskette into drive 1 (A:), and enter the following command.

]RUN MENU,D1<CR>

and choose option 1, OR enter

]RUN CP/M TO TEXT,D1<CR>

** Please note that there are a limited number of lines that can be transferred with this program. Any larger files will need to be segmented and then rejoined after being transferred.

The program will require the entry of the CP/M 68K drive, CP/M 68K file name, and the Apple file name. The disks must be in place before the Apple text file name is entered.

*** See the detailed instructions for the program to move Applewriter II files to a CP/M 68K diskette for an indication of the options and procedures for entering the file names.

First, the text that is being read from the CP/M 68K file will be seen being printed on the screen. Then the cursor will be seen flickering in place as the Apple DOS 3.3 file is created.

Any errors will be listed on the screen.

MOVING TEXT FILES FROM APPLE TO CP/M 68K DISKETTES

Use the program "TEXT TO CP/M", on the "Apple Emulation Utilities" diskette, to move a type T file on an Apple DOS 3.3 formatted diskette to a CP/M 68K formatted diskette. Make sure that the CP/M 68K formatted diskette has enough free space for the file(s) to be transfered.

*** The Mass Storage Unit must be active when running this program. Use <F7> in the welcome message or the "+M" parameter in the command line used to start the Emulator.

From within the Apple][Plus Emulator, put the backup copy of the "Apple Emulation Utilities" diskette in drive 1 (A:), and enter the following command.

]RUN MENU,D1<CR>

and choose option 2, OR enter

]RUN TEXT TO CP/M,D1<CR>

*** Please note that only a limited number of lines can be transferred with this program. Any larger files will need to be segmented and then rejoined after the transfer.

The program will require the entry of the Apple file name, the CP/M drive, and the CP/M file name. All of the disks must be in place before the entry of the CP/M file name.

*** See the detailed instructions, for the program to move Applewriter II files to a CP/M 68K diskette, for an indication of the options and procedures for entering the file names.

First, the cursor will be seen flickering in place as the Apple DOS 3.3 file is read into memory. Then, the text will be seen being printed on the screen as it is stored into the CP/M 68K file.

Any errors will be listed on the screen.

MOVING APPLEWRITER II FILES TO CP/M 68K DISKETTES

Applewriter II files are simply text files that have extremely long sequences of characters between <CR> characters. Applewriter II stores a single <CR> character at the end of each paragraph in your text.

The "TEXT to CP/M" program will not correctly transfer files that have lines longer than 250 characters. The "AWII TO CP/M" program will handle this by dividing any line, that is longer than 70 character columns long, at the first space beyond character column 70. A <LF> is added to each <CR> so that the CP/M 68K convention is followed.

The "AWII TO CP/M" program is not suitable for transferring BASIC programs because it may break a BASIC statement line. Also it is considerably slower.

The "AWII TO CP/M" program, on the "Filer" diskette, runs similarly to the other programs that have been described above. The program will need a CP/M 68K formatted diskette with enough free space for the files that are to be transfered.

*** The Mass Storage Unit must be active when running this program. Use <F7> in the welcome message or the "+M" parameter in the command line used to start the Emulator.

From within the Apple][+ Emulator, put the backup copy of the "Apple Emulation Utilities" diskette in drive 1 (A:), and enter the following command.

```
]RUN MENU,D1<CR>
```

and choose option 3, OR enter

```
]RUN AWII TO CP/M,D1<CR>
```

The screen will clear and you will see the message and prompt,

```
                DIMENSION 68000

          MOVE APPLEWRITER II FILES TO CP/M 68K


          ENTER APPLE FILE NAME FOR INPUT
           (OR D1 OR D2 FOR CATALOG):
```

Respond with the name of the file that is to be transfered to CP/M 68K. For example, to transfer the file MYTEXT, enter the following response.

```
MYTEXT<CR>
```

If it is necessary to see the catalog of the diskette with that file on it, then make sure the source diskette (Apple format) is in drive 1 (A:) and, enter the following response instead.

D1<CR>

The program will respond by showing the CATALOG. (A key may have to be pressed to get the catalog to finish if it is longer than one screen.) Then, the same prompt line will be seen again.

After entering a file name, the following message will be seen.

