ALTOS
COMPUTER SYSTEMS

Series 5 Computer System

Altos Diagnostic Executive (ADX) Manual

Revision E
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SERIES 5 COMPUTER SYSTEM

DIAGNOSTICS MANUAL

REVISION E

This revision replaces but does not obsolete previous versions of this document. The information contained herein is subject to change without notice. Changes will be incorporated in new editions of the document as they are published.

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SECTION 1

ADX PROGRAM DESCRIPTION

GENERAL INFORMATION

This manual provides the necessary instructions for the execution of Altos diagnostic programs. These utility and test programs prepare the Series 5 computer for the installation of an operating system and for selected application programs. This program must be run the first time the computer system is powered up, and each time a new component is added to the system.

ADX PROGRAM FUNCTIONS

The ADX master diskette provided with the system contains a group of command programs that format and copy floppy diskettes, copy boot tracks, and test Series 5 computer system components. These programs comprise the Altos Diagnostic Executive Program (ADX).

CAUTION

A back-up copy of the ADX master should be made before proceeding to test system components. To protect the master diskette, at least two copies should be made. One copy, the ADX system diskette, is for daily use. The other, the back-up master, is used for making additional copies for daily use. The ADX master diskette is not for daily use but should be stored, together with the back-up masters, in a secure location away from the computer to prevent accidental use.

ADX UTILITY PROGRAMS

The ADX program uses five utility programs to prepare the Series 5 computer for operation. They are:

MFORMAT - which formats floppy disks for all models of the Series 5.

BOOTCOPY - which copies boot tracks.

COPY - which copies floppy disks including boot tracks if on the disk.

ADXCOPY - which copies ADX onto a formatted floppy disk.

ADXSETUP - which specifies and updates baud rates for the console terminal, printer, and auxiliary port.

ADX TEST PROGRAMS

The ADX program uses four utility programs to test the Series 5 computer components for operation. They are:

MEMTEST - which tests RAM.

PRNTEST - which tests the printer interface.

MFT - which tests floppy disk drives.

HARDS5 - which tests hard disk drives.

BOOTING FROM FLOPPY OR HARD DISK DRIVES

There are two methods of bootstrapping available with the Series 5 computer system. One is booting from a floppy diskette and the other from a hard disk. When booting from a floppy diskette, regardless of the type/model of Series 5 computer, it is necessary to use the right-hand (RH) floppy disk drive.

KNOWN DEFICIENCIES

At the time this manual was printed, the below listed system deficiencies were known to exist.

1. After loading and running ADX, the self-test sometimes runs spontaneously when the system is re-booted.

SECTION 2

LOADING AND RUNNING ADX

INTRODUCTION

This section presents the loading and running of the Altos diagnostic program. It describes the booting of ADX and the display of the ADX directory.

BOOTING THE ADX PROGRAM

Step 1. Make sure that computer is ON. If not, power up the computer system as outlined in the Series 5 User Manual.

Step 2. The system will display the following message and prompt on the screen.

If the system is configured with a hard disk unit the following appears:

```
ALTOS COMPUTER SYSTEMS
MONITOR VERSION 7.Ø2

Self test completed

Press any key to interrupt Boot operation
Booting from Hard Disk.....

Selected device does not contain Boot program

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

Go to step 3. below to continue the loading process.

If the system is configured without a hard disk unit

the following appears:

```
ALTOS COMPUTER SYSTEMS
MONITOR VERSION 7.Ø2

Self test completed

Booting From Floppy Disk . . .
```

If a floppy disk containing the boot program was not inserted into the right-hand drive the following prompt will appear:

```
Insert Floppy Disk for Autoload.
```

Go to step 4 below.

Step 3. Enter **2** to boot from the floppy disk. The ADX program cannot be booted from hard disk. The system will display the following message:

```
2
Booting from Floppy Disk......

Insert Floppy Disk for Autoload
```

Step 4. Insert Master ADX diskette. The system will display the ADX directory and the REQUEST prompt on the screen as shown below.

