

**DISTO**  
**SUPER PRODUCTS**

# H DISK SUPER ADAPTER



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## HARD DISK II ADAPTER

Congratulations on the purchase of your new DISTO HARD DISK II Adapter. The quality materials and workmanship used in this product insures years of trouble free use. The HARD DISK II Adapter will work only with the DISTO SUPER CONTROLLER I or II, the DISTO SUPER RAM DISK or MEB carrier. Only one DISTO Super Adapter will fit into a carrier.

### INTRODUCTION:

The HDII Adapter is the vital link between your computer and a hard drive system. A hard drive system consists of a hard drive controller, a hard drive (usually between 10 and 60 meg), a case and power supply and a 50-pin cable. The 50-pin cable connects between this adapter and the controller. The controller, hard drive and power supply are all inside the case. A hard drive controller is an intelligent device that has full control of the hard drive itself. It communicates to your computer via this adapter. Two protocols are supported by this adapter; SASI and SCSI. A software driver is also needed to save and retrieve files to the hard drive system. For more details on controllers or hard drives, refer to the controller or hard drive manuals. In the SASI protocol, the hard drive controllers fully supported by this adapter are, the Zebec 1410A, the Western Digital WD 1002-SHD and the DTC 500 series. Other compatible controllers may work, but are not guaranteed. In the SCSI protocol, the Adaptec 4000A series. In the drive and controller combination, the Rodime 650 series and the Seagate 'N' series will all work with the HDII. Before turning on your hard disk system, please take the time to READ THIS MANUAL TO THE END!

## INSTALLATION INSTRUCTIONS:

1 - Turn your computer, and any another devices connected to it, off. Remove the Controller or and MEB adapter holder from the computer and remove any cables. Remove the cover of the device by removing the 2 screws on each side and locate the 17 pin connector J1 on the board. See it's user's manual.

2 - Before inserting the adapter into the connector, insert a 50-pin cable through the slot in the back of the device. The pin #1 indicator (usually a red stripe) should go away from you (the same way as a floppy disk cable). Insert the 50-pin cable to the 50-pin connector of the adapter. Pin #1 is on the side of the 74ALS580 chip.

3 - Locate the single row female connector on one edge of the adapter. Hold the adapter so that the components face towards the controller. Insert the adapter into the connector (J1) so that the solder side of the adapter faces upwards and the adapter completely fits inside the controller case. Make sure that the connector is properly positioned so that there are no pins sticking out on either side.

4 - If you have the RS232 option installed, locate the wire jumper on the adapter board and insert the connector into J2 on the carrier device you have. Note; if you have the SC-1, the connector is J3.

5 - To access the serial port connector, if the serial port adapter is installed, punch out the rectangle cutout in device's upper cover. A small flathead screwdriver and long-nose pliers are needed. Insert the flathead in the middle of the cutout from the inside and pry it open. Using the pliers, bend the cutout back and forth until it breaks off.

6 - Tape on or glue the HDII's protective plastic sheet to the inside of the cover. Make sure that it is properly positioned, directly above the HDII. Replace the cover and replace the 4 screws to the cover.

## TECHNICAL INFORMATION:

### HARD DISK ADAPTER

The DISTO HARD DISK adapter is memory mapped to the I/O area known as the SCS. The following is a memory map of the Hard Disk adapter;

<u>Location</u>		<u>Read</u>
<u>Write</u>		
65361 (\$FF51)	H Status *	H Reset
65362 (\$FF52)	N/C	H Select
65363 (\$FF53)	HD Data	HD Data

\* D7 = REQ  
D6 = C/D  
D5 = I/O  
D4 = N/C  
D3 = N/C  
D2 = MSG  
D1 = ACK  
D0 = BSY

To select the device, Store the device number in the H Drive Data then Store any value to the H Select to activate it. The Select is latched until the responding device replies by asserting busy. If no device responds, the select can be reset by storing any value to H Reset or hitting the reset button. Any Store to the H Reset location will also reset the hard drive controller. See your controller manual for hard drive commands and protocols. The HDII hardware will work with both SASI and SCSI controllers without any hardware change.

## OS9 SOFTWARE

The following instructions require that you have of good knowledge of OS9 commands and module structures. Like any other device in OS9, if you want the Hard Disk to be present on boot-up you must make a new boot disk. Delete the modules H0.dd and CCHDISK.dr on a copy of your Boot/Config disk. Copy the H0 descriptor and driver that suits your hardware needs. Now make a new boot disk using the 'config' or 'os9gen' command and include H0 along with whatever other modules you require.

