

ALLOS COMPUTER SYSTEMS
ACS 8000-12 OR AN ACS 8000-14
COMPUTER SYSTEM
USER MANUAL

C A U T I O N

Altos Equipment, when installed as defined within this manual, is intended for use as a Class A computing device subject to FCC Rules, Part 15, Subpart J. The equipment is used under temporary permit while awaiting completion of testing for compliance with FCC Rules. These Rules ensure reasonable protection from radio emissions that can interfere with normal reception by radio communications devices. Should any interference occur, the user of this equipment will be required to take corrective measures at his own expense.

P R E F A C E

This manual is divided into two parts.

Part One presents hardware installation procedures and diagnostics tests and utilities. The diagnostic tests should be run whenever the ALTOS ACS 8000-12 or an ACS 8000-14 system is set up or reconfigured.

Part Two presents hardware specifications and circuit schematics for the ALTOS 8500 CPU, the Hard Disk Controller Board, the Tape Controller Board, and the I/O Port Assignments. This section does not normally need to be consulted during initial system set up.

The Table of Contents for Part Two repeats starting after Part One, page 2-35.

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SCHEMATICS

8500 CPU PCB SCHEMATICS

8" HARD DISK CONTROLLER SCHEMATICS

XENTEK 6055 POWER SUPPLY SCHEMATICS

REAR PANEL I/O PCB SCHEMATIC

QUANTUM SCHEMATICS

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ALTOS COMPUTER SYSTEMS

ACS8000-12, ACS800-14

COMPUTER SYSTEMS

USER'S MANUAL

1. INTRODUCTION.

The ALTOS ACS8000-12, (Figure 1-1) is a multi-user computer system in a single-chassis unit. It is equipped with a Qume 20-Mbyte eight-inch hard disk drive and a single eight-inch floppy disk drive. It operates under the CP/M*, MP/M*, or the OASIS** operating system.

The ALTOS ACS8000-14 has the same features as the ACS8000-12, except that it is equipped with a Qume 40-Mbyte hard disk drive.

Your computer fits any standard 19-inch rack mount. The physical dimensions of the computer Systems are given below:

System	Width (inches)	Length (inches)	Height (inches)	Weight (pounds) (installed)
ACS8000-12	19	22	7	80
ACS8000-14	19	22	7	80

ALTOS recommends the following manuals for user information:

- a. CP/M User's Guide by Digital Research, Inc.
- b. MP/M User's Guide by Digital Research, Inc.
- c. OASIS System Reference Manual by Phase One, Inc.

*CP/M and MP/M are trade marks of Digital Research, Inc

**OASIS is a trade mark of Phase One, Inc.

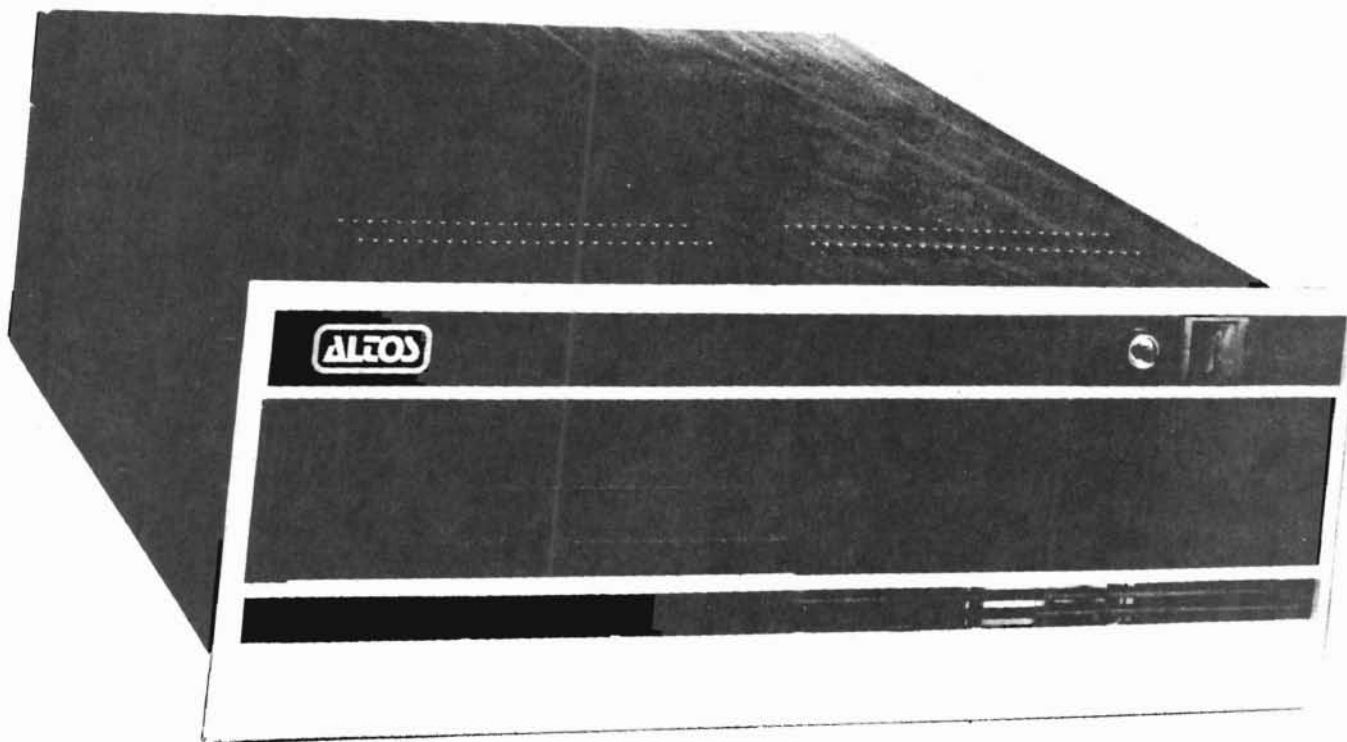


Figure 1-1.

ALTOS ACS 8000-12 -14 Computer System

1.1 Unpacking and Installing your Computer.

Included with your Computer are the following items:

- o Three-pronged power cord, #230-10223
- o Fuse
 - 3A for 115-Volt System, #140-10732
 - 1.5A for 230-Volt System, #140-10731
- o Floppy Diskette Containing the current ADX Version

1.1.1 Unpacking Your Computer.

When unpacking your Computer, be sure not to use any sharp or pointed instruments as these may pierce the protective covering and scratch the finish on the system. **Save** the packing box as you may need it for shipping in the future. Be sure that the ventilation ports are unobstructed. Follow the procedure below when setting up your computer.

- a. After removing the system from its shipping container, store those containers in a safe place should it be necessary to move the system in the future. Make note of the method used to pack the system.
- b. Carefully turn the unit over so that the top is face down on a non-abrasive work surface.
- c. Remove the four (4) screws that hold the rubber feet in place. This allows removal of the bottom cover plate. See Figure 1-2a, items 1 through 4.
- d. **Loosen** drive motor nut with 11/32" Hex socket or Hex nut driver. (See Figure 1-2a.)
- e. Rotate the locking clip away from pulley. Do not rotate the pulley.
- f. Retighten 11/32" nut. DO NOT overtighten.

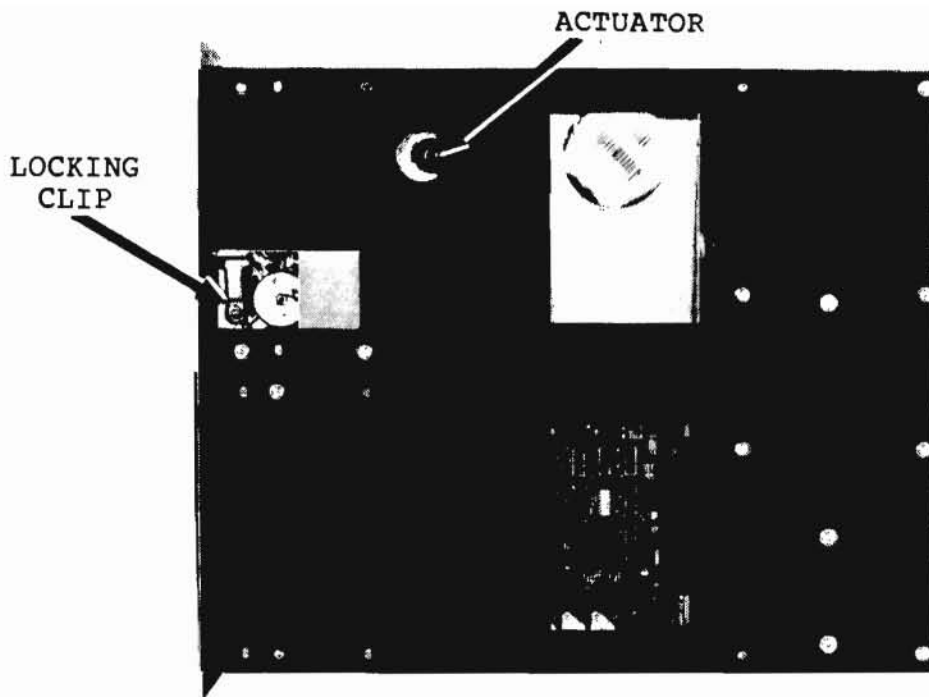


Figure 1-2a. ACS8000-12, ACS8000-14 with Bottom Plate Removed and Locking clip in Operating Position.

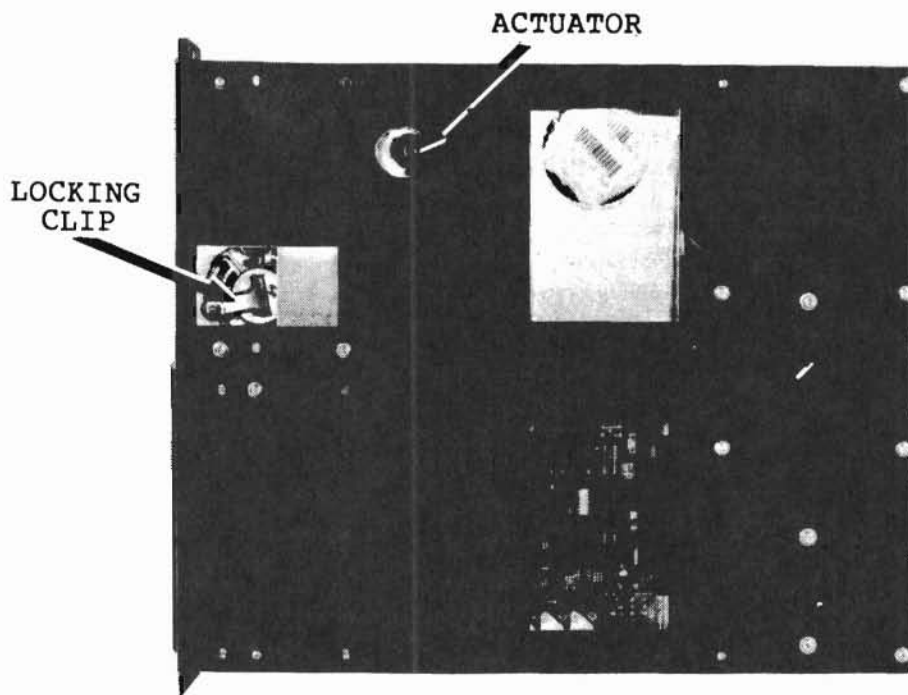


Figure 1-2b. ACS8000-12, ACS8000-14 with Bottom Plate Removed and Locking Clip in Shipping Position

1.1.1 Continued.

- g. Unlock actuator by rotating the actuator lock counter clockwise as far as it will go to the "RUN" position (approximately 1/2 turn) DO NOT force the turn. See Figure 1-2b.
- h. Place the bottom cover plate back on the unit and re-install the rubber feet with the screws that were removed earlier (see step c above).
- i. Carefully turn the unit to its upright position and proceed with installation.