```
Altos ADX 3.ØØ

ALTOS DIAGNOSTIC MONITOR VERS 3.1

* * * DIAGNOSTIC COMMAND DIRECTORY * * *

ADXCOPY     COPY        BOOTCOPY    MFT
MEMTEST     PRNTEST     HARDS5      MFORMAT
ADXSETUP

REQUEST:
```

Step 5. Proceed to one of the sections listed below and select the desired utility/test program.

Section 3 - Making Back-up Copies of ADX
Section 4 - ADX Utility Programs
Section 5 - ADX Test Programs

SECTION 3

MAKING BACK-UP COPIES OF ADX

ADX COPIES WITH THE SERIES 5-5D

Have at least two new blank 5-1/4 inch floppy diskettes. These should be 8Ø track (at 96 tracks-per-inch), double-density, double-sided, soft-sectored diskettes.

Step 1. With the ADX Master diskette loaded and the Diagnostic Command Directory menu displayed, enter MFORMAT after the REQUEST prompt. The terminal will display the following:

ALTOS 5-1/4 INCH FLOPPY FORMAT FACILITY__V 1.1
Insert diskette to be formatted in available drive
Remove system disk if necessary
Enter drive letter to continue A/B?

Step 2. Insert blank diskette in right-hand drive and type A. The system will respond by counting the diskette cylinders as they are formatted as shown below:

Cylinder XX (where XX is a cylinder number from Ø to 79)

Step 3. After completing the format for cylinder 79 the utility will verify the format task as shown below:

Disk Format Complete
Press Any Key to Abort Verifying
Verifying Cylinder XX (where XX is a cylinder number from Ø to 79)

If you allow the verification to go to completion you will see the following message:

Verify Complete

Would you like to format another diskette? Y/N

Step 4. At this point remove the diskette from the drive and label it "ADX Back-up Master" and set it aside.

WARNING

Use only felt tip pens when writing on a floppy diskette. The use of a pencil or a ball point pen can make indentations on the surface of the diskette and will cause media related errors during use. Preferably prepare and write on the label before it is placed on the diskette.

Step 5. To make the "ADX System Diskette", the one to be used in daily use, insert the second blank diskette and type Y to the prompt shown in step 3 above. The prompt shown in step 1 above will be repeated, respond in the same manner as before. Upon completion, remove diskette and label it properly.

Step 6. Respond with a N to the prompt in step 3 to exit the MFORMAT utility. The next prompt will then be displayed:

System disk in drive A
Enter to continue.....

Step 7. Insert the ADX Master diskette and depress the return key on the keyboard of the terminal. Control will then return to the Diagnostic Command Directory.

Step 8. Type "ADXCOPY" after the "REQUEST" prompt. The following prompt appears:

ALTOS ADX Disk Copy Program -- Version 1.Ø

Please insert diskette to be read from

Then press return key

Step 9. Press the return key. The system will respond by counting the diskette cylinders as they are read as shown below:

Reading cylinder XX (where XX is a cylinder number from Ø to 79)

Note

The ADXCOPY procedure when used with a single diskette system (5-5D) will read as many cylinders as possible from the source disk into memory and will then write those 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 disk into memory and then write that information out to the destination disk. It may require as many as five iterations of this procedure to fully copy a disk. In the event that memory cannot hold the full contents of the disk in one execution of the procedure, the system will direct you to insert the destination disk to which you want to write for a partial copy. You should proceed to step 10 below. When you have completed steps 10-12 you can return to step 8 to continue copying from the source disk at the cylinder number where the copy process was temporarily halted.

Step 10. After the maximum numbers of cylinders have been read the following prompt will appear:

Please insert diskette to be written to

Then press return key

Step 11. Remove the ADX Master diskette from the drive, insert the formatted diskette labelled "ADX Backup Master". Press the return key. The system will respond by counting the diskette cylinders as they are written to as shown below:

Writing cylinder XX (where XX is a cylinder number from 0 to 79)

Step 12. After all cylinders have been written to the following prompt will appear:

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

If you enter a "Y" for yes, the original prompt in step 8 above will be repeated.

If you enter a "N", control passes back to the diagnostic menu.

ADX COPIES WITH THE SERIES 5-15D

Step 1. Enter COPY after the REQUEST prompt. The terminal displays the following:

Altos 5-1/4 Inch Disk Copy Program-- V 1.1

Insert diskette to be read from in drive A

Insert diskette to be written to in drive B

Type return

