

HARDHELP

HARDHELP is a test and diagnostic program for all DMS hard disk products and is designed to run under DDT control. HARDHELP allows the user to read or write the disk, examine the buffers, and run various disk tests. It is generally used for testing and trouble shooting but it can also be used to format the entire disk for CPM operation and to examine and modify the defective sector table.

To use HARDHELP, boot up on a CP/M diskette and type DDT space, HARDHELP.COM then carriage RETURN. DDT will prompt the user with a "-" when HARDHELP is ready to be run. Type G100 to initialize the diagnostic. HARDHELP will ask the size and type of disk drive being used. Next it will ask what operation the user wishes to perform. Answer "0" (return to DDT) as the other options are designed to be run without DDT control and return back to CP/M when finished. When control has returned to DDT ("-") prompt) type G100 to get a menu of the available diagnostic routines. Use this program carefully on a "live" disk as many of the test (such as format) will destroy data. A sample of a HARDHELP menu is given below.

DMS HARD DISK TEST PROGRAM VER DSC3 2.37

THE FOLLOWING ENTRY POINTS ARE IMPEMENTED

100H	PRINT THIS MESSAGE
104H	SETUP INTERRUPTS FOR USE WITH DDT
108H	RESET HDC4000
10CH	ABSOLUTE SECTOR READ
110H	ABSOLUTE SECTOR WRITE
114H	VERIFY READ ENTIRE DISK
118H	FORMAT ENTIRE DISK
11CH	LOAD HDC RAM PROGRAM
120H	RUN WRITE, READ, COMPARE TEST
124H	RUN SEEK TEST
128H	GET DISK SIZE
12CH	INITIALIZE USER AREA FROM 1000H
130H	RUN INTERFACE TEST
134H	RUN MEMORY TEST
138H	GET CONTENTS OF HDC MEMORY
13CH	REPEAT READ THS
140H	REPEAT TEST THS
144H	SEND COMMAND 40H TO CONTROLLER

DATA AND COMMAND BUFFERS

The above test entry points use the following memory locations for data and command buffers.

1000H-1400H WBUFFER: Data in this buffer is transferred to the hard

disk on a write command.

- 1800H-1C00H RBUFFER: Data that is read from the disk is stored in this buffer on disk read commands.
- 20H-27H COMMBUFF: This buffer is loaded and transmitted to the HDC on every HDC command. The HDC decodes the command buffer and acts on the information contained therein. Location 20H is loaded with the command byte. The rest of the buffer is loaded from location 0F00-0F06. These locations specify the disk location (track, head, sector), number of retries, and whether to perform a read after write check on a write command. Note that this command buffer is prepared automatically by the various tests.

COMMANDS AND COMMAND FORMAT

The HDC commands that are loaded into 20H of the COMMBUFF by the various test programs are as follows.

- ABSRDCOMM=1 Absolute read command
- ABSWRTCOMM=2 Absolute write command
- INITUSER=3 Loads the HDC user RAM area from locations 1000H. User programs can be special purpose test programs designed operate specific parts of HDC hardware. The user RAM area of the HDC starts at 4100H, therefore all user programs should be designed to run at 4100H.
- TSTINT=6 This causes the HDC program to run at 4100H where the user program HDCIT.HEX should be stored.
- REREAD=7 Causes the HDC to run at 4100H. HDCIT.HEX should be at this location. Two of the entry point programs use this HDC command.
- MTEST=8 Causes a memory test program to run at 4100H.
- HDFORMAT=9 Causes a disk format program to run at 4100H.

Memory locations 0F00H-0F06H contain the disk location and the number of retries. HARDHELP programs manipulate these locations before loading them into COMMBUFF. The user may also manipulate these locations. For example if the user wished to see the contents of the bad sector table all he would have to do is change track, head, and sector to 0,0,11H respectively and perform a disk read (G10C). The contents of the RBUFFER would then contain the bad sector table.

The meaning of F00-F06 is given below.

OF00=Track
 OF01=Head
 OF02=Sector
 OF03=Tag 0 -not used
 OF04=Tag 1 -not used
 OF05=Retrys -number of retries + 1 . msb=1 means use ECC
 capability on CRC errors for a read sector
 command, or it means perform read after write
 check for a write sector command.
 OF06=0

DESCRIPTION OF ALL ENTRY POINT TESTS

To perform any of the tests contained in HARDHELP simply type GNNN then carriage RETURN, where NNN is the test entry location. All test programs return to DDT through a RST 06 or a manual interrupt. Several of the tests require a manual interrupt for a termination of the test and a return to DDT. The manual interrupt switch is the middle of the three switches on the front panel of the machine. Most tests terminate when an "R" is typed and show a summary when an "S" is typed.