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\_HDIISASI.dd and H1\_HDIISASI.dd are set for a ST-225 (20-Meg hard drive) and a WD 1002-SHD controller. Before you format your drive, if it is different than the above mentioned drive, the parameters in the descriptor must be properly set to match your drive. This is done by using 'hmode' 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). This tells OS9 the size of drive is connected to it.

You must also tell the hard disk controller what kind of drive is connected to it. The following procedure is for SASI type controllers only. This is done by modifying the initcmd and the inittbl in the descriptor. The initcmd is the code used to tell your controller what kind of disk is connected to it. In the case of the Zebec 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 SASI 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 20-Meg drive, refer to the hard drive's manual for this information. Using the 'hmode' 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 parameter is not given or not known, try the default value or 00, but do not forget to change the Cyls and Hds values.

In the case of the SCSI drives, the low level formatting is done via a Disk Basic program. If your drive is different than a ST-225, list the program and change the parameters in the DATA area to suite your drive. If you have a drive with a built in controller choose the proper format program. Then in OS9, use the /H0\_HDIISCSI.dd and use the 'format' command, but since your drive is already physically formatted, when it asks for 'both physical and logical', answer no. In the SCSI descriptor, the initcmd is set to 00, since an SCSI controller gets its drive information from a reserved track on the drive itself. Any time the initcmd byte is 00 no

initialization is done. In any case, OS9 must still be told how many cylinders and heads your hard drive has. Use 'hmode' to change these values.

Finally, the hard disk driver is written in such a way that, it can access the HDII hardware in any Multi-Pak Interface slot. The slot number is determined by the \$15' th byte of the /HO descriptor. This byte should be \$80 + (Slot # - 1). For example, if the HDII is in slot #3, then the value for that byte is \$82. The default slot for the descriptors supplied is slot #4.

When all this is said and done, you may want to use 'cobbler' to make the changes to the descriptor permanent. But remember there are many ways of installing and changing modules, the above is only a guideline.

#### Disk Extended Basic Software

DISTO does not support the hard disk adapter under DEB, but there are third party software available for the HDII. If you are using a SCSI controller, you can use the hard disk software by RGB Computer Systems. 294 Stillwell Ave Kenmore, NY 1417. (716) 876-7538. Or if you are using a SASI controller you can use Hyper I/O software by Burke & Burke, P.O. Box 1283 Palatine, Il 60078-1283 (312) 397 2898. Look through the pages of the latest Rainbow for more up to date info on compatible software on the HDII.

#### RS232 Communications Port

The HDII uses the R6551P2 as its main ACIA. It will run at 2 mhz and is functionally the same as the Tandy Deluxe RS232 Pak. The only difference being address location. The Deluxe Pak is mapped

starting at \$FF68 while the HDII is mapped starting at \$FF54. For more details on how the ACIA works, see the Rockwell Controller Products Data Book. The following is a memory map of the ACIA;

<u>Location</u>	<u>Read</u>	<u>Write</u>
\$FF54	Data	Data
\$FF55	Status	Reset
\$FF56	Command Register	
\$FF57	Control Register	

The following is a pinout of the 16 pin RS232 connector (J3);

<u>Pin</u>	<u>Function</u>
1	N/C
2	TXD
3	RXD
4	RTS
5	CTS
6	DSR
7	GND
8	DCD
9	N/C
10	DTR
11-16	N/C

#### OS9 SOFTWARE

In the modules directory of the Boot/Config disk is the driver for the Tandy Deluxe RS232 Pak. This is what you must use to drive the RS232 portion of the HDII. In order for it to work properly, since it is not mapped at the same location as that of the Tandy's Pak, you must use a different /T2 descriptor. It is named T2\_FF54.dd on the Disto disk. Copy it from the the modules directory to your Boot/Config disk. Make a new bootdisk using the

/T2\_FF54.dd descriptor and aciapak.dr and use it as you would the Tandy Deluxe RS232 Pak. Due to the memory mapping techniques (the SCS pin) and the IRQ handling of the COCO, the HDII'S RS232 port will only work in slot #4 inside the controller (1 or 2). If you are using a COCO 3, the aciapak.dr driver can inadvertently turn off the interrupts via the GIME chip. A fix using modpatch will prevent this. With Aciapak.dr and modpatch in memory type;

```
modpatch <aciapak.mod
```

Then you can cobble another bootdisk to make the mod permanent. Another method to prevent this is to just initalize T2. If you have the Tandy hard disk, you must fix, it for the RS232 interrupts as well.

#### Disk Extended Basic Software

DISTO does not support the RS232 under DEB but there are third party software for the RS232. Several terminal packages support the RS232 adapter in the HDII. Refer to any recent issue of Rainbow for this software.

