AUGUST 20, 1985

T H E   S W P   C O - P O W E R   S Y S T E M   G U I D E
==

        F O R :   A T R 8 0 0 0

                  A T R 8 5 0 0

                  B I G B O A R D   1   (W/ SWP DD)

                  K A Y P R O   2 , 4   (1983)

                  M O R R O W   M D 3

                  O S B O R N E   1   (W/ DD ONLY)

                  O S B O R N E   E X E C U T I V E

                  X E R O X   8 2 0   (W/ SWP DD)

                  X E R O X   8 2 0 - I I

                  Z O R B A   7 "   (CO-POWER-88 ONLY)

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TABLE OF CONTENTS

DOCUMENT LIST

You should have received three documents with your CO-POWER:

- The SWP CO-POWER System Guide

- Installation Instructions

DISKETTES

You should have received two diskettes with your CO-POWER:

- Load Files and RAMDISK Software Diskette
  (a single-sided CP/M formatted disk)

- SWP DOS Utility Diskette
  (an IBM PC formatted disk. To use this you must also
  have a PC-DOS system disk, which we do not provide.)

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INTRODUCTION

The SWP CO-POWER board is a high speed 16 bit microprocessor with up to one million bytes of random access memory. It comes with a special adapter card that enables it to be interfaced to a Z80 based CP/M computer, which enables that computer to then run IBM PC-DOS, CP/M 86 and RAMDISK.

CO-POWER's RAMDISK feature helps speed up CP/M job operation time. If you purchased the CO-POWER-Plus board, then this RAMDISK is expandable all the way to 1024k, giving you a fast, simulated disk drive large enough to process even enormous database files.

By merging the SWP DOS Utility Disk with a copy of PC-DOS, you can run PC-DOS programs on CO-POWER. Information on making an MS-DOS Master for your computer is in Section Two of this document.

If you haven't already done so, install your CO-POWER following the instructions in the enclosed Installation Instructions. Then use this Guide to learn how to use your new system.

NOTE: You must have the CO-POWER package for your specific computer. If you do not have the correct CO-POWER, you can order a conversion package from SWP Sales.

Special Notes for Osborne Executive

As of May 1, 1985, CO-POWER for the Osborne Executive does not include a CP/M RAMDISK program. The Executive runs CP/M 3.0 instead of CP/2.2. RAMDISK.COM only runs under CP/M 2.2.

Also at this time, CP/M-86 is not available for the Osborne Executive. Again, this is because our CP/M-86 BIOS is written for CP/M 2.2, not CP/M 3.0.

If either of these features become available for the Executive, you will be contacted if you send us your CO-POWER registration and make a special note that you have the Osborne Executive.

PART 1. CO-POWER'S CP/M RAMDISK

When you are not using CO-POWER as an PC-DOS processor, you can use it's memory as a high-speed simulated disk drive for CP/M RAMDISK can greatly speed up the time it takes to do disk-bound applications like sorting large databases, recalculating spreadsheets or moving around in large word processing files.

The best way to use RAMDISK is to transfer both the application program files and your data files to RAMDISK, then run the program. If you do not have enough space to hold both the program files and the data files, you can still speed up your job time by using RAMDISK for one of them. Experiment to find out if it is quicker to have the program or the data files in RAMDISK.

The RAMDISK can be set up to be any of the possible CP/M drivenames, Drive A - Drive P, including the names of 'real' drives on your computer. (If you name the RAMDISK to the same name a 'real' drive has, like Drive A, the 'real' drivenames will be renamed alphabetically. I.E., 'real' Drive A becomes Drive B, 'real' Drive B becomes Drive C, and so on.) This enables you to run programs in RAMDISK that are configured so they must be run from Drive A.

A. Running RAMDISK

RAMDISK has four prompts that set it up. Once you learn how to set RAMDISK for your needs, you can use a shorthand method of running the program, described after this section.

RAMDISK is started by running the RAMDISK.COM program found on the PC-DOS LOAD FILES AND RAMDISK SOFTWARE disk. When run (type RAMDISK from the system prompt), four prompts will appear:

    Drivename (A thru P) to assign to ramdisk ....

Enter the letter for the name you want to use. If you press <return> here, the default drive, M:, is used. Again, if you name the RAMDISK to a drivename that is used by a 'real' drive, the 'real' drivenames will shift accordingly.

    Erase contents of ramdisk file directory (Y/N?) ......

Normally enter Y or press <return> to use the Y default. This will erase the contents of the file directory so it can be initialized for use (this is something that CP/M floppy disk formatting programs do). SAFETY FEATURE: By answering N to this prompt you can sometimes recover your data files if you accidentally reset the computer before transferring files back to a real disk.

    Ramdisk driver load address or <CR> to use default ...

Normally press <return>. More on the use of this feature is in
the Tech Notes section.

    CO-POWER-88 port address or <CR> to use default ......

Normally press <return>. More on the use of this feature is in
the Tech Notes section.

A1. The Shorthand Way to Run RAMDISK

Once you are familiar with the RAMDISK program prompts you can
bypass them by using the following 'shorthand' method of running
RAMDISK.

Simply enter a space after the command RAMDISK and enter the
parameters separated by commas. If you enter less than four
parameters, or if two commas in a row are entered, then the
default value is taken for the undefined one.

For example, this CP/M command:

    A>RAMDISK A

starts RAMDISK and names it Drive A. The directory is erased and
the default parameters for load address and I/O port setting are
used.

For example, this command:

    A>RAMDISK A,N

names the RAMDISK Drive A, does not erase the file directory, and
uses the other default settings.

For example, this command:

    A>RAMDISK B,,FC00

installs RAMDISK as Drive B, erases the directory, and loads the
software in the top 1k of Z80 memory starting at FC00 hex.

One last example:

    A>RAMDISK *

starts RAMDISK with all the default settings. (Drivename is M:.)

B. Copying Files to RAMDISK

Once RAMDISK is set up, use PIP, DISK or another file copy program to transfer files to it. Refer to the RAMDISK drive like a normal drive in the copy program formulas. If you name the RAMDISK to the same drivename that a 'real' drive normally has, be sure to remember the "new" drive names. (I.E. If RAMDISK is A:, then 'real' A: is B: and so on).

B1. Using SUBMIT Files

If you use RAMDISK to regularly work on a specific program, consider creating a CP/M SUBMIT file to automatically move the program and related files to the RAMDISK. SUBMIT is described in your CP/M Owner's Manual. Following is an example of using it.

Situation: Moving WordStar into RAMDISK and running it. When WordStar is exited, copy the WordStar data files back to a real disk. In this case RAMDISK is Drive A:, the WordStar master disk is copied from Drive B: ('real' Drive A), and the data files are written back to Drive C: ('real' Drive B).

First create the file to be used by SUBMIT: (Enter this exactly as shown.)

TYPE THIS	THEN	THEN
A>PIP SETUP.SUB=CON:	<RETURN>	
PIP A:=B:WS*.*[V]	<RETURN>	<LINE FEED>
WS	<RETURN>	<LINE FEED>
B:PIP C:=A:*.DOC[V]	<RETURN>	<LINE FEED>

End the input by entering <CTRL><Z> and <RETURN>. There is now a file on your disk called SETUP.SUB. To test the above file:

In Drive A have a disk with these files: WS.COM
WSOVL1.OVR
WSMSGS.OVR
RAMDISK.COM
SUBMIT.COM
PIP.COM

In Drive B place a formatted disk for WordStar data files to be written to. (It can already contain files.) The SETUP.SUB file requires that all data files have the .DOC extent.

