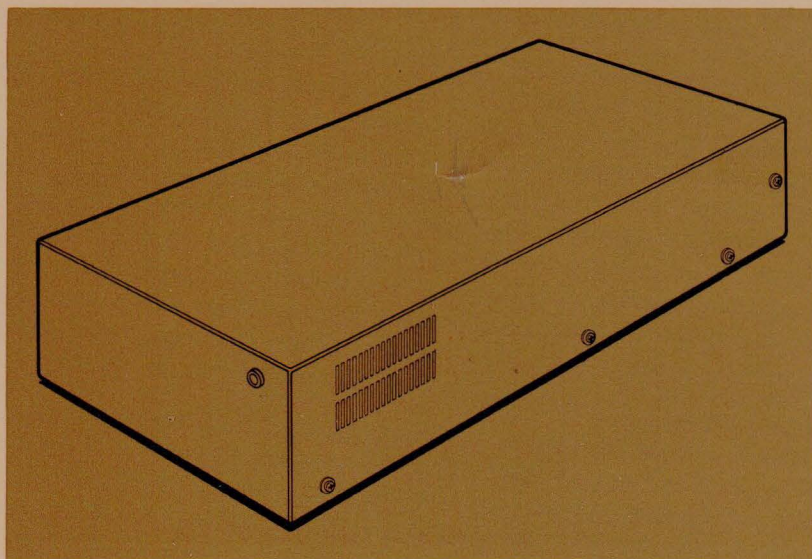




SHTM HARD DISK DRIVE

For the STTM Computer



Owner's Manual

IMPORTANT INFORMATION

Like any electrical appliance, the ATARI SH Hard Disk Drive uses and produces radio-frequency energy. If not installed and operated according to the instructions in this manual, the equipment may cause interference with your radio and TV reception.

If you experience interference while using the equipment, switch it off. If interference stops, the equipment is probably at fault. With the equipment switched on, try to correct the problem with the following measures:

- Adjust the position of the radio or TV antenna.
- Reposition the equipment in relation to the radio or television.
- Move the equipment away from the radio or television.
- Plug the equipment into a different electrical outlet so the equipment and radio or television are connected to separate branch circuits.
- Consult your ATARI dealer or an experienced radio-TV technician for additional suggestions.

A helpful resource is *How to Identify and Resolve Radio-TV Interference Problems*, prepared by the Federal Communications Commission and available from the U.S. Government Printing Office, Washington, DC 20402, Stock No. 004-000-00345-4.

WARNING: This equipment is certified to comply with the limits for a Class B computing device, pursuant to Subpart J of Part 15 of the FCC rules. These rules are designed to provide reasonable protection from interference when the equipment is used in a residential setting. However, there is no guarantee that interference will not occur in a particular home or residence. Only peripherals (computer input/output devices: terminals, printers, etc.) that are certified to comply with the Class B limits should be attached to this computer. Operation of noncertified peripherals with this computer is likely to result in interference with radio and TV reception. Shielded cables should be used on all I/O connectors (except the joystick and mouse connectors); otherwise, radio emissions may exceed Class B limits.

In satisfaction of Federal Communications Regulation 15.838(d), this peripheral includes an ATARI shielded cable to minimize interference with older electronic devices. Use of this device without an ATARI shielded cable or equivalent is prohibited. Replacement cables are available through your ATARI dealer.

NOTE: Every effort has been made to ensure the accuracy of the product documentation in this manual. However, because Atari Corp. is constantly improving and updating its computer hardware and software, it is unable to guarantee the accuracy of printed material after the date of publication and disclaims liability for changes, errors, or omissions.

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SHTM HARD DISK DRIVE

For the STTM Computer

Owner's Manual

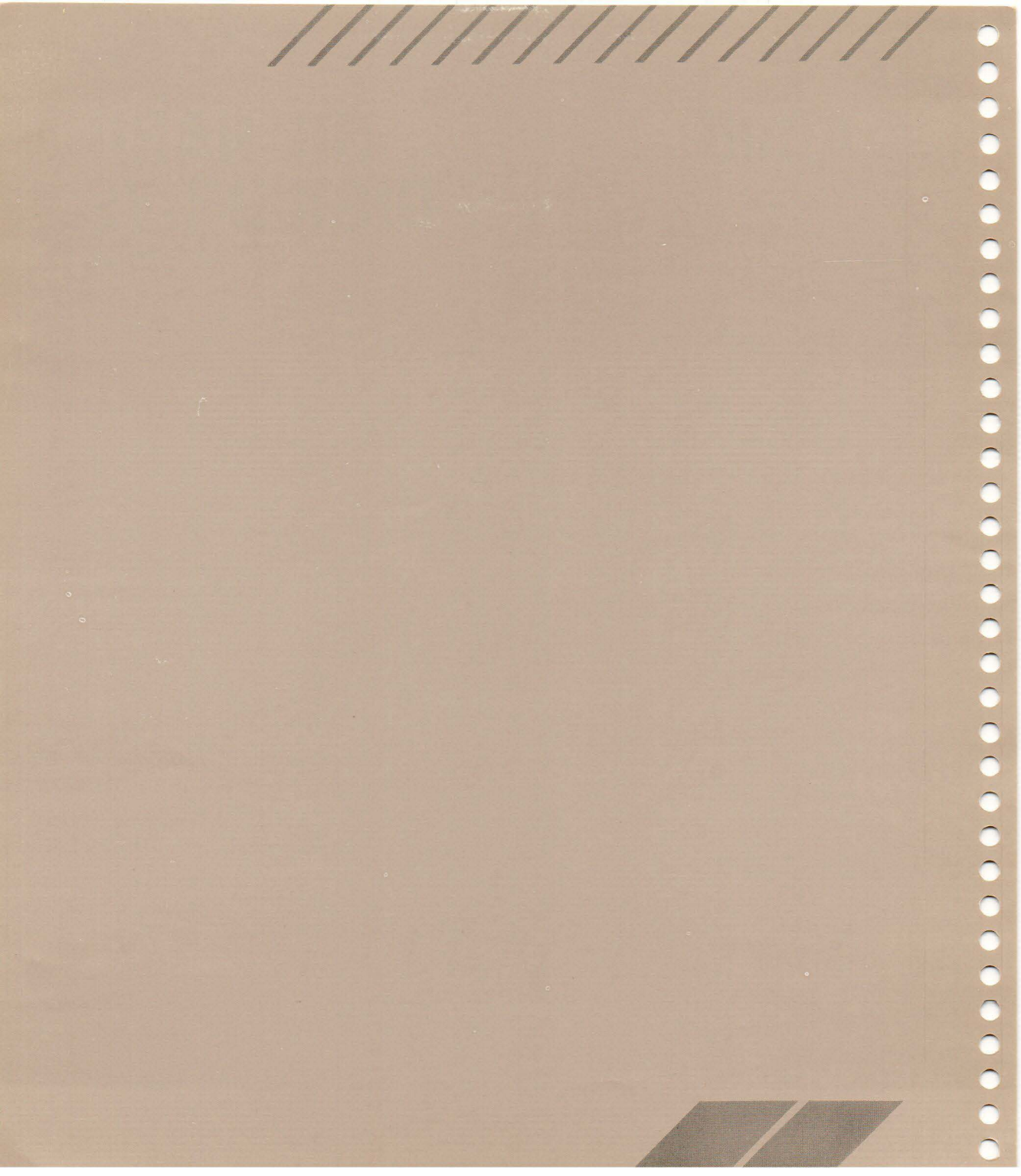


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INTRODUCTION

The ATARI® SH™ Hard Disk Drive consists of a hard disk, controller, interface, and power supply in one box. The hard disk drive lets you take advantage of your ST™ Computer's built-in, high-speed DMA channel (hard disk port), providing high performance at low cost.

USING THE MANUAL

Operating the hard disk drive is not difficult, especially if you learn to use it correctly. This manual is designed to assist you, whether you're a computer novice or seasoned expert. Information in the manual progresses from setting up and working with the drive to troubleshooting and preventive maintenance. Reading the manual thoroughly from beginning to end will help you take full advantage of your hard disk drive's capabilities.

Note: To protect the original SH Boot Disk, it's important to make a backup copy of it before you work with the hard disk drive. (To make a backup copy, see **Chapter 1**.)

The manual's contents are outlined below:

Chapter 1, *Getting Started*, explains how to unpack the hard disk drive, connect it to your computer, and get your system up and running.

Chapter 2, *Working with the Hard Disk Drive*, explains the operations and features of the HDX (Hard Disk) Program, including how to format, partition, zero, and mark bad sectors. The chapter ends with important notes and warnings about the operation of your drive.

Chapter 3, *Addressing Multiple Hard Disk Drives*, tells how to set the addresses of multiple hard disk drives connected to your ST Computer system.

Appendix A, *Troubleshooting and Preventive Maintenance*, lists problems you may encounter while setting up or operating your drive, and offers solutions. The appendix includes helpful hints for proper maintenance of the hard disk drive.