ENTER DRIVE FOR CP/M OUTPUT:

Do NOT include the colon (:) after the drive name. Applesoft does not allow colons in keyboard responses. If the transferred file is to be saved on drive B: (which is a usual way to do things), enter the following response.

B<CR>

Any erroneous entry will cause an error message to be shown and cause the program to request that entry again. Be sure not to enter a drive that does not exist or that does not have a diskette in it. CP/M does not signal such errors to a running program and the program will get stuck, forever (or "hung up").

After entering a drive specification that is between A: and P:, the program will show the following prompt.

ENTER CP/M FILE NAME FOR OUTPUT
(OR D FOR DIR):

Respond with a valid CP/M 68K file name and extension. Start the name with an alphabetic character followed by up to 7 alphabetic characters or numbers. Optionally you may add a period (.) and three character extension on the end. Do not include any spaces in the file name. (A good extension for text files is TXT as in LETTER.TXT.) Do not type the name with any lower case letters -- use capitals only.

For example, to create or re-create the file MYTEXT.TXT on the CP/M 68K diskette, make sure that the Apple diskette is in place and that the CP/M 68K diskette is in place and, enter the following response.

MYTEXT.TXT<CR>

If it is necessary to see what files are already on the CP/M 68K diskette, then instead enter the following response.

D<CR>

The program will show the CP/M 68K directory in two columns, but it will be similar to the listing given by the DIR command in CP/M. Then after the directory listing, the following prompt will be seen.

PRESS RETURN WHEN READY

When return is pressed, the directory will be erased and the message asking for the CP/M file name will be seen. Both diskettes MUST be in place before responding to the request for the CP/M 68K file name. After the CP/M 68K file name is entered, press <Retrn>, then the following message will be seen.

... READING DOS TEXT FILE ...

Then, after a while, the text of the file will be seen scrolling across the screen (it isn't fast). The lines will be spaced too much, but this will not carry over to the transferred file.

Eventually, the following message will be seen.

FILE COPIED CORRECTLY

And the program will stop.

Press <Ctrl> <Alt> and <Del> at the same time and then press the <Break> key to exit the Apple][Plus Emulator back to CP/M 68K. The CP/M 68K TYPE command may be used to make sure the file was transferred correctly. Or, the CP/M 68K text editor program may be used to view the results and make any changes.

MOVING BASIC PROGRAMS TO CP/M 68K FOR USE WITH UNIBASIC

Applesoft BASIC program files (which are type A) cannot be transferred directly to CP/M 68K. They must first be converted to type T text files. Then the text files are transferred using option 1 of the MENU program (the "TEXT TO CP/M" program). Option 3 (the "AWII TO CP/M" program) will not transfer a program correctly.

To convert an Applesoft BASIC program to a text file, enter the Apple][Plus Emulator, and then put the disk that has the Applesoft BASIC program that you wish to convert into Drive 1. Put the "Apple Emulation Utilities" diskette into Drive 2. Enter the following command.

```
]LOAD basic program,D1<CR>
```

Fill in the real name of the program for the words "basic program" in the line above. The Apple command CATALOG D1 will show the names of the files on that diskette.

Drive 2 holds the "Apple Emulation Utilities" diskette with the mover programs on it. Enter the following Command.

```
]EXEC ASOFT TO TEXT EXEC,D2<CR>
```

A few lines will scroll on the screen.

Drive 1 should now hold a disk that has enough room for the Applesoft BASIC program as a text file. Enter the following commands.

```
]CATALOG D1<CR>          To direct the output to drive 1
]RUN<CR>
```

The program will be stored on the diskette in drive 1 as an ASCII text file with the filename "TEXTFILE". To transfer the program, which is in text form, to a CP/M 68K diskette, the "TEXT TO CP/M" program will be used. This program is described previously. The CP/M 68K program entitled "ADDLF" will possibly need to be used to add the <LF> characters to the resulting file on the CP/M 68K diskette.

ADDING LINE FEED CHARACTERS TO FILES WITHOUT THEM

Sometimes, after transferring a text file to CP/M 68K, there will be no <LF> characters after each <CR> character. The <LF> characters are necessary to most CP/M 68K programs using text files.