Now that everything is set up, you can easily start RAMDISK, transfer WordStar, and transfer .DOC files when you exit. Start the process by:

A>RAMDISK A
A>B:
B>SUBMIT SETUP

NOTE: If you do not set up the RAMDISK as Drive A, i.e. B-P, then you can also include the RAMDISK command in the SUBMIT file. Using the same example altered so that RAMDISK is Drive C:, the SETUP.SUB file is:

```
      TYPE THIS                      THEN          THEN
      --------------------       ----------    -----------
A>PIP SETUP.SUB=CON:             <RETURN>
      RAMDISK C                   <RETURN>      <LINE FEED>
      PIP C:=A:WS*.*[V]          <RETURN>      <LINE FEED>
      C:                         <RETURN>      <LINE FEED>
      WS                         <RETURN>      <LINE FEED>
      A:PIP B:=C:*.DOC[V]        <RETURN>      <LINE FEED>
      <CTRL><Z><RETURN>
```

To run this, simply enter:

```
A>SUBMIT SETUP
```

C. Saving Data When Using RAMDISK

RAMDISK is an electronic disk drive. When the computer is powered down the files in RAMDISK are erased. Before you reset or power down the system, copy any new or modified files back to a real disk.

You can use PIP, DISK or another copy program to do this. Unless a program is modified, there is no need to recopy this type of program since it already exists on the disk it was copied from.

If you frequently use the same data files you may want to create a SUBMIT file to easily copy data for you. More on this is described in the previous subsection.

SAFETY FEATURE: If you accidentally reset the computer before saving files back to disk or if you 'lock up' the computer, you may be able to recover your files. In this situation, rerun RAMDISK making sure to name RAMDISK to the same drivename you were using and answering N to the erase directory prompt. Look at the RAMDISK file directory. Your data should be there and you can now save it to a floppy disk.

The above method should usually recover your data. This does not work if you powered down the system and may not work if the reset button is held down too long. Nonetheless, it is always worth a try!

D. Running PC-DOS or CP/M-86 After Running RAMDISK

Once RAMDISK is run, you must reset the computer before entering
PC-DOS or CP/M-86. This resets the 8088 chip so the boot loader
can be executed again.

Remember RAMDISK's safety feature. If you accidentally reset the
computer before saving files in RAMDISK, you may be able to save
them. In this case, rerun RAMDISK, name it the same drivename and
answer N to the second prompt. Check the RAMDISK directory to see
if the files are still there.

When the power is turned off, all data in RAMDISK is erased.

E. Technical Notes

This section describes the RAMDISK program prompts and possible
answers in detail. It also details error codes. This is provided
for technically-oriented users.

E1. User Definable Parameters

1. Drivename (A thru P) to assign to ramdisk ....

RAMDISK can be installed with any of the 16 possible drive ID's
allowed in CP/M, including one already taken by a 'real' drive.
The default drivename, used if you press <return>, is M:. If you
assign RAMDISK to a currently existing drivename, then that drive
and all others after it are moved in sequence to the next name.

For example if you have a two drive system with Drives A: and B:
and you name RAMDISK to B:, then Drive A: does not change,
RAMDISK is Drive B: and the 'real' Drive B is now named Drive C:.
This assignment of drivename is done purely in software and in no
way requires any of the physical disk drive select hardware to be
changed.

If RAMDISK is named to Drive A:, the other drivenames are moved
as described above, plus RAMDISK has a copy of your CP/M
operating system written to it. This happens so that all future
warm boots (CTRL Cs) are done from the RAMDISK. This speeds up
normal operation and frees you from always having to keep a
'sysgened' disk in physical Drive A:. Because of the extra space
taken for CP/M, RAMDISK set up as A: will have slightly less
storage space than when it is set up for Drives B: through P:.

2. Erase contents of ramdisk file directory (Y/N ?) ....

The file directory of a CP/M disk must be initialized to a known
state before the disk can be used. Floppy disk formatting
programs usually do this for floppies and a similar process must
be performed on the RAMDISK. The default for this prompt is Y.
Answer Y to this prompt whenever you are loading the software for
the first time since powering up the computer, or whenever you
load the RAMDISK after previously running DOS or CP/M-86.

SAFETY FEATURE: The directory can be left intact by answering N.
Use this if you need to reload the RAMDISK software without
losing any of the data in the 8088's memory. This situation could
arise if you needed to get out of a lock-up situation by pressing
the computer's reset button.

3. Ramdisk driver load address or <CR> to use the default....

This prompt allows you to define where in the Z80's memory the
ramdisk driver will be loaded. Use the default option (press

<return>) if you do not know the location of any free space in high memory for the software to use. With the default, the RAMDISK driver will be automatically relocated just below CP/M's console command processor, and the size of the TPA (free memory for user programs) will be reduced by 3k bytes to make room.

If you cannot tolerate the loss of 3k from the TPA, a place for the RAMDISK driver can usually be created by generating a smaller CP/M system using the utility programs 'MOVCPM' and 'SYSGEN'. The precise operation of these programs varies between manufacturers, so consult your system's documentation on how to generate a new CP/M system. Having done that, you can specify the address of a 1k byte block of memory starting on an even 256 byte boundary as the load address of the RAMDISK driver. This address is specified in hexadecimal notation.

4. CO-POWER-88 port address or <CR> to use default ....

The CO-POWER board communicates with the Z80 processor in your Kaypro computer through a pair of jumper-selectable I/O ports. The provided RAMDISK software for your computer has been set for the correct address of your machine, so you will usually respond to this prompt by pressing <return>.

If you are using CO-POWER in a computer not specifically supported by SWP, you will need to enter the starting address of the two ports being used. The input is in hexadecimal with valid values ranging from 0 to FE.

There are two styles of CO-POWER Z80 Adapter Boards. On one, the I/O port addresses are defined by 4 jumpers on the CO-POWER Z80 adapter board. On the other, they are determined by a PAL chip on the Z80 Adapter Board. On the jumper style board, the jumpers allow us to define the value of the upper 4 bits of the port address being decoded. The lower 4 bits are fixed permanently as 1110 ('E' in hexadecimal). This gives 16 possible sets of port addresses in the form 0E, 1E, 2E, etc. through FE. Some custom daughter boards may have hardwired port addresses with different values.

E2. Error Conditions

After loading, displaying the signon message and getting input from either the command buffer or direct from the console keyboard, the ramdisk software will take a moment to communicate with the 8088 processor and then exit back to CP/M. Upon exit a summary of the settings assigned for drivename, directory fill, load address and port number is displayed. If you get to here you are in business, otherwise some kind of error condition exists.

Most of the time this is due to invalid input data. When the program cannot make sense of what you typed in the direct input mode, the prompt is simply reissued and the input must be

repeated. If the data was all included on the command line as described in the previous section, then the program simply displays the following message and terminates:

*** invalid parameter in command line ***

Here is the current list of errors that will get you in trouble in this respect.

a) Drivename outside the range A through P.

b) Response other than Y,N or <CR> to directory fill prompt.

c) Load address not valid hexadecimal, that is not composed of the digits 0 through 9 or A through F.

d) Load address below BIOS start or not on even 256 byte boundary.

e) I/O port address not valid hexadecimal.

f) I/O port address greater than FE hex.

A couple of other conditions may exist that will make it impossible to load the ramdisk software. One possibility is that the I/O port address for CO-POWER is not really correct for the actual system being used. It is also possible to get the 8088 stuck in a situation where it will not respond. In both cases you will get the following error message:

*** cannot load, 8088 does not respond ***

If you see this message, you should check to see that you are using the correct CO-POWER Z80 Adapter Board for your system, and that CO-POWER is correctly connected to the computer. After doing that, press the Z80's reset button, reboot CP/M and try running RAMDISK.COM again.

