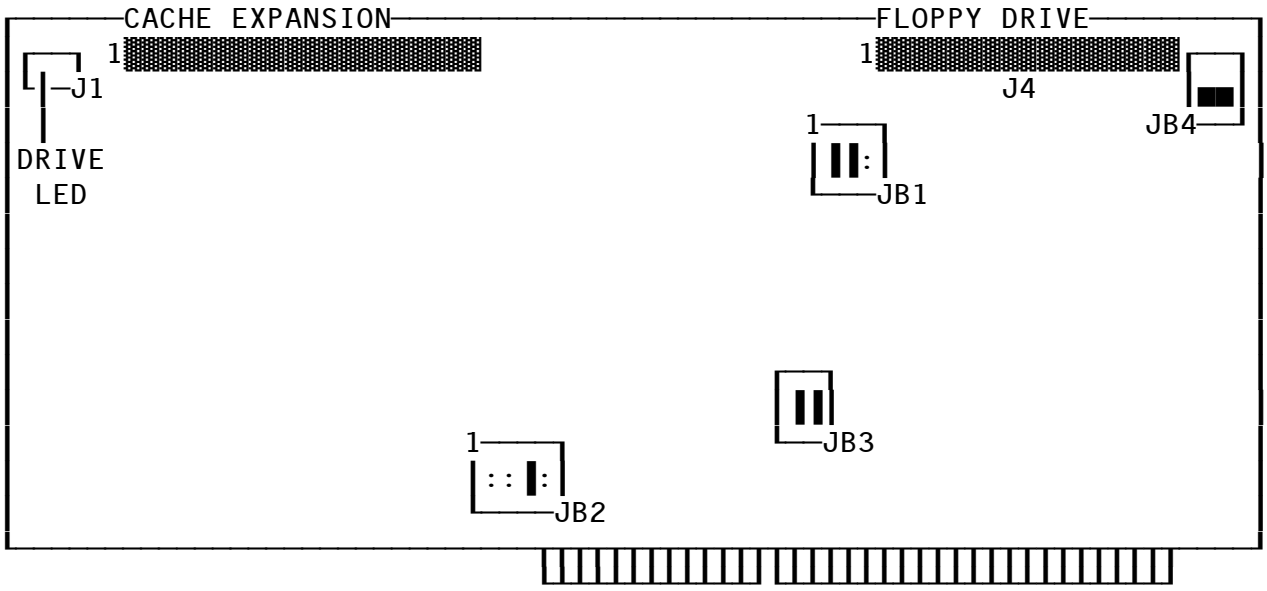
Perceptive Solutions

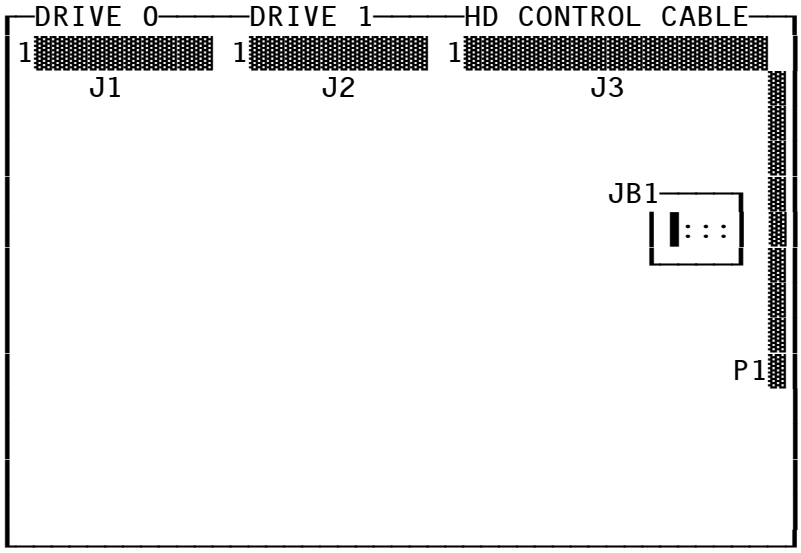
hyperSTORE 1600 USER'S GUIDE

1991 VERSION 2.5

Board Layout
showing default jumper settings



ESDI Mediaadapter
showing default jumper settings for the first Mediaadapter



Jumper Setting

JB1 Floppy Controller/Drive Configuration

JB1-1 ON Primary Floppy Address (default)
OFF Secondary Floppy Address

JB1-2 ON Primary HD Port Address (default)
OFF Secondary HD Port Address

JB1-3 ON Dual Speed Floppy Drives
       OFF Single Speed Floppy Drives (default)

NOTE
If there is difficulty reading 360K floppies in a high density drive, place a jumper across JB1-3. The floppy drive may be a dual speed drive.

ADDRESS	WD EMULATION MODE	SSP MODE
Primary	1F0-1F7, 3F0 & 3F1	3F0 & 3F1
Secondary	170-177, 370 & 371	370 & 371

JB2 IRQ (Interrupt) Configuration

JB2-1 ON IRQ5 Enabled
      OFF IRQ5 Disabled (default)

JB2-2 ON IRQ12 Enabled
      OFF IRQ12 Disabled (default)

JB2-3 ON IRQ14 Enabled (default)
      OFF IRQ14 Disabled

JB2-4 ON IRQ15 Enabled
      OFF IRQ15 Disabled (default)

NOTE
When the board is running in Western Digital Emulation, IRQ14 MUST BE enabled for the emulation to operate. If you operate the hyperSTORE-1600 in the SSP mode without a Driver, it is advisable to remove the jumper at IRQ14 even though no other device requires IRQ14.

NOTE
All SSP Mode drivers (except DOS) require an interrupt. Any interrupt may be used.

JB3 Memory Address Selection

JB3-1 ON
JB3-2 ON Memory Address C800H (default)

JB3-1 ON
JB3-2 OFF Memory Address CA00H

JB3–1 OFF
JB3–2 ON Memory Address D8000H

JB3–1 OFF
JB3–2 OFF Disable SIOS

WARNING
In most cases the primary address of the hyperSTORE will perform with no complications. If the system has a 512K VGA card, it may be necessary to set the hyperSTORE address to D800H.

JB4 Secondary SIOS Disable

JB4 ON Enable SIOS (default)
     OFF Disable SIOS

Use this jumper to enable or disable the on–board SIOS (Storage Input Output System). Removing the jumper disables the hard disk controller, allowing the system to load the Operating System from diskette.

WARNING
The hyperSTORE–1600 Requires that JB4 is installed to enable the controller and access the hard drive(s). JB4 should only be removed if it is necessary to boot a floppy when there is a CMOS setup error or an error with the SIOS stored in the non–volatile memory.

Mediaadapters Configuration

The hyperSTORE–816 and 1600 controllers support MFM, RLL, ESDI, SCSI, and IDE interfaces. This section will give a brief description of Mediaadapter addressing and configuration.

hyperSTORE with one Mediaadapter installed

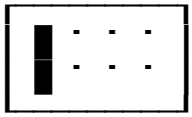
If there is only one Mediaadapter on the hyperSTORE, that Mediaadapter MUST be at MD0.

hyperSTORE with multiple Mediaadapters installed

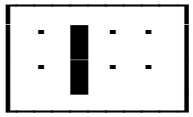
When addressing additional Mediaadapter set the address for each card to a unique address. If you install multiple Mediaadapters, the only requirement is that you MUST set one Mediaadapter to MD0.

The following figure will show the four possible jumper settings for addressing each Mediaadapter(s). Note the shading for Mediaadapter Address 0. This is the default setting on all Mediaadapters when shipped from the factory. If there is only one Mediaadapter on the

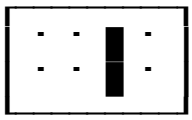
hyperSTORE, set it at MD0 or the board will not operate. If you install two Mediaadapters on the hyperSTORE, set one to MD0 and the second to MD1, MD2, or MD3.



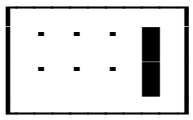
MEDIAADAPTER
ADDRESS 0
MD0



MEDIAADAPTER
ADDRESS 1
MD1



MEDIAADAPTER
ADDRESS 2
MD2



MEDIAADAPTER
ADDRESS 3
MD3

Addressing Mediaadapters

The figures of each Mediaadapter, display and identify the configuration jumpers for that Mediaadapter's addressing and configuration.

Mediaadapters Configuration

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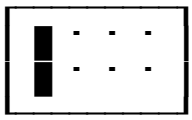
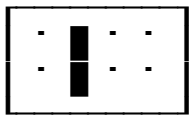
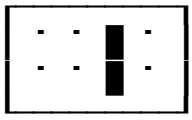


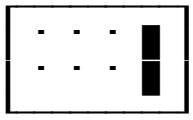
MEDIAADAPTER
ADDRESS 0
MD0



MEDIAADAPTER
ADDRESS 1
MD1



MEDIAADAPTER
ADDRESS 2
MD2



MEDIAADAPTER
ADDRESS 3
MD3

Addressing Mediaadapters

The figures of each Mediaadapter, display and identify the configuration jumpers for that Mediaadapter's addressing and configuration.