1.2. Installation and Checkout.

Setup the ACS8000-12, ACS8000-14 computer system for operation in the following manner:

- a. Verify the power specifications for the computer by looking at the serial I.D. tag.

115 V 60 Hz 4 Amps
230 V 50 Hz 2 Amps

The system you receive will have the proper power supply to meet your requirements. It is recommended that you use a dedicated power outlet for your system to prevent possible overloads on that outlet.

- b. Insert the fuse provided with your computer in the rear panel fuse outlet.
- c. Insert the fuse provided with your computer in the rear panel fuse outlet.

1.2.1. Console and Printer Connections.

The connectors on the rear panel of the computers allow connection of peripheral devices to the system. Console terminal #1 (user 0 for MP/M and CP/M) will be connected to the JX RS232 Serial Connector. See Figure 1-3 for the complete breakdown of the rear panel connectors.

1.2.2 Disk Insertion

Figure 1-4 shows the proper way to insert the disk into the floppy drive. Note that the manufacturer's label is face-up.

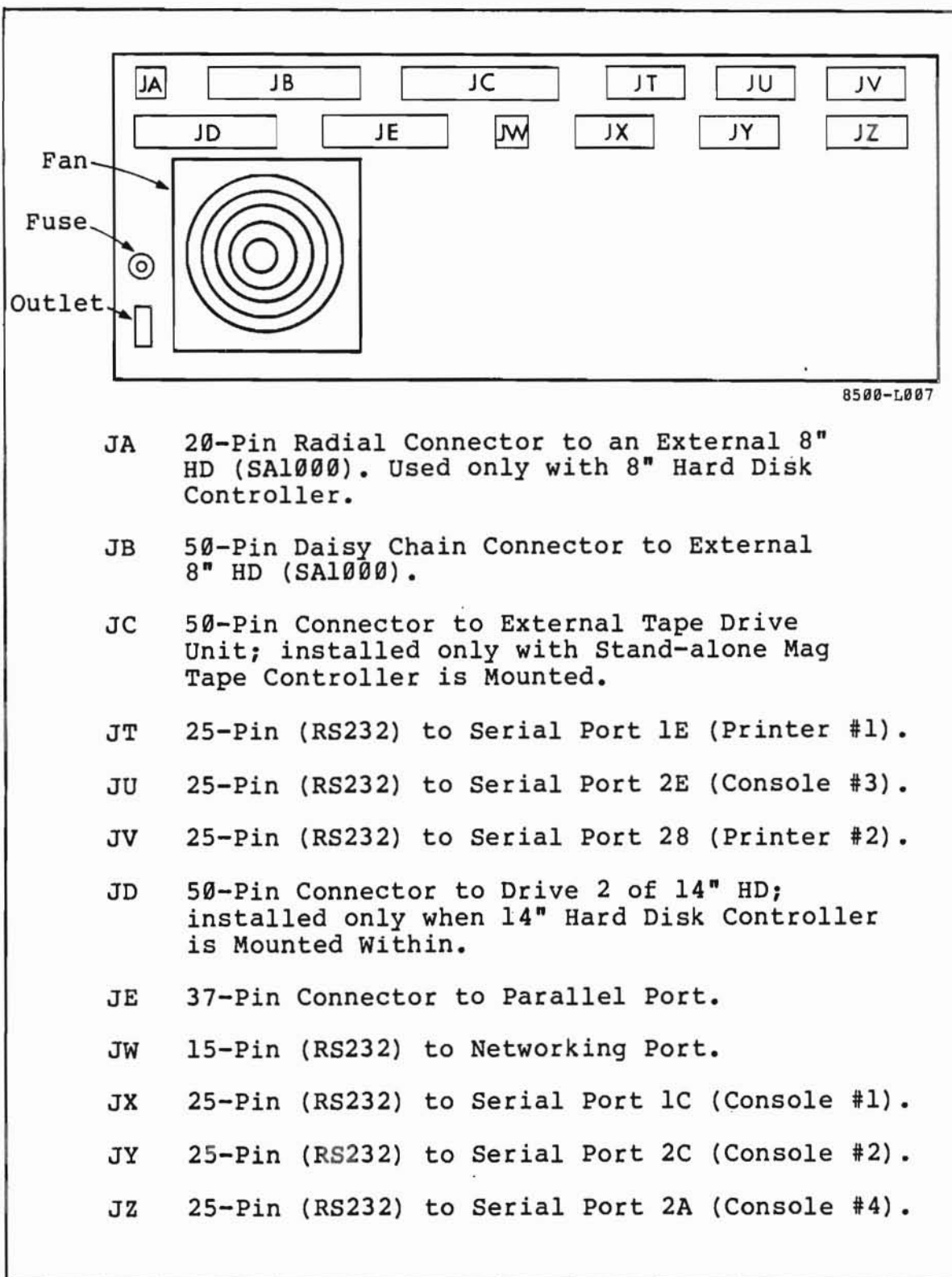


Figure 1-3. Rear Panel Connectors

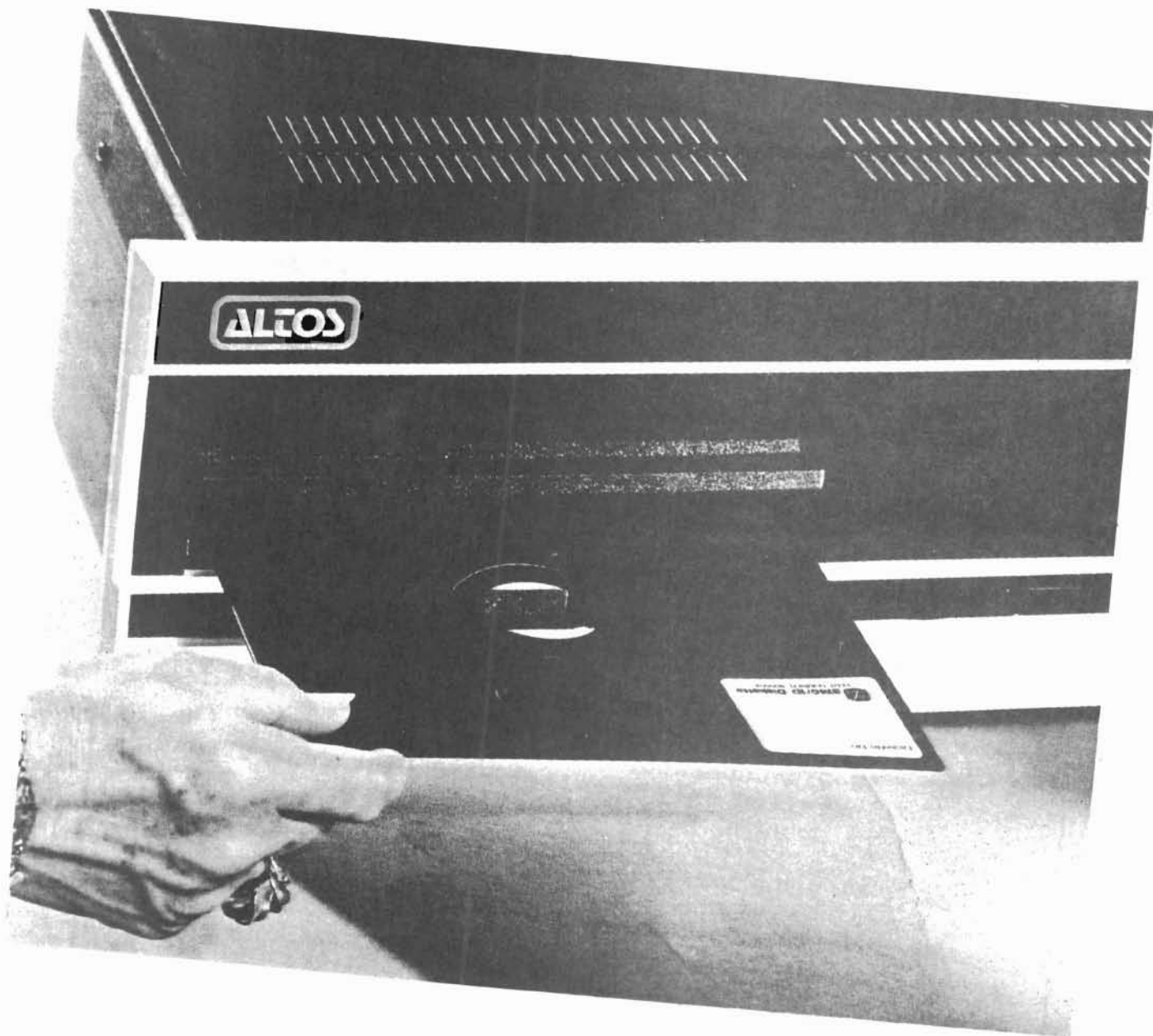


Figure 1-4. Disk Insertion for the ACS8000-12, ACS8000-14 Computer Systems.

1.3 Packing and Shipping.

Follow the directions below carefully when packing and shipping your system.

- a. Ensure that there is no tape cartridge in the drive and that all data contained on the hard disk has been backed up to some other storage media.
- b. Power down the system and remove the power cord from the rear of the chassis.
- c. Carefully turn the unit on its edge to have access to the bottom plate.
- d. Remove the four (4) screws that hold the rubber feet in place. Remove the bottom cover plate.
- e. Lock the actuator by rotating the actuator lock clockwise as far as possible (approximately 1/2 turn.) DO NOT force. Refer to Figure 1-2a, b.
- f. Loosen the 11/32 inch hex nut that secures the drive motor clip. See Figure 1-2a, b.
- g. Rotate the locking clip until engaged into pulley. Refer to Figure 1-2b.
- h. Tighten 11/32 inch hex nut. DO NOT overtighten.
- i. Pack the system in the containers that were used to ship the system to you. Insure that any necessary documentation is enclosed in the container.
- j. Place the bottom cover plate back on the unit and re-install the rubber feet with the screws that were removed earlier (see step (c) above).
- k. Carefully turn the unit to its upright position and proceed with installation (See subsection 1.2).

NOTE: IMPROPER SHIPPING COULD VOID THE WARRANTY

1.4 Bringing up Your Computer.

1.4.1 System Power-on.

Before you turn the system on, ensure that you do not have a floppy disk inserted into the floppy drive. You run the risk of erasing data contained on that disk.

1.4.2 Initial Console Display.

The proper way to bring up the system is to first turn on the console and then power-on the computer system. This ensures that you are able to observe any output from the computer at power-on. The following screen display will appear:

```
ALTOS COMPUTER SYSTEMS
MONITOR VERSION X.XX
PRESS ANY KEY TO INTERRUPT BOOT
```

If you do not press any key within 2 seconds, you will see the screen display:

BOOTING FROM THE HARD DISK

If there is no operating system on the hard disk, nothing will happen. Press the reset button on the computer and immediately press any key. You will be given the following prompt:

```
ENTER 1 TO BOOT FROM THE HARD DISK
ENTER 2 TO BOOT FROM THE FLOPPY DISK
ENTER 3 TO BOOT FROM THE TAPE UNIT
ENTER 4 TO BOOT DIAGNOSTICS
```

Select option 2. You will see the screen display:

```
ALTOS COMPUTER SYSTEMS
INSERT DISK FOR AUTOLOAD
```

1.4.2 --Continued.

