

SOFTWARE REFERENCE MANUAL

Heath Disk Operating System

Model H8-17



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H-8-17 PURCHASE REGISTRATION

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SOFTWARE REFERENCE MANUAL

HDOS SYSTEM

Chapter 0

**Configuration
for the
H8-17**

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INTRODUCTION

The heart of your H8-17 Heath Disk Operating System, HDOS, is a sophisticated library of programs which control and facilitate the operations you will soon be performing. Before you use HDOS, be sure to read the parts of this section entitled "Configuration" and "Theory of Operation." You will then have to perform the "System Start-Up Procedure" in order to get your system up and running. From there, you can proceed to Chapter 1, the HDOS Manual, which will instruct you in the everyday use of HDOS.

The H8-17 system and HDOS have set a new standard in the hobby computer industry. This is the first hobby system to offer many of the functions of large commercial computer systems. The enjoyment and rewards you will derive from using the system are limited only by your own imagination.

SYSTEM CONFIGURATION

The following paragraphs describe the minimum requirements of your operating system. It is impossible to list all the different combinations that you may want to use. But this information will let you configure the operating system so you can begin using your H8 computer system.

This section only contains the information about the software configuration. Refer to the "System Configuration" section of your "Assembly Manual" for instructions on how to configure your hardware.

You must have an H8 computer system with a minimum 16K bytes of memory. Moreover, this memory must operate continuously from decimal location 8192 (i.e., 040.000A) to the available upper memory limit of your computer. Note that the lower 8191 bytes of memory are reserved.

The Heath Disk Operating System, HDOS, requires that you use a console terminal. This console can be interfaced with either an H8-4 or H8-5 Serial Interface Card. These cards let you communicate at standard baud rates (i.e., 110, 150, 300, 600, . . . , 9600). The serial communication may be wired for either 20 mA or RS-232 communication levels.

Some interface cards use a fixed interrupt and port allocation scheme and cannot be adjusted, such as the controller card for the floppy disk. This information is supplied in the "System Configuration" section of your H17 Manuals.

Table 0-1 outlines the port allocation scheme on the H8 computer system. It lists the device and the device name used in the software. For instance, the console terminal is referenced by the software as TT: and the line printer as LP:.

All port addresses are given in octal, indicated by a "Q". Thus, 350Q is port 350 octal.

TABLE 0-1

<u>DEVICE</u>	<u>DEVICE NAME</u>	<u>INTERFACE CARD</u>	<u>PORT ADDRESS</u>	<u>INTERRUPTS</u>
Console Terminal	TT:	H8-5 Serial	372-373Q	3
		H8-4 Serial	350-357Q	3
Cassette	--*	H8-5 Serial	370-371Q	—
Line Printer	LP:	H8-4 Serial	340-347Q	—
Alt. Terminal	AT:	H8-5 Serial	374-375Q	—
		H8-4 Serial	300-307Q	—
Front Panel	--*	--*	360-361Q	—
Floppy Disk	SY:	Special	174-177Q	—
Reserved			170-173Q	—
Reserved			376-377Q	—

* - None is used.

NOTE: If you are using an H36 DECWRITER as a Line Printer, you **must** connect it as the device AT: In addition, an H14 Line Printer **must** be connected as the device LP:.

The table also shows the interface card normally used with each device and the port address(s) assigned for the device. You will have to install jumpers on the interface card to select the appropriate address.

Also, the console terminal requires the use of interrupts, and you will have to jumper its interface card for the proper level interrupt. With either an H8-4 or an H8-5 Card, you must jumper the circuit board for a level 3 interrupt.

The device and the interface card must be using the same baud rate. The baud rate is hardware selectable on all cards except the H8-4. The H8-4 Card is software programmable and lets you select a standard baud rate for each channel.

You must correctly jumper the system console terminal interface card. If your system console is interfaced via an H8-5 Serial I/O Card, the serial port should be addressed at port 372Q and the baud rate jumpered to match your console terminal. Since an H8-4 port addressed at port 350Q will take precedence over any H8-5 port addressed at port 372Q, it is also imperative that no active H8-4 ports be addressed at port 350Q.

Alternatively, if your system console is interfaced with an H8-4 Multiport Serial I/O Card, the system console port should be addressed at port 350Q, and the Card should be jumpered to generate level 3 interrupts on the channel addressed at port 350Q.

All system software assumes that your system console interface card will be jumpered at one of these two ports. If the interface card is not properly jumpered, HDOS will not communicate with your system console. The cards need only be rejumpered when the system console interface board is to be changed.

The H8 operating system does not use any port address below 100 octal. These ports are available for your use.

The H8-17 system is initially configured with a single 5.25" disk drive unit. The system also includes a disk controller card, which plugs into the H8 bus.

The initial drive is mounted in the left-hand side of the H17 cabinet, and is connected to the disk controller by means of a 34-conductor flat ribbon cable. The first drive will hereafter be referred to as SYØ. * The second drive is referred to as SY1:, and can be installed using the same cable and controller.

SYØ: is the "system" drive unit. You were provided with one 5.25" "distribution" diskette. When you have generated a "system" diskette, as described in the "System Set-Up Procedure," starting on Page 0-14, it will always be mounted in SYØ: for normal operation. And since you can easily damage or destroy a diskette by misuse or improper handling, always follow the instructions vary carefully until you are thoroughly familiar with HDOS operating procedures.

WARNING: You should only use the distribution diskette to transfer files (see Page 0-9) to the volumes in **your** system. Therefore, do not run any programs other than those specified in this Software Reference Manual. If you try to run other programs, such as BASIC (with the distribution diskette in SYØ:), you will cause unpredictable results.

Note that the distribution diskette is supplied with a write-protection tab in place. This is done to guarantee that you will always have an accurate copy of the operating system. **Never remove this tab.** Heath may refuse to support a system if the write-protection tab is removed from the distribution diskette.

Under normal conditions, you will need extra diskettes for storage of data and programs. It is also advantageous to have a dual-drive system to facilitate copying data and to allow more "on-line" working storage. We recommend that you have at least two copies of the system diskette on hand, as well as a spare copy of any important information. The "System Set-Up Procedure" will include a section called "System Generation," which will tell you how to make system diskettes. The HDOS Manual will tell you how to make copies of other information.

*NOTE: "SYØ" means system unit zero. Where the notation may be confusing, zeros will be slashed, to distinguish them from the letter O.

THEORY OF OPERATION

Although it is not absolutely essential that you know the Theory of Operation for this system, a basic knowledge of it will help you use the system more effectively. Read this information before you proceed to the "System Start-Up Procedure." Refer to the "Glossary" in Chapter 1, for a definition of any unfamiliar term.

A disk system combines many of the advantages of other types of data storage systems. It is not as fast as random-access memory, but for the same amount of storage area it is much less expensive. On the other hand, a disk system costs more than a tape system for the same amount of storage space, but it can locate a given data record much more rapidly. Each type of data storage system has its advantages. However, the disk system provides the most functional combination for everyday applications.

The Diskette

A diskette is a circular sheet of plastic coated with a magnetic oxide. As the diskette rotates at 300 rpm, an electromagnetic head passes over the oxide material, called the "medium", and interacts with it by means of a magnetic field. This combination of head and medium is a lot like the magnetic tape recorder you use to record and play music.

The medium consists of millions of tiny magnetic particles called "domains". Each of these domains is magnetized in one direction or the other, like the north and south poles of a magnet. The direction in which each domain is magnetized describes the binary data stored on the diskette.