Appendix B, *SH Hard Disk Drive Controller Command Summary*, provides information on command structure, operation codes, status structure, and status error codes for the hard disk drive.



Appendix C, *SH Hard Disk Drive Partitioning*, contains partition information.

Customer Support tells where to find further information about the SH Hard Disk Drive.

The **Index** helps you locate terms and procedures used in this manual.

Paragraphs marked **Warning** or **Note** appear throughout the manual. Warnings alert you to potential problems and suggest ways to avoid them. Notes contain useful hints and information.

CHAPTER 1

GETTING STARTED

UNPACKING THE EQUIPMENT

Carefully lift the SH Hard Disk Drive in its foam packing out of the carton. Remove the packing and plastic bag, and place the drive on a firm, level surface. In the carton you should find these items:

- ATARI SH Hard Disk Drive
- Power Cable
- Interface Cable
- SH Boot Disk
- Owner's Manual
- Warranty Card

Make sure you received all items. If anything is missing, contact your ATARI dealer.

Note: Save all packing materials for shipping and storing your hard disk drive. (See **Running SHIPPRG** in Chapter 2 for important information about safely storing and transporting your drive.)

CONNECTING THE DRIVE TO THE COMPUTER

Like your computer system, your SH Hard Disk Drive is composed of complex electronic and mechanical devices, and should be used in a proper working environment. Avoid places that expose the components to dust, grease, extreme temperatures, or high humidity. An environment suitable for a stereo system or TV set will also suit your hard disk drive. Always arrange the components securely on a firm, level surface. (See **Appendix A** for information on caring for your hard disk drive.)

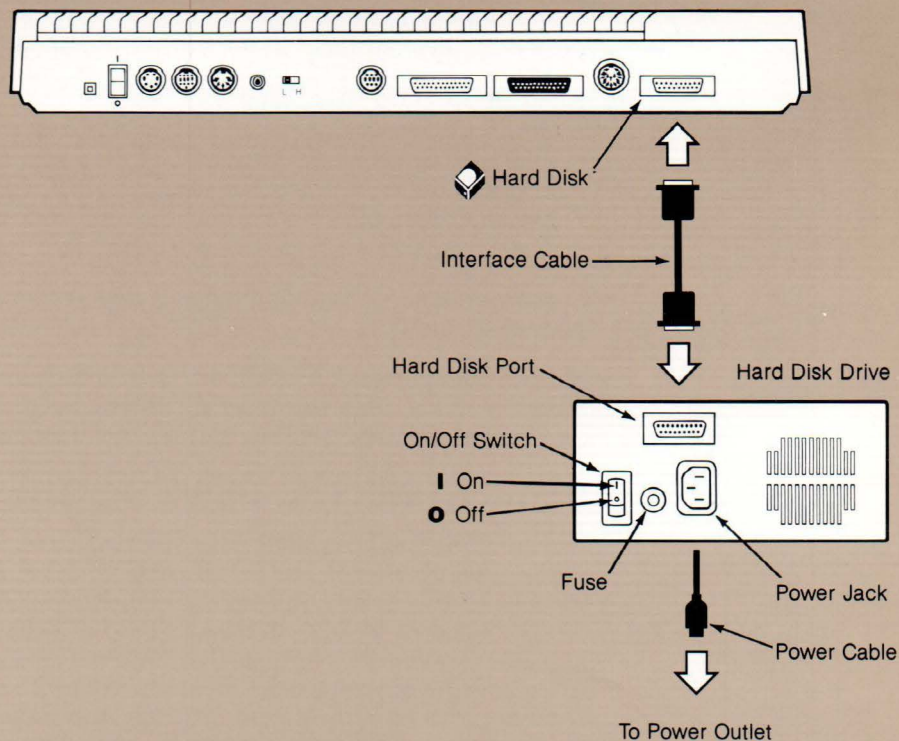
To connect the hard disk drive to your computer, follow these steps:

1. Make sure both the drive and computer are switched off.
2. Plug one end of the drive's interface cable into the port marked "Hard Disk" on the back panel of the computer. Plug the other end into the matching port on the back of the drive.

Note: For technical reasons related to the high speed of data transfer, the drive's interface cable must be no more than 18 inches long. This ensures reliable data transfer between the drive and computer.

3. Plug one end of the power cable into the power jack on the back of the drive. Make sure the drive and computer are both switched off, then plug the power cable's electrical plug into a wall outlet or power strip.

Computer

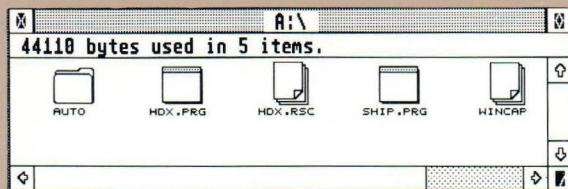


Warning: The side and bottom vents in the drive's housing are part of the drive's internal cooling system. Never obstruct the airflow through these vents by placing the drive on a soft surface, such as a bed or sofa, and never let loose papers slip under the drive's housing.

THE BOOT DISK

What's on the Boot Disk?

The SH Boot Disk contains programs and other data that allow your computer and hard disk drive to work together.



The disk is called a "boot" disk because you must switch on (boot) your system with the disk inserted in Floppy Drive A in order to work with the hard disk drive (see **Booting the Hard Disk Drive** in this chapter). The following summary briefly explains the files contained on the disk.

\AUTO

The \AUTO\ folder contains AHDI.PRG, the SH Hard Disk Drive Interface device driver. During booting, the driver is automatically installed from the boot disk in Floppy Drive A.

HDX.PRG

The HDX Program is used to format, partition, zero, or mark bad sectors of the hard disk drive. Use this utility carefully; make certain you have backed up all valued files.

HDX.RSC

HDX.RSC is a GEM™ resource file used by HDX.PRG.

SHIP.PRG

SHIP.PRG moves the hard disk drive's heads to their safe landing zones for secure shipping, handling, or storage. (See **Running SHIP.PRG** in Chapter 2.)

WINCAP

WINCAP is a text file used by HDX.PRG.

Preparing a Working Boot Disk

Copy the contents of the SH Boot Disk that came with your hard disk drive onto a new, formatted floppy disk. Store the original disk in a safe place and use only the copy when working with your hard disk drive. This will protect the contents of the original disk from damage.

BOOTING THE HARD DISK DRIVE

Once you've connected the hard disk drive and prepared a working boot disk, boot the system by following the steps below.

Warning: If your ST Computer does not have TOS™ in ROM, you cannot use a hard disk drive. (See **Notes and Warnings** in Chapter 2.)

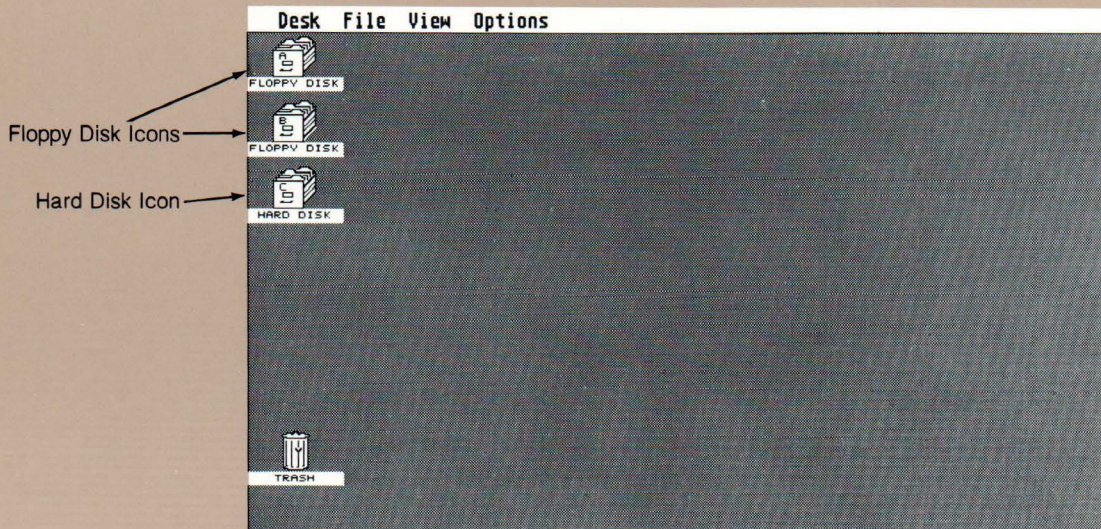
1. Make sure both your drive and computer are switched off.
2. Switch on the drive. You must always switch on the hard disk drive before switching on the computer. You hear the drive whirl as it performs seek operations during its internal initialization and calibration. Finally, after a few last beeps, the drive's busy light goes off. This initialization process should last about 15 seconds.