Step 2. Make sure that the ADX Master diskette is in the right hand drive (drive A). Insert the formatted diskette labeled ADX Back-up Master in the left hand drive (drive B) and then depress the return key on the keyboard of your terminal.

Step 3. When copy is finished, it returns back to the Diagnostic Command Directory. Remove the diskette. Repeat the COPY operation for the second diskette.

NOTE

This utility copies boot tracks as well.

NOTE

At this point store the original ADX Master diskette in a safe place away from the system work area. DO NOT USE THIS DISKETTE EXCEPT TO CREATE ADDITIONAL ADX BACK-UP MASTERS, AND ONLY USE THE ADX BACK-UP MASTERS TO CREATE ADX SYSTEM DISKETTES! The back-up procedure for Series 5-15D systems is now complete.

Step 4. Upon completion, remove the diskette from the drive and label it ADX System Master. Repeat the COPY procedure to make a copy of the ADX System Diskette. Do not use the ADX Master, set it aside and use the ADX Back-up master in its place.

SECTION 4

ADX UTILITY PROGRAMS

INTRODUCTION

This section describes the four utility programs that are a part of the Altos diagnostic program (ADX).

MFORMAT

The MFORMAT utility program either formats or reformats diskettes. This program erases all data stored on an old diskette.

Step 1. Insert the diagnostic diskette in the diskette drive. Push the system reset button. The ADX Diagnostic menu is displayed on the terminal screen. Enter MFORMAT after the REQUEST prompt. The terminal displays the following:

ALTOS 5-1/4 INCH FLOPPY FORMAT FACILITY -- V 1.1
Insert diskette to be formatted in available drive
Remove system disk, if necessary
Enter drive letter to continue A/B?

Step 2. Insert the blank disk into the desired drive and close the loading door. Type A for the right hand side drive or B for the left hand side floppy disk drive (Series 5-15D only). The system responds by counting the diskette cylinders as they are formatted as shown below:

Cylinder XX (where XX is a cylinder number from Ø to 79)

Step 3. After completing the format for cylinder 79 the utility will verify the format task as shown below:

Disk Format Complete
Press Any Key to Abort Verifying

Verifying Cylinder XX (where XX is a cylinder number from Ø to 79)

If you allow the verification to go to completion you will see the following message:

Verify Complete

Would you like to format another diskette? Y/N

Step 4. At this point, remove the formatted diskette from the disk drive, label it, enter Y for Yes to repeat, or N to return to the ADX Diagnostic menu.

COPY

COPY performs a sector by sector copy of a 5-1/4 inch diskette. This utility requires two floppy disk drives, therefore it can only be used on the Series 5-15D computer system. The COPY utility requires a source and a previously formatted object diskette to be copied.

Step 1. Load the ADX Diagnostic diskette into drive A. Press the system reset. The ADX Diagnostic menu displays on the terminal screen. Enter COPY after the REQUEST prompt. The terminal displays the following:

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

Step 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 then depress the return key on the keyboard. The system responds by displaying the diskette cylinders as they are copied as shown below:

Copying Cylinder XX (where XX is a cylinder number from Ø to 79)

Step 3. After completing the copy, the utility will prompt for repetition of the copy task. Remove the source and object diskettes. Type Y, for Yes, to repeat copying or type N to return to the Diagnostic Command

Directory. This copy utility copies all areas on the disk, including the boot tracks.

BOOTCOPY

The BOOTCOPY program is designed for the Series 5 computer system. It copies the autoboot system tracks (Ø and 1) from a source disk, to any object disk that has already been formatted.

Follow the procedure below to execute the BOOTCOPY program.

Step 1. To perform the BOOTCOPY program, the diagnostic disk, a source disk, and an object disk are required.

Step 2. Insert the ADX diagnostic diskette in the right-hand diskette drive. Depress the system reset button. The ADX Diagnostic menu displays 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

After the diskette has been read, the next prompt is given:

Insert diskette to be written to in drive A
Press return key

Do you want to repeat, (Y/N)

Step 3. After completion of the boot copy the system returns back to the ADX Diagnostic menu if the reply is N (No).

ADXSETUP

Step 1. This utility is used to specify baud rates for the console terminal, printer and auxiliary port. After the screen displays the command menu, select ADXSETUP as follows:

REQUEST: ADXSETUP (Depress return)

The screen displays the following:

ALTOS COMPUTER SYSTEMS

DIAGNOSTIC DISK

BOOT SETUP PROGRAM, VERSION 3.ØØ

SELECT BAUD RATE FROM FOLLOWING LIST FOR CONSOLE #1