Another error can occur when using ramdisk as logical Drive A:. In this case the ramdisk software must locate your copy of CP/M in memory and transfer it to the ramdisk for use by subsequent warm boots. A special mechanism called a CRC check is used by the software to insure that a valid copy of CP/M is present in memory. If this check fails to verify, you will see the following message:

*** not standard CP/M system, cannot load ***

If this happens you will not be able to use the ramdisk as Drive A: unless you can find what is causing the CRC to fail. The most likely causes are listed below:

a) The operating system is not CP/M version 2.2, but rather some look alike such as CDOS, TPM, TurboDOS, CP/M+ or MP/M. Consult SWP on the availability of ramdisk software for these systems.

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b) The operating system is CP/M 2.2 but the code has been altered in some way for use on your machine. Also call SWP for help.

c) The operating environment of your system has been altered by an applications program that was run previously. Any program that alters the BIOS jump table or the BDOS vector at location 5 should be loaded after you load the ramdisk driver, not before. Even if you reverse the load sequence there may be some such programs that will not work with the ramdisk.

PART 2. Using DOS on CO-POWER

SWP's PC-DOS Utility Disk is included with your CO-POWER. By combining this disk with a copy of PC-DOS version 2.1 (not included) you can run PC-DOS on your computer. The Master DOS disk (what we call the combined SWP/PC-DOS master) has many enhanced PC-DOS features for CO-POWER. These include file transfer programs to copy data files between CP/M and PC-DOS, multiple PC-DOS screen drivers so you can install more software, and communications 'hooks' which make it easy to adapt modem software for your computer.

This PC-DOS section details PC-DOS features that are specific to SWP's system. Information on standard DOS features are in your PC-DOS Manual. Thoroughly read this section to learn about your system and to know how to take advantage of CO-POWER's special features.

NOTE: Be sure to read about the screen driver feature in Section C. The driver you use must match the installation of your PC-DOS software.

NOTE: Prior to August 1, 1985, CO-POWERs included the MS-DOS operating system. MS-DOS is no longer available due to excessive OEM price increases from Microsoft. The new software included with CO-POWER makes it possible to run IBM PC-DOS on the CO-POWER while retaining most of the features of the June 10, 1985, version of MS-DOS from SWP.

A. Booting PC-DOS and Making a Master DOS System Disk

You received two disks with the CO-POWER, a SWP PC-DOS Utility
Disk and a disk with PC-DOS Load Files and RAMDISK Software. The
Load Files disk is a single-sided CP/M disk. The other disk is an
IBM PC formatted disk.

PC-DOS is booted in two stages. The first step is done by running
the CP/M program PCDOS.COM. This loads the Z80 software that
provides all the 8088's input/output functions and transfers
control to the 8088 in preparation for loading PC-DOS. The second
step is to remove the CP/M disks and place a bootable PC-DOS disk
(not provided by SWP) drive A:. This enables the PC-DOS load to
be completed.

Before booting DOS for the first time, copy the PCDOS.COM file on
the PC-DOS Load Files disk to a bootable CP/M disk.

To boot DOS for the first time you need:

- a PC-DOS 2.1 system disk

- a bootable CP/M disk with the PCDOS.COM file

To boot:

#1   Turn on the computer and boot CP/M using the disk you copied
PCDOS.COM to. (Use your normal boot procedure).

#2   From the A> prompt in CP/M, type the command PCDOS<return>.

#3   In a few seconds the screen will show:

    ... Ready to load DOS ...

    Insert a DOS system disk in the boot drive
    and type any key when ready to begin loading

    ?

    Put a PC-DOS 2.1 system disk in Drive A and press any key.

#4 The screen will show the messages listed below and then begin
loading DOS from the disk in drive A:.

```
*********************************
**                           **
**  SWP Microcomputer Products **
**  1000 West Fuller           **
**  Fort Worth, Texas 76115    **
**  copyright 1983,84,85       **
**  20-August-85               **
**                           **
*********************************
```

Current date is: Tue   1-01-1980
Enter new date:

Enter the date in the format shown (month,day,year) or press
<return> to bypass. (PC-DOS files are time and date stamped
in the directory so this can be a very useful feature.)

Next the screen shows:

Current time is: 0:00:00.05
Enter new time:

Again, either answer or press <return> to bypass. Next the
screen shows the IBM sign-on message and the logged drive
prompt:

The IBM Personal Computer DOS
Version 2.10

A>

#5   The initial boot is now done. To take advantage of SWP's MS-
DOS utility programs, you'll make a Master DOS disk that
will combine the PC-DOS files and the SWP files.

First make a copy of the PC-DOS disk by doing the following:
Have the PC-DOS disk in Drive A and put a blank disk in
Drive B, then enter:

A>FORMAT B:/S

The screen will say:

Insert new disk for drive B:
and strike any key when ready

Press any key. The screen will tell you what is happening.
These messages will show:

Formatting . . . Format complete
System transferred

362496 bytes total disk space
 40960 bytes used by system
321536 bytes available on disk

Format another (Y/N) ?

Answer N. (Note: if you have single sided disk drives,
          the disk space shown will be about half
          this amount.)

#6   Now we'll copy all files from the PC-DOS disk to the new disk. With the PC-DOS disk still in Drive A and the new disk in Drive B, enter:

        A>COPY *.* B:/V

    When the copy is completed, remove the PC-DOS disk from Drive A and store it. Place the new disk from Drive B into Drive A. Put the SWP PC-DOS Utility Disk in Drive B. Log onto Drive B with the command:

        A>B:<return>

    Now we'll run a program on the SWP disk that will copy some of SWP's files to the disk in Drive A and will remove files that do not pertain to the CO-POWER system. The resulting disk will be your Master DOS disk. Type:

        B>SETUP<return>

    When the program is done, you will return to the B> prompt. Label the disk in Drive A the "Master DOS" disk. Set aside the SWP PC-DOS Utility disk.

#7   For SWP's PC-DOS features to become part of DOS we must reboot PC-DOS using the Master DOS disk in place of the PC-DOS disk. Log onto Drive A (A:<return>) and run the Z80 program to return to CP/M:

        A>Z80<return>

    A screen message tells you when to put a CP/M system disk in Drive A. Use the bootable disk containing PCDOS.COM.

#8   Now let's go back to PC-DOS. From CP/M A> type PCDOS and <return>. When prompted for the DOS disk, use the Master DOS disk we just made.

    The screen will show the same SWP sign-on message and then the following:

        CPM: device driver installed
        Multi-mode console driver installed
        Current time is: 0:00:00.0
        Enter new time:

The rest of this section tells you how to use SWP's special DOS features. The PC-DOS boot automatically loads the ANSI24 screen driver. You can change this default using the information in Section C3.

SPECIAL NOTES: To make a PC-DOS system disk that will boot the SWP system, it must be sysgened with the FORMAT /S command and it must contain these files:

CONFIG.SYS

File to define system set-up parameters and to load user writtem extensions to PC-DOS. Read about this in the DOS user's manual from IBM.

CONSOLE.SYS

Loadable driver for multi-mode console device to replace the standard IBM console.

MULTFMT.SYS

OPTIONAL module. This is a loadable driver for non-standard disk devices. Include the statement DEVICE=MULTFMT.SYS in the CONFIG.SYS file only if you have a hard disk, quad density five inch disks or eight inch disks. These extra drives will appear as drives numbered C: or higher on most systems. (drive D: or higher on SWP's ATR8000 computer.)