#### Credits:

The DISTO HDII, and all its documentation are conceived and designed by Tony DiStefano. The DISTO HDII is manufactured and distributed by;

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OS-9 Level II.  
WD-1002-SHD or Xebec 1410 Controller.  
SEagate ST-225 : 20 Meg, 615 Cyls, 4 Hds.  
Two disk drive sys.  
Disto Hard Disk OS-9 Drivers in drive /d1

```
First Boot with OS-9 lvl.II in drive /d0  
Load /d1/modules/CCHDISK_SASI_LII.DR  
Load /d1/modules/H0_HDIISASI.DD
```

At this stage if you need to change the number of CYLINDERS or number of HEADS (I.E. for a 5 Meg. hard disk with 160 cyls and 4 hds) Load /d1/cmds/HMODE if not step to FORMAT.

```
hmode /h0  
(Notice that the CYLS=615, HDS=4 and the INITTBL=026704)  
hmode /h0 cyls=160 hds=4 inittbl=00A004 (Note: 160=00A0, 4=04)  
hmode /h0  
(Now cyls should be 160, hds=4 and inittbl=00A004)
```

#### FORMAT :

```
-----  
format /h0  
Answer "Y" for FORMATTING A HARD DISK..  
Answer "Y" at "Are you sure ?"  
Answer "Y" for BOTH PHYSICAL AND LOGICAL FORMAT  
Answer "Y" or "NO" for LOGICAL VERIFY DESIRED  
(If you answer "Y" be patient...)
```

Now that your Hard disk is formatted, if you want the hard disk to be present on boot-up you must make a new boot disk. Delete the modules H0.dd and CCHDISK.dr on a copy of your Boot/Config disk in D0. Copy the H0 descriptor and driver that suits your hardware needs.

NOTE : If you have modified the H0\_HDIISASI.dd, you may use the SAVE command (OS-9 LVL.I) to copy H0.dd on your Boot/Config disk. EXAMPLE using SAVE: First LOAD and HMODE /H0 to your needs, then save /d0/modules/H0.DD H0  
copy /d1/modules/CCHDISK\_SASI\_LII.DR /d0/modules/CCHDISK.DR

Example : (If you did not use HMODE)  
copy /d1/modules/CCHDISK\_SASI\_LII.DR /d0/modules/CCHDISK.DR  
copy /d1/modules/H0\_HDIISASI\_DD /d0/modules/H0.DD

Now make a new boot disk using the 'config' or 'os9gen' command and include H0 along with whatever other modules you require.

OS-9 Level II.  
SEGATE ST-225, 20 Meg. Hard drive.  
ADAPTEC 4000-A SCSI Controller.  
Two disk drive sys.  
Disto Hard Disk OS-9 Drivers in drive /d1

In the case of the SCSI Controller, the low level formatting is done via DISK BASIC. For this example, we are using a ST-225, 20 Meg, 615 Cyls. 4 Hds. hard drive.

RUN "FMTADPC" and answer all questions.  
Then Boot with OS-9 lvl.II in drive /d0  
Load /d1/modules/CCHDISK SCSI\_LII.DR  
Load /d1/modules/H0\_HDIISCSI.DD

At this stage if you need to change the number of CYLINDERS or number of HEADS (I.E.: For a 5 Meg. hard disk with 160 cyls and 4 hds) LOAD /d1/cmds/HMODE and modify the value in the descriptor. If not step to FORMAT.

hmode /h0  
(Notice that the CYLS=615, HDS=4 and the INITTBL=026704)  
hmode /h0 cyls=160 hds=4 inittbl=00A004 (160-00A0 HEX, 4-04 HEX)  
hmode /h0  
(Now CYLS should be 160, HDS=4 and INITTBL=00A004)

format /h0  
Answer "Y" for FORMATTING A HARD DISK..  
Answer "Y" at "Are you sure ?"  
Answer "N" for BOTH PHYSICAL AND LOGICAL FORMAT  
Answer "Y" or "NO" for LOGICAL VERIFY DESIRED  
(If you answer "Y" be patient...)

Now that your Hard disk is formatted, if you want the hard disk to be present on boot-up you must make a new boot disk. Delete the modules H0.dd and CCHDISK.dr on a copy of your Boot/Config disk in d0. Copy the H0 descriptor and driver that suits your hardware needs.

NOTE : If you have modified the H0\_HDIISCSI.dd, you may use the SAVE command (OS-9 LVL.I) to copy H0.dd on your Boot/Config disk. EXAMPLE using SAVE: First LOAD and HMODE /h0 to your needs, then save /d0/modules/H0.DD H0  
copy /d1/modules/CCHDISK SCSI\_LII.DR /d0/modules/CCHDISK.DR

Example : (If you did not use HMODE)  
copy /d1/modules/CCHDISK SCSI\_LII.DR /d0/modules/CCHDISK.DR  
copy /d1/modules/H0\_HDIISCSI.DD /d0/modules/H0.DD

Now make a new boot disk using the 'config' or 'os9gen' command and include H0 along with whatever other modules you require.

