HDOS SOFTWARE REFERENCE MANUAL

HEATH DISK OPERATING SYSTEM

VERSION 3.0

CHAPTER 2

GENERAL OPERATIONS

HEATH DISK OPERATING SYSTEM

SOFTWARE REFERENCE MANUAL

VERSION 3.0

 Through the years it continued to be improved by successive revisions which included 1.5, 1.6, and finally 2.0. It was entered into public domain on 19 July 1989 per letter by Jim Buszkiewicz, Managing Editor, Heath Users' Group, P.O. Box 217, Benton Harbor, MI 49022-0217 (616)982-3463. A copy of this letter is available for public inspection.

This manual is indicative of further improvements and provides for the latest revision, HDOS 3.0 and HDOS 3.02. The revision 3.0 is detailed in chapters 1, 2, and 3, while chapters 4 through 8, 13 and 14, are related to revision 3.02. Chapters 9 through 12, with minor improvements, are essentially picked up from the original HDOS 2.0 manual. Indeed, HDOS is still alive and well!

Chapter 2, General Operations, tells how to boot, initialize, and sysgen disks in a general, basic manner. It tells how to make a working disk and configure line printers. It provides information about booting techniques which include booting from drive SY1: or SY2:, instead of the normal technique of booting from SY0: (refer to appendix 2-A for details), how to program drives (refer to appendix 2-B for details), and provides a conversion chart (refer to appendix 2-C for details).

SPECIAL DISCLAIMER: The Heath Company cannot provide consultation on either the HDOS Operating System or user-developed or modified versions of Heath software products designed to operate under the HDOS Operating System. Do not refer to Heath for questions.

Instead, you are invited to direct any questions concerning the Heath Disk Operating System (HDOS) to Mr. Kirk L. Thompson, Editor "Staunch 89/8" Newsletter, P. O. Box 548, #6 West Branch Mobile Home Village, West Branch, IA 52358.

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INTRODUCTION

At this point, your computer, disk drives, and peripherals, should be connected and ready to operate.

The purpose of this chapter is to acquaint you with the procedure for generating both data disks and bootable disks (i.e., disks that contain the HDOS 3.0 operating system).

In case you have different types of drives (i.e., either H17 and H37, or H17 and H47), simply perform the procedure which concerns itself with the type of drive that you will be using as the PRIMARY boot drive.

A word about our terminology. Throughout the "System Setup Procedure," we will refer to steps such as STEP 1, Bootstrap; STEP 2, INIT; and so on. These "STEPS" refer to SECTIONS that have a title in full capital letters, underlined with the "+" key, and a heading next to that title.

For example, when you are instructed to proceed to STEP 1, Boot, look for BOOTSTRAP, STEP 1. Therefore, the term "STEP" always refers to an entire section, and NOT to an individual instruction such as:

    Press the SHIFT and RESET keys.

In the event that you are unable to complete the entire "System Setup Procedure," you can safely remove the disk and turn off the AC power after completing any of the 8 sections indicated below.

If you do not finish the entire procedure, mark where you have left off. To continue with the procedure later, boot your system disk and then reenter at the point in the instructions where you put your mark.

The following paragraphs divide the presentation into three segments, as follows:

    [1] H89 COMPUTERS WITH MULTIPLE DRIVES.

    [2] H89 COMPUTERS WITH A SINGLE DRIVE.

    [3] H8 COMPUTERS WTIH THE HEATH H19 TERMINAL.

This chapter will walk you through the eight fundamentals that will show you how to set up your computer system. The tasks that are an integral part of these fundamentals will be used continually as you use your computer, regardless of whatever components your Heath computer system contains.

INTRODUCTION (Cont)

The eight fundamental steps are as follows:

STEP 1 - Bootstrap (alias Boot)

STEP 2 - Initialization (alias Init)

STEP 3 - Sysgen

STEP 4 - Summary of Test

STEP 5 - Set

STEP 6 - Preparing a Working Disk

STEP 7 - Configuring Line Printers

STEP 8 - Power Down

STANDARD OPERATING PROCEDURE

SYMBOLS: A direct statement from the computer will be set off in quotation marks. For example:

"MEDIA CHECK? <YES>?"

Commands or options made by the operator will be set off in apostrophes. For example:

'<RTN>'

CAUTION: Do not type the quotation or apostrophe marks. Also, pay attention to the spaces, or the absence of spaces, since HDOS is very particular about spaces.

NOTE: A row of asterisks indicates a change of topic.
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[1] H89 COMPUTERS WITH MULTIPLE DRIVES

BOOTSTRAP BOOTING A DISK STEP 1

Introduction

One of the primary functions of a computer operating system is to enable the various physical parts of the computer to cooperate to execute your commands. In order for this cooperation to take place, there must be communication between HDOS 3.0 (software) and the physical parts of the computer (hardware). The computer cannot execute any command unless HDOS is communicating with the hardware.

[1] H89 COMPUTERS WITH MULTIPLE DRIVES

BOOTSTRAP (Cont) BOOTING A DISK STEP 1

Bootstrap is a small "hidden" program stored within the hardware. It serves to establish a communications link between HDOS 3.0 and the various functional parts of the computer. The bootstrap procedure is so-named because, by means of this procedure, you will be causing HDOS 3.0 to "pull itself up by its bootstraps" -- that is, the responses you give in this procedure, will enable HDOS to lift itself off the disk and place itself in the computer's memory. Having been installed in memory, HDOS 3.0 may then issue instructions to and coordinate the actions of the appropriate parts of the computer in response to your commands.

This procedure will be referred to several times throughout the HDOS 3.0 manual. BE SURE TO PERFORM THE SEQUENCE EXACTLY.

CAUTION

DO NOT INSERT ANY DISK INTO THE DRIVES UNTIL AFTER AC POWER IS APPLIED TO THE COMPUTER SYSTEM!!! USE OF A POWER OUTLET BOX WITH SPIKE PROTECTION TO PLUG IN COMPUTER AND PERIPHERALS IS HIGHLY RECOMMENDED.

Procedure

(1) Insure that the off-line key is in the up position. This connects the keyboard to the computer.

(2) Turn on the AC power to the computer system. Now apply AC power to the computer and then the drives, if applicable. If you have an H89, you should hear two beeps from the computer. If you have an H90, some models beep twice and some models only beep once. If you are using a Heath ROM, an "H:" will appear in the upper left hand corner of your screen. However, if you are using a non-Heath ROM, such as the Kres KMR-100 ROM, the presentation will be different. This display is referred to as the "Monitor ROM" prompt. Press the right SHIFT and RESET keys similtaneously, and note how the monitor prompt reappears. The right-hand SHIFT and RESET keys pressed simultaneously will always return you to the monitor prompt.

(3) Insert the bootable system distribution disk into the drive that has been configured as "primary boot drive SY0:." Always close the door of the drive unit after you have inserted the disk.

(4) Type the letter 'B' from the keyboard (ignore the apostrophe marks). The computer will complete the statement "oot." Now the complete statement on the screen is "BOOT."

(5) Press the RETURN key. RETURN will hereafter be signified by the expression <RTN>. You should hear some soft hissing and clicking sounds from the disk drive. This is normal. You will hear such sounds whenever the disk drive unit reads from or writes to the disk. In addition, the drive light will turn on briefly.

[1] H89 COMPUTERS WITH MULTIPLE DRIVES

(6) If your H89 is equipped with the MTR-88 ROM, HDOS will now print the message:

"TYPE SPACES TO DETERMINE BAUD RATE"

If your H89 is equipped with the MTR-90 ROM, or some other late model non-Heath ROM, this statement will not appear. However, the computer will hang up until you type spaces.

NOTE

Every time you are booting a freshly-initialized and sysgened disk for the first time, you MUST hit the SPACE BAR a few times so that the system can determine the disk baud rate. The same is true if you change the computer baud rate on the TLB board to a different value. If there is no write-protect tab on the disk to be booted, this baud rate will be written onto the disk's boot track, and you will not need to type SPACES for that disk again.

(7) After you type 'B' for "BOOT," within HDOS 3.02, the computer will immediately begin the boot process.

(8) The screen will be filled with large letters, each about 3/4 inch high. The operating system title will be printed on the screen as follows:

"HDOS 3.0
ISSUE 50-07-00"

(9) HDOS 3.02 will then print:
"System Has 64k of RAM."

Exception: If you don't have the standard 64k RAM, the HDOS system will print out the amount of RAM your system actually has.

The program continues with:
"Drivers found - TT:, SY:, DK:, LP:"

Exception: Unless you are booting the HDOS 3.02 system bootable disk, the message may include different drivers. It prints all of the drivers on disk whatever they are.

(10) Then the message appears:

"Date <30-Aug-89>?"

[1] H89 COMPUTERS WITH MULTIPLE DRIVES

How to enter the date:

(A) For HDOS 3.0:

Enter today's date in the format DD-MMM-YY. DD is a two-digit day, MMM is a three-digit month, and YY is a two-digit year. Be sure to set off the date data groups with hyphens. Thus, if today's date were 30 Aug 89, you would enter: '30-AUG-89'.

(B) For HDOS 3.02:

(1) If you are booting up for the first time, or the first time in a day, month, or year, follow the standard HDOS method of providing the date, i.e. the entire date.

(2) If you are booting up during the same month for the second or higher instance, just type the current day. For example: '30<RTN>'. The remainder is understood.

(3) If you are booting up for the first time in a new month, just type the day and the month. The remainder is understood.

HDOS then halts and requests the time:

"Time: (00:00:00)?"

NOTE

This question only appears when you copy either the CLOCK.TAS or the CLOCK89.TAS file to your system disk. The file CLOCK.TAS is used with the standard H89/Z90 computer system. The file CLOCK89.TAS is only used if you have a D-G Electronics CPU board installed.

To activate the clock, you must also add the command START CLOCK to your AUTOEXEC.BAT file. Do this using an ordinary text editor such as PIE or TXTPRO. This procedure prompts the computer to print the clock question which appears during boot to systems so prepared.

If you type in the correct time, the system clock starts up. From that time on, no matter how many times you cold boot during that session, the system clock keeps up with the latest time.

[1] H89 COMPUTERS WITH MULTIPLE DRIVES

BOOTSTRAP (Cont) BOOTING A DISK STEP 1
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After you type your choice of either the correct time or just a RETURN, the system continues its boot procedure until the system disk is mounted.

(11) The disk comes up to boot:

"Volume 01000 Mounted in SY0: (The volume number may vary.)
Label: HDOS 3.0 - 80-Track System Disk"

The HDOS system prompt appears:
"S:"

It is possible to customize your prompt. To do so, you must type the command into the file AUTOEXEC.BAT, using a text editor such as PIE or TXTPRO. For example, if your name is BOB, type the command:

'PROMPT: BOB+><RTN>'

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Refer to Appendix A-2: BOOTING TECHNIQUES, for additional details concerning booting from drives other than the one hardware-configured for SY0:.

Refer to Appendix A-3: PROGRAMMING DRIVES, for instructions on how to hardware-program disk drives.

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[1] H89 COMPUTERS WITH MULTIPLE DRIVES

INIT INITIALIZING A DISK FOR THE H89 STEP 2

Introduction

INIT is an abbreviation for INITIALIZATION, a program designed to write a map on the disk which HDOS will use to locate files. It is necessary to initialize all blank disks prior to use.

There are actually two levels of mapping that are written onto the disk during INIT. The first is a low-level initialization of the disk surface. This map is for the benefit of the floppy disk controller. It lays out a pattern on the surface of the disk that indicates the position of each of the tracks and each of the sectors on each of those tracks. The data recorded on each track includes the track number, the side number, and a pattern that signals the start of each of the data sectors on the track. Each sector header also includes the sector number, as well as a block of 256 bytes of dummy data. This process is repeated until all tracks are formatted. This process enables the floppy disk controller to read the track and sector that is currently passing under the heads, instead of counting steps from track zero, or counting milliseconds from the appearance of the index hole. The second level of mapping is referred to as HIGH-LEVEL. This causes the three system files to be transferred to the disk being initialized. Among other things, the files that are transferred are: GRT.SYS, RGT.SYS, and DIRECT.SYS.

When INIT is complete, the disk that has been initialized is said to be a DATA DISK, since it contains no system files that would enable it to boot the disk. The chief advantage of a data disk is that it can store more files than a disk of the same capacity that has been INITed and then SYSGENed. This is not much of a problem for H37 disk, due to their relatively large storage space, but it is a problem for the H17 disks, due to their relatively low storage space.

INIT is a conversational program in that it asks you questions to help you to decide what you want to do. If this is your first time through INIT, you will doubtless find the questions helpful. If you are an experienced INIT user, refer to "INIT Options," Chapter 3, page 3-7.

In SYSGEN, STEP 3, you will copy the HDOS Operating System files to your SYSTEM VOLUME. Thereafter you will be able to substitute your own SYSTEM VOLUME for the DISTRIBUTION DISK, supplied in the HDOS 3.02 package, thus keeping your distribution disk safe from inadvertent error. For now you should have your bootable system distribution disk installed in SY0: and a blank disk installed in SY1:.

NOTE

Certain portions of the INIT program differ between computer systems with H37 and/or H47 drives versus computer systems with H17 drives. These data differences will be explained in the text.

[1] H89 COMPUTERS WITH MULTIPLE DRIVES

Procedure for multiple H37 Drives:
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(1) At the HDOS prompt, type 'INIT<RTN>'.

(2) INIT will introduce and describe itself. Below this paragraph the following message will be printed:

"YES/NO)^<NO>?"

(3) Type 'YES', and the following message will print on the screen:

"Dismounting all Disks"

Drive SY2: was empty, so no message is given.

"Volume 60000, Dismounted from SY1:
Label: HDOS 3.02 - MANUAL FILES CHAPTER 1"

"Volume 10, Dismounted from SY0:
Label: HDOS 3.02 - DISTRIBUTION DISK"

"Remove the disk(s). Hit RETURN when ready:"

Remove the disk mounted in SY1:.

(4) When the query:

"Device<SY0:>?"

is displayed, type:

'SY1:<RTN>'

The system will print:

"Insert the volume you want to initialize into SY1:
Remember, any data on this volume will be destroyed."

and then:

"Hit RETURN when ready.
Ready?"

(5) Type '<RTN>'. The computer will check SY1: and report:

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

(Assuming that you are using a new disk.)

[1] H89 COMPUTERS WITH MULTIPLE DRIVES

"Type NO to cancel. Type YES to
erase and initialize the disk. (YES/NO)?"

(6) Type 'YES<RTN>'

(7) The computer will instruct:

"Enter a volume serial number between 0 and 65535."

(8) Type '10<RTN>'. (Just an example.)

(9) The computer will instruct:

"Enter a volume label of 60 characters or less."

(10) Type 'SYSTEM VOLUME<RTN>'.

"Enter BOOT step rate: (30,20,12,6)<30>."

(11) For a double-sided drive connected to the H37 controller enter: '6<RTN>'.

Most double-sided drives will operate at this step time. In case you notice read/write errors on a specific drive, you may decide to initialize future disks at a steptime of 12.

The computer stamps the boot step rate you selected onto the disk, and the following message is printed on the screen:

"Double density? <YES>"
"Double sided? <YES>"
"80 tracks? <YES>"

(12) Your response should be '<RTN>' to the first two questions in most cases. However, your response to the third question depends upon what kind of disk drive you are INITing on. In case you are INITing on a 48 tpi drive, simply type 'NO<RTN>'. This will inform the program that you want the disk to be initialized at 48 tpi, not at 96 tpi. If you were attempting to INIT a 48 tpi disk on a 48 tpi drive, but in error, typed a return to the last question, you could damage the drive.

Procedure for computer systems with multiple H17 drives:
---

(11) For computer systems with multiple H17 drives, no message concerning the BOOT step rate will appear since most single-sided drives are factory set to step at a super-conservative rate of 30 milliseconds. In addition the H17 controller card imposes limitations on drive speed in the form of WAIT STATES.

[1] H89 COMPUTERS WITH MULTIPLE DRIVES

Instead, the following message is printed on the screen:

"Number of sides (1 or 2)? <1>
"Recording density (1=48 tpi, 2=96 tpi)? <1>"

(12) If you have two or more single-sided drives connected to the H17 controller, respond to the first question by typing: '<RTN>'. Then respond to the second question by typing: '<RTN>'.

If you have one or more double-sided drives connected to the H17 controller, respond to the second question by typing: '2'. Then respond to the second question by typing: '2'.

CAUTION

You can damage a disk drive during this step if you instruct the computer to INIT a disk in a 48 tpi drive at 96 tpi. Take care!

For computer systems with multiple H37 or H17 drives:

(13) After you have instructed the computer as to how you want your disk INITed and hit the last '<RTN>', the computer starts the INIT process.

The computer shows you the status of the INIT as it goes along by printing a line of asterisks. If you are initializing a 48 tpi disk the line of asterisks will print halfway across the screen.

If you are initializing a 96 tpi disk the line of asterisks will print all the way across the screen. However, when you initialize a 48 tpi disk, the line of asterisks will only print halfway across the screen.

The line of asterisks looks like this for a 48 tpi drive:

"**********"

(14) At the completion of the INIT process, the computer prints the following message on the screen:

"MEDIA CHECK? <YES>?"

To start the media check, type: '<RTN>' (NO SPACES!)

NOTE

Even if you have first-quality, top brand-name disks, it is ALWAYS a good idea to run the media check, since you never know if there might be bad sectors on any disk. The media check will provide a positive check for you.

When the media check begins, it will also start printing a horizontal row of asterisks, such as that printed by the INIT process above. If media check finds bad sectors it will write the number of the addresses on the screen.

For computer systems with multiple H17 drives:
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(14) You will not be given an opportunity to perform a media check.

For computer systems with multiple drives:
---

(15) You will be asked if you have any bad sectors. If bad sectors have been identified, you may now type in their addresses.

The computer prints:

"Enter the number of bad sectors, one at a time.
Hit RETURN after each entry, and when finished.
Sector?"

NOTE: DETERMINING BAD SECTORS FOR H17 DISKS

Prior to running INIT for your H17 disks, there are two methods of determining bad sectors:

The first method is to cross over to HDOS 2 and perform the TEST17 "Media Check." If you decide to do this, be sure to write down on a piece of paper the bad sectors determined by the test, if any. Follow-up this action by initializing your disks in HDOS 3.02 and plug in the bad sector addresses when you get to this place in the program.

The second method is to use other software such as "BAD.ABS" which is explained in Chapter 7, page 7-38, or the equivalent.

[1] H89 COMPUTERS WITH MULTIPLE DRIVES

NOTE: OPTIMIZING H17 DRIVE SPEED

The H17 step rate may be speeded up on a disk-to-disk basis, but not during INIT. The best method is to first run the Seek Time test, part of TEST17 from within HDOS 2. This will determine the maximum error-free step rate of individual drives. Once this rate is determined, mark the drive with a stick-on label with the maximum reliable steprate determined by test. After this, EACH DISK to be used in that drive may be speeded up by using the SET command (but not during INIT). For example, type: 'SET ^SY1:^HELP<RTN>.' A list of drive SET options will appear on the screen. Then type: 'SET^SY1:^STEP^nn<RTN>', where the expression nn stands for the best step rate determined by test. The SET command must be repeated for each data disk. After you determine the slowest drive in the chain, set all of the drives to that speed.

(16) If bad sectors are found by the media check, you must type the bad sector numbers one at a time after the question "Sector?" For example:

"Sector?"'159<RTN>'

If, on the other hand, no bad sectors were detected, just type a '<RTN>' after "Sector?" and continue. The computer prints:

"Disk Initialization complete."

The computer prints:

"Insert the volume you wish to initialize into SY1:;
Remember, any data on this volume will be destroyed."

(17) You now have three options:

(A) INIT a new disk:

If you want to INIT another disk just remove the disk that was freshly INITed and insert another disk that you want to INIT. Type '<RTN>' to start. A good practice at this time is to apply a self-stick label on the completed disk, so that you can identify it later. The option to INIT multiple disks in a continuous fashion is a big help and is time-saving.

[1] H89 COMPUTERS WITH MULTIPLE DRIVES

For systems with multiple H37 or H17 drives:

(B) INIT a new disk in a different drive:.

You might want to do this if your computer system consists of both 48 and 96 tpi drives.

To do this after the computer prints:

"Hit RETURN when ready,
Ready?"

Hit 'CTRL-D' once.

The computer will ask:

"Device <SY0:>?"

Type 'SY2:' for example, where SY1: is an 80 track drive, and SY2: is a 40 track drive. At this time, you will be instructed to place your disk into SY2:. Then the INIT process repeats.

(C) Exit INIT.

To exit after the computer prints:

"Hit RETURN when ready,
Ready?"

Hit: 'CTRL-D' twice.

At this time the computer will print on the screen:

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

Hit a '<RTN>' and the computer completes the INIT process and then mounts the disk in SY0: without requiring further instructions. Then it prints:

"Volume 00000, mounted on SY0:
Label: HDOS 3.0 - Distribution Disk"

The HDOS 3.02 system prompt reappears.

(18) Before you forget what contents you had planned for the initialized disks, you are strongly urged to identify the disk(s) with label(s).

[1] H89 COMPUTERS WITH MULTIPLE DRIVES

INIT (Cont) INITIALIZING A DISK FOR THE H89 STEP 2

Remove the disk you have just initialized. With a felt tip pen (NEVER PENCIL OR BALLPOINT) once the label is affixed to the disk write the volume number, 10, for example and disk title, SYSTEM VOLUME on a standard disk label, and attach the label to the disk.

[1] H89 COMPUTERS WITH MULTIPLE DRIVES

SYSGEN SYSTEM GENERATION STEP 3

Introduction

SYSGEN is an abbreviation for "System Generation." In this procedure you will copy HDOS 3.02 system files from the distribution disk to your SYSTEM VOLUME. After performing this procedure, you will be able to substitute the SYSTEM VOLUME into any of the preceding steps that formerly required the distribution disk. If you have performed this procedure before, refer to "SYSGEN Options," Chapter 3, page 3-10.

During the SYSGEN operation, the computer is instructed to perform two main tasks. One main task is to copy system files (or other files by your command) from the source disk to the destination disk. Another main task is to set flags on files and add HDOS boot data on track 0 of the destination disk.

When the following command examples contain the symbol [^], this indicates that a space must be inserted. Do not type the symbol [^] instead of the space, just type the space.

NOTE

There is essentially no difference in SYSGEN for a computer system with multiple H37, H47 and H17 drives. systems with multiple H17 drives. Therefore, the following instructions will apply to all these configurations.

Procedures

(1) Insert the bootable distribution disk into SY0: and press <RTN> to boot it.

(2) For information concerning the three forms of SYSGEN, refer to Chapter 3, SYSTEM OPTIMIZATION. To perform SYSGEN in the standard fashion, proceed as follows:

Type: 'SYSGEN<RTN>' HDOS prints:

"SYSGEN
Version 3.0
ISSUE: #50.07.00"

"Destination Device<SY0:>?"

(3) Type: 'SY1:<RTN>' and the computer prints:

"Dismounting all Disks:"

"Volume 00010. Dismounted from SY0:.
LABEL: SYSTEM VOLUME"

[1] H89 COMPUTERS WITH MULTIPLE DRIVES

"Remove the disks.
Hit RETURN when ready!"

(4) Press the RETURN key. The computer prints:

"Insert the Source Diskette in SY0:
Hit Return when Ready:"

(5) Press the RETURN key. The computer prints:

"Insert the Destination Diskette in SY1:
Hit Return when Ready:"

(6) The computer whirs and buzzes for a period of time, and the red leds on the drives SY0: and SY1: turn on and off for a few seconds, as they normally do when files are being transferred from one disk to another. Then the computer finishes its task and is momentarily quiet.

The computer prints:

"5 Files Copied:"

The files that it copies are as follows:

1. HDOS30.SYS 40
2. SYSCMD.SYS 40
3. TT.DVD 13
4. PIP.ABS 49
5. SY.DVD 20

Remember, the files: GRT.SYS, RGT.SYS, and DIRECT.SYS were copied to the destination disk during the INIT procedure. After the files that SYSGEN copies to the disk, you now have a total of 8 system files.

Then HDOS 3.0 automatically mounts SY0:, requiring no instructions.

"Volume 00010, Mounted on SY0:;
Label: HDOS 3.0 - SYSTEM VOLUME"

Go on to Step 5, "SET."
****

[2] H89 COMPUTERS WITH A SINGLE DRIVE

BOOT BOOTING A DISK STEP 1

An H89 Computer with a single drive boots a disk exactly like an H89 Computer with multiple drives. For details on booting, refer to Page 2-3.

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INIT INITIALIZING A DISK STEP 2

Introduction:

For details concerning "Introduction," see page 2-8.

With respect to performint INIT, there are some differences between an H89 with multiple drives and an H89 with a single drive. The following data illustrates how to INIT a blank disk or a disk to be recycled.

Procedure

(1) At the HDOS 3.02 prompt, type 'INIT<RTN>'

(2) INIT will introduce and describe itself. Then it will ask you if you want to continue. Below this paragraph the following message will be printed:

"(YES/NO)^<NO>?"

(3) Type 'YES', and the following message will print on the screen:

"Dismounting all Disks"

"Volume 00000, Dismounted from SY0:
Label: HDOS 3.02 - SYSTEM DISTRIBUTION DISK"

"Remove the disk(s). Hit RETURN when ready:"

At this time remove the disk in SY0:.

NOTE: The INIT program is a stand-alone program. It loads into memory and runs without needing a system volume in SYO:.

(4) When the query:

"Device<SY0:>?"

is displayed, type '<RTN>'

[2] H89 COMPUTERS WITH A SINGLE DRIVE

INIT (Cont) INITIALIZING A DISK STEP 2

The system prints:

"Insert the volume you wish to initialize into SY0:;
Remember, any data on this volume will be destroyed."

(5) Insert the disk to be initialized into drive SY0: and then the system prints:

"Hit RETURN when ready.
Ready?"

(6) Type '<RTN>'

The computer prints:

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

(Assuming that you are using a new blank disk.)

Without pause, the computer prints:

"Type NO to cancel. Type YES to
erase and initialize the disk. (YES/NO)?"

(7) Type 'YES<RTN>'

The computer instructs:

"Enter a volume serial number between 0 and 65535."

(8) As an example, type: '10<RTN'

The computer instructs:

"Enter a volume label of 60 characters or less."

(9) Type 'SYSTEM VOLUME<RTN>'

NOTE: For computer systems with a single drive connected to the H17 controller, no message concerning the BOOT step rate will appear. Most single-sided drives are factory set to step at a super-conservative rate of 30 milliseconds. In addition, the H17 controller card imposes limitations on drive speed in the form of WAIT STATES.

The computer prints the following message on the screen:

"Number of sides (1 or 2)? <1>"
"Recording density (1-48 tpi, 2=96 tpi)? <1>"

[2] H89 COMPUTERS WITH A SINGLE DRIVE

INIT (Cont) INITIALIZING A DISK STEP 2

(10) If you have one single-sided drive connected to the H17 controller, respond to the first and second questions by typing '<RTN>'. This is the default response.

If you have one double-sided drive connected to the H17 controller, respond to the first and second questions by typing '2'.

CAUTION

You can damage a disk drive during this step if you instruct the computer to INIT a disk in a 48 tpi drive at 96 tpi.

After you have instructed the computer as to how you want your disk INITed and hit <RTN>, the computer starts the INIT process.

In HDOS 3.0, the computer shows you the status of the INIT as it goes along by printing a horizontal line of asterisks. If you are initializing a single-sided 48 tpi disk, the line of asterisks will print halfway across the screen.

Initializing an H17 disk does not provide you with the opportunity to do a media check. Instead, you will be asked if you have any bad sectors. If bad sectors have been identified, you may now type in their addresses.

NOTE: FINDING BAD SECTORS

One way to find whether there are any bad sectors is to boot HDOS 2.0 and perform the TEST17 "Media Check." HDOS 3.0 does not offer these tests, since they do not run in the HDOS 3.0 environment. After this check is made, the data determined the data should be recorded so that it may be typed in when the computer asks for it.

Another way to find whether there are any bad sectors is to use the utility program called "BAD.ABS," or an equivalent. This program is briefly described in Chapter 7, page 7-38, and is available from Kirk Thompson as an add-on to the HDOS 3.0/3.02 Operating System Manual. "BAD.ABS" may be run after the INIT is completed.

When the computer is finished INITing your disk, it instructs:

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

[2] H89 COMPUTERS WITH A SINGLE DRIVE

(11) If you have determined whether there any bad sectors on your disk by running the "Media Check" in HDOS 2.0, now is the time to type in their addresses. For example:

"Sector?"'100159<RTN>

If you have more than one bad sector, every time the computer prints:

"Sector?"

You type in the addresses until all the addresses are done. Then, when the computer prints the next "Sector?" just type a <RTN>.

If you decide to ignore this process or if you have not determined whether any bad sectors exist, you may just type <RTN> after the query "Sector?" to enable the program to move on to the next step. However, this practice is discouraged, unless you intend to use "BAD.ABS" later.

After you type <RTN>, the computer prints:

"Insert the volume you wish to initialize into SY0:;
Remember, any data on this volume will be destroyed."

"Hit RETURN when ready"

(12) At this time you have three options. Refer to page 2-13 for details. However, if you are done with the INIT program, just type:

'CTRL-D' twice.

The computer will ask:

"Do you have any more disks to initialize? (Yes/No)^(NO>?"

Just type '<RTN>' or 'NO'.

If you remove your freshly INITed disk, and swap it with the bootable system disk, the HDOS Operating System will reboot your system disk automatically.

Now go on to STEP 3 for instructions on SYSGEN, or how to make your data disk bootable. These instructions are immediately following.
****

[2] H89 COMPUTERS WITH A SINGLE DRIVE

SYSGEN SYSTEM GENERATION STEP 3

The Heath Company has kindly provided for those with a computer system having only one drive. SYSGEN is a stand-alone program. This means that once started, the program continues on to completion with only minimal cooperation from the user.

You don't NEED multiple drives to SYSGEN disks. However, having multiple drives makes things more convenient.

Insure that the program SYSGEN.ABS is on it, and then BOOT up with your normal system disk. Type: 'SYSGEN<RTN>'. SYSGEN starts up by identifying itself and then it gives you a chance to abort. If you continue, the program will print:

"Destination Device <SY0:>?"

Type: '<RTN>' and switch disks. Remove your normal system disk and insert the disk you have just INITed during STEP 2, INIT. Then the SYSGEN program begins. After it copies the five system files the program is complete.

At this time, insert your normal system disk. HDOS 3.0 does the rest, as it brings your system disk up to BOOT without the need for further instructions.

For details, follow the computer/user dialogue starting on page 2-16.

****

[3] H8 COMPUTERS WITH H19 TERMINAL

BOOTSTRAP BRINGING A DISK TO BOOT LEVEL STEP 1

Introduction

One of the primary functions of a computer operating system is to enable the various physical parts of the computer to cooperate toward the execution of your commands. In order for this cooperation to take place, there must be communication between HDOS (software) and the physical parts of the computer (hardware). The computer cannot execute any command unless HDOS is communicating with the hardware.

Bootstrap is a small program stored within the hardware which serves to establish a communications link between HDOS and the various physical parts of the computer system. The bootstrap procedure is so named because, by means of this procedure, you will be causing HDOS to "pull itself up by its bootstraps" -- that is, the responses you give in this procedure will enable HDOS to lift itself off the disk and into the computer's memory. Having been installed in memory, HDOS can then issue instructions to and coordinate the actions of the appropriate parts of the computer system in response to your commands.

[3] H8 COMPUTERS WITH H19 TERMINALS

SYSGEN SYSTEM GENERATION STEP 3

Procedures

(1) First apply A-C power to the H8 and your terminal.

(2) Apply A-C power to your disk drives.

(3) Install the distribution disk in the disk drive unit that has been hardware configured as primary boot drive 0. Close the door of the drive unit after you have inserted the disk.

NOTE

All attempts to run HDOS 3 with an H8 using a PAM-8 ROM will be doomed to failure. HDOS 3 is "ORG-0," and requires that both the Org 0 board and the XCON8 ROM be installed. The PAM-8 ROM will not work.

(4) If you are using the XCON8 ROM with your H8, press the 1 key on the H8 front panel. The front panel LEDS will display:

Pri H17 or
Pri H37 or
Pri H47

depending upon which kind of drive you have hardware configured to be SY0: on the Org-zero level.

If you have the H8-4 card installed, regardless of what you enter at the H8 front panel, the front panel leds will display: SPACE. However, this is ROM dependent. There are some non-Heath ROMs available that do not show SPACE.

NOTE

The unique features of the H8 have been presented above. Essentially, comparing the H8 to the H89, the initial steps of the BOOT sequence are the only thing that differs.

****

TEST17/TEST37/TEST47 STEP 4

NOTE: TEST17/TEST37/TEST47 must be run on HDOS Version 2.0, as it is not available in HDOS Version 3.0.

Three test programs are provided: TEST17/TEST37/TEST47. These tests provide checks for testing both the disk media and the disk drives themselves. Each of these tests contain the same type of tests as the other, but each has been designed to operate under different conditions. For example, TEST17 tests H17, 5-1/4 inch hard-sectored disks and drives, while TEST47 tests 8-inch disks and drives, and TEST37 tests H37, 5-1/4 inch soft-sectored disks and drives.

Therefore, due to the close similarity between the three tests, describing the testing processes may be combined into one section.

The programs, TEST17.ABS, TEST37.ABS, and TEST47.ABS are included in the HDOS 2.0 distribution disks. Therefore, those persons interested are invited to perform the tests desired in HDOS 2.0. It should be noted that these tests will not run in the HDOS 3.02 environment.
****

SET SYSTEM OPTIMIZATION STEP 5

NOTE: When the following command examples contain the symbol [^], this indicates that a space must be inserted. Do not type the symbol [^] instead of the space; just type the space.

This section will enable you to communicate effectively with HDOS by using some special features of your computer.

(1) At the HDOS system prompt, type:'SET^TT:^BKS<RTN>'. This instructs the system to allow you to backspace (using the BACKSPACE, or DELETE keys) in order to delete characters.

(2) At the next HDOS system prompt, type:'SET^TT:^NOMLI<RTN>'.This instructs the system to allow you to input lower case letters as well as upper case.

(3) At the next HDOS system prompt, type:'SET^TT^NOMLO<RTN>'. This tells HDOS to display all lower case input as lower case output instead of expressing it all in capital letters.

(4) At the next HDOS system prompt,type:'SET^WIDTH 255<RTN>'. This tells HDOS to set an "unlimited" right-hand margin. This will be useful for certain applications, such as working spreadsheets, typing source code, etc.

(5) At the next HDOS system prompt, type:'SET^TT:^1SB<RTN>'. This sets the terminal driver to one stop bit.

(6) At the next HDOS system prompt, type:'SET^TAB'. This lets the terminal process tabs faster.

SET (Cont) SYSTEM OPTIMIZATION STEP 5

For more information about the SET command and SET options, refer to the SET section of Chapter 3, page 3-19, "System Optimization."

Leave the SYSTEM VOLUME in the drive and go on to Step 6, "Preparing a WORKING DISK." Put your original distribution disk away in a safe place, separate from the working disks that you will create. You should not use it again unless something accidentally damages your new working SYSTEM VOLUME disk.

****

SYSGEN/COPY PREPARING A WORKING DISK STEP 6

Introduction

In this section you will prepare a system volume which will contain the most-used files contained in the Heath distribution disk, done the "easy way." Since this disk will contain the essential HDOS system files, you will be able to use it to perform Bootstrap.

This section presumes that you will be starting with a disk that has been INITed.

Procedure

(1) At the HDOS system prompt, type:'SYSGEN /MIN<RTN>'.

(2) When the message "DESTINATION DEVICE<SY0:>" is printed, type: 'SY1:<RTN>'.

(3) HDOS will instruct you to remove the disks. Instead, type: '<RTN>'.

(4) Since both source disks and destination disks are mounted in their respective drives, SYSGEN will begin copying the minimum number of system files that are required to make the disk bootable.

(5) After performing SYSGEN in HDOS 3.0, the system disk in SY0: is automatically re-mounted, and HDOS is ready for your commands.

(6) Copy only the files on your DISTRIBUTION DISK that you desire to have on your destination disk. For example, use the following command:

'COPY SY1:BASIC.ABS=SY0:BASIC.ABS<RTN>'

****

CONFIGURING LINE PRINTERS STEP 7

If you have an H14, H24 (TI-810), H25, H44 (Diablo), or MX-80 printer, this section will instruct you how to incorporate it into your system. With an H-89 there is no jumper to control the port address. The H89 has two printer ports on the rear panel: 340Q and 320Q. If you have an H8 computer, make sure that the jumpers on your serial I/O card are configured for address 340Q. If you need to set the jumpers, first turn off the AC power, perform the change, and return to this manual to continue.

(1) Insert your SYSTEM VOLUME and boot up the system.

(2) At the HDOS system prompt, copy all of the device driver files to a freshly initialized data disk.

(3) The following is an enhanced list of all of the printer drivers on the HDOS 3.0 distribution disks:

FILENAME	SIZE	DATE	FLAGS	MODE	PRINTER
AT84.DVD	5	6-OCT-86	WC D	Serial	*AT
AT85.DVD	5	6-OCT-86	WC D	Serial	*AT
H1484.DVD	6	7-OCT-86	WC D	Serial	H14
H1485.DVD	6	7-OCT-86	WC D	Serial	H14
H2484.DVD	6	7-OCT-86	WC D	Serial	H24(TI-810)
H2584.DVD	10	5-OCT-86	WC D	Serial	H25
H4484.DVD	8	9-OCT-86	WC D	Serial	Diablo
MX8084.DVD	8	10-OCT-86	WC D	Serial	MX-80
MX8011.DVD	8	10-OCT-86	WC D	Parallel	MX-80

This is a directory of all of the HDOS 3.02 line printer device driver files.

NOTES:
1. * AT: Alternate Terminal - configured at port 320Q via an H8-4 card for the H8 Computer, or port 320Q for the H89 Computer.

2. * AT: Alternate Terminal - configured at address 374Q via an H8-5 card for the H8 Computer.

In most cases you only need one of the files, and the one that you need depends upon what line printer you are using, and also whether it is connected in the serial or parallel mode. For instance, if you have an H14 printer, you should select H1484 if you are using the serial mode, or H1485 if you are using the parallel mode.

To access the parallel mode, you must be either using the Heath H89-11 parallel card, or some non-Heath vendor's parallel card.

CONFIGURING LINE PRINTERS (Cont) STEP 7

UNOFFICIAL NOTE

At this time there are some printer drivers provided by non-Heath vendors that will print your files in the HDOS 3.0 environment. For example, Quikdata sells the "Ultimate Driver" written by Bill Lindley of Lindley Systems. Quikdata's address is: Quikdata Computer Services, Inc., 2618 Penn Circle, Sheboygan, WI, 53081. Kirk Thompson, editor of the Staunch 8/89'er Newsletter, may also have some printer drivers. Contact Kirk at the following address: Mr. Kirk L. Thompson, Lot #6 West Branch Mobile Home Village, West Branch, IA, 52358.

(4) The next step is to copy the appropriate printer driver to your System Volume. After you have selected the printer driver that you want to use, copy it to your System Volume in accordance with the following example:

'COPY SY0:AT84.DVD=SY1:AT84.DVD<RTN>'

(5) Having copied the device driver to your System Volume, you must rename it. According to the rules for device drivers, the filename must be composed of two letters, and the extension must always be ".DVD." Rename the device driver as follows:

'RENAME SY0:LP.DVD=AT84.DVD<RTN>'

After renaming a device driver, you must reboot in order to get HDOS 3.02 to recognize the driver.

In the HDOS 3.0 environment, one may have many printer drivers. However, each of the drivers must have a different two-letter filename. Some common examples of filenames for printer drivers are: UD.DVD, EP.DVD, etc. However, the primary printer driver should be named LP.DVD, since many user programs have been built to search for that driver before they can continue with their assigned task. One example is QUERY!2.

