

The SWP CO-POWER-88 System

1. Using RAMDISK
2. Supplement to MS-DOS 2.0 Manual
3. Supplement to CP/M-86 Manual

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Appendix A: Setting up MS-DOS for Kaypro 10 CO-POWER-88 Systems

1. Using RAMDISK

SWP's Ramdisk software is an extremely useful added feature of CO-POWER-88. This package allows the memory of the 8088 to be utilized as a high-speed simulated disk drive for CP/M 2.2 applications. The ramdisk is not available when running CP/M-86 or MS-DOS, since all the memory in the 8088 is being used by the operating systems in these situations.

To load the ramdisk software, simply type 'RAMDISK' while in the command mode of CP/M. If you have been running CP/M-86 or MS-DOS prior to this time, it may be necessary to reset the computer and re-boot CP/M 2.2 in order to get the CO-POWER-88 to reinitialize itself properly. In any case, the first thing that the ramdisk software does after loading is to display a signon message and then issue a series of prompts for the various user-definable parameters of the program. These are described in the following sections.

1A. User Definable Parameters

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

The ramdisk may be installed with any of the 16 possible drive ID's allowed in CP/M, including one already taken by one of the 'real' disk drives in your system. If you assign the ramdisk to a currently existing drivename, then that drive and any others above it are simply 'moved up' one place alphabetically and the ramdisk is 'inserted' in the place of the old drive.

For example, in a system with two floppy disks configured to be drives A: and B:, if you assign the ramdisk as B: then the floppy normally known as B: will thereafter respond as drive C:. This process of drivename reassignment is done purely in software and in no way requires any of the physical disk drive select hardware to be changed.

If you assign the ramdisk to be drive A: another interesting thing happens besides all the drivenames being moved up one place. The ramdisk also has a copy of your currently running CP/M operating system written on it, so that all future warmboots (the thing the computer does when you type control-C) are done from the ramdisk, instead of from the normal drive A:. This greatly speeds up normal operation and frees you from always having to keep a 'sysgened' disk in physical drive A:.

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. Answer yes 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 CP/M-86 or MSDOS.

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, or if you crashed the system with a whiz-bang new program that wasn't quite debugged.

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

This prompt allows you to define where in the Z80's memory the ramdisk driver will be loaded. Use the default option if you do not know the location of any free space in high memory for the software to use. In this case 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 please 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-88 board communicates with the Z80 processor in your computer through a pair of jumper-selectable I/O ports. The ramdisk software for each of the computers supported by SWP has been set for the correct address for that machine, so you will usually respond to this last prompt by typing a carriage return. If you are using a CO-POWER-88 in a computer not specifically supported by us, you will need enter the starting address of the two ports being used. The input is in hexadecimal with valid values ranging from 0 to FE.

The I/O port addresses are defined by 4 jumpers on the small daughter board included in the CO-POWER-88 board set. These 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 values other than these.

1B. Shorthand Notation

An alternate form of entering the 4 parameters described above has been provided to streamline loading of the ramdisk software. It is possible to include the values for all of the parameters on the CP/M command line when running the RAMDISK.COM file. Simply type a space after the word RAMDISK and then enter the parameters separated by commas. If the list of values given is shorter than 4, or if two commas in a row are entered, then the default value is taken for the undefined value(s).

For example, the following CP/M command:

```
A>RAMDISK A,N
```

has the effect of installing ramdisk as drive A: with the directory not erased, using the default load address and I/O port setting.

This command:

```
A>RAMDISK B,,FC00
```

has the effect of installing ramdisk as drive B: with the directory erased, but loading the software in the top 1k of 280 memory starting at FC00 hex.

One final shorthand command form is possible, namely:

```
A>RAMDISK *
```

which has the same effect as typing carriage return to all 4 prompts. This gives the default value for drivename (M:), directory treatment (erased), load address (automatic relocation below the CCP) and port address (FE for most machines). The default values for all user definable parameters are contained in a block at the start of the RAMDISK.COM file. These values may be changed without notice in versions of the software distributed for special machines or applications.

1C. When Things Go Wrong

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 the CO-POWER-88 board 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 right I/O port address for your system, and that the CO-POWER-88 is correctly connected to the computer. After doing that, press the Z80's reset button, reboot CP/M and try running RAMDISK.COM again. Some computers do not have a reset pushbutton, in which case it will be necessary to turn the power off and back on again to reset everything. (The TRS80 model 1 and the Osborne are two machines that do not have a true hardware reset button.)

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.
- 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.

1D. How to Use the RAMDISK

The answer to this question is quite simple. Just use the ramdisk as you would any other disk drive. There is no difference except that floppies (or even some hard disks) are lots slower than ramdisk. You may want to use PIP or some similar file copy program to load the ramdisk up with programs or data files prior to starting work. Then these programs will run at many times their usual speed (assuming they are heavily dependent on disk I/O). At the end of a run, you will need to do the reverse process, that is, copy any updated files off the ramdisk onto permanent media. Remember that the ramdisk data will be lost if the system loses power or if you switch from running ramdisk to running CP/M-86 or MSDOS!

1E. RAMDISK Setup Tutorial

The SWP RAM disk software is a very powerful tool when used with the CP/M 2.2 operating system. The following is a suggestion of how you might use the RAM disk in your daily operation.

```
A>PIP SETUP.SUB=CON:
RAMDISK D
PIP D:=PGM.COM
PIP D:=*.DAT
D:
PGM
A:PIP A:=D:*.DAT
(type)Control Z(to exit PIP)
```

The above example will build you a SUBMIT file that sets up the RAM disk as drive D:, copies your program from A: to D:, copies your data files to drive D:, transfers control to D: and executes your program. The program will now access the data at the speed of RAM and speed up your operation. When you exit your program, the remainder of the SUBMIT file will save your data files to a real disk. To execute the above program, perform the following instructions.

```
A>SUBMIT SETUP
```

If you're as lazy at the keyboard as I am, you might try renaming SUBMIT.COM to DO.COM. This will allow you to do the program by typing:

```
A>DO SETUP
```

The above operation can be performed as any disk drive, except drive 'A'. If you try to setup the RAM disk from your SUBMIT file as drive 'A' the SUBMIT program will stop functioning. You can over ride this by changing the SUBMIT file to:

```
B>PIP SETUP.SUB=CON:
PIP A:=PGM.COM
PIP A:=*.DAT
A:
PGM
B:PIP B:=A:*.DAT
(type)Control Z(to exit PIP)
```

then perform the following commands to activate it:

```
A>RAMDISK A
A>DO SETUP
```

After RAMDISK A is executed, the real drives will be renamed to 'B' and 'C'.

Good luck and happy computing.

2. Supplement to the MS-DOS 2.0 Manual

A. Introduction to CO-POWER-88 MS-DOS System

MS-DOS 2.11 is included with your CO-POWER-88 system, along with the MS-DOS 2.0 User's Guide. This section details MS-DOS procedures that are particular to your CO-POWER-88 MS-DOS system. It tells how to boot up MS-DOS, how to backup the distribution disks, lists additional options for the FORMAT program, and describes the use of function keys.

Setting up MS-DOS for the Kaypro 10 CO-POWER-88 system is different because of the hard disk. Kaypro 10 users need to follow Appendix A to learn how to set up and boot MS-DOS. Sections 2C, E, F and G also apply to Kaypro 10 systems.

With your coprocessor, you have received two disks for MS-DOS. One disk is labeled as "MSDOS Disk 1 of 1" and the other is labeled "MSDOS LOAD FILES AND RAM DISK SOFTWARE."

The "MSDOS LOAD FILES" disk is a CP/M-80 formatted disk. It contains these files:

<u>File</u>	<u>Function</u>
MSDOS.COM	The file that begins the MS-DOS boot process.
RAMDISK.COM	The file that sets up the 256k RAM of CO-POWER-88 to be a CP/M-80 RAM disk.
RAMDISK.DOC	A file that describes RAMDISK.COM.

