



Preliminary Series 5 Computer System Supplement 3. Executing Diagnostic Programs

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NOTE

This revision replaces but does not
obsolete previous revisions
of this document.

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ALTOS SERIES 5 COMPUTER SYSTEM**SUPPLEMENT 3. EXECUTING THE ALTOS DIAGNOSTIC
EXECUTIVE PROGRAM (ADX)****GENERAL INFORMATION**

This supplement provides instructions for executing diagnostic programs to prepare your system for installing the operating system and the selected application programs.

This supplement also presents the ADX program diskette loading procedure, and reviews ADX program functions.

KNOWN SYSTEM DEFICIENCIES

At the time this preliminary manual was printed, the following system deficiencies were known:

1. There is no way to change baud rates or use a parallel printer with ADX. Use only 9600 baud terminals and serial printers.
2. There is no Direct Memory Access (DMA) or memory write-protect test.
3. The system will hang (possibly with a memory parity error) if "9" is entered to exit from HARD5. Reboot the system to exit from HARD5.
4. HRDINIT5 does not return to the ADX menu. Reboot the system to exit from HRDINIT5.
5. The self-test will run spontaneously sometimes when the system is booted after running ADX.
6. COPY and BOOTCOPY do not yet verify the data on the destination disk.

ADX PROGRAM FUNCTIONS

The ADX master diskette that came with the system contains a group of command programs that test Series 5 computer system components, format diskettes, and copy programs. These programs comprise the ALTOS Diagnostic Executive program (ADX). The ADX program must be run the first time the computer system is powered up, and every time a new component is added to the system.

WARNING

You should make a backup copy of this diskette before proceeding to test system components. To insure protection of your master diskette, you should make at least two copies. One copy, the ADX system diskette, is for daily use. The other, the back-up master, is only for making additional copies for daily use. You should never use your Altos master diskette for daily operations. It should be stored away from your computer area in a secure location to prevent accidental use.

The utilities and tests comprising the ADX program are grouped into three categories, described in this section. Each program prompts you for every operation you need to perform. The programs perform these following functions:

1. They format diskettes and copy diskette utilities.
2. They test computer memory, printer, terminal, and floppy drives.
3. They test hard disk functions.

Loading and Running the ADX Program

Follow the power up procedures listed in Section 1 of this manual. Your system should be unpacked. System components should be cabled together. You should see a display prompting you to insert a floppy diskette into the floppy drive after you turn on your system.

Place your ADX diskette with the label facing up into the RH floppy disk drive. Close the door of the disk drive unit, and the diagnostics program loads automatically. After loading the diagnostics diskette, your terminal screens the following display.

Altos ADX 3.0
 ALTOS DIAGNOSTIC MONITOR VERSION 3.0

```
***D I A G N O S T I C   C O M M A N D   D I R E C T O R Y***
      MFORMAT      BOOTCOPY      PRNTEST      MEMTEST
      MFT          COPY          HRDINIT5    HARDS5
```

REQUEST:

You must always load ADX programs into the RH drive. Note that default logical Drive A will always be a floppy disk drive. It is possible to pin the floppy disk drive in many ways, but you must still load the operating system disk into logical drive A. Normally (standard factory configuration) logical drive A is the right-hand side drive as you face the front.

Making Back-up Copies of the ADX Diskette

For all Series 5 Computers:

Have at least two new blank 5 1/4" floppy diskettes. The disk drive vendor for all Series 5 models has qualified VERBATIM model number MP557-01-18242 Data Life 5 1/4" diskettes. These diskettes are 5 1/4", 96 track per inch, double density, double sided, soft sector diskettes.

With the ADX Master diskette loaded and with the Diagnostic Command Directory menu displayed, type "MFORMAT" after the "REQUEST" prompt. The terminal will display the following MFORMAT prompts:

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

Type A for the right hand side drive or B for the left hand side floppy disk drive (Series 5-15D only). The system will respond by counting the diskette cylinders as they are actually formatted with the following prompt:

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

After completing the format for cylinder 79 the utility will finish and prompt you for repeating the format task, in the following manner:

```
Would you like to format another diskette?  Y/N
```

At this point remove the diskette from the disk drive and label it "ADX Backup 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 cause indentations on the surface of the diskette which will cause media related errors during use. Preferably prepare and write on your label before you place it on the diskette.

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. The original prompt will be repeated, respond in the same manner as you did before. Upon completion remove diskette and label it properly.

Respond with a "N" to the "Would you like to format another diskette? " Y/N" prompt to exit the MFORMAT utility. In response to the next prompt displayed:

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

Insert the ADX Master diskette and depress the return key on the keyboard of your terminal " [RETURN]". This return you back to Diagnostic Command Directory.

For Series 5-15D system perform the following steps to actually make the copy:

Type "COPY" after the "REQUEST" prompt. The terminal will display the following prompt:

```
Altos 5-1/4 inch disk copy program
Insert source in drive A
Insert object in drive B
Type return
```

Make sure that the ADX Master diskette is in the right hand side drive (drive A). Insert the formatted diskette labeled "ADX Backup Master" in the left hand side drive (drive B) and then depress the return key on the keyboard of your terminal "[RETURN]"

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

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 BACKUP MASTERS, AND ONLY USE THE ADX BACKUP MASTERS TO CREATE ADX SYSTEM DISKETTES! The backup procedure for Series 5-15D systems is now complete.

For Series 5-5D systems perform the following steps to actually make the copy:

WARNING

A copy can be made of the ADX Master diskette only if you have a CP/M or MP/M operating system with a Series 5-5D system. CP/M or MP/M is required to make the backup copy. If you have the OASIS operating system only, you cannot make a copy of the ADX Master at this time, so use the ADX Master with caution and only after reading the instruction completely. This will be corrected at a later date, contact your distributor.

Type "HRDINIT5" to initialize the hard disk. Answer "Y" to the "Do you want to continue" prompt. HRDINIT5 takes about 5 minutes to complete. The Diagnostic Command Directory will be displayed when HRDINIT5 is finished.

Type "BOOTCOPY" after the "REQUEST" prompt. The terminal will display the following prompt:

Altos 5-1/4 inch boot copy program
Insert diskette to be read from and type CR

Depress the return key. The following prompt will then be displayed:

Insert diskette to be written to and type CR

Remove the ADX Master diskette from the right hand side drive (drive A) insert the formatted diskette labeled "ADX Backup Master." Then depress the return key on the keyboard of your terminal "[RETURN]"

When BOOTCOPY is finished, remove the diskette and insert either a CP/M or MP/M operating system diskette. Depress the System Reset push button switch to load the operating system. The final system prompt after "booting" will be:

A>

for CP/M or:

ØA>

for MP/M.

You need to copy all files from your CP/M or MP/M Master diskette to the hard disk logical drive B:, to do this type:

PIP B:=A:*. *[v] [RETURN]

after the A> or ØA> prompt. When the transfer is complete, log-on to logical drive B by typing B:[RETURN] after the A> or ØA> prompt; example for CP/M:

A>B: [RETURN]

or for MP/M

ØA>B: [RETURN]

Remove the CP/M or MP/M master diskette from the floppy disk drive and insert the ADX Master diskette.

To complete the copy function perform the next steps, in response to the system prompts:

B>PIP B:=A:*.DIA[v]

This will transfer all diagnostic files (MFORMAT.DIA, BOOTCOPY.DIA, PRNTEST.DIA, MEMTEST.DIA, HARDS5.DIA, COPY.DIA, HRDINIT5.DIA) from the ADX Master diskette to the hard disk. Upon completion, remove the ADX Master diskette from the floppy disk drive and replace it with the previously formatted and boot copied "ADX Backup Master" diskette. Next, transfer all diagnostic files back to the floppy diskette, again using PIP:

B>PIP A:=B:*.DIA[v]

Upon completion you will have completed the backup. At this point, remove the diskette from the drive and label it ADX System Master. Repeat this procedure to make the copy of your "ADX System" Diskette. Do not use your ADX Master, set it aside and use the ADX Backup master in it's place.

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 BACKUP MASTERS, AND ONLY USE THE ADX BACKUP MASTERS TO CREATE ADX SYSTEM DISKETTES! The backup procedure for Series 5-5D systems is now complete.

NOTE

After making your ADX backup remove all Diagnostic files from the hard disk by typing after the system prompt:

```
B>ERA *.DIA
```

Do not attempt to execute the ADX utility program from the CP/M or MP/M operating systems.

ADX PROGRAM TESTING ORDER

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.

DIAGNOSTICS PROGRAM REVIEW

This section describes each utility comprising the ADX diagnostic program, under these three section headings.

1. System set up, diskette format and diskette copy programs.
2. Floppy disk drive testing programs.
3. Hard disk drive testing programs.

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

DISKETTE FORMAT AND DISKETTE COPY UTILITY PROGRAMS**The MFORMAT Utility (Mini FORMAT)**

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

The disk drive vendor for all Series 5 models has qualified VERBATIM model number MP557-01-18242 Data Life 5 1/4" diskettes. These diskettes are 5 1/4", 96 track per inch, double density, double sided, soft sector diskettes.

Follow this procedure to execute MFORMAT.

1. Insert the diagnostic diskette in the diskette drive. Press [SYSTEM.RESET]. The ADX Diagnostic menu will display on the terminal screen. Type "MFORMAT" after the "REQUEST" prompt. The terminal will display the following MFORMAT prompting message.

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

Insert the blank disk into 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 will respond by counting the diskette cylinders as they are actually formatted with the following prompt:

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

After completing the format for cylinder 79 the utility will finish and prompt you for repeating the format task, in the following manner:

```
Would you like to format another diskette?  Y/N
```

At this point remove the formatted diskette from the disk drive, label it, enter "Y" for Yes if you wish to repeat or "N" to return back to the ADX Diagnostic menu.

The BOOTCOPY Utility

The BOOTCOPY program is designed for the Series 5-5D and the Series 5-10 computer systems. This utility will also work on the Series 5-15. It copies the autoboot system tracks (0 and 1) from a source disk, to any object disk that has already been formatted.

The following procedure prompts you to load a diagnostics diskette in drive A; then exchange the diagnostics diskette for a source diskette; then finally exchange the source diskette for the blank formatted diskette.

Follow the procedure below to execute the BOOTCOPY program.

1. Format a blank diskette using the MFORMAT program. This newly formatted diskette is the object diskette. To perform the

BOOTCOPY program, you will need the diagnostic disk, a source disk, and the object disk.

2. Insert the ADX diagnostic diskette in the diskette drive. Press [SYSTEM.RESET]. The ADX Diagnostic menu will display on the terminal screen. Type "BOOTCOPY" after the "REQUEST" prompt. The terminal will display the following prompt:

```
Altos 5-1/4 inch boot copy program
Insert diskette to be read from in drive A:  and type CR
Insert diskette to be written to in drive A:  and type CR
```

Insert the diskette and press RETURN.

Do you want to repeat, (Y/N)

After completion of the boot copy you will return back to the ADX Diagnostic menu, if you reply "N."

NOTE

At this point the object disk contains bootcopy tracks 0 and 1. It does not contain data. Use the PIP procedure outlined in the operating system section to copy or transfer program or data files from source disks to object disks.

Using the COPY Utility

The COPY performs a sector by sector copy of a CP/M or MP/M 5-1/4" 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" disk to be copied.

Follow this procedure to execute the COPY utility program.

Load the ADX Diagnostic diskette into logical drive A. Press [SYSTEM.RESET]. The ADX Diagnostic menu will display on the terminal screen. Type "COPY" after the "REQUEST" prompt. The terminal will display the following prompt:

```
Altos 5-1/4 inch disk copy program
Insert diskette to be read from in drive A
Insert diskette to be written to in drive B
Type return
```

Insert the diskette you wish to copy in the right hand side drive (drive A). Insert the formatted "object" diskette in the left hand side drive (drive B) and then depress the return key on the keyboard of your terminal "[RETURN]".

After completing the copy, the utility will finish and prompt you for repeating the copy task. Remove the "source" and "object" diskettes. Type "Y" for Yes to repeat copying or type "N" to return back the Diagnostic Command Directory. This copy utility copies all areas on the disk, the AUTOBOOT portion as well as the data/program area.

Documentation for HRDINIT5

This program is provided on the diagnostic diskette. The program will not run under CP/M or MP/M.

The program should be run only once, unless the disk has been reformatted. Since the program will erase all files on the hard disk, back up all files to floppy disk, if required.

The program when run from a diagnostic diskette will initialize 5-1/4" hard disks. In the process of initialization the program builds bad sector information table, this table is written on the last sector of the first track of a particular disk drive. Up to two drives are supported.

Alternate sectors are allocated to bad sectors, the number of alternate sectors available is a function of the size of the drive involved. A fixed number of tracks in the beginning of the disk drive are reserved for use for alternate sectors.

Procedure for Running HRDINIT5

- 1) Boot from the diagnostic disk.
- 2) Request HRDINIT5 when the diagnostic directory is displayed.
- 3) Reply "Y." Do you want to continue?
- 4) If there is a request for a second drive, reply with appropriate number, after the system disk has been initialized.
- 5) Reboot the system.

FLOPPY DISK DRIVE TESTING PROGRAMS

These tests will not normally need to be run unless problems with the floppy diskette drives, printer, memory or the CPU PCB are encountered.

Mini Floppy Test (MFT)

The ADX MFT test program package tests the computer's floppy disk drive system. It consists of 7 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 known good diskettes, 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 insure that you do not have defective media.

To run this test, insert the ADX copy diskette into logical drive A and depress the reset pushbutton. 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 overnight, 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.

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.

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. Loosing data integrity between the Floppy Disk Controller and Volatile memory.

The following screen displays, with a prompt for you to select the error display table.

ERRORS

	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

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	0	23	4	CMP	0	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.

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; when setting up a system or locating major hardware/software interface problems, this test should be allowed to run overnight.

It first prompts you to select a drive number, 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.

Printer Test (PRNTEST)

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{|}~
```

Memory Test (MEMTEST)

MEMTEST command allows the user to test all but a small portion of system RAM for possible errors. Since the program itself occupies some memory, that portion cannot be tested.

Follow this procedure to run MEMTEST.

1. Insert the diagnostic diskette into drive A.
2. Boot up the system. You will see the diagnostic menu.
3. Type MEMTEST at the REQUEST: prompt to select MEMTEST.

The screen will display the following.

```

ALTOS BOOT MEMORY TEST VERSION X.XX

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 FIVE TESTS (YES=Y,NO=N)

```

You will be prompted 4 times to select a memory bank. If you wish to elect only one memory bank, select bank, 0,1,2, or 3, and press [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)?

```

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 press [RETURN] after each selection.

Memory testing will now begin. The screen will display this prompt as it tests.

```

12345  PASSES -      1      ERRORS -      0
12345  PASSES -      2      ERRORS -      0

```


ALL DONE, WAITING FOR CONSOLE INPUT....
 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

If you wish to stop the test without terminating it, and see the results, press 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.

Press [SYSTEM,RESET] to return to the diagnostic menu.

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 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 Series 5 computer.

HARD DISK TESTS AND FUNCTIONS

Hard Disk Test (HARDS5)

HARDS5 tests computer system hard disks. It consists of 9 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") Test Facility vX.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>
```

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 vX.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 Test.

Select required function by number:

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 HARDTEST FUNCTION *
* CHANGES DATA ON THE HARD DISK *
* AND MAY CAUSE LOSS OF USER DATA *
*****
```

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

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

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 determine whether a format of the hard disk is necessary.

Type your password after the question mark if you wish to continue. If you enter N and press [RETURN], you will return to the hard test selection menu.

Enter your password and press [RETURN]. The screen will display the following.

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

Type Y and press [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, nor have you allocated dummy files to those bad sectors. This should be done before any attempt is made to transfer user data to the hard disk.

Verify Addresses for All Sectors on Disk

This test checks addresses on the hard disk. It does not erase user data. It reads every sector on the hard disk and checks the first three bytes. These bytes contain the cylinder, head/drive and sector numbers.

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 complete, 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 verifies the addresses at head 0, sector 0, 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 0 and cylinder 152. For minimum boundary, specify cylinder 0 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 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.

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.

WARNING: THIS HARDTEST FUNