

## H-89 HARD DISK (TOO LATE??) HARDWARE/SOFTWARE REVIEW

by  
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PRODUCT: H-89 20 MEGA BYTE HARD DISK  
(internally mounted) with CP/M software.

PRICE: \$595.00 PLUS \$15.00 for shipping and  
handling

TEST CONFIGURATION: H-89A with 64k memory,  
Micronics Technology 4Mhz plug-in mod, H-17 &  
H-37 floppy disk controllers, three DSDS floppy disk  
drives, H-88 three port serial interface card,  
CP/M2.2.03 and CP/M 2.2.04. No permanent  
modifications to H-89.

### INTRODUCTION

Some people may think that the H-89 is obsolete  
and past its prime, but I don't hold that opinion.  
Specifically, why would anyone want to upgrade an  
H-89 by putting in a 20 megabyte hard disk when a  
16 machine can be purchased for just a "few"  
dollars more. Well, I might not be in my right mind,  
but I did just that.

In my case, I did not need any more software than  
what I have right now on my H-89. The big problem  
is trying to cope with the dozens and dozens of  
floppy disks. The key word here is "need". Sure, I  
would like to have a 16 bit machine; I am spoiled on  
them at work. However, the cost is significant when  
you add up all the peripherals that are required or  
will be acquired later: color monitor, hard disk,  
enhanced graphics adapter, memory upgrades, etc.

To satisfy my appetite for high density mass storage  
capability, I decided to buy the internally mounted 20  
MB hard disk currently advertised by Micronics  
Technology in Remark and Sextant. I had previous  
experience with Micronics Technology with the 4  
Mhz speed up mod for the H-89 for \$30.00 which  
was a very competitive price. The advertised price  
of the hard disk setup seemed competitive  
considering that bare Seagate ST-225 20 MB drives  
with controllers for PC compatibles can be  
purchased for about \$400.00.

But, what about a controller for the H-89? As a  
comparison, the February 1987 issue of REMARK  
contains an article on the Sigmasoft H-89 hard disk  
installation which lists the price for an internally  
mounted 20MB hard disk for \$995. That is \$400.00  
more than the price advertised by Micronics  
Technology. Well, where does all this discussion take

us? The best is yet to come. Lets take a look at the  
hardware/software that Micronics Technology has to  
offer.

### HARDWARE

The H-89 hard disk system consists of three major  
components. SEAGATE ST-225 20 mb hard disk,  
EVEREX hard disk controller for PC compatibles and  
a nifty interface card that mounts on the left hand  
side of the CPU next to the 16K memory card. The  
EVEREX controller comes complete with  
documentation and MSDOS software for installation  
in a PC compatible (e.g Z-158). This is a very nice  
feature because the hard disk and controller can be  
removed and installed in a PC compatible at any time  
and without any modification (other than software of  
course). The half height hard disk mounts internally  
and comes with both full and half height bezels.

Now we come to the Micronics Technology interface  
card. The interface card installs on the left hand side  
of the CPU card next to the 16K memory expansion  
board. That means that the three right hand slots  
which have the serial interface card, hard sector  
controller, and soft sector controller can be left fully  
populated. In order to accomodate the PC  
compatible hard disk controller card, the interface  
card extends upward about 1 1/4 inches higher than  
the 16k memory board. Unfortunately, this forces  
the removal of the bracket which secures the boards  
in place. However, this should not be a problem  
unless the H-89 would be subjected to excessive  
movement.

The top right hand side of the interface card contains  
a connector into which the PC compatible hard disk  
controller is mounted. When installed, the controller  
card is in a horizontal position with the components  
facing down and the long dimension of the card going  
from the front to the back of the H-89. The front  
edge of this card actually rests on the top of the CRT  
so I put a foam pad with adhesive backing on the  
card to prevent it from touching the metal grounding  
strap surrounding the CRT. This also provides some  
mechanical support.

Lets get back to the interface card. Installation of  
this board involves the following: (1) removal of the  
Heath MTR-90 ROM from U-518 of the CPU card  
and reinstall in a socket on the interface card; (2)  
install two 2114 ICs on the CPU board in empty  
sockets U522 and U524; (3) insert the 20 pin IC  
board attached to the interface card with four wires  
between the CPU and the IC at U509. (4) plug the  
single black jumper wire from interface card into pin  
18 of U518 (socket from which the MTR-90 ROM  
was removed).

The controller and interface card are powered by the internal power supply by connecting a cable from the interface board to the H-89 floppy disk power connector. A parallel connector is used to power the hard disk. Two control cables for the hard disk are the same as would be used in a PC compatible.

The hard disk is installed in the same manner as a half-height floppy disk. A half-height floppy disk is NOT recommended for internal installation because of the possibility of power supply overload. For appearance sake, the hard disk should be installed with the full height bezel. In a nutshell, that's it. No soldering, trace cuts or any permanent modifications to the H-89.

## SOFTWARE

Software to support the hard disk is supplied on two separate disks. The first disk contains 26 separate files some of which are public domain and others which have been written by Micronics Technology to support the hard disk. The second disk contains the popular ZCPR2 CP/M public domain enhancement. The Micronics Technology utilities to support the hard disk consist of a hard disk format program, hard disk install program for CP/M to make the hard disk bootable, a PARKHEAD utility, a hard disk backup utility, a hard disk surface fix/check utility, a FORMAT utility for hard disk directory tracks, and a program named SWAP.COM which enables the user to jump to the Micronics Technology monitor ROM. This is useful if you want to jump to the standard Heath MTR-90 ROM and get the familiar "H:" if you want to boot from a floppy disk.

In order to properly access the hard disk using CP/M, a suitable BIOS.SYS must be prepared and assembled with the HEATH MAKEBIOS utility. To simplify this, Micronics Technology supplies a SUBMIT file which will make the appropriate BIOS.ASM changes with the CP/M ED.COM editor. After the BIOS.ASM file is modified by the SUBMIT file, the MAKEBIOS program is run followed by MOVCPMXX and SYSGEN. When the MAKEBIOS utility is run, the user only needs to answer the questions relative to the type of floppy disks are installed. The end result is a bootable floppy disk with a BIOS.SYS that recognizes the hard disk. Once the BIOS.SYS is successfully generated, the user should run CONFIGUR.COM to tailor the BIOS to his particular system. After configuration is complete, the Micronics Technology program HINSTALL.COM is run to transfer CP/M system files and BIOS to the system tracks of the hard disk. Unlike the H-89 floppy system, the system tracks of the hard disk have sufficient room to hold the BIOS.SYS file. Because of this, CONFIGUR cannot

be run from the hard disk. Since CP/M will only address eight megabytes of disk space, the BIOS and FORMAT utility is configured by Micronics Technology to logically divide the hard disk into two 8 MB drives and one 4 MB drive. In order to show how much space is available, here is the output when STAT DSK: is executed:

### A: Drive Characteristics

```
65536: 128 Byte Record Capacity
8192: Kilobyte Drive Capacity
1024: 32 Byte Directory Entries
0: Checked Directory Entries
512: Records/Extent
64: Records/Block
68: Sectors/Track
2: Reserved Tracks
```

### B: Drive Characteristics

```
65536: 128 Byte Record Capacity
8192: Kilobyte Drive Capacity
1024: 32 Byte Directory Entries
0: Checked Directory Entries
512: Records/Extent
64: Records/Block
68: Sectors/Track
966: Reserved Tracks    ---> track offset to set up drive B
```

### C: Drive Characteristics

```
35136: 128 Byte Record Capacity
4392: Kilobyte Drive Capacity
1024: 32 Byte Directory Entries
0: Checked Directory Entries
256: Records/Extent
32: Records/Block
68: Sectors/Track
1930: Reserved Tracks    ---> track offset to set up drive C
```

## OPERATION

When first turning on the computer, the Micronics Technology Boot Prom gives the following message:

Micronics Technology Winchester Boot Prom version 2.2

```
<B>oot from Winchester
<S>wap to Heath Rom
```

MT:

As you may have guessed, you have two choices: press the "B" key or press the "S" key. If you press "B", the hard disk is accessed and CP/M is loaded in a manner of seconds. If "S" is pressed, the familiar "H:" returns. From this point, you can only boot from either the hard or soft-sector floppy disk controllers. When you want to return to the Micronics Boot PROM signon, you must either power down the computer or boot from a floppy disk



and run the program SWAP.COM. The best thing to do is to keep a bootable floppy disk handy with the SWAP program on it so that the hard disk does not have to be cycled on and off unnecessarily.