Place your disk with manufacturer's label face up in drive A. Refer to Figure 1-4. When you insert the operating system disk and close the door the operating system will load itself into memory. Depending on your operating system, one of the following prompts will appear after the ALTOS monitor version:

- a. **A>** CP/M Operating System
- b. **OA>**MP/M Operating System
- c. Under OASIS Operating system you will first be prompted for the time and then the date. This information will then be displayed and you will receive the prompt >

If you wish to Boot diagnostics see ADX Current Version instructions enclosed with your system.

If one of the above prompts does not appear on the screen, check the following:

- a. Check to be sure that the floppy disk has been inserted with the manufacturer's label face up.
- b. Ensure that the RS232 serial connector between console terminal and computer is properly "pinned". The most common fault is not having "DATA TERMINAL READY", pin #20, connected.
- c. Ensure that the console terminal is set-up properly. The ALTOS Computer will talk , on reset, to terminal #1 terminal at 9600 baud, eight bits per character, with no parity, one start bit and one stop bit. Consult your console terminal's operating instructions on setting these parameters.

1.4.3. System Power-Down.

When you are finished with the computer, you should insure that no diskette is left in the floppy disk drive before you turn the system off.

1.5 Floppy Disk Drive Identification.

When you initially power-up the computer system it is required that you load the operating system disk in "logical" drive A. Do not confuse this with any physical drive designations. It is possible to "pin" the floppy disk drive(s) in many ways, but you must still load the operating system disk in logical drive A.

The ACS8000-12, ACS8000-14 Computer allows you to address up to four logical floppy disk drives, and up to 2 eight-inch hard disks drives. The logical floppy disk drive designations are A, B, C, and D.

The capacity of each floppy disk drive is determined by density mode used.

1.6 OASIS Operating System Installation on ACS8000-12,
ACS8000-14, ADD-12 and ADD-14 Computers.

This version of OASIS supports the ACS8000-12, ACS8000-14 Computers. There are single-user and multi-user versions of this release that replace the following OASIS Versions:

OASIS Multi 5.512M
OASIS Single 5.512S

The new diskettes are given below:

OASIS Multi 5.514M - Two Diskettes for multi-user OASIS 5.5
OASIS Single 5.514S - Two Diskettes for single-user OASIS 5.5

1.6.1 Hard Disk Formatting and Initialization.

Provided below are procedures to initialize the hard disks. It is important that the first logical unit on the hard disk be formatted before the second or third logical units. **Note that the asterisk (*) within a user response is part of the command.**

Figure 1-5 is sample Quantum Media Defect Report that will provide you with the information you should use to respond to the prompts for the ACS8000-12, ACS8000-14, ADD-20, ADD-40. Either the Shugart Error Map or the Quantum Defect Report will be provided with your system. Use these samples when prompted for information regarding sparing.

QUANTUM Q2000 MEDIA DEFECT REPORT 7/17/81 3:24 PM

MODEL NUMBER: Q2040 110V, SERIAL NUMBER 667

CYLINDER	HEAD	ERROR DISPLACEMENT IN BYTES	ERROR LENGTH IN BITS
66/42	0	2279/ 8E7	11/B
79/4F	1	1549/ 60D	1/1
93/5D	6	6199/1837	1/1

Figure 1-5 . Sample Quantum Media Defect Report

1.6.2 Initialize the ACS8000-12, ACS8000-14 Computer Hard Disk.

- a. If you are updating an existing OASIS System for ACS8000-12, first copy all data and program files from the hard disks to diskettes with either ARCHIVE or COPYFILE. Reformat the hard disks with the updated OASIS version, and reload the data and program files to the hard disk.
- b. Insert the OASIS operating system disk in the floppy drive and boot from the floppy drive.
- c. After you log on with the time and date you will see the screen prompt >. Attach the hard disk as follows:

ACS8000-12:

```
>ATTACH A HARD1  
>ATTACH B HARD2
```

ACS8000-14:

```
>ATTACH A HARD1  
>ATTACH B HARD2  
>ATTACH C HARD3
```

- d. Format the hard disk and spare the bad sectors for your system as follows:

ACS8000-12:

```
>INITDISK A (FORMAT TRACK 512 HEAD 4)  
>INITDISK A (SPARE TRACK 512 HEAD 4)
```

Enter the information provided on the Quantum Defect report as per the example in Figure 1-5. You only have to enter the bad sector information once.

```
>INITDISK B (FORMAT TRACK 512 HEAD 4)
```

ACS8000-14:

```
>INITDISK A (FORMAT TRACK 512 HEAD 8)  
>INITDISK A (SPARE TRACK 512 HEAD 8)
```

1.6.2 --Continued.

Are you using byte/bit count or sectors [B|S]? B

Enter information from Shugart or Quantum Media Defect Report.

Track number: n
Head Number: n
Head count: n
Err bits: n

Enter the information provided on your Quantum Defect Report as per the example in Figure 1-5. You only have to enter the bad sector information once.

>INITDISK B (FORMAT TRACK 512 HEAD 8)
>INITDISK C (FORMAT TRACK 512 HEAD 8)

Are you using byte/bit count or sectors [B|S]? B

Enter information from Shugart or Quantum Media Defect Report.

Track number: n
Head Number: n
Head count: n
Err bits: n

- e. To copy files from the floppy disk to the hard disk perform COPYFILE:

>COPYFILE * * S = = A (NOQUERY)

To do a selective copy proceed as follows:

COPYFILE filename* * S = = A

1.6.2 --Continued.

- f. Press the reset button and allow the computer to boot from the hard disk.
- g. After you log on with time and date insert the second floppy disk and perform ATTACH:

```
>ATTACH G FLOPPY1
```

- h. Copy the files from the second diskette to the hard disk as follows:

```
>COPYFILE * * G = = S (NOQUERY)
```

1.6.3 Adding a 20- or 40-Mbyte Hard Disk.

If you are adding another hard disk to your computer, follow the procedure to initialize and format the additional disk.

Remember that you can only add a 10-Mbyte hard disk to the ACS8000-10; a 20- or 40 Mbyte Hard disk to an ACS8000-12 or ACS8000-14.

- a. Follow the installation instructions provided with your ADD Kit.
- b. Be sure that the first physical hard disk is formatted and initialized.
- c. Allow the computer to boot from the hard disk.
- d. Perform ATTACH operation for the second hard disk:

20-Mbyte ADD:

```
>ATTACH D HARD4  
>ATTACH E HARD5
```

40-MBYTE ADD:

```
>ATTACH D HARD4  
>ATTACH E HARD5  
>ATTACH F HARD6
```

1.6.3 --Continued.

e. Format and initialize the disk as follows:

20-Mbyte ADD:

>INITDISK D (FORMAT TRACK 512 HEAD 4)
>INITDISK D (SPARE TRACK 512 HEAD 4)

Enter the information provided in the Quantum
Media Defect Report.

>INITDISK E (FORMAT TRACK 512 HEAD 4)

40-Mbyte ADD:

>INITDISK D (FORMAT TRACK 512 HEAD 8)
>INITDISK D (SPARE TRACK 512 HEAD 8)

Enter information from Quantum Media Defect
Report.

>INITDISK E (FORMAT TRACK 512 HEAD 8)
>INITDISK F (FORMAT TRACK 512 HEAD 8)

1.6.4 OASIS Update Information.

Provided below are some of the features of new OASIS operating system.

- a. Since the OASIS operating system has become too large for one double density diskette, two diskettes are now required. The first diskette contains the SYSTEM.NUCLEUS file and all utility commands. The second diskette contains all 29 of the terminal class files (previously only 9 class files were on the system disk) plus some other miscellaneous files that are described in an attachment.
- b. The cylinder numbers displayed by INITDISK are real cylinder numbers. Be aware that other commands such as VERIFY display logical cylinder numbers starting at 0 for the logical unit.
- c. The software has been fixed so that entering duplicate spare information does not result in a duplicate spare table entry.
- d. The SYSTEM.DEV NAMES file allows for six (6) hard disk units. Currently, the hard disk error messages on the ACS8000-10 now say S(3) instead of S(5).
- e. BOOTWRIT command is new and the ACSTPLR.ABSOLUTE file is different to handle the boot tape.

1.6.4 --Continued.

- f. The software has been fixed so that on the ACS8000-10 there are 249 cylinders instead of 250. This allows the diagnostics (ADX) and OASIS to reside on the hard disk at the same time.
- g. INITDISK on the hard disk clears (sets to all zeros) spared sectors. This means that any directory sectors that are spared will now be cleared, so that INITDISK (CLEAR) does not have to be done after INITDISK (SPARE).
- h. When the first logical unit on a drive is formatted with INITDISK, the following warning message will appear:

**SPARE INFORMATION FOR ALL UNITS ON THE HARD WILL BE ERASED
DO YOU WISH TO CONTINUE? (Y/N)**

This is to remind the operator that the sector spare information should be re-entered after INITDISK is finished.

- i. The hard disk can be either a 10-Mbyte Shugart SA-1004, a 20-Mbyte Quantum Q2020, or a 40-Mbyte Quantum Q2040.
 - 1. The 10-Mbyte drive has one logical drive.
 - 2. The 20-Mbyte drive has two logical drives
 - 3. The 40-Mbyte drive has three logical drives.
- j. There can also be a second hard disk in an external box that is connected to the main box. The second hard disk must be of the same manufacturer.
- k. Within OASIS, the hard disk units are device numbers 3 through 8 and have names HARD1 through HARD6. Listed below are the device numbers and names and their corresponding physical and logical drive designations:

1.6.4 --Continued.

Device Number	Device Name	Logical Drive	Physical Drive
3	HARD1	First	First
4	HARD2	Second	First
5	HARD3	Third	First
6	HARD4	First	Second
7	HARD5	Second	Second
8	HARD6	Third	Second

The following table shows the disk drives capacities and directory sizes for the logical drives on the various drive sizes. The units are designated S, A and B.

Unit	Designation	Capacity Mbytes	Default dir size	Starting cyl no.	Ending cyl no.	Number of cyl	Number of heads
10 Mbyte	S	8.7	1968	1	249	249	4
20 Mbyte	S	16.7	1936	1	480	480	4
	A	.9	880	481	505	25	4
40 Mbyt	S	16.7	1936	1	240	240	8
	A	16.7	1936	241	480	240	8
	B	2.0	1992	481	508	28	8

Some of the restrictions of the OASIS operating system are listed below:

- a. OASIS boots from only the first logical unit on the first hard disk. That unit is the only hard disk unit that can be used as the system disk.
- b. The locations of the logical units on the hard disk is fixed. The locations cannot be moved to other places on the hard disk by the user.
- c. BOOTWRIT can only be run on "large" system disks such as the 16.7 Mbyte logical drive on the ACS8000-12 and ACS8000-14.
- d. The SYSTEM.NUCLEUS is about 500 bytes larger the previous version.

1.6.4 --Continued.

The directory size can be specified to some other value by using the SIZE option on INITDISK. The default value listed above is also the maximum value allowed. None of the other values listed above can be changed.

SYSTEM DISKETTE NUMBER 2

The Oasis operating system has become too large to fit on one double density diskette. Thus, two diskettes are now required. The first diskette contains the SYSTEM.NUCLEUS file and all utility commands. The second diskette contains all 29 of the terminal class files (previously only 9 class files were on the system disk) plus some other miscellaneous files that are described below.