The problem manifests itself as a file that, when listed using the CP/M 68K TYPE command, appears normal. However, when there is an attempt to use it, one of several problems pops up:

1. The editor program doesn't seem to load any text.
2. Text is loaded but has turned into one long line.
3. Unibasic says there is a SYNTAX ERROR when the file is ALOADed.
4. The DUMP program shows there is no ØA after a ØD character.

If one of these problems exists with a file that was transferred over from Apple DOS 3.3 with the mover programs, you will need to use ADDLF.

To add <LF>s after each <CR>,

1.) Get the system to CP/M 68K. Either leave the Apple][Plus Emulator or "boot" the "SYSTEM 1" diskette.
2.) Put the emulator diskette with the "ADDLF.68K" program in drive B:.
3.) Put the diskette with the file to be changed in drive A:.
4.) Make sure there is enough free space on the diskette for a new file of the same size with <LF>s added to each <CR>
(i.e. 1% - 3% larger).
5.) Enter DIR A:<CR>
to make sure that CP/M 68K knows that the disk in drive A: has been changed.
6.) Enter B:ADDLF A:file.ext >A:newfile.ext<CR>
filling in the file names.
The existing file is first and the new file (with <LF>s) is second.
The new file must have the greater-than sign (>) in front of it.
7.) Wait for the A> prompt to return and it's done.

Now the ALOAD command in UNIBASIC can be used to load the file into the UNIBASIC workspace. Or, edit the text in the file with a text editor program. (eg. ED on the "SYSTEM 2" diskette.)

DIFFERENCES FROM A NORMAL APPLE][PLUS

LOWER CASE KEYBOARD

The DIMENSION 68000 comes with a high-quality keyboard that supports both upper and lower case letters, all printable ASCII characters, and a variety of special purpose keys. In APPLE][Plus Emulation, if the +L (or -U) is given in the command line or if the option is made active (with the <F8> key in the Welcome Menu), then a modified version of the F8 Monitor ROM allows lower case letters to be typed in, as well as the usual upper case letters on the Apple][Plus keyboard. Many programs will not recognize commands, if they are entered in lower case. For example, if the Apple DOS 3.3 command "catalog" is entered in lower case letters, then Apple DOS signals a SYNTAX ERROR. The same is true for Applesoft BASIC and it is true for Integer BASIC, although string constants and REMarks can have lower case letters in them.

Usually, it is well to press the CAPS LOCK key (to the right of the space bar) immediately at the start of Apple][Plus Emulation. When the red light on the CAPS LOCK key is ON, only upper case letters can be typed. Number and Special Character keys act normally.

Control characters that are greater than control-Z cannot be entered in the usual way. Use the table of special key sequences below if you must enter these control codes.

In the Apple][Plus Emulator only some of the special purpose keys are defined. If the NUM LOCK key is pressed, the light on that key will come ON and the numeric keypad will be available for typing the numbers 0 through 9 and the period (.). But, the left and right arrow keys will return the characters "4" and "6", respectively. In this case, use the the <F1> and <F2> keys for left and right arrow keys, respectively.

If the NUM LOCK light is OFF, these codes are returned by the following special purpose keys:

Key Labeled	ASCII	Control Code	Notes
F1	$88	control-H	left arrow
F2	$95	control-U	right arrow
F3	$84	control-D	for DOS
F4	$85	control-E	for MSU
F7	$93	control-S	pause
F8	$93	control-S	' '
F9	$83	control-C	DOS break, Pascal ETX
Tab	$89	control-I	
BackSpace	$88	control-H	
<--	$88	control-H	*NUM LOCK off
-->	$95	control-U	*NUM LOCK off
(up arrow)	$8F	control-O	*NUM LOCK off
(down arrow)	$8C	control-L	*NUM LOCK off
Break	$83	control-C	
Enter	$8D	control-M	(return)
Insert	$89	control-I	

** The <-- key, the BackSpace Key, and the F1 key all act like the <-- key on an Apple][Plus. Also, the --> key and the F2 key act like the --> key on an Apple][Plus.

In addition, the following special key combinations are needed to access several special codes that are not available in the normal way on the DIMENSION 68000 keyboard. Notice that the "Alt" key is similar in function to the "Shift" and "Ctrl" keys. All three of these change the effect of pressing one of the other keys on the keyboard.

