



Computer System ACS8000-10 User Manual

February 1982

ALTOS COMPUTER SYSTEMS

ACS 8000-10

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 8000-10 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 2-34.

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SCHEMATICS

8500 CPU PCB SCHEMATICS

8" HARD DISK CONTROLLER SCHEMATICS

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REAR PANEL I/O PCB SCHEMATIC

SHUGART SCHEMATICS

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ALTOS COMPUTER SYSTEMS

ACS8000-10

COMPUTER SYSTEM

USER'S MANUAL

1. INTRODUCTION.

The ALTOS ACS8000-10 (Figure 1-1) is a multi-user computer system in a single-chassis unit. It is equipped with a Snugart 10-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.

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

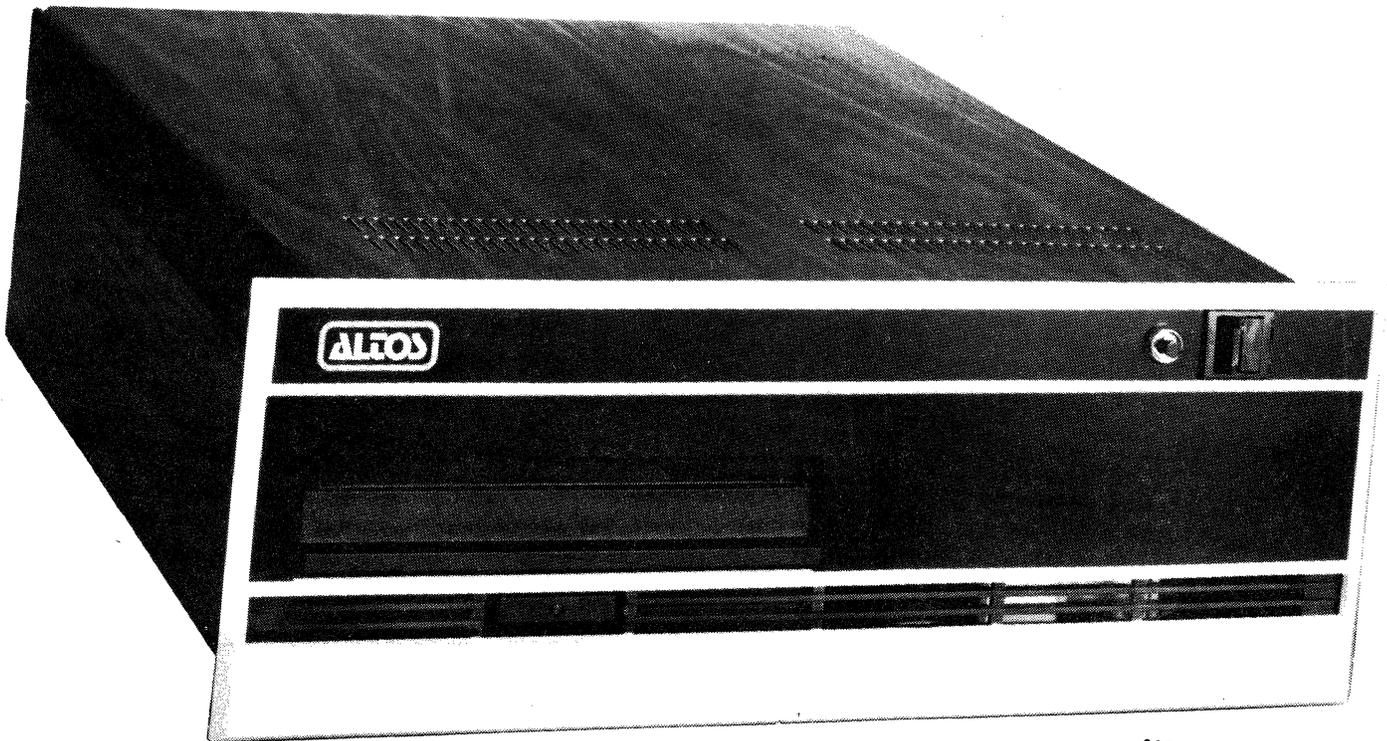
Width (inches)	Length (inches)	Height (inches)	Weight (pounds) (Installed)
19	22	7	80

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.