G100 -Display the directory of all entry points
 G104 -Enables the front panel interrupt ON DSC2 ONLY
 G108 -Resets the HDC See HDC OPERATION DESCRIPTION
 for a detailed description of a reset. (Note that G100
 "falls through" and executes a G104 and G108).
 G10C -Reads the sector specified by track, head, and sector
 For detailed description see HDC OPERATION DESCRIPTION
 G110 -Writes the sector specified by track, head, sector.
 For detailed description see HDC OPERATION DESCRIPTION
 G11C -This program loads the HDC user area from 1000H. It is
 intended that the user programs will be test programs.
 G114 -This is a read test, it reads all sectors on the disk
 and reports any read errors.
 G118 -This test formats the entire disk. It destroys all
 data on the disk. The program asks the user whether or
 not he wishes to continue. The first 17 1K blocks
 of the disk will be saved and restored.
 G120 -This is a complete disk test. It writes and reads
 continuously over all sectors on the disk except for track

0. Two types of patterns are used; a cyclicly rotated B6D9 pattern, and a random pattern. G120 reports write errors, read errors and compare errors. An error counter at F08 counts the number of errors. Return through front panel interrupt or "R". Typing an 'S' while the program is running causes an error summary to be printed.
- G124 -This is a seek test program. It causes the disk to perform random, maximum or incrementing seeks. Return through front panel interrupt or by typing "R".
- G128 -G128 gets the size of the disk and displays it on the screen. The program assumes that controller firmware has been stored on track0, head 0, sector 1.
- G12C -INITIALIZE USER AREA FROM 1000H. This program is very similar to G11C in that both load the HDC user memory area. The difference is that G12C also loads track 0, head 0, sectors 1 and 2 with the same program. Programs that are loaded by 12C must have the same format as CPMUSER.
- G130 -RUN INTERFACE TEST. This routine tests the CPU/HDC interface. This is achieved by sending data blocks to the HDC and reading them back. Three data patterns are used, a 00 pattern, FF pattern and a random pattern. Any errors are displayed on the screen.
- G134 -MEMTEST. This program tests the HDC RAM memory. For each test loop containing no errors, an 'OK' is printed. The program first executes at 4100H and tests C000H to FFFFH. After 256 loops it moves itself to C000H and tests 4100H to 7FFFH. If an error is found, the address, expected contents, and actual contents is printed in hex.
- G138 -GETMEM. This routine retrieves the HDC read buffer (F000H to F3FFH) and moves it to 4000H in the host's memory. This allows examination of the header which is normally not returned by the HDC.
- G13C -READTHS. This routine reads until error the sector specified by TRACK, HEAD, and SECTOR. Get summary with "S" and exit with "R".
- G140 -WRITETHS. This routine writes, reads, and compares the sector specified by TRACK, HEAD and SECTOR until error. Get summary with "S" and exit with "R".
- G150 -RDISPC. Read and display continuously. This routine calls READISP below, increments the physical sector and repeats. Exit with "R".
- G154 -READISP. This routine reads the sector specified by TRACK, HEAD, and SECTOR and displays the first 100H bytes.

- G158 -GETBST. This routine reads the Bad Sector Table and displays it. Additional entries may be added.
- G15C -ZROBST. This routine zeroes the Bad Sector Table. (G158 must be run immediately before G15C).
- G160 -COMP. Compares read and write buffers. Useful to locate byte in error after G140.

ERROR MESSAGE FORMAT

When G120 or some of the other test routines are running read and write errors are displayed with 6 numbers. They have the following meaning:

ERROR TYPE, ERROR RETURN FROM HDC, TRACK, HEAD, SECTOR, DATA PATTERN

ERROR TYPES: 00 Write
 01 Read
 02 Compare (data different from expected result)

ERROR RETURN FROM HDC:

80 Command Error
40 Data CRC Error
21 Could not find sector-1 (header)
22 Bad track, head, or sector # in header
23 Header checksum error
11 Write fault
12 Drive Not Ready
13 Internal timeout
14 Read after write compare error
91 Error in saving first 17K during Format
92 Error in restoring first 17K in Format