



ALTOS 580 Computer System

ADX Diagnostic Manual

ALTOS 580 COMPUTER SYSTEM

ADX DIAGNOSTIC MANUAL

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ALTOS Manual Number: 690-13593-002

January 1984

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CHAPTER 1:
GENERAL INFORMATION

1.1 INTRODUCTION

This manual provides information on loading and executing the Altos 580 Computer System Diagnostic Executive programs (ADX). The ADX diagnostic package consists of a series of menu driven utility and verification programs. Utility programs are used for formatting, copying, and specifying baud rates. Verification programs test:

- Random Access Memory (RAM)
- Printer Interface
- Floppy Diskette Drive
- Hard Disk Drive
- Magnetic Tape Unit

Both utility and verification programs reside on the Altos 580 ADX master diskette that is shipped with each system.

1.2 DOCUMENTATION

The Altos 580 Computer System ADX Diagnostic Manual contains the following eight chapters.

Chapter 1 General Information: This chapter provides general information regarding the Altos ADX package and other diagnostic capabilities that accompany the Altos 580 Computing System. It also supplies a recommended execution sequence for the ADX programs and the initial instructions required to load the ADX programs from the Altos supplies ADX diskette.

Chapter 2 Utilities: This chapter describes the utility programs on the ADX diskette and gives the loading and execution procedures for each utility.

Chapter 3 Floppy Disk Drive Verification: This chapter gives the loading and execution procedures for verifying the operation of the hard disk drive.

Chapter 4 Hard Disk Verification: This chapter gives the loading and execution procedures for verifying the operation of the hard disk drive.

Chapter 5 Random Access Memory (RAM) Verification: This chapter gives the loading and execution procedures for verifying the RAM memory.

Chapter 6 Printer Verification: This chapter gives the loading and execution procedures for verifying the printer interface.

Chapter 7 Magnetic Tape Unit (MTU) Verification: This chapter gives the loading and execution procedure for verifying the operation of the magnetic tape unit.

Chapter 8 Error Messages: This chapter supplies a brief description of error codes that may be encountered because of hardware failure during diagnostic test execution.

NOTE

This manual should be read carefully before attempting to load or execute ADX programs.

1.3 RECOMMENDED TEST SEQUENCE

Each of the ADX programs may be executed independently as required by the user. However, upon receipt of a new Altos 580 Computer System, there is a recommended test sequence that verifies proper machine operation. This series of tests should be executed prior to any attempt to install an operating system.

Test Sequence:

1. Load the floppy verification program (MFT) as described in Chapter 3. Select and execute the Reliability Test for at least four passes. After these tests run successfully, make two backup copies of the ADX diskette. Store the ADX master diskette in a secure location and proceed to execute the remaining tests using one of the copies.
2. Load and execute the RAM verification test (MEMTEST) as described in Chapter 5. Two passes of tests one through six should be run.
3. Load and execute the hard disk read/write error test from the Hard Disk TEST FACILITY menu. The routine resides in the ADX program HARDS5. Instructions for using this program are located in Chapter 4.

This series of tests provide a basic system checkout. Peripheral systems (hard disk, printer, or magnetic tape unit) may be verified (Chapter 4, 6, and 7) after the operating system has been loaded.

1.4 DATA ENTRY CONVENTIONS

Throughout this manual, certain data conventions are used to indicate instructions to the user on how to enter responses to screen prompts. These conventions include:

1. When a response is indicated in the text, it will appear in boldface type. Thus, if the user is to enter a Y it would appear in the text as "enter **Y**"; or if the key to be pressed is named, "press the **Escape key**". In some cases the user response is an enclosed mnemonic, <CR> to indicate that the return key should be pressed.

Example:

Reply Y or N <CR>

2. Alphabetic data may be entered in upper or lower case letters; thus, either **C <CR>** or **c <CR>** is acceptable.
3. Pressing the return key usually stores the data that has been previously entered. Occasionally, the data is automatically entered when a key is pressed to make a selection from a menu and a <CR> is not required. Entering <CR> as a response to a prompt has the effect of entering a 0 for a numerical prompt, or a No to a Y/N prompt.
4. To erase the last character typed, use the Control-H (**CTRL H**).
5. To erase an entire entry, use the **RUBOUT** or Delete **DEL** key.

1.5 LOADING THE ADX PROGRAM

The following is a step-by-step procedure for loading the ADX program into the Altos 580 Computer System.

1. Turn the Altos system and terminal power ON/OFF switches to ON.
2. If the system is an Altos 580-10, -20, -30, or -40; the following message and prompt will be displayed on the terminal screen:

```
ALTOS COMPUTER SYSTEMS  
MONITOR VERSION 7.02
```

```
Self test completed
```

```
Press any key to interrupt Boot operation
```

If no key is pressed, the system will automatically attempt to boot from the hard disk drive. In this case the following message will appear on the terminal screen.

```
Booting from Hard Disk
```

Pressing any key in response to the initial prompt results in the following being displayed on the terminal screen.

```
Enter 1 to Boot from Hard Disk  
Enter 2 to Boot from Floppy Disk
```

Enter 2 to boot from the floppy diskette. The ADX program cannot be booted from the hard disk. The system will now display the following:

```
Booting from Floppy Disk
```

```
Insert Floppy Disk for Autoload
```

- 2a. If the system is an Altos 580-2, the boot sequence results in the following message and prompt being displayed after power-up.

```
ALTOS COMPUTER SYSTEMS  
MONITOR VERSION 7.02
```

```
Self test completed
```

```
Booting from Floppy Disk
```

```
Insert Floppy Disk for Autoload
```

3. Insert the master ADX diskette as shown in Figure 1-1. The system displays the ADX directory and the **REQUEST** prompt on the terminal screen.

```
Altos ADX 3.00
Hard disk drive #1 not available for CP/M
ALTOS DIAGNOSTIC MONITOR VERS 3.2
```

```
* * * DIAGNOSTIC COMMAND DIRECTORY * * *
```

```
ADXCOPY   COPY       BOOTCOPY   MFT
MEMTEST   PRNTEST   MFORMAT   ADXSETUP
HARDS5    ATD
```

```
REQUEST:
```

4. Enter the appropriate program by typing the program name followed by a carriage return **<CR>**. The function of each of the programs is described below.

- ADXCOPY** This utility allows copying the diskette when there is only one floppy drive (Models 580-10, -20, -30, and -40). The utility makes an image copy of the diskette and may be used on either double or single density diskette drive systems.
- ADXSETUP** This utility is used to specify baud rates for the console, terminal, printer and auxiliary port.
- BOOTCOPY** This utility copies the autoboot system tracks (0 and 1) from a source diskette to any object diskette that has been previously formatted.
- COPY** This utility makes an image copy of the diskette and verifies cylinder addresses. To use this utility requires two floppy disk drives and is therefore restricted to use on the model 580-2.
- MFORMAT** This utility formats diskettes having 80 tracks (at 96 tracks per inch), double density, double sided, and soft-sectored.
- MFT** This program tests the basic mechanical functions and the media integrity of the floppy diskette drive.
- HARDS5** A collection of hard disk utility and test routines. Utilities include the formatter and a routine to flag bad sectors. Diagnostics include quick tests, fault isolation tests, and long exercise routines.
- MEMTEST** This diagnostic test routine tests RAM memory and memory bank switching.

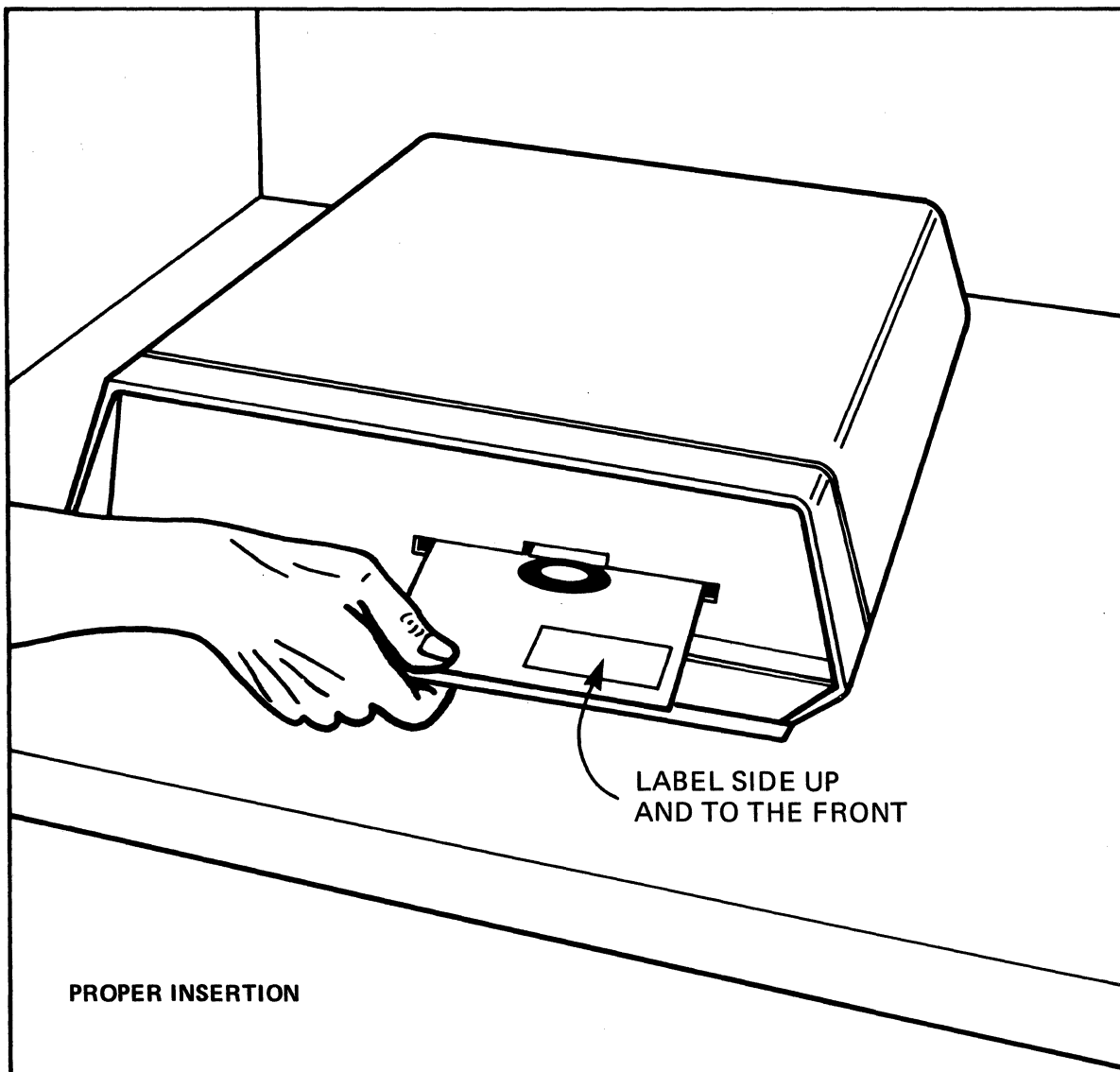


Figure 1-1. Inserting Floppy Diskette

PRNTEST This diagnostic test routine verifies that the I/O communication through the serial and parallel printer ports is functioning properly.

ATD This diagnostic program tests the integrity of the tape media and the basic mechanical functions of the magnetic tape drive.

To load and execute the utility programs listed in the Diagnostic Command Directory, refer to Chapter 2. To run the diagnostic tests listed in the Diagnostic Command Directory, refer to the appropriate chapter listed in the table of contents.

2.1 INTRODUCTION

There are five utility programs for the Altos 580 Computer System. The purpose of these programs are given in paragraph 1.5 and consist of the COPY utility, ADXCOPY utility, BOOTCOPY utility, MFORMAT utility, and the ADXSETUP utility. Procedures for executing each of these utilities is given in the following paragraphs.