MFM/RLL Mediaadapter

There are two configuration headers on the MFM/RLL Mediaadapters. JB2 is the Mediaadapter Address header and JB1 is a factory hardwired jumper.

Mediaadapter	Header	Mediaadapter Configuration	Default Setting
MFM/RLL	JB2	Mediaadapter Address	MD0
MFM	JB1	Factory Setting	OPEN
RLL	JB1	Factory Setting	CLOSED

ESDI Mediaadapter

Only one configuration header is available on the ESDI Mediaadapter. This is the Mediaadapter Address header.

JB1 Mediaadapter Address MD0 (default setting)

SCSI Mediaadapter

There are several methods of configuring the SCSI Mediaadapter. The following sets of tables and figures should provide the information necessary to allow you to configure the SCSI Mediaadapter to your application.

JB3 Mediaadapter Address MD0 (default setting)

SCSI Termination Configuration

There are three components used in configuring the SCSI Termination. These are JB1 which enables Termination Power Source, R1/R2/R3 which are the Termination resistors, and DS1 the Termination Power Source indicator.

SCSI Mediaadapter/Drive Termination

When using the SCSI bus, one basic rule MUST be followed:
The device at each end of the SCSI bus MUST provide Bus Termination.

The most common installation is when there is only one drive and the hyperSTORE with a SCSI Mediaadapter. If you are running this configuration, make sure that the SCSI Mediaadapter is set to the default configuration and that the drive also provides bus termination.

The second method is when there are three or more SCSI devices on the SCSI bus. There are four options:

- hyperSTORE is at one end of cable and provides SCSI bus Termination and sources Termination Power.

- hyperSTORE at one end of the SCSI bus cable provides only SCSI Termination

- hyperSTORE located in "center" of SCSI bus cable provides neither SCSI Termination or sources Termination Power

The next table shows each of the four possible ways to configure the hyperSTORE for the four options.

SCSI MEDIAADAPTER CONFIGURATION

JB1	DS1	R1/R2/R3	CONFIGURATION
ON	LIT	INSTALLED	Termination and Termination Power supplied by Mediaadapter (default)
OFF	OFF	INSTALLED	Termination supplied by Mediaadapter
ON	LIT	REMOVED	Termination Power supplied by Mediaadapter
OFF	OFF	Removed	Mediaadapter supplies neither Termination or
ON	OFF	Don't Care	Fuse F1 blown on Mediaadapter. If this occurs, the board MUST be sent to the factory for repair.

IDE MEDIAADAPTER

Only one configuration header is available on the IDE Mediaadapter. This is the Mediaadapter Address header located at JB2.

JB2 Mediaadapter Address MD0 (default setting)

ESDI & SCSI High Speed Option

The high speed option allows the hyperSTORE to transfer data from the drive to the onboard cache more efficiently by doubling the size of the transfer buffer. On both the ESDI and SCSI, this option is located near the center of the board. If the High Speed option is not installed, there will be an empty 28 pin IC socket.

Notes on Installation

Installation and Cabling

There are two different issues which must be addressed before installation. The first is configuration of CMOS, the second is the actual installation of the hyperSTORE–816 or 1600.

WARNING
Before beginning the installation, copy the data from your hard disk to floppies or other external backup device. When the hyperSTORE utility is run, it WILL ERASE ALL DATA on the hard disk.

Preparation

Make a copy of the HS utility diskette. You can either use COPY or DISKCOPY to accomplish this task. The recommended method is to format a blank diskette and place an operating system (DOS 3.x or higher) on it. When complete, copy the contents of the HS utility diskette to this system diskette. This will make a "working copy" of the utility diskette that you can load the Operating System from.

If you plan to use the same verion of DOS as your operating system, copy FDISK.COM and FORMAT.COM to the working diskette. This way, when the HS utility completes, this diskette can be used to partition and prepare the hard disk.

WARNING
You MUST run CMOS Configuration BEFORE installing the hyperSTORE, otherwise the system will lock when power is applied.

CMOS Configuration

Use either the built—in setup program in the BIOS, or a Setup program on diskette to configure CMOS. Set BOTH Drive C AND Drive D to NOT INSTALLED. This is mandatory for proper operation at this stage. Once you remove both drives from CMOS, you are ready to install the board in the system.

hyperSTORE Installation

Most manufacturers include some documentation about installation of add—on cards for their systems. Refer to this section of your owners manuals for these details.

General Board Installation Procedure

The following is a general procedure for installation of the hyperSTORE in any system. Every system is dissimilar in some fashion, so thee following procedure is general:

01. Backup data from hard disk

02. Run Setup and set drives C and D to NOT INSTALLED

03. Remove AC Power from the system

04. Disconnect monitor and keyboard and set aside

05. Remove cover from system

06. Locate and remove your present hard disk controller. Leave the cables attached to the drive(s) unless you are installing a new set of cables.

07. Remove the old disk controller and install the hyperSTORE into the system.

08. Cable the hyperSTORE

09. Hook up AC, Monitor, and keyboard

10. Put the working diskette in Drive A: (the one you just made).

11. Power up the system and make sure that POST (Power On Self Test) is functioning properly.

12. The system should boot from the working diskette.

Cabling Floppies

To install the cable from the floppy drive to the controller, locate the 34 pin ribbon cable. Install one end in J4 of the hyperSTORE, the other on the floppy drive. Notice that Pin 1 is facing away from the rear mounting bracket (towards the front of the board).

Cabling MFM, RLL, and ESDI Drives

When cabling MFM, RLL, and ESDI drives, two cables are used. The 34 Pin cable is the Drive Control cable (J3) and the 20 Pin cable is the Data cable (J1). Note that if there are two hard drives installed on the controller, an additional 20 pin cable will be necessary (J2).

Cabling SCSI Drives

When cabling SCSI drives, one 50 Pin ribbon cable is used. Be very careful when installing the SCSI drive cable. If you install the cable backwards, there is a chance of damaging the drive and Media– adapter.

Cabling IDE Mediaadapter

The IDE Mediaadapter is available in two versions; dual drive or quad drive configurations. On either version, the primary drive installs in J1, on the quad–drive version, the secondary cable installs in J3.

Installing Hard Drive Activity LED

If your system has a drive activity LED, connect the cable to J1 on the hyperSTORE. Locate J1 at the front of the hyperSTORE main card (NOT the Mediaadapter). Most cables for the Hard Disk Activity LED, are red (+) and black (−). Connect the red wire to J1−1 and the black wire to J1−2.

Preparation

WARNING
By now you should have backed up data on the hard disk, as the initialization process will COMPLETELY ERASE all data on the hard disk.

hyperSTORE−816 Preparation

If you have run the system manufacturer's CMOS Setup Utility, physical drives 0 and 1 should be set to NOT INSTALLED. If this is not done, the hyperSTORE controller will lock up the system when power is applied.

hyperSTORE−1600 Preparation

If you have run the system manufacturer's CMOS Setup Utility, physical drives 0 and 1 should be set to NOT INSTALLED. Failure to set the drive types to NOT INSTALLED will lock up the system when power is applied.

If the current system does not have the CMOS Setup Utility built into the BIOS, you may disable the hyperSTORE by removing the jumper at location JB4. This will disable the SIOS and allow you to boot the system from diskette and run the system manufacturer's Setup Utility.

Once the drives are set to NOT INSTALLED, replace the jumper at JB4 and proceed. Whenever, CMOS is altered, the system will reboot, so make sure that a bootable diskette is in A: drive.

Make a Working Copy of the Distribution Diskette

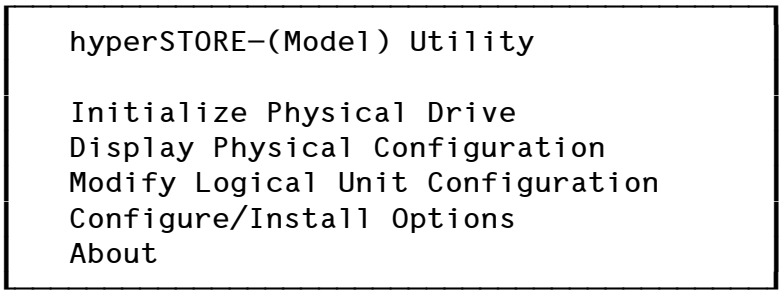
Boot DOS from a diskette and make a working copy of the hyperSTORE Utility diskette.

NOTE
DOS 3.21 is the lowest version of DOS recommended for use with the hyperSTORE.

Low Level Initialization

Insert the working copy of the hyperSTORE Utility diskette in the A: Drive and type [HS],[Enter].

The Utility will load and display the opening menu on the screen as depicted below:



Note that there is a double-line border around the window. This identifies the window as the active window. In certain sections of the Utility, several windows will be displayed on the screen concurrently. The double-line simplifies the identification of the active window.