OS-9 Level II.  
SEGATE ST-225-N 20 Meg. SCSI Hard Drive.  
Two disk drive sys.  
Disto Hard Disk OS-9 Drivers in drive /d1

In the case of the SCSI drives, the low level formatting is done via DISK BASIC. For this example, we are using a ST-225-N 20 Meg SCSI hard drive.

RUN "FMTSGATN" and answer all questions.  
Then Boot with OS-9 lvl.II in drive /d0  
Load /d1/modules/CCHDISK SCSI\_LII.DR  
Load /d1/modules/H0\_HDIISCSI.DD

At this stage if you need to change the number of CYLINDERS or number of HEADS (I.E.: For a 5 Meg. hard disk with 160 cyls and 4 hds) LOAD /d1/cmds/HMODE and modify the value in the descriptor. If not step to FORMAT.

hmode /h0  
(Notice that the CYLS=615, HDS=4 and the INITTBL=026704)  
hmode /h0 cyls=160 hds=4 inittbl=00A004 (160-00A0 Hex, 4-04 HEX)  
hmode /h0  
(Now CYLS should be 160, HDS=4 and INITTBL=00A004)

format /h0  
Answer "Y" for FORMATTING A HARD DISK..  
Answer "Y" at "Are you sure ?"  
Answer "N" for BOTH PHYSICAL AND LOGICAL FORMAT  
Answer "Y" or "NO" for LOGICAL VERIFY DESIRED  
(If you answer "Y" be patient...)

Now that your Hard disk is formatted, if you want the hard disk to be present on boot-up you must make a new boot disk. Delete the modules H0.dd and CCHDISK.dr on a copy of your Boot/Config disk in d0. Copy the H0 descriptor and driver that suits your hardware needs.

NOTE : If you have modified the H0\_HDIISCSI.dd, you may use the SAVE command (OS-9 LVL.I) to copy H0.dd on your Boot/Config disk. EXAMPLE using SAVE: First LOAD and HMODE /h0 to your needs, then save /d0/modules/H0.DD H0  
copy /d1/modules/CCHDISK SCSI\_LII.DR /d0/modules/CCHDISK.DR

Example : (If you did not use HMODE)  
copy /d1/modules/CCHDISK SCSI\_LII.DR /d0/modules/CCHDISK.DR  
copy /d1/modules/H0\_HDIISCSI.DD /d0/modules/H0.DD

Now make a new boot disk using the 'config' or 'os9gen' command and include H0 along with whatever other modules you require.

OS-9 Level II.  
RODIME 650 Series 20 Meg. Hard Drive.  
Two disk drive sys.  
Disto Hard Disk OS-9 Drivers in drive /d1

In the case of the SCSI drives, the low level formatting is done via DISK BASIC. For this examlpe, we are using a RODIME 652-A 20 Meg hard drive.

RUN"FMTRDME" and answer all questions.

Then Boot with OS-9 lvl.II in drive /d0

Load /d1/modules/CCHDISK\_SCSI\_LII.DR

Load /d1/modules/H0\_RODIME652.DD

At this stage if you need to change the number of CYLINDERS or number of HEADS, LOAD /d1/cmds/HMODE and modify the value in the descriptor. If not step to FORMAT.

format /h0

Answer "Y" for FORMATTING A HARD DISK..

Answer "Y" at "Are you sure ?"

Answer "N" for BOTH PHYSICAL AND LOGICAL FORMAT

Answer "Y" or "NO" for LOGICAL VERIFY DESIRED

(If you answer "Y" be patient...)

Now that your Hard disk is formatted, if you want the hard disk to be present on boot-up you must make a new boot disk. Delete the modules H0.dd and CCHDISK.dr on a copy of your Boot/Config disk in d0. Copy the H0 descriptor and driver that suits your hardware needs.

NOTE : If you have modified the H0\_RODIME652.dd, you may use the SAVE command (OS-9 LVL.I) to copy H0.dd on your Boot/Config disk. EXAMPLE using SAVE: First LOAD and HMODE /h0 to your needs, then save /d0/modules/H0.DD H0  
copy /d1/modules/CCHDISK\_SCSI\_LII.DR /d0/modules/CCHDISK.DR

Example : (If you did not use HMODE)

copy /d1/modules/CCHDISK\_SCSI\_LII.DR /d0/modules/CCHDISK.DR

copy /d1/modules/H0\_RODIME652.DD /d0/modules/H0.DD

Now make a new boot disk using the 'config or 'os9gen' command and include H0 along with whatever other modules you require.