If the read/write head is "reading" information, it senses the direction in which the domains in a given area are magnetized, and converts this information into electric impulses which become binary bits. If the head is "writing" the opposite happens; the bits are converted into electrical impulses, changing the magnetic field around the head. This, in turn, magnetizes some of the domains in one direction or the other, depending upon whether the bits are ones or zeros.

Each diskette can store 102,400 bytes of data, with each byte composed of eight bits. The diskettes are divided into 40 tracks, circular rings, much like the grooves in an LP record. Each track is subdivided into 10 sectors, giving a total of 400 sectors of 256 bytes each.

Access Time — Finding the Right Sector

The process of finding the correct track is called “seeking.” It takes a small amount of time for the head to jump from track to track as it seeks the correct one, and this is called the “track step-time.” The drives used in the H17 have a guaranteed track step-time of 30 milliseconds. However, most units can operate much faster. “General Operation” will explain how to optimize your H17 for the best performance.

Another factor that determines system speed is called “rotational latency.” Since the diskette rotates at 300 rpm, the system may have to wait as long as 200 milliseconds for the desired sector to rotate under the head after it finds the correct track. This latency period averages 100 milliseconds for a random disk access.

A little arithmetic, then, shows that up to 500 milliseconds will be required to access a random sector. This depends on the track step-time of the particular drive; and it is based on calculations which show that one-third of the tracks will have to be skipped over, on the average, for a random disk access. The average drive will require about 225 milliseconds for every access of a random sector. If many sectors are accessed and if they are close to each other, the average access time will be much lower.

As soon as the system finds the correct sector, it reads or writes the data, one bit at a time (serially) at a rate of 16,000 bytes per second. The data is transferred between the drive and the controller. The controller converts the serial data into a parallel format, and communicates it by means of an I/O port to the H8 CPU.

As an example of its quick access and high performance, the H17 system can load Extended Benton Harbor BASIC into memory in about two seconds. The Heath cassette system, operating at 1200 baud, requires about two minutes to load from the beginning of the tape.

The Software System

The sector, because it is the smallest amount of data that the system can transfer between the H17 and memory in a single access, is the basic unit of the diskette. The H17 system is “hard-sectored.” This means that the size and location of each sector is determined by the disk controller board rather than by the operating system. This is actually where HDOS comes into play. It must communicate with hardware devices, such as an H17 controller. On the other side of the interface, it must also communicate with you, the “user” or “operator,” by means of programmed instructions or console commands.

An operating system is more than just a collection of programs that perform various functions, such as communicating with peripherals or finding data on a diskette. The central idea is that the software system is logically organized. All its programs are available to you at any time, for specific purposes, by means of operating system “commands”.

A portion of the operating system called “**monitor**” is in control of the other portions. It controls the decoding of commands and temporarily passes control to subprograms, which carry out the commands. After each operation is completed, control returns to the monitor, which awaits the next command. Thus, the monitor is like a switchboard operator who handles communications for a busy city.

Files

The operating system establishes this communication between hardware and software by means of a data structure known as a “**file**”. If you consider a disk drive as if it were a filing cabinet, then the sectors on the diskette correspond to sheets of paper within the filing cabinet. The disk file is then analogous to a folder within the cabinet, with a label on it, which contains a number of the sheets of paper. In other words, a file is an organized group of disk sectors.

Whether you keep the files in an office filing cabinet or on a diskette, you must organize them in a way that allows you to find them easily. A new file must be inserted into its proper place, and old files that are changed must be replaced for future reference.

In this sense, an operating system is like a clerk who keeps track of a great deal of information, or a librarian who must know where all the books are found. The operating system must: find space on the disk for new files; give each file a name that allows it to be cross-referenced; be able to copy data from one file to another; and be able to rename, update, and delete (remove) files. Above all, the operating system must be able to communicate with you and carry out your commands quickly and efficiently.

Under HDOS each file consists of one or more “clusters”, where each cluster is composed of two contiguous sectors. HDOS automatically increases the size of your files, as required, in increments of one cluster. Therefore, the size of an HDOS file can run from 512 bytes up to the total available space on a diskette.

In order to communicate with the operating system, you or your program must issue commands. The exact command syntax is discussed in “General Operation”. In some cases, the commands will be issued from the system console.

Other commands may be included in a program written in BASIC or assembly language. These will allow a process to “open” and “close” files, and to perform read/write operations on the files. Refer to the appropriate language manual for the proper command syntax.

Controlling the Peripherals

An operating system must also manage all the peripherals in the system. This allows you to type-in commands from the system console, and have the operating system perform some I/O function without your intervention. You may also include such commands in your programs without having to write detailed instructions for controlling the peripherals. The operating system will take care of the “messy details”.

HDOS uses programs called “**device drivers**” to control peripherals. Each device driver is written with the characteristics of a particular peripheral in mind. Its speed, line length, and “handshaking” capability are examples of these characteristics. For standard ASCII serial peripherals, the device drivers may differ only in minor details. They may be unique for other devices such as paper tape punches or X-Y plotters.

However, all device drivers have one thing in common. After they are written, one for each peripheral, they become a part of the operating system. It is not necessary to include the drivers in each program which uses the peripherals because these programs can simply issue I/O requests to the operating system. This can save a great deal of space in each program because the instructions for controlling the peripherals need not be repeated over and over again. You can also make a program communicate with many different peripherals, without rewriting it, by simply redefining the appropriate device drivers.

Programs running under HDOS are called “device independent”. Each peripheral is given a symbolic name, much like a file. For instance, the system console is referred to as “TT:”, and “SYØ:” identifies the system disk drive. The colon (:) at the end of each name identifies it as that of a device name rather than a file name.

Transferring Data

Data can be copied from file to file. It can also be copied from a file to a device, or from a device to a file. To create a new file with data typed-in from the console, you simply command HDOS to copy from your terminal to a unique file name. Refer to the HDOS Manual for the syntax of such commands.

In order to keep track of all the files and devices in the system, an operating system uses a cross-index listing known as “**directory**”. The directory contains the name, location, size, and creation date of every file in the system. In order to access a given file, HDOS first looks up its name in the directory. It then uses the information listed with the name to locate the sectors which make up the file.

As the sectors are accessed, HDOS transfers the data between the disk and RAM. The area of RAM that is used to hold the data is called the “**buffer**”. A buffer of sufficient size must be set aside by each program which reads files. BASIC automatically sets aside any necessary buffer space.

Memory Map

An operating system requires a “memory management” capability in order to function with other programs. If you issue a command to run a program, HDOS finds the file that bears that program’s name and determines whether or not it will fit in the available memory. If it will fit, HDOS reads the file into a memory area which begins at the program’s starting address. After the loading process is completed, HDOS jumps to the program’s starting address, and execution begins. (See Appendix A.)

The HDOS monitor is automatically located in the high end of your H8’s memory when you “boot-up” the system. It occupies about 2.4K of RAM. Other portions of HDOS, such as the program which communicates with the H17 drive-units and other peripherals, may require another 9K. Therefore, 12K is required to run HDOS. Other products, such as BASIC, require as much as 16K total RAM, with HDOS included.

HDOS attempts to conserve memory by using the available area for more than one purpose. For example, some of this area is used only for opening and closing files. This capability is not required very frequently, so this part of the operating system can be left on the diskette most of the time. When HDOS requires these functions, it temporarily stores the contents of the overlay area on a file while it loads the contents of another file into the area. This new portion of the operating system performs its task and then restores the original overlay area memory contents when finished. When the overlay area is not required for other purposes, HDOS resides there continuously.