The title frame also changes according to the model of hyperSTORE installed in the system. If the controller is a hyperSTORE-816, the window will reflect that controller type.

Standard Function Keys

Also, observe at the bottom of the screen, the status line which reflects the currently active function keys used by the Utility. In general, the following standard keys are use throughout:

ESC	Backup one window is allowed
F1	Help if help is available
F2	Edit if editing is allowed
ENTER	Accept or continue

Shift-Mode Options

Shift-Mode Options are optional commands used by the hyperSTORE Utility to perform specific functions. In most cases, these functions are shortcuts and are not displayed in the status line because, as the name implies, they are optional functions. To view theese options, hold down either the [Shift],[Alt], or [Ctrl] keys for about one second. If no options are available, the status bar will inform you.

Command Definitions

I – Initialize Physical Drive: This command starts the sequence which low–level formats the hard disk drive for use with the hyperSTORE.

D – Display Physical Configuration: This command is used to display the configuration and status of the hyperSTORE and drive(s) attached to the hyperSTORE controller's Mediaadapter(s).

M – Modify Logical Unit Configuration: This command allows the user to edit, change, add, delete, or reassign Logical Units.

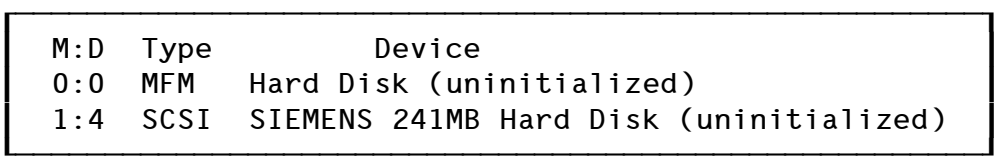
C – Configure/Install Options: As options are introduced, this section of the Utility allows the user to install these new options (supplied on separate diskettes as Installable Software Modules).

U – Update Controller Software: This option allows the user to update or change the hSOS and/or SIOS.

A – About: Information on the hS Utility software, such, etc.

Initialization

The first step in preparing the drive for use is initialization or low–level format. To select Initialization, press [I] or use the [Up/Down Arrow] keys to highlight the selection and press [Enter] to execute the command. The hS Utility will display a window on the screen similar to the following:



Window Definition:

TERM	DEFINITION
M	Mediaadapter at Address M (0 through ┘)
D	Drive #(n) on Mediaadapter (0 or 1 for MFM, RLL, ESDI), (0 through 3 for IDE), (0 through 6 for SCSI)
Type	Type of Drive (MFM, RLL, IDE, ESDI, SCSI)
Device	Device type: Hard Disk (MFM, RLL, ESDI, IDE) or Mass Storage Device (SCSI) + Drive Status

In this example, there are two drives displayed in the Select Target window. Physical Drive 0 (D=0) is attached o Mediaadapter 0 (M=0). This is an MFM Drive that has not been low–level formatted (initialized). Physical Drive 1 (D=4) is a SCSI drive which is attached

to Mediaadapter 1 (M=1). In the case of the SCSI drive, D=4 indicates that the SCSI drive attached to the Mediaadapter was set to device address 4. If the drive was set to device address 6, then the screen would have displayed D=6.

Using the [Up/Down Arrow] keys, highlight the MFM drive and press [Enter] to select it. The hS Utility will then display a data base of drive types to choose from. In this example, the drive we are installing is an ACME 200X, so we must locate this drive in the data-base.

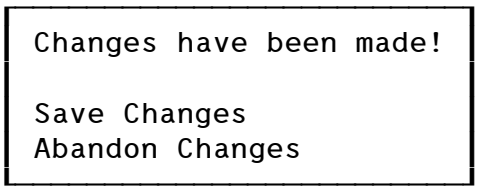
Selecting a MFM or RLL Drive

There are two methods of searching and selecting the correct drive. The first method, called Data Search, searches the database for the correct drive using keyboard input (usually the drive manufacturer's name is entered). The second method, called Scroll Search, searches for the correct drive by use of the [PgUp], [PgDn], or [Up/Down Arrow keys.

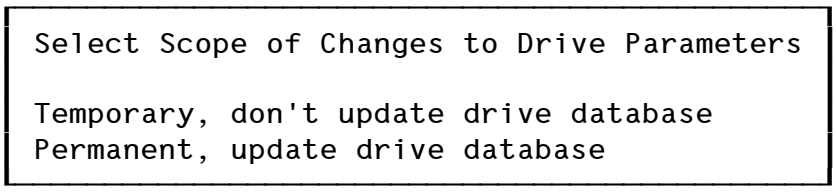
Once the database has located the correct drive, simply press [ENTER] to select the highlighted menu item. If all data correct press [ENTER]. If the selection is incorrect press [ESC].

If the database does not contain the specific drive, select a drive whose specifications match your drive. Press [ENTER] to accept that drive. Now, press [F2] to edit the window. Replace the incorrect data with the parameters of your drive. Press [ESC].

The following window warning you of changes made to the drive para-meters:



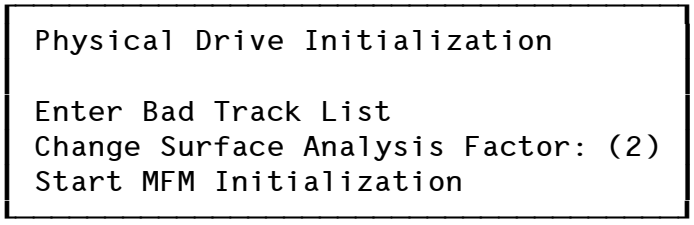
Press [A] to abandon the changes.
Press [S] to save them. You will see the following window:



Press [INS] and the database is updated.
Press [P] and the Utility will replace the selected drive with the new

parameters.

Once the drive parameters are accepted, the Utility will display the Physical Drive Initialization Window. The window should appear as follows:



Window Definition
Enter Bad Track
Allow the user to enter the bad track map from the drive. This locks out these areas from use.

Change SAF
Change the degree of testing done by the Utility. [0 = no pattern testing] [9 = very thorough pattern testing]

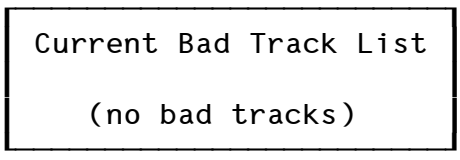
Start
Begin the low-level format

Abort
Go back to the opening screen

Enter Bad Track List (MFM/RLL/ESDI Only)

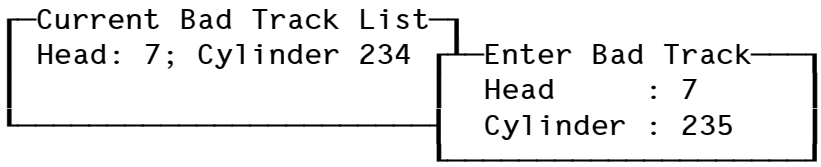
To prevent errors when storing data on the hard disk, all manufacturers of hard disks perform exhaustive tests on the media. These test are designed to test for flaws in the platters which can cause data errors. When testing is complete, a defect list is printed and attached to the drive.

To enter the defect list, press [E] or use the [Up/Down Arrow] keys to highlight the selection and press [Enter] to accept the option. The following window should be displayed at the top left corner of the screen:

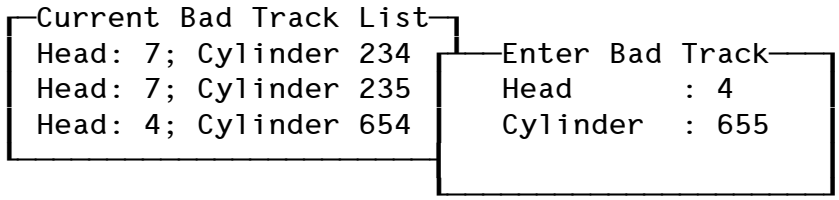


Press [INS] to enter the defect list.

The Utility positions the cursor at the Head data entry field. To enter data, input [Head #], [ENTER], [Cylinder #], [ENTER].
In this example, there are three defects on the drive, (Head 7/Cyl. 234 and 235 and Head 4/Cyl. 654). Head 7/Cylinder 234 has been entered and the screen should now appear as follows:



Once a defect has been entered, the Utility updates the Current Bad Track Window with the defect information. Also notice that the cylinder in the Enter Bad Track Window has incremented by one. Many media defects are scratches or flaws that cross several tracks. Incrementing the cylinder eliminates some of the tedious data entry duties. To accept the "new" head and cylinder information, press [ENTER] twice. The Current Bad Track Window will update and the Utility will place the cursor at the head entry field. Now input [4], [ENTER] for the head and [654], [ENTER] for the cylinder. The windows should appear as follows:



If all this correct, press [ESC] and the Utility will return you to the Current Bad Track List Window. If any entries are incorrect, highlight the incorrect entry using the [Up/Down Arrow] keys and press the [DEL] key to remove that entry from the table. If an incorrect defect was removed, or a defect was overlooked, press the [INS] key and enter the defect into the bad track table.

Once all defect are entered, press the [ESC] key and the Utility will return you to the Drive Initialization Window.

Setting Surface Analysis Factor

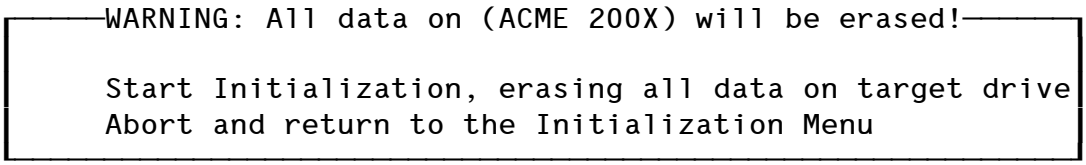
The surface analysis factor is used to specify the degree of media testing that is performed during the low-level format. To change the factor, press [C].

The default setting of two provides a thorough analysis of the disk surface. If there is plenty of time to test the unit, it is suggested that the factor be set to nine. This test will take several hours to run, depending on the size of the drive, but it is good insurance against possible future data loss.

A surface factor of zero (0) formats the hard drive but bypasses all media testing. This is not recommended unless the drive is for test purposes, and WILL NOT be used in a permanent installation.

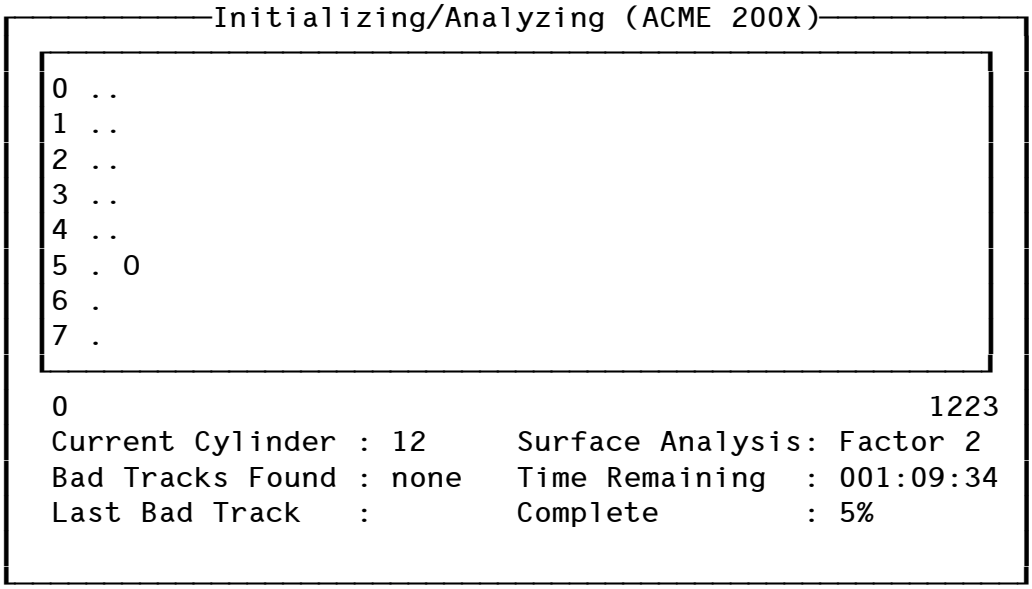
Start Low Level Initialization

To start the low Level Format program, press the [S] key or use the [Up/Down Arrow] keys to highlight the selection and press [ENTER] to begin. The Utility will display the following window:



To start the Initialization, press [S] and the Utility will display a secondary warning on the screen. This message safeguards against accidental formatting of the drive. To bypass the safeguard and format the drive, press [ALT] + [G]. To terminate the Low-Level format, press [Any Key].

Once [S] has been pressed and the secondary safeguard is bypassed, the Utility will display a screen similar to the following:



Window Definition

Current Cylinder
The current cylinder that is being analyzed.

Bad Tracks
This is a counter which displays the number of defects detected.

Last Bad Track
This field displays head/cylinder of the LAST defect that was detected.

Surface Analysis
This field displays the Surface Analysis factor that you selected.

Time Remaining
An estimation of time to completion.

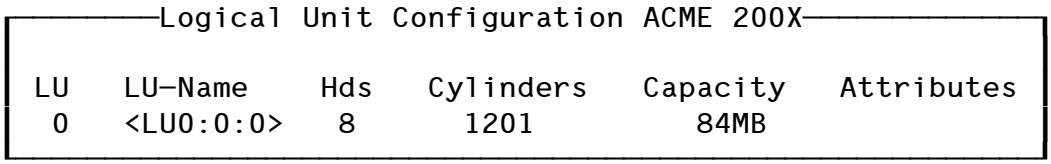
Complete
This field show approximately what percentage of the test is complete. 45% would mean that the test is 45% complete.

. , O
Indicate the write/read mode of the Utility.

. (Flashing)
Indication of a bad track. If the marker is flashing, then Last Bad Track should have data head and cylinder information.

Logical Unit Definition (MFM)

Once the Low Level format is complete, it is necessary to define the Logical Units. After the table generation is complete, the Utility will display the following window at the top left corner of the screen.



At the bottom of the screen, the Utility displays the command line. Also available, but not displayed are both Control and Alt Shift-Mode commands.

Window/Command Line/Shift Mode Definition:

LU
The defined Logical Unit number

LU Name
Utility defined as <LU M:D:L> User definable to any alphanumeric value

Heads/Cylinders
the number of heads and cylinders available AFTER the low level format

is complete

Capacity
The capacity in MB AFTER the low level format is complete. Bad tracks and reserved cylinders decrease the drive capacity making it a "zero defect" drive.

Attributes
The attributes of the Logical Unit, if any

SHIFT-MODE Definitions:

Ctrl + T
Command to enable/disable or set the mode of Geometry Translation (SSP or WD-1003)

Ctrl + A
Allocates any remaining available space to the currently selected Logical Unit

Alt + n(0..8)
Provides a shortcut method of splitting a drive into equal size Logical Units. [Alt+3] would split a drive into three equal sized Logical Units.

Enter
Displays information about the selected Logical Unit

F2
Allows editing of the Logical Unit parameters

F3
Moves selected Logical Unit to the top of the list. By moving the Logical Unit to the top of the list. By moving the Logical Unit to the top, the logical Unit becomes the boot device for the system

F4
Allows Logical Units to be moved or "swapped"

Del
Deletes the currently selected Logical Unit

Ins
Inserts a Logical Unit from unallocated space

Esc
Saves the Logical Unit configuration and exists

Up/Down Arrows
Used to select a different Logical Unit

Press ENTER to display the Logical Unit configuration <ESC>. Press F2 to edit the Logical Unit Parameters. Press <ESC> if the parameters are correct.

Geometry Translation

In order to use hard drives with more than 1024 physical cylinders, the hyperSTORE Utility provides a method to alter the logical geometry of the drive. This alteration method is called "Geometry Translation", and it fools the system into detecting a hard disk drive with less than 1024 cylinders.

Translation Mode MUST be used in the following situations when the drive exceeds 1024 cylinders:

1. A hyperSTORE–1600 operating in Western Digital Compatibility Mode.

2. Any Boot Drive

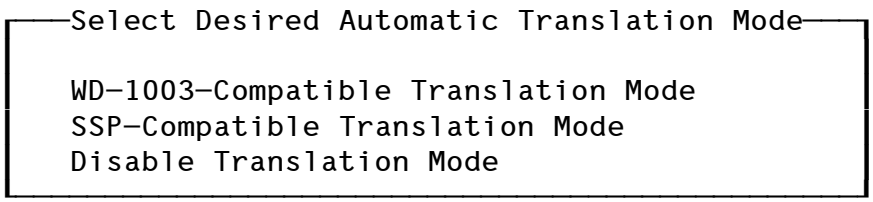
WARNING
A special restriction in WD Compatibility Mode also requires that the logical head count not exceed sixteen (16) heads and 1024 cylinders. If you are using a very large drive in this mode, it may be necessary to split the drive(s) into multiple Logical Units to get the head count to 16 or less, AND the cylinder count to 1024 or less.

Enabling Geometry Translation

Once the Low Level format is complete, and you have edited the Logical Unit Name, it is necessary to enable Translation Mode. The Utility will return to the Logical Configuration Window, and high light the Logical Unit that was just formatted.

NOTE
Translation mode defaults to Western Digital Mode unless an SSP SIOS has been installed previously.