Note: If the hard disk drive fails to come on, or switches off automatically during operation, you may need to replace the fuse on the drive's back panel. Always use the same type of fuse: 1½ Amp, type 3AG; USA only. If the fuse fails again, have the unit checked at an authorized ATARI Service Center.

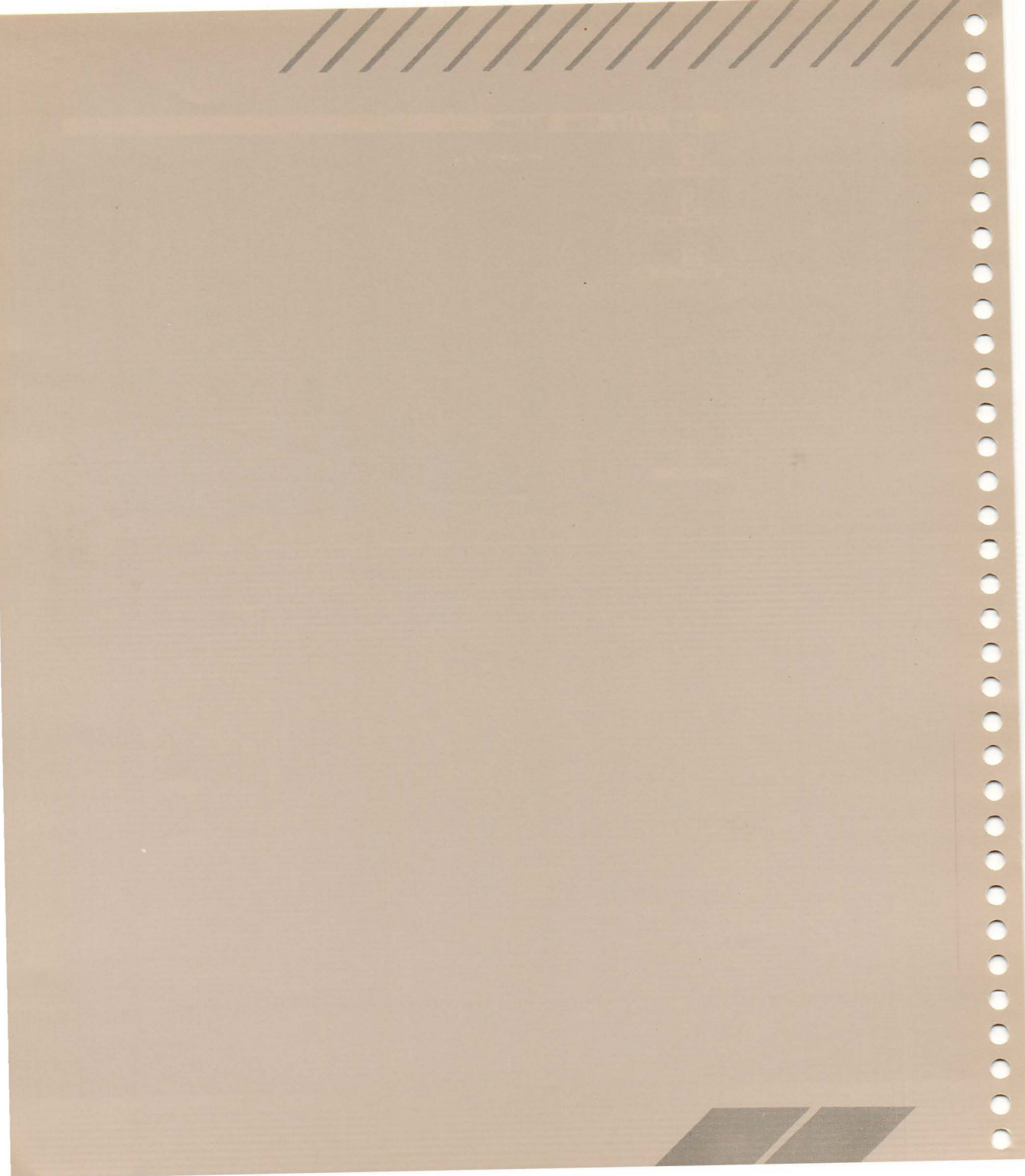
3. Insert the working boot disk into the floppy disk drive connected directly to your computer (Drive A). The SH Boot Disk contains the hard disk driver (AHD1.PRГ) in a folder called \AUTO\.

Note: Your working boot disk need not contain all files you received on the SH Boot Disk. It's only necessary that the \AUTO\ folder be present on the boot floppy and that it contain the file AHD1.PRГ (in addition to any other \AUTO\ files).

4. Switch on your computer. As Floppy Drive A whirls and the ST boots, the hard disk driver loads automatically. When the GEM Desktop appears, it displays the hard disk icon (Drive C) as well as the usual two floppy disk icons.



Note: If the hard disk icon fails to come up on screen, switch all components off. Make sure all cable connections are proper and secure. Then switch the system on again, carefully following the steps above. If the problem persists, see **Appendix A**.



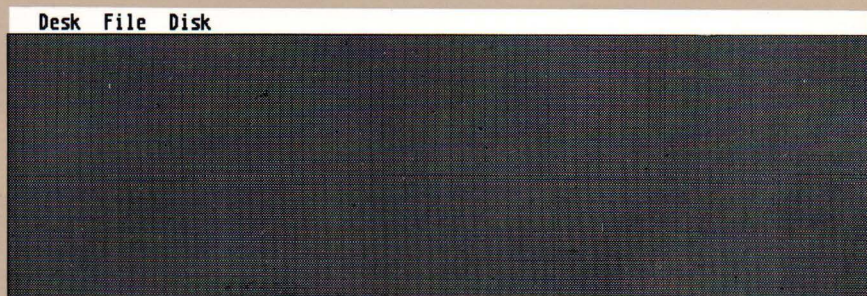
CHAPTER 2

WORKING WITH THE HARD DISK DRIVE

This chapter explains how to format, partition, zero, and mark bad sectors.

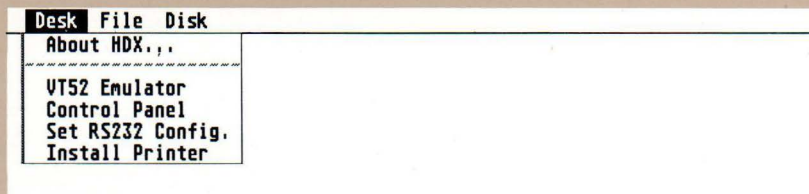
THE HDX PROGRAM

HDX is the utility you use to perform certain operations, such as formatting, on your hard disk drive. Obtain a directory window of your working boot disk, and double-click on (open) the file HDX.PRG. In a moment HDX comes up on screen.



Desk

The Desk Menu contains the About HDX Option.



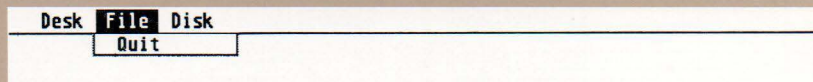
When you select About HDX, a Dialog Box comes up on screen:



Click on OK to exit.

File

The File Menu contains the Quit Option.

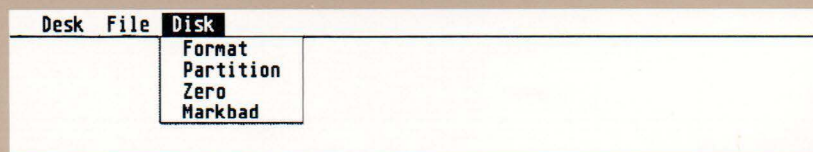


Select Quit to exit the HDX Program and return to the GEM Desktop.

When you select Quit before completing an operation under the Disk Menu, the program simply returns to the GEM Desktop. When you select Quit after completing an operation, the program reboots the system. Rebooting is necessary after using the Disk Menu operations to format, partition, zero, or mark bad sectors. (See **Disk** in this chapter.)

Disk

The Disk Menu contains the Format, Partition, Zero, and Markbad Options.



Format and Partition work on physical units (drives), and affect the entire unit. Zero and Markbad work on logical drives (partitions), affecting only the logical drive you select. (See **Partitioning the Hard Disk** in this chapter.)

RUNNING HDX.PRG

Formatting the Hard Disk

You must format the hard disk before you can use it. To do that, follow these steps:

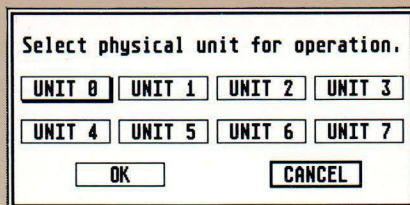
1. Select Format from the Disk Menu. An Alert Message immediately comes up on screen:



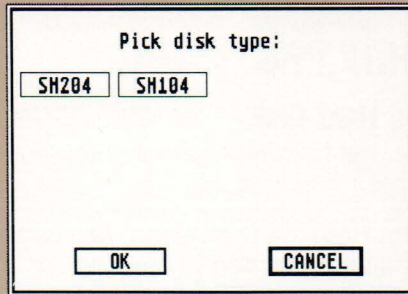
Note: If you are reformatting the hard disk, be certain you have backed up all valuable files before proceeding.