Key Group	ASCII	Control Code	Notes
Alt+Shift+"[{"	$9B	control-[	Same as ESC
Alt+Shift+"|"	$9C	control-backslash (\)	
Alt+Shift+".>"	$9D	control-]	Apple = Ctrl-Shift-M
Alt+"6^"	$9E	control-carat (^)	Apple = Ctrl-Shift-N
Alt+"-_"	$9F	control-underline	
Ctrl+Alt+Del	causes a reset to occur		

All other special purpose keys, including the other 3 function keys at the left side of the keyboard, are not defined. A keystroke will not be recorded by pushing these undefined keys.

LOWER CASE CHARACTERS DISPLAYED

The Apple][Plus Emulator adds the equivalent of a Lower Case Display generator to the the Apple 40-column screen. This allows lower case letters to appear on the screen when included in a BASIC string, when printed using the Applesoft CHR$ function, or when read in from a peripheral device such as a MODEM or a disk drive. The lower case characters have the ASCII codes $E0 to $FF. They are not avaible in the INVERSE or in the FLASH modes, and hence, they will not appear under the cursor.

NO FLASHING CHARACTERS

The un-enhanced DIMENSION 68000 has NO flashing character capability. This means that any flashing characters are printed as inverse. The most obvious place that this shows up is in the Applesoft cursor character. It is an inverse block (space character) rather than a flashing block.

INVERSE and NORMAL characters are shown as usual for an Apple][Plus.

DISK DRIVES

The DIMENSION 68000 disk drives are normal Apple][disk drives. The drives support "half-tracking" and the drives will read most Apple][diskettes, whether the diskette is copy protected or not. Because the Apple][Plus Emulation causes pauses in the execution of the Apple][program that the Apple][program does not know about, any copy protection technique that is timing sensitive, with respect to the diskette drives will fail to load on the DIMENSION 68000 Apple][Plus Emulator.

Only, drives A: and B: (D1 and D2) are available in Apple][Plus Emulation, but these drives will support 40 track software. This special software is not available from Micro Craft but several programs that provide 40 track software for the Apple][Plus are available from other companies.

Using the <F6> key to declare the disk drives in slot 6 inactive has no effect whatsoever. The option is included to keep things well organized in the welcome menu.

Drives A: and B: MUST be 40 Track drives in order to properly WRITE as Apple drives D1 and D2.

THE MASS STORAGE UNIT (MSU)

Use the +M option in the command line or use the <F7> within the welcome menu to turn on the Mass Storage Unit (MSU). The MSU is in slot 7 of the Apple][Plus Emulator. Do not access slot 7 for any other purpose.

GAME PADDLE AND JOYSTICK PORTS

Adding Game Paddles or Joysticks to the "GAME CONTROL" connector at the back of the Dimension 68000 will make them available to programs running under the Apple][Plus Emulator. Standard Apple][Plus Game Paddles or Joysticks cannot be plugged into the GAME CONTROL port, but this is only due to connector differences.

Some values between 0 and 255 are never returned by the PDL function in Applesoft BASIC. However, the full range of values is supported. This means, for example, that the PDL function will never return the values 4 or 204, but the values 3, 5, 203 and 205 can be returned (depending on the paddle or joystick setting). There are NO Apple][programs that are known to fail because of this difference.

The following 6502 Assembly Language program can provide a quicker method of obtaining the game paddle port reading.

A DIMENSION 68000 ASSEMBLY LANGUAGE ROUTINE
TO QUICKLY READ ALL FOUR PADDLES

```
READ4:
        BIT $C070       Trigger all four paddle inputs
        LDX #3          Index Register 3, 2, 1, 0

LOOP:   LDA $C064,X     Read Paddle X
        LSL             Paddle Value is now in 6502 Accumulator
        STA PDL,X       Save it away
        DEX             Maybe do next Paddle down
        BPL LOOP        .. and loop if not all 4 done
        RTS             PDL now has the 4 values in 1 byte apiece

PDL     HEX 00000000    4 bytes storage
```

The normal method of reading the paddle inputs will work, as usual. This assures compatability with most off-the-shelf Apple][Plus software.