As you can see, the hard disk drive has 1203 physical cylinders and 8 physical heads. In order to reduce the cylinder count to less than 1024 cylinders, the Utility must change the geometry of the drive. To enable Geometry Translation, enter the Shift–Mode Command [Ctrl + T], and the Utility will display the following window:



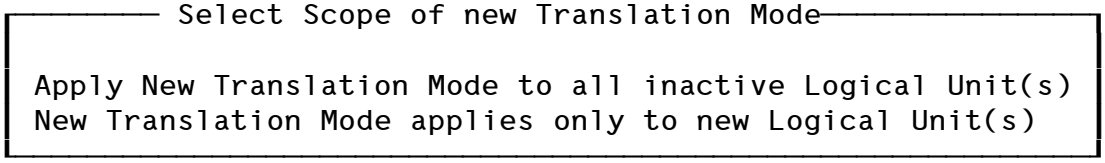
Window Definitions:

WD-1003
WD-1003 Translates drives to less than 1024 cylinder and 16 heads

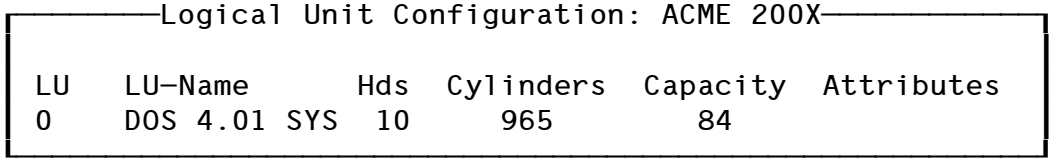
SSP
SSP translates drives to less than 1024 cylinders and 64 heads

Disable
Disables all Sector Translation on current or unallocated drive(s)

In this case the Operating System is DOS 4.01, so SSP Translation mode would be the proper choice. Press [S] to select SSP Translation Mode. The utility will then display the following screen:



Select Apply by pressing [A] or use the [Up/Down Arrow] keys to highlight the selection and press [Enter]. The Utility will return you back to the Logical Unit Configuration Window. The newly created Logical Unit will be highlighted and the translated head/cylinders will be displayed. The Logical Unit Window should now appear as follows:



Press [ESC] to accept the Logical Unit Configuration. The Utility will write the system tables to the drive and load the hyperSTORE Operating System (hSOS) on the drive. The command bar will display the progress of all the above activities. When the hSOS has been written to the drive and verified, the Utility will return to the opening menu.

This completes the initialization, Geometry Translation, and Logical Unit Configuration of the ACME 200x Drive. The next drive to format and configure will be the SCSI drive attached to Mediaadapter 1.

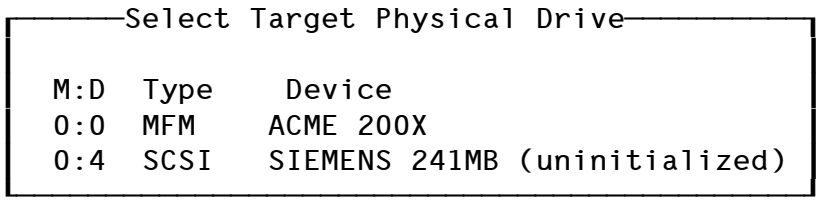
Low level formatting the SCSI drive

Low level formatting the SCSI drive is almost identical to formatting an MFM/RLL/ESDI drive with two exceptions. These exceptions are:

1. There is a SCSI low level format command sequence to low level format SCSI drives. This is in addition to the hyperSTORE initialization.

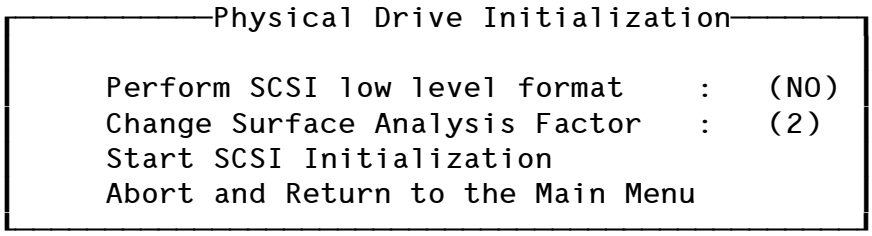
2. There is no bad track entry. All SCSI drives are considered "zero defect" drives.

From the opening menu press [I] or use [Up/Down Arrow] keys to highlight the selection and press [Enter] to execute the command. The Utility will display a screen similar to the following:



Highlight the SCSI drive by using the [Up/Down Arrow] keys and press [Enter] to select the drive. The hyperSTORE Utility will read the drive parameters and display it in a window.

Press [Enter] to accept the Physical Drive parameters and the Utility will display the Physical Drive Initialization window. The window should appear as follows:



Observe that there is a difference between this window and the same window for the MFM drive. Because there are no defects on SCSI drives, it is not necessary to enter defect information. Therefore, the "Enter Bad Tracks" menu item is not needed. In its place is an item labeled Perform SCSI low level Format.

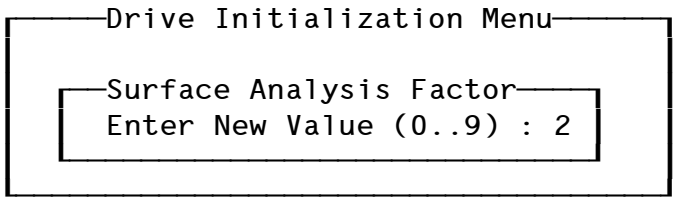
SCSI Drive Manufacturer's Low Level Format

Most drive manufacturers build a low level format Utility into the SCSI interface on the drive. This low level format initializes the drive, and marks defects. It is generally not necessary to perform this

option, as most drives are formatted at the factory. If you wish to perform this operation, use the [Up/Down Arrow] keys to the selection and press [Enter], or press [P] to enable the option. The word (NO) after this selection will change to (YES). If this feature is selected, the Utility will issue the format commands to the drive and wait for completion. Upon completion, the Utility will then begin the hyperSTORE initialization.

Setting Surface Analysis Factor

The surface analysis factor is used to specify the degree of media testing that is performed during the initialization. To change the factor, press [C] from the initialization menu and a secondary window will appear prompting for a new value. This window should appear as follows:



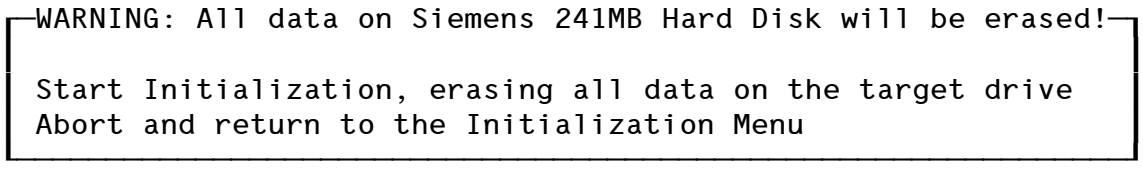
To change the value of the factor, simply enter any number between [0 and 9]. When the new factor is entered, the Utility accepts the new value and returns to the Drive Initialization Menu.

The default setting of (2) provides a thorough analysis of the disk surface. If there is plenty of time to test the unit, it is suggested that the factor be set to nine (9). This test will take several hours to run, depending on the size of the drive, but it is good insurance against possible future data loss.

A surface factor of zero (0) formats the hard drive but bypasses all media testing. This is not a recommended unless the drive is for test purposes, and that drive WILL NOT be used in a permanent installation.

Start SCSI Initialization

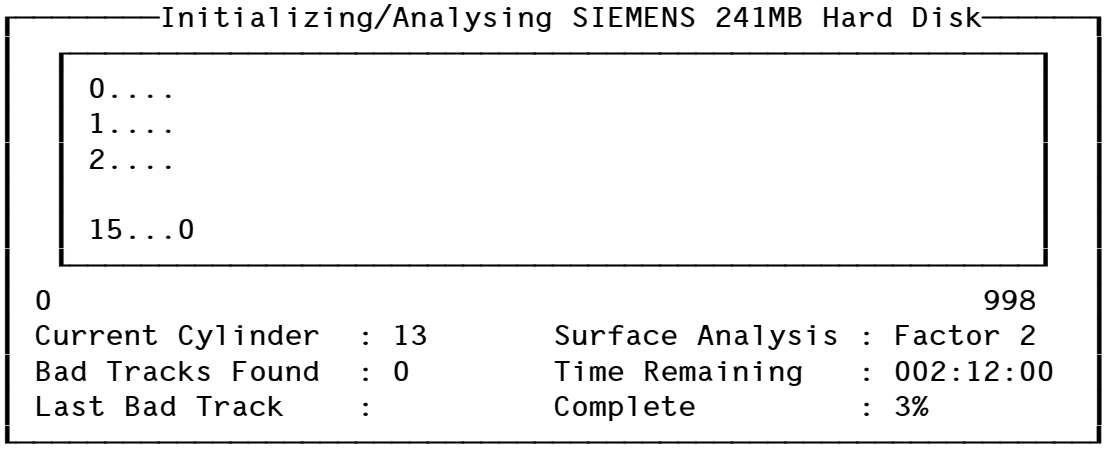
To start the low Level Format procedure, press [S] key or use the [Up/Down Arrow] keys to highlight the selection and press [Enter] to begin. The Utility will display the following window:



To start the initialization, press [S] and the hS Utility will display

a secondary warning on the screen. This message safeguards against accidental formatting of the drive. To bypass the safeguard and format the drive, press [Alt]+[G]. To terminate the Low-level format, press [Any Key].