```
Ø DON'T CHANGE CONSOLE BAUD RATE
1  11Ø  BAUD
2  3ØØ  BAUD
3  6ØØ  BAUD
4 12ØØ  BAUD
5 24ØØ  BAUD
6 48ØØ  BAUD
7 96ØØ  BAUD

Specify baud rate:
```

Step 2. Select the baud rate applicable to your terminal by the list item number. The Altos system requires that console #1 have a 9600 baud rate. After making a selection, depress return.

The next display is to determine the baud rate for consoles #2 and #3. Since these consoles are not presently used by ADX, select Ø and depress return.

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

```
SELECT PRINTER BAUD RATE FROM FOLLOWING LIST

Ø  CENTRONICS TYPE PRINTER (PARALLEL PORT)
1   11Ø BAUD
2   3ØØ BAUD
3   6ØØ BAUD
4  12ØØ BAUD
5  24ØØ BAUD
6  48ØØ BAUD
7  96ØØ BAUD

Specify baud rate:
```

Step 4. 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 Ø. If, however, you are using a Centronics which is serially connected, select the applicable baud rate. You may need to consult the operators manual for the printer to determine this specification. Make your selection and depress return.

The user is now prompted to place the disk to be updated in drive A as follows:

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

Step 5. If you are updating the diagnostic disk presently being used, then depress return. If it is another copy of the diagnostic disk and it requires an update, then remove the diagnostic disk presently in use and place the disk to be updated in drive A.

Once the disk to be updated is in drive A, close the loading door and depress return. The following is displayed:

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

Step 6. If the updated diagnostic disk was used to perform this operation, then depress the system reset button on the front panel to reset the system. This is to reinitialize the system with the updated information.

Step 7. If the updated diagnostic disk is not the diagnostic disk being used, then place that diagnostic disk in drive A and depress return.

SECTION 5

ADX TEST PROGRAMS

INTRODUCTION

This section describes the four test programs that are a part of the Altos diagnostic program (ADX).

These tests should be run if:

1) problems with the floppy diskette drives, hard disk, printer, memory, or the CPU PCB are encountered,

2) the system is first setup, or

3) new components are added to the system.

You should run ADX test programs in the following order to test and initialize system components. Refer to the next subsection for test program descriptions and operating procedures.

1. Run MEMTEST to test computer system RAM.

2. Run PRNTEST to test the printer interface.

3. Run MFT to test computer system floppy disk drives.

4. Run HARDS5 to test the computer system hard disk, if your Series 5 system has a hard disk.

The ADX program may include other programs depending upon how your system is configured.

TEST RAM USING MEMTEST

The MEMTEST command allows you 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.

Follow this procedure to run MEMTEST.

Step 1. Insert the diagnostic diskette into drive A.

Step 2. Boot up the system. You will see the diagnostic menu.

Step 3. Type MEMTEST following the REQUEST: prompt.

The screen will display the following:

```
ALTOS SERIES 5 MEMORY TEST VERSION 2.4

VALID TEST MEMORY RANGE (HEX)
COMMON AREA C000 - FFFF
BANKS 0-2: 0000-BFFF; BANK 3: 4000-BFFF
SELECT MEMORY BANK TO BE TESTED

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)
```

Step 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)?
```

Step 5. Refer to matrix maps for memory address selections. 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 L TO GET A LIST OF VALID COMMANDS
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
```

Step 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.

Step 7. Replace any defective memory chips with 64KX1 dynamic RAM 200 nanosecond access time. The chip you select must support a refresh cycle by performing a RAS only cycle at each of 128 raw 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 Series 5 computer.

TEST PRINTER INTERFACE USING PRNTEST

Step 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 when the printer is connected.

```
PRINTER TEST X.X

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

A parallel printer can be specified by using ADXSETUP.

TEST FLOPPY DISKETTE DRIVES USING MFT

The ADX MFT test program package tests the computer's floppy disk drive system. It consists of seven tests. Run various test programs in this package if you suspect that you have a hardware

driven problem with your system.

Running MFT

You will need one formatted blank diskette for Series 5-5D (two for Series 5-15D) to use MFT. Using diskettes that are known to be good, format the diskettes on the drive to be tested using MFORMAT. Then run MFT function test C (listed on the MFT main menu) for at least 400 passes, if possible. There should be fewer than one error per pass.