Click on OK.

2. Select a physical unit to format. (Only shadowed physical units are available for formatting.) Click on OK.

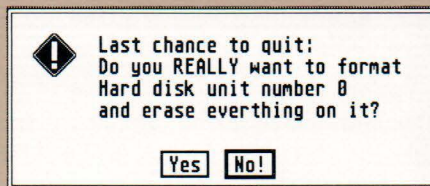


3. Select the disk type. Click on the box showing your hard disk drive's model number, then click on OK.



Note: The first two numbers following "SH" in the hard disk's model number refer to the total number of Mbytes of storage capacity for that hard disk. For instance, "20" in model number SH204 indicates a 20-Mbyte hard disk.

4. The program asks once more if you're certain you want to format the selected drive. Click on Yes to format the drive.



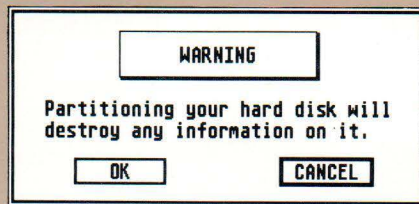
Note: When you are using the SH204 Hard Disk Drive, the format routine automatically partitions it into three logical drives of four, six, and ten Mbytes, respectively. (For more information, refer to **Partitioning the Hard Disk and Installing Logical Drives** in this chapter.) If this partitioning scheme is acceptable, you can quit HDX after formatting, provided you do not want to zero or mark bad sectors.

Partitioning the Hard Disk

To partition your hard disk means to divide it into separate logical disks (parts). You can partition a hard disk into a maximum of four discrete logical disks. The system then treats your hard disk as four distinct storage devices. This feature is useful for dedicating the parts of a partitioned disk to distinct tasks (such as storing word-processed files, storing programs, etc.).

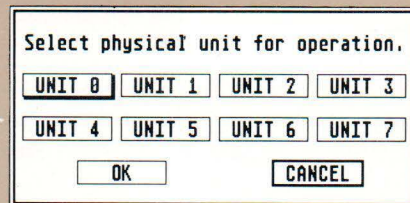
To partition a hard disk, follow these steps:

1. Select Partition from the Disk Menu. An Alert Message immediately comes up on screen:



Be sure you have backed up all valuable files on your hard disk before proceeding. Then click on OK.

2. Select a physical unit to partition. (Only shadowed physical units are available for partitioning.) Click on OK.



3. The Edit Partition Parameters Box comes up on screen. Use this box to design your own partitioning scheme, or click on Menu to move on to the Pick Partition Scheme Menu, which provides preselected partitioning schemes. No partition may be greater than 16 Mbytes. Once you've selected partition parameters, click on OK.

Edit partition parameters

4.3Mb	↓	↑	Left: 0Mb
6Mb	↓	↑	
10Mb	↓	↑	
Unused	↓	↑	OK
Menu	Undo	CANCEL	

Pick partition scheme:

4-6-10	10-10	16-4	4-16
5-5-10	5-10-5	10-5-5	5-5-5-5
10	5-5		
OK	CANCEL	Edit	

4. The program asks once more if you're certain you want to partition the selected physical unit. Click on Yes to partition.

 **Last chance to quit:
Do you REALLY want to
partition unit 0 and
erase everything on it?**

Installing Logical Drives

In order to access any logical drive (partition) other than the first, you must install the drives from the GEM Desktop. If you don't, you'll only be able to use Drive C, the first partition.

To install a logical drive, select the Drive C icon, then move up to the Options Menu on the GEM Desktop and select Install Disk Drive. When the Install Disk Drive Box appears, change the Drive Identifier to D. Click on the Install Box to install the logical drive. The Drive D icon then appears on the desktop.

Repeat the installing procedure for each partition, identifying the logical drives in alphabetical order: the third partition becomes Drive E: the fourth becomes Drive F. **Do not skip a letter.** If you have more than one hard disk drive, continue in the same way, installing Drives G, H, etc.

After you install all partitions, save the desktop with those logical drives installed. To do that, select Save Desktop from the Options Menu. The desktop will be saved to Drive C.

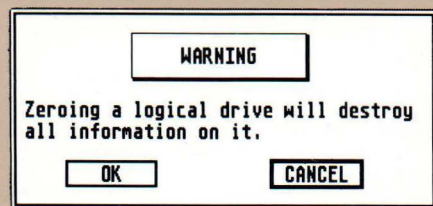
Note: It is not necessary to have all drives installed on your desktop all the time. For example, you might keep infrequently used programs or data in a partition that you install only when needed.

Zeroing Logical Drives

To zero a logical drive means to erase all files in its directory. The Zero Option lets you erase the entire contents of a partition in one step, without reformatting the hard disk.

To zero a logical drive, follow these steps:

1. Select Zero from the Disk Menu. An Alert Message immediately comes up on screen:



Be sure you have backed up all valuable files on the logical drive before proceeding. Then click on OK.

2. Select the partition you want to zero. (Only logical drives in darkened type are available for zeroing.) Click on OK.

Select logical unit for operation

C:	D:	E:	F:
G:	H:	I:	J:
K:	L:	M:	N:
O:	P:		

OK CANCEL

3. The program asks once more if you're certain you want to zero the selected logical drive. Click on Yes to zero the unit.

 Last chance to quit:
Do you REALLY want to zero
drive C: and erase everything
on it?

Yes NO!

Marking Bad Sectors in a Logical Drive

To mark bad sectors in a logical drive means to mark as unusable all unreadable or unwritable sectors within the partition. The Markbad Option lets you do this. After exhausting other troubleshooting techniques (such as checking cable connections), use the Markbad Option if your computer returns frequent disk error messages when accessing files on the hard disk.

To mark all bad sectors in a logical drive, follow these steps:

1. Select Markbad from the Disk Menu. Be sure you have backed up all valuable files on the logical drive before proceeding. Then click on OK.
2. Select a partition in which to mark bad sectors. (Only logical drives in darkened type are available for Markbad.) Click on OK.

Select logical unit for operation

C:	D:	E:	F:
G:	H:	I:	J:
K:	L:	M:	N:
O:	P:		

OK CANCEL

3. The program asks once more if you're certain you want to mark the selected logical drive. Click on Yes to mark all bad sectors in the unit.

 Markbad may destroy files on C: -- are you sure you want to risk it?

Yes NO!

RUNNING SHIP.PRG

SHIP.PRG moves the disk drive heads to their safe landing zones for secure shipping and handling. The program must be run from a floppy disk, with no directory windows open on any hard disk drive. Immediately after running the program, you should switch off your hard disk drive(s).

BACKING UP

As with any data storage device, it's important that you frequently back up data on the hard disk drive. Regularly copy important files onto floppy disks and store them in a safe place. Otherwise, an errant program, a slip of the fingers, or an electronic transient might destroy days of work which could have been easily and quickly backed up.

NOTES AND WARNINGS

The following information gives important hints and precautions for using your hard disk drive successfully.

1. Use a hard disk drive only if you have TOS in ROM. (Do not use the hard disk drive with a disk-based TOS.) If you do not have TOS in ROM, contact your ATARI dealer or ATARI Customer Relations (see **Customer Support**).
2. When the GEM Desktop performs its initialization, it checks to see if a hard disk drive is active in the system. If so, the program loads the Desk Accessories (if present) from Drive C's main directory. If the Desk Accessories are on the boot floppy disk, the program loads them from that disk after first checking the hard disk.
3. When you select the Save Desktop Option, the DESKTOP.INF file is written to Drive C (if present). If you subsequently boot your system with a DESKTOP.INF file on floppy disk, the information in that floppy disk file will be ignored.
4. Never have more than 40 directories or subdirectories in total among all mass storage devices connected to your ST.Computer. Count each main directory (floppy drive, hard disk partition, cartridge) and each folder as one directory.
5. The GEM Desktop can report a maximum of 400 items, total, within all open directory windows. More items may be present on disk, but they will not be reported on screen.
6. A hard disk drive's main directory can hold a maximum of 256 items.
7. Do not install more than 14 hard disk icons on the desktop.
8. At least one partition must be larger than zero Mbytes.
9. You cannot copy one partition to another using the disk-to-disk copy utility from the GEM Desktop. For example, you cannot copy Drive C to Drive D (assuming Drive C and Drive D are partitions within the same physical unit). You can, however, copy a file or files from one partition to another.

CHAPTER 3 ADDRESSING MULTIPLE HARD DISK DRIVES

Your ST Computer is capable of accessing up to eight hard disk drives. To do that, additional hardware and software are required. In anticipation of their availability, this chapter tells you how to set the addresses of multiple hard disk drives.