XCPM.SYS

Loadable driver to provide for the DOS <--> CP/M file transfer capability.

8. Backing Up The SWP Master Disks

Before learning how to use your new CO-POWER system, it's a good idea to make copies of the SWP Master Disks and to store the originals.

The PC-DOS Load Files and RAMDISK Software Disk is a single-sided CP/M disk. If you have not already done so, make a backup copy of this disk like you would any CP/M disk.

The SWP PC-DOS Utility disk is an IBM PC format disk. Backup up this disk by booting PC-DOS and doing the following:

1. Run FORMAT and format a new disk.

   FORMAT X:/V

   where X: is the drive (ie. A,B,C or D) to be used.

   (PC-DOS's FORMAT automatically formats single-sided disks if the drive is single-sided, and double-sided disks if the drive is double-sided.)

2. COPY all files from A> to another drive by:

   A>COPY *.* X:/V

   (COPY is an internal command, not a disk file. B: is the destination drive and /V verifies the transfer.)

For better protection: Be sure that your master disks are write-protected before you store them. 5 1/4" disk users should place a foil tab over the write-protect notch on the disk. 8" disk users should remove the foil tab if it is on the disk.

More about formatting and copying disks is described later in this section and in your PC-DOS Manual.

C. Selecting and Using PC-DOS Screen Drivers

SWP's multi-mode console driver has a feature that lets you dynamically select different screen formats. With this feature you have can select between an a) ANSI terminal emulation and b) the native display of your CP/M machine.

ANSI control codes are used in many PC-DOS applications programs that are intended to be adaptable to different types of machines, rather than being just for the IBM PC. Among the ANSI features are highlighting (or inverse video), cursor positioning, clearing portions of the screen and other functions.

Not all PC-DOS programs will run under both drivers. The default for your system is the ANSI24 driver. If a program doesn't run correctly under ANSI24, it may work under the other driver. Experiment and keep track of what driver each of your programs needs.

These drivers will not make IBM-PC programs that are screen or keyboard dependent run. They will allow installation of other programs for your system.

To change screen drivers, simply run the .COM file of the desired one. Below is a description of each driver.

       24-lines: ANSI24.COM - a 24-line ANSI display emulated
                                   using the native CP/M console

                      NATIVE.COM - the unadorned CP/M console

C1. ANSI24.COM

This driver mates the ANSI crt control sequences together with your computer's screen characteristics in a 24-line mode. This driver is used to install PC-DOS application programs that use a 24-line ANSI display. ANSI features are documented in the IBM "DOS Technical Reference Manual". We have also added two control codes not used by IBM. These are handy for Turbo Pascal and Wordstar. They are the following;

    Insert Line = ESC [1 L

    Delete Line = ESC [1 M

Note: Not all machines have the same CRT capabilities. This means that some ANSI features may not work on some computers. For the most part, if your machine emulates a Televideo 9XX or Lear Siegler ADM-31 terminal then all the ANSI codes will work as described. It is possible to adapt the DOS console driver to other types of terminals if needed. This patching procedure

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should only be attempted by someone with a knowledge of Z80
debugging techniques using the CP/M utility program DDT.COM.
Below is a list of where the CRT control strings are located in
the PCDOS.COM file. These can be altered with DDT to create a
customized ANSI emulation.

hex address	function
010B	cursor up
010F	cursor down
0113	cursor right
0117	cursor left
011B	cursor positioning
011F	clear screen
0123	clear to end of screen
0127	clear to end of line
012B	start highlighting
012F	stop highlighting
0133	insert line
0137	delete line

(Each string can be up to 4
characters long, with a
byte of zeros terminating
any string 3 bytes long or
less.)

C2. NATIVE.COM

This driver is a 24-line screen with your computer's CP/M
characteristics. With this installed you may be able to run CP/M
code that you have written and transferred to PC-DOS. (For
example, you could transfer a program written in Basic and run it
under PC-DOS MSBASIC, 5.28.)

C3. Changing the Default Screen Driver

Changing screen drivers is done by running the .COM file for the
driver you want to use. For example, to change to the NATIVE
driver, you would run NATIVE.

If you will not be using the default ANSI24 driver most of the
time, you can make the system boot up with the NATIVE driver by
making a new AUTOEXEC.BAT file as described below. (AUTOEXEC is a
file that PC-DOS automatically loads when the operating system is
booted.

The following example shows how to make an AUTOEXEC.BAT file that
loads the NATIVE driver on boot up. (Type a <return> after each
line.

```
A>COPY CON:=AUTOEXEC.BAT
    NATIVE
    <CTRL><Z>
```

You will be back at the A> prompt. Type DIR and list the
directory. AUTOEXEC.BAT should be there. You can doublecheck the

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contents by using the TYPE feature:

A>TYPE AUTOEXEC.BAT

It should show:

NATIVE

You cannot modify an AUTOEXEC.BAT file made like above. To change it, delete (ERASE) the old one and make a new one.

D. IBM PC Function Keys

PC-DOS on the CO-POWER supports the basic 10 IBM PC function keys, F1 through F10. This feature is available under all SWP screen drivers. This can be indispensable when one encounters a program that requires the user to press one of the function keys to make something happen.

D2. Function Keys from Programs

These keystrokes work in programs that use the IBM keyboard interrupt call (INT 16H) or the DOS console input function calls. They will not work with programs that bypass the keyboard interrupt call and check the keyboard hardware directly.

Following is a list of the IBM key and the equivalent key(s) to use on your computer. These are the only function keys supported by CO-POWER. Please note that 2 keystrokes are required to produce the equivalent of the single IBM function key. If the character entered after the ESC is not one of the ones below, then the system reacts simply as if two characters were entered.

IBM KEYSTROKE	EQUIVALENT CO-POWER KEYSTROKE	
	First	Second
F1	ESC	1
F2	ESC	2
F3	ESC	3
F4	ESC	4
F5	ESC	5
F6	ESC	6
F7	ESC	7
F8	ESC	8
F9	ESC	9
F10	ESC	0

E. Transferring Files Between PC-DOS and CP/M

This is a new CO-POWER PC-DOS feature. You can transfer files from CP/M to PC-DOS and vice versa. Also, while you are in PC-DOS, you can look at a CP/M disk directory. CP/M files can be transferred to the screen or to disk!

Technical Aspects:
To create this feature we added a new a character device called CPM:, which can be accessed with DOS system calls to read and write data. DOS function #44 hex (I/O control for devices) can be used to send commands to CPM to open, search or create files. Source code for the transfer files is included on your disk. If you make any interesting changes, please let us know!

E1. CPMDIR.COM

This program lets you look at a CP/M disk directory from PC-DOS. You can specify the drive, and use the * and ? wildcards. You can even specify CP/M user areas! This is done with a / tag that tells the user area number.

Examples of use:

    CPMDIR B: shows the CP/M directory of the disk in Drive B.

    CPMDIR A:*.DOC   shows all the .DOC files in the CP/M directory
                       of Drive A.

    CPMDIR A:/3   shows the directory of the files in user area 3
                       of Drive A.

E2. CPM2DOS.COM

This PC-DOS program transfers a CP/M file to PC-DOS. The file can be transferred to the screen or to disk. The file may be taken from any user area.