The RAMDISK files are described in Part 1 of this document. MSDOS.COM is used to begin the MS-DOS boot. Copy MSDOS.COM to a bootable CP/M disk. Store the original disk.

The disk labeled "MSDOS" is a MS-DOS formatted disk. It cannot be read in CP/M. This disk contains the MS-DOS system and utility programs from Microsoft. Using and backing up this disk is explained in this section.

2B. Booting MS-DOS

To boot MS-DOS you need the following disks:

1. The MS-DOS distribution disk or a copy of the same.
2. A CP/M disk containing MSDOS.COM. (You should have already copied this file from the "MSDOS LOAD FILES" disk to one of your CP/M disks.)
3. If Disk 2 is not bootable, a bootable CP/M 2.2 disk.

MS-DOS is booted by following these steps:

- #1 Turn on your system and boot with CP/M 2.2. (Follow your normal procedure.)
- #2 Load the MSDOS.COM file. (If the file is on the CP/M disk in drive A, type: MSDOS and press <return>. If it is on drive B, from A> type: B:MSDOS and press <return>.)
- #3 In a few seconds the screen will show:

Place MSDOS disk in drive

Then type drive (A,B) to load system.

Any other drive defaults to drive A

ie, RETURN without drive letter defaults to drive A:

"A" boots MSDOS on drive A:

"B" boots MSDOS on drive B:

"G" defaults to drive A:

To boot MS-DOS in Drive A, insert the MS-DOS distribution disk or a copy into Drive A, and press A (do not add <return>). MS-DOS will also be booted in Drive A if you press <return> or any letter other than B.

To boot MS-DOS in Drive B, insert the MS-DOS distribution disk or a copy into Drive B, and press B (do not add <return>).

- #4 After a few seconds, the screen will show:

Microsoft MS-DOS version 2.11

Copyright 1981,82,83 Microsoft Corp.

Command v. 2.11

The screen will ask for a time. Enter a time or press <return> to bypass this prompt. Next the screen will ask for a date. Enter a date or press <return>.

MS-DOS is booted and the logged drive and prompt will show. (For example, A:)

2C. Exiting MS-DOS and Returning to CP/M 2.2

If you wish to exit MS-DOS and turn-off the computer, simply remove all disks from the drives and turn off the power. [Kaypro 10 owners need to go to CP/M 2.2 first so they can run SAFETY.]

If you wish to exit MS-DOS and to return to CP/M 2.2, do the following:

#1 Do a directory of your MS-DOS disk and find the file Z80.EXE. This file is used to exit MS-DOS and to reboot CP/M 2.2.

#2 From either Drive, run Z80. The screen shows:

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

#3 Remove MS-DOS disks from the drives, insert a CP/M 2.2 disk into Drive A and press any character. CP/M 2.2 will be booted.

2D. Backing up the Distribution Disks

It is important to make a working copy of the MS-DOS distribution disk set and to store the originals in a safe place. Follow these steps:

#1 To backup the disk marked "MSDOS LOAD FILES AND RAM DISK SOFTWARE", copy the files to a formatted CP/M 2.2 disk. Store the original disk. (For example, use PIP to copy these files to a CP/M disk. If the disk has not been formatted, do so first.)

#2 To backup the MS-DOS distribution disk (marked 1 of 1), do the following.

A. Boot MS-DOS on Drive A. Answer or bypass the time and date prompts so that A: shows on the screen.

B. First the backup disk must be formatted. From A: type

FORMAT B:

and press <return>. The computer will instruct you to insert the disk to be formatted into Drive B and to strike any key when you've done so. Do this. When the formatting is done, it will prompt Y/N to format another disk. Answer N. Leave the formatted disk in Drive B.

C. A: shows on the screen. To copy all files, including the MS-DOS system files, from the disk in A: to B:, type:

DISKCOPY A: B:

and press <return>. The screen shows:

Insert source diskette into drive A:
Insert formatted target diskette into drive B:
press any key when ready

Press any key and the files will be copied. When the copy is completed, the following message shows:

Copy complete
Copy another (Y/N)?

D. Test your backup copy of MS-DOS by booting MS-DOS with the backup disk. Store the original in a safe place.

More information on backing up disks is in the MS-DOS 2.0 Manual on Page 2-6.

2E. Additions to FORMAT

The MS-DOS FORMAT command is explained in the MS-DOS 2.0 Manual beginning on Page 5-33. The following switches can be used in addition to the ones described in the MS-DOS 2.0 Manual.

Switch	Function
/D	For double-sided drive users. Add this to the FORMAT command to format a double-sided disk.
/8	The default format uses a 9 sector/track format. This is the standard format of MS-DOS 2.0. The standard format of MS-DOS 1.25 is an 8 sector/track format. Adding this switch, /8, to the FORMAT command causes the disk to be formatted in the 8 sector/track format.

2F. Using Function Keys

Some IBM-PC programs use function keys to perform specified tasks. The CO-POWER-88 MS-DOS system supports the use of function keys in a nonhardware dependent IBM-PC program if the program uses PC ROM calls to activate them. In this case, use these keys:

<u>IBM-PC</u>	<u>Use</u>	<u>IBM-PC</u>	<u>Use</u>
F1	ESC 1	F6	ESC 6
F2	ESC 2	F7	ESC 7
F3	ESC 3	F8	ESC 8
F4	ESC 4	F9	ESC 9
F5	ESC 5	F10	ESC 0

Remember, this feature does not apply to IBM programs that do not go through the IBM ROM for the use of function keys.

Page 6-4 of the MS-DOS 2.0 User's Guide describes the use of function keys for special editing functions. These key sequences should be used:

<u>Key</u>	<u>Editing Function</u>	<u>Your Keyboard</u>
<COPY1>	Copies one character from the template to the command line	ESC S
<COPYUP>	Copies characters up to the character specified in the template and puts these characters on the command line	ESC T
<COPYALL>	Copies all remaining characters in the template to the command line	ESC U
<SKIP1>	Skips over (does not copy) a character in the template	ESC V
<SKIPUP>	Skips over (does not copy) the characters in the template up to the character specified	ESC W
<VOID>	Voids the current input; leaves the template unchanged	ESC E
<INSERT>	Enters/exits insert mode	ESC P (enter) ESC Q (exit)
<NEWLINE>	Makes the new line the new template	<return>
<CONTROL-Z>	Puts a CONTROL Z (1AH) end-of-file character in the new template	CTRL Z

2G. Alterations to the MS-DOS 2.0 Manual

The MS-DOS 2.0 User's Guide lists a few programs in the Package Contents list that are not part of the CO-POWER-88 package. Ignore all references to these files:

CREF.EXE

IO.SYS

LIB.EXE

MASM.EXE

MSDOS.SYS *replaced by MSDOS.COM in the CP/M load process.

Also, the package only contains the MS-DOS 2.0 User's Guide.

3. Supplement to the CP/M-86 Manual

A. Introduction to the CO-POWER-88 CP/M-86 System

CP/M-86 is an option for all CO-POWER-88 systems. CP/M-86 purchasers receive the DOS on two disks marked as a set. (The disks are marked 1 of 2 and 2 of 2.) The CP/M-86 disks contain standard CP/M-86 files and files from SWP Microcomputer Products, Inc. Standard CP/M-86 files are explained in the DRC CP/M-86 manual. This documentation will explain SWP files, as well as boot and backup procedures.

CP/M-86 disks use the same disk format as your computer's CP/M 2.2 disks. CP/M-86 files can share disks with CP/M files and you can distinguish executable files for each DOS by looking at the file extents. In CP/M, command files have .COM as the extent, such as PIP.COM. The command file extent in CP/M-86 is .CMD, such as PIP.CMD.

CP/M-86 disks are formatted using your CP/M-80 format program. The CP/M-86 operating system is stored on a disk in a file in the user area, not on the system tracks of the disk like CP/M 2.2. Therefore, CP/M-86 can be transferred to a disk by simply PIPping the CP/M-86 files to the disk.

The CO-POWER-88 CP/M-86 files on the CP/M-86 distribution disks are:

<u>File</u>	<u>Function</u>
CPM.SYS	CPM.SYS is a file that contains the CP/M-86 operataing system.
Z88.COM	Z88 is a command file that loads the CPM.SYS file.
Z80.CMD	Z80 is a command file that is used to exit CP/M-86 and to return to CP/M-80.

Copy these files and the CP/M-86 utility files to a bootable CP/M 2.2 disk. Store the originals.

3B. Booting CP/M-86

Use this process to boot CP/M-86:

#1 Boot your 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.COM

#3 From the A> prompt, type:

Z88

and press <return>. CP/M-86 is now loaded.

Notes: CPM.SYS must reside on the disk in Drive A to enter CP/M-86. We recommend that Z88.COM resides on the disk in Drive A, but it can be on another drive. (If it resides on Drive B, from Drive A's CP/M prompt you would type: B:Z88<RETURN>.) When the system initially enters CP/M-86, the logged drive will always be Drive A, regardless of which drive Z88.COM was run from.

3C. Exiting CP/M-86 and Returning to CP/M 2.2

Z80.CMD is used to exit CP/M-86 and to return to CP/M 2.2. If you wish to exit CP/M-86 and turn off the computer, then it is not necessary to exit to CP/M 2.2. (Kaypro 10 owners may need to go to CP/M 2.2 to run SAFETY before turning off the power.)

To exit CP/M-86 and go to CP/M 2.2, do the following:

- #1 Place a disk in Drive A that contains CP/M 2.2 system tracks (like the one we used to enter CP/M-86 above). Make sure you are logged on, that is if you do a disk swap here, also press CTRL C.
- #2 Run Z80.CMD. (If it is on the disk in Drive A, from A>, type Z80 and press <return>.)

Z80.CMD can be run from any drive. Regardless of the drive it is run from, it will cause the system to do a warm boot on Drive A. The disk in Drive A must contain CP/M 2.2 system tracks or the computer will have to be reset.

3D. Backing up the Distribution Disks

It is important that you make a working copy of the CP/M-86 distribution disks and that you store the originals.

The CP/M-86 distribution disks do not contain system tracks. Make the backups by:

- #1 Formatting two disks in CP/M 2.2 using your normal procedure.
- #2 Write the CP/M 2.2 systems tracks on the disks, using SYSGEN or your computer's equivalent.
- #3 Use PIP to copy the files from the two CP/M-86 disks to the two backup disks. DO NOT remove the write-protect tabs from the distribution disks.
- #4 Store the originals.

3E. Alterations to the IBM-PC CP/M-86 Manual

With your CP/M-86 disks you received a CP/M-86 Manual for the IBM-PC. The following are differences between the IBM Manual and CP/M-86 for your CO-POWER-88 system:

All references to functions involving the use of the IBM's special function keys should be ignored as they only refer to the IBM. So should functions that rely on the IBM ROM, IBM I/O and IBM graphics. Other changes are as follows:

Relating to low and high resolution, color and monochrome display: the CO-POWER-88 computer will have the same abilities it has with CP/M-80. A light pen will not interface.

Some of the commands listed in the command summary do not apply to non-IBM systems. These are:

CONFIG	DSKMAINT	FUNCTION	ASSGN (use STAT for this)
--------	----------	----------	---------------------------

Disks used for CP/M-86 must be formatted under CP/M-80.

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

Appendices F and H do not apply to CP/M-86 on CO-POWER-88.

Loading (booting) CP/M-86 is described in this document. It is entered after the host computer has been booted with CP/M-80. Refer to this document for details. (As with CP/M-80, when you change a disk in any drive in the system always do a CTRL C.)

There is not a hardware supported message that is displayed upon bootup with the CO-POWER-88 system as there is with the IBM.

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

To backup disks use CP/M-80 or use CP/M-86's PIP.

Regarding physical devices: non-IBM computers do not have IBM hardware. Devices used with CO-POWER-88 must be supported by the system's CP/M-80 or they will not work under CP/M-86.

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