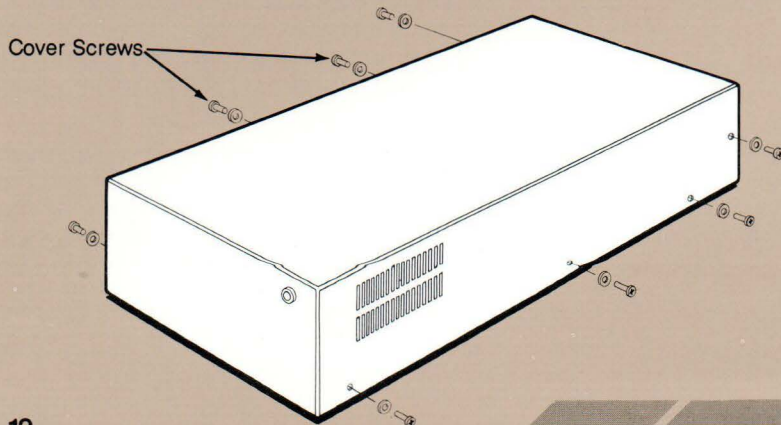
SETTING THE DIP SWITCHES

In order to tell the system that it is connected to multiple hard disk drives, as well as how many, you must set the DIP switches inside the drives. (DIP stands for "dual in-line package.") Each hard disk drive in your system must have a unique address (0 to 7), determined by the drive's DIP switch setting. Hard disk addresses correspond to physical unit numbers in the format and partition routines run from HDX.

Use the following steps to set the DIP switches.

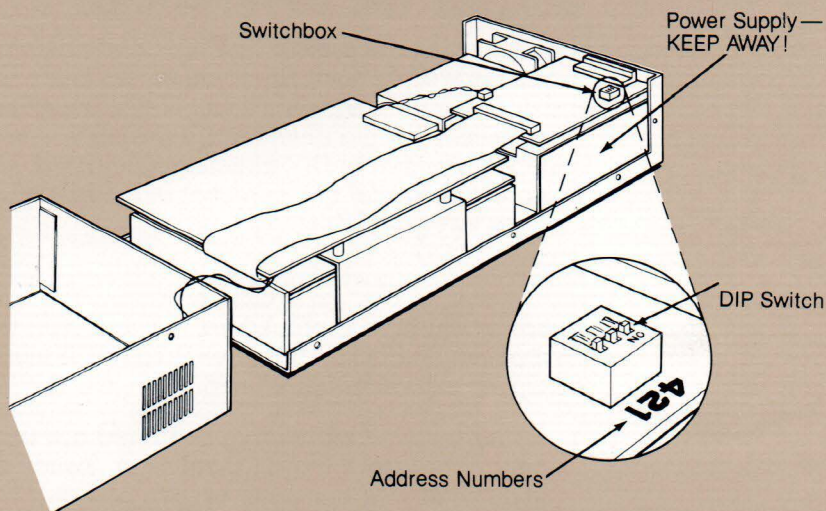
Warning: During the procedure, it is essential that your system's environment be clean, dust-free, and dry. It must not be wet, humid, or extremely hot or cold.

1. **Be sure your hard disk is switched off, unplugged, and disconnected from the ST Computer.** Switch off all other components in your computer system as well.
2. With a phillips screwdriver, unscrew and remove the eight cover screws (four on each side) of the hard disk drive's housing.



Warning: While its internal components are exposed, keep all foreign objects (tools, etc.) outside the unit. Keep your fingers and hands away from the drive's internal power supply.

3. Remove the cover by raising its back end up and towards the front of the drive. Lay the cover beside the unit.
4. Inside the drive, find a small printed circuit board (PCB) towards the back of the unit. The DIP switches are housed in a small switchbox on this board. The switchbox should be plainly visible.



5. The switchbox contains three tabs; these are the DIP switches. A DIP switch has two possible states: ON and OFF. All switches are initially set to the ON position. To turn a switch OFF, move the tab to the OFF position using the tip of a pencil or ballpoint pen.
6. The numbers "4 2 1" are printed on the board along one side of the switchbox. Each number is assigned to a DIP switch. These numbers combine to determine the hard disk drive's address. **Disregard any numbers on the switchbox itself. The important numbers are "4 2 1" as printed on the PCB.**

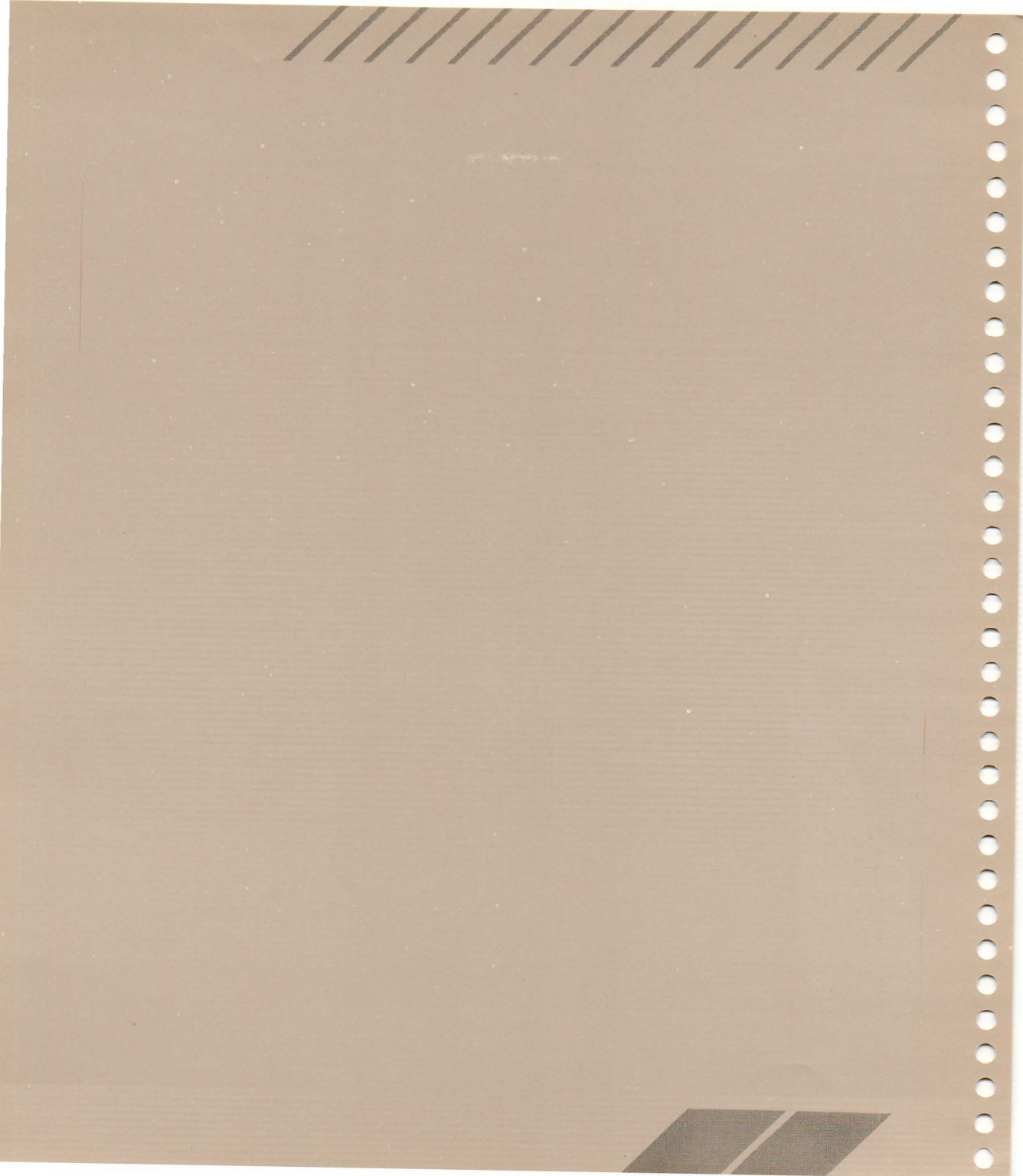
The following table gives all possible DIP switch settings and the addresses returned. Add together the assigned numbers of switches in the OFF position for a given drive's address.

Unit Address	SW4	SW2	SW1
0	ON	ON	ON
1	ON	ON	OFF
2	ON	OFF	ON
3	ON	OFF	OFF
4	OFF	ON	ON
5	OFF	ON	OFF
6	OFF	OFF	ON
7	OFF	OFF	OFF

If you have two hard disk drives, leave one as originally set (Unit 0) and address the other as Unit 1 (move SW1 to the OFF position, leave SW2 and SW4 ON). Always address multiple hard disk drives in ascending numerical order. **Do not skip a number.** After formatting and partitioning the drive(s), remember to install each logical drive from the GEM Desktop.

7. Replace the cover and cover screws.

Warning: If you perform any operation or modification to the inside of your hard disk drive other than setting the DIP switches, Atari Corp. reserves the right to disclaim warranty liability for your SH Hard Disk Drive or any other adversely affected component in your system.