The syntax of this program is like the PC-DOS COPY function. It follows the general form:

                   CPM2DOS A:TEST.DOC B:

where the file TEST.DOC is copied from Drive A (CP/M) to Drive B (PC-DOS). If the destination drivename is not specified, the file is displayed on the console (screen). Example:

                   CPM2DOS A:TEST.DOC

As with CPMDIR, the / tag can be used to specify a CP/M user area
number. For example:

CPM2DOS A:TEST.DOC B: /3

gets the CP/M file TEST.DOC from user area 3.

CAUTION: when using this program be sure to keep track of what
type of disk each drive contains. The CP/M portion of this
program uses the CP/M BDOS for disk I/O. Some systems will hang
up if a PC-DOS disk is accidentally in the specified CP/M drive.

E3. DOS2CPM.COM

This PC-DOS file transfers an PC-DOS file to CP/M. This program
follows the PC-DOS COPY format of source,destination. Both drives
must be specified.

Example:

DOS2CPM B:NEW.DOC A:

copies the file NEW.DOC from Drive B (PC-DOS) to Drive A (CP/M).
As with CPM2DOS be careful to have the right disks in the
specified drives. You can specify the CP/M user area the file
will be written to by using a / tag:

DOS2CPM B:NEW.DOC A:/4 ·

Transfers the PC-DOS NEW.DOC file from Drive B to user area 4 of
the CP/M disk in Drive A.

F. Formatting PC-DOS Disks

The PC-DOS manual contains instructions on how to format disks
with FORMAT.COM. This program will only create disks in the IBM
PC formats, namely five inch, 9 sector per track, single and
double sided/double density. With the SWP loadable disk driver
MULTFMT.SYS, it is possible to operate with a number of non-IBM
disk formats such as five inch quad density and eight inch. In
order to initialize disks in these formats it is necessary to use
the SWP supplied format program DISKINIT.COM instead of
FORMAT.COM. The DISKINIT program works quite a bit differently
from IBM's FORMAT. Instead of using a list of format options on
the command line, DISKINIT simlpy shows a menu of formats
available and asks you to select which format and physical disk
drive to use. It does not have the capability to make system's
disks or to make disks with a volume label. It is strictly meant
to be used to create diskettes for use with the MULTFMT.SYS
driver. (ie. for drive C: or greater on most machines).

G. Differences With the PC-DOS Manual

The following items in the PC-DOS Manual do not apply to CO-POWER PC-DOS.

1. CO-POWER PC-DOS does NOT run hardware dependent IBM-PC programs. Ignore all references to such programs, mainly discussed in Appendix D.

2. CO-POWER cannot run IBM-PC BASIC or BASICA. These BASICs make calls to the IBM ROM. Microsoft MSBASIC 5.28 runs on CO-POWER.

3. CO-POWER does not do IBM screen graphics. Disregard all references to graphics.

4. CO-POWER PC-DOS does not support hard disks except on the Kaypro 10.

5. CO-POWER PC-DOS includes our own ANSI screen drivers. Do not attempt to use the ANSI.SYS driver from IBM. It does not work with CO-POWER and will lock up the system if loaded.

H. Using PC-DOS Software

This section gives you some tips on using PC-DOS and PC-DOS programs. Together with the PC-DOS Manual, this will teach you how to make the most of your new system.

H1. Buying Software for CO-POWER

Many 16-bit programs are distributed in both MS-DOS and PC-DOS versions. CO-POWER allows you to run some programs from both. We recommend that you first try MS-DOS versions of software, even though the CO-POWER is running PC-DOS. This is because MS-DOS software is usually less IBM hardware dependent that PC-DOS, and hardware incompatibility is the prime cause of programs not working. SWP's software list lists programs that SWP has tested to work with CO-POWER. When obtaining other programs to use with CO-POWER follow these guidelines:

PC-DOS
(limited compatibility)

CO-POWER boots PC-DOS and allows you to run PC-DOS programs that are not hardware dependent. Steer away from PC-DOS programs that require graphics, use IBM BASIC, or that do direct writes to an IBM-PC screen. MS-DOS programs that SWP has tested and found to be compatible are in the software list. They are marked with the "IP" and "PC" codes. This list is not conclusive, there are other non-hardware dependent programs that will run.

CO-POWER PC-DOS is data compatible with the IBM-PC. It formats disks in the IBM-PC disk format. Data disks from a CO-POWER system can be used in an IBM-PC and vice versa. Programs that use IBM BASIC will not run because this BASIC resides in the on-board rom chips of the IBM PC and is highly propriatary to IBM. Lastly, remember to get software on single sided diskettes if your system has only single sided disk drives.

112. Public Domain Disks Available From SWP

SWP is now offering PC-DOS public domain disks to CO-POWER users. Each disk is $10, including postage, disk and handling. (Disks are 5 1/4" DSDD unless otherwise specified.) The disks are:

#1 Public Domain files sent to SWP by the Capitol ATR Peripheral Micro-Users Group. This disk has several utility programs (with document files) that run on CO-POWER. Some are:

MEMBRAIN.EXE - a RAMDISK program for PC-DOS! This is a terrific program. Use part of CO-POWER's RAM as operating RAM and the rest as a RAMDISK. Works with both CO-POWERs.

SDIR26.COM   - An enhanced directory program.

CWEEP1.EXE   - A utility similar to CP/M's DISK76. Good for file copying, specified file deleting, viewing text and hex files.

NEWDATE.COM - Changes the date on a file.

VOLSER.COM   - Changes the volume label on a disk.

KEY.EXE   - Displays the code a keystroke produces.

#2 Public Domain and Freeware files submitted by CO-POWER users. This disk contains lots of useful utilities and a freeware database program, PC-FILE. [Freeware means that you can have a free copy of the program. If you like it, there is a suggested contribution.] Among the files are:

LU-DOS.EXE   - The library utility program that lets you build, examine, extract, etc., files.

SQUNSQPC.LBR - Contains SQueeze and UNSQueeze. Utilities that let you compress and uncompress files for easier storage and transfer.

PC-FILE.LBR - A library containing PC-FILE, a freeware database, and related files. A file with the manual is included. Suggested contrib.: $35.

SD.LBR   - A library with a sorted directory program and complete documentation.

These programs are provided as a service to SWP CO-POWER users. THEY ARE NOT SUPPORTED BY THE SWP TECHNICAL ASSISTANCE LINE. Most programs list an author that can be contacted for information and help.

H3. Installing WordStar 3.3 for a 24-Line ANSI Display

These instructions tell how to create a 24-line ANSI screen WordStar with the WINSTALL program. With this installation, the MS-DOS WordStar will display with inverse video in the screen. This installation also makes the screen scroll much faster than non-ANSI installed WordStar. NOTE: If your computer screen does not work with the inverse feature, simply remove the highlighting code from the installation. How well inverse works depends on the host computer.

1. Run WordStar's installation program, WINSTALL. Select what the source and destination files for the install will be. From the installation menu choose "B", custom installation of terminals.

2. From the TERMINAL INSTALLATION MENU choose "A" for Automatic installation of all features. You will be asked to answer several questions about the terminal. Following is a list of how to respond.

    Q. Terminal Name.
    R. Enter C to change. Then name the terminal ANSI25.

    Q. Screen Size. Default is 24 x 80.
    R. Press <return> to accept.

    Q. Cursor Positioning.
    R. Enter C to change.
       Q. Function Code Sequence
       R. Enter C to change. Type in these values as shown:

Current Value	New Value	
1Bh	<return>	leaves it unchanged
3Dh	:[	
00h	.	

    If you entered this correctly, the screen lists it as 1Bh 5Bh. Press <return> to accept.

    Q. Are there characters after the line # and before the other dimension?
    R. Enter C to change. Type in these values as shown:

Current Value	New Value
00h	:;
00h	.