HDOS will now recognize commands to utilize LP:, the primary printer driver, the next time you boot from the working disk. For more information about configuring line printers and other peripherals, refer to the PERIPHERALS" section of Chapter 3, System Optimization.

PRINTER DRIVERS WITH MULTIPLE UNITS:

Some printer drivers, such as the Lindley driver for HDOS 3.0/3.02 will enable you to make your printer print out in different modes. For example, 10, 12, 15, 17, or 20 characters per inch (CPI), or 6 or 8 lines per inch (LPI) draft mode, letter quality mode, etc, depending upon whatever features have been built-in to your printer. These modes are controlled by printer codes.

These printer codes are obtained from your printer manual. For example, in the Panasonic KX-P1124 Printer Manual, the codes are listed under the chapter for Mode Commands. One example is the printer code for EMPHASIZED PRINTING: for Hex to turn it on, type 1B 45. To turn it off type 1B 46.

CONFIGURING LINE PRINTERS (Cont) STEP 7

Each text editor has different ways of imbedding these codes. For example, in EDIT19 to set the printer codes, follow these procedures:

1. Put the cursor on the line where you want the printer code.
2. Press the "ERASE" key to go into Command Mode.
3. Type C<RTN>.
4. The line to have the printer codes added will appear in the command screen.
5. Type CTRL-D, then the first byte of the control code.
6. Type CTRL-D again for the second byte.
7. Continue typing CTRL-D and follow up with a third byte, and continue this until the last printer code is typed.
8. Press RETURN and the line will be restored to the editing screen.
9. Press ERASE to return the cursor to the editing screen.
10. Note the bullet-shaped control codes in the text, where you placed them while in the command screen.

Often it is necessary to translate the codes provided in your printer manual to other types of notation. For example: If your manual shows the control codes in decimal, but the printer driver requires the codes to be converted to OCTAL, you need a conversion chart. Refer to Appendix 2-C, page 2-38 for a decimal to octal to hex to to ASCII conversion chart.

Remember to reboot after you create these code strings, so that the system will recognize your printer drivers.

Leave the disk in the drive and go on to STEP 8, "Power Down."

POWER DOWN STEP 8

Part of the operating system resides in memory at all times, and part of it resides on the disk. Any alterations you have made to the portion of the system that is being stored in memory may or may not have been written to the disk. Thus, whenever you are finished using your computer, perform one of the following procedures to insure that any configuration changes you have made to the system are written back to the disk:

POWER DOWN (Cont) STEP 8

If the message "Install a Bootable disk in SY0: Hit RETURN to reboot' is displayed on the terminal, such as occurs after running INIT, it is always safe to remove the disk and turn off the power. Be sure that you remove all disks before turning off the A-C power, since disks left in the drives during power-down may be magnetically damaged.

If the HDOS system prompt is displayed on the terminal:

(1) Type 'BYE<RTN>'.

(2) Remove all disks.

(3) Turn off the A-C power to the drives, computer, and power bar. It is a good practice to turn off the power to the drives first before turning off the power to the computer to avoid drive head-banging. If you have a power bar, just leave the switches on the computer and disk drives on and switch off the power bar.

****

SUMMARY

You now have two bootable disks. Volume 1, SYSTEM VOLUME, is a complete copy of the distribution disk. Volume 10, WORKING DISK, is a subset of the SYSTEM VOLUME and contains the files necessary to operate the system as well as BASIC.

You will need to perform parts of the "System Set-Up Procedure" again. All new disk must be initialized. If you use H17 disks, we recommend that you run the M (Media Check) option to TEST17.ABS, or equivalent. This check will tell you whether there are any bad sectors on the disk.

Another option is to use the utility "BAD.ABS," which may be purchased separately from Kirk Thompson, since it is quicker and easier to use.

If there are any bad sectors, use INIT to instruct HDOS not to write to any of the bad sectors. Remember that even if the media check finds no bad sectors, you must reinitialize the the disk upon which the test was performed if you use the Media Check associated with TEST17.ABS

Since the SYSTEM VOLUME is a duplicate of the DISTRIBUTION disk, you can substitute your SYSTEM VOLUME into any procedure that formerly required the DISTRIBUTION disk. A system volume does not have to be an exact copy of the distribution disk. A system volume is simply a disk that contains HDOS system files. All disks that have been SYSGENed are system volumes. In this sense the WORKING DISK is actually a system volume. Only system volumes may be used to perform Bootstrap, so if you have a one-drive system, you will probably want to SYSGEN all of your disks.

To create several SYSTEM VOLUMES each with a specific system resource, such as EDIT, DBUG, ASM, or BASIC:

SUMMARY (Cont) STEP 7

(1) Perform Bootstrap using your new SYSTEM VOLUME.

(2) Initialize the blank disk. Name it anything you like, but it is a good practice to name your disks according to their function so you can distinguish among them. Note that each volume name and number should be unique -- that is, you should avoid assigning the same volume number or disk label to two different disks.

(3) Run SYSGEN. The SYSTEM VOLUME is the source and the blank disk is the destination.

(4) Run ONECOPY if you have a single drive computer system, or PIP if you have a multiple drive system. See Chapter 3, "System Optimization" for more information about ONECOPY and PIP. Instead of specifying *.* after the OC: or P: prompt, specify the name of the individual file or files that you want to be copied to your new volume.

(5) Run SET, using the same commands you used in the preceding SET section.

(6) Perform the Power-Down procedure.

If you are using 5-1/4 inch drives as your primary boot drives, you will need to use either PIP or ONECOPY to transfer system utilities such as ASM, DBUG, and EDIT from your SOFTWARE TOOLS disk. The use of both PIP and ONECOPY is documented in Chapter 3.

If you have a multiple disk drive system, the COPY command will copy either single files or multiple files most handily. One neat utility program that is furnished with the HDOS 3.02 Operating System programs is called "MegaPip," or "MP.ABS."

In addition, certain well-respected vendors have programs that will also copy files. For instance, T & E Associates provide two disks called "HDOS Enhancements." These disks include the files: DM.ABS and FM.ABS. These programs enable one to easily copy files singly or the entire disk, while verifying the copies. These programs were originally designed for HDOS 2.0, but they work fine in the HDOS 3.0 environment. The address for T & E Associates is: P.O. Box 352, Millersville, MD 21108, phone: (301) 987-4748.

You will probably want to proceed from here directly to the HDOS 3.0 Manual, Chapter 3. At some point you will want to scan the data provided in the appendixes for chapters 1, 2, and 3. This information will come in handy when you start working HDOS 3.0 in earnest. Refer back to Chapter 2, "General Operations" for details on INIT and SYSGEN as required.
****

APPENDIX 2-A: BOOTING TECHNIQUES

DETAILS CONCERNING BOOTING:

ASSUMPTION: These instructions assume that you have a multiple disk drive computer system with three disk drives connected to the H37 soft-sector controller and two drives connected to the H17 hard-sector controller. Even if you have fewer drives than that, or have a different type of controller such as the H47 as long as you have a minimum of two drives connected to each type of controller, these instructions will work. If your system is different from that shown, you will have to modify the instructions to fit your system.

(1) Decide which type of drive that you want to use the most: H17, H37, or H47, hard or soft-sectored. Due to considerations of speed and disk storage capacity, most people choose to make either the H37 or H47 types their primary boot drives. Remember: primary drives are always drives located on the SYn: drive chain. Secondary drives are always located on the DKn: drive chain.

(A) If you desire to use the hard sector drives as primary boot drives, ignore step (1) or whatever doesn't apply to your system.

(B) If you desire to use the H37 or H47 drives as primary boot drives, you must make one simple, power off, hardware adjustment to your CPU board. The following instructions apply if you are using a MTR-90 Monitor ROM, Heath part number 444-142, 444-41, or 444-83. (Also some non-Heath Monitor ROMs such as the Kres KMR-100.)

(a) With A-C power shut off and the line cord disconnected from the wall socket, open your computer top cover. Disconnect the fan cable and remove the top cover. DIP Switch SW501 is located on the lower right of the H89/Z90 CPU card. The switch is marked with a legend printed on the board. Be sure you identify the correct switch.