The Hard Disk utilities have been integrated into the hard disk diagnostic (HARDS5) menu and are listed as test 1 Format Disk Drive and test 6 Set Flag Byte for a Specific Sector. Procedures for executing these utilities are covered in Chapter 4 Hard Disk Verification.

To use the ADX utility programs, load the ADX diskette as described in Chapter 1. When the master diagnostic menu is displayed on the terminal screen, proceed to the appropriate section in this chapter and follow the instructions.

2.2 COPY UTILITY

The COPY utility performs a track-by-track copy of a 5-1/4 inch diskette and can only be executed by a system having two floppy disk drives (i.e., Model 580-2). It requires a source diskette and a previously formatted object diskette. To use the COPY utility, follow the procedure given below.

1. Load the ADX Executive Diagnostic diskette (after the system has been booted up) into drive A (right hand drive) and press the system reset pushbutton. The ADX Command Directory is displayed on the terminal screen, paragraph 1.5. Enter **COPY <CR>** after the REQUEST prompt. The terminal screen will display:

ALTOS 5-1/4 Inch Disk Copy Program -- V1.1

Insert diskette to be read from in drive A

Insert diskette to be written to in drive B

Type return

2. Remove the ADX diskette and insert the diskette to be copied in the right hand drive (drive A). Insert the formatted object diskette in the left hand drive (drive B) and press the **RETURN** key on the keyboard. The system responds by displaying the diskette cylinders as they are copied.

Copying Cylinder XX

Where XX is a cylinder number from 0 to 79. When the program is done it asks:

DO YOU WANT TO REPEAT, (Y/N)

If **Y** (yes) is selected, the program repeats the previously described sequence. If **N** (no) response is selected, the program returns to the Diagnostic Command Directory (ADX diskette must be in drive A).

3. At this point, remove the newly copied diskette from drive B and label it.

2.3 ADXCOPY UTILITY

The ADXCOPY utility program copies information from one diskette to another and was designed for a single floppy drive system such as model 580-10, -20, -30, or -40. The program assumes that all useable data is compressed to the beginning of the diskette and therefore copies only those tracks with useable data. The program does not attempt to copy beyond the first cylinder containing the null data E5. When using the ADXCOPY utility follow the procedures given below.

1. Load the ADX Executive Diagnostic diskette after the system boots up (paragraph 1.5). The ADX Command Directory is displayed on the terminal screen. Enter **ADXCOPY <CR>** after the REQUEST prompt. The terminal screen displays:

ALTOS ADX Disk Copy Program -- Version 1.1

Please insert diskette to be read from

Then press return key

2. Press the **RETURN** key. The system will respond by counting the diskette cylinders as they are read:

Reading cylinder XX

Where XX is a cylinder from 0 to 79.

3. The ADXCOPY procedure reads as many cylinders as possible from the source disk into memory. After the maximum number of cylinders have been read the terminal screen will display:

Please insert diskette to be written to

Then press return key

4. Remove the source diskette from the drive and insert a formatted blank diskette. Press the **RETURN** key. The system will respond by counting the diskette cylinders as they are written to the object diskette.

Writing cylinder XX

Where XX is a cylinder number from 0 to 79.

The ADXCOPY procedure reads as many cylinders as possible from the source diskette into memory and then writes these files to cylinders on the destination diskette that has been inserted into the drive. Because there is a limit to the number of cylinders of information that can be placed into memory at one time, it may be necessary to read only part of the source diskette into memory and then write that

information out to the destination diskette. The operation is repeated, putting the source diskette back into the drive to allow the remaining tracks to be read and then copied.

4. After all cylinders have been written (repeating steps 2 and 3 if necessary) the following prompt will appear:

Do you want to copy another diskette? (Y/N)

If **Y** (yes) is selected, the program repeats the previously described sequence. If **N** (no) is selected the program returns to the Diagnostic Command Directory (ADX diskette must be in drive).

2.4 BOOTCOPY UTILITY

The BOOTCOPY utility program copies the autoboot tracks (0 and 1) from a source diskette to any object diskette that has already been formatted and requires only one disk drive. To use the BOOTCOPY utility, follow the procedure given below.

1. Boot from the ADX Executive Diagnostic diskette. The ADX Diagnostic Command menu (paragraph 1.5) will be displayed on the terminal screen. Enter **BOOTCOPY** after the REQUEST prompt, the terminal displays the following:

ALTOS 5-1/4 Inch Boot Copy Program -- V1.1

Insert diskette to be read from in drive A

Press return key

2. After the diskette has been read, a prompt to exchange diskettes and press the RETURN key is given.

Insert diskette to be written to in drive A

Press return key

3. Upon completion of the boot copy, the system prompts:

Do you want to repeat, (Y/N)

If **Y** (yes) is selected, the program repeats the previously described sequence. If **N** (no) is the response selected, the program returns to the Diagnostic Command Directory (ADX diskette must be in drive A).

2.5 MFORMAT UTILITY

The MFORMAT utility program either formats or reformats diskettes. When used, the program erases all data stored on the diskette, therefore caution should always be used when reformatting an old diskette. To use the MFORMAT utility, follow the procedures given below.

1. Boot the ADX Executive Diagnostic diskette in drive A (paragraph 1.5). The ADX Command Directory is displayed on the terminal screen. Enter **MFORMAT** after the REQUEST prompt. The terminal screen displays:

ALTOS 5-1/4 INCH FLOPPY FORMAT FACILITY -- V1.1

Insert diskette to be formatted in available drive

Remove system disk if necessary

Enter drive letter to continue A/B?

2. Insert the blank diskette into the drive and close the loading door. Type **A** or **B** for the appropriate drive designation. The system responds by counting the diskette cylinders as they are formatted.

Cylinder XX

Where XX is a cylinder number from 0 to 79. If the wrong drive letter (e.g., selecting drive B in a single drive system) the following message is displayed on the screen.

**HOME ERROR.....PROGRAM ABORTED
ERROR DETECTED ON WRITE.....ABORT**

Would you like to format another diskette? Y/N

3. After completing the format for cylinder 79, the utility will verify the format task by reading every sector on the diskette.

**Disk Format Complete
Press Any Key to Abort Verify**

Verifying Cylinder XX

Where XX is a cylinder number from 0 to 79

If the verification goes to completion and the diskette is good, the following message will be displayed on the terminal screen.

Verify Complete

Would you like to format another diskette? Y/N

If the verification is not successful, the following message will appear.

Hard error found, try another diskette

or

Excessive soft errors, try another diskette

This is an indication that the previously formatted diskette cannot be read correctly and is therefore not useable. Try formatting another diskette as all floppy utilities, diagnostics, and other Altos software depend upon defect free diskettes.

4. At this point, remove the formatted diskette from the disk drive, label it, and enter **Y** for yes or **N** to return to the ADX Executive Diagnostic menu. If **N** is selected the following message is displayed on the screen.

System disk in drive A

Enter to continue...

5. Place the ADX Executive Diagnostic diskette into drive A and press **<CR>** to continue testing.

2.6 ADXSETUP UTILITY

The ADXSETUP utility program is used to specify baud rates for the console terminal, printer, and auxiliary port. To enter the ADXSETUP utility use the following procedure:

1. Load the ADX Executive Diagnostic diskette into drive A after system boot up (paragraph 1.5). The ADX Command Directory will be displayed. Enter **ADXSETUP** after the **REQUEST** prompt. The terminal screen displays:

```
ALTOS COMPUTER SYSTEMS
DIAGNOSTIC DISK
BOOT SETUP PROGRAM, VERSION 3.00
```

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
```

Specify baud rate:

2. Select the baud rate applicable to the terminal by the list item number. The Altos system requires that console #1 have a 9600 baud rate. After making a selection, press the **RETURN** key.

The next display is to determine the baud rate for consoles #2 and #3. Since these consoles are not presently used by ADX, select **0** and press the **RETURN** key.

The next display prompts to select the baud rate for the printer:

```
SELECT PRINTER BAUD RATE FROM FOLLOWING LIST
0 CENTRONICS TYPE PRINTER (PARALLEL PORT)
1 110 BAUD
2 300 BAUD
3 600 BAUD
4 1200 BAUD
5 2400 BAUD
6 4800 BAUD
7 9600 BAUD
```

Specify baud rate:

3. Select the applicable baud rate for the printer in use by list item number. If a Centronics printer operating, as a parallel device is used, select **0**. If, however, a Cen-

tronics printer is serially connected, select the applicable baud rate. It may be necessary to consult the operators manual for the printer to determine this specification. Make the selection and press the **RETURN** key.

The user is now prompted to place the diskette to be updated in drive A.

**PLACE DISK WITH BOOT TO BE UPDATED IN DRIVE A
REMOVE SYSTEM DISK IF NECESSARY
Hit <CR> when ready to proceed:**

4. If the diagnostic diskette presently being used is to be updated, then press the **RETURN** key. If it is another copy of the diagnostic diskette and it requires an update, then remove the diagnostic disk presently in use and place the diskette to be updated in drive A.

Once the diskette to be updated is in drive A, close the loading door and press the **RETURN** key. The following message is displayed on the terminal screen.

**ADX BOOT SECTOR SUCCESSFULLY UPDATED
REPLACE SYSTEM DISK IN DRIVE A:
HIT <CR> WHEN READY**

5. If the updated diagnostic diskette was used to perform this operation, then press the system reset pushbutton on the front panel to reset the system. This reinitializes the system with the updated information.
6. If the updated diagnostic diskette is not the diagnostic diskette being used, then place that diagnostic diskette in drive A and press the **RETURN** key. The system will return to the diagnostic monitor and display the Diagnostic Command Directory.

FLOPPY DISK DRIVE VERIFICATION

3.1 INTRODUCTION

The Floppy Disk Drive Verification (MFT) program tests the floppy disk drive system. MFT consists of ten tests that may be run when it is suspected that there is a hardware problem with the floppy disk system. To run the MFT tests, the ADX diskette and a formatted diskette is required. If a newly formatted diskette is not available, create one by using the utility program described in paragraph 2.5. To enter the MFT tests, use the procedure given in paragraph 3.2. After the MFT program has been entered, any one of the ten menu driven floppy tests may be accessed. Each of these tests is briefly described and the display messages given in paragraph 3.3.1 through paragraph 3.3.10. Error displays for the floppy test are given in paragraph 3.4.

3.2 ENTERING MFT FROM ADX

To enter the floppy disk drive verification program, use the following procedure.

1. Load the ADX program as described in paragraph 1.5.
2. From the Diagnostic Command Directory, enter the **MFT** command after the REQUEST prompt. The MFT menu will be displayed on the terminal screen.

*******ALTOS 5.25 INCH FLOPPY TEST FACILITY*******
Version 1.1K Double sided 96 tpi

- a) Continuously write a sector
- b) Continuously read a sector
- c) Reliability test
- d) Continuously write then read one track
- e) Motor start timing test
- f) Drive alignment aid
- g) Continuously seek between two cylinders
- h) Read every sector on diskette (no compare)
- j) Continuously read cylinders 69-79 (compare)
- k) Determine time between index pulses
- l) Exit program

To enter any function test simply type the letter designation corresponding to the test to be entered. For example; to continuously write a sector type a). To abort any function test at any time type **ESC**. To return to the ADX Command Directory, use the "Exit program" l.

Following each test sequence, a display prompt will ask if a hard copy is to be printed. Do not press yes (**Y**) unless a printer is connected to the system. After answering the print prompt, an Error Summary (Figure 2-1) is displayed/printed followed by the prompt "Enter to continue." Pressing the RETURN key (<**CR**>) will cause the display to return to the MFT menu. Each of the MFT test programs is described in the following paragraph.

3.3 FLOPPY TEST PROGRAMS

3.3.1 Continuously Write A Sector

Enter **A** to select this first test. Prompts request that the operator enter the drive, cylinder, and sector number to be written to. To run this test a formatted test diskette must be inserted into the drive to be tested. When the letter **A** is entered, the following is displayed on the terminal screen.

A
Enter drive (A or B)

Enter either **A** for drive A or **B** for drive B, after which the cylinder prompt will be displayed.

Enter cylinder (track) number (0-79)
Enter number in decimal

Enter the track number desired, and press **<CR>**. This determines the track that test data will be written on. After the **<CR>** has been pressed the next prompt, head side selection, will appear on the terminal screen.

Enter head (side) number (0 or 1)
Enter number in decimal

Select either the top head (**0**) or the bottom head (**1**) and press **<CR>**. After the **<CR>** has been pressed, the last setup prompt, sector number, will appear on the terminal screen.

Enter sector number (1-9)
Enter number in decimal

Enter the sector number desired, and press **<CR>**. At this time, the following message and prompt will be displayed.

Insert formatted test diskette in drive(s) to be tested
Remove system diskette if necessary
Enter to continue....

If the test is to be aborted press the **ESC** key. The display will return to the MFT menu. If the test is to be run, press the **<CR>** key and the following will appear on the terminal screen.

SECTOR WRITE TEST
(hit <esc> to exit)
Drive X Cylinder X Head X Sector X
Pass XX

Where X is the drive, Cylinder, Head, and Sector numbers. XX is the number of passes at any one instant. At the completion of the test, or if the test is aborted (pressing the **ESC** key) the following message will appear on the terminal screen.

Do you wish to print (hard copy) the errors? Y/N

Enter either **Y** yes or **N** no. If yes is entered, the system will print out the Error Summary chart (Figure 2-1). If no is entered the Error Summary chart will be displayed in the terminal screen along with the prompt:

Enter to continue....

Pressing **<CR>** will cause the display to return to the MFT menu.

3.3.2 Continuously Read A Sector

Enter **B** to select this test. Prompts request that the operator enter the drive, cylinder, head, and sector number to be read from and then displays the contents of the sector selected. It then asks if a dump of the read buffer on a CRC or compare error is desired. When the letter **B** is entered, the following prompt is displayed on the terminal screen.

B
Enter drive (A or B)

Enter either **A** for drive A or **B** for drive B, after which the cylinder prompt is displayed on the terminal screen.

Enter cylinder (track) number (0-79)
Enter number in decimal

Enter the track number desired, and press **<CR>**. This determines the track that test data will be read from. After the **<CR>** has been pressed the next prompt, head side selection, will appear on the terminal screen.

Enter head (side) number (0 or 1)
Enter number in decimal

Select either the top head (**0**) or the bottom head (**1**) and press the **<CR>**. After the **<CR>** has been pressed, the last setup prompt, sector number, will appear on the terminal screen.

Enter sector number (1-9)
Enter number in decimal

Enter the sector number desired, and press **<CR>**. At this time, the following message and prompt will be displayed.

Do you wish to dump the read buffer
on a CRC or compare error? Y/N

After either **Y** or **n** is entered, the terminal screen will display:

**Insert formatted test diskette in drive(s) to be tested
Remove system diskette if necessary
Enter to continue....**

If **Y** (yes) has been entered when the **CR** is pressed, the system will dump the read buffer whenever a cyclic redundancy check (CRC) error or a compare error is detected.

If after the buffer prompt the letter **N** (no) was pressed, the system will display any error encountered and then continue on

**ERROR....on Read Pass 80 Drive A SECTOR READ TEST
cylinder 28 head 1 Sector 7 Soft CRC**

**ERROR....on Read Pass 81 Drive A SECTOR READ TEST
cylinder 28 head 1 Sector 7 Soft CRC**

If, during the test, no errors are encountered then only the pass number will be displayed on the terminal screen:

Pass XXX

At the completion of the test, or if the test is aborted (pressing the **ESC** key) the following message will appear on the terminal screen:

Do you wish to print (hard copy) the errors? Y/N

Enter either **Y** yes or **n** no. If yes is entered, the system will print out the Error Summary chart (Figure 2-1). If no is entered the Error Summary chart will be displayed on the terminal screen along with the prompt:

Enter to continue....

Pressing **<CR>** will cause the display to return to the MFT menu.

3.3.3 Reliability Test

Enter **C** to select this test. On normal systems this test should be run for a few hours. Test accuracy is increased greatly when the number of passes over the test diskette is increased. The test first prompts to select drive A, B, or both (C) and then to insert a formatted test diskette in the drive selected. Next it displays the reliability test screen and begins to conduct a read/write error test. It displays errors in a table similar to the Error Display Table. To run this test, a formatted test diskette must be inserted into the drive to be tested. When the letter **C** is entered, the following is displayed on the terminal screen.

C
Enter drive (A or B)
Enter C for both drives

Insert formatted test diskette in drive(s) to be tested
Remove system diskette if necessary
Enter to continue

When the <CR> key is pressed the terminal screen will display:

RELIABILITY TEST
(HIT <esc> to exit)
Write Pass 0 drive A
Cylinder XX

Where XX is the cylinder number (0 - 79). If an error is encountered, the test will attempt to write that cylinder four times and will display, each time, the following message before going on to the next cylinder.

Cylinder 23
ERROR....Write Pass 0 Drive A RELIABILITY TEST
Cylinder 23 Head 1 Sector 1 Soft RNF

Error....Write Pass 0 Drive A RELIABILITY TEST
Cylinder 23 Head 1 Sector 1 Soft RNF

Error....Write Pass 0 Drive A RELIABILITY TEST
Cylinder 23 Head 1 Sector 1 Soft RNF

Error....Write Pass 0 Drive A RELIABILITY TEST
Cylinder 23 Head 1 Sector 1 Soft RNF
Cylinder 24

If the **S** key is pressed, the current Error Summary Table (Figure 2-1) is displayed and the test continues.

If the abort key <esc> is pressed, the test will complete the pass and display:

Do you wish to print (hard copy) the errors? Y/N

If the letter **Y** yes is entered the system will print the Error Summary Table, Figure 2-1, and list the soft errors/hard errors. The letter **Y** should not be pressed unless a printer is connected to the system. If the letter **N** is entered, the system will display the tables and end the test with the prompt:

Enter to continue....<esc> to exit

Pressing the <esc> key returns the display to the MFT menu.

3.3.4 Continuously Write Then Read One Track

Type **D** to select this test. It first prompts you to select a drive, cylinder, and head number, and then to insert a formatted test diskette into the drive number selected. It displays errors in a table similar to the Error Display Table, Figure 2-1. To run this test, a formatted test diskette must be inserted into the drive to be tested. When the letter **D** is entered, the following will be displayed on the terminal screen.

D
Enter drive (A or B)

Enter either **A** for drive A or **B** for drive B, after which the cylinder prompt will be displayed.

Enter cylinder (track) number (0-79)
Enter number in decimal

Enter the track number desired, and press **<CR>**. This determines the track that the test data will be written to and read from. After the **<CR>** has been pressed, the following message will be displayed on the terminal screen.

Enter head (side) number (0 or 1)
Enter number in decimal

Select either the top head (**0**) or the bottom head (**1**) and press **<CR>**. After the **<CR>** has been pressed, the following message will be displayed on the terminal screen.

Do you wish to dump the read buffer
on a CRC or compare error? Y/N

If **Y** (yes) is entered, the system will dump the contents of the read buffer whenever a cyclic redundancy check (CRC) or a compare error is detected. If **N** (no) is entered, the system will display the error as it is encountered and then continue with the test. After selecting either yes or no and pressing **<CR>**, the following message will be displayed on the terminal screen.

Insert formatted test diskette in drive(s) to be tested
Remove system diskette if necessary
Enter to continue....

When the **<CR>** is pressed, the test will begin and the following will be displayed on the terminal screen.

WRITE/READ TRACK TEST
(hit <esc> to exit)
Drive X Cylinder X Head X
Write Pass XXX
or
Read Pass XXX

To terminate the test press the abort key <esc>, the test will complete it's current pass and display on the terminal screen the following prompt.

Do you wish to print (hard copy) the errors? Y/N

If the letter **Y** (yes) is entered, the system will print the Error Summary Table, Figure 2-1. Note, the letter **Y** should not be pressed if a printer is not connected to the system. If the letter **N** (no) is entered, the system will display the Error Summary Table and end the test with the prompt:

Enter to continue....

Pressing the <esc> key returns the display to the MFT menu.

3.3.5 Motor Start Timing Test

Enter **E** to select this test. The Motor Start Timing Test requires a formatted test diskette to be placed in drive A. When accessed, the test turns the motor on and off constantly to verify that it is operating correctly. When this test is selected, the following appears on the terminal screen.

E
Place formatted test diskette in drive A
Enter to continue....

To begin the test, press the <CR> key, the following will appear on the terminal display screen.

MOTOR ON TIMING TEST
(hit <esc> to exit)
Pass XX

Where **XX** is the number of passes. Terminating the test by pressing <esc> will display the following on the terminal screen.

Do you wish to print (hard copy) the errors? Y/N

Do not select **Y** (yes) unless a printer is connected to the system. If **Y** is selected the Error Summary Table, Figure 2-1, will be printed. If **N** (no) is selected, the Error Summary Table will be displayed on the terminal screen along with the following prompt.

Enter to continue....

Pressing <CR> terminates the test and returns the terminal display screen to the MFT menu.

3.3.6 Drive Alignment Aid

The Drive Alignment Aid is used in conjunction with an alignment diskette and an oscilloscope. This allows the user to select a

head and position it over the desired cylinder to verify radial and azimuth alignment. To check the head alignment, follow the instructions furnished with the alignment diskette. The alignment diskette recommended is a Dymek DK 502-1D. This diskette is used for testing the alignment of double-sided, 5.25 inch, 96TPI flexible disk drives. Enter the letter **f** for this test.

3.3.7 Continuously Seek Between Two Cylinders

The Continuously seek between two cylinders test gives the user the option of verifying that the heads seek to the correct cylinders by reading the cylinder address. This test is useful as a seek test where correct seeking is in question with verify enabled. It is also useful as a quick test for head motion without the verify. To run this test, enter the letter **g** from the MFT menu. The following will appear on the terminal screen.

g
Enter drive (A or B)

Enter the letter **A** for drive A or **B** for drive B, after which the cylinder prompt will be displayed.

Enter first cylinder (track) number (0-79)
Enter number in decimal.

Enter the track number desired and press **<CR>**. This determines one track that heads will seek. After the **<CR>** has been pressed, the next prompt will appear on the terminal screen.

Enter second cylinder number (0-79)
Enter number in decimal

Enter the second track number desired and press **<CR>**. This second track should be widely separated from the first. After the **<CR>** has been pressed, the last prompt will appear on the terminal screen.

Would you like to verify cylinders? Y/N

If **Y** (yes) is pressed, the Error Summary Table, Figure 2-1, and the hard copy prompt will be displayed when the test is aborted **<esc>**. If **N** (no) is pressed, the display will return to the MFT menu when the test is aborted **<esc>**. After either **Y** or **N** has been selected, the terminal screen will display:

CONTINUOUS SEEK TEST
(hit <esc> to exit)
Cylinder XX

Where **XX** is the alternating first and second cylinder numbers selected. Press **<esc>** to terminate test.

3.3.8 Read Every Sector On Diskette

The Read every sector on diskette test (no compare) is useful to determine the readability of a diskette. Diskettes with "clobbered" addresses or data fields will show up with hard RNF or CRC errors. Enter the letter **h** from the MFT menu to run this test, the following prompt will be displayed on the terminal screen.

h
Enter drive (A or B)

Enter either **A** for drive A or **B** for drive B, after which the following message will be displayed.

Insert diskette to be read in appropriate drive.
Enter to continue....

Insert the diskette to be tested and press the **<CR>** key. The following will be displayed on the terminal screen.

READ EVERY SECTOR W/O COMPARE
(hit <esc> to exit)
Cylinder X

Each cylinder (track) will be read, when an error is encountered, an error message will be displayed and then the test will continue automatically. The error message displayed will have the following format:

Error....on Read Pass X Drive X READ EVERY SECTOR W COMPARE
cylinder XX Head X Sector X Soft RNF
cylinder XX

When the test is terminated **<esc>**, the following message will be displayed on the terminal screen:

Do you wish to print (hard copy) the errors? Y/N

If the letter **Y** is entered a printer must be connected to the system. If the letter **N** is entered the Error Summary Table, Figure 3-1, and a listing of the soft errors, Figure 2-2, and hard errors, Figure 3-3, will be displayed. After the hard error table has been displayed, the following prompt will be displayed on the terminal screen.

Enter to continue....

Pressing the **<CR>** key returns the display to the MFT menu.

3.3.9 Continuously Read Cylinders 69-79 (Compare)

This test can be used as a quick test of the floppy drive system. Looping on reading the inner cylinders was chosen because they are the most difficult to read. This test does a compare of the read data against an expected value, so the diskette used must

have previously been written to test c (Reliability Test). To access this test, enter j. The following will appear on the terminal screen.

j
Enter drive (A or B)

Enter either **A** for drive A or **B** for drive B, after which the following message will be displayed.

**Do you wish to dump the read buffer
on a CRC or compare error? Y/N**

If **Y** (yes) is entered, the system will dump the contents of the read buffer whenever a cyclic redundancy check (CRC) or a compare error is detected. If **N** (no) is entered, the system will display the error as it is encountered and then continue with the test. After selecting either yes or no and pressing the **<CR>**, the following message will be displayed on the terminal screen.

**Insert diskette to be read in appropriate drive
Enter to continue....**

When **<CR>** is pressed, the test will begin and the following will be displayed on the terminal screen.

**READ CYLINDERS 69-79 W COMPARE
(hit <esc> to exit)
Cylinder 69**

If an error is encountered during the test, it will be repeated five times and the test will continue if the dump read buffer option has been selected. If the dump option has not been selected, the test will stop and the following will be displayed on the terminal screen.

**Error....on Read Pass X Drive A READ CYLINDERS 69-70 W COMPARE
Cylinder X Head X Sector X Soft RNF**

Enter to continue....

Pressing **<CR>** terminates the test and returns the terminal display screen to the MFT menu.

3.3.10 Determine Time Between Index Pulses

This test gives the measurement, in milliseconds, between index pulses. The nominal value should be 200ms. The specified tolerance is ± 5.0 ms for most floppy disk drives. To access this test, enter the letter **k**. The following will appear on the terminal screen.

k
Enter drive (A or B)

Enter the letter **A** for drive A or **B** for drive B, after which the following message will be displayed.

**Insert formatted test diskette in drive(s) to be tested.
Remove system diskette if necessary
Enter to continue....**

Insert the formatted diskette to be tested and press the **<CR>** key. The following will be displayed on the terminal screen.

**TIME BETWEEN INDEX PULSES
(hit <esc> to exit)
XXX.X Milliseconds**

When the test is terminated, pressing the **<esc>** key, the following message will appear on the terminal screen.

Do you wish to print (hard copy) the errors? Y/N

If the letter **Y** (yes) is entered, a printer must be connected to the system. If the letter **N** (no) is entered, the Error Summary Table, Figure 3-1, will be displayed along with the following prompt:

Enter to continue....

Pressing the **<CR>** key returns the display to the MFT menu.

3.3.11 Exit Program

All function programs return to the MFT main menu when finished. Exit MFT by selecting option 1 on the menu.

3.4 DISPLAYING ERRORS

All MFT function tests seek, find, and report errors in the floppy disk system. Error information can be displayed in two different tables: The Error Summary Table, Figure 3-1, and the Error Display Table, Figure 3-2.

Type the letter **S** to call the Error Summary Table. It can be called at any time from any function test on the MFT main menu. The Error Summary Table tallies errors as an individual test accumulates them. The summary table will not interrupt the test. The following is a list of error code definitions and suggested problem sources for the Error Summary Table.

CRC	Cyclic Redundancy Check. This error type shows that data integrity is being lost between the controller and the floppy diskettes.
RNF	Record Not Found. The sector address holding test data cannot be located.
SKV	Seek/Verify Error. Unable to verify track number after seeking.
CMP	Compare Error. Losing data integrity between the floppy diskette and volatile system memory.

In general, errors 1, 2, and 3 are often associated with defective media. Error 2 and 3 sometimes arise due to an unformatted diskette.

ERROR SUMMARY

	DRIVE A				DRIVE B			
	CRC	RNF	SKV	CMP	CRC	RNF	SKV	CMP
SOFT	0	0	0	0	0	0	0	0
HARD	0	0	0	0	0	0	0	0

Figure 3-1. Error Summary Table

SOFT ERRORS

DRIVE	SIDE	TRACK	SECTOR	ERROR	PASS	OCCURRENCES
A	0	23	4	CMP	0	2

Enter to continue....

HARD ERRORS

DRIVE	SIDE	TRACK	SECTOR	ERROR	PASS	OCCURRENCES
A	0	0	1	CRC	0	1

Enter to continue....

Figure 3-2. Error Display Table

4.1 INTRODUCTION

The Hard Disk Verification routines are a collection of utility and diagnostic programs. To execute Hard Disk Verification, follow the ADX loading procedures described in Chapter 1. When the Master Diagnostic Menu appears, enter HARDS5. After approximately 10 seconds, the terminal displays the following sign-on message and menu:

```
***Hard Disk (5-1/4") Test Facility 2.0***  
Specify Configuration of HARD DISK to be tested.  
Default Configuration is:  
Drive Number      : 1  
Drive Type        : Series 5-5  
Press RETURN to bypass a selection.  
Enter Drive Number ("1" or "2")           <cr> **
```

Press the return key to test the internal drive (Drive Number 1) of a system. Proceed as follows for other configurations:

Enter 2<cr> to test an external drive; 1<cr> for internal drive.

The following prompts are displayed:

Enter Drive Type ("1" = Series 5-5,
"2" = 580-10,
"3" = 580-5,
"4" = User specified):

For a 580-10 system enter 2<cr> in response to the first (cylinders) question.

For a 580-20 system select "4" for the drive type. The following prompts will appear on the screen.

Enter cylinders per drive (Default = 153) <cr>
Enter number of heads (Default = 4) <cr>

Enter 306 for the number of cylinders and 6 for the number of heads. For an Altos 580-30, enter 512 cylinders and 6 for the number of heads.

The test program displays the following menu:

*****Hard Disk (5-1/4 ") Test Facility 1.1*****

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. Terminate this Test Series

Select required function by number:

Note: test 2 is non-destructive and is therefore recommended for use when a quick overall check is desired.

CAUTION

Tests 1, 4, 6, and 7 are destructive of data and track IDs.

Menu Descriptions

The following is a brief description of each menu function. Those functions having an asterisk by the function number are destructive tests and should not be done unless absolutely necessary to resolve circuit problems. To execute a test refer to the appropriate section in this chapter.

CAUTION

Destructive tests should not be used unless all data on the disk is backed up and can be restored to the drive after testing.

- 1.* **Format Disk Drive.** The hard disk is formatted prior to shipment from the factory. Formatting places the cylinder and sector addressing on the disk, and blocks out the data areas that can be written to on the disk. It is usually not necessary to reformat a hard disk in the field. Formatting destroys any prior data (user files, flagged bad sectors) on the disk. If it is necessary to reformat the hard disk, the "Flag Bad Sector" program must also be used to restore all the bad sector flags.
2. **Verify Addresses for All Sectors.** This reads the addressing information (drive, head, cylinder, sector, buffer, etc.) on the disk to verify its availability and integrity. No data is read or destroyed in this program. This is a good, quick test of format integrity.
3. **Seek Test with Optional Verify.** This test permits specification of two cylinders that the disk controller accesses alternately and continually. The main use of this test is for cylinder address/data fault isolation.
- 4.* **Write Entire Disk.** This writes a user- or factory-specified pattern to all sectors of the disk. This test can be used to erase an entire disk.
5. **Read Entire Disk.** This reads data from every sector on the disk, and compares that data to a user- or factory-specified pattern. It is normally used after the "Write Entire Disk" program to verify successful data retention.
- 6.* **Set Flag Byte for a Sector.** This program flags a sector as bad (not to be used for storing data). All known bad sectors are flagged prior to shipment from the factory. This feature can be used in the field if a bad spot develops on the disk, or if the disk has been re-formatted.
- 7.* **Hard Disk Write/Read Test.** This test writes a user- or factory-specified pattern over one cylinder, or the entire disk, reads it back, and compares the data for integrity. The test can also be used to exercise the disk for an extended period of time (i.e., overnight). It reports on the test results at the end of the period and/or at the end of each pass.

8. Miscellaneous Functions. There are three miscellaneous functions. The first suppresses or enables the display of the disk status error message. This can be disabled while running some repetitive operations for the purpose of checking the drive with electronic test equipment. The second function displays the contents of a selected sector on the screen in hexadecimal and ASCII. The third function is used to set the heads of the stepper motor drives (-10, -20) at the desired position for shipping the system.

9. Terminate this test series. This option reboots the system to exit the Hard Disk Verification test series and returns the program to the Master Diagnostic Menu.

4.2 FORMAT DISK DRIVE

The hard disk is formatted prior to shipment from the factory. Formatting places the cylinder and sector addressing on the disk and blocks out the data areas. This must be done before any data can be written on the disk. It is not usually necessary to run this program in the field. Formatting/reformatting destroys any prior data on the disk.

One of the major repercussions of formatting/reformatting is that any flag indicators of known bad sectors are erased. These bad sectors are flagged prior to shipment and are noted on the error map provided with the hard disk. Sectors previously marked as bad are considered valid after formatting. Unless these sectors are re-flagged as bad sectors, data written to them may be lost.

CAUTION

This format utility changes data on the hard disk and may cause loss of user data.

Once you have selected test 1 and depressed 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?

This function will destroy both user data and bad track information written on the disk by the manufacturer. Password entry is used as a safeguard to protect the system and the data it stores. You can obtain this password from your distributor or from Altos Customer Service. (Contact your distributor first.)

Before a password is given to you, an attempt will be made to continue. If you enter N and depress RETURN, you will return to the hard test selection menu.

Enter your password and depress RETURN. The screen will display the following.

*****THIS TEST WILL ERASE FILES ON THE HARD DISK*****

Do you want to continue? (y or n):

Type Y and depress RETURN to continue. The format process will begin and a count from 0 to N; where N = cylinder count specified when loading this test; will appear on the screen as each cylinder is formatted. The program returns to the hard disk menu when formatting is completed, and the prompt to make a new selection will appear on the screen.

REMEMBER: You have formatted the disk, but you have not flagged any bad sectors. This should be done before any attempt is made to transfer user data to the hard disk. (Use menu item 6, **Set Flag Byte for a Specific Sector** to do so.)

4.3 VERIFY ADDRESSES FOR ALL SECTORS ON DISK

This test reads the addressing information for every sector of every cylinder on the disk to verify its availability. No data is read; nothing is written or erased.

The identification area of every sector on the hard disk contains addressing information which consists of the cylinder, head, drive, and sector numbers. This test reads and verifies those numbers. If that information cannot be read, that particular sector should not be used and should be flagged as bad.

The identification area also contains flag byte information (where sectors can be flagged as bad), and a Cyclic Redundancy Check (CRC) value. The CRC is a value developed by the circuitry when it writes data on the sector. When data is read from the sector, a CRC value is again generated and compared to the stored value as a check on data integrity.

Type 2 [RETURN] to select this test. The screen will display the following.

Press any key when "ready" to start this test

You will see a count displayed at the bottom left corner of the screen as the tracks are checked. Any bad sectors encountered which have been flagged as bad will cause a BAD SECTOR display. Any bad sectors encountered which have not been flagged earlier as bad will possibly cause a CRC error display. Once completed, the screen will display the hard disk test menu again.

4.4 SEEK TEST WITH OPTIONAL VERIFY

The primary use of this test is for head/sector address fault isolation. It is typically run in conjunction with the use of electronic test equipment to check details of circuit functioning.

Two cylinders are alternately and continually accessed by the disk controller during program execution. The user selects the two cylinders to be accessed. The test verifies the address information at head 0 and sector 0 of each cylinder specified, unless verification is disabled.

Type 3 [RETURN] to select this test. The screen displays this prompt.

Press any key when "ready" to start this test

The program then prompts you to specify a low cylinder and a high cylinder to set the test boundary. For maximum boundary limit, select cylinder 0 and cylinder N-1, where N = cylinder count specified when loading this test. For minimum boundary, specify cylinder 0 and cylinder 79. Specify any appropriate low/high cylinder combination.

The program then prompts you to set the verification flag on the test loop. 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 at head 0, sector 0 at each of the specified cylinders. Verify is used to insure that the heads are seeking to the specified cylinders. If the cylinder number does not match, a record not found (RNF) is reported.

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 be performing the seek operation properly. To verify that SEEK is performing properly, select another cylinder.

Press the Escape (ESC) key to terminate the test.

4.5 WRITE ENTIRE DISK

This function fills the data block of each sector with a two-byte character to the data block for each track of the disk. This character can be selected by the operator. The companion program, "Read Entire Disk," verifies the data retention of the disk.

Type 4 [RETURN] to select this test. Answer Y at this warning prompt to continue.

*****THIS TEST WILL ERASE FILES ON THE HARD DISK*****

Do you want to continue? (y or n):

The test asks if you want to specify a write-pattern. Enter Y [RETURN] to specify a pattern. You will be prompted to select the two byte pattern you wish to use.

If you have no specific pattern, enter N [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.

The message:

******* Homing drive *******

will appear as the heads are positioned to begin the operation.

The final error display can vary depending upon these four write situations.

1. Writing to a flagged bad sector will cause a BAD SECTOR display.
2. Writing to a sector with a bad data block will not generate an error display provided the ID area is not defective. A READ test will detect this error condition.
3. Writing to an unflagged bad sector will only cause a CRC error display if the CRC bytes of the ID are also bad.
4. Writing to an unflagged bad sector with a bad ID block will generate a RECORD NOT FOUND display regardless of the condition of the CRC portion of that ID block.

NOTE

If any character other than E5H is written to the data fields of the disk, such character must eventually be overwritten with E5H before the drive is put back into use. This is required so that the operating system knows that the disk is empty.

4.6 READ ENTIRE DISK

This function reads each sector of each track of the hard disk. The test uses a memory buffer area. The program writes FFH into the memory buffer before beginning the read process. As each sector is read into this buffer, the contents of that sector will be written over the FFH hex number that is located there.

FFH hex is again written to the memory buffer, and the next sector writes over FFH a second time. This "flushing" of the memory buffer is done to ensure that the contents of each sector are read accurately.

Type 5 [RETURN] to select this test. This menu of display options screens.

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:

OPTION DESCRIPTIONS

1. For all options, if an error is encountered, the cylinder head sector numbers and status are displayed. Option #1 does not display the contents of the data block when an error is encountered.
2. Option #2 will cause the data block to be displayed if there is a CRC error.
3. Option #3 will cause the data block to be displayed if there is a compare error. It allows the operator to select a one or a two byte character for comparison for the test. It will display the following prompt:

Patterns can be specified by entering:

*1 for 256 byte pattern (hex 00 FF)

One or Two byte pattern - enter pattern in binary, octal, decimal or hex.

Select pattern:

You should select the same read bytes that you used to perform a write test (HARDS5 test #3). This option uses the CPU to compare the contents of the data block against the operator-selected pattern.

A compare error generates an error message along with the contents of the sector in error. Since the data block does have a CRC area associated with it, the sector 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 this occurs, a CRC ERROR display message will display.

4. Option #4 will cause the data block to be displayed if there is either a compare or CRC error. It also allows you to select read-bytes.

4.7 SET FLAG BYTE FOR A SPECIFIC SECTOR

This utility flags a sector as bad, that is, one not to be used for storing data. Usually, any bad sectors are flagged before shipment of the system. This utility can be used in the field in case a bad spot develops on the disk, or when the disk has been re-formatted and it is necessary to re-flag known bad sectors. The flag location is in the identification area, which also holds the sector addressing and the CRC characters.

Sectors to be flagged can be specified in two ways:

1. You can use error map data provided by the drive vendor.
2. You can select the cylinder, head, and sector to be flagged.

Type 6 [RETURN] to select this test. The program displays this warning:

*****THIS TEST WILL ERASE FILES ON THE HARD DISK*****

Do you want to continue? (y or n)

Press Y <CR> then any Key when ready to Start this Test.

The program then displays this option menu.

Hard Disk "Flag Bad Sector" Options are:

1. Seagate Disk Error Map (for Series 5 only)