The terminal class files are names SYSTEM.CLASSn where n is a number from 1 through 33 that represents the class code. See the next page for a description of the terminals supported by the class codes. (note: Class codes 16 through 19 are not currently used.)

The other files on the second system diskette are the following:

ASM.EXEC- EXEC program that performs assembly and link

CLASS.MACLIB - Macros that are needed to create additional terminal class files.

BOOTWRIT.COMMAND -command to create a boot tape

ACSTPLDR.ABSOLUTE - Tape loader program. BOOTWRIT copies this file to the boot tape as the first block.

SYSTEM.EXEC2 - EXEC scratch file for partition 2.

SYSTEM.EXEC3 - EXEC scratch file for partition 3.

SYSTEM.EXEC4 - EXEC scratch file for partition 4.

SYSTEM.HARDBOOT - Boot program for 14" hard disk. This program only applies to the -6 and -7 systems. It can be copied to a blank diskette, and then when that diskette is booted from, the system will be loaded from the 14" hard disk.

1.6.5 Code Terminal.

1 Beehive B100
2 ADDS 580 Envoy
3 Lear Siegler ADM 3A
4 Soroq IQ 120
5 Special (VDM)
6 Hazeltine 1500
7 Televideo TVI912/920
8 Perkin Elmer FOx
9 Perkin Elmer BANTOM
10 Heath H19 (ANSI)
11 Infoton 100
12 Vector Graphic Flashwriter (VDM)
13 Tandy Radio Shack TRS80 II (VDM)
14 Elbitt
15 ADDS Regent 20
16
17
18
19
20 Intormer 304
21 Data Media
22 IBM 3101 (Uses ESC,ESC for system control)
23 S D Systems VDB 8024 (VDM)
24 Intertube
25 Volker-Craig VC404
26 Teleray 1000 Series
27 Tektronix 40
28 Visual 200
29 Heath H19 (Heath Mode)
30 Zentec Zepher
31 Televedeo TV1950 (Uses ESC,ESC for system control)
32 Hazeltine Modular One
33 Kontron PSI80 (VDM)

1.6.6 INITDISK Command.

The INITDISK command allows you to initialize a disk for use by OASIS. This description only covers the initializing of the hard disk on ACS8000-10, -12, and -14 systems. For other information about INITDISK, see the OASIS Reference Manual.

INITDISK should be executed several times in order to correctly initialize the hard disk. The first INITDISK will perform the format operation and the second will allow the entering of spare information.

Then, if the hard disk has more than one logical unit (i.e., if the system is a -12 or a -14), INITDISK should be executed once for each of those units to perform the format operation.

Formatting the first logical unit on the hard disk will erase spare information for all units on the drive. The following warning will be displayed to remind the operator of this:

```
SPARE INFORMATION FOR ALL UNITS ON THE DISK WILL BE ERASED
Do you wish to continue? (Y/N)
```

INITDISK will abort if N is entered.

The important thing to remember about formatting the hard disk is that the TRACK and HEAD options must be specified so that INITDISK knows how big the hard disk drive is. These options specify the total capacity of the physical hard disk drive - not the size of the one logical unit that is being initialized. The following table shows the only three acceptable combinations of TRACK and HEAD options:

SYSTEM	TRACK	HEAD
8000-10 (10Mbytes)	256	4
8000-12 (20Mbytes)	512	4
8000-14 (40Mbytes)	512	8

If any other combination of values is specified, then INITDISK uses the default values of 256 for TRACK and 4 for HEAD (i.e. the default is a 10 Mbyte drive).

NOTE: The format operation on a hard disk unit is somewhat time consuming. For the single unit on a -10, it takes about 15 minutes. For the large 16.7 Megabyte units on the -12 and -14, it takes about 25 minutes.

1.6.6 --Continued.

In some rare instances, it might be desirable to pretend that a 40 MByte disk is only a 20 MByte disk. that is, only half of the hard disk (i.e. heads 0, 1, 2, and 3) would be used; the other half (i.e. heard 4,5,6, and 7) would be "wasted" (or used for some other purpose besides an OASIS disk). This can be done by simply "lying" to INITDISK about the size of the disk with the following command:

```
INITDISK A (FORMAT TRACK 512 HEAD 4)
```

After running INITDISK, boot the system before entering any spares. Wnen the spare information is entered, skip those entries on the media defect report that have heads 4, 5, 6, or 7. But, to reiterate, this is not the normal situation. You should have a very good reason for wanting to do this.

The cylinder numbers that are displayed by INITDISK as it is formatting a disk are real cylinder numbers on the hard disk (i.e. numbers from 0 through 255 or 511 depending upon the disk size). In previous versions of INITDISK, these numbers were off by one since cylinder 0 is not used. But beware that other commands (such as VERIFY) display logical cylinder numbers (i.e. numbers starting at 0 for the first cylinder number on the logical unit.)

1.6.7 Sector Sparing.

The INITDISK command provides sector sparing either automatically or on command. Whenever the hard disk is formatted, the INITDISK program checks for any bad sectors (sectors that cannot be written or read reliably). When a bad sector is found, it is spared to the first physical track on the disk. (This track is guaranteed by the disk manufacturer to be error free for the life of the disk drive.)

Alternately, spare sectoring may be done by specifying the specific sector that is to be spared. This mode is invoked by executing the INITDISK command with option SPARE specified.

When using this method of sector sparing for a new disk drive, you should have the media defect report from Shugart or Quantum available. This report is a form that the disk manufacturer uses to inform you of the sectors that it has found to be questionable. This report is sealed in an envelope on the inside of the bottom cover of the machine. When you are installing the machine, you have to remove this cover to disable the locking bracket on the hard disk; at this time, you should make a copy of the media defect report so that it will be available when you run INITDISK with the SPARE option.

If you want to enter sector numbers (as shown in OASIS error messages), enter S. If you want to enter bit/byte information from the Shugart or Quantum Media Report, enter B. When you have entered the last entry, type a RETURN only in response to the track number prompt.

(Note: If you are using a Quantum Media Defect Report, be sure to enter only the decimal numbers - not the hexadecimal numbers. The decimal numbers are those listed to the left of the "/" in each field.)

The sector sparing information for all logical units on the hard disk must be re-entered whenever the first logical unit on a drive is reformatted. The operator is reminded of this by the following message when the first logical unit is formatted:

```
SPARE INFORMATION FOR ALL UNITS ON THE DISK WILL BE ERASED
Do you wish to continue? (Y/N)
```

Spares can be added with INITDISK if additional bad sectors are encountered while the system is running. However, individual spares cannot be deleted; the only way to delete spares is to reformat the first logical drive and re-enter the desired spares.

1.6.7 --Continued.

If it is anticipated that the spare information will have to be entered fairly frequently (as might be the case on the test floor), the spare information can be included in an EXEC program. However, EXEC thinks that lines that begin with a number have line numbers on them. So, when creating the EXEC program either put line numbers on the statements or put some leading blanks on line that have numbers on them. The following EXEC program will enter the spares for the media defect report shown in Figure 1-2.

&BEGSTACK

B

66

Ø

2279

11

79

1

1549

1

93

6

6199

1

&END

INITDISK A (SPARE TRACK 512 HEAD 8)

1.6.8 BOOTWRIT Command.

The BOOTWRIT command provides a means of writing boot tapes. Boot tapes can be used on -10, -12, -14 MTU systems to initialize the hard disk and to copy the operating system from the tape to the hard disk.

The format of the command is:

```
BOOTWRIT [<fdl> [<TAPEn>]]
```

where

fdl indicates the disk drive containing the system to be copied. Default is S.

TAPEn indicates the tape drive containing the tape to be copied to. Default is TAPE1.

BOOTWRIT expects the file named ACSTPLDR.ABSOLUTE to be on the source disk. It copies that file to the tape as the first block, and then copies all of the files on the disk to the tape. The resulting tape is called a boot tape. Boot tapes are not compatible with either backup tapes or with archive tapes; they can only be used for booting the system.

Run BOOTWRIT as follows:

- a. Attach the tape with the following command
>ATTACH TAPE1 TAPEDRV
- b. Tension the tape with the following command
>INITTAPE (TENSION)
(Note: Boot tapes do not have to be labeled.)
- c. Ensure the source disk contains ACSTPLDR.ABSOLUTE.
- d. Perform the command:
>BOOTWRIT S TAPE1
- e. Insert a blank tape when asked to do so.
- f. When BOOTWRIT has finished, remove the tape.
- g. WRITE PROTECT THE TAPE IMMEDIATELY!

1.6.8 --Continued.

The boot tape should be tested immediately to see if any errors occurred when the tape was written. The following procedure can be used to test the tape without overwriting the data on the hard disk:

- a. Push the reset button and interrupt boot by pressing any key.
- b. Enter 3 to boot from tape.
- c. If the format question appears on the screen, the boot tape is okay since the first tape block has been read correctly.
- d. Push the reset button to boot up the system again.
- e. If the format question does not appear on the screen, then the boot tape was not written correctly. Push the reset button to boot up the system again, rerun BOOTWRIT, and test the boot tape again. If it fails again, try another tape.

The following procedure can be used to boot from tape to load OASIS to the hard disk:

- a. Insert the boot tape.
- b. Push the reset button and interrupt the boot by pressing any key.
- c. Enter 3 to boot from tape.
- d. Answer Y to the format question if you wish to format the hard disk. Then enter the number of cylinders (either 256 or 512) and the number of heads (either 4 or 8) for the hard disk.
- e. Answer Y to the spare question if you wish to enter any spare information. If you want to enter any sector numbers (as shown in OASIS error messages), enter S. If you want to enter bit/byte information from the Shugart or Quantum Media Defect Report, enter B. When you have entered the last entry, type a RETURN only in response to the track number prompt.

Note: If you are using a Quantum Media Defect Report, be sure to enter only the decimal numbers.

1.6.8 --Continued.

- f. Press any key to start the copy from tape to the hard disk. DO NOT REMOVE THE BOOT TAPE UNTIL THE COPY OPERATON IS FINISHED.
- g. Press the reset button to boot from the hard disk.

BOOTWRIT is not intended to replace BACKUP. Use BOOTWRIT to make a copy of the boot tape that is delivered with your system; that is, BOOTWRIT should be run as soon as the system is installed. Use BACKUP periodically to insure that you have an up-to-date copy of your hard disk data.

BOOTWRIT cannot create multi-volume tapes.

In multi-user OASIS, BOOTWRIT must be run in single user mode.

A FINE POINT:

Currently, BOOTWRIT must be run on a disk unit that has the maximum size allocation bit map. The 16.7 Mbyte units on the -12 and -14 are such units. Also, the system disk created by booting from tape is such a unit.

1.7 System Configuration.

1.7.1. Hardware Configuration Jumper Block.

If your distributor has not configured your system for you it will be necessary to remove the top cover and set the system configuration jumpers. This is done on the 8500 Central Processing Unit Printed Circuit Board (CPU PCB) as shown in Figure 1-6. Figure 1-7 shows the system hardware configuration jumper options.

1.7.2. Software Configuration Jumper Block.

It may also be necessary to configure your system to conform with the operating system software (CP/M, MP/M or OASIS) you are using. Figure 1-7 shows the system software configuration options.

1.7.3. Multi-user/Networking Port Configuration Jumper Block.

The Multi-user/Networking Port, located at matrix position 16C/D, enables Consoles #2, #3 and #4 and Printer #2. Figure 1-8 shows the proper jumper configuration.

1.7.4 Eight-inch Hard Disk Controller.

Figure 1-10 is a matrix map of the eight-inch hard disk controller and the S2 Configuration for Quantum or Shugart Drives is highlighted.

HARDWARE CONFIGURATION
MATRIX POSITION 21P

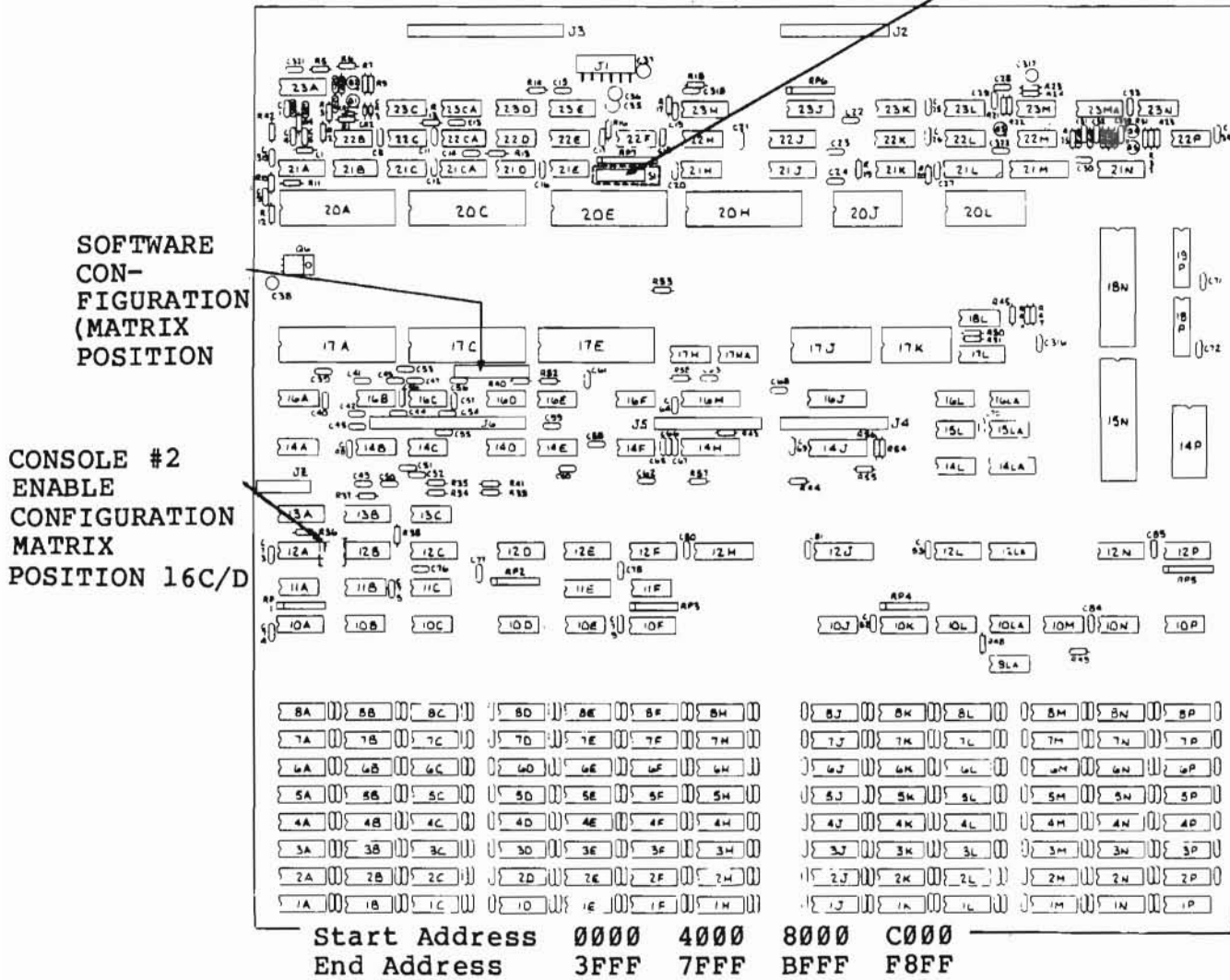
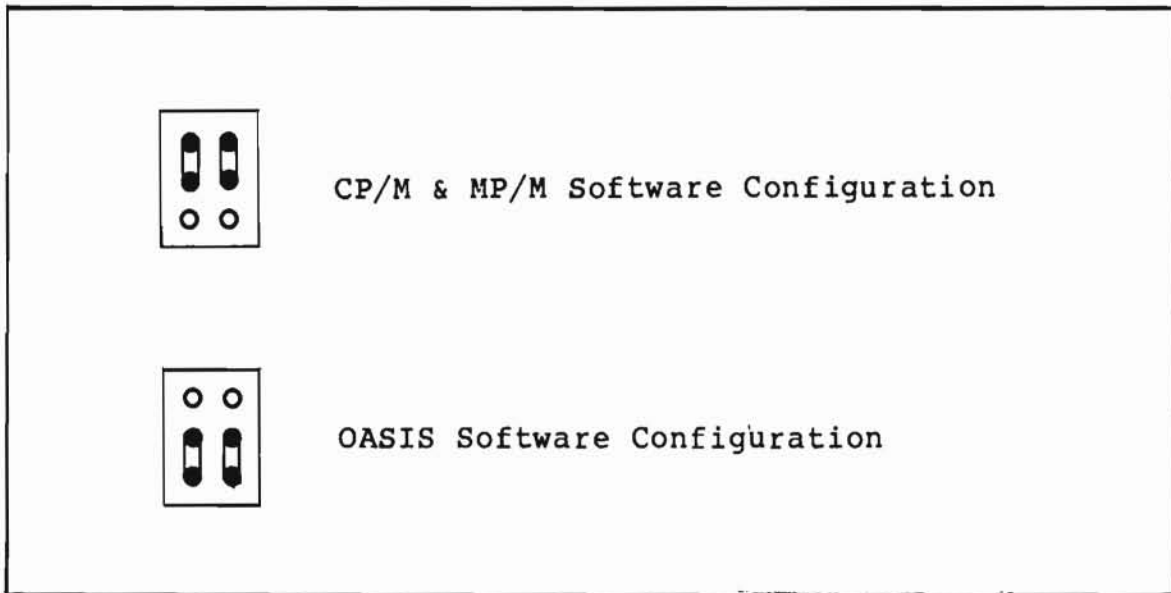
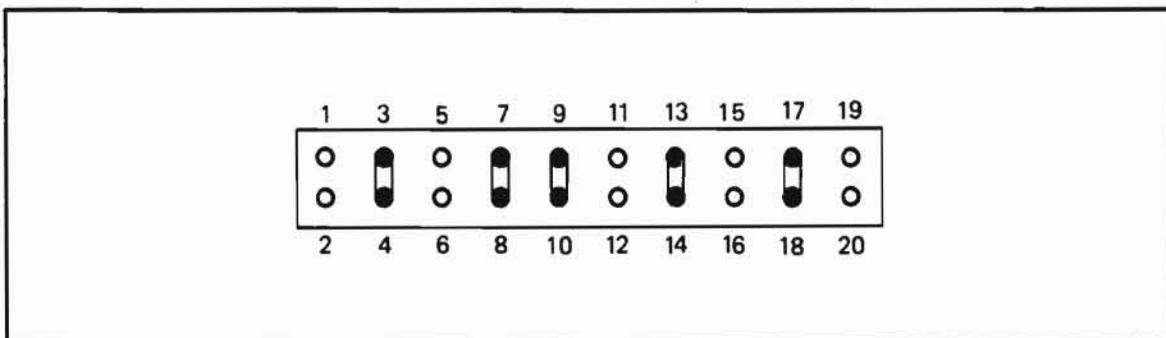


Figure 1-6. 8500 PCB Matrix Map Highlighting Hardware, Software and Multi-User Configuration Block Options



8500CPU-L008

Figure 1-8. Software Configuration Matrix (Position 12A/B)



8500CPU-L009

Figure 1-9. S13 Multi-user/Networking Port Configuration Jumper Block (Matrix Position 16C/D)

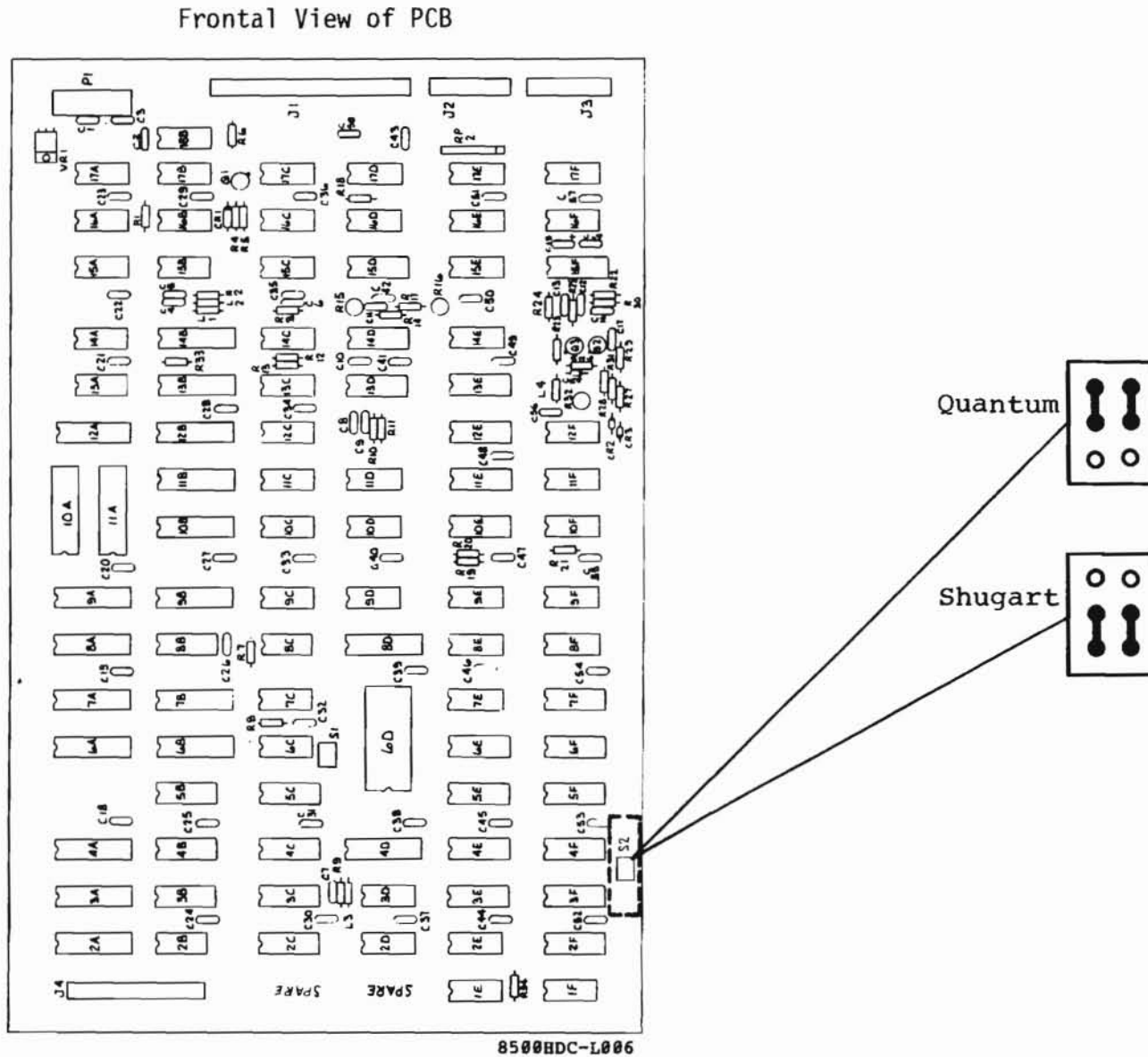


Figure 1-10. Eight-inch Hard Disk Controller Board Highlighting the S2 (Matrix Position 3/4G) Sector Size Configuration.

2. ALTOS DIAGNOSTIC EXECUTIVE (ADX), VERSION 2.4F.

Included with your system is the ALTOS Diagnostic Executive (ADX) Disk, version 2.4F. This version is to be used only on ACS8000-12 and the ACS8000-14 systems. The disk is serialized and in double-density. After powering-on the system you will see the following display:

**ALTOS COMPUTER SYSTEMS
Monitor Verson 6.05**

Press any key to interrupt Boot operation

Press any key within 2 seconds and the following display will come on the screen:

**Enter 1 to Boot from Hard Disk
Enter 2 to Boot from Floppy Disk
Enter 3 to Boot from Tape Unit
Enter 4 to Boot Diagnostics**

Place the diagnostic disk into the drive and select option 2. The screen will display the following:

**2
Booting from Floppy Disk...**

**ALTOS ADX 2.00
ALTOS DIAGNOSTIC MONITOR VERS.2.3**

***** D I A G N O S T I C C O M M A N D D I R E C T O R Y *****

FLPYFORM	FLPYTEST	ADXSETUP	BOOTCOPY
PRNTEST	MEMTEST	FLPY	CUPTST85
DISKSTAT	HARDS8		

REQUEST:

Altos recommends that you make a back up copy of the diagnostic disk and use that copy to perform all diagnostic operations. The original should be stored in a safe place. To make a back-up copy you will need to use FLPYFORM AND BOOTCOPY utilities of ADX, and several utilities of CP/M or MP/M operating system. Refer to your operating system guide for making back-up copies.

2.1 Diagnostic Command Categories.

The utilities and tests of the command directory can be broken down into three categories and are described in subsequent subsections. The prompts that will be displayed and the required responses are also given. The three categories are given below:

- a. SETUP/FORMAT/COPY UTILITIES
- b. COMPUTER AND FLOPPY DRIVE TESTS
- c. HARD DISK FUNCTIONS/TESTS

2.1.1 SETUP/FORMAT/COPY UTILITIES.

The utilities given below are designed for your Computer System.

ADXSETUP FLPYFORM BOOTCOPY FLPY

The above utilities are most widely used by the end-user.

2.2 --Continued.

Select the applicable baud rate for the printer you are using with your system by list item number. Please note that if you are using a Centronics printer which is operating as a parallel device as opposed to a serial connected printer, then you will select 0. If, however, you are using a Centronics printer that is serially connected, select the applicable baud rate. You may have to consult the user's manual for the printer to determine this specification. Make your selection and press return.

The next display is to determine the baud rate for the auxiliary port. Since this port is not presently used, select 0 and press return.

You will then determine the default density mode for the floppy disk drives. The display will be as follows:

```
SELECT DEFAULT MODE FOR FLOPPY DISKS,  
      0 (SINGLE)  
      1 (BLOCKED DOUBLE DENSITY)  
      2 (UNBLOCKED DOUBLE DENSITY)
```

Normally you would select Option 1 (Blocked double density) since it allows more storage space. Make note of the option you do select as you will want to thereafter format all your disks in that density. If you wish to change the disk drive density mode you will have to run ADXSETUP again.

Blocked double density means that the default mode of the disk is 512 byte sectors. The operating system will set the computer hardware to initialize to the default density depending on this selection. This selection effects the diagnostic disk on boot and any other disk you might insert while performing a diagnostic operation and it does affect all floppy disk drives. Make your selection and press return. If you make an error and select any number other than 0, 1 or 2 you will receive an error message and be asked to select again.

The next display will be for determining whether you have a single- or double- sided floppy disk:

```
SELECT SINGLE OR DOUBLE HEADED DISKS, 1 (SINGLE), 2 (DOUBLE)
```

Select option 1. The screen will display the following:

**PLACE DISK WITH BOOT TO BE UPDATED IN EITHER DRIVE A:
OR DRIVE B: REMOVE DIAGNOSTIC DISK IF NECESSARY.
REPLY WITH DRIVE LETTER ("A" OR "B") WHEN READY TO
PROCEED.**

If you are updating the diagnostic disk you are presently using then enter the letter A and press return. If you have another copy of the diagnostic disk and wish to update that disk, remove the diagnostic disk presently in use and place the disk to be updated in the drive and press return. The screen will display the following:

**ADX BOOT SECTOR SUCCESSFULLY UPDATED
REPLACE DIAGNOSTIC DISK IN DRIVE A:
HIT (CR) WHEN READY.**

If the diagnostic disk you updated is not the diagnostic disk you are using, then place that diagnostic disk in drive A and press return.

DISK IN < > HAS BEEN SUCCESSFULLY FORMATTED

**....ALTOS FLOPPY DISK FORMAT ROUTINE....
VERSION 1.10**

- 1. STANDARD SINGLE DENSITY FORMAT**
- 2. DOUBLE DENSITY FORMAT FOR CP/M AND DIAGNOSTIC DISKS**
- 3. DOUBLE DENSITY FORMAT FOR MP/M**
- 4. DOUBLE DENSITY FORMAT WITH 512 BYTE SECTORS FOR CP/M AND MP/M**
- 5. END THIS PROGRAM**

SELECT FORMAT OPTION BY NUMBER

To end this program select option 5 and press return. The next prompt will take you back to the diagnostic menu:

**REPLACE DIAGNOSTIC DISK IN DRIVE A:
HIT <CR> WHEN READY**

2.5 FLPY Utility.

This utility allows the user to perform the functions listed in the submenu below. Since this utility requires that you have at least two floppy disk drives on your system, **it does not apply to the ACS8000-12 or ACS8000-14 Computer** unless you have added more floppy drives. It also requires that you copy like disks to like disks. If you have a double-density source disk, your object disk must also be double-density. To perform this utility format the object disk using the FLPYFORM utility or list item 0 on the submenu below. Then return to the diagnostic menu. After selecting FLPY, you will see the following screen display:

**....ALTOS FLOPPY DISK COPY ROUTINE....
VERSION 2.1**

Select one of the following options:

- | | |
|--|---|
| 0. Format disk only | (Formats floppy disk) |
| 1. Copy system tracks | (Copies system tracks onto formatted disk) |
| 2. Copy SINGLE density disk | (Copies entire disks in single density when object disk is formatted in single density) |
| 3. Copy SINGLE density disk data only | (Copies data only onto single density disks) |
| 4. Copy DOUBLE density disk data only | (Copies data from double density disks to formatted double density disks) |
| 5. Copy DOUBLE density disk | (Copies entire double density disk onto a formatted double density disk) |
| 6. Copy BLOCKED DOUBLE density disk | (Copies 512 byte sector double density disks) |
| 7. Copy BLOCKED DOUBLE density disk data only | (Copies data from 512 byte sector double density disks) |
| 8. End this program | |

2.5 --Continued.

For single density disks the screen will display the following:

```
ALL TRACKS WILL BE COPIED

+SOURCE IN A
+OBJECT IN B
+TYPE <RETURN>                    <CR>
```

For double density disks the screen will display the following:

```
ALL TRACKS WILL BE COPIED

WHAT KIND OF DISK ARE YOU COPYING?

1.  MP/M
2.  CP/M OR DIAGNOSTIC DISK
3.  OTHER (OR DON'T KNOW)

+SOURCE IN A
+OBJECT IN B
+TYPE <RET>                        <CR>
```

Remove the diagnostic disk from drive A and insert the source disk. Insert the object disk in drive B. Press return. If the source or object disk has errors or unlike densities the following display will appear:

```
PERMANENT DISK ERROR, DRIVE DD TRACK TT SECTOR SS STATUS 10
PERMANENT SOURCE ERROR EXIT
....FUNCTION FAILED....
```

If there are no source or object disk errors the function will complete successfully and the screen will display the following:

```
+FUNCTION COMPLETE
+REPLY WITH "R" TO REPEAT OR <RET> TO END:                    <CR>

INSERT DIAGNOSTIC DISK IN A: TYPE <RET>                        <CR>
```

2.5 --Continued.

Once the task is completed, it is a good idea to boot the new diskette or to look at the directory of the new disk to ensure that you have copied the desired information.

2.6 SYSTEM AND FLOPPY DRIVE TESTS.

The following tests fall under this category:

CPUTST85 FLPYTEST PRNTEST MEMTEST

The end-user should not have to use these tests unless there are problems with drives, printer, memory or the CPU PCB. Consult with your distributor.

2.7 CPUTST85.

The following routines test various functions of the 8500 CPU board and system. To enter a test routine type the number of the test after the prompt. If the test is completed with no errors, a "NO ERRORS" message will appear and the test will continue looping (for debugging purposes) until the ESC key is pressed. Tests 4 and 5 do not print anything on the screen. Test 4 requires that the user move the CRT terminal cable to the various serial connectors and see that keys pressed on the keyboard are echoed to the screen. Test 5 requires that a test fixture be connected to the network connector and a scope check of pins 12 and 13 of IC 17C be made. Both tests 4 and 5 are terminated by pressing the ESC key.

0. Print this message.
1. Test write protect function
2. Test DMA chip and DMA banking.*
3. Test memory banking.*
4. Run and echo test for RS232 channel (hit ESC to return)
5. Test Network channel (hit ESC to return)
6. Test 9511
7. Return to operating system

Type the number of the test (0-7)

* Tests 2 and 3 will not run if your system is pinned for Oasis.

When test 6 is run, if the AMD9511 floating point processor option is not installed, you will receive an ERROR DETECTED message. To terminate this test press the ESC button.

2.8 FLPYTEST Utility.

This test allows the user to test all aspects of operation of the floppy disk drive. For the FLPYTEST to discriminate between media problems with the floppy disk and hardware problems, the user should use a diskette that is known to be free of errors.

After receiving the Diagnostic menu on the screen select FLPYTEST as follows:

REQUEST:FLPYTEST <CR>

Have two scratch diskettes (formatted, data free) available for this test. The following will appear on the screen:

Floppy disk test and stress analysis version 2.00

*****HIT ESC. TO EXIT*****

**Load scratch diskettes in drive(s) to be tested
Hit <CR> when ready to proceed**

ARE DISKETTES REALLY SCRATCH?? "Y" OR "N":

**Use diskettes with 128 byte sectors.
"MODE 1" diskettes not supported.
Enter "S" for single Density, "D" for double:**

**Will the terminal be connected during the test?
Enter "Y" or "N":**

If you select N, the terminal is disconnected and the test will run continuously.

STARTING WRITE/READ DATA INTEGRITY TESTS

.....WRITE PHASE

**..DISK 0
Trk: <Side:> (Disk 0 is in Drive A)**

**..DISK 1
Trk: <Side:> (Disk 1 is in Drive B)**

.....READ PHASE

**..DISK 0
Trk: <Side:>**

**..DISK 1
Trk: <Side:>**

2.8 --Continued.

Scratch diskettes should have the same default modes and should be either single-sided or double-sided. Note that if you have double sided disk drives, you will see the side that is being tested. Between the screen displays 'DISK 0 AND' DISK 1' during the WRITE and READ operations there are pauses. During this time the system is writing to or reading from the disk. If terminal is disconnected, test will continually repeat.

Upon completion of the WRITE/READ operations, you will be given the following prompts:

**SWAP ALL DISKETTES, A: TO B:, B: TO A:, ETC.
THEN HIT <CR> WHEN READY**

After you have swapped diskettes a second READ Phase will occur; the disk that was written by drive A will be read by drive B; The disk that was written by drive B will be READ by drive A. This only occurs when the system has two floppy drives so this test is not performed on systems having only one floppy disk drive.

STARTING HEAD LOAD DELAY TESTS

**HIT "ESC" TO EXIT
<CR> TO REPEAT TEST**

During this test the system rapidly selects and de-selects the floppy disk drives for short periods. You will then see the display:

**DISK TEST COMPLETED
DTEST ERROR SUMMARY**

TOTAL TRACKS PASSED n (number of tracks)

**DRIVE 0 READ 0000 (), WRITE 0000 (), REF 0000 ()
DRIVE 1 READ 0000 (), WRITE 0000 (), REF 0000 ()
DRIVE 2 READ 0000 (), WRITE 0000 (), REF 0000 ()
DRIVE 3 READ 0000 (), WRITE 0000 (), REF 0000 ()
REPLACE SYSTEM DISK IN A:, HIT <CR> WHEN READY**

The first 4 digits will be in Hex and the second 4 digits will be in decimal. The numbers given will be the number of errors that were found during the test. Even though the test made several passes and picked up a given it will repeat that as another error.

Select PRNTEST after the Request on the diagnostic command directory. This command causes the following characters to be displayed on the terminal and to be printed on the printer when the printer is connected:

```
REQUEST:PRNTEST
```

```
<CR>
```

```
PRINTER TEST 1.1
```

```
!"#$%&'()*+,-./  
0123456789:;<=>?  
@ABCDEFGHIJKLMNO  
PQRSTUVWXYZ[\]^_  
`abcdefghijklmnop  
pqstuvwxyz{|}~
```

The screen will display the characters shown above. If you have properly performed ADXSETUP, your printer will print the characters shown above, or their equivalent, on your particular printer.

2.10 MEMTEST.

MEMTEST command allows the user to test all but a small portion of system RAM for possible errors. Since the program itself occupies some memory, that portion cannot be tested. After inserting the Diagnostic Disk into drive A and booting up the system, you will see the diagnostic menu. Select MEMTEST as follows:

REQUEST: MEMTEST <CR>

The screen will display the following:

```
ALTOS BOOT MEMORY TEST VERSION 1.1  
VALID TEST MEMORY RANGE (HEX) 0000 - F8FF  
SELECT MEMORY BANK TO BE TESTED
```

You will be prompted 4 times to select memory bank. If you wish to select only one memory bank, Select bank, 0,1,2 or 3, press return. Press return to bypass subsequent memory bank select option. You will now receive the following screen display:

```
STARTING ADDRESS (HEX)?  
ENDING ADDRESS (HEX)?
```

Refer to Section 1, Figure 1-6, matrix map for memory address selections. Memory test range is given in the screen display above. Select the starting and ending addresses and press return after each selection.

Memory testing will now begin. The screen will display .,;! as it tests. These four characters indicate that one pass has been completed. You should allow the test to make eight passes.

If you wish to stop the test without terminating it, and see the results, press (CTRL S) ^S (STOP) on the keyboard and the results will be displayed. If you wish to terminate the test, see the results and select another memory bank, press (CTRL R) ^R (Restart) on the keyboard.

To go back to the diagnostic menu, press the RESET button on the computer.

2.11 DISKSTAT.

DISKSTAT gives the status of each disk. Enter DISKSTAT after the request prompt.

REQUEST:DISKSTAT <CR>

The screen will display the following:

DRIVE(S) A	Floppy	Cylinders	n Heads	n Sectors
	No Temporary Errors		No Permanent Errors	
DRIVE(S) B	Floppy	Cylinders	n Heads	n Sectors
	Last error Address:	Cylinder 0,	Head 0,	Sector 1

The screen will continue to list the each drive and the status. If you wish to stop the test to read a portion of it without ending the test press **^S** (Show); press any key to continue from that stopping point. The test will complete itself and automatically return to the diagnostic command directory.

2.12 Hard Disk Tests and Functions.

The hard disk test used on the Computer system is called HARDS8. This test consists of twelve tests or functions. In order to run HARDS8 simply enter the command following:

REQUEST: HARDS8 (press return)

The screen will display the following:

```
*** Hard Disk (8") Test Facility V3.4 ***
Specify Configuration of HARD DISK to be tested.
Default Configuration is:
Drive Number      : 1
Cylinders per Drive: 256
Number of Heads   : 4
Sector Size       : 512
press RETURN to bypass a selection.
Enter Drive Number      ("1" or "2")      <CR>
```

At this point you will specify the conditions under which you will run hard disk tests or functions. The following prompts would appear as follows:

```
Enter Diagnostic Cylinder Number:

    If you have the ACS8000-12 enter 506      <CR>
    If you have the ACS8000-14 enter 509

Enter Diagnostic Head Number      0      <CR>
Enter Number of Diagnostic Tracks 24      <CR>
Enter Operating System Type Number 0      <CR>
```

See Section 1.6 Operating Guide for default values for your ACS8000-12 or ACS8000-14.

The screen will display the following:

***** Hard Disk (8") Test Facility V3.4 *****

1. Format Disk Drive
2. Verify Addresses for all Sectors on Disk
3. Seek test with optional Verify
4. Write entire Disk
5. Read entire Disk
6. Set Flag Byte for a Specific Sector
7. Hard Disk Read/Write Error Test
8. Miscellaneous Functions
9. Copy Diagnostics to Hard Disk
10. Initialize Hard Disk System Track
11. Copy System to Hard Disk
12. Assign Diagnostic Area
13. Terminate This Test Series

Select required function by number:

2.13 Hard Disk (8") Test Facility, V3.4.

In the following subsections each of facility and test of HARDS8 will be discussed in detail. The tests that are applicable to the ACS8000-10 are tests 1 thru 8. Tests 9 thru 12 apply to non-floppy systems.

2.13.1 Format Disk Drive.

This function formats each sector on the hard disk drive. This function will erase flag byte indications of bad sectors (obtained from the Shugart Error Map provided with each computer and all data. Sectors previously marked as bad will now be marked as valid. Unless these sectors are re-marked as bad sectors, data written on these bad sectors will be lost.

```
*****  
* WARNING: This Hardtest function *  
* changes data on the hard disk *  
* and may cause loss of user data *  
*****
```

Once you have selected test 1 and pressed return, the screen will display the following:

```
*** DO NOT RUN THIS TEST WITHOUT PERMISSION FROM -ALTOS- CUSTOMER  
SERVICE *** CALL 408-946-6700  
Do you want to continue?
```

If you wish to continue, enter Y and press return, you will return to the hard test selection menu. If you enter N and press return you will return to the hard test selection menu. The reason for this is that a "password" is required to run the hard disk format function. You can obtain this password from your distributor or from ALTOS Customer Service. But before that password is given to you an attempt will be made to determine whether a format of the hard disk is necessary. Since this function does destroy user data this safeguard was made a part of the function.

If you have obtained the password, entered that password and press return, the screen will display the following:

```
*** THIS TEST WILL ERASE FILES ON THE HARD DISK. ***  
Do you want to continue? (y or n):
```

If you have determined that this is indeed the function you wish to perform, respond with Y and press return. The format process will begin and you will see a count from 0 to 255 appear on the screen as each cylinder is formatted. Once complete the screen will return to the hard disk menu and you will be prompted to make a selection.

REMEMBER: You have formatted the disk but you have not flagged any bad sectors nor have you allocated dummy files to those bad sectors. This should be done before any attempt is made to transfer user data to the hard disk. See Subsection 2.13.6.

2.13.2 Verify Addresses for all Sectors on Disk.

This is an address check. It is non-destructive to user data. This test will read every sector on the hard disk and check the first 3 bytes. These bytes contain the cylinder, head/ drive and sector numbers.

If you wish to run this test select 2 and press return. The screen will display the following:

Press any Key when "ready" to Start this Test

Once any key is selected a return is automatically generated and the test begins. You will see a count displayed at the bottom of the screen as the tracks are checked. Any bad sectors encountered which have been flagged as being bad will cause a BAD SECTOR display. Any bad sectors encountered which have not been flagged earlier as bad will cause a CRC error display. Once complete, the screen will display the hard disk test menu again with the following notation at the bottom:

....Address Check Completed

You will be prompted to select which hard disk test or function you wish to perform.

2.13.3 Seek Test with Optional Verify.

This test will seek between two operator specified cylinders and, at the operator's request, verify the addresses at head 0, sector 0 of each specified cylinder.

Select test 3 and press return. The screen will display:

Press any Key when "ready" to Start this Test

Press any key, return is automatically generated and the screen will display:

Enter "seek" First Cylinder Number:

Refer back to the beginning portion of HARDS8 where you specified how many cylinders you had on your system. You are going to do a seek operation between two of those cylinders. You can seek between cylinder 0 and cylinder 255 at the extreme, or cylinder 0 and cylinder 1 at minimum.

Select first cylinder number, press return, select ending cylinder number and press return again. The screen will display the following:

Do you want test Verification of the Cylinder Numbers? (y or n)

To the operator it doesn't appear to make any difference whether y or n is selected, the cylinder numbers will be displayed as the seek is performed, but if y is selected the logic of the system reads data for each cylinder. With Verification selected a BAD SECTOR display will be generated if any bad sector that has been flagged is encountered. If the head 0 and sector 0 address of the specified cylinder has not been previously flagged as a bad sector, and the I.D. block for that sector is bad, a RECORD NOT FOUND display will be generated. The system may not performing the seek operation properly. To verify that SEEK is performing properly, select another cylinder.

2.13.4 Write Entire Disk.

This function will write a two-byte character to the data block for each track of the disk. This character can be selected by the operator.

```
*****  
* WARNING: This hardest function *  
* changes data on the hard disk *  
* and may cause loss of user data *  
*****
```

To perform the write test select test 4 and press return. The warning that this test will destroy files on the hard disk will appear and you will be asked if you wish to continue. If you do, enter y and press return. You will now be asked if you wish to write a specific pattern. If you have a specific pattern which you prefer to use then enter y and press return. You will be prompted to select the pattern you wish to use. If you have no specific pattern enter n and press return. The system will then write its own character, E5H, on the disk. You will see the count, track by track, as it writes to the disk.

There are 4 different situations that could occur and the error display will vary depending on which situation does occur:

- a. Attempting to write to a sector which has been flagged earlier as being bad will cause a BAD SECTOR display.
- b. While attempting to write to a sector which has not been flagged earlier as being bad, a sector is encountered in which the ID Block CRC Bytes are bad. This will cause a CRC error display.
- c. While attempting to write to a sector which has not been flagged earlier as being bad, but the I.D. block is bad. A RECORD NOT FOUND display will be generated regardless of the condition of the CRC portion of that I.D. block.
- d. If a sector is encountered in which the sector I.D. block is good but the data block is bad, no error display will be generated. If a READ test were subsequently performed this error condition could be detected.

2.13.5 Read Entire Disk.

This function will read each sector of each track of the hard disk. This is done using a memory buffer area. Before reading a sector memory buffer has FFH written into it and as each sector is read into this buffer the contents of that sector write over the FFH that is located there. After each sector is read FFH is again written to the memory buffer and the next sector will again write over the FFH. This "flushing" of the memory buffer is done to ensure that each sectors contents are accurately read.

Select test 4 and press return. A menu of display options will be presented as follows:

Hard Disk "read" display Options are:

1. DO NOT display data if any error,
2. Display data only if a STATUS error,
3. Display data only if a COMPARE error,
4. Display data if a STATUS or COMPARE error.

Select option by number:

If option #1 is selected, the test will begin, but if any status or compare errors are encountered only the error display will be generated. The contents of the data block will not be displayed.

If option #2 is selected, the hard disk controller will send back status errors (BAD SECTOR, RECORD NOT FOUND, CRC) when the controller is unable to locate and properly identify a sector. The data block is passed unchecked but a check is made of the CRC portion of the data block for CRC errors. The contents of any sector found in error will be displayed as well as the error message.

If option #3 is selected, the operator is given the option of selecting a one or two-byte character to be used for the test as follows:

Patterns can be specified by entering:
1-for 256 byte pattern (hex $\text{FF} \dots \text{FF}$)
one or two byte pattern - enter pattern in binary, octal, decimal or hex
select pattern:

If the operator does select a pattern to be read it should the same pattern as was used if a write test was performed just before this test. This check is made by having the CPU compare the contents of the data block against the operator selected pattern.

2.13.5 --Continued.

In the event that a compare error is detected the error message will be displayed and the contents of the sector which was found in error will also be displayed. Since the data block does have a CRC area associated with it, that CRC is also checked. It is possible, but unlikely, that the data could be compared favorably, but the CRC bits be found in error. If, however, this did occur, a CRC ERROR display would be generated.

If option #4 is selected the operator will again be given the opportunity to select a pattern to be used. In this case both status and compare errors would be displayed as well as the contents of the sector found in error.

2.13.6 Set Flag Byte for a Specific Sector.

This function may be done in one of two ways:

- a. The operator can select the cylinder, head and sector to be flagged;
- b. The error map data provided by Shugart can be used.

```
*****  
* WARNING: This hardtest function *  
* changes data on the hard disk *  
* and may cause loss of user data *  
*****
```

Select test #6 and press return. The display will be as follows:

Press any Key when "ready" to start this test

The next display will be:

Hard Disk 'Flag Bad Sector' Options are:

1. Disk Error Map
2. Cylinder, Head, Sector

Make your selection and press return. If you select option 1, you will be prompted to enter TRK, HD, byte count and length (bits). Once these entries have been made and return as been pressed, the bad sector range will be displayed as follows:

Bad Sector Range: Cylinder = n: Head = n: Sector(s) = n

Do you want to continue this test? (y or n)

If you enter y you will be prompted to begin entering data for the next bad sector to be flagged. If you enter n and press return you will return to the hard disk menu and the display

....
Bad Sectors have been flagged will appear.

Please note: this function sets flags for bad sectors but it does not allocate dummy files to those sectors which you have flagged. Refer to test #8 for the procedure to use for allocating dummy files to sectors which you have flagged using this function.

2.13.7 --Continued.

Do you want to "write" specific patterns? (y or n)

If you respond y to writing specific patterns you will see:

As many as four(4) patterns may be specified, as follows:

**Enter one or two byte pattern in binary, octal, decimal or hex
press RETURN to bypass a pattern selection.
Select Pattern #1:**

Assuming you want to write E5H on the disk, enter E5H here and press return. Now press return for the other 3 options. The display will now show all 4 patterns which are going to be used in the test as follows:

**Pattern #1 revisited: E5E5H
Pattern #2 revisited 5555H
Pattern #3 revisited AAAAH
Pattern #4 revisited FFFFH
Press any key when "ready" to continue this test**

You may specify patterns for all four tests if you wish. If, for any reason, you choose not to specify a pattern to be read in pattern #1, 0000H will be used by the system.

Once you press any key, the screen will fill with the display which is used for this test. You will also hear the hard disk as the heads seek the patterns to the disk.

Notice that all patterns are shown, hard errors and soft errors are separated into individual categories. If you have bad sectors on your hard disk you will be able to see the computer record the bad sectors as it encounters them. The counter also increments as it writes from track to track. It will take quite some time to run this test in its entirety. It is a good idea to let the test run overnight, if possible. When you decide to terminate the test you must press ESC. The test will complete the pass it is presently performing.

This is a good place to define "soft" and "hard" errors. An error is considered to be a soft error when one attempt has been made, unsuccessfully, to read data. These tests will make 3 attempts to read data.

2.13.7 --Continued.

A RECAL is made between each attempt. If the read is successful on the second or third attempt then that sector had a soft error. A certain amount of soft errors is acceptable as that data is recoverable. If, however, the data is not read after 3 attempts, a hard error is declared flagged and allocated.

Those sectors which have been identified as having hard errors should be mapped by using either this test, test #7, or by using the combination of tests #6 and #8.

While the screen display was presented, if you chose to have the display on during the entire test, please notice that once the soft error count occurs 3 consecutive times the hard sector count is incremented to one and the soft error count goes back 3 places from where the hard error occurred. to 0.

You will now be asked if you wish the results printed. Make your selection and press return.

You will now be given a display which will show all soft errors and where they were found. This is a summary of the entire test. Presently, hard errors are not backed-out of the soft error summary. Again, pressing any key will now generate a display of all hard errors and where on the disk they were found.

Once again you will press any key and now the disk will be erased. During this erase process flags will be set on all the bad sectors. After erasure is completed, the display will be:

Do you want to allocate files for bad sectors? (y or n)

You will prompted for the kind of system you have (when the allocation of a dummy file is made, this tells the operating system to ignore this block and pretend that it doesn't exist) **This is applicable for CP/M and MP/M only.**

Make your selection, the return is automatically generated and the display returns to the hard disk test menu.

2.13.8 Miscellaneous Functions.

At present this selection provides three unique functions:

1. Select Disk Error "status" display option
2. Display a Sector

Option 1 allows you to alter the way displays are provided on other hard disk tests.

Option 2 allows you to display a sector on the screen, in ASCII on the right side of the screen, in HEX on the left side.

- a. Option 1: select the option by number and press return. The display will be as follows:

Do you want the Disk Error "status" message displayed? (y or n)

If you select y then no change will be made to the way in which error messages are displayed. If you select n then some of the tests will have the display deleted entirely while others will be modified such that no amplifying data on any error encountered will be displayed.

- b. Option 2: Select the option by number and press return. The displays will be as follows:

***Allocate a CPM block ***

Enter Cylinder Number: (select and press return)
Enter Head Number: (select and press return)
Enter Sector Number: (select and press return)

You will return to the test #8 menu with a display that the CP/M block has been allocated.

- c. Option 3: select option 3 and press return. The displays will be as follows:

*** Display Hard Disk Sector ***

Enter Cylinder Number: (select and press return)
Enter Head Number: (select and press return)
Enter Sector Number: (select and press return)

2.13.8 --Continued.

The contents of that sector will be displayed, in hex on the left side of the screen, and in ASCII on the right side.

To return to test #8 menu press any key.

To terminate test #8 select option 4 and press return. The display will return to the hard disk test menu.

2.13.9 Hard Test 9--Copy Diagnostics to Hard Disk.

Tests 9,10,11 and 12 pertain to non-floppy units. If the diagnostic area of the disk is not formatted, you will see the screen display:**DIAGNOSTIC AREA SECTOR 0 NOT FORMATTED.**

If your diagnostic area is formatted, you will see the screen display:

1. COPY DIAGNOSTICS FROM TAPE TO HARD DISK
2. COPY DIAGNOSTICS FROM DISKETTE TO HARD DISK
3. REFORMAT HARD DISK DIAGNOSTIC AREA AND COPY DIAGNOSTIC FROM TAPE
4. REFORMAT HARD DISK DIAGNOSTIC AREA AND COPY DIAGNOSTIC FROM DISKETTE

SELECT REQUIRED FUNCTION BY NUMBER:

Select the function and procede with the copy onto the hard disk.
....**DIAGNOSTIC AREA CLEAR COMPLETED**

COPYING FROM TAPE:

•
•
•
•
•

.... **DIAGNOSTIC COPY COMPLETED**

After the diagnostics are copied onto the hard disk, you will return to the HARDS8 Menu.

2.13.10 Hard Test 10--Initialize Hard Disk System Track.

Your system should have the OASIS operating system on it as well as the diagnostics. To initialize the Hard Disk system track for CP/M and MP/M, select Option 10. The screen will display the following:

*****Diagnostic Area Not Defined (Track 0, Sector 0)**

To the prompts below input the following values:

Enter Diagnostic Cylinder Number: 250 <CR>

Enter Diagnostic Head Number: 0 <CR>

Enter Number of Diagnostic Tracks: 24 <CR>

Enter Operating System Type (Number) 0 <CR>

At this point it is not necessary to specify an operating system; However, to complete the test you must enter a value (0,1,2, or 3). If you do not wish to specify the operating system, enter 0. If you enter 1, you are specifying CP/M; entering 2 specifies MP/M and entering 3 specifies OASIS.

When the test is completed, you will see the following display:

....System Track Initialization Completed

The Hard Disk (8") Test Facility will again come on the screen.

2.13.11 Hard Test 11--Copy System to Hard Disk

This function allows you to initialize the hard disk with a CP/M or MP/M operating system. When you select test 11 of HARDS8, one of two prompts will appear:

PROMPT 1

1. Copy System from Tape to Hard Disk
2. Copy System from Diskette to Hard Disk

Select required function by number:

If you receive the above two prompts, proceed with the test.

PROMPT 2

ENTER DIAGNOSTIC CYLINDER NUMBER: <CR>
ENTER DIAGNOSTIC HEAD NUMBER: <CR>
ENTER NUMBER OF DIAGNOSTIC TRACKS: <CR>
ENTER OPERATING SYSTEM TYPE (NUMBER):<CR>

If you receive the above 4 prompts, do not go any further until you consult with your distributor or Altos Customer Service 408-946-6700.

PROCEED WITH THE TEST

Currently, the facility only allows you to copy the system from the tape unit, so select option 1. Before pressing return, remove the **diagnostic loader** tape and place the **system** tape into the drive. Wait for menu to display. Reset the computer and allow the boot from the hard disk. You should receive the MP/M prompt **0A>**

Note that since there are no floppy drives on the ACS8000-10/MTU the drive designations on the hard disk are as follows:

- a. Logical drives A and B are associated with the first hard disk. Drive A has a formatted capacity of approximately 8 MBytes. Drive B has a formatted capacity of approximately 290 KBytes.
- b. Logical drives C and D are associated with the second hard disk. Drive C has a formatted capacity of approximately 8 MBytes. Drive D has a formatted capacity of approximately 290 KBytes.

2.13.12 Hard Test 12--Assign Diagnostic Area.

If you must assign a new diagnostic area on the hard disk, select test 12. You will see the following display:

```
CURRENT DIAGNOSTIC AREA
CYLINDER:    250*    HEAD: 0*    NUMBER OF DIAGNOSTIC TRACKS: 24*
OPERATING SYSTEM:    N*

DO YOU WISH TO CHANGE THE CURRENT DEFINITION (Y or N):
<CR>
```

* these values are standard.

If you entered Y to the above prompt, the following prompts will appear on the screen:

```
ENTER DIAGNOSTIC CYLINDER NUMBER:
ENTER DIAGNOSTIC HEAD NUMBER:
ENTER NUMBER OF DIAGNOSTIC TRACKS:
...DIAGNOSTIC AREA ASSIGNMENT COMPLETED
```

After this test is successfully completed, you will be given the HARDS8 menu on the screen.