(b) Instruct your computer to designate the H37 drives as primary by insuring that all seven of the little switches on DIP Switch SW501 are set to 0 (zero). Similarly, if you want to designate the H47 as primary drives, set DIP Switch SW501 to the following: PIN 1 = 1, PIN 3 = 1. All other pins are set to zero. This is easily done by using the eraser end of a long wooden pencil to perform any switch changes that are required. The one and zero positions are marked on the part.

(c) Step (b) will insure that the high capacity drives will function as the primary booters and that the H17 drives will function as the secondary booters, provided that the drives have been correctly physically designated. You may have to redesignate them now by adjusting the programming plug on the disk drive.

NOTE: To physically designate a drive means to disconnect the drive from your computer system and adjust the programming plug to the appropriate settings. For details on how to program drives, refer to Appendix 2B, page 2-35.

APPENDIX 2-A: BOOTING TECHNIQUES (Cont)

If the configuration of your computer system at first designated the SYn: chain of drives as "hard sector," and the drives were single-sided 400-sector types, you will have to gain access to the drives and manually reset the programming plugs to change them to be either DK0:, DK1:, or DK2. Likewise, your soft sector, double-sided drives must be set to SY0:, SY1, and SY2 in a like manner.

(2) Normally you boot the drive that has been configured as SY0:. The first command given to the computer when at the monitor ROM prompt, usually the "H:" prompt is:

'B<RTN>'

It is also possible to boot from the second or third primary drive. In the case of booting from drives other than the drive physically programmed to be SY0:, the command is:

For Booting SY1: 'B1<RTN>' For Booting SY2: 'B2<RTN>'

(3) If you want to boot from the secondary drives, assuming that you would like to boot from hardware configured drive DK0: or DK1:, respectively, the commands are:

For Booting DK0: ';SD<RTN>' For Booting DK1: ';SD1<RTN>' etc.

BOOTING THEORY

If you have an H89 computer with two or more drives, and are using one of the following combinations: H17 + H37, H17 + H47, or H37 + H47 drives, when you boot from a drive other than the one designated SY0:, all the drives change their names. In order to operate the computer, you have to be able to predict what the new name will be for each drive that you have. The following data is presented in the form of charts which show this information presented in an easy-to-read fashion.

It is important to note that whatever drive you boot from, whether it be H17, H37, or H47, that drive and others connected to the same disk controller become SY0:.... SYn:, and the drives connected to the other disk controller become DK0:.... DKn:.

The alternate device, DKn:, always has a logical number the same as the physical drive number. DK0: is the drive physically designated as hardware unit 0 (zero), DK1: is the drive physically designated as hardware unit 1 (one), etc. The primary drive logical numbers rotate among all the possible unit numbers, whether or not a disk drive is physically connected. Note in the tables shown below, the logical drive names rotate as you boot from physical units 0, 1, 2, or 3.

The system shown is composed of both H17 and H37 drives. Drives SY0: through SY2: are H17, hard-sector. Drives DK0: through DK2: are H37, soft-sector.

APPENDIX 2-A: BOOTING TECHNIQUES (Cont)

BOOT MAP: COMBINATION OF H17 AND H37 DRIVES

BOOT DRIVE	H17 #0	H17 #1	H17 #2	H37 #0	H37 #1	H37 #2	H37 #3
H17 (0)	SY0:	SY1:	SY2:	DK0:	DK1:	DK2:	DK3:
H17 (1)	SY2:	SY0:	SY1:	DK0:	DK1:	DK2:	DK3:
H17 (2)	SY1:	SY2:	SY0:	DK0:	DK1:	DK2:	DK3:
H37 (0)	DK0:	DK1:	DK2:	SY0:	SY1:	SY2:	SY3:
H37 (1)	DK0:	DK1:	DK2:	SY3:	SY0:	SY1:	SY2:
H37 (2)	DK0:	DK1:	DK2:	SY2:	SY3:	SY0:	SY1:
H37 (3)	DK0:	DK1:	DK2:	SY1:	SY2:	SY3:	SY0:

BOOT MAP: COMBINATION OF H17 AND H47 DRIVES

BOOT DRIVE	H17 #0	H17 #1	H17 #2	H47 #0 (LEFT)	H47 #1 (RIGHT)
H17 (0)	SY0:	SY1:	SY2:	DK0:	DK0:
H17 (1)	SY2:	SY0:	SY1:	DK0:	DK1:
H17 (2)	SY1:	SY2:	SY0:	DK0:	DK1:
H47 (0)	DK0:	DK1:	DK2:	SY0:	SY1:
H47 (1)	DK0:	DK1:	DK2:	SY1:	SY0:

HOW TO USE THE CHARTS

It is easy to boot from the drive physically designated as SY0:, but there may be times when you would like to boot from the drive next to it which is configured as SY1:. One good reason for this is if you have a computer system composed of three H37 drives, where the first drive is a 40 track drive, and the second and third drives are 80 track. If you want to produce a 40 track soft sectored disk, you must boot from one or the other of the 80 track drives. In that case, the logical drive names will change. Another good reason is if one of your drives, say, the drive normally used as SY0: should fail.

APPENDIX 2-A: BOOTING TECHNIQUES (Cont)

To use the charts provided, keep in mind the type of system you have (i.e., H17 + H37 or H17 + H47), and then simply determine the type of drive you wish to boot from. With that data available, go to the appropriate table, and scan down the left hand column until you find the type of drive you want to boot from and the number.

For example: you want to boot from an H37 drive physically jumpered as SY1:. On the extreme left column, find the H37 (1). Scan that line to the right and find the associated drive names that apply to your system. You may have to study the tables carefully before the logic pattern becomes apparent. If you are still not certain, one sure-fire test is to perform a "DIR" to the drives, first SY1:, then SY2:, etc. The drive where the red light comes on bears the name you directed the DIR to.

Even if you only have two drives connected to the H37 controller, the mapping stays the same. If you have two H37s jumpered as physical units 0 and 1, then boot from drive 0, everything will make sense: the drives will respond to SY0: and SY1:. But if you boot from the drive jumpered as physical drive 1, the names change in an unexpected way. The boot drive (physical unit 1) becomes logical drive SY0: but the other drive (physical unit 0) becomes logical drive SY3:. In this case, one would reasonably think that the drive (physical unit 0) would become logical drive SY1:, but it doesn't. Any call going out to SY1: or SY2: will prove it. To unlatch the lockup this causes, type CTRL-Z twice.

DEFINITIONS:
Physically jumpered or designated drives are drives that have been physically set to operate as SY0: through SY3: and/or DK0: through DK2:. To physically jumper or designate a drive one must adjust the drive plug that resides on the logic card of the disk drive.

Logical drive names may be completely divorced from the physically jumpered or designated drive names. A logical drive name is one that HDOS requires when a program is being run. Logical drive names change around without anything physical being done to them.
****

APPENDIX 2-B: PROGRAMMING DRIVES

There are two different types of disk drives suitable for use with the H8, H89, and Z90 on the market today. The older style is the full-size drive, and the newer style is the half-height drive. Although the drives are different in appearance, the general manner of designating a drive is the same.

TERMINATING RESISTOR

The last drive on a chain must contain a terminating resistor. This applies whether you have a single drive system or a multiple drive system. This terminating resistor looks like a standard microcircuit, but instead of the conventional circuitry, it consists of a series of resistors in a row. These resistors are connected from one pin to the other pin across the body of the device. Each drive is sold with its own terminating resistor. Therefore, insure that the correct part number of terminating resistor is installed. CAUTION: Do not install a terminating resistor in every drive!

FULL SIZE DRIVES:

Full size drives are manufactured by Tandon, Siemens, Control Data, and a number of other manufacturers.

To set up a computer system, one must give each drive a different name. These names are SY0: thru SY3: or DK0: thru DK2.

The means to designate a drive and make it different from its fellows is to adjust the programming plug which is found on the logic card of the drive assembly. Look for an integrated circuit socket which contains a jumper block instead of a chip.