8000 - P002

Figure 1-1. ALTOS ACS8000-10 Computer System

1.1 Unpacking and Installing your Computer.

Included with your Computer are the following items:

- Three-pronged power cord, #230-10223
- Fuse
 - 3A for 115-volt System, #140-10732
 - 1.5A for 230-Volt System, #140-10731
- 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. With the bottom plate off, remove the screw and locking bracket for the eight-inch hard disk spindle motor. Figure 1-2b, item 5 shows the location of the locking bracket and screw. The bracket and screw must be re-installed anytime the system is moved (See subsection 1.3 for packing and shipping instructions.) Store the locking bracket and screw in a safe place.
- e. 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).
- f. Carefully turn the unit to its upright position and proceed with installation (See subsection 1.2).

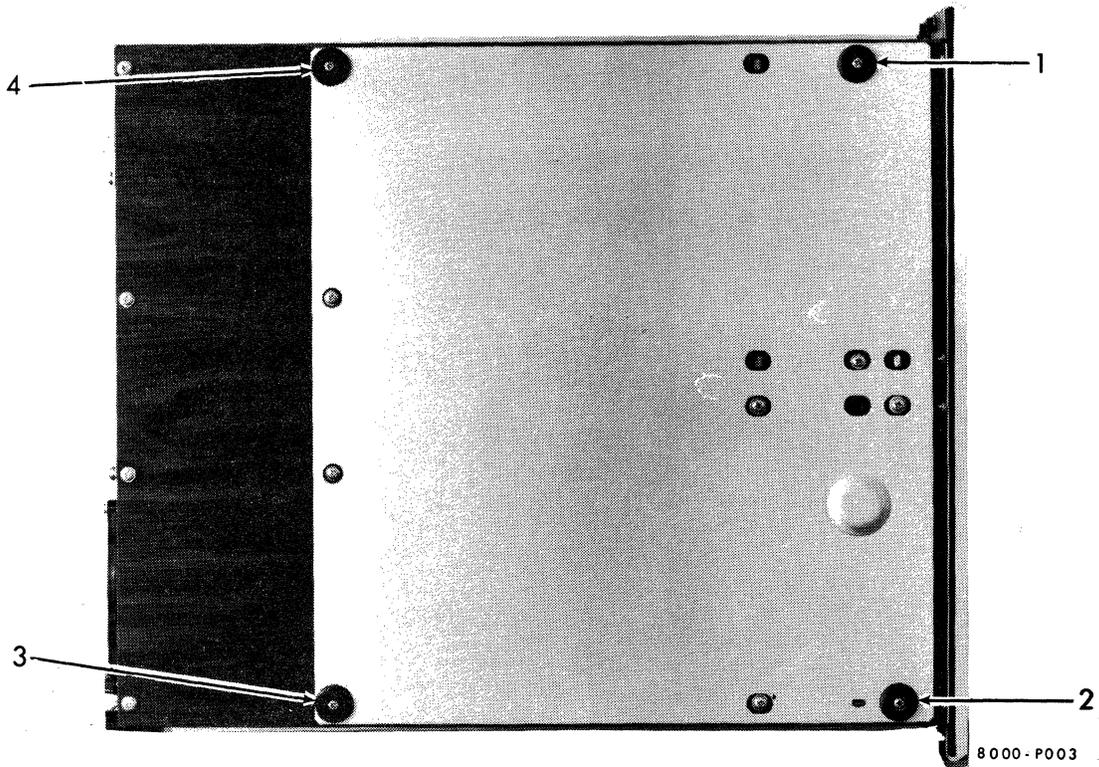


Figure 1-2a. ACS8000-10 Computer with Bottom Plate Mounted

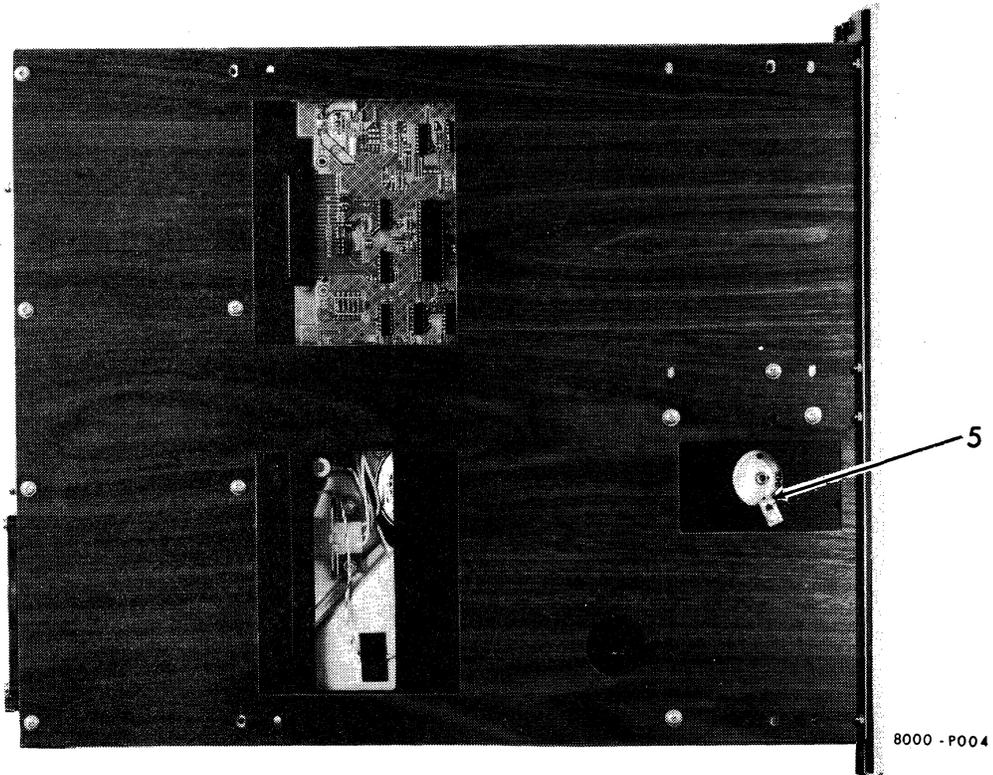


Figure 1-2b. ACS8000-10 Computer with Bottom Plate Removed and Locking Bracket and Screw Exposed

1.2. Installation and Checkout.

Setup the ACS8000-10 computer system for operation in the following manner:

- a. Verify the power specifications for the ACS8000-10 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. Install the three-pronged power cord provided with your system. (It will fit only one way).

1.2.1. Console Terminal 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. Refer to Section 2 "THE 8500 CPU PRINTED CIRCUIT BOARD (PCB)" for the Serial and Parallel Port Assignments.

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.