Errors

The last important function of HDOS, its ability to recognize and report errors, is one with which you will soon become very familiar. Typical errors involve attempts to issue commands which are not correctly formatted, or references to nonexistent files. In order to prevent damage to the contents of your diskette, HDOS recognizes such attempts and replies with appropriate error messages.

NOTE: The remaining parts of Chapter 0 will lead you through the important parts of HDOS one step at a time, so your errors should be few. If you follow the instructions carefully, you should be able to take full advantage of all the capabilities of HDOS.

Notation Conventions

- △ = Required space, produced by the space bar on the console keyboard.
- Ⓖ = Carriage return. Produced by the Return key on a console keyboard.
- <exp> = If you type a Ⓖ, HDOS assumes the reply enclosed in the arrows.
- CTRL = Symbol for control key on a console keyboard.

Underlined text is used to indicate user/operator input from the console.

Console Conventions

In addition to the standard operating system commands, there are a number of conventional ASCII control codes you can use for special purposes. For example, in typing a command, you may accidentally strike the wrong key on your console. You may use the ASCII DELETE (or RUBOUT) control code to erase the last character, which you may then retype. You may also use the key several times in succession to back-up more than one space. The operating system will recognize the code; even if your terminal will not physically backspace, they cause the last character you typed to be discarded. You may reject an entire line of keyboard input by striking CTRL-U, as long as you do it before typing a carriage return. The following list summarizes the HDOS control conventions.

CTRL-C — Halts any ongoing activity by HDOS or a utility program. Control is retained by whatever program is currently running, but it will stop and await commands from the console.

CTRL-D — Causes an exit from the command mode of a utility program, such as PIP, back to the HDOS command mode. When copying files, this signifies an “end-of-transmission” condition, returning you to the current command mode, whether it is the “main” HDOS command mode or one of the utilities.

CTRL-P — Resumes output immediately (after CTRL-O).

CTRL-S — Temporarily halts the output to the console until CTRL-Q is struck.

CTRL-Q — Restarts output to the console (following a CTRL-S).

CTRL-U — Discards the current console input line, allowing you to start over.

CTRL-Z — Cancels any ongoing HDOS activities when struck twice in succession. Also causes the data in an input file or buffer to be discarded. This code is generally used in emergency situations to return directly to the HDOS command mode.

DELETE — Allows you to retype the last character. The HDOS response to this command depends upon the configuration of HDOS (see “System Optimization,” in the HDOS Manual). If your console terminal produces hard copy (such as the H36) or cannot backspace, a “/” will be printed on the console the first time you use this control code, and after the correction is made, to indicate the extent of the corrections. For example, suppose you wish to type “HELP” and actually type “HALP”. The correction would be printed as follows:

```
>HALP/PLA/ELPⓈ
```

In this example, after “HALP” was typed, the user typed the delete key three times and then typed “ELP”. If you are using a CRT terminal that can backspace, like the H9, you may configure HDOS to actually backspace over the last character, removing it from the screen, when you type DELETE.

RUBOUT — Has the same effect as DELETE.

SYSTEM SET-UP PROCEDURE

At this point, your H17 should be assembled and connected to the H8 computer, and the "Read/Write Test" in your H17 Operation Manual should have been successfully completed. Read through the following "Power-Up," "Power-Down," and "Bootstrap" sections before actually performing any of the operations described in this "System Set-Up Procedure."

You will use this section frequently. The first time, however, you will have to sysgen a diskette. The distribution diskette should only be used to transfer files. Running a program other than those specified in this program will cause unpredictable results.

Sysgening a diskette will produce your own system volume capable of running HDOS and other programs. You will probably wish to configure different diskettes for other programs. For now, follow this procedure to generate a system volume.

WARNING: If the "Read/Write Test" failed, DO NOT attempt to perform the "System Set-Up Procedure" at this time. Instead, refer to the troubleshooting guide in your H17 Operation Manual.

Power-Up

Use the following method to get your H8-17 system started from a power-off condition.

WARNING: DO NOT install a diskette in either drive unit before applying power.

1. Apply power to your H8 and to your terminal device.
2. Apply power to your H17.
3. Install the system (distribution) diskette in your system drive unit. If you purchased two drives, install it in the left-hand unit. The label should be facing up and toward you. Close the door on the drive unit after you insert the diskette.
4. Use the H8 front panel to load 030 000 into the program counter register. You may refer to your H8 Operation Manual for additional assistance or:
 - A. Press the REG button.
 - B. Press the PC button.
 - C. Press the ALTER button.
 - D. Enter the numbers: 030 000.
 - E. Press the ALTER button again.

The H8 should produce a faint "click" each time you press a button. When you press ALTER the first time, the decimal points should begin scanning from right to left. When you press ALTER the second time, the decimal points should extinguish. The H8 will produce a short "beep" each time you enter a group of three numbers. When finished, the H8 display should look as follows:

030 000 Pc

5. Press the GO button on your H8 front panel.

Bootstrap

This procedure establishes communication between your H8 and your H17. It is called “booting” the operating system (HDOS) in order to get it started. When you “boot up”, the ROM bootstrap program (located on the disk controller board) will examine your H8’s memory to find out how much is installed. It will then load the HDOS monitor into the upper 2.4K of the memory area. When this is accomplished, control will be passed from the ROM bootstrap program to the monitor. HDOS will respond in one of two ways: by typing “ACTION? <BOOT>” on the system console, or by displaying “SPACE” on the front panel LEDs.

The front panel “SPACE” prompt appears when HDOS has found an H8-4 port addressed at port 350Q. HDOS then assumes that the peripheral attached via this port is to be the system console terminal. HDOS then requires spaces from the system console to determine the system console baud rate. Each successive space should be echoed on the front panel LEDs as an additional decimal point. (If the spaces are not echoed and HDOS does not proceed with the “BOOT” prompt, check the cabling between the H8-4 Multiport Serial I/O Card and your system console terminal. If you receive the space message and your terminal is interfaced with an H8-5 Card, insure that no H8-4 ports are addressed at 350Q, reset the PC, and try again.)

Once HDOS has determined the baud rate at which your terminal is set, it will resume with the normal “BOOT” routine. (Note: the number of spaces HDOS requires to determine your baud rate will vary with the baud rate. Terminals transmitting at 4800 baud should require three spaces; those at less frequently used baud rates, such as 110, may require as many as six spaces.)

If your system console is interfaced via an H8-5 Card, the baud rate is jumper selectable on the H8-5 Serial I/O Card itself; hence, HDOS assumes that the H8-5 on-board jumper-selected baud rate matches that of your terminal.

Once HDOS has determined your baud-rate (or immediately after the user strikes “GO” from the front panel monitor, PAM-8, if the system console is interfaced via an H8-5 Card,) HDOS will prompt on the system console with:

ACTION? <BOOT>

If this does not take place, repeat this procedure, making sure you are using the system (distribution) diskette and that you have correctly installed the disk controller board and interconnecting cable. If you have the system properly configured and it still does not “boot up” correctly, refer to the troubleshooting guide in your H17 “Operation Manual.”

At this point you can take any one of three options. First, if you strike any key except “C”, “B”, or CARRIAGE RETURN, a “help” listing will be printed, as follows:

```
ACTION? <BOOT> HELP

LEGAL  COMMANDS:
BOOT -  BOOT HDOS
CHECK - SECTOR THIS LIST
HELP -  PRINT THIS LIST

ACTION? <BOOT>
```

The most common option is to “boot up” your system normally. Use the following procedure:

1. Press the carriage return (␣) or the upper case B. HDOS will identify itself by printing the version and issue number. The current date is then requested by printing:

```
DATE(DD-MMM-YY)?
```

2. Respond with the date in the following format:

```
5-MAY-79␣
```

The system is now booted up. From now on, HDOS will reply with “>” as a prompt to indicate that it is in the command mode, waiting for you to issue operating system commands. In general, you should type the command as directed and follow it with a carriage return.