H37 SOFT SECTOR DRIVE PROGRAMMING:

NAME	HS	DS0:	DS1:	DS2:	DS3:	MX	BLANK	HM
SY0:	(SHORT)	(SHORT)	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN
SY1:	(SHORT)	OPEN	(SHORT)	OPEN	OPEN	OPEN	OPEN	OPEN
SY2:	(SHORT)	OPEN	OPEN	(SHORT)	OPEN	OPEN	OPEN	OPEN
SY3:	(SHORT)	OPEN	OPEN	OPEN	(SHORT)	OPEN	OPEN	OPEN

H17 HARD SECTOR DRIVE PROGRAMMING:

NAME	HS	DS0:	DS1:	DS2:	DS3:	MX	BLANK	H#
DK0:	(SHORT)	OPEN	OPEN	(SHORT)	OPEN	OPEN	OPEN	OPEN
DK1:	(SHORT)	OPEN	(SHORT)	OPEN	OPEN	OPEN	OPEN	OPEN
DK2:	(SHORT)	(SHORT)	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN

APPENDIX 2-B: PROGRAMMING DRIVES (Cont)

Blank jumper blocks may be purchased from Quikdata Computer Services, Inc., 2618 Penn Circle, Sheboygan, WS 53081. T0 program a given drive first determine whether you want to designate a soft sector drive (H37) or a hard sector drive (H17). Consult the proper table and look at your drive logic circuit card. Notice the information printed near the drive jumper block socket. Orient your jumper block to match the data on the circuit card and make your jumper block like the information shown on the table. When you are done, there should be only two different circuits shorted. All the others should be open.

HALF-HEIGHT DRIVES:
A so-called half-height drive is a drive that is nearly half the width of the standard full size drives. It is called half-height because on the newer computers it is mounted on its side and from that angle it lives up to its description, "half-height."

Similar to the full size drives, the half-height drives have a programming jumper block on the logic circuit card. However, instead of having a microcircuit socket that a programming plug fits into, these type of drives have a series of paired pins that stick out from the card in a row. Similar nomenclature is printed on the circuit card near the set of jumpers. The object is to fit the tiny shorting piece over the pin so as to short the pins. Only one jumper bar need be set.

Some drives may have two sets of these paired pins. Look for the set that has the following type of data printed next to it: HS, DS0, DS1, DS2, DS3, MX, BLANK, and HM. This set is usually positioned toward the rear of the card.

Unfortunately, the method of having the set of programming set of pins is not standard. There seems to be two different methods that drive manufacturers use. One type is to call their pins: DS1, DS2, DS3, and DS4. The other type is to call their pins: DS0, DS1, DS2, and DS4. Some drives only offer only three possible pins: DS0, DS1, and DS2 or DS1, DS2, and DS3. Before you purchase a new drive, check to see that there are four sets of programming pins so that you can have four drives on the H37 soft sector controller if you desire.

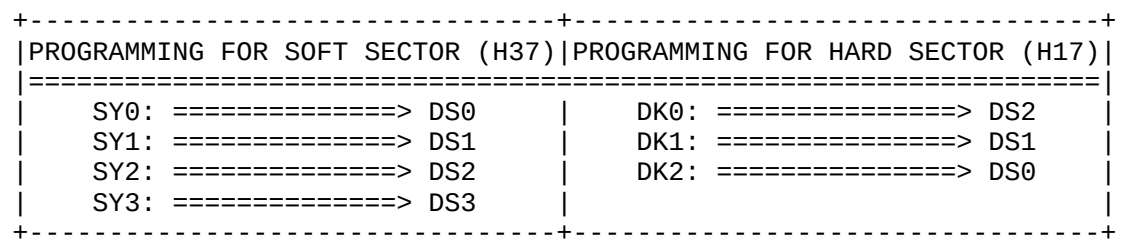
Visually inspect the logic circuit card and check for printed legends.

For example, if the data printed on the circuit card says DS1, DS2, DS3, DS4, fit the second shorting bar as follows:

PROGRAMMING FOR SOFT SECTOR (H37)	PROGRAMMING FOR HARD SECTOR (H17)
SY0: ==========> DS1	DK0: ==========> DS3
SY1: ==========> DS2	DK1: ==========> DS2
SY2: ==========> DS3	DK2: ==========> DS1
SY3: ==========> DS4	

APPENDIX 2-B: PROGRAMMING DRIVES (Cont)

For example, if the data printed on the circuit card says: DS0, DS1, DS2, DS3, fit the second shorting bar as follows:



APPENDIX 2-C
DECIMAL TO OCTAL TO HEX TO ASCII CONVERSION

DECIMAL	OCTAL	HEX	ASCII	CTRL-n	DECIMAL	OCTAL	HEX	ASCII
0	000	00	NUL	CTRL-@	48	060	30	0
1	001	01	SOH	CTRL-A	49	061	31	1
2	002	02	STX	CTRL-B	50	062	32	2
3	003	03	ETX	CTRL-C	51	063	33	3
4	004	04	EOT	CTRL-D	52	064	34	4
5	005	05	ENQ	CTRL-E	53	065	35	5
6	006	06	ACK	CTRL-F	54	066	36	6
7	007	07	BEL	CTRL-G	55	067	37	7
8	010	08	BS	CTRL-H	56	070	38	8
9	011	09	HT	CTRL-I	57	071	39	9
10	012	0A	LF	CTRL-J	58	072	3A	:
11	013	0B	VT	CTRL-K	59	073	3B	;
12	014	0C	FF	CTRL-L	60	074	3C	<
13	015	0D	CR	CTRL-M	61	075	3D	=
14	016	0E	SO	CTRL-N	62	076	3E	>
15	017	0F	SI	CTRL-O	63	077	3F	?
16	020	10	DLE	CTRL-P	64	100	40	@
17	021	11	DC1	CTRL-Q	65	101	41	A
18	022	12	DC2	CTRL-R	66	102	42	B
19	023	13	DC3	CTRL-S	67	103	43	C
20	024	14	DC4	CTRL-T	68	104	44	D
21	025	15	NAK	CTRL-U	69	105	45	E
22	026	16	SYN	CTRL-V	70	106	46	F
23	027	17	ETB	CTRL-W	71	107	47	G
24	030	18	CAN	CTRL-X	72	110	48	H
25	031	19	EM	CTRL-Y	73	111	49	I
26	032	1A	SUB	CTRL-Z	74	112	4A	J
27	033	1B	ESC	CTRL-[	75	113	4B	K
28	034	1C	FS	CTRL-\	76	114	4C	L
29	035	1D	GS	CTRL-]	77	115	4D	M
30	036	1E	RS	CTRL-^	78	116	4E	N
31	037	1F	US	NOTE 1	79	117	4F	O
32	040	20	SP		80	120	50	P
33	041	21	!		81	121	51	Q
34	042	22	"		82	122	52	R
35	043	23	#		83	123	53	S
36	044	24	$		84	124	54	T
37	045	25	%		85	125	56	U
38	046	26	&		86	126	56	V
39	047	27	'		87	127	57	W
40	050	28	(		88	130	58	X
41	051	29	)		89	131	59	Y
42	052	2A	*		90	132	5A	Z
43	053	2B	+		91	133	5B	[
44	054	2C	,		92	134	5C	\
45	055	2D	-		93	135	5D	]
46	056	2E	.		94	136	5E	^
47	057	2F	/		95	137	5F	_

APPENDIX 2-C
DECIMAL TO OCTAL TO HEX TO ASCII CONVERSION (Cont)

DECIMAL	OCTAL	HEX	ASCII	DECIMAL	OCTAL	HEX	ASCII
96	140	60	`	112	160	70	p
97	141	61	a	113	161	71	q
98	142	62	b	114	162	72	r
99	143	63	c	115	163	73	s
100	144	64	d	116	164	74	t
101	145	65	e	117	165	75	u
102	146	66	f	118	164	76	v
103	147	67	g	119	167	77	w
104	150	68	h	120	170	78	x
105	151	69	i	121	171	79	y
106	152	6A	j	122	172	7A	z
107	153	6B	k	123	173	7B	{
108	154	6C	l	124	174	7C	|
109	155	6D	m	125	175	7D	}
110	156	6E	n	126	176	7E	~
111	157	6F	o	127 NOTE 2	177	7F	DEL

NOTE 1: DECIMAL 31: CTRL-SHIFT-HYPHEN
NOTE 2: DECIMAL 127: DELETE KEY
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