Once [S] has been pressed and the secondary safeguard is bypassed, the Utility will display a screen similar to the screen for the MFM drive.



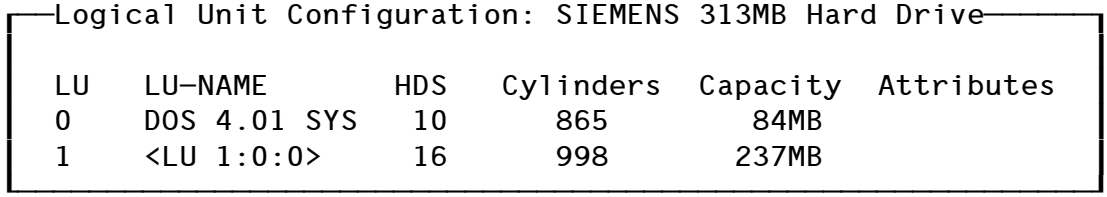
WARNING
The hyperSTORE utility automatically translates ALL SCSI Drives to a drive geometry of 16 Heads. This is because, there is no standard way to actually tell how many heads and cylinders are on a drive. By doing this, the hyperSTORE creates a point of reference for itself.

After the test is complete, a new window will view. If surface defects were detected, there will be flashing dots within the matrix and the Bad Track Fields will contain data. At the lower right corner of the window the message PRESS ENTER TO CONTINUE is flashing. To continue, press [Enter].

This completes Low Level Format and Surface Analysis for the SIEMENS 241MB hard disk. The Utility will then execute four phases of internal table generation for the new drive. This requires NO user intervention, but progress information will be displayed at the bottom of the screen. For very large drives, this step may take several seconds.

The next step is to define the Logical Unit(s) for this drive.

Once the Low Level Format is completed, it is necessary to define the Logical Units. After table generation is complete, the Utility will display the following window in the upper left corner of the screen.



This window displays the information about the SCSI Drive. It was decided to make this one large Logical Unit, simply press [ESC] to accept the default parameters. In this case, the drive will be split into three Logical Units. The first Logical Unit is 118MB, the second and third Logical Units will be 60MB each, To do this, the Logical Unit must be edited.

Editing Logical Units

There are two methods of editing the logical Units. The first method is to use the F2 key to manually edit the drive capacity. The second method is a Shift–Mode Command that divides the drive into equal size Logical Units.

Shift–Mode Command

The Shift–Mode command for splitting the drive into equal sized Logical Units is [ALT]+[1..8]. Pressing [ALT]+[2] splits the Logical Unit into two equal size Logical Units.

The Utility has placed the select bar on the newly formatted drive. The drive is formatted to 237MB and we need to split the drive in half for the first Logical Unit. Press [ALT]+[2] and the Utility will display the following window on the screen:

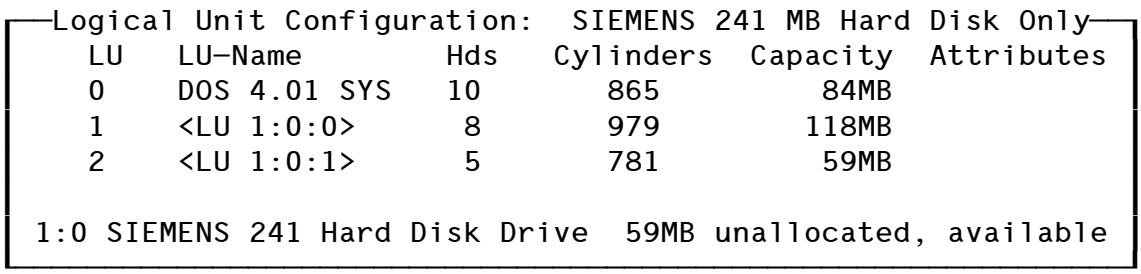
Logical Unit Configuration: SIEMENS 241 MB Hard Disk Only

LU	LU–Name	Hds	Cylinders	Capacity	Attributes
0	DOS 4.01 SYS	10	865	84MB	
1	<LU 1:0:0>	8	979	118MB	
2	<LU 1:0:1>	8	979	118MB	

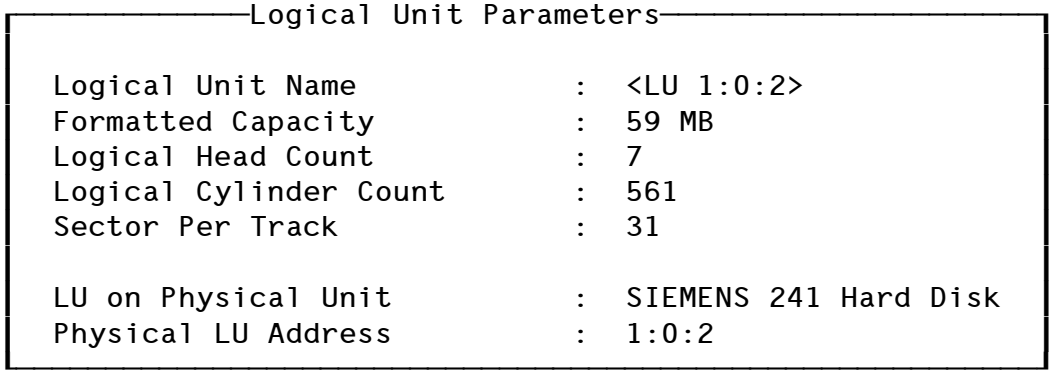
Manually Editing Logical Units

The Utility has just created two identical 118 MB Logical Units. To split the second Logical Unit into two smaller units, use the [Down Arrow] key to highlight the second Logical Unit and press the [F2] key to edit.

The Utility will then display data for the Logical Unit. Using the [Down Arrow] key, highlight the Formatted Capacity field and input [59], [ENTER]. The Utility will automatically translate the head and cylinder to adjust to the capacity of the drive. Next, press [ESC] to accept the changes. The Utility will display a window similar to the following:

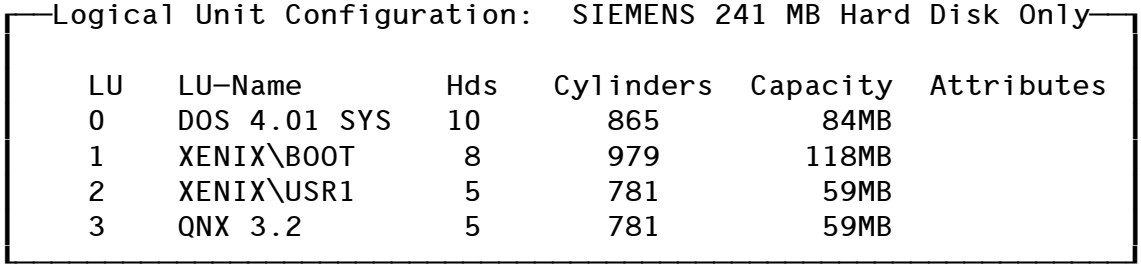


Now that the Logical Unit has been edited, the Utility displays a new Logical Unit Configuration. Notice at the bottom of the window that the SIEMENS drive still has 59 MB unallocated. To create the second 59 MB Logical Unit, this unallocated space must be configured as a Logical Unit. To unallocate the space, press the [INS] key and the Utility will display a window similar to the following:



Press [ESC] to accept the configuration of the Logical Unit. The Utility will display a final window that will show all of the Logical for both the ACME 200X and the SIEMENS 241 MB drives.

Before, exiting, you may wish to assign labels to the Logical Units. To do so, use the [Up/Down Arrow] keys to highlight the desired Logical Unit and press [F2]. The Logical Unit Parameter window will be displayed and the Utility will place the cursor in the Name field. For Logical Unit 1, type [XENIX/BOOT] and press [ESC] to accept the data. Select Logical Unit 2 and enter [XENIX/USR1] and press [ESC] to accept the data. Finally, select Logical Unit 3 and enter [QNX 3.2] and press [ESC] to accept the data. The window would appear similar to the following:



Press [ESC] to accept the Logical Unit configuration. The Utility will then build the necessary tables and will write the hSOS to each of the Logical Units. When complete, the Utility returns to the opening menu.

This completes the Logical Unit configuration of the SCSI drive.

Manipulation of Logical Units

In the overview, Logical Unit manipulation was mentioned. This section deals with moving Logical Units, and selecting a Logical Unit as the boot drive.

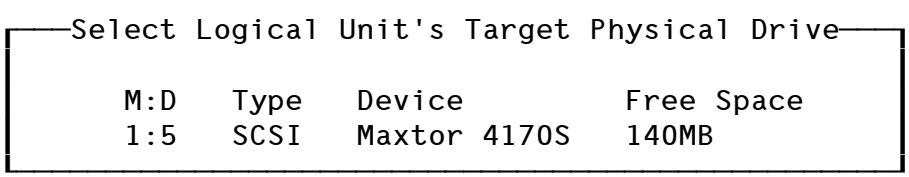
WARNING
Once Logical Units are defined, there are some ways to manipulate Logical Units which will cause permanent data erasure.