CASSETTE TAPE SAVE AND LOAD

The DIMENSION 68000 does not support Cassette Tape input and it does not support Cassette Tape output. Any program that uses any of the following things will need to be changed.
- the BASIC commands SAVE or LOAD (with no DOS file names)
- the BASIC commands SHLOAD or SHSAVE
- the MONITOR commands R or W
- any instruction that accesses the I/O addresses $C020 through $C02F
- any instruction that accesses the I/O address $C060

In general, any attempt to output (SAVE) will have no result. But any attempt to input (LOAD) will result in the program waiting forever.

ANNUNCIATOR PORTS AND UTILITY STROBE

There are NO Annunciator Ports in the DIMENSION 68000. If a program in the Apple][Plus Emulator accesses the annunciator addresses ($C058 to $C05F), no action will be taken, nothing will be hurt, and nothing will happen.

There is NO Utility Stobe in the DIMENSION 68000. If a program in the Apple][Plus Emulator accesses the Utility Strobe output addresses ($C040 to $C04F), no action will be taken, nothing will be hurt, and nothing will happen.

OPTIONS TO ENABLE AND DISABLE PERIPHERAL CARDS

Note that options can either be in upper or lower case.

Option	Action
+R	Leave the 16K RAM Language card enabled ("plugged in").
-R	No 16K card is emulated.
+P	Leave the Parallel Printer Card in slot 1.
-P	No Printer card is emulated.
+S	Put the Serial Card in slot 2. (not yet available)
-S	No Serial card is emulated.
+8	Put the 80 Column Display card in slot 3.
-4	Put the 80 Column Display card in slot 3.
-8	No 80 Column card is emulated.
+4	No 80 Column card is emulated.
+M	Put the Mass Storage Unit in slot 7.
-M	No Mass Storage Unit is available to Apple programs.
+L	Lower case characters are allowed to be typed.
-U	Lower case characters are allowed to be typed.
-L	Lower case characters are converted to Upper case.
+U	Lower case characters are converted to Upper case.

These options are included optionally in the command line that runs the Apple][Plus Emulator. For example:

apple -r +8<CR> NOTE: Upper or Lower case letters are both OK.

This will cause the Emulator to begin operation with NO 16K RAM Language card available and with the 80 Column Display card being emulated in slot 3.

These options may, of course, by changed by pressing the appropriate function key (<F1> to <F10>) when the welcome menu comes up on the screen before the Apple diskette is booted at the first.

The default options are shown in the sample command line below:

APPLE +r +p -s -8 -m +1<CR>

You should set the parameters appropriately for the programs that you will be using under the Emulator. (eg. some copies of Applewriter II will not run correctly when the 80 Col card is turned on with +8 or -4 option or the <F3> key.)

DETAILED DESCRIPTION OF EMULATED PERIPHERALS

This section is intended to assist programmers that need to know specifics about the cards that are Emulated in the various slots. Note that the slots that are discussed are NOT physical slots in the DIMENSION 68000. The Dimension slots are described in the "DIMENSION 68000 System User's Guide" and "DIMENSION 68000 System Reference Manual."

All of the slots that are not defined below and all of the slots that are defined below (but are disabled from the welcome menu), have the following program in the section of ROM allocated to that slot.

```
CX00:       JSR $FE93       ; DO PR#0
            JSR $FE89       ; DO IN#0
            RTS             ; LEAVE AND LET DOS REHOOK ITSELF
```

This means that any such peripheral slot when activated with a PR# or IN# command will immediately deactivate itself with the equivalent of a PR#0 and IN#0 command. From the keyboard the Applesoft prompt] will then print immediately after the command on the same line.

If IN# is active on a valid slot and a program uses PR# on an invalid slot the IN# will be turned off.

SLOT 1 - PARALLEL PRINTER CARD

Command parameters:

+P or +p	Printer Card is in slot 1.
-P or -p	No printer card is available in Emulator.

Welcome menu uses <F1>.

This card is recognized by the Pascal 1.1 system as an Apple Parallel Card. No control codes (ie. ctrl-I, Hex 09) are recognized. In BASIC the card always echoes to the video screen, even in 80-col mode. There is not a maximum line length.