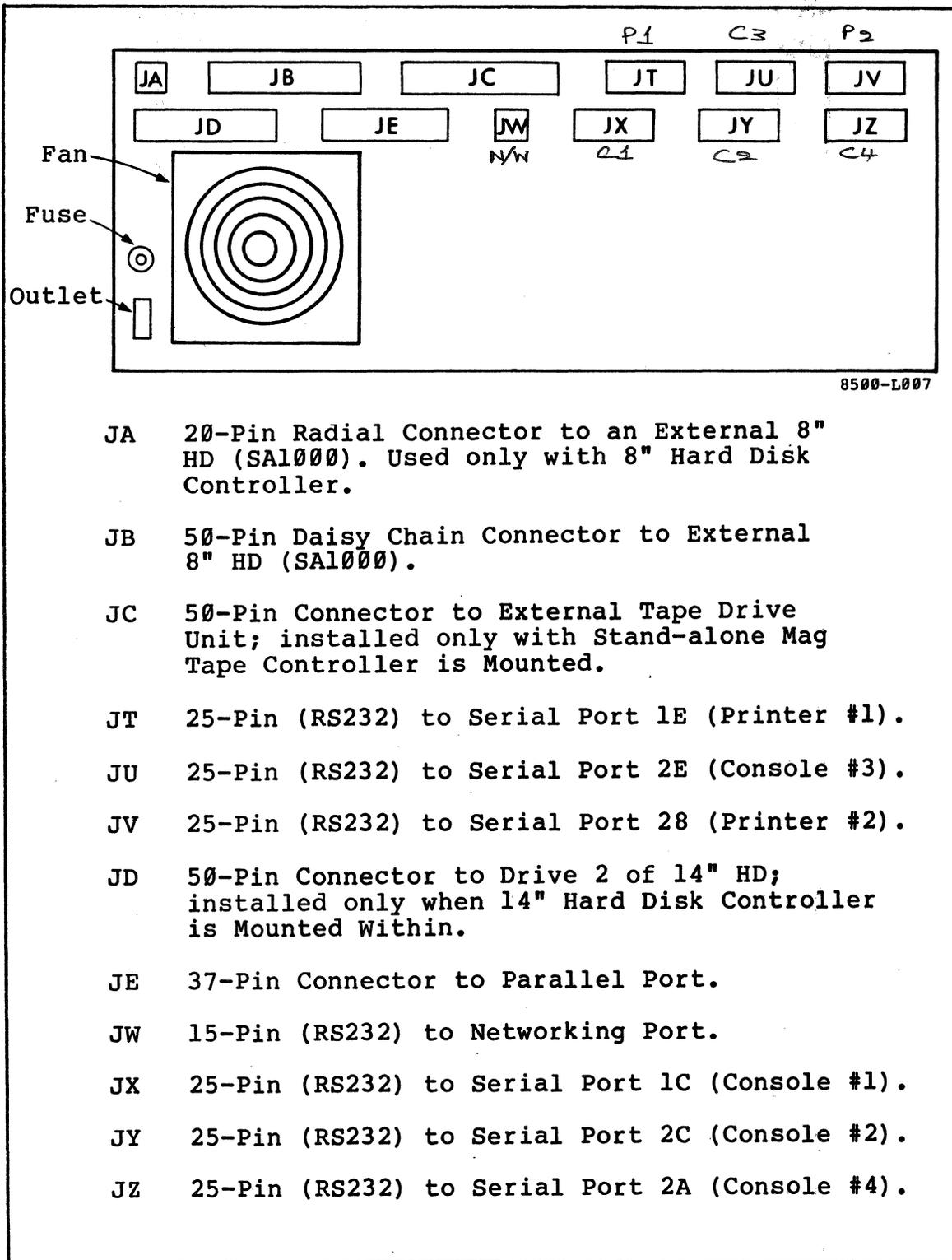


Figure 1-3. Rear Panel Connectors



Figure 1-4. Disk Insertion on the ACS8000-10 Computer

1.3 Packing/Shipping.

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

- a. Ensure that there is no floppy disk 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 over so that the top is face down on a non-abrasive work surface.
- d. Remove the four (4) screws that hold the rubber feet in place. This allows removal of the bottom cover plate. Refer to Figure 1-2a.
- e. With the bottom cover plate removed, you will have access to the eight-inch hard disk spindle. (Refer to Figure 1-2b.) You must rotate the pulley in a clockwise direction so that the hole that holds the locking bracket is lined up and allows installation of the locking bracket and the screw that secures it. DO NOT rotate the pulley in a counterclockwise direction as you will damage the hard disk.
- f. Once the locking bracket and screw are in place and secure, place the bottom cover plate on the unit and re-install the rubber feet using the screws that were removed earlier (see item d above).
- g. 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.

NOTE: IMPROPER SHIPPING COULD VOID WARRANTY!

1.4 Bringing up 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 terminal 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 diskette 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 only talk on reset to terminal #1. Terminal #1 should be set 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 still 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 ACS8000-10 Computer allows you to address up to four logical floppy disk drives, and up to 2 eight-inch hard disks drives. The ACS8000-10 Computer addresses single-sided floppy disk drive. The logical floppy drive designations are A, B, C and D. The hard disk logical drive designations are E, F, G, and H.

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

1.6 System Configuration.

1.6.1. 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 1-5. Figure 1-6 shows the system hardware configuration jumper options.

1.6.2. 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.

1.6.3. 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. The networking port is not presently used. Figure 1-8 shows the proper jumper configuration.