    If you entered the above correctly, the screen lists it as 3Bh. Press <return> to accept.

Q. Are there characters after the line and column #s?
R. Enter C to change. Type in these values:

```
Current        New
Value          Value
-------        -------
00h            :H
00h            .
```

If you entered the above correctly, the screen lists
it as 48h. Press <return> to accept.

Q. Is the line # sent before the column #. Currently no.
R. Do not change this. Press <return> to accept.

Q. What character is sent for line 1? Default is 20h.
R. Enter C to change.

New Value: ,1

If you entered this correctly it will list it as 1h.
Press <return> to accept.

Q. What character is sent for column 1? Default is 20h.
R. Enter C to change.

New Value: ,1

If you entered this correctly it will list it as 1h.
Press <return> to accept.

Q. What types of codes are sent to show line or col #s.
Default is Single byte BINARY value.
R. Enter C to change to Multi Character ASCII.

Q. The # of ASCII characters sent to represent line or
column #s is 1.
R. Enter C to change. Enter 2. Press <return> to accept.

Q. Terminal Start-up. Default is empty.
R. Press <return> to accept.

Q. Terminal Exit. Default is empty.
R. Press <return> to accept.

Q. Highlighting. Currently empty.
R. Enter C to change. Enter C to change Highlight-on and
   input these values:

```
         Current        New
         Value          Value
         -------        -------
         00h            ,1B
         00h            :[
         00h            :7
         00h            :m
         00h            .
```

If you entered this correctly, the screen lists it as
1Bh 5Bh 37h 6Dh. Press <return> to accept.

Q. Highlight-off sequence. Currently empty.
R. Enter C to change. Input these values:

```
         Current        New
         Value          Value
         -------        -------
         00h            ,1B
         00h            :[
         00h            :0
         00h            :m
         00h            .
```

If you entered this correctly, the screen lists it as
1Bh 5Bh 30h 6Dh. Press <return> to accept.

Q. Erase to End of Line. Default is empty.
R. Enter C to change. Input these values:

```
         Current        New
         Value          Value
         -------        -------
         00h            ,1B
         00h            :[
         00h            :K
         00h            .
```

If you entered this correctly, the screen lists it as
1Bh 5Bh 4Bh. Press <return> to accept.

Q. Delete Line. Default is empty.
R. Enter C to change. Input these values:

Current Value	New Value
00h	,1B
00h	:[
00h	:1
00h	:M
00h	.

If you entered this correctly, the screen lists it as
1Bh 5Bh 31h 4Dh. Press <return> to accept.

Q. Insert Line. Default is empty.
R. Enter C to change. Input these values:

Current Value	New Value
00h	,1B
00h	:[
00h	:1
00h	:L
00h	.

If you entered this correctly, the screen lists it as
1Bh 5Bh 31h 4Ch. Press <return> to accept.

Q. Handling of Last Character on Screen. Default is Yes for
scroll command.
R. Press <return> to accept.

3. Now you are back at the TERMINAL INSTALLATION MENU. Select X
to Exit this menu.

4. You are now back at the main INSTALLATION MENU. If you need to
install a printer do so. Once any other selections are done,
select X to exit the installation.

Choose option A to save your changes in your preselected
filename.

WORDSTAR NOTE: You can also install MS-DOS WordStar for a Lear
Siegler ADM-3A display. If you do so, select that terminal then
select customization of features. Be sure that the "handling of
last character causing scroll" is set to Y.

H4. Installing dBASE II Version 2.4 for CO-POWER

The following tells how to patch dBASE II to work properly with CO-POWER. The patch is to fix an incompatibility with PC-DOS 2.11, NOT with the CO-POWER software.

Have DEBUG.COM on a disk in Drive A and have dBASE II in Drive B. In these instructions <cr> means press the <RETURN> key. XXX indicates the segment that debug is using.

The screen shows:	You type:
A>	B:<cr>
B>	A:DEBUG DBASE.COM<cr>
Both dBASE and debug will load into memory. When done:	
-	A53F8<cr>
XXX:53F8	NOP<cr>
XXX:53F9	NOP<cr>
XXX:53FA	<cr>
-	
You have now made the patch and need to save the patched dBASE onto disk. Do this:	W<cr>
-	
When done, exit dBASE	Q<cr>
B>	

dBASE is now patched and saved. During the installation, when you select the type of terminal, we recommend that you choose the Lear Siegler ADM-3A.

I. Enhanced Communications Capabilities

The CO-POWER system attempts to fully emulate the functions of the RS-232 ports on the IBM PC. These are usually refered to as the COM1: and COM2: devices. As with any computer, a communications program must be adapted for the system used. This section tells programmers how to do this.

In computers with two RS-232 ports, COM1: is the port normally used for the modem and COM2: is the port used for the serial printer. Machines with only one port have COM1 and COM2 both going to the single port. These ports may be accessed by doing DOS calls to the devices, or by doing INT 14H calls to the IBM rom BIOS. Other methods, especially those that make direct reference to the 8250 chip in the IBM PC are absolutely GUARANTEED not to work, and will usually result in the following message appearing on the screen;

*** 8088 SYNC ERROR, PRESS 'R' TO RETRY OR ELSE ABORT ***

Information on the interrupt 14 calls follows. This can also be found in the IBM technical manual. The COM: devices are modeled on the IBM to the point that the PC-DOS MODE program can be used to set baudrates, parity and so on. Also the CTTY command can be used to switch the console over to the modem port so PC-DOS can be run remotely.

There are three ways to get a communications program going:

1. Find one that already uses non-hardware dependent mechanisms to do it's input/output. Before you buy such a program, make sure that:

> - the program uses interrupt 14 calls or DOS calls to access the RS-232 ports.

> - the part of the program that displays data on the screen must go through normal DOS or rom BIOS calls to operate. Programs that write directly to the video refresh buffer of an IBM PC will run but the display information will be lost.

2. Find one that allows you to write interface code for it, a common practice in communications programs. Many public domain modem programs are set up to facilitate end-user modifications, and the source code for these is also usually available.

3. Write your own program. Gee, what fun!

11. Interrupt 14 Calls

AH=0   INITIALIZE THE COMMUNICATIONS PORT

AL= FOLLOWING BIT DEFINITIONS

7	6	5	4	3	2	1	0
--- BAUD RATE ---			- PARITY -		- STOP BIT -	- WORD LNGTH -	

```
   000 -   110           X0 - NONE      0 - 1      10 - 7 BITS
   001 -   150           01 - ODD       1 - 2      11 - 8 BITS
   010 -   300           11 - EVEN
   011 -  .600
   100 -  1200
   101 -  2400
   110 -  4800
   111 -  9600
```

DX = WHICH COMMUNICATIONS PORT, 0 OR 1

```
CALL WITH    MOV    AL,init          ;bits defined as above
             MOV    DX,which         ;indicate which port to use
             MOV    AH,0
             INT    14H
```

RETURNS WITH CONDITIONS SET THE SAME AS IN THE STATUS CALL (AH=3)

AH = 1   SEND CHARACTER IN AL, AL IS PRESERVED

DX = WHICH COMMUNICATION PORT, 0 OR 1

```
CALL WITH    MOV    AL,character     ;character to send
             MOV    DX, which        ;indicate which port to use
             MOV    AH,1
             INT    14H
```

RETURNS WITH BIT 7 OF AH SET **IF UNABLE TO TRANSMIT. THE REMAINDER**
OF AH IS SET THE SAME AS IN THE STATUS CALL (AH=3).

AH = 2   RECEIVE CHARACTER IN AL

DX = WHICH COMMUNICATION PORT, 0 OR 1

```
CALL WITH    MOV    AH,2
             MOV    DX, which        ;indicate which port to use
             INT    14H
```

RETURNS WITH CHARACTER IN AL, ERROR BITS 7,4,3,2,1, ARE SET IN AH
AS DEFINED IN THE STATUS CALL (AH=3). AH BIT 7 INDICATES DATA SET
READY WAS NOT RECEIVED. THUS, A NON ZERO AH ON RETURN INDICATES
AN ERROR.

AH = 3   RETURNS STATUS IN AX

DX = WHICH COMMUNICATIONS PORT, 0 OR 1

```
CALL WITH    MOV    AH, 3
             MOV    DX, which      ;indicate which port to use
             INT    14H
```

RETURNS WITH AH BITS SET AS FOLLOWS:

```
BIT 7 = TIME OUT
BIT 6 = TRANSMIT SHIFT REGISTER EMPTY
BIT 5 = TRANSMIT HOLDING REGISTER EMPTY
BIT 4 = BREAK DETECTED
BIT 3 = FRAMING ERROR
BIT 2 = PARITY ERROR
BIT 1 = OVERRUN ERROR
BIT 0 = DATA READY
```

AL BITS ARE SET AS FOLLOWS:

```
BIT 7 = RECEIVED SIGNAL DETECT
BIT 6 = RING INDICATION
BIT 5 = DATA SET READY
BIT 4 = CLEAR TO SEND
BIT 3 = DELTA RECEIVE SIGNAL DETECT
BIT 2 = TRAILING EDGE RING DETECTOR
BIT 1 = DELTA DATA SET READY
BIT 0 = DELTA CLEAR TO SEND
```

J. Using the MEMTEST Program

The SWP PC-DOS Utility disk contains a memory test program that performs an exhaustive test of CO-POWER's RAM chips. This program runs continuously and displays the addresses of any bad locations. If you think you may have some bad memory chips in the CO-POWER, run this test. Once MEMTEST is run, the only way to stop it is to reset the computer.

To run the program, type MEMTEST<return>.

If no errors are detected, a display like this will show on the screen:

    0000 1.2...................3.4...5....................

The first number tells how many times the test has repeated. The other digits (and the dots between them) indicate which section of the test is currently in progress. The five tests performed are:

    1. a rotating bit data pattern
    2. an incrementing data pattern
    3. a varying size checkerboard pattern
    4. a memory data retention/refresh test
    5. an address fault test

Each full cycle takes at least 10 minutes. After a pass is completed, the program relocates itself to a new place in memory and repeats. This makes it possible to test all memory including the area where the program is initially loaded. For this reason, allow at least one pass for each 64k of RAM to insure all memory is tested. This is a good program to leave running all night!

If any bad locations are found, an error message is displayed in this format:

    (XXXXX=EE should=DD xor=BBBBBBBB)

where: XXXXX is the hex address of the bad memory
       EE   is the incorrect data read from that location
       DD   is the value that was supposed to have been there
    BBBBBBBB is the binary (ie. ones and zeros) representation of
             the bits that are different between the values given
             by EE and DD.

The above information can be used to locate which chip is bad. If you get an instance where many locations are bad and the error message is coming out too fast to read, you can stop the display by typing any key on the keyboard. Typing another key restarts the program. Be sure to note the exact values of the error message if you have any questions about a CO-POWER board that fails MEMTEST.

K. Exiting DOS

If you are going to power down your computer after working in MS-DOS, simply remove any disks and turn off the power. If you want to go back to CP/M to do some work, then do the following:

Your Master DOS disk contains a file called Z80.EXE. This program takes you back to CP/M. Run Z80.

In a moment the screen will show:

TYPE A CONTROL-C TO RETURN TO MSDOS

PLACE A CP/M-80 SYSTEM DISK IN DRIVE A
TYPE ANY OTHER CHARACTER TO GO TO CP/M-80

Before typing the character to return to CP/M, be sure to place a bootable CP/M disk in Drive A.

PART 3. CP/M-86

CP/M-86 is an option for CO-POWERs. There are no hardware changes
to the CO-POWER system to run CP/M-86, just the addition of the
CP/M-86 operating disks.

CP/M-86 is the 16-bit version of CP/M. Many programs that you run
in CP/M are also available in CP/M-86. The syntax of CP/M-86 is
like CP/M's so it is very easy to learn.

Like PC-DOS, CP/M-86 is customized for CO-POWER. It is entered
from a CP/M system file. CP/M-86 has your CP/M disk format. You
can store files from CP/M and CP/M-86 on the same disks. Files
are distinguished by a different extension: CP/M command files
have the .COM extent, CP/M-86 command files have a .CMD extent.

Disks are formatted for CP/M-86 with your CP/M disk format
program. Transferring the CP/M-86 operating system to a disk is
done by using PIP or a copy program to move the entry files to
it.

This section describes portions of CP/M-86 that are particular to
CO-POWER. Information on using CP/M-86 in general is in the
Digital Research CP/M-86 manual you received with CP/M-86.

We have added some files to the standard Digital Research CP/M-86
files on your system disk. These are:

> CPM.SYS   contains the CP/M-86 operating system
>
> Z88.COM   the command file that loads the CPM.SYS
>   file
>
> Z80.CMD   a CP/M-86 command file that exits CP/M-86
>   and returns the system to CP/M.

Before continuing, backup the CP/M-86 master disks and store the
originals. Do this exactly like you backup CP/M disks.

A. Booting CP/M-86

To boot CP/M-86, do the following:

#1   Boot the computer with CP/M 2.2.

#2   Put a bootable CP/M 2.2 disk in Drive A that contains these
     files:

            CPM.SYS   Z88.COM   Z80.CMD

#3   From the A> prompt, type:

     Z88

     and press <return>. This file loads CPM.SYS and CP/M-86 is
     booted.

CPM.SYS must be on the disk in Drive A when CP/M-86 is booted.
Z88.COM can be run from any drive. For simplicity, we recommend
that they both reside on Drive A. When CP/M-86 is booted it
always logs onto Drive A.

B. Exiting CP/M-86

If you are done using the computer, remove any disks from the drives and power down. To return to CP/M 2.2 to do more work, do the following: (Kaypro 10 owners may want to go to CP/M to run SAFETY before powering down.)

Be sure the disk in Drive A is a bootable CP/M 2.2 disk. (You can make a disk that contains all CP/M-86 files and the CP/M 2.2 sysgened tracks.)

Run the Z80.CMD file.

That's it. Z80 can be run from any drive. Regardless of what drive it is run from, the computer will do a warm boot on Drive A. Be sure that Drive A has a bootable CP/M disk in it before running Z80.

C. Differences With the IBM-PC CP/M-86 Manual

With CP/M-86 you received an IBM-PC CP/M-86 manual. These are differences between the IBM manual and the CO-POWER system.

1. Ignore all references to the IBM function keys, the rom, or to the input/output or graphics hardware.

2. Relating to low and high resolution, color and monochrome display, the Kaypro has the same abilities it has with CP/M. A light pen will not interface.

3. The following command files are not part of CO-POWER CP/M-86:

    CONFIG   DSKMAINT   FUNCTION   ASSGN (use STAT for this)

4. Format disks under CP/M.

5. In DDT-86, there are no QI, QQ or SR commands.

6. Appendices F and H do not apply.

7. Boot CP/M-86 as per this document. As with CP/M-80, do a CTRL C when you change disks in any drive.

8. There is not a hardware supported message displayed on the screen during bootup as there is on an IBM.

9. The CP/M-86 control characters that work depend on your computer. CTRL C, CTRL P, and CTRL S work on all systems.

10. Backup disks with PIP.CMD or a CP/M-80 copy program.

11. Regarding physical devices: you do not have IBM hardware in your computer so you cannot use any extra devices that your CP/M system will not support.

