DISTO
SUPER PRODUCTS

H DISK ADAPTER OS-9

MANUFACTURED & DISTRIBUTED BY

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DISTO SUPER HARD DISK OS-9 DRIVER

CONGRATULATIONS. Not only have you purchased one of the best hard disk interfaces for the CoCo, but you now own something that will change your OS-9 world; the OS-9 Hard Disk Driver.

FEATURES:

The OS-9 Hard Disk Driver works like an extremely large floppy disk. Anything that you can do with a floppy disk, you can do with the Hard Disk. Instead of using "/D0", "/D1", etc. use the Hard Disk's name, "/H0".

The Hard Disk is compatible with all known utility commands and applications for OS-9.

The two big advantages to using a Hard Disk are SIZE & SPEED. The total time to read/write a sector on the Hard Disk is many times faster than the fastest floppy disk. This makes floppies look even slower than they actually are.

A word of warning. Because the Hard Disk's contents CAN be lost or damaged in the same ways that floppies can, you should regularly copy to floppies any files that have been updated.

GETTING UP & RUNNING:

Type:

LOAD LOAD <ENTER>

Then place the Hard Disk master disk in drive 0, and type:

LOAD /D0/HARDDISK <ENTER>

This places the device driver ("CCHDISK") and the device descriptor ("H0") into memory. The ("H0") descriptor in the HARDDISK file defaults to a 5 meg drive in slot ±2. At this point, though, the system doesn't have H0 locked into place. It will need to be LINKed. To do this, place your system disk back into drive 0, and type:

LINK H0 <ENTER>

Your Hard Disk is now installed, but, if you have not yet used this hard disk, it is like any blank floppy disk; it must be formatted before it can be used. Also, like a floppy, before you format the disk you will want to make sure that the device descriptor contains the proper information about the size of the drive, numbers of tracks, sectors, heads, the interleave, etc. Before proceeding with a FORMAT, see the section of this documentation titled "DMODE UTILITY COMMAND". Now you can format the hard drive. Type:

FORMAT /H0 R "OS-9 Hard Disk" <ENTER>

This uses two options of the FORMAT command that are undocumented in any RS manuals to this date. The "R" on the command line tells FORMAT that you are <R>eady and that it doesn't need to ask you. The "OS-9 Hard Disk" gives FORMAT the name that you want for the disk, without asking you. You will also be asked whether you wish to have a physical format, or just a logical one. A logical format only makes to the hard disk SEEM to be blank, it does not format it. In this case, answer the prompt to physically format the disk. The FORMAT program will also ask if you wish to verify the sectors formatted. You should answer this one Yes. It will take a while, but you will gain two things from this action; (1) Peace of mind, since a sector that has been verified is a sector that can be

read. No verify errors means a good format, and (2) Any sectors that D0 have errors will be marked as bad and eliminated from OS-9's list of available sectors. This leaves less chance for I/O errors.

Okay, now give it a try. Type:

DIR /H0 <ENTER>

You should get a blank directory. Try a few commands with it, like COPYing a few files, and DELeting them.

INSTALLATION:

The Hard Disk can be permanently installed as a part of your OS9BOOT file. To do so easily, place a system disk in drive 0. Then type:

LOAD COPY OS9GEN <ENTER>
COPY /D0/OS9Boot /H0/OLDBoot <ENTER>

Place your Hard Disk Master disk in drive 0, then type:

MERGE /H0/OLDBoot /D0/HARDDISK >/H0/OS9Boot <ENTER>

Place a blank formatted disk in drive 0, and type:

OS9GEN /D0 <ENTER>

The OS9GEN program is now waiting for you to enter a filename. Type in:

/H0/OS9Boot <ENTER>

Then press the <ESCAPE> key (<CLEAR><BREAK> on the CoCo).

The disk in drive 0 will now have a bootfile that

contains everything on your original system disk, with the addition of the Hard Disk driver and device descriptor.

To test this disk out, hit the reset button on the CoCo and reboot OS-9 on this new system disk. The files that you copied to the Hard Disk will still be there (Try it; type "DIR /HO").

TECHNICAL INFORAMTION:

The Device Descriptor for the DISTO Hard Disk has been extended in the following manner:

MODULE OFFSET				
$20	IT.SAS	RMB	1	LAST DEFINED ENTRY FOR STANDARD RBF DEVICES.
$21	IT.InitC	RMB	1	HARD DISK INITIALIZE CODE.
$22	IT.InitT	RMB	20	HARD DISK INITIALIZE DATA TABLE.

OS-9 VERSION 2.XX.XX:

To create a new bootable disk using the CONFIG utility supplied with version 2.xx.xx of OS-9, delete the CCHDISK file on a copy of the config disk and take the CCHDISK_DISTO file that is located in the MODULES directory of your HARD DISK Master disk and copy it to the MODULES directory of your CONFIG disk. Now, delete the "HO" file on the config disk and copy one of the HO_DISTO files that is located in the MODULES directory of your HARD DISK Master disk and copy it to the MODULES directory of your CONFIG disk. Then, using CONFIG, select CCHDISK_DISTO and HO_DISTO, along with the other desired boot modules.

DMODE UTILITY COMMAND:

The DMODE utility is very similar to the XMODE utility, supplied with OS-9. It allows you to change various device descriptor options in a convenient manner. It also leaves the device descriptor with a correct CRC, allowing you to COBBLER a new bootfile with the changes, or SAVE a corrected copy.