Registers: $C090 - Data Output Port
$C1C1 - Data Status Port
Bit 7 = 1 is NOT Ready for Output (MINUS)
Bit 7 = 0 is Ready for Output (PLUS)
Bit 0-6 are undefined (but usuallly 1's)

SLOT 2 - SERIAL COMMUNICATIONS CARD

Command parameters:

+S or +s	Serial Card should be in slot 2.
-S or -s	No serial card is available in Emulator.

Welcome menu uses <F2>.

This card is not yet built into the Emulator.

SLOT 3 - 80 COLUMN DISPLAY CARD

Command parameters:

+8 or -4	80 Column Card is in slot 3.
-8 or +4	No 80 Column card is available in Emulator.

Welcome menu uses <F3>.

Minimal version:

Under BASIC the 80-column display, when enabled, causes the usual Escape codes to be disabled. This precludes using Esc-IJKM or Esc-ABCD to move over the screen and Esc-@EF for clearing parts of the screen. Also the right arrow key does not copy the character under the cursor into the input buffer. These features will be added to a later release of the Emulation Software.

This "card" is recognized by Pascal 1.1 as a FIRMWARE type card.

Pascal 1.0 is not supported and will not work.

The following control-codes are supported when in 80-column mode. These are the same codes supported by the Apple //e 80-column Text card and Extended 80-column Text card. It is a super-set of the codes supported by the Videx 80-column card (with the exception of the ^Z codes to change the screen format):

Dec	Hex	Ctrl	Function
0	$00	@	Do nothing
7	$07	G	Ring the bell (buzzer)
8	$08	H	Move the cursor left one position (backspace)
10	$0A	J	Move the cursor down one line (possibly scroll up)
11	$0B	K	Clear from cursor position to end of screen
12	$0C	L	Home cursor, Clear entire screen
13	$0D	M	BASIC - Move cursor to front of next line down (maybe scroll) Pascal- Move cursor to front of current line
14	$0E	N	Normal display, later chars are NOT in inverse
15	$0F	O	Inverse display, later chars are printed in inverse
17	$11	Q	Switch to 40 col text display
18	$12	R	Switch back to 80 col text display
21	$15	U	BASIC only - Turn off 80 col card
22	$16	V	Scroll down one line (top line becomes blank)
23	$17	W	Scroll up one line (bottom line becomes blank)
25	$19	Y	Move cursor to top, left corner of screen
26	$1A	Z	Clear entire line cursor is on
28	$1C	\	move cursor right one position
29	$1D	]	clear from cursor position to end of line
30	$1E	^	Position cursor, position is specified by the next two chars -- col first, line next. Use the char with ASCII 32 for the leftmost col or top line. Add 1 to the ASCII for each greater position.
31	$1F	_	Move cursor up one line, do not move on top line

All other control codes print graphics characters as defined in the "DIMENSION 68000 System Reference Manual."

Registers:
- $C0B0 - Switch 80 Col display OFF
- $C0B1 - Switch 80 Col display ON
- $C0B2 - Init 80 Col display, Switch ON
- $C0B3 - Switch 80 Col display OFF (alternate)
- $C0B4 - Char Output Port (always ready)
- $C0B5 - Char Input Port
  - Bit 7 = 1 is char Ready for input (MINUS)
  - Bit 7 = 0 is char NOT Ready for input (PLUS)
  - Bits 0-6 are 7-bit ASCII code of last key
  - (Equivalent to $C000)
- $C0B6 - Char Input Strobe
  - Access clears bit 7 of Input Port
  - (Equivalent to $C010)

SLOT 4 - DIMENSION EMULATOR SERVICE FUNCTIONS

This information is proprietary to Micro Craft Corp. Do not access any of the slot 4 addresses. ($C0C0 to $C0CF or $C400 to $C4FF)

SLOT 6 - DISK CONTROLLER CARD

This is a completely standard Apple Disk][controller card.

SLOT 7 - MASS STORAGE UNIT CARD

Command parameters:

+M or +m	Mass Storage Unit is in slot 7.
-M or -m	No MSU is available in Emulator.

Welcome menu uses <F7>.

This information is proprietary to Micro Craft Corp. Do not access any of the slot 7 addresses. ($C0F0 to $C0FF or $C700 to $C7FF)

C H A P T E R 4

C U S T O M E R S U P P O R T

CUSTOMER SUPPORT

The Micro Craft Corporation and its dealers are committed to providing you with the highest quality products and services. Micro Craft appreciates your input. If you have suggestions or comments you would like to make, Micro Craft welcomes them and appreciates your interest.