PART 4. EXPANDING CO-POWER MEMORY

There are two models of CO-POWER boards; the CO-POWER-88 and CO-POWER-Plus. Expanding each is described below.

CO-POWER-88: This CO-POWER has a maximum memory of 256k. Owners of the older 128k model can expand their board to 256k by purchasing an Add-On RAM card from SWP Sales. If you want to expand past 256k, call SWP Sales for details on the current trade-in policy to swap for a CO-POWER-Plus.

CO-POWER-Plus: This CO-POWER is expandable to 1024k of RAM! There are 32 sockets for RAM chips on this board. Each 8 256k RAM chips that are plugged in give the board 256k of memory. If your board is not populated to the 1024k level, you can purchase additional RAM sets from SWP Sales.

CO-POWER-Plus is expanded with 256k RAM chips that are 200 nanoseconds or faster. Our price as of April 1985 price is $80 per set of 8. To take a 256k board to 1024k, you would purchase 3 sets of chips at $80 each, or $240. (Prices may change without notice. Call SWP Sales for current prices.)

Unlike the IBM-PC which can only use 640k of RAM for the operating system, CO-POWER can use all but 64k of the 1024k available. The top 64k is reserved for SWP drivers. This means you can run IBM programs like dBASE II and make bigger data files than the IBM can!

If you're interested in speed and big operating system memory, then read about the PC-DOS public domain ramdisk program available from SWP Sales. Details are in the PC-DOS section. Also, additional memory is also terrific for the CP/M RAMDISK. A 1024k CO-POWER adds a lot of power to your computer.

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PART 5. TROUBLE-SHOOTING: QUESTIONS AND ANSWERS

Q. How do I keep up-to-date on CO-POWER information?
A. Send SWP your registration card so your name will be added to our CO-POWER mailing list. You'll receive new information and the quarterly issues of CO-POWER NEWS.

Q. How do I obtain updates on software?
A. If a new version of our software is released, send your original SWP disks (both the PC-DOS Utilities and Load Files disks) to SWP with a check for $25. You'll receive new software and any new documentation. [Texas residents add $1.28 Sales Tax; Ft. Worth residents or will-call customers add $1.35 Sales Tax.]

Q. What is the maximum RAM capacity CO-POWER can have?
A. CO-POWER-88 has a maximum RAM of 256k. CO-POWER-Plus has a 1024k RAM maximum.

Q. What power does CO-POWER take?
A. Less than 750 milliamps of +5 volts.

Q. After running RAMDISK if I reset the computer and rerun RAMDISK without erasing the directory, why do I sometimes get incomplete files or other problems?
A. Such problems can happen but it is not the RAMDISK program at fault. The ability to load ramdisk without erasing the file directory is mainly an emergency measure and should be used as such. If the reset pulse is extremely long it can cause the 8088 to drop bits in memory.

Q. Under CP/M I run a key reassign program. When I use RAMDISK it does not work. What can be done?
A. In some cases, both the key reassign program and RAMDISK use the same area of memory. You can try relocating either program. In the case of Smartkey, they have a solution.

Q. Can I obtain source code for CO-POWER programs?
A. No. This is not currently released and because of various contracts SWP is involved with it is not scheduled to be released.

Q. Can I obtain CO-POWER schematics?
A. Yes. First you must sign a non-disclosure agreement. The agreement and schematics are available from SWP Sales. As of May 1985, CO-POWER-88 schematics are available for $25 and CO-POWER-Plus schematics have not been completed.

Q. If I think my CO-POWER board has a bad memory chip, what do I do?

A. First run the MEMTEST program and see if it turns up any bad chips. Directions are in this document. You may be able to locate and replace the bad chip yourself.

Q. Where do I go for help if I don't understand something in the CO-POWER system?

A. If you purchased CO-POWER from a dealer, contact them for support. If you bought CO-POWER directly from SWP, contact SWP Technical Support. Tech Support hours are Monday thru Thursday, 9 a.m. to 4 p.m.

Q. If I have a problem with the CO-POWER hardware can I just ship it back to you for repair?

A. No! First call and get an RMA#, then ship the unit back. If the CO-POWER is under warranty (90 days) we'll repair it and return it to you at no charge. If the unit is out of warranty, there is a minimum repair charge of $35. Actual cost depends on problem diagnosed. Repair for customers outside the U.S.A. may require additional charges for customs and freight.

Q. I heard that I can run LOTUS 1-2-3 on CO-POWER. Is this true?

A. Only if you have a Kaypro 2X, 4/84 or 10. LOTUS requires a 25-line screen, inverse video, and double-sided 5 1/4" disk drives. SWP wrote a utility file for these Kaypros that enable them to run LOTUS. Other CO-POWERs cannot run LOTUS because the computers' screens do not have the right features.

PART 6. REGISTRATION AND WARRANTY

CO-POWER Warranty

CO-POWER is under warranty for 90 days from the original end user's date of purchase. To be valid the enclosed registration form must be thoroughly completed and returned to SWP Microcomputer Products within 10 days from the date of purchase. (A purchase receipt may be required at the sole discretion of SWP.) The serial number of the CO-POWER must be entered on the registration card. (This number is written on the circuit board.) Under no circumstances will any warranty be honored after 6 months past the last date of a production run or board change regardless of purchase date.

SWP is not responsible for any changes the user makes to the CO-POWER circuit board, including the improper configuring or connecting of any peripherals. Detailed information on such procedures are in this manual.

SWP is responsible for replacing or repairing malfunctioning components on an under-warranty CO-POWER. The responsibility is void if the user has damaged the board or caused the malfunction or if CO-POWER is resold.

SWP will NOT accept any returned merchandise, FOR ANY REASON, that has not been issued an RMA number by SWP Technical Support. The RMA # must be clearly marked on the outside of the shipping carton.

The user is responsible for shipping charges to SWP for any warranty work. SWP will pay return shipping via ground service within the continental United States. Any other type of special shipping will be at the customer's expense.

Repairs on SWP Components Not Under Warranty

Once the warranty has expired, or if the warranty has been voided, SWP will repair malfunctioning CO-POWERs and other SWP products for repair charges (minimum is $35). These charges will include both the cost of materials used and labor.

The user will be charged for all time spent analyzing and repairing the unit. Any pertinent information sent in writing by the user describing the malfunction will decrease the analysis time, and lower the repair charges.

The customer is responsible for all shipping charges to and from SWP. Repairs must be paid in full before return shipping. SWP accepts checks and credit cards. No CODs.

License

All SWP programs are licensed on an "AS IS" basis without warranty.

SWP shall have no liability or responsibility to customer or to any other person or entity with respect to liability, loss or damage caused or alleged to be caused directly or indirectly by SWP computer programs or equipment, including but not limited to any interruption of service, loss of business or anticipatory profits or consequential damages resulting from the use or operation of such computer programs or equipment. By purchasing an SWP product, user agrees to these conditions.

Software License

1). SWP grants to customer a nonexclusive, paid-up license to use on customer's SWP computer the SWP computer software received. Title to media on which the software is recorded (disk) or stored (ROM) is transferred to the customer but not title to the software.

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3). Customer may resell SWP's software (modified or not, in whole or in part), provided customer has purchased one copy of the software for each one resold.

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