Inserting a Logical Unit

To insert a Logical Unit, there must be unallocated space available to create the Logical Unit. The Logical Unit can be only as large as the largest amount of unallocated space on a single Physical Drive. In this example, a second SCSI drive was installed and formatted.

To add a Logical unit, select the [M] option from the opening menu. The Utility will display a window which displays Logical Unit configuration for all drives (allocated and unallocated).

The Logical Unit Configuration window will display the four Logical Units that were previously configured, plus the additional drive that was just installed as unallocated space. To create a new Logical Unit, press [INS] and the Utility will display a window similar to the following:



Any drive(s) with free space available are displayed in the window in a different color of intensity. The Utility will highlight the first Physical Drive that has free space available. If there is more than one drive available with free space, use the [UP/DOWN Arrow] keys to select the desired drive. The Up/Down Arrow keys will highlight ONLY the drives with free space available. Once the desired drive is highlighted, press [ENTER] to select that drive.

The Utility will then display a Logical Unit Parameters window and

place the cursor in the data entry field for Name. If desired, enter the name of the Logical Unit and press [ENTER] to select it. Edit any other fields, and when all fields are satisfactory, press [ESC] to accept the configuration.

The Utility will then display a secondary window asking whether you wish to Save the Logical Unit or Abort the Edit. To save the Logical Unit, press [S]. To abort the creation of the Logical Unit, press [A].

If the configuration was accepted, the Utility will display all Logical Units including the newly created Logical Unit(s). Also, observe that the corresponding amount of space is removed from the unallocated space list. If the configuration was aborted, the Utility will return to the opening menu.

For all additional Logical Units, repeat this sequence for each drive.

Deleting Logical Units

To delete Logical Units, select [M] from the opening menu. The Utility will display all Logical Units which have been defined. Use the [Up/Down Arrow] key to highlight the Logical Unit you wish to delete and press [Del] to initiate the removal of the Logical Unit.

The Utility will then display a secondary window asking whether you wish to Perform or Abort the selection. Press [A] to abort and the Utility will return to the Logical Configuration Menu.

Press [P] to perform the deletion and the Utility will then display a "last Chance" warning message. To continue with the deletion process, press [Alt]+[G]. The Utility will delete the Logical Unit and display the opening window showing Logical Unit configuration. Observe that the deleted Logical Unit is removed from the active list, and returned to the unallocated/available list. Next, press [ESC]. The Utility provides one last opportunity to save or abort the edit.

WARNING
At this point, the data on the "deleted" Logical Unit has already been ERASED!. If you Abort at this time, the original Logical Unit Configuration will remain unchanged, but the data:

W I L L B E L O S T !

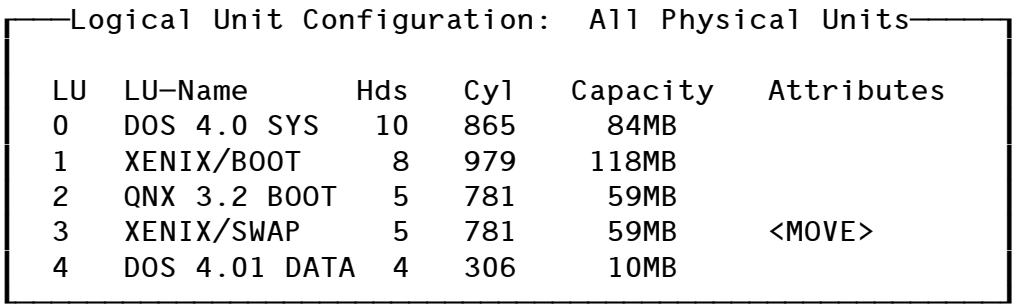
To save the edit press [S] and the Utility will save the changes and return to the opening menu of the Utility.

Moving Logical Units

There are two ways in which to move Logical Units. The first is by the

use of the MOVE command (F4), the second by use of the TOP command (F3).

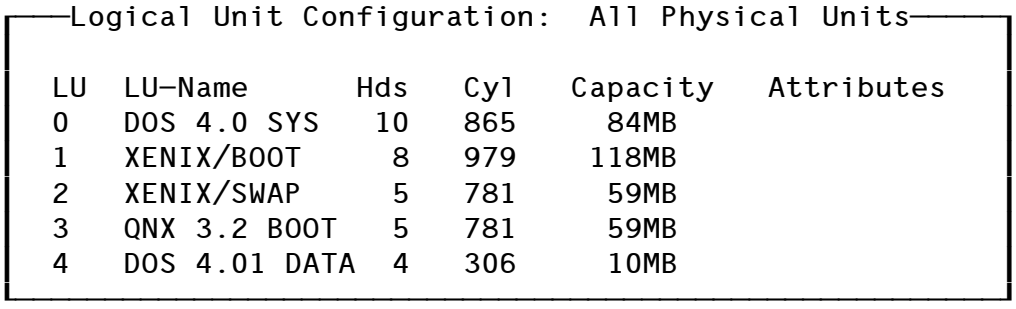
For the next two options, use the window which follows as a reference:



To move Logical Units, press [M] from the opening menu. The Utility will then display all Logical Units which have been defined.

Using the above example, if you wish to move the XENIX/SWAP Logical Unit under the XENIX/BOOT Logical Unit, you must move the SWAP drive. To move the Logical Unit, use the [Up/Down Arrow] keys to highlight the XENIX/SWAP LU and press [F4]. The Utility will place the word <MOVE> immediately following the Logical Unit in the attributes column as shown in the example.

Next, using the [Up/Down Arrow] keys highlight the XENIX/BOOT Logical Unit and press [ENTER]. The Logical Unit will be moved to the position directly UNDER the highlighted Logical Unit. The window should appear as follows:



If the Logical Configuration is correct, press [ESC] and the Utility will display a secondary window asking whether you wish to Save or Abandon the Logical Unit Configuration.

Press [A] if you wish to abandon the configuration, or press [S] if you wish to save the configuration. Upon saving or abandoning, the Utility will return you to the opening menu.

NOTE
When Logical Units are moved, they are positioned BELOW the highlighted Logical Unit.

Defining Logical Units as BOOT Devices

As show in the example, there are three Logical Units which are capable of being BOOT devices. As stated earlier, ONLY Logical Unit 0 can be a BOOT device. To define a Logical Unit as a BOOT device, that Logical Unit must be moved to the top.

To move a Logical Unit, press [M] on the opening menu. The Utility will display a window similar to the window used in the example. Using the [Up/Down Arrow] keys, highlight the Logical Unit you desire to make Logical Unit 0 and press [F3]. That Logical Unit will be assigned as Logical Unit 0 and moved to the top of the window. All other LU's will be renumbered.

If the configuration is correct, press [ESC] to save and exit. Upon exit, the Utility will query whether you wish to Save or Abandon the changes to the Logical Unit Configuration. Press [A] if you wish to abandon the changes, or press [S] if you wish to keep the configuration. Upon saving or exiting the Utility will return you back to the opening menu.

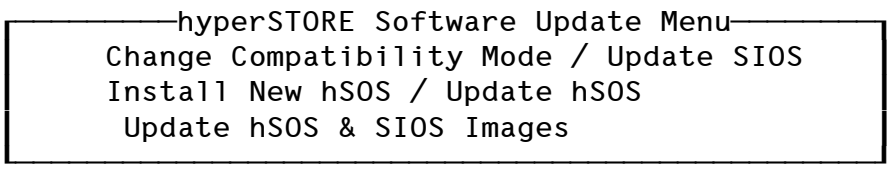
NOTE
In order for any Logical Unit to BOOT, it must have a bootable Operating System loaded on that Logical Unit.

This completes the section on manipulation of Logical Units.

Updating Controller Software

The purpose of this menu selection is to allow the user to update the software for the hyperSTORE controller. Either hSOS or SIOS, or both can be updated by this routine.

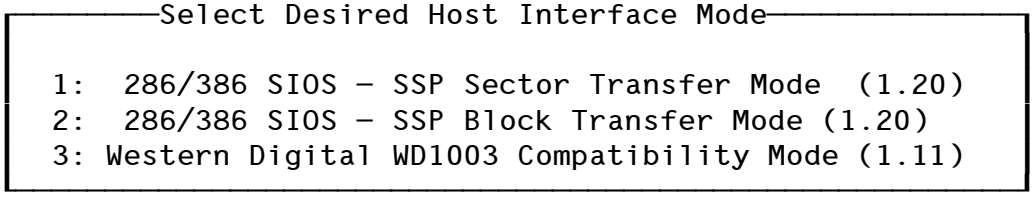
To update the software, press [U] at the opening menu. The Utility will then display the following window:



Change Compatibility Mode

This option is used to switch between the different compatibility modes of the hyperSTORE controller card. There are two native modes (SSP) and Western Digital 1003 Emulation Mode.