APPENDIX A TROUBLESHOOTING AND PREVENTIVE MAINTENANCE

TROUBLESHOOTING

If you run into problems while connecting or operating your SH Hard Disk Drive, chances are the difficulty is a minor hitch that you can take care of easily. This appendix describes possible problems and suggests solutions.

It Just Won't Work

Sometimes the drive just won't work. If your drive doesn't respond—for instance, it won't come on, or the desktop doesn't display a hard disk icon(s)—try the following steps:

1. Switch off all parts of your ST Computer system. Make sure all cable connections are correct and secure.
2. Switch the hard disk drive on. Be sure the drive's internal fan and busy light come on. If they don't, tighten the fuse on the back panel of the drive (or, if necessary, replace it using a 1½ Amp, type 3AG fuse, USA only). After switching it on, allow the drive at least 15 seconds to initialize before switching on the computer.
3. Make sure you have a working boot disk inserted in Drive A, then switch on the system components in the order described in **Chapter 1**. Always switch on the computer last.

Software Problems

If you still have difficulty getting the system up and running consistently, it may be that your working boot disk contains garbled data. Try booting your system with the original SH Boot Disk. If this works, make a new copy of the boot disk and use it as your working boot disk.

If running a particular applications program causes problems, it may be that the program has not been designed for use with a hard disk drive. Contact the program's manufacturer for confirmation and possibly a program update.

A Final Note

Your ATARI SH Hard Disk Drive is designed for low maintenance and high reliability. Like anything electronic and mechanical, however, a hard disk drive can break down. If you experience serious problems, take your drive to an authorized ATARI Service Center. For the location of the nearest Atari Service Center, contact your ATARI dealer or write to ATARI Customer Relations, P.O. Box 61657, Sunnyvale, CA 94088. Write "Service Center Information" on the envelope.

PREVENTIVE MAINTENANCE

To ensure top performance from both your SH Hard Disk Drive and your entire ST Computer system, follow these guidelines:

- Avoid dusty or greasy work areas.
- Avoid smoking near your computer system.
- Keep all components away from extreme heat or moisture.
- Keep liquids away from the components.
- Clean the outside of the components with a soft, slightly damp, lint-free cloth only. Do not use cleansers, abrasives, or solvents.
- Keep all components out of direct sunlight.
- Always have your system securely placed on a firm, level surface.
- Do not move the components more than necessary.
- Do not switch the hard disk drive off while it is busy.
- After switching the drive off, wait at least two seconds before you switch it on again.
- To ship or store your drive, run SHIP.PRГ, switch the system off, and repack the drive in the original packing materials (see Running SHIP.PRГ in Chapter 2).

APPENDIX B

SH HARD DISK DRIVE CONTROLLER

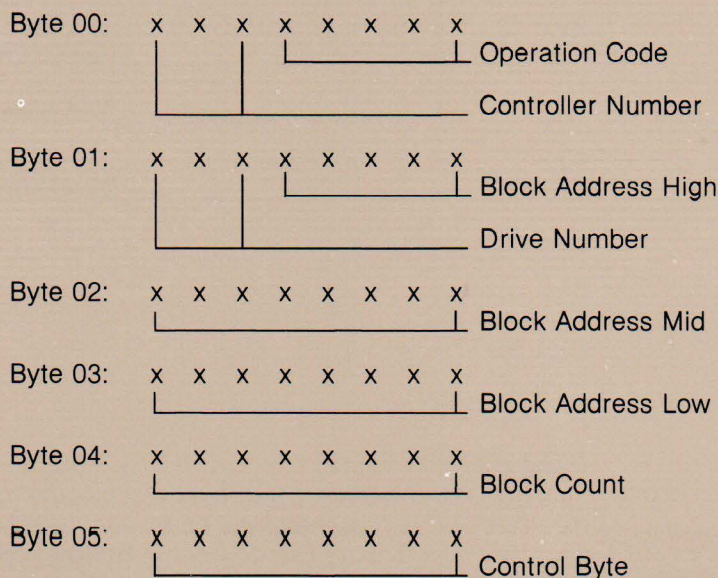
COMMAND SUMMARY

The ATARI Hard Disk Controller consists of an ATARI Hard Disk Interface host adapter and an intelligent Small Computer Systems Interface (ANSI X3T9.2 SCSI) ST506/412 hard disk controller. Bus communication is achieved via a defined host-initiated dialog sequence made up of a Command Phase, either a Data Out (write) Phase, a Data In (read) Phase, or neither, and a Status Phase. Data transfers are asynchronous and follow a Data Request/Acknowledge handshake protocol, with one byte of data transferred during each handshake.

COMMAND STRUCTURE

Commands are dispatched to the hard disk controller via a six-byte Command Descriptor Block, shown below.

Note: A delay is required between consecutive Command Descriptor Blocks to allow time for the controller to respond.



COMMAND OPERATION CODES

The Atari Hard Disk Interface command set contains the following hard disk operations.

Note: All unused Command Descriptor Block fields are assumed to be zero-checked by the controller.

OpCode	Command
0x00	Test Drive Ready
0x03	Request Sense
0x04	Format Drive
0x08	Read (seek implicit)
0x0a	Write (seek implicit)
0x0b	Seek
0x15	Mode Select

0x00 (Test Drive Ready)

This command returns zero status if the requested drive is powered on and ready. If the drive is not ready, the Check Condition bit is set in the Completion Status Byte.

Byte 00: x x x 0 0 0 0 0 Test Drive Ready OpCode

|-----|

Controller Number

Byte 01: x x x - - - - - Drive Number

|-----|

Byte 02: - - - - - - - -

Byte 03: - - - - - - - -

Byte 04: - - - - - - - -

Byte 05: - - - - - - - -

0x03 (Request Sense)

This command returns a four-byte block containing the status error code associated with the immediately preceding drive operation (see **Status Structure** and **Status Error Codes**).

Byte 00: x x x 0 0 0 1 1
 Request Sense OpCode
 Controller Number

Byte 01: x x x - - - - -
 Drive Number

Byte 02: - - - - -

Byte 03: - - - - -

Byte 04: 0 0 0 0 0 1 0 0

Byte 05: - - - - -

0x04 (Format Drive)

The controller writes from index to index all ID and data fields with a block size as specified by an immediately previous Mode Select command. If no Mode Select command is executed, the previous data block size is used. Data fields are completely written with 0x6c unless the Data Pattern Flag bits are set. The Interleave Factor is equivalent to the number of disk revolutions required to sequentially read one track.

Byte 00: x x x 0 0 1 0 0
 Format Drive OpCode
 Controller Number

Byte 01: x x x - - x x -
 Data Pattern Flag
 Drive Number

Byte 02: x x x x x x x x
 Data Pattern

Byte 03: x x x x x x x x
 Interleave Factor High

Byte 04: x x x x x x x x
 Interleave Factor Low

Byte 05: - - - - -

0x08 (Read)

This command transfers to the host the specified number of blocks starting at the specified logical starting block address.

Byte 00: x x x 0 1 0 0 0

Read OpCode

Controller Number

Byte 01:

x	x	x	x	x	x	x	x
---	---	---	---	---	---	---	---

Block Address High
Drive Number

Byte 02: x x x x x x x x
 └──────────────────┘ Block Address Mid

Byte 03: x x x x x x x x

Block Address Low

Byte 04: x x x x x x x x
 └──────────────────┘ Block Count

Byte 05: - - - - - - - -

0x0a (Write)

This command transfers to the drive the specified number of blocks starting at the specified logical starting block address.

Byte 00: x x x 0 1 0 1 0

Write OpCode

Controller Number

Byte 01: x x x x x x x x

Block Address High

Drive Number

Byte 02: x x x x x x x x

Block Address Mid

Byte 03: x x x x x x x x
|-----| Block Address Low

Byte 04: x x x x x x x x
 | Block Count

Byte 05: - - - - - - - -

0x0b (Seek)

This command causes the selected drive to seek to the specified logical starting block address.

Byte 00: x x x 0 1 0 1 1
 | Seek OpCode
 | Controller Number

Byte 01: x x x x x x x x
 | Block Address High
 | Drive Number

Byte 02: x x x x x x x x
 | Block Address Mid

Byte 03: x x x x x x x x
 | Block Address Low

Byte 04: - - - - - - - -

Byte 05: - - - - - - - -

0x15 (Mode Select)

This command is used by the hard disk controller to specify drive format parameters. It should always precede the Format Drive command. The Landing Zone Position byte specifies the number of cylinders outside the first or last track to be designated as the shipping position of the data head. If the most significant bit is set, then the position is outside the first track; otherwise the position is outside the last track. The Step Pulse Code is defined as 0 for non-buffered seeks at 3 milliseconds, 1 for buffered seeks at 28 microseconds, and 2 for buffered seeks at 12 microseconds.

Byte 00: x x x 1 0 1 0 1
 | Mode Select OpCode
 | Controller Number

Byte 01: x x x - - - - - Drive Number

Byte 02: - - - - -

Byte 03: - - - - -

Byte 04: 0 0 0 1 0 1 1 0 Byte Count (0x16)

Byte 05: - - - - -

Byte 00: - - - - -

Byte 01: - - - - -

Byte 02: - - - - -

Byte 03: 0 0 0 0 1 0 0 0

Byte 00: - - - - -

Byte 01: - - - - -

Byte 02: - - - - -

Byte 03: - - - - -

Byte 04: - - - - -

Byte 05: x x x x x x x x Block Size High

Byte 06: x x x x x x x x Block Size Mid

Byte 07: x x x x x x x x Block Size Low

Byte 00: 0 0 0 0 0 0 0 1

Byte 01: x x x x x x x x Cylinder Count High

Byte 02: x x x x x x x x Cylinder Count Low

Byte 03: x x x x x x x x
 | Data Head Count
 Byte 04: x x x x x x x x
 | Reduced Write Cylinder High
 Byte 05: x x x x x x x x
 | Reduced Write Cylinder Low
 Byte 06: x x x x x x x x
 | Write Precomp Cylinder High
 Byte 07: x x x x x x x x
 | Write Precomp Cylinder Low
 Byte 08: x x x x x x x x
 | Landing Zone Position
 Byte 09: x x x x x x x x
 | Step Pulse Code

STATUS STRUCTURE

The Completion Status Byte is returned following the successful (or unsuccessful) execution of a command. If an error occurs, the Check Condition bit is set. Further information can be obtained by a subsequent Request Sense command. (The Check Condition bit is never set in response to a Request Sense command.)

Byte 00: - - - - - x -
 | Check Condition

STATUS ERROR CODES

The following status block is returned by the Request Sense command:

Byte 00: - x x x x x x x
 | Error Code
 Byte 01: - - - - - - -
 Byte 02: - - - - - - -
 Byte 03: - - - - - - -

Drive	0x00	NO ERROR
	0x01	NO INDEX
	0x02	NO SEEK COMPLETE
	0x03	WRITE FAULT
	0x04	DRIVE NOT READY
	0x06	NO TRACK ZERO
Controller	0x10	ID ECC ERROR
	0x11	UNCORRECTABLE DATA ERROR
	0x12	ID ADDRESS MARK NOT FOUND
	0x13	DATA ADDRESS MARK NOT FOUND
	0x14	RECORD NOT FOUND
	0x15	SEEK ERROR
	0x18	DATA CHECK IN NO ECC MODE
	0x19	DATA ECC ERROR
	0x1c	BAD FORMAT
Command	0x1d	SELF TEST FAILED
	0x20	INVALID OPERATION CODE
	0x21	INVALID BLOCK ADDRESS
	0x23	INVALID FINAL ADDRESS
	0x24	INVALID ARGUMENT
	0x25	INVALID DEVICE NUMBER

APPENDIX C

SH HARD DISK DRIVE PARTITIONING

The ATARI Hard Disk Drive can be subdivided into up to four "logical" hard disks. Sector 0 of the hard disk contains information about where the logical disks, or partitions, are stored on the physical disk.

LOGICAL SECTOR 0

Offset	Size	Name
0x1b6	word	hi__cc
0x1b8	byte	hi__dhc
0x1b9	byte	(unused)
0x1ba	word	hi__rwcc
0x1bc	word	hi__wpc
0x1be	byte	hi__lz
0x1bf	byte	hi__rt
0x1c0	byte	hi__in
0x1c1	byte	hi__spt
0x1c2	long	hd__size
0x1c6	byte	p0__flag
0x1c7	3 bytes	p0__id
0x1ca	long	p0__start
0x1ce	long	p0__size
0x1d2	byte	p1__flag
0x1d3	3 bytes	p1__id
0x1d6	long	p1__start
0x1da	long	p1__size
0x1de	byte	p2__flag
0x1df	3 bytes	p2__id
0x1e2	long	p2__start
0x1e6	long	p2__size
0x1ea	byte	p3__flag
0x1eb	3 bytes	p3__id
0x1ee	long	p3__start
0x1f2	long	p3__size
0x1f6	long	bsl__start
0x1fa	long	bsl__count
0x1fe	word	(reserved for checksum)

Format Information

hi__cc is the number of cylinders on the drive.

hi__dhc is the number of heads on the drive.

hi__rwcc specifies the reduced write current cylinder.

hi__wpc specifies the write-precompensation cylinder.

hi__lz specifies the landing zone.

hi__rt is the seek rate code.

hi__in is the interleave factor.

hi__spt is the number of sectors per track.

Partition Information

A disk may contain up to four partitions. Each partition is described by a 12-byte structure. (In the following discussion, "X" may be 0, 1, 2 or 3):

pX__flag (a byte) should be nonzero to indicate that the partition is valid. The hard disk boot code will boot the first partition that has bit 7 set in this byte.

pX__id is a three-byte field that identifies the partition. For GEMDOS partitions this field must contain the ASCII characters, G, E, and M.

pX__start specifies the logical sector number of the beginning of the partition. This is the partition's bootsector.

pX__size specifies the size of the partition, in sectors.

hd__size indicates the size of the disk in physical sectors.

bsl__start specifies the starting sector number of the bad sector list.

bsl__count indicates the number of bad sector entries in the list; if **bsl__count** is zero, there are no bad sector entries. Each bad sector is specified by a longword, in 68000 format, containing the sector's number. The bad sector list is contained in a contiguous set of **bsl__count**/128 sectors, starting at sector **bsl__start**. The list will typically be located near the end of the media.

CUSTOMER SUPPORT

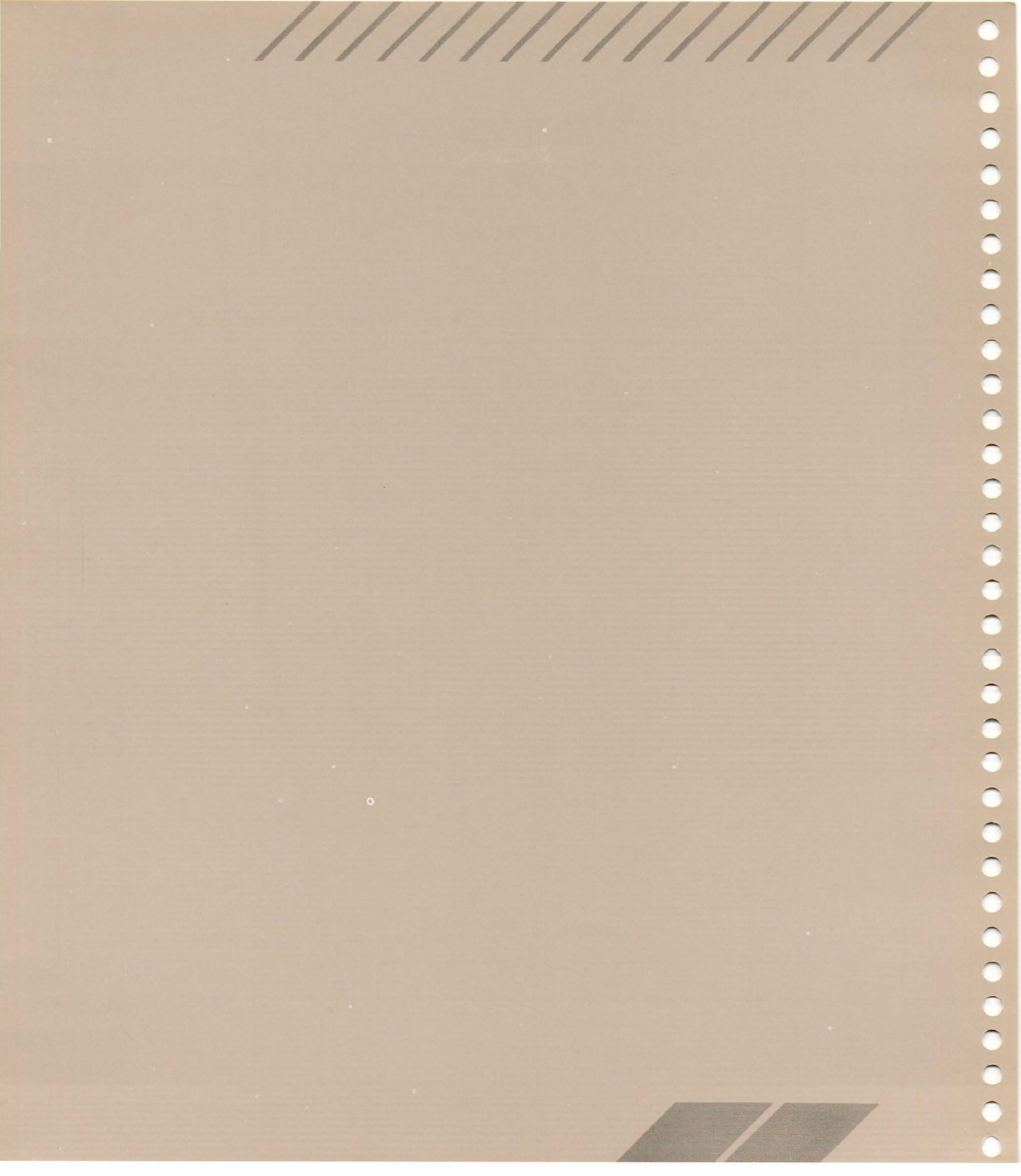
Atari Corp. welcomes questions about your SH Hard Disk Drive or any other ATARI Computer product. Write to:

ATARI Customer Relations
P.O. Box 61657
Sunnyvale, CA 94088

Please write the subject of your letter on the outside of the envelope.