2. MiniScribe Disk Error Map (580-10 or -20)
3. Cylinder, Head, Sector

For the 580 product line, valid options include both 2 and 3. Make your selection and depress [RETURN]. If you select Option #2, you will be prompted for Cylinder, Head, and Byte Offset from Index. Type your selection and depress [RETURN]. If option three is selected, you are prompted for cylinder, head, and sector.

After entering the specified location the program will display the following prompt:

Is is OK to flag the sector specified? ("Y" or "N"):

A Yes response flags the sector as bad. The No response does not. Both responses cause the following option to appear on the display:

Do you want to continue this test? (Y or N)

If you type Y at the prompt, the program will continue to prompt you for the next bad sector to be flagged, until all bad sectors have been flagged. If you enter N [RETURN] the program will return you to the hard disk menu.

NOTE

This function sets flags for bad sectors but it does not allocate alternate sectors to those sectors which you have flagged.

4.8 HARD DISK WRITE/READ ERROR TEST

This test fully tests all aspects of the disk by writing and reading a variety of data patterns to the entire disk. The display will show all hard errors (bad sectors) and CRC errors.

In this test, an error is considered to be a "soft" error when one unsuccessful attempt has been made to read data. A RECAL is made between each attempt. If the READ is successful on the second or third attempt, then the program declares a soft error. The program tolerates a certain number of soft errors.

The program declares a "hard" error after it has made three unsuccessful attempts to read data. The hard error is declared, flagged, and allocated. Sectors containing hard errors should be flagged by using test #6.

Press ESC to terminate the test. The program will go back and erase the entire disk and automatically flag those sectors which are identified as being bad. Enter the test by typing the number 7 after the prompt. Select required function by number, the following will be displayed.

*****THIS TEST WILL ERASE FILES ON THE HARD DISK*****

Do you want to continue? (y or n)

Entering N (no) returns the display to the test facility menu. Entering Y (yes) and <CR> causes the terminal screen to display:

Press any key when "ready" to Start this Test.

Press any key to continue or hit <esc> if the test is to be terminated. After pressing any key, the following will be displayed on the terminal screen.

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

Enter N (no) and <CR> causes the test to skip to the Homing drive menu. This response generates four different bit shifted patterns. Enter Y and <CR> causes the following to be displayed:

As many as four (4) Patterns may be specified.

Patterns can be specified by entering:

***1 - for 256 byte pattern (hex 00....FF)**

one or two pattern-enter pattern in binary, octal, decimal or hex

Press RETURN to bypass a Pattern selection

Type the two byte pattern you want to write onto the disk and depress RETURN. The program will shift to the next pattern on the menu. Press RETURN alone to accept the pattern showing for the pattern option. The screen will fill with the display which is used for this test. You will also hear the hard disk chirp as the heads seek the cylinders on the disk.

Pattern #1 revisited: XXXX
Pattern #2 revisited: XXXX
Pattern #3 revisited: XXXX
Pattern #4 revisited: XXXX

Press any key when ready to continue this test.

Pressing any key causes the following to be displayed

****Homing drive****

Hard Disk reliability display Options:

1. Continuous display on terminal,
2. Display error summary at the end of each pass,
3. Display error summary only at the end of the test.

Select option by number.

Using Option #1 selects a sub-option which offers a selection of two terminals (Altos II and Televideo 912). If an ADM31 is attached, select the Televideo sub-option. Use Option #2 with any terminal. Use Option #3 when the terminal is to be removed during test.

This prompt displays after you have selected your option.

Do you want to display data if a CRC error? (y or n):

Entering either Y or N will begin the test and display the following prompt. For Y, the test will stop and display the buffer if a CRC error is encountered.

Press ESCAPE when "ready" to Abort the Test.

The program displays all patterns, and separates hard errors and soft errors 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.

This test can take several hours to complete. Set up the test to run overnight, if possible. Press ESC to terminate the test. The test will complete its current pass, and stop. It will ask if you wish to print out the test results.

ALTOS Hard Disk Checkout - Press ESC to Abort the Test.

Drive under test: xxx-xx
Cylinders/Drive: xxx
Number of Heads: x

Pass count: x
Pattern: xxxx4

Cylinder: xxx
Operation: WRITE/READ
Seek From: x

Soft Errors

Chars: User (Pattern #1)	CMP Err 0	CRC Err 0	RNF Err 0	BAD SEC 0
Chars: User (Pattern #1)	CMP Err 0	CRC Err 0	RNF Err 0	BAD SEC 0
Chars: User (Pattern #1)	CMP Err 0	CRC Err 0	RNF Err 0	BAD SEC 0
Chars: User (Pattern #1)	CMP Err 0	CRC Err 0	RNF Err 0	BAD SEC 0

Hard Errors

Chars: User (Pattern #1)	CMP Err 0	CRC Err 0	RNF Err 0	BAD SEC 0
Chars: User (Pattern #1)	CMP Err 0	CRC Err 0	RNF Err 0	BAD SEC 0
Chars: User (Pattern #1)	CMP Err 0	CRC Err 0	RNF Err 0	BAD SEC 0
Chars: User (Pattern #1)	CMP Err 0	CRC Err 0	RNF Err 0	BAD SEC 0

Do you want to print (LP) the errors? (y or n):

Enter N (no). Do not enter Y (yes) unless printer is connected to the system.

The program will display a soft and hard error table that summarizes the entire test. Press any key on the keyboard to generate a hard error display.

No Soft Errors Detected
No Hard Errors Detected
Press any key when "ready" to Continue Test.

When a key is pressed, the following will be displayed on the terminal screen.

******Homing Drive******
Erasing Disk
XXX

At the completion of the erasing function, the display will return to the hard disk test facility menu with the message that the Reliability Test is completed.

4.9 MISCELLANEOUS FUNCTIONS

At present, this selection provides four functions:

1. **Select Disk Error "status" Display Option**
2. **Display a Sector**
3. **Park Disk Drive Head for shipment**
4. **Terminate this series of tests**

Select required function by number:

1. You may alter the way displays are provided on other hard disk tests. Type 1 [RETURN] and the screen will display this prompt.

Do you want the disk error "status" message displayed? (y or n)

2. You may display a sector on the screen with ASCII on the right side of the screen, and in HEX on the left side. Type 2 [RETURN] and the screen will display this menu.

*** 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)

3. You may place the disk head in its shipping position. The menu will ask which type of drive you have.

1. **MiniScribe 2000 Series** (moves head inside cylinder 305)
2. **Seagate ST400 Series** (use with CMI only)
3. **Seagate ST506** (Series 5 only)

Type 4 [RETURN] to terminate this test. The display will return to the hard disk test menu.

4.10 TERMINATE TEST SERIES

Selecting option 9, Terminates this Test Series and causes the Diagnostic Command Directory menu to be displayed.

RANDOM ACCESS MEMORY (RAM) VERIFICATION

5.1 INTRODUCTION

The 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. Proceed as follows:

1. Insert the diagnostic diskette into drive A.
2. Boot up the system. You will see the diagnostic menu.
3. Type MEMTEST following the REQUEST: prompt. The screen will display the following message:

ALTOS SERIES 5 MEMORY TEST VER 2.4

VALID MEMORY TEST RANGE (HEX)

BANKS 0-2: 0000-BFFF; BANK 3: 4000-BFFF

COMMON AREA IN BANK 0; RANGE C000-FFFF

PROGRAM RESIDES IN BANK 0; ADDR F000-FFFF

TEST ALL BANKS? (YES=Y: NO=N)

USER DEFINED TEST PATTERN (Y OR N)

DEFINE PATTERN:

TEST ALL MEMORY? (YES=Y, NO=N)
OF PASSES TO RUN:
HALT ON FIRST ERROR? (YES=Y, NO=N)
SPECIFY MAXIMUM # OF ERRORS ALLOWED:
RUN ALL SIX TESTS (YES=Y, NO=N) [See Table 5-1 for
test descriptions]

4. You will be prompted four times to select a memory bank. If you wish to select only one memory bank, select bank, 0, 1, 2, or 3, and depress RETURN. Also, press RETURN to bypass subsequent memory bank select options. You will now receive the following screen display.

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

5. Memory test range is given in the screen display above. Select the starting and ending addresses and depress RETURN after each selection.

Memory testing will now begin. The screen will display the following prompt as it tests:

123456	PASSES -	1	ERRORS -	0
123456	PASSES -	2	ERRORS -	0

ALL DONE, WAITING FOR CONSOLE INPUT.....

Enter one of the following options.

TYPE C TO GET CURRENT CONTROL WORD
TYPE L TO GET LIST OF ALL COMMANDS
TYPE S TO PRINT TEST SUMMARY
TYPE R TO RESTART THE TEST
TYPE P TO RESTART WITHOUT CHANGING ANY PARAMETERS
TYPE H TO HALT TESTING

6. If you wish to stop the test without terminating it, and see the results, depress S (SUMMARY) on the keyboard and the results will be displayed. Press R (RESTART) on the keyboard if you wish to terminate the test, see the results, and select another memory bank.

Depress the system reset button to return to the diagnostic menu.

7. Replace any defective memory chips (Figure 5-1) with 64K x 1-bit dynamic RAM with 200 nanosecond or less access time. The chip you select must support a refresh cycle by performing a RAS only cycle at each of 128 row addresses every 2 milliseconds or 128 cycles. Chips that require 256 refresh cycles cannot be used. 64K RAM chips from Okidata and Motorola have been qualified for use in a 580 computer.

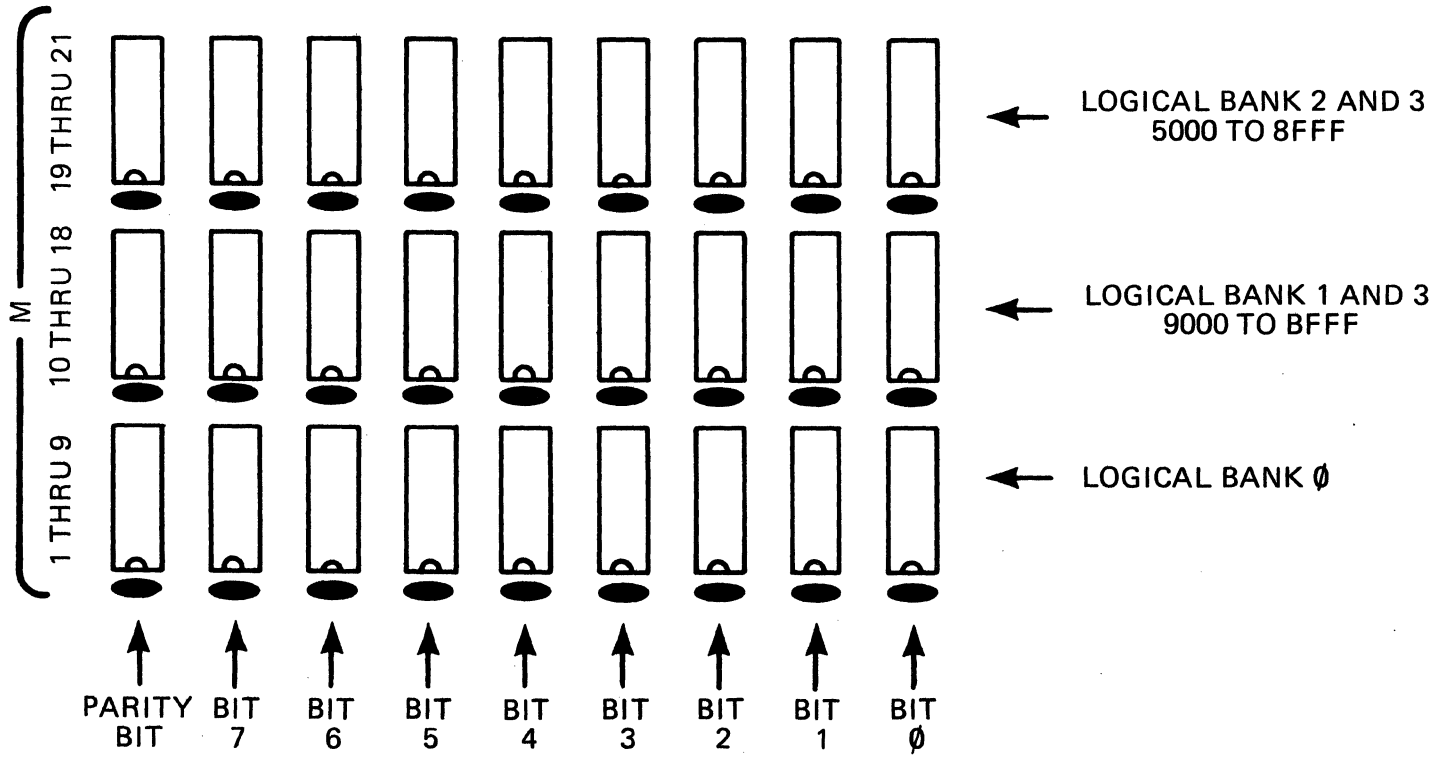


Figure 5-1. Memory Chip Locations

6.1 TEST PRINTER INTERFACE USING PRNTEST

Proceed as follows to execute PRNTEST:

1. Select PRNTEST after the REQUEST: prompt from the diagnostic command directory. This command causes the following characters to be displayed on the terminal and to be printed on the printer.

PRINTER TEST X.X

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

A parallel printer can be specified by using ADXSETUP.

NOTE

Attempting to execute this program on a system that does not have an attached printer may cause the system to hang up.

7.1 INTRODUCTION

The Altos Tape Diagnostic (ATD) tests are executed only when a Magnetic Tape Unit (MTU-4) is connected to the 580 system. ATD tests are performed in either automatic mode or manual mode. Automatic mode tests are described in paragraph 7.2 while the manual mode is described in paragraph 7.3. Error messages and displays are described in paragraph 8.7.

To enter the Altos Tape Diagnostic (ATD) program use the following procedure

1. Load the ADX programs as described in paragraph 1.5.
2. From the Diagnostic Command Directory, enter the ATD command after the REQUEST prompt. The |ATD| command menu will be displayed on the terminal screen (Figure 7-1).

The ATD command menu contains command arguments for the most significant nibble (MSN) and the least significant nibble (LSN) used when in the manual mode. Following the command argument menu is the autotest prompt. The AUTOTEST may be entered by selecting either A, B, or C (see paragraph 7.2). The manual mode is entered by pressing the RETURN (<CR>) key (see paragraph 7.3).

ALTOS TAPE DIAG. REV 3.0 (8K SIZE)

CA MSN:	EFFECT
CR	TERMINAL INPUT
L	LOOP ON PRECEDING STRING
CNTRL C	RETURN TO MONITOR
CNTRL D	RETURN TO DDT
OR HEX VALUE	

CA INPUT:	EFFECT
X0	NOP
X1	READ A RECORD
X2	WRITE A RECORD
X3	WRITE FILE MARK
X4	FORWARD SPACE RECORDS
X5	FORWARD SPACE FILES
X6	REVERSE SPACE RECORDS
X7	REVERSE SPACE FILES
X8	SEND STATUS
X9	COPY
XA	WRITE WITH RANGE CHECK
XB	SEARCH UNDER MASK
XC-XF	ASX4-X7, BUT HIGH SPEED

AUTOTEST (A, B, C, OR CR TO SKIP)? Δ

Figure 7-1. ATD Menu

7.2 AUTOTEST MODE

The ATD automatic mode consists of three tests: primary AUTOTEST A, secondary AUTOTEST B, and tertiary AUTOTEST C. Tests A and B verify operation of the hardware by writing and reading and verifying that the correct track is accessed. Test C verifies the tape. It does this by writing and then reading the full length of the track.

In all three tests (A, B, and C), the tape does not rewind at the end of the test. In test C, error messages are displayed after the read operation and the tape stops. If no errors are encountered when a test is completed, the command argument menu gets refreshed without indicating that the test completed without error.

7.2.1 AUTOTEST A

Entering the letter **|A|** after the AUTOTEST prompt, Figure 7-1, initializes the primary AUTOTEST A routine (Figure 7-2). This routine writes a filemark (FMK) to track 1, a type one record (RT1) to track 2, a type two record (RT2) to track three, a type three (RT3) record to track four, and then verifies each. The RT1, RT2, and RT3 records are written to track one followed by a file mark (FMK). A forward space one record, relative to beginning-of-tape (BOT), is then executed and the RT2 record verified. A search file mark (FMK) is then performed followed by a space reverse of one file and then one record, both relative to the current position, and the RT3 record is verified.

If no errors are encountered during AUTOTEST A, the terminal display automatically returns to the ATD command menu, Figure 7-1. If an error is encountered, the tape stops and a status sequence and error message is displayed. Refer to paragraph 8.7 for a description of the error message and status sequence.

7.2.2 AUTOTEST B

Entering the letter **|B|** after the AUTOTEST prompt, Figure 7-1, initializes the secondary AUTOTEST B routine, Figure 7-3. This routine writes a type one record, reads it, writes a file mark, reads that, rewinds the tape and then reports the drive and interface status. This is done once for each track.

If no errors are encountered during AUTOTEST B, the terminal display automatically returns to the ATD command menu, Figure 7-1. If an error occurs, the tape stops and a status sequence and error message is displayed. Refer to paragraph 8.7 for a description of the error message and status sequence.

```
AUTO DIAGNOSTIC ROUTINE
WRITE FMK TO TK1, RT1 TO TK2, RT2 TO TK3, AND RT3 TO TK4
CONFIRM FMK, RT1, RT2, AND RT3
WRITE TO TK1: RT1, RT2, RT3 AND A FMK
REW, SPACE FWD 1 REC, & CONFIRM RT2
REW, SEARCH FMK, SPACE REV 2, CONFIRM RT3
```

Figure 7-2. AUTOTEST A Display

```
TESTING TRACK 1
TESTING TRACK 2
TESTING TRACK 3
TESTING TRACK 4
```

Figure 7-3. AUTOTEST B Display

7.2.3 AUTOTEST C

Entering the letter C after the AUTOTEST prompt, Figure 7-1, initializes the tertiary AUTOTEST routine, Figure 7-4. This routine writes type one records to a track, rewinds the tape and then reads (verifies) the record written and rewinds the tape again. The process is repeated for each track.

```
FULL TAPE WRITE/READ TEST
TESTING TRACK 1
    WRITING TO TRACK/READING TRACK
TESTING TRACK 2
    WRITING TO TRACK/READING TRACK
TESTING TRACK 3
    WRITING TO TRACK/READING TRACK
TESTING TRACK 4
    WRITING TO TRACK/READING TRACK
```

Figure 7-4. AUTOTEST C Display

7.3 MANUAL MODE

The manual mode of the Altos Tape Diagnostic (ATD) program allows arguments to be entered into various fields for sequential operation. Protocol for the manual mode operation uses a three byte activation sequence that includes a mode argument (MA), positional argument (PA) and a command argument. The MA specifies the drive selection and track selection. PA specifies the repeat value for the record/file search, while CA specifies the actual command to execute.

Enter the manual mode by pressing the RETURN <CR> key after the ATD command menu has been displayed. The PA and MA are entered after their respective prompts. The PA (repeat value) contains one less than the actual space count, i.e., values 0-255 correspond to space counts 1-256. The least significant nibble of the MA is taken from Table 7-1 and is somewhat dependent upon the system tape configuration.

The command argument (CA) is a string of two hexadecimal digit command values with no separators between commands. The first digit is used to determine the operational mode (MSN of CA) and the second determines the actual tape command (LSN of CA).

The CA MSN may be either a special character, Figure 7-1, or a hexadecimal value, Figure 7-6. If the MSN is a zero, it will cause a record search under mask to look for a valid record. Non-zero values cause a search for an invalid record.

The CA LSN is also given in the ATD menu, Figure 7-1. Note that the X preceding the hexadecimal value merely indicates the position of the MSN. If the letter X is actually entered, it will default the operation to the AUTOTEST mode. A description of each of the LSN commands is given in the following paragraphs. Pressing the RETURN <CR> key terminates the command string. If a character is struck while processing a command string, a return to the command string input mode will occur.

ENTER PA (ONE HEX DIGIT ONLY):
ENTER LS NIBBLE OF MA:

ENTER STRING OF 2 DIGIT COMMANDS:

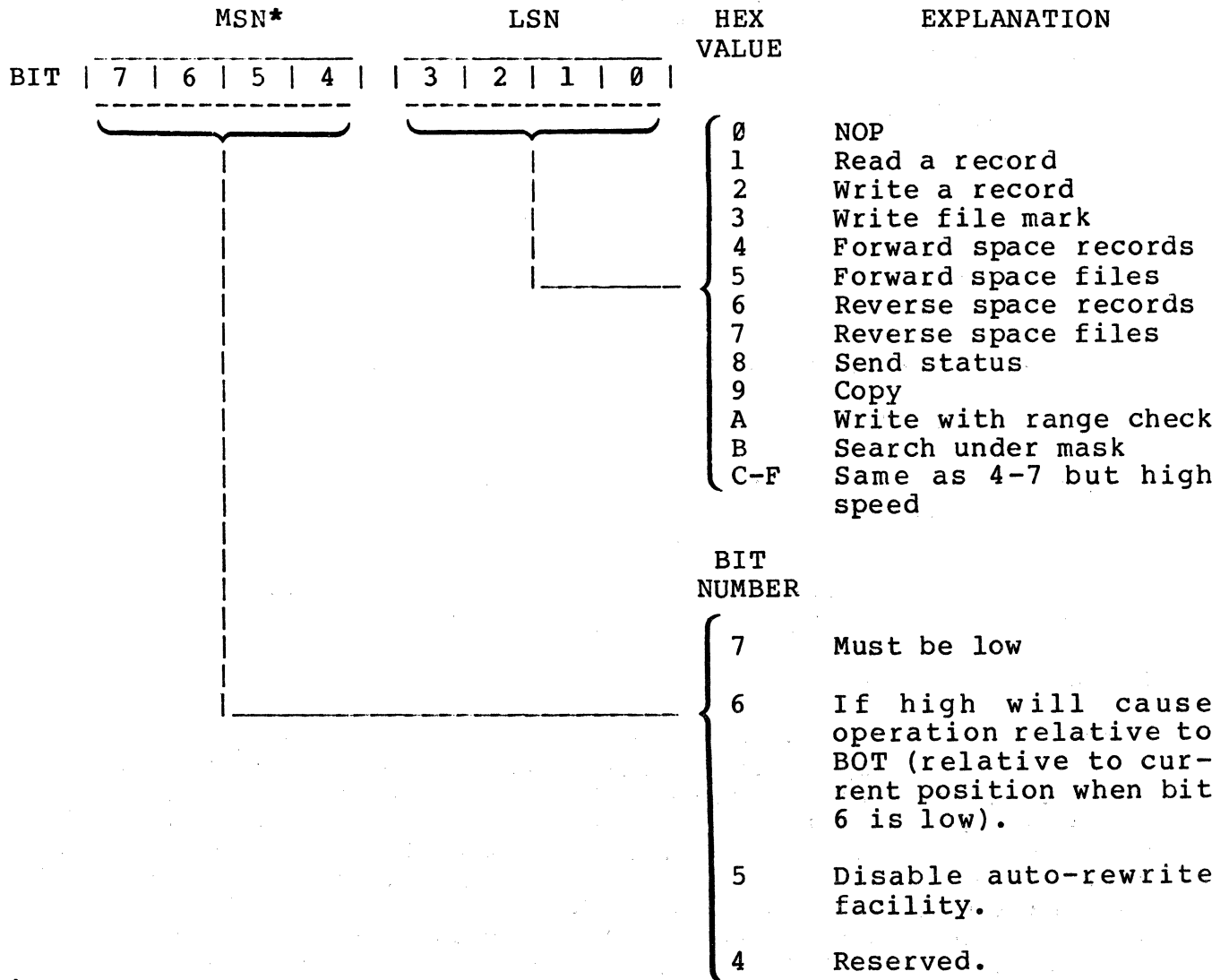
Figure 7-5. Manual Mode Activation Sequence Prompts

Table 7-1. Least Significant Nibble Mode Argument

HEX VALUE	DRIVE	TRACK
0	1	1
1	1	2
2	1	3
3	1	4
4	2	1
5	2	2
6	2	3
7	2	4
8	3	1
9	3	2
A	3	3
B	3	4
C	4	1
D	4	2
E	4	3
F	4	4

* NOTE: Only drive #1 is supported on the ACS 580.

COMMAND ARGUMENT



* NOTE: A CA MSN of zero when LSN = B (hex) will cause record search under mask to search for a valid record, a non-zero value causes a search for an invalid record.

Figure 7-6. Command Argument-Most Significant Nibble (MSN) and Least Significant Nibble (LSN)

1 - Read A Record

The READ command will read a block of data from the tape, and store it in the read/write buffer at location 3000H. Due to the read-after-write checking, read errors should be very infrequent, unless the tape has been mishandled or abused. Aborts could possibly occur for the following reasons:

Dirty or mis-aligned Read Head.

Faulty read circuitry.

Tape was abused or stored near magnetic field.

Specified record size did not agree with 'writing' parameter.

Reading proceeded beyond the second consecutive File Mark.

Incompatible recording format.

Adjacent record was 'edited' with an inconsistent record size parameter, out of calibration servo board, or without disabling the 'auto-rewrite' facility.

Note also that a read operation will terminate if a file mark is detected, and no data will be transferred.

2 - Write A Record

Write will take the data found in the read/write buffer and write this onto the tape. The utility will attempt to rewrite the record if an error is detected, each time backspacing to the start of the record in error and erasing three inches of tape. The number of retries is application sensitive. All records are verified during writing using the read-after-write facility on the transport. If end-of-tape (EOT) status is sensed during the write to tape, the procedure will abort and the error status will be reported. If EOT is sensed after the record is written it will be reported in the drive status, but the interface status will indicate command status OK (00).

3 - Write File Mark

The Write File Mark command will write a file mark on the tape. This mark is used to separate files on the tape, and two consecutive file marks must appear at the end of each track.

4 & 6 - Forward/Reverse Space Records

The Space Records commands will space the tape in the specified direction past the number of records specified by the positional argument. Note that the value of the PA is one less than the number of records to space past. These routines will abort and signal an error if a file mark is encountered.

5 & 7 - Forward/Reverse Space Files

These commands operate as per Space Records, but counting file marks instead of records. Obviously this routine will not abort on file mark detected.

8 - Send Status

The current drive status (DS) and interface status (IS) are returned after the interface receives a 'ready' condition from the selected drive. This is useful when issued 'relative to BOT' as the status will not be returned until the tape has completed its rewind operation.

9 - Copy

This command is not used as the Altos 580 supports only one tape drive.

A - Write With Range Check

This command writes a return error if the number of data bytes were not what was specified by the block size.

B - Search Under Mask

A mask of up to 16 bytes is associated with this command, and is stored in the mask buffer area, which begins at location 2900H, prior to calling the utility. The interface then searches the tape for a record whose initial data bytes match this mask. If a mask byte is 3F (HEX) then the corresponding record byte is ignored (i.e., a match is assumed). When a matching record is found it is returned in its entirety, as per a read data. This command will abort with attempt if a file mark is detected.

C thru F - High Speed Commands

These commands operate identically with commands 4 thru 7, except if the PA value is greater than 0, they will be executed at 90 I.P.S.

8.1 INTRODUCTION

The information provided in this appendix explains error information that may be displayed as a result of hardware malfunctions that occur during the power-up sequence, boot sequence, or ADX program execution. Error information that may be generated by end-user operating systems is outside the scope of this manual.

The categories of error information presented here include:

1. Power-up
2. Boot Sequence
3. Floppy Disk
4. Hard Disk
5. Memory
6. Magnetic Tape

8.2 POWER-UP

Two error messages may be displayed as a result of hardware malfunction. These include:

Number of errors in memory test xx

The xx value represents the number of memory bytes in error, i.e., the data read from a memory location was not the same as that written.

In addition, in the event that hardware detects a single bit parity error the message:

PARITY ERROR - - - - -

BANK	ADDR	WRITTEN	READ
n	aaaa	ww	rr

where

n = bank (0-3)
aaaa = address in hexadecimal
ww = value written to memory (hexadecimal)
rr = value reset from memory (hexadecimal)

8.3 BOOT SEQUENCE

Messages that may be displayed as a result of an error during the boot sequence include:

Selected device does not contain Boot program

This message indicates that the boot device (either diskette or hard disk drive) does not have a valid boot program in the first sector. The message is only displayed, however, if the first byte contains hexadecimal E5 (the value written to every byte of a hard disk or diskette when it is newly formatted).

Floppy Disk read error.... status xx

An error was encountered while trying to read the boot program from the floppy disk. xx is the error status (in hexadecimal) from the floppy disk controller. The bit definitions in the error status are illustrated in Table 8-1.

Table 8-1. Floppy Disk Status Byte

HIGH ORDER				LOW ORDER				
8	4	2	1	8	4	2	1	
								----- Busy
								----- Data Register is full
								----- Lost Data
								----- CRC Error
								----- Record Not Found
								----- Deleted data mark encountered
								----- Not Used
								----- Drive Not Ready

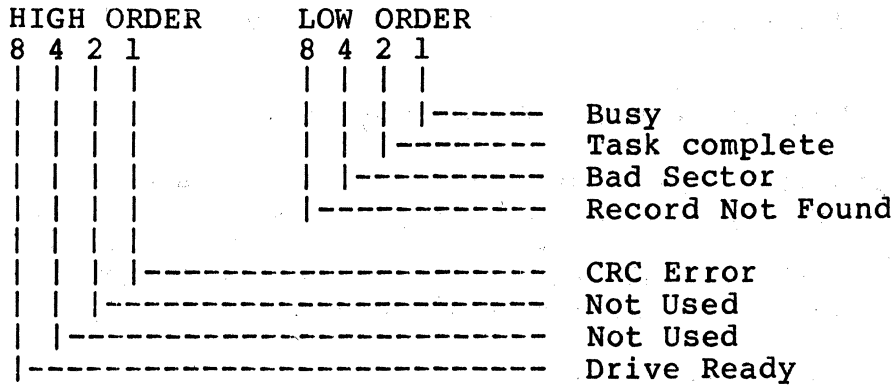
Hard Disk Boot Failures

Failure of the system to boot from the hard disk can result in the following error message:

Hard Disk read error.... status xx

An error was encountered while trying to read the boot program from the hard disk. xx is the error status (in hexadecimal) from the hard disk controller. The bit definitions in the error status are shown in table 8-2.

Table 8-2. System Monitor Hard Disk Status Byte



8.4 FLOPPY DISK

While executing the MFT program, a hardware malfunction generates error information that is displayed on the screen. The typical error format that appears on the display screen is:

```
ERROR.... on XXXX Pass XX Drive X NNNNN  
  Cylinder XX Head X Sector X      EEE
```

The field definitions for the error format are as follows:

1. **ERROR.... on XXXX** - this field describes what operation was taking place when the error occurred (e.g., where XXXX may actually say READ or WRITE).
2. **Pass** - indicates on which pass of the test the error occurred.
3. **Drive** - indicates which floppy drive was operating when the error occurred.
4. **NNNNN** - this field displays the name of the diagnostic routine that was executing at the time the error occurred.

Cylinder - indicates which cylinder was being accessed at the time of the error.

Head - indicates which head was active when the error took place.

Sector - indicates the sector that was being accessed when the error occurred.

EEE - this field displays the type of error that occurred. The following errors may appear in this field:

1. **CRC -- Cyclic Redundancy Check.** This error type shows that you are probably losing data integrity between the controller and the floppy diskette.
2. **RNF -- Record Not Found.** The sector address holding test data cannot be located.
3. **SKV -- Seek/Verify Error.** Unable to verify track number after seeking.
4. **CMP -- Compare Error.** Losing data integrity between the floppy disk controller and volatile system memory.

In addition to the formatted error codes, certain error messages may be displayed on the screen. These messages include:

DISK IS WRITE PROTECTED -

Under normal conditions this message indicates that the file protect sticker is in place on the floppy diskette while a write operation is being attempted. Removing the sticker will stop the error condition.

Drive Not Ready

This error indicates that the floppy drive did not signal ready when it was selected.

8.5 HARD DISK

While executing the ADX programs, a hardware malfunction generates error information that is displayed on the screen. This error information is described in the sections that follow.

Address Errors

Address errors occur when a sector address on the disk cannot be recognized by the controller. Normally, an address error indicates a flaw in the surface of the disk. It is important to note that this bad sector is not yet flagged as bad (otherwise a **Bad Sector** error code would have been displayed on the screen as follows:

```
**** Address Error ****
"Expected" cylinder:      head:      sector:
```

A sector with an unrecognizable address should be flagged as bad by using the **Set Flag Byte for a Specific Sector** program described in the ADX manual.

Invalid Cylinder Number

This error is caused by the user entering an invalid cylinder number. The error message will appear as follows:

```
Invalid Cylinder Number, please try again.
```

This error is not one that will cause injury to the system.

Compare Error

This error occurs during the disk read sequence. The message appears as follows:

```
COMPARE Error - Cylinder:      , Head:      , Status
```

This is a data error accompanied by a CRC error. (See CRC errors in this section).

Other error information that may appear on the display screen provides status information related to the hard disk drive or the controller. The displayed error information appears as follows:

```
*** ERROR *** Drive: X
Cyl:      , Head:      , Sector:      , Status:
Status bit meanings:
```

The definitions for the six fields displayed in the message are as follows:

1. Drive - This is the hard disk on which the error occurred (i.e., 01 = hard disk that will be in the 580 system enclosure, 02 = hard disk that will be in the upgrade it, or secondary enclosure).
2. Cylinder - This is the cylinder that was being accessed at the time the error occurred.
3. Head - This is the head that was active when the error occurred.
4. Sector - This is the sector that was being accessed during the occurrence of the error.
5. Status - This eight-bit status byte provides information that further defines the error condition. The bit codes of the status byte are:

BIT	MNEUMONIC	DESCRIPTION
7	RDY	Selected drive is ready
6	WR FLT	Write Fault (from drive)
5	Not Assigned	Not Assigned
4	CRC ERR	CRC Error encountered
3	RNF	Record Not Found
2	BD SECT	Bad Sector encountered
1	TC	Task Complete
0	BUSY	Busy

6. Status bit meanings - This field presents the meaning of each 1-bit displayed in the status field.

If a "Drive Not Ready" occurs, it indicates that the Ready Status was not returned by the tape drive. When this occurs, the problem may be that the interface cables are not attached or that the connector is not pinned correctly.

8.6 MEMORY

While executing the MEMTEST programs, a hardware malfunction generates error information that is displayed on the screen. The error information is presented in the following format:

COMPARE ERROR-BANK X ADR: XXXX WRITTEN: 0000 0000 READ: 0000 0000

The field definitions for the error message include:

BANK - Indicates the memory bank number in which the error took place.

ADR - Indicates the memory location within the bank that failed.

WRITTEN - Presents the bit pattern that was written to the memory location.

READ - Represents the bit pattern that was actually read from the failing memory location.

8.7 MAGNETIC TAPE DRIVE

While executing ATD programs, a hardware or media malfunction will generate error information. This information is presented on the terminal screen in the following format.

```
READ DATA IN ERROR
TAPE SUBERROR CODE  14
  DRIVE STATUS:  10010001
  INTERFACE STATUS:  11000000
STRIKE RETURN TO CONTINUE
```

The first line of the format is an explanatory message which may indicate either an abort or error function. The second line of the format is a tape sub-error code. Sub-error codes and their meanings are explained in Table 8-3. The third and fourth lines of the format are the drive status (DS) and interface status (IS) bytes. The drive status reports the status of the currently selected drive. Figure 8-1 gives the meanings of the drive status bit activation. The interface status bytes reports on the command status as well as the currently selected tape drive and tape track. Figure 8-2 gives the meanings of the interface status bits.

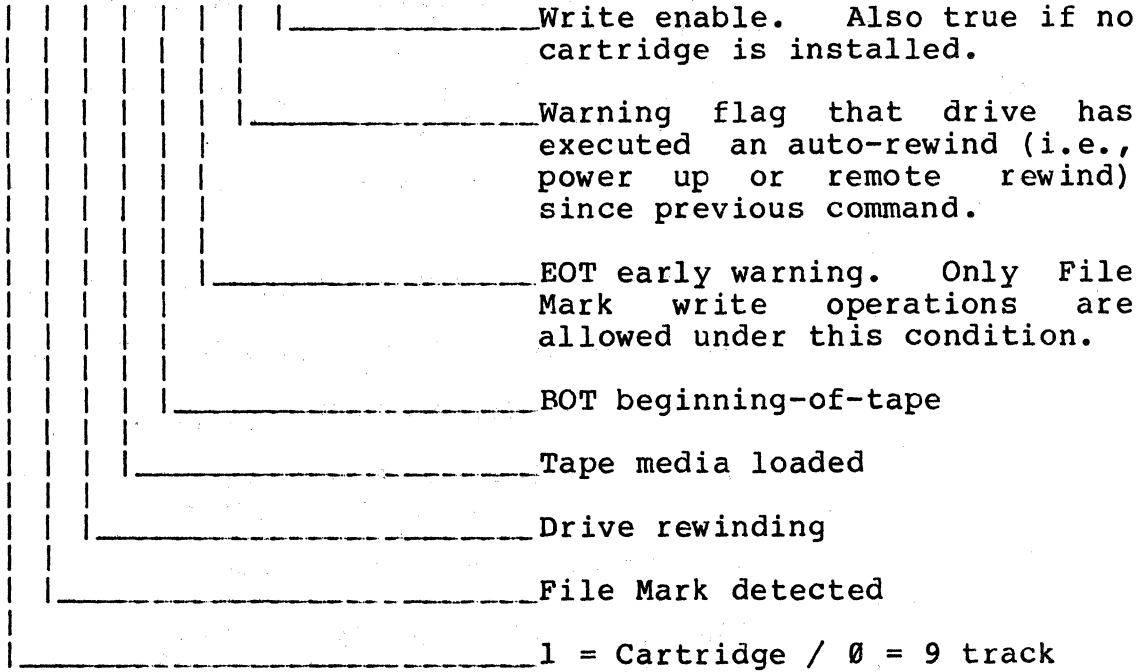
Following the error information is a prompt. Pressing the RETURN (<CR>) key in response to the prompt returns the system to the ATD menu. To abort the ATD tests, at any time, press the <esc> key. This returns the system to the Diagnostic Command Directory.

Table 8-3. Magnetic Tape Suberror Codes

CODE	MEANING
00	SELECTED DRIVE HAS EXECUTED AUTO-REWIND SINCE PREVIOUS INIT OR REWIND CMD.
01	WRITE OPERATION REQUEST TO A WRITE PROTECTED DRIVE
02	COMMAND ISSUED TO NON-PRESENT DRIVE OR DRIVE WITH CARTRIDGE REMOVED
03	DRIVE FAILED TO RESPOND TO THE REQUESTED COMMAND
06	FILE MARK VERIFICATION ERROR AFTER WRITING IT
07	TRANSPORT ABORT PRIOR TO COMMAND COMPLETION
08	READ FAIL - MISSING DATA OR FMK
09	READ FAIL - LRCC RECORD ERROR or IHER* ON 9-TRACK
10	READ FAIL - SHORT RECORD ERROR
11	READ FAIL - BAD VERTICAL PARITY
12	WRITE FAIL - R-A-W VERIFY ERROR
13	WRITE FAIL - READ DATA NOT DETECTED PRIOR TO RECORD WRITE OPERATION COMPLETION
14	READ FAIL - FILE MARK DETECTED

Drive Status Bits

7 6 5 4 3 2 1 0
| 1 0 0 1 1 0 0 0 |



Note: All bits are high true.

Figure 8-1. Drive Status Bit Definitions

INTERFACE STATUS BITS

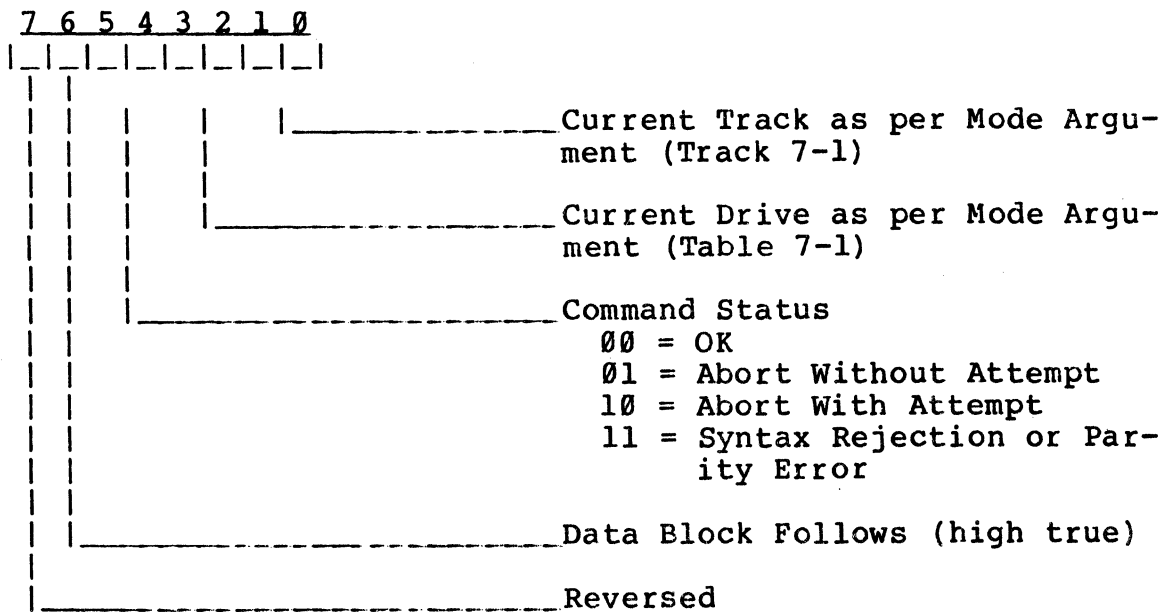


Figure 8-2. Interface Status Bit Definitions

ALTOS 580 COMPUTER SYSTEM ADX DIAGNOSTIC MANUAL

READER COMMENT FORM

Altos Computer Systems
2641 Orchard Parkway
San Jose, CA 95134

This document has been prepared for use with your Altos Computer System. Should you find any errors or problems in the manual, or have any suggestions for improvement, please return this form to the ALTOS PUBLICATIONS DEPARTMENT. Do include page numbers or section numbers, where applicable.

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