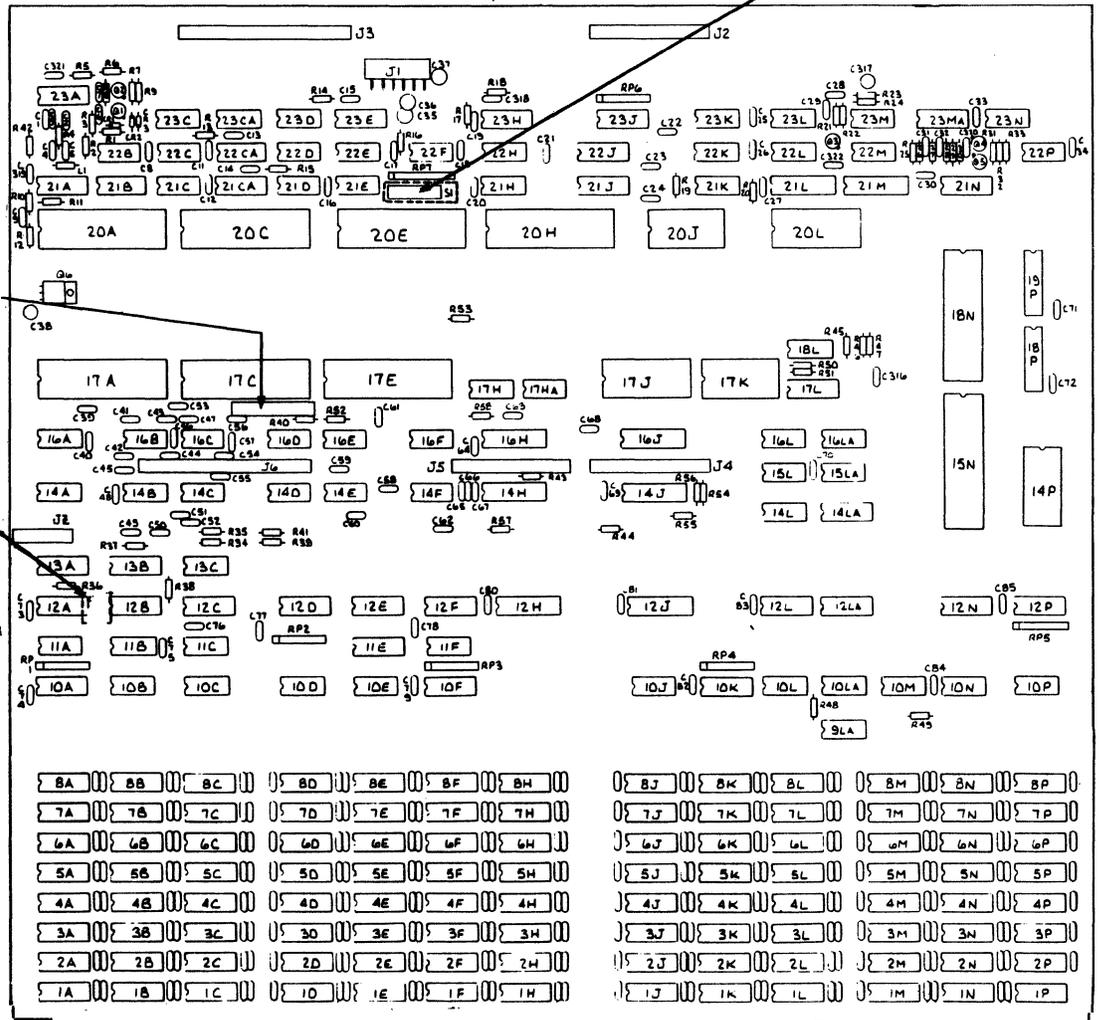
1.6.4 Eight-inch Hard Disk Controller.

Figure 1-9 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**

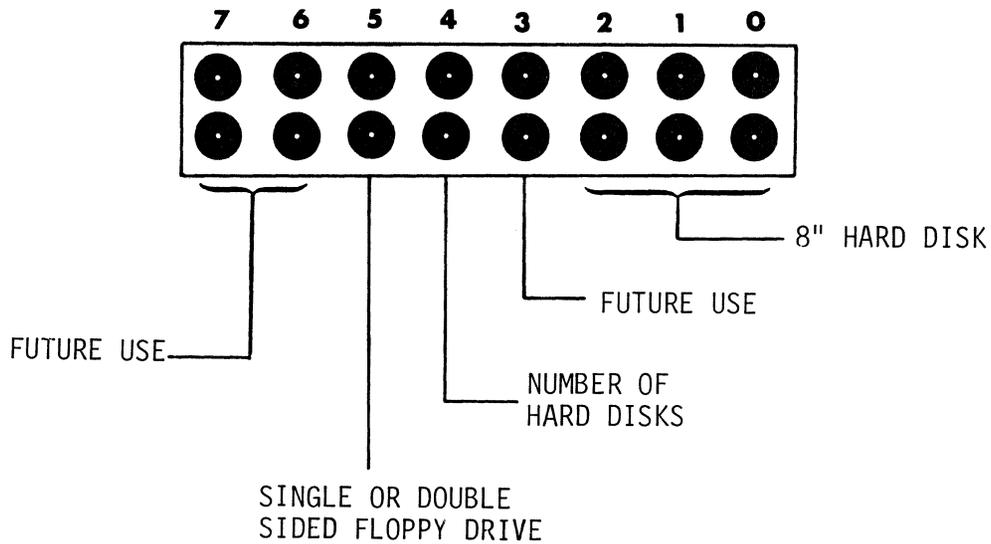
**SOFTWARE
CON-
FIGURATION
(MATRIX
POSITION
21P)**