If the number of errors per pass is greater than one, terminate the test and try new and different floppy diskette, to ensure that you do not have defective media.

To run this test, insert the ADX copy diskette into logical drive A and depress the reset button. The diskette will boot up automatically, and display the Diagnostic Commands Directory. First, type MFORMAT after the REQUEST: prompt to format a blank diskette. Return to the Diagnostic commands directory after formatting a diskette, and type MFT after the REQUEST: prompt.

The MFT Main menu displays in a few moments. It prompts you to choose which floppy disk drive function to be tested. The most useful choice to make in most field situations is Option C, RELIABILITY TEST, but other tests on the menu may also be chosen. The RELIABILITY TEST should be run for one or two hours if possible; most other tests on the menu will take less time. All tests display screen prompts to guide you clearly through simple operating procedures. Do not use diskettes that have good data on them for any tests.

Type S on the keyboard to generate a summary error display at any time during any function test you select in this program.

Type ESC to abort any function test at any time.

*******ALTOS 5.25 INCH FLOPPY TEST FACILITY*******

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) Exit program

Test C above is best used for Acceptance Test procedures when first verifying system operation or component additions.

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 and the ERROR DISPLAY TABLE.

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 you are running.

Here is a list of error code definitions and suggested problem sources for the Error Summary Table.

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

The following screen display is listed when you specify the error summary table. You may display the errors if desired.

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

Do you wish to display errors? Y/N

The error display table is selected by answering Y (Yes) to the prompt that appears at the bottom of the error summary table. It shows error types and the physical locations of errors on the diskette. It is best called toward the end of a test.

SOFT ERRORS

DRIVE	SIDE	TRACK	SECTOR	ERROR	PASS	OCCURRENCES
1	Ø	23	4	CMP	Ø	2

Continuously Write a Sector

Enter A to select this first test. It prompts you first to enter the Drive, cylinder, head and sector number to be written to, and then to insert a formatted test diskette into the drive to be tested.

Continuously Read a Sector

Enter B to select this test. It prompts you first to enter the drive, cylinder, head and sector number to be read from, and then displays the contents of the sector. It then askes if you'd like a dump of the read buffer on a CRC or Compare error.

Reliability Test

Enter C to select this test. Test accuracy increases greatly with the number of passes it has time to make over the test diskette. It should run for a few hours on a normal system.

It first prompts you to select drive A or B, and then to insert a formatted test diskette in the drive number 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.

Continuously Write Then Read One Track

Type D to select this test. It first prompts you to select drive, cylinder and head numbers, and then to insert a formatted test diskette in the drive number selected. It displays errors in a table similar to the Error Display table.

Motor Start Timing Test

Enter E to select this test. This test prompts you to place a formatted diskette in drive A. The test turns the motor on and off constantly to verify that it is operating correctly. Press ESCAPE key to terminate the test.

EXIT Program

All function programs return to the MFT main menu when finished. Exit MFT by selecting option f., exit program.

TEST HARD DISK DRIVE USING HARDS5

HARDS5 tests computer system hard disks. It consists of eight tests. To run this test, load the ADX diskette and type HARDS5 after the REQUEST: prompt. The screen displays the following status message:

```
***Hard Disk (5-1/4") Test Facility X.X***
Specify Configuration of HARD DISK to be tested.
Default Configuration is:
Drive Number            :   1
Cylinders Per Drive     : 153
Number of Heads         :   4
Sector Size             : 512
Press RETURN to bypass a selection.
Enter Drive Number ("1" or "2")                <cr>  **
```

Note: ** enter 2 if testing an external drive.

Respond by specifying the conditions under which you will run the hard disk tests or functions. The following prompts will appear.

```
Enter cylinders per drive ("1" = 153; "2" = 306)      <cr>

Enter number of heads     ("2","4","6", or "8")       <cr>

Enter sector size         ("1" = 256; "2" = 512)      <cr>

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

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:
```

Normally run test 7 at the time the computer system is powered up and each time a new component is added to the system.

Also note that test 2 is non-destructive and is therfore recommended for use when a quick overall check is desired. Tests 1, 4, 6, and 7 are destructive of data and track IDs.

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 Seagate 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 HARDS5 function erases data on the hard disk and will 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 user data. 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 you will see a count from 0 to 152 appear on the screen as each cylinder is formatted. The program returns to the hard disk menu when formatting is completed, and you will be prompted to make a new selection.

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.

Verify Addresses for all Sectors on Disk

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.

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

Seek Test with Optional Verify

This test seeks between two operator specified cylinders and can verify the addresses at head Ø, sector Ø, of each specified cylinder.

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 Ø and cylinder 152. For minimum boundary, specify cylinder Ø and cylinder 1. 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 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 Ø and sector Ø 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.

Write Entire Disk

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

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 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 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 unflagged bad sector may cause a CRC error display if the ID block and CRC bytes are also bad.

3. Writing to a 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.

4. A bad sector with a bad data block by a good ID block will not generate an error display. A READ test will detect this error condition.

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 hex 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. Option #1 runs the test but does not display the contents of the data block nor any status or compare errors.

2. Option #2 will cause the hard disk controller to send

back status errors when the controller is unable to locate and properly identify a sector. The data block is passed unchecked but the program will check the CRC portion of the data block for a CRC error. This option displays the contents of any error sector found, along with an error message.

3. Option #3 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 ØØ .... 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 bad sector. 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 also allows you to select read-bytes. This option displays both status and compare errors, as well as the contents of the sector found in error.

Set Flag Byte for a Specific Sector

This function may be done in one of two ways.

1. You can use error map data provided by Seagate.
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 any key when ready to start this test.

The program then displays this option menu.

Hard Disk "Flag Bad Sector" Options are:

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

Make your selection and depress [RETURN]. If you select Option #1, you will be prompted to enter TRK, HD, byte count and length in bits. Type your selection and depress [RETURN].

```
Select option by number:      1
Enter CYL:                   60
Enter HD:                     2
Enter sector number:          4
Enter byte number:          300
Bad sector range:      cylinder = 60 head = 2 sector(s) = 12

Do you want to continue this test? Y/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.

Hard Disk Read/Write Error Test

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 attempt to read data. The hard error is declared, flagged, and allocated. Sectors containing hard errors should be mapped by using either this test; test #7; or by using the combination of tests #6 and #8.

This test provides two functions:

1. It 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.

2. Once the first function is terminated, the user is given the opportunity to allocate dummy files to those bad sectors which were flagged during the first portion of the test.

Press ESC to terminate the test. The program will go back and erase the entire disk and automatically flag those sectors which is identified as being bad.

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

Do you want to continue? (y or n)

This Error Test MENU displays next.

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:

Use Option #1 with the ADM31 and Televideo 912 terminals, and other terminals with similar type cursor control.

Use Option #2 with any terminal.

Use Option #3 when no terminal is attached to the computer system or 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)

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

A Y response to the last prompt will generate this pattern prompting menu. Type the 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 patterns on the disk.

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.

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.

Pass count:
Pattern:
Cylinder:

Soft Errors

Chars:	**E5E5H**	**CMP Err Ø**	**CRC Err Ø**	**RNF Err Ø**	**BAD SEC Ø**
Chars:	**5555H**	**CMP Err Ø**	**CRC Err Ø**	**RNF Err Ø**	**BAD SEC Ø**
Chars:	**AAAAH**	**CMP Err Ø**	**CRC Err Ø**	**RNF Err Ø**	**BAD SEC Ø**
Chars:	**FFFFH**	**CMP Err Ø**	**CRC Err Ø**	**RNF Err Ø**	**BAD SEC Ø**

Hard Errors

Chars:	**E5E5H**	**CMP Err Ø**	**CRC Err Ø**	**RNF Err Ø**	**BAD SEC Ø**
Chars:	**5555H**	**CMP Err Ø**	**CRC Err Ø**	**RNF Err Ø**	**BAD SEC Ø**
Chars:	**AAAAH**	**CMP Err Ø**	**CRC Err Ø**	**RNF Err Ø**	**BAD SEC Ø**
Chars:	**FFFFH**	**CMP Err Ø**	**CRC Err Ø**	**RNF Err Ø**	**BAD SEC Ø**

Finishing Current Pass

Do you want to print (LP) the errors? YES=Y, NO=N

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

Miscellaneous Functions

At present, this selection provides three unique functions:

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 in 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)

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