Your local ATARI User Groups are outstanding sources of information on using ATARI Computer products. To obtain a list of User Groups in your area, send a self-addressed stamped envelope to:

ATARI User Group List
P.O. Box 61657
Sunnyvale, CA 94088



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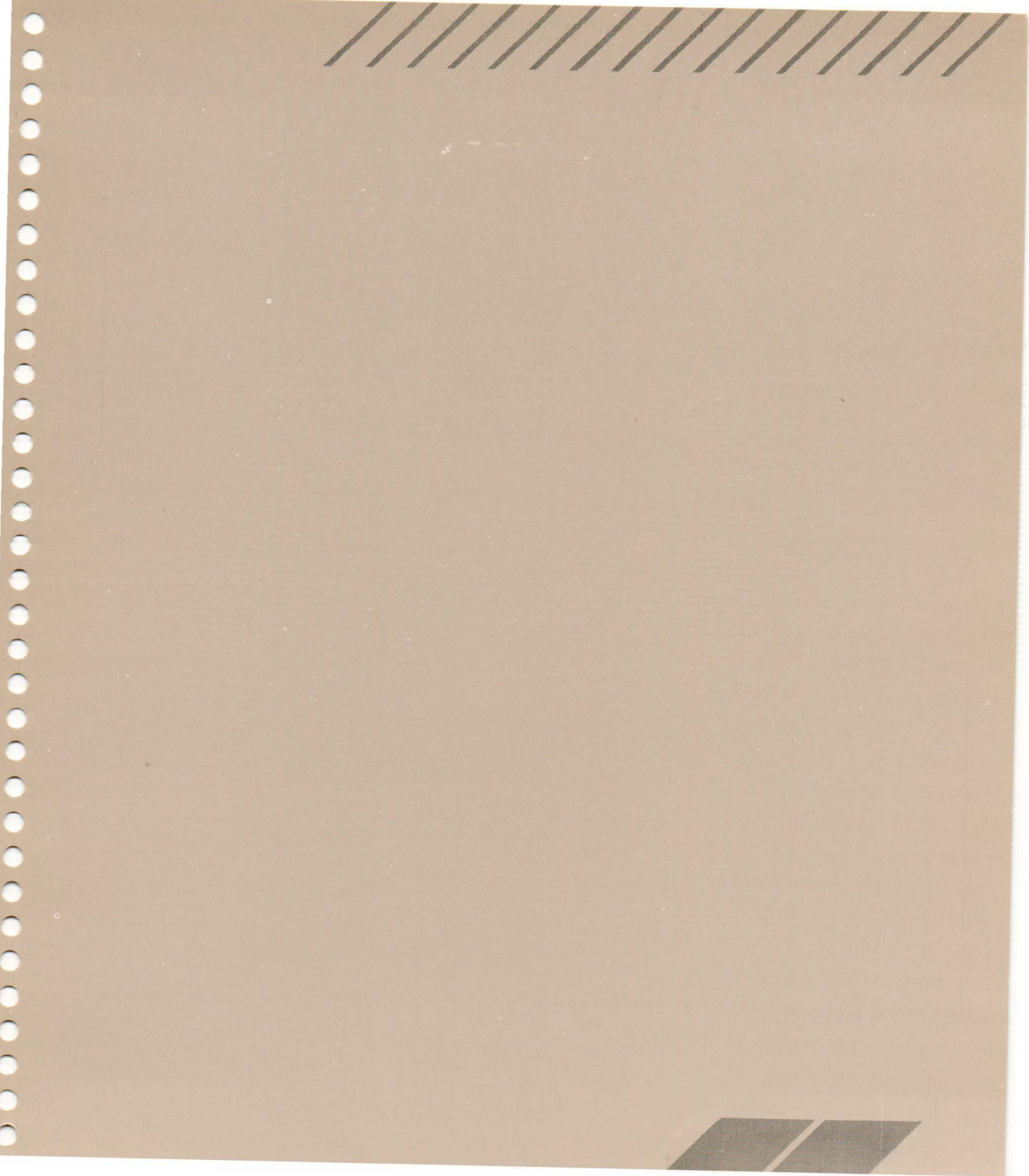
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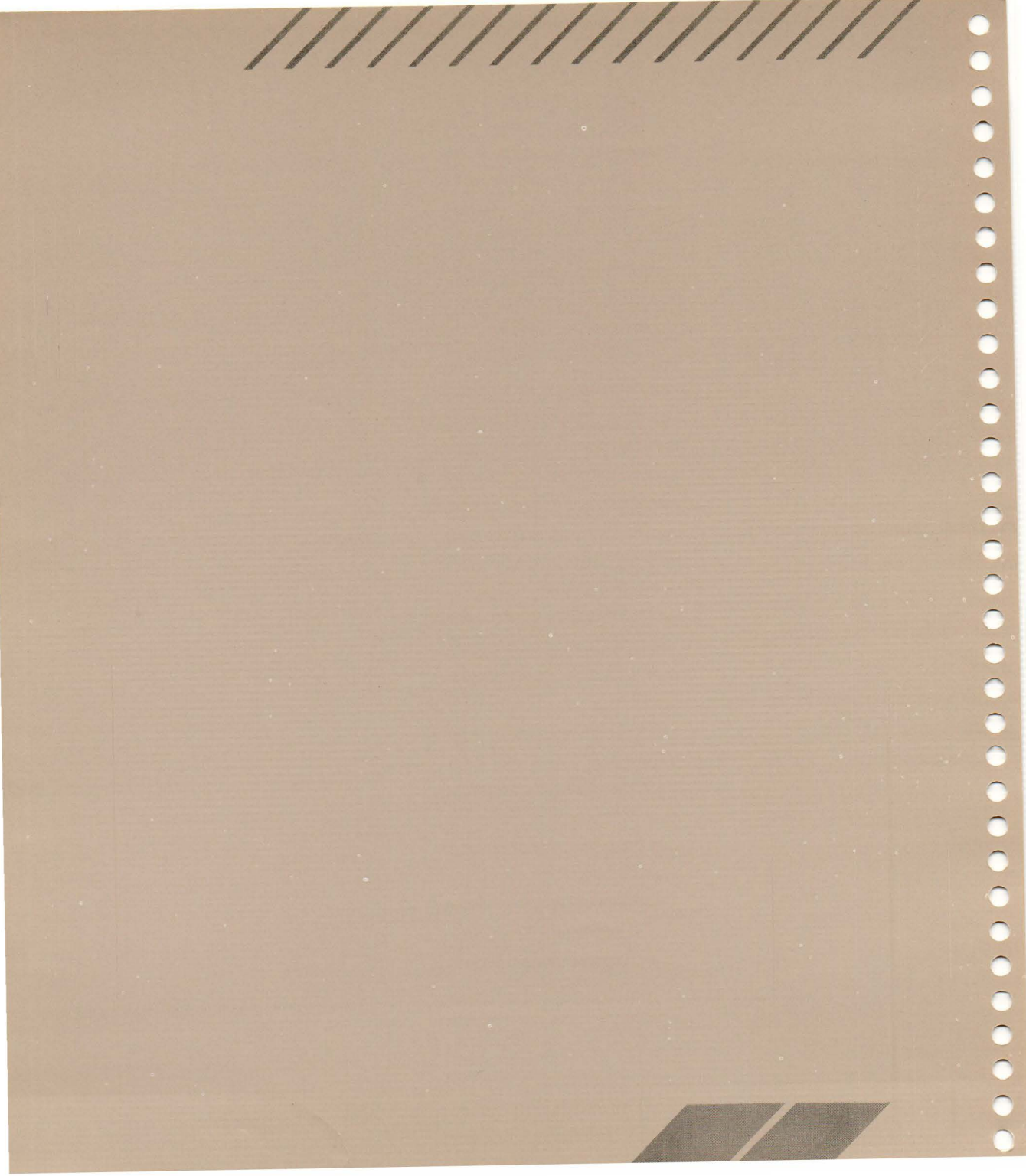
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