(You should use the “B” response now, if this is your first time through this procedure, and then proceed to the “Initialization” section.)

Another option allows you to select a “checksum” test to be performed on each of the diskette’s sectors, except the first ten, which are reserved by HDOS. HDOS compares the numbers printed during this test with a checksum value stored in each sector “header” to determine if any data on a given sector has been damaged.

If a bad sector is discovered, an error message will be printed. This allows you to isolate the problem to the diskette itself rather than the drive or controller. If this occurs with your distribution diskette, it will have to be replaced. If the problem occurs with any other diskette, you can reuse it as explained in the “Initialization” section. Take the following steps to execute the CHECKSUM routine.

1. Type a capital C as the ACTION? <BOOT> response.
2. Examine the listing for an error message.

You may type a CTRL-C to terminate the test early. An abbreviated listing of the CHECKSUM test is printed below:

```
ACTION? <BOOT> C
SECTOR 010 = 00268
SECTOR 011 = 50062
SECTOR 012 = 37497
?00 1 ERROR *
SECTOR 013 = 63304
^C
ACTION? <BOOT>
```

In this example Bootstrap error was discovered at sector 013. The listing was terminated when CTRL-C was pressed. If this test should function without any error messages and the “Bootstrap” procedure still does not function properly, refer to the troubleshooting guide in your H17 “Operation Manual” for assistance.

INITIALIZATION (INIT)

Initialization is a process that prepares a diskette for data storage. A new diskette must be initialized before you can use it. If it already contains data, the data will be destroyed when that volume is initialized.

NOTE: HDOS should now be in the command mode with a prompt (>) printed at the left margin of the console.

The “Initialization” program sets up a directory on the diskette which allows HDOS to locate files. Therefore, it is necessary to initialize new diskettes and those diskettes which have been run through the “Diagnostic” procedure.

When you have finished this “Set-Up” Procedure, and are using your system, you must use INIT to prepare diskettes for storage of data. You will be able to copy the file which contains INIT onto your system volume(s). Then you will be able to substitute a system volume for the distribution diskette throughout this procedure. For now, however, you should have the distribution diskette installed in SYØ.

INIT is a “tutorial” or “conversational” program in that it instructs you when to perform each step and asks you to make decisions. The following instructions should clarify this conversational process, but you may refer to the appropriate listing in “Appendix B” for an example of how the output from this program should look.

The program will print a message each time a step is to be performed. Wait until it has completed printing out the message; then take the actions indicated by the numbered steps.

1. Type INIT Ⓢ.

HDOS will “dismount” the distribution diskette, meaning the operating system is no longer in charge. INIT is now “standing alone” in memory, and has taken over the following steps. To get back into HDOS, it will be necessary to “reboot” the system. You can do this at any time by performing “Power-Up” and “Bootstrap,” although a normal completion of this procedure will allow you to return to the operating system by performing only “Bootstrap.” You may initialize as many diskettes as you have available, but remember that any data or programs contained on them will be destroyed.

2. Remove the distribution diskette from the H17 and press the carriage return.

INIT will print a warning message and ask if you wish to proceed. If you type YES the program will continue. If you type NO or a carriage return, INIT will instruct you to reinstall the "bootable" diskette (the distribution diskette) and type a carriage return. You will then have to perform "Bootstrap" from the beginning.

3. Type YES and a carriage return.
4. Install the diskette to be initialized and press the carriage return.

INIT will identify the volume, unless it is a brand new diskette, and ask again if you wish to proceed. If you type NO, you can replace the diskette with another one which you may initialize instead, beginning at this step. If you type YES, however, the procedure will continue.

5. Type YES and a carriage return.
6. Enter a volume number for the diskette to be initialized, followed by a carriage return. This can be any integer between 1 and 255; leading zeroes may be omitted. It is important that each diskette you own have a unique volume number.

If you use two diskettes at one time that have the same volume number, HDOS will become confused and may store data on the wrong diskette. Do NOT initialize two diskettes with the same volume number.

7. Enter a volume label, followed by a carriage return. This can be anything you like, from 1 to 60 characters. However, it is best to use a meaningful label, such as "System Volume". As soon as you press the carriage return following the label, initialization will occur.

This process will require several seconds. When it is almost completed, you will be asked to identify the bad sectors on the diskette under initialization. Ignore this option if this is your first time through the procedure. You will not be able to identify the bad sectors, if any, until you have run "Diagnostic." After you have run "Diagnostic," you may identify each bad sector by typing in its number and a carriage return. This will remove any bad sectors from the diskette's "available sectors" table; thus, ignoring the defective sectors.

8. Press the carriage return.

You will be asked if you have any more diskettes to initialize. If you do, answer YES and go back to step 4 in this procedure. Remember that you must initialize all new diskettes before you can use them, and that the distribution diskette **MUST NOT** be initialized. If you have no more diskettes, proceed to the next step.

9. Press the carriage return.

10. Reinstall the distribution diskette and press the carriage return.

You will now have to perform the "Bootstrap" procedure, if you wish to continue. If you do not wish to continue at this time, reset your H8 by simultaneously pressing the front panel buttons labeled \emptyset and ALTER. Then remove the diskette and shut off the power. If you wish to continue the "System Start-Up Procedure" at a later date, first perform the "Power-Up" and "Bootstrap" sections. Then proceed directly to the section entitled "Diagnostic."

DIAGNOSTIC (TEST)

A Diagnostic program is used to troubleshoot computer systems, or the various components of a computer system. The most common diagnostics are programs that are used to find possible read/write errors in memory devices.

HDOS should be in the command mode, with a prompt (>) printed at the left margin of the console. You should have performed "Power-Up" and "Bootstrap"; and you should have performed "Initialization" using a spare diskette. This diskette will now be used with a program called TEST to test your system. The directory which was established on the diskette during "Initialization" will be destroyed, so it will have to be reinitialized before you can use it for program or data storage.

When you have completed the "System Set-Up Procedure," and are performing everyday operations such as programming or text-editing, you may wish to use "Diagnostic" to test new diskettes or to test your system. You may copy TEST onto your system volume(s) using a program called ONECOPY; or by the use of methods discussed in the HDOS Manual. If you do this, you may substitute a system volume for the distribution diskette throughout this procedure.

Like INIT, this program stands alone in memory and operates in a conversational fashion. It will instruct you when to perform certain operations and will ask you to make decisions. The following instructions are intended to clarify the various options. Each time TEST prints a message, you should perform the action indicated in the appropriate numbered instruction. Many of the numbered instructions have explanations printed beneath them. You may refer to the TEST output in "Appendix B" for additional help.

1. Type TEST and a carriage return.

HDOS will dismount the diskette(s). This means that you will have to reboot the system when this procedure is terminated. TEST is now resident in memory and has taken control of the following operations. It will first tell you to remove the diskette(s).

2. Remove the distribution diskette from SYØ: and press the carriage return.

TEST will now identify itself and print a message. If you wish to proceed at this time, make sure you have an initialized diskette available to use in this test. If you would rather not proceed, type a CTRL-C and reinstall the distribution diskette. You will then have to execute the "Bootstrap."

3. Type YES and a carriage return.

TEST will ask you which dirve you wish to test. If this is your first time through the procedure, you should reply with a "Ø" in order to test SYØ:, the system drive. If you purchased two drives, you may repeat this test with the second drive by typing "1" after you perform "System Generation." As an alternative, you may switch to the other drive by using the "Switch" procedure (Page 0-29).

4. Type Ø and a carriage return. TEST will ask you to insert the diskette to be used in the test. DO NOT use the distribution diskette.
5. Insert a diskette that has been initialized into the left-hand drive (SYØ:) and press the carriage return.

TEST will print a list of test options. If this is your first time through "Diagnostic," perform these tests in the order listed. To start a test, type the letter which precedes the name of the test in the listing, and then type a carriage return. To end a test, type a CTRL-C on your console.

The instructions for each test are printed below. You may now proceed to the first test, labeled "Drive Speed."

Drive Speed

First time through "Diagnostic"?

Run this test to set your drive speed. Rerun the test only if you suspect speed problems.

1. Type a T and then a carriage return.

The H8 front panel will display the relative rotational speed of the drive under test. A decimal number, which should be close to 1.000, will flash on and off. The numbers will also scroll and update on the console screen. The rotational speed tolerance is one percent. The final value should be between 0.990 and 1.010. Do not adjust the speed unless it is out of tolerance.

The drive unit supplied with you H17 has a Speed Adjustment Control (shown in Pictorial 9 of your Operation Manual) which is used to vary the drive speed. This control is located on the left-hand side of the circuit board, on the top of the unit. The adjustment of this control is extremely sensitive so, if an adjustment is necessary, do not turn it far in either direction. Less than one degree of rotation in either direction should bring the drive speed into tolerance. A counterclockwise adjustment will increase the drive speed, and a clockwise adjustment will decrease the drive speed.

You may have to perform this test again at some future time, depending upon how heavily your H17 is used. As the drive bearings wear, the speed may change slightly. Fluctuations within the tolerance are normal and may be attributed to variations in temperature and humidity.

2. If the decimal number displayed is less than 0.990 or greater than 1.010, carefully adjust the Speed Adjustment Control with a small screwdriver until the number is within tolerance.
3. Type CTRL-C to terminate the drive speed test.

Proceed to "General Checkout."

General Checkout

First time through "Diagnostic"?

The TEST program should now be running, with a list of test functions printed on your console. You should have performed the "Drive Speed" procedure successfully. If the rotational speed is incorrect, this and other tests may give erroneous indications.

The purpose of "General Checkout" is to verify that your system is working normally. Each sector on the diskette under test will be written and read a number of times. Various patterns will be written on the sectors to allow the testing of the head seek mechanism and the read/write head itself. The test will automatically be repeated three times. Do not be alarmed if this test seems to be taking an abnormally long time to finish. It is a very thorough test and requires over 30 minutes. Rerun this test only if you encounter problems.

While each pass is being executed, the program will print the letters "ABCDEFGH", one after the other, at intervals of a few minutes. These letters indicate the various phases of the test and give you an idea of how far it has progressed.

A message will be printed at the end of each pass. Here, there are two possibilities. If everything proceeds normally, the output for the pass will read:

```
ABCDEFGH END OF PASS n
```

However, if the test discovers any problems on the current pass, the output will include the number of "hard" and "soft" errors, as follows:

```
ABCDEFGH xxx/yyy END OF PASS n
```

These tests are:

- A — Write all zeros.
- B — Read all zeros.
- C — Write all zeros.
- D — Read all ones.
- E — Write ID pattern.
- F — Read ID pattern.
- G — Random read/write test.

The numbers of hard and soft errors (refer to the "Glossary" in the HDOS manual) are indicated by the numbers "xxx" and "yyy", respectively. Let the test run through all three passes, even if errors are discovered. If you have any errors, the best approach is to perform the "Exit" section (Page 0-29); then run another blank diskette through "Initialization" and repeat the entire "Diagnostic." If this approach is successful, the first diskette probably had one or more bad sectors, possibly caused by dust. Set the "bad" diskette aside for now and after performing "Media Check" and "Seek Time" as explained below, you may use the "Switch" procedure to restart TEST. You may then use "Media Check" again with the bad diskette to identify the bad sectors. Once they are identified, you will be able to type in their numbers during "Initialization" and use the diskette normally.

If changing the diskette does not correct the problem and if you have a dual drive system, refer to your Operation Manual and exchange the two drive units. If you have a single-drive system, or if the exchange proves unsuccessful, refer back to the troubleshooting guide in the "Operation Manual."

1. Type D and a carriage return.

You will have to wait several minutes for this test to be completed. The H17 will make "ticking" or "grinding" sounds while the test progresses. This is perfectly normal; it is the sound made by the head-seek mechanism.

2. Record the numbers of hard and soft errors, if any, for future reference.
3. If required, perform the troubleshooting procedure as explained above. When the test is completed, the list of test functions will automatically be printed. When this happens, proceed to "Media Check."

Media Check

First time through "Diagnostic"?

The list of test functions should now be printed on your console and you should have already performed the "Drive Speed" and "General Checkout" tests.

This test will examine the diskette under test for defects in the magnetic oxide medium. If you had any hard or soft errors during "General Checkout," such defects could be the cause. If any bad sectors are found, they will be listed at the end of the test. Run this test for all diskettes you will use.

1. Type M and a carriage return.

This test will take less than five minutes. At the end, a message will be printed, which reads:

```
nnn BAD SECTORS LOCATED
```

The number nnn, which can range from 000 to 400, tells you how many of the 400 sectors are defective. The actual bad sectors, if any, will also be listed. Record the numbers for future reference. If any bad sectors are discovered, the problem will be solved when you reinitialize the diskette after completing "Diagnostic." "Initialization" allows you to type in the identifying number for each bad sector, and it removes the bad sectors from the diskette's directory.

The list of test functions will automatically be printed at the end of this test. When this occurs, you may proceed to the next test.

Seek Time

First time through "Diagnostic"?

The list of test functions should now be printed and you should have already performed the "Drive Speed," "General Checkout" and "Media Check" tests.

This test will vary the track seek time of your unit in order to determine its highest reliable speed.

The drive assemblies are guaranteed to perform reliably at a seek time of 30 milliseconds. You can check the optimum seek time using tests supplied with your disk software. If you are using dual drives, your fastest possible seek speed will be determined by your slower drive assembly.

Remember, the seek speed can change as a unit "wears in". If frequent errors occur, you should re-run the seek test to check for possible changes in your drive assembly speed. Again, the drives supplied with the operating system are specified at 30 mS only.

1. Type S and a carriage return. You will be asked if you wish to proceed. If you reply "NO", the list of test functions will be printed again.
2. Type YES and a carriage return.

The first interval to be attempted is 36 milliseconds. This information will be printed on your console. Shorter intervals will be attempted until your H17's best capability is determined. As each pass is completed, the message "OK!" will be printed.

The test will require a few minutes for completion. When it is finished, the message "Drive performs reliably at nnn milliseconds per track." will be printed out, where "nnn" is the optimum interval for your unit. Record this number for future reference. _____

If you purchased two drives, you can perform this test again after "System Generation," or you can switch to the second drive and repeat the test as explained in the "Switch" procedure. The "General Operation" section, of the HDOS manual, will explain how to set your system for the speed of the slower of the two drives.

The list of test functions will automatically be printed when this test is completed. If you have a single-drive system, you are now ready to Exit, as explained below. If you have a dual-drive system, you may perform "Switch" to test the second drive, or you may Exit and test the second drive later. We recommend that you perform "Switch" and test it now.