IF YOU EXPERIENCE DIFFICULTY

If you experience diffilculty, in the installation or operation of your Coprocessor System, your dealer and Micro Craft Corporation are available for assistance. There are a number of checks you may make yourself in order to assist your dealer or Micro Craft in solving your problem.

DIMENSION 68000 MALFUNCTIONS AFTER COPROCESSOR INSTALLATION

If you suspect your DIMENSION 68000 System is malfunctioning after installation of the 6512 Coprocessor Circuit Board, remove the board from the system and check operation.

- If your DIMENSION 68000 functions properly, then the problem is most likely with your Coprocessor. If your Coprocessor does not function properly, but your DIMENSION 68000 does, then return the Coprocessor circuit board to your dealer (or Micro Craft).

- If your DIMENSION 68000 still does not function properly with the Coprocessor removed, then there is a problem in the DIMENSION 68000 System itself. If the symptoms, of the problem, are the not same as the symptoms when the Coprocessor circuit board was installed, then note the changes, in the symptoms, so as to help in diagnosing the problem. If your DIMENSION 68000 does not work, return both it and your 6512 Coprocessor to your dealer.

COPROCESSOR MALFUNCTION

If your DIMENSION 68000 functions normally, but you suspect that your Coprocessor Board may be malfunctioning, there are several tests that you may perform yourself in order to aide in the determination of the problem. Record your observations in order to assist your dealer, and Micro Craft, in solving the problem.

- Does the problem consistently occur with only one software package, or with just a few programs? If the problem occurs with only one program, or with just a few programs, then the problem is most likely an incompatability between the emulation software and your program, or programs. Your dealer may be able to provide assistance in reconfiguring the system to work with your program.

- Do the errors or problems always occur at the same point in the program?

- Do the errors, in the program, occur in a random fashion?

- Does the problem occur when the system has been used for an extended length of time?

- Does the problem only occur with a specific copy of your program or a specific copy of the emulation software? If this is the case, you most likely have a defective diskette.

If you have access to another DIMENSION 68000 system, try to reproduce the problem on that system. If the problem is unique to your system, the problem could be with your hardware.

If you are unable to solve the problem yourself contact your dealer. In many cases, problems may be traced to defective diskettes or an improperly configured system. Your observations will greatly assist your dealer (and Micro Craft) in solving the problem.

IF YOU NEED REPAIR OR ASSISTANCE...

Your authorized Micro Craft dealer is the most expedient means of obtaining repair or assistance with your 6512 Coprocessor board, your DIMENSION 68000 system, or your application software. When contacting your dealer, please make certain that you fully describe the problem. If the problem only occurs under certain circumstances, then make certain that your dealer (or Micro Craft) is told the conditions which created the problem. If you fail to do this, the problem may be overlooked and the system returned to you as it was.

Warranty service may require proof of purchase. Save all the receipts in order to verify the purchase date. In addition, your receipts document ownership of your system for insurance purposes.

If you are unable to contact your dealer or have moved since purchasing your DIMENSION 68000, contact the Micro Craft Customer Relations department for specific instructions. Micro Craft will direct you to the dealer or service center closest to you.

If it is impractical for you to return the product to a dealer, Micro Craft will issue a Return Materials Authorization so that you may ship the unit directly to the factory. Do not return any product to Micro Craft without a return authorization and description of the problem.

Save ALL packing material. If you do not have the original shipping container, Micro Craft will provide (for a nominal charge) a shipping container for the DIMENSION 68000 system unit. When returning the system, make certain that you insure the unit for full replacement cost. Micro Craft is not responsible for damage or loss which occurs to the unit in transit. For additional information on returning equipment for repair, consult the Micro Craft Customer Relations department.

IF YOU NEED ADDITIONAL INFORMATION OR HAVE SUGGESTIONS...

If you have suggestions for improvement or have questions about this documentation or any Micro Craft product we would like to hear from you.

You may contact us at:

Micro Craft Corporation
Customer Relations Department
4747 Irving Blvd., Suite 241
Dallas, Texas 75247