**CONSOLE #2
ENABLE
CONFIGURATION
MATRIX
POSITION 16C/D**



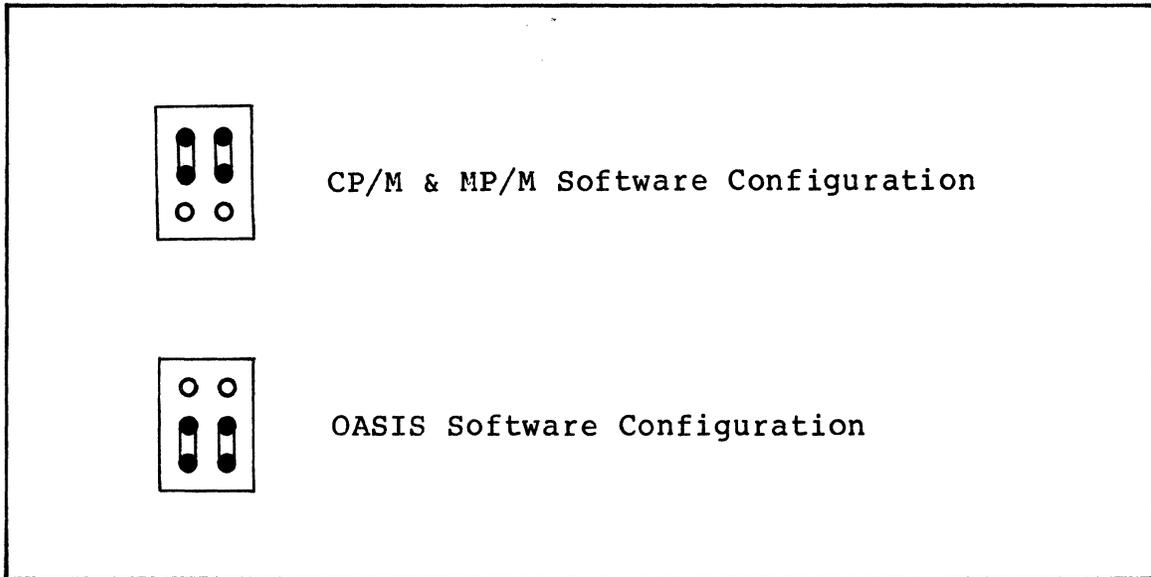
Start Address 0000 4000 8000 C000
End Address 3FFF 7FFF BFFF F8FF

Figure 1-5. 8500 PCB Matrix Map Highlighting Hardware, Software and Multi-User Configuration Block Options



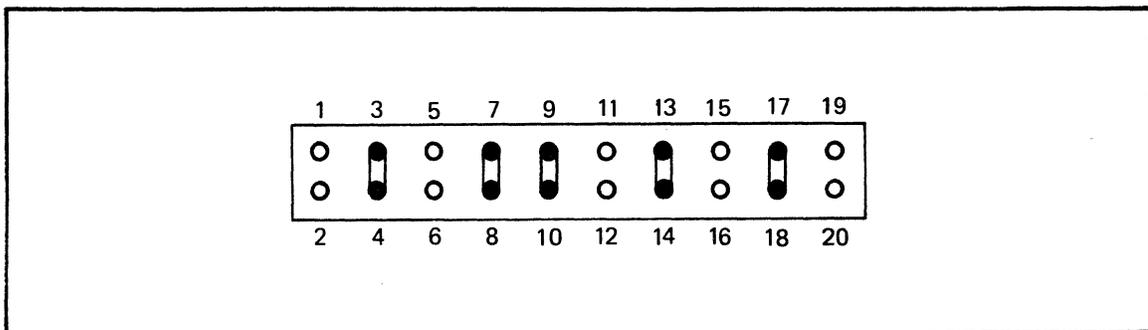
PIN NUMBER	MEANING
0,1,2	Designates Hard Disk Family: $\begin{array}{ccc} \underline{2} & \underline{1} & \underline{0} \\ \circ & \circ & \circ \\ \circ & \circ & \circ \\ \circ & \circ & \circ \end{array}$ Not Jumpered for SA1000 Family (8" Hard Disk) $\begin{array}{ccc} \circ & \circ & \circ \\ \circ & \circ & \circ \end{array}$ Not currently used
3	Reserved--Must <u>Not</u> be Jumpered
4	Designates number of Hard Disk Drives; $\begin{array}{c} \underline{4} \\ \circ \\ \circ \\ \circ \end{array}$ Not jumpered for one (1) Hard Disk $\begin{array}{c} \circ \\ \circ \\ \circ \end{array}$ Jumpered for two (2) Hard Disks
5	Designates Number of Sides on Floppy Disk Drive(s) $\begin{array}{c} \underline{5} \\ \circ \\ \circ \\ \circ \end{array}$ Not Jumpered for Single-sided Drive(s) $\begin{array}{c} \circ \\ \circ \\ \circ \end{array}$ Jumpered for Double Sided Drive(s)
6,7	Reserved--Must Not be Jumpered

Figure 1-6. 8500 CPU PCB S1 Hardware Configuration Block Option (Matrix Position 21P)



8500CPU-L008

Figure 1-7. Software Configuration Matrix
(Position 12A/B)



8500CPU-L009

Figure 1-8. S13 Multi-user/Networking Port Configuration Jumper Block (Matrix Position 16C/D)

Frontal View of PCB

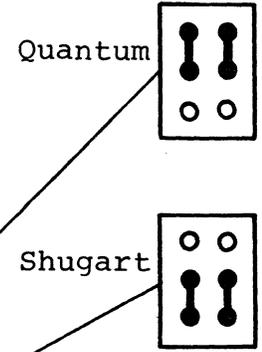
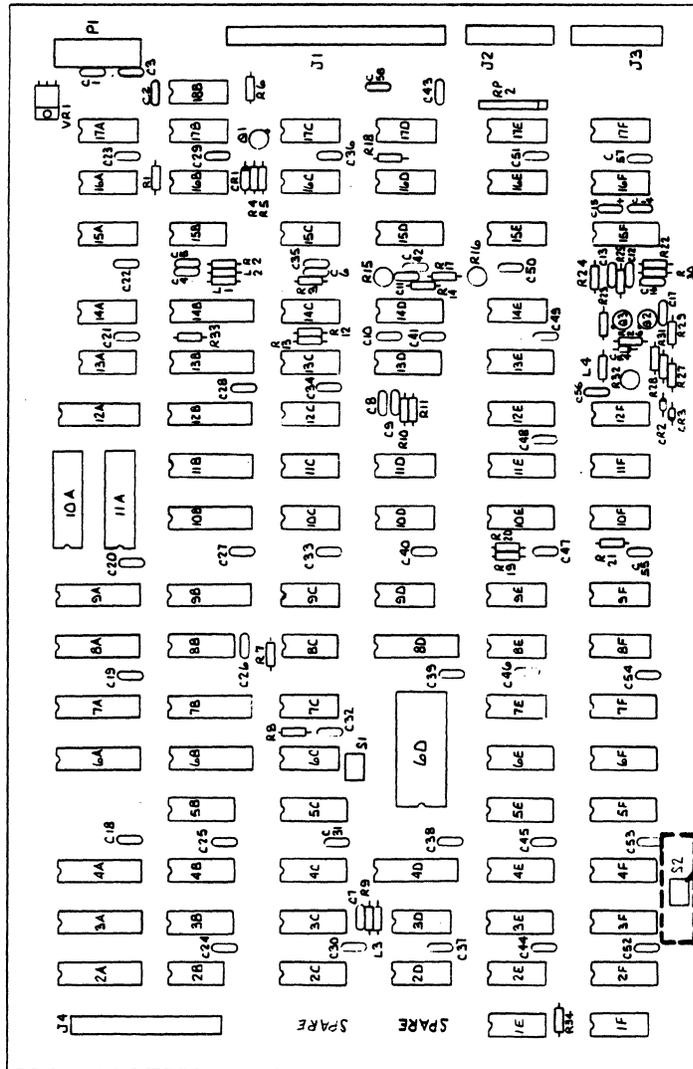


Figure 1-9. Eight-inch Hard Disk Controller Board Highlighting the S2 (Matrix Position 3/4G) Sector Size Configuration.

2. ALTOS DIAGNOSTIC EXECUTIVE (ADX) VERSION 2.3F.

Included with your system is the ALTOS Diagnostic Executive (ADX) Disk, version 2.3F. This version is to be used only on ACS8000-10 system. The disk is serialized and comes 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 diagnostics 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 ACS8000-10 Computer System.

ADXSETUP FLPYFORM BOOTCOPY FLPY

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

2.2 ADXSETUP Utility.

This utility is used to specify baud rates for the console terminal, printer and auxiliary port. You will specify the default density for the floppy drives and specify that you have single-sided floppy disk drives. After the screen displays the command menu, select ADXSETUP as follows:

REQUEST: ADXSETUP

<CR>

The screen will display the following:

```
ALTOS COMPUTER SYSTEMS
BOOT SETUP PROGRAM, VERSION
SELECT BAUD RATE FROM FOLLOWING LIST FOR CONSOLE #1

0  DON'T CHANGE CONSOLE BAUD RATE
1  110 BAUD
2  300 BAUD
3  600 BAUD
4  1200 BAUD
5  2400 BAUD
6  4800 BAUD
7  9600 BAUD
```

Select the baud rate applicable to your terminal by the list item number. The ALTOS system requires that console terminal #1 have a 9600 baud rate. After you have made your selection press return. You will be prompted for the baud rates for consoles #2 and #3 and #4 together.