Switch

First time through "Diagnostic"?

You should now have completely tested SY0: by performing the "Drive Speed," "General Check-out," "Media Check" and "Seek Time" tests, before switching to SY1:. If you have only a single-drive system, you should now perform "Exit."

This procedure will allow you to select SY1: in order to run it through the complete "Diagnostic."

1. Type U and a carriage return.

TEST will restart itself from step three of the main section, where it identifies itself, prints a message, and asks if you wish to proceed. You may use each test procedure as before, except that you should type 1, when asked which drive you wish to test. Note that executing the "Switch" procedure will allow you to swap back and forth between the two drives indefinitely as long as you wish to test them. Simply specify drive 0 or drive 1 at step four of the main section (Page 0-24).

Exit

1. Type E and a carriage return.

You will be instructed to install a bootable disk in SY0:. This refers to your distribution diskette; or, if you have performed "System Generation," this means your system volume.

2. Install the diskette and press the carriage return.

You are now ready to perform the "Bootstrap" again to get back into the HDOS command mode.

SYSTEM GENERATION

This procedure will allow you to make usable copies (“system volumes”) of your distribution diskette. You cannot use the distribution diskette for normal purposes; it is physically write-protected with a sticker which was placed over the slot on the edge of the diskette.

The reason for protection is that users of operating systems frequently make errors. The wrong error could result in the destruction of the distribution diskette if it had no protection. Diskettes are very fragile. They should be kept away from dust, static electricity, liquids, electrical machinery, children, and pets. After you complete the “System Set-Up Procedure,” you should use the distribution diskette only to generate system volumes by means of a utility program called SYSGEN. Then store it in a safe place for use as a back-up copy.

In this procedure you will begin with the distribution diskette mounted in SYØ. It will then be necessary to perform “Initialization” again on the diskette which was used in “TEST.” As soon as the spare diskette is reinitialized, you must reinstall the distribution diskette and execute SYSGEN as explained below. This program will require you to swap back and forth between the distribution diskette and the spare diskette. The result will be a minimum system copied onto the spare diskette.

The next step will be to use the new system volume to copy a few more programs from the distribution diskette, depending upon your intended use of the system. These programs are BASIC, DBUG, EDIT, ASM, INIT, TEST, and SYSGEN.

However, we suggest that you make at least two system volumes, by means of SYSGEN, and keep one as a spare. You should also make an extra copy of any programs or records you create with HDOS in case the primary diskette is inadvertently erased or damaged.

SYSGEN

The system should be booted up and in the command mode, with a prompt (>) printed at the left margin of your console. Remember, you should have performed “Initialization” and “Diagnostic” before attempting this procedure.

1. Perform “Initialization” to initialize the diskette that will become your primary system volume.
2. Reinstall the distribution diskette and perform “Bootstrap” to boot up the system.

3. Type "SYSGEN" and a carriage return.

HDOS will dismount the disk(s) and turn control over to SYSGEN; you will have to reboot when this procedure is finished. You will be instructed to remove the disk(s). This will not be necessary, since the distribution diskette should already be installed in SYØ. It would be necessary to remove the diskette only if you wished to perform SYSGEN using a different source diskette.

4. Leave the distribution diskette installed, and type a carriage return.
5. Type another carriage return.

SYSGEN will now instruct you to alternate between the source and the destination. When you are told to insert the destination, you must install the spare diskette in SYØ and type a carriage return. When you are told to insert the source, you must install the distribution diskette in SYØ and type a carriage return. This procedure will be repeated a number of times, depending upon the amount of memory in your H8. If it is more convenient, you may strike any key on the H8 front panel instead of typing a carriage return.

6. Swap the diskettes, as instructed, and type a carriage return, repeating this step until all the files are copied.

When the procedure is finished, SYSGEN will tell you how many files were copied, and return you to the beginning of the "Bootstrap" procedure.

7. Leave the destination diskette installed and perform "Bootstrap."

You now have a minimum system volume. The files contained on it permit you to explore the capabilities of your H8-17, using "HDOS."

ONECOPY

This program allows you to copy files from one diskette to another using only a single-drive system. You have the option of copying one file or multiple files in the same operation, as explained below. It also requires you to swap back and forth between a source diskette and a destination diskette, in exactly the same way as SYSGEN. The difference is that ONECOPY cannot generate a usable system volume. This utility cannot link a set of programs together to be used as an operating system.

To use this program you need a system volume installed in SY ϕ :. HDOS should be in the command mode, with a prompt (>) printed at the left margin of your console.

1. Type "ONECOPY" and a carriage return.

HDOS will dismount the disk(s) and turn control over to ONECOPY. You will have to reboot the system when you are finished copying files.

2. Remove the system volume and type a carriage return.

You will now have to install the source diskette. If this is your first time through this procedure, the source is the distribution diskette. If you have already created a full system volume and wish to copy files from it, you can use the system volume as the source diskette.

3. Install the source diskette and type a carriage return.

ONECOPY will prompt you with :OC:. It will be necessary to specify a file to be copied, so BASIC.ABS will be used in this example. The valid choices are:

```
SYSGEN .ABS
TEST .ABS
INIT .ABS
TXTCON .ABS
BASCON .ABS
PATCH .ABS
DEBUG .ABS
EDIT .ABS
ASM .ABS
BASIC .ABS
HDOS .ACM
```

Refer to the appropriate sections of this Manual for information about BASIC, EDIT, DEBUG, PIP and the assembler (ASM).

The following example will show you how to copy BASIC to your system volume. You may use the same procedure to copy the other files simply by substituting the proper file name in the following step.

4. Type "BASIC.ABS" and a carriage return.

ONECOPY will load several sectors of this file into a memory buffer and ask you to insert the destination diskette. It will then write the contents of the buffer onto the destination.

5. Swap the diskettes as instructed by ONECOPY, and repeat this step until the entire file is copied.

When the file is copied, ONECOPY will notify you and then issue another prompt. You will then be able to specify another file to be copied by repeating steps 4 and 5. You may specify any of the files, depending upon your requirements. If you are not sure which you will be needing, you may wait until you are more familiar with the various products. You can use ONECOPY at any time.

You are now ready to return to the HDOS command mode to continue with "System Set-Up Procedure."

6. Type CTRL-D on your console. This will get you back to the beginning of the "Bootstrap."
7. Install the new system volume in SYØ: and boot up the system.

Be sure to store your distribution diskette in a safe place while you explore the capabilities of HDOS.

Power-Down

When you have finished using your H17, after performing some or all of the procedures in this Manual, it will be necessary to power-down the system in an orderly fashion. Part of the operating system resides in your H8's memory at all times, and part of it is located on the system diskette. The exact proportions are determined by the operations which are currently being performed. When you power-down the system in the correct fashion, you insure that the contents of the system diskette are updated to reflect the most recent changes in the system.

When you are in the command mode, with a ">" printed at the left margin of the system console, execute the following steps to shut down the system:

1. Dismount the diskette(s) by typing:
 - a) > **Dismount SY1:** ☞ (If you have mounted SY1:)
 - b) > **Dismount SY0:** ☞
2. Remove the diskette(s).

WARNING: Always remove the diskette(s) before shutting off the power. Failure to do so could result in data loss as the hardware powers down.

3. Shut off the power to your H17.
4. Shut off the power to your H8.

APPENDIX A

Memory Layout

A simplified memory map of the HDOS system is shown in Figure 1. The major items shown in the memory map are:

PAM-8 ROM (1K) — Contains the PAM-8 (front panel monitor) code.

HDOS RAM Work area (1K) — Used by HDOS to hold important system tables. Among other things, these tables are used to hold storage allocation and directory information about the currently mounted disks. Damage to these tables could cause all of the information on a disk to become lost. For this reason, these areas are write-protected (via hardware) from user programs. **Under no circumstances should a program attempt to write into these locations.**

HDOS ROM (2K) — Contains the HDOS bootstrap routine, several general-purpose utility subroutines, and some parts of the HDOS operating system.

SYSTEM RAM AREA — Occupies the first locations of RAM in your machine. This area contains cells used by PAM-8 as well as cells used by HDOS. These values are kept in RAM because they may need to be changed by HDOS during normal operation. They should not be altered by the user.

USER STACK AREA — Used to hold the stack of the user program and HDOS. Since the stack on an 8080A builds downwards, the top of the stack is at 42200A. HDOS will automatically maintain this stack for user programs. Users should not change the stack area by loading the SP register.

FWA USER RAM — Location 42200A is the first byte of RAM available to user programs. Most assembly language programs ORG (start) here, but they may ORG at a higher location, if desired. A user program may use the contiguous block of RAM starting at 42200A and continuing up to FWA RESIDENT HDOS. This limit address depends upon the amount of memory in the system, since HDOS locates itself in the highest available RAM. HDOS will issue an error message if you attempt to load a program larger than the available space.

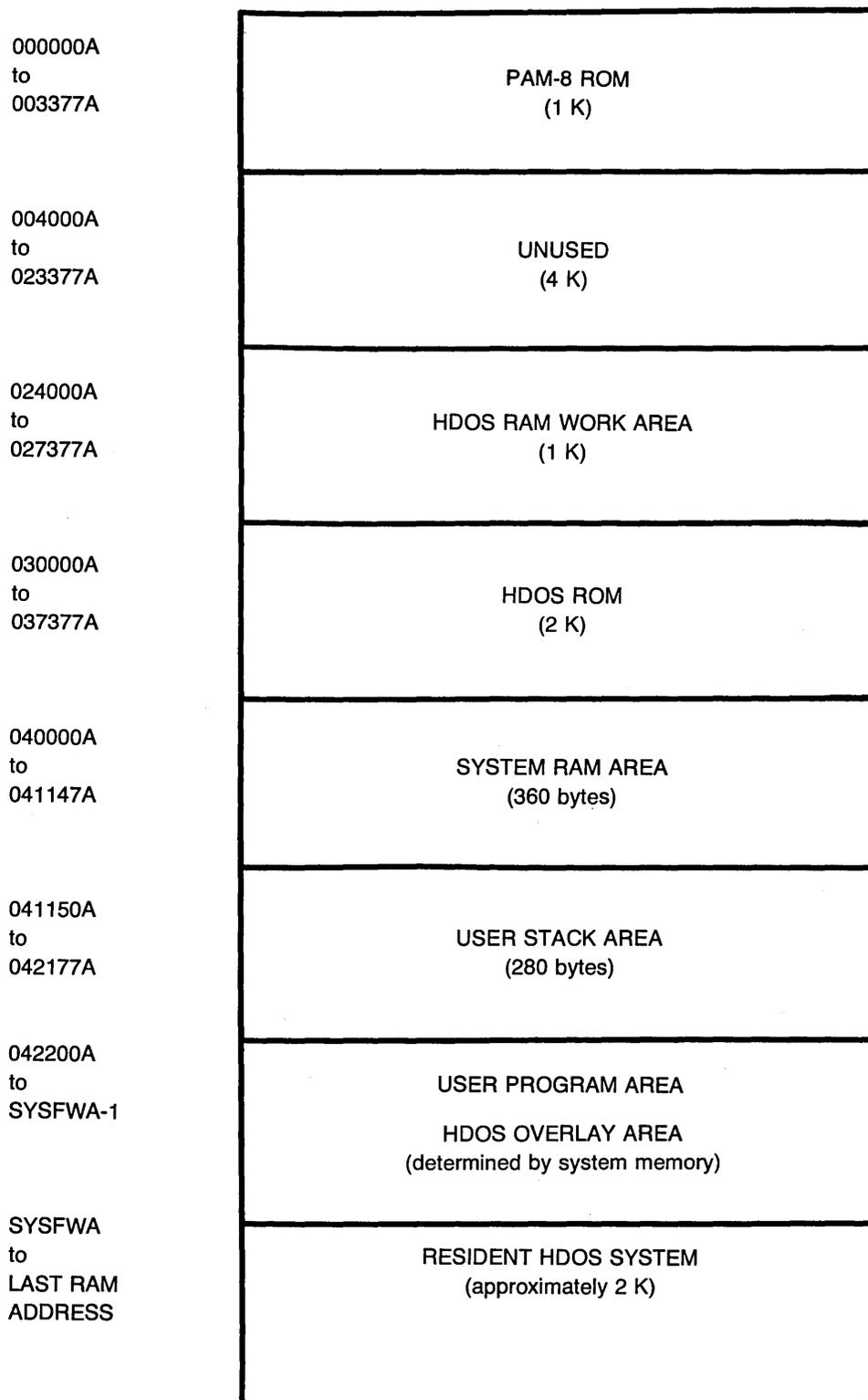


Figure 1

Memory map.

Table of Port Assignments

Port	Description
170-173Q	Reserved
174-177Q	H17
340-347Q	H8-4 Line Printer
350-357Q	H8-4 Console Terminal
360-361Q	H8 Front Panel
370-371Q	H8-5 Cassette
372-373Q	H8-5 Console Terminal
374-375Q	H8-5 Alternate Terminal
300-307Q	H8-4 Alternate Terminal
376-377Q	Reserved

NOTE: 000-077Q are available for user applications and will not be referenced by Heath software.

Interrupts

Interrupt Level	Use
0	Master reset/clear
1	Clock
2	Single step
3	Input/Output
4	reserved
5	unused
6	unused
7	HDOS system calls

APPENDIX B

Stand Alone Program Outputs

INITIALIZATION

>INIT Ⓢ

Dismounting All Disks:

Volume 001, Dismounted from SY \emptyset :

Label: HDOS SYSTEM VOLUME

Remove the Disk(s). Hit RETURN when ready: Ⓢ

INIT

Version: 1.5

Issue: #50.04.00

This routine is used to initialize HDOS floppy disks. It is a stand-alone utility, and will destroy any files on the disks it initializes. Do not attempt to use this program until you have studied the appropriate manual.

Proceed (YES/NO) <NO> ?YES Ⓢ

Insert the volume you wish to initialize into SY \emptyset ;
remember, any data on this volume will be destroyed.

Hit RETURN when ready.

Ready? Ⓢ

The volume now in the drive ...
Apparently has not been initialized before

Type NO to cancel, type YES to erase and initialize the disk, (YES/NO) ?YES Ⓢ

Enter a unique volume serial number from 1 to 255: 2 Ⓢ

Enter a volume label of 60 characters or less

SYSTEM Δ VOLUME Ⓢ

Enter the numbers of the bad sectors one at a time. Hit RETURN
after each entry, and when finished.

Sector? Ⓢ

Disk Initialization complete.

Do you have any more disks to initialize (YES/NO) <NO> ? Ⓢ

Install a bootable disk in SYØ:. Hit RETURN to reboot:

Type spaces to determine BAUD RATE

ACTION? <BOOT>

DIAGNOSTIC

>TEST Ⓢ

DISMOUNTING ALL DISKS:

VOLUME 000 DISMOUNTED FROM SYØ
LABEL: HDOS SYSTEM VOLUME

Remove the Disk(s). Hit RETURN when ready:

TEST
Version: 1.5
Issue #50.04.00

This program tests your disk system. It destroys the data on the volume under test. This volume must have been initialized at least once, and will have to be reinitialized before being used for anything else.

TO PROCEED, TYPE YES; TO CANCEL TYPE CTRL-C
PROCEED? YES Ⓢ

WHICH DRIVE (0/1) ? 0 Ⓢ

INSERT THE DISKETTE YOU WISH TO USE FOR THIS TEST
INTO DRIVE SYØ:, AND HIT RETURN.
READY? Ⓢ

FUNCTIONS AVAILABLE:

T - DISPLAY DRIVE ROTATIONAL SPEED
D - PERFORM GENERAL DRIVE CHECKOUT
M - PERFORM MEDIA CHECK (SECTOR VALIDITY)
S - PERFORM SEEK TIME CHECKOUT
U - SELECT ANOTHER DRIVE UNIT
E - EXIT TO BOOT PROGRAM

CTRL-C CANCELS THE TEST IN PROGRESS

OPTION: T Ⓢ

1.007
1.008

<CTRL-C>

FUNCTIONS AVAILABLE:

- T - DISPLAY DRIVE ROTATIONAL SPEED
- D - PERFORM GENERAL DRIVE CHECKOUT
- M - PERFORM MEDIA CHECK (SECTOR VALIDITY)
- S - PERFORM SEEK TIME CHECKOUT
- U - SELECT ANOTHER DRIVE UNIT
- E - EXIT TO BOOT PROGRAM

CTRL-C CANCELS THE TEST IN PROGRESS.

OPTION: D Ⓢ

GENERAL DRIVE TEST FOR 3 PASSES:

- ABCDEFGH END OF PASS 1
- ABCDEFGH END OF PASS 2
- ABCDEFGH END OF PASS 3

FUNCTIONS AVAILABLE:

- T - DISPLAY DRIVE ROTATIONAL SPEED
- D - PERFORM GENERAL DRIVE CKECKOUT
- M - PERFORM MEDIA CHECK (SECTOR VALIDITY)
- S - PERFORM SEEK TIME CHECKOUT
- U - SELECT ANOTHER DRIVE UNIT
- E - EXIT TO BOOT PROGRAM

CTRL-C CANCELS THE TEST IN PROGRESS.

OPTION: M Ⓢ

000 BAD SECTORS LOCATED

FUNCTIONS AVAILABLE:

- T - DISPLAY DRIVE ROTATIONAL SPEED
- D - PERFORM GENERAL DRIVE CHECKOUT
- M - PERFORM MEDIA CHECK (SECTOR VALIDITY)
- S - PERFORM SEEK TIME CHECKOUT
- U - SELECT ANOTHER DRIVE UNIT
- E - EXIT TO BOOT PROGRAM

CTRL-C CANCELS THE TEST IN PROGRESS.

OPTION: S Ⓢ

See Page 0-28 for information on Seek times.

Seek Timing Test: see the manual before running this test.

```
*****
*****
**
**      Note:
**      The floppy disk drives are spec-
**      ified to step at 30 milliseconds per
**      track by their manufacturer.
**
**      Occasionally, drives may step
**      faster, and this test determines the
**      minimum step time for your particular
**      drive. However, Heath does not guar-
**      antee that any drive will step faster
**      than 30 milliseconds per track.
**
*****
*****
```

Proceed (Yes/No)? Yes ☺

```
Trying 36 milliseconds per track - OK!
Trying 34 milliseconds per track - OK!
Trying 32 milliseconds per track - OK!
Trying 30 milliseconds per track - OK!
Trying 28 milliseconds per track - OK!
Trying 26 milliseconds per track - OK!
Drive performs reliably at 26 milliseconds per track.
```

FUNCTIONS AVAILABLE:

```
T - DISPLAY DRIVE ROTATIONAL SPEED
D - PERFORM GENERAL DRIVE CHECKOUT
M - PERFORM MEDIA CHECK (SECTOR VALIDITY)
S - PERFORM SEEK TIME CHECKOUT
U - SELECT ANOTHER DRIVE UNIT
E - EXIT TO BOOT PROGRAM
```

CTRL-C CANCELS THE TEST IN PROGRESS

OPTION: U ☺

```
TEST
VERSION: 1.5
ISSUE #50.04.00
```

This program tests your disk system. It destroys the data on the volume under test. This volume must have been initialized at least once, and will have to be reinitialized before being used for anything else.

TO PROCEED TYPE YES; TO CANCEL TYPE CTRL-C
PROCEED? YES.

WHICH DRIVE (0/1) ? 1

INSERT THE DISKETTE YOU WISH TO USE FOR THIS TEST
INTO DRIVE SY1:, AND HIT RETURN.

READY?

FUNCTIONS AVAILABLE:

T - DISPLAY DRIVE ROTATIONAL SPEED
D - PERFORM GENERAL DRIVE CHECKOUT
M - PERFORM MEDIA CHECK (SECTOR VALIDITY)
S - PERFORM SEEK TIME CHECKOUT
U - SELECT ANOTHER DRIVE UNIT
E - EXIT TO BOOT PROGRAM

CTRL-C CANCELS THE TEST IN PROGRESS.

OPTION: E

INSTALL A BOOTABLE DISK IN SY0:. HIT RETURN TO REBOOT:

TYPE SPACES TO DETERMINE BAUD RATE

ACTION? <BOOT> BOOT

SYSTEM HAS 24K OF RAM

VOLUME 000, MOUNTED ON SY0:
LABEL: HDOS SYSTEM VOLUME

HDOS VERSION 1.5
ISSUE # 50.04.00
DATE (10-MAY-79)?
>

SYSTEM GENERATION

>SYSGEN Ⓢ

Dismounting all Disks:

Volume 001, Dismounted from SY0:

Label: HDOS SYSTEM VOLUME

Remove the Disk(s). Hit RETURN when ready: Ⓢ

SYSGEN
Version: 1.5
Issue: #50.04.00

Insert the System Distribution Source Disk. Hit RETURN when ready: Ⓢ

INSERT DESTINATION: Ⓢ

INSERT SOURCE: Ⓢ

INSERT DESTINATION: Ⓢ

INSERT SOURCE: Ⓢ

INSERT DESTINATION: Ⓢ

15 FILES COPIED

TYPE SPACES TO DETERMINE BAUD RATE

ACTION? <BOOT> Ⓢ BOOT

SYSTEM HAS 16K OF RAM

VOLUME 001, MOUNTED ON SY0:

LABEL: SYSTEM VOLUME

HDOS VERSION 1.5

ISSUE # 50.04.00

DATE (10-MAY-79)? Ⓢ

>

ONECOPY

>ONECOPY Ⓢ

Dismounting All Disks:

Volume 001, Dismounted from SY0:

Label: HDOS Disk:

Remove the Disk(s). Hit RETURN when ready: Ⓢ

ONECOPY

Version: 1.5

Issue: #50.04.00

ONECOPY is used to copy files for systems with only one floppy drive. Read the appropriate manual before using.

INSERT THE INITIAL SOURCE DISK. HIT RETURN WHEN READY: Ⓢ

:OC:BASIC.ABS Ⓢ

INSERT DESTINATION: Ⓢ

INSERT SOURCE: Ⓢ

1 FILES COPIED

:OC: <CTRL-D>

TYPE SPACES TO DETERMINE BAUD RATE
ACTION? <BOOT>

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