## CONCLUSION

This concludes installation, setup and operation of the H-89 hard disk sold by Micronics Technology. In my opinion, it is a quality product, well engineered, and receives good support from Micronics Technology. The software initially supplied to me worked beautifully, except that it wouldn't access floppy disk drives. This was promptly corrected by Micronics Technology to my satisfaction. My H-89 more than meets my needs now, but if I do need to upgrade to a PC compatible, I already have a 20 megabyte hard disk ready to plug in.

## DISPLAY.COM

Comments by William F. Fowler

In an article in the March 1986 >CHUG, I discussed John Stetson's File Scroll Utility SC30 and compared it to a commercial editor (VEDIT) and the CP/M resident command TYPE. At this time I would like to add another file display utility to the comparison and provide a table summarizing the comparisons. The utility DISPLAY.COM from CHUG Library Disk #174 is another utility that allows you to view an ASCII file, with the provisions for scrolling by line and by page, backward and forward in the file. It was written by Kelly Smith. Unlike SC30 which uses the H-19 special function keys to move you around in a file, DISPLAY.COM uses commands similar to the CP/M line editor ED.COM, to view a file. For example, entering 6P at DISPLAY's prompt (which is ".") will move the file pointer 6 pages toward the end of the file and display the page. Entering -4L will move the file pointer 4 lines toward the beginning of the file and display the page. Unlike ED.COM, DISPLAY does not allow you to alter the file being viewed. In operation, DISPLAY functions very much like SC30 but does not have those "finishing touches" that distinguish SC30 like the HELP or STATUS information display on the 25th line. With SC30 you don't have to remember commands or refer to a guide since SC#) uses the special function keys and the key labels are always available on the 25th line at the touch of a key.

| PROGRAM NAME  | DISPLAY*      | VEDIT*             | TYPE         | SC-30*         |
|---|---------------|--------------------|--------------|----------------|
| DATE  | 10/30/80      | 1982               |              | 1982           |
| VERSION   | 1.00          | 1.36e              |              | 3.0            |
| AVAILABILITY  | Public Domain | Commercial Product | CP/M Utility | Public Domain  |
| DISK SPACE  | 3K            | 12K                | 0K (1)       | 2K             |
| DOCUMENTATION   | 1 pg. on disk | EXTENSIVE          | CP/M         | 3 pgs. on disk |
| FILE ON SCREEN <sup>(4)</sup>                           | 11 sec.       | 15 sec.            | 3 sec. (2)   | 13 sec.        |
| ALLOW ALTERING FILE                                     | No            | Yes                | No           | No             |
| FILE MOVEMENT:  |               |                    |              |                |
| Backward:   |               |                    |              |                |
| By line -   | Yes           | Yes                | No           | Yes            |
| By page -   | Yes           | Yes                | No           | Yes            |
| Forward:  |               |                    |              |                |
| By line -   | Yes           | Yes                | No           | Yes            |
| By page -   | Yes           | Yes                | Yes          | Yes            |
| USES H-19 SPECIAL FUNCTION KEYS                         | No            | Yes                | No           | Yes            |
| PROVIDE FOR PRINTING ALL OR PART OF FILE <sup>(3)</sup> | No            | Yes                | No           | No             |

\* An extension of .COM is assumed.

(1) CP/M resident command; takes up no disk space. (2) Does not wait to read the entire file into memory before displaying. (3) For those programs that don't provide a "hard copy" capability, some VERY LIMITED printing can be done using the CNTRL-P capability of CP/M to echo screen display to a printer. However, using CNTRL-P with display will also print the programs's prompt (".") after every 24th line and SC30 will print its status/help line after every screen of text, usually overwriting one line of the text on each page. (4) For comparisons, a 15K ASCII text file residing on another drive was used.

## CONCLUSION:

A comparison chart is easy to produce. A comparative evaluation is more difficult since it requires assumptions concerning one's use of the system. For my use, I rarely ever need to view an ASCII file to a level of detail that requires a lot of forward and backward scrolling by line or page. If I want to examine the file at that level of detail, I'm probably gonna want to alter the file in some way and there is no substitute for an editor at that point. If I just want to see what a file contains, TYPE is fast and is usually sufficient.