The next display will prompt you to select the baud rate for the printer as follows:

```
SELECT PRINTER BAUD RATE FROM FOLLOWING LIST

0  CENTRONICS PRINTER (PARALLEL PORT)
1  110 BAUD
2  300 BAUD
3  600 BAUD
4  1200 BAUD
5  2400 BAUD
6  4800 BAUD
7  9600 BAUD
```

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)
```

On your ACS8000-10 you can only use single sided diskettes, so select option 1.

**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.

2.3 FLPYFORM Utility.

This command allows the user to (1) format floppy disks prior to using them for the first time, or (2) reformat a disk that has been previously formatted. Note that anytime you format a floppy disk you erase all data on that disk. You will be able to format floppy disks for either single, blocked (512 byte sectors) double-density or unblocked (128 byte sectors) double-density and perform formatting on any logical drive, A, B, C or D. You must refer to your ADXSETUP routine and the density mode you established for the floppy drive when formatting a blank diskette. Be extremely careful that you do not accidentally format the diagnostic disk. To execute FLPYFORM follow the procedure below.

Insert the diagnostic disk in the drive. Press the reset button on the front panel. Select FLPYFORM as follows:

REQUEST: FLPYFORM <CR>

The screen will display the following:

**....ALTOS FLOPPY DISK FORMAT ROUTINE...
VERSION 2.00**

- 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 WITH 512 BYTE SECTORS FOR CP/M AND MP/M**
- 5. END THIS PROGRAM**

SELECT FORMAT OPTION BY NUMBER

Again you must know the drive density you selected during ADXSETUP and select appropriate option by list item number; press return. The screen will display the following:

**PLACE DISK TO BE FORMATTED IN AVAILABLE DRIVE
REMOVE DIAGNOSTIC DISK IF NECESSARY.
WHEN READY TO PROCEED,
REPLY WITH DRIVE LETTER:**

Insert the blank disk into the drive; close the loading door, enter the drive designation on the terminal and press return. Your disk is now being formatted. When the task is complete, the screen will display the following:

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**

2.4 BOOTCOPY Utility--One Floppy Disk Drive.

The BOOTCOPY utility is designed for systems that have only one floppy disk drive. However, this utility will work just as well on systems with two or more floppy disk drives. It allows you to copy the operating system tracks, 0 and 1, from a source disk such as the operating system disk, to any object disk that has been properly formatted. The object disk should be in the same density as the source disk. If you have one floppy disk drive and one or more hard disk drives, follow the procedure below.

Format a blank disk using the FLPYFORM utility discussed in subsection 2.3. This will now be the object disk. To perform the BOOTCOPY operation you will need the diagnostic disk, a source disk and the object disk.

Insert the diagnostic disk into drive A. Select BOOTCOPY as follows:

```
REQUEST: BOOTCOPY          <CR>
```

The screen will display the following:

```
BOOTCOPY version 2.00
```

```
SOURCE ON A:  
TYPE <CR>
```

When this prompt is given, remove the diagnostic disk and place the source disk in the drive; Press return. You will then be prompted to remove the source disk from drive A and insert the object disk as follows:

```
OBJECT ON A:  
TYPE <CR>          <CR>
```

```
BOOTCOPY COMPLETE  
INSERT DIAGNOSTIC DISK
```

NOTE: At this point the object disk contains system tracks 0 and 1. It does not contain data tracks. If you wish to transfer data from the system disk onto the object disk, follow the PIP procedure outlined in the ALTOS Computer Systems current version of CP/M, or the ALTOS Computer Systems current version of MP/M copy or transfer data from the source disk to the object disks.

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 ACS8000-10 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, double-sided source disk, your object disk must also be double-density, double-sided. 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:>
```

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[\]^_  
`abcdefghijklmno  
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 1-5, 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 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 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 cylinders per drive ("1" =256; "2" = 512) <CR>
Enter Number of Heads   ("2", "4", "6", or "8") <CR>
Enter Sector Size       ("1" = 256, "2" = 512) <CR>
```

***** 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 hardtest 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 00FF)

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 proceed 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.