To change compatibility modes press [C] from the Update Menu. The Utility will then display the following window on the screen:



SSP Sector Transfer Mode

Select SSP Sector mode if the system has a high speed serial port installed. The use of the Sector mode prevents the loss of characters caused by missed interrupts. The exceptions are serial printers, and systems that use intelligent I/O cards.

SSP Block Transfer Mode

Use SSP Block mode for the fastest data transfer rates and should always be considered your first choice. Unless there are high speed serial communications, which are not using intelligent controllers, the SSP block transfer mode is suggested for all applications that run in "Interrupt 13" mode or with SSP Mode drivers.

Western Digital Emulation Mode

Western Digital Emulation Mode is used when the Operating System will not run in the hyperSTORE's native SSP mode. In most cases, an INT13 driver is not supported, forcing you to select this mode operation.

WARNING
When selecting Western Digital Mode, the drive limits are 16 Heads and 1024 cylinder or less. The hyperSTORE software limits the size of the drive to these specifications. If the drive is larger, then that drive must split into smaller Logical Units using the hyperSTORE Utility diskette.

The table below should provide the necessary information to allow you set the hyperSTORE compatibility mode to the Operating System that the system is running.

OPERATING SYSTEM	WD MODE	SSP MODE	HYPERDRIVER AVAILABLE	SSP IRQ SETTING
SCO UNIX	*	*	YES	14
AT&T UNIX V3.2	*	*	YES	14
COHERENT 3.0	*		NO	NONE
CONCURRENT DOS	*	*	NO	NONE
DR DOS	*	*	NO	NONE
ESIX SYSTEM V3.2	*	*	YES	14
INTEL UNIX V3.2	*	*	YES	14
INTERACTIVE 386/IX	*	*	YES	14
MS/PC DOS 3.21+	*	*	NO	NONE
MS/PC DOS 4.X+	*	*	NO	NONE
NETWARE 286 V2.15+	*	*	YES	14,15,12,5
NETWARE 386 V3.0+	*		NO	NONE
OS/2	*		NO	NONE
OS/9000	*		NO	NONE
PC-MOS	*	*	NO	NONE
PICK	*		NO	NONE
SCO UNIX	*	*	YES	14
QNX 2.3+	*	*	YES	14
SCO XENIX	*	*	YES	14
THEOS 3.1+	*		NO	NONE
UHC UNIX 4.0	*	*	YES	14
VM/386	*	*	YES	14
VRTX/PC	*		NO	NONE
WINDOWS 3.0	*	*	NO	NONE

 * = WD Mode REQUIRES IRQ14 in all cases
 ** = SSP Mode IRQ selections listed in preferred order.

To select the desired mode press the corresponding number [1, 2, or 3]. The Utility will load the file from the Utility diskette and program the non-volatile memory on the controller card. When complete, a warning message will be displayed informing you that the system must be rebooted. Press [Enter] to reset the system.

Installing/Update hSOS

To update the hSOS [U] on the opening menu. The Utility displays the hyperSTORE Software Update Menu. Press [I] and the UTILITY will then display a secondary window. This window provides the options to Abort the operation or update the current version of the hSOS.

If you wish to abort the operation, press [A] and the Utility will abort the process and return to the opening menu. If you wish to update the hSOS press [R] and the Utility will replace the hSOS with the current version on the diskette.

Observe that the current version of the hSOS (if any) will be displayed in the option box along with the version of hSOS that will be loaded on the drive.

Update hSOS & SIOS Images

This option is the combination of updating SIOS and updating hSOS and is usually run when a new version of the software is released. To engage this option press [U] in the opening menu. The Utility will then display the hyperSTORE Software Update Menu. Press [U] to select the Update hSOS & SIOS Option.

The Utility will then prompt you to select the Host Interface Mode and upon selection of the mode, the Utility will write the new SIOS to the non-volatile memory on the hyperSTORE and the new hSOS to the drive. The Utility will then display the Reboot Warning message. Press [Enter] to Reboot the system. Once the system reboots, the new software will be running.

"hyperDRIVER for NetWare/386 3.10/3.11"

This release of the hyperDRIVER for NetWare/386 provides the following features and functions:

a) Support for hyperSTORE/1600 and eachCACHE Pro controllers
b) Support for two (2) controllers in the same fileserver
c) No driver-imposed limit on supported drive-size (the first Logical Unit is limited to 64 heads and 1024 cylinders, or about

2GB).
d) Support for up to 32 Logical Units on up to 28 physical drives.

The following configuration is required to run the NetWare/386 hyperDRIVER:
a) easyCACHE Pro or hyperSTORE/1600 w/Mediadapter(s)
b) NetWare/386 3.10 or 3.11
c) PSIDISK.DSK file (on this disk)
d) At least one Logical Unit defined with a DOS and a NetWare partition

First-Time Standard Installation

1. Using the hyperSTORE Utility, initialize the target drive(s) and create at least one (1) Logical Unit no smaller than 40MB.
2. Select SSP Block or Sector Mode; NOT ISA (WD1003) MODE! Be sure that drive types in CMOS are set to "Not Installed" or "None".
3. Create a DOS partition no smaller than 10MB and no larger than 50% of the total available disk space. Make the DOS partition bootable.
4. Copy SERVER.EXE and related NetWare files to the bootable DOS partition.
5. Copy PSIDISK.DSK to the bootable DOS partition.
6. Run SERVER.EXE and enter appropriate Server Name and Local Network Address.
7. Type "LOAD PSIDISK" and accept the defaults or supply appropriate port and interrupt information.

At this point, the primary NetWare hyperDRIVER is loaded. If you are running two controllers, type "LOAD PSIDISK" again and accept the defaults or supply appropriate port and interrupt information. If not, proceed with INSTALL using standard Novell installation procedures. Note that SURFACE ANALYSIS is not required when using a hyperSTORE, but you may perform this step if you wish.

PSIDISK Command-line Parameters

PORT = 1F0 or 170
The PORT parameter selects the address range of the target hyperSTORE controller. The default is 1F0, which selects the primary controller address range. The table below shows the actual addresses occupied for each of the selections:

PORT	easyCACHE Pro and hyperSTORE/1600
1F0	1F0..1F7; 3F0..3F1; 3F6..3F7 + floppy
170	170..177; 370..371; 376..377 + floppy

INT = E, F, 5, or C
The INT parameter selects the interrupt used by the target hyperSTORE.

This selection must match the interrupt jumpers set on the controller. Interrupt E (or 14 decimal) is the default for the primary controller, but any of the four selections may be used.

OS = 310 or 311
The OS parameter tells the driver which version of NetWare/386 it is running on. If omitted, OS defaults to 310 (Version 3.10). If you are running Version 3.11, adding OS=311 to the command line will enable Scatter/Gather operation in the driver, yielding better overall performance. If you are running Version 3.10, DO NOT set OS=311! This will cause data corruption and other errors.

NOTE:
We feel that the requirement of this parameter is somewhat silly, since the driver should be able to "ask" the operating system what version is running. But the folks at Novell chose not to provide a driver function that would return this information, so the OS parameter was the only option we had.

When Running Two Controllers

In order to run two easyCACHE or hyperSTORE controllers in the same fileserver, the second controller must be configured as follows:

a) Disable the floppy controller (remove JB1–1 on the 1600)
b) Disable the SIOS/DTTS (remove JB4 on the 1600)
c) Select the alternate address range (remove JB1–2 on the 1600)
d) Select a DIFFERENT interrupt than the one selected for the primary controller on JB2 on the 1600 (typically use interrupt 15/F)

If Starting with a Running System Working in ISA/WD1003 Mode

Before loading the NetWare hyperDRIVER, you must run the utility and select SSP Block or Sector Mode and set the CMOS drive types to "Not Installed" or "None". This is because the hyperSTORE must start up in SSP mode in order to run the NetWare hyperDRIVER. (Note that Block or Sector mode is not important at this point, since the hyperDRIVER takes over after NetWare is up and running). If you run INSTALL after changing from ISA/WD1003 mode to SSP mode, you will notice additional "free space" in the amount of one logical cylinder. This is not a problem, but simply a manifestation of the difference between how SSP and ISA mode interpret the cylinder count.
If you choose to ignore this extra cylinder, the fileserver can be changed back and forth from ISADISK to PSIDISK operation at any time. If you create new partitions or reconfigure the partitions to use the extra cylinder, it may not be possible to go back to ISADISK operation at a later time.

NOTE: For hyperSTORE/816 Users Only:

Since hyperSTORE/816 controllers do not support a secondary address, only one controller may be used in a system. The installation procedure is identical to that of a hyperSTORE/1600 or eachCACHE/Pro, with the exception of the driver used. The driver "PSI816.DSK" must be used for the hyperSTORE/816!