The DMODE command is located in the CMDS directory of your HARD DISK Master disk. Copy it to your CMDS directory. Now type:

DMODE -? <ENTER>

This will show you all that you can do with DMODE. Type DMODE devicename (DMODE /DO) to get a display of the current options. The following is a complete list of the modifiers and their meanings.

cyls=n	- number of cylinders (tracks)
hds=n	- number of heads (sides)
step=n	- step rate code
sectrk=n	- number of sectors per track
sectrk0=n	- number of sectors per track on track 0
alloc=n	- segment allocation size in sectors
ilv=n	- sector interleave factor
initcmd=h	- controller initialize command (hex) (hard disk)
inittbl=<hstr>	- controller initialization string (hex) (hard disk)
[no]verify	- verify disk writes (floppy)
48tpi96tpi	- step density (48=35/40 track, 96=80 track) (floppy)
FMMFM	- recording density (FM=single, MFM=double) (floppy)

The biggest reason for having the DMODE command is to allow the user to customize for different hard drives and controllers. The "initcmd" is the command that the hard disk controller needs to initialize for

the proper drive information such as size. The "inittbl" is the table of information given to the controller during the initialize command. This command and information varies between different SASI controllers. Consult your hard disk controller manual for this information. The default is set for a Zebec 1410 or WD 1002, SHD hard disk controller using a single 5 meg hard drive.

MULTI-PAK INTERFACE:

The Hard Disk driver is written in such a way that, it can access the Hard Disk adapter in any slot. The slot number is determined by the $15'th byte of the "H0" descriptor. This byte should be $80 + (SLOT NUMBER - 1). For example, if the Hard Disk Adapter is in slot 3, then the value for that byte is $82. Supplied with this disk are 4 "H0" descripters, one for each slot number.

DISTO HARD DISK FORMAT ADDENDUM

When a new hard disk is installed, before it can be used, it must be formatted. Formatting a hard disk is a little like formatting a floppy disk. You must use the FORMAT command. The format command in OS-9 uses the information in the descriptor such as number of cylinders and number of heads. The default descriptor /H0 is set for a typical 5-Meg hard drive.

Before you format your drive, the parameters in the descriptor must be properly set to match your drive. This is done by using DMODE to modify the values in the descriptor. There are usually only two parameters to change. The Cyls (number of cylinders) and the Hds (number of heads). But, you must also tell the hard disk controller what kind of drive is connected to it. This is done by modifying the initcmd and the inittbl in the descriptor. The initcmd is the code used to tell your controller the disk parameters. In the case of the Xebec 1410 and the WD 1002-SHD, the code is $0C in hex. This is the default value in the supplied descriptor. If you are trying out another controller, it may be different. Consult the controller's manual for the right value. Look under "Initialize Drive Characteristics" or "Set Parameters".

The initcmd gets its parameters from the inittbl. For the above mentioned controllers only the first 8 bytes of the table are used. Twenty bytes has been reserved for this table, in case your controller needs more than 8 bytes. The 8 bytes used are listed below;

C = Maximum number of cylinders (2 bytes)
H = Maximum number of heads (1 byte)
W = Reduced write current cylinder (2 bytes)
P = Write Precompension cylinder (2 bytes)
E = Max ECC data burst length (1 byte)

To set these values to other than a 5-Meg drive, refer to the hard drive's manual for this information. Using the DMODE command, enter the new values according to your drive specifications. Each byte requires a 2 character HEX value and are entered in the order given above without spaces. If a paramater is not given or not known, try the default value or 0. Do not forget to change the Cyls and Hds values also.

The following is a list of various hard drive parameters;

APPENDIX A

CONFIGURATION PARAMETERS FOR VARIOUS DISK DRIVES

The abbreviations for the manufacturers are as follows:

CMI	Computer Memories Incorporated.
OLI	Olivetti.
RMS	Rotating Memory Systems Incorporated.
SEA	Seagate Technology Incorporated.
TAN	Tandon Incorporated.
TI	Texas Instruments
RO	Rodime Ltd.
MS	Miniscribe

Mfgr/Model No.	Cylinders	Heads	Reduce Write Cyl.	Write Precomp Cyl.
CMI CM-5205	256 (100)	2	256 (100)	256 (100)
CMI CM-5410	256 (100)	4	256 (100)	256 (100)
CMI CM-5616	256 (100)	6	256 (100)	256 (100)
OLI HD561	180 (B4)	2	128 (80)	180 (B4)
OLI HD562	180 (B4)	2	128 (80)	180 (B4)
RMS 503	153 (99)	2	77 (4B)	77 (4B)
RMS 506	153 (99)	4	77 (4B)	77 (4B)
RMS 512	153 (99)	8	77 (4B)	77 (4B)
SEA ST-506	153 (99)	4	128 (80)	64 (40)
SEA ST-412	306 (132)	4	128 (80)	64 (40)
TAN TM602S	153 (99)	4	128 (80)	153 (99)
TAN TM603S	153 (99)	6	128 (80)	153 (99)
TAN TM603SE	230 (E6)	6	128 (80)	128 (80)
TI 5¼+	153 (99)	4	64 (40)	64 (40)
RO 101	192 (C0)	2	96 (60)	0 (0)
RO 102	192 (C0)	4	96 (60)	0 (0)
RO 103	192 (C0)	6	96 (60)	0 (0)
RO 104	192 (C0)	8	96 (60)	0 (0)
RO 201	321 (141)	2	132 (84)	0 (0)
RO 202	321 (141)	4	132 (84)	0 (0)
RO 203	321 (141)	6	132 (84)	0 (0)
RO 204	321 (141)	8	132 (84)	0 (0)
MS 1-006	306 (132)	2	153 (99)	0 (0)
MS 1-012	306 (132)	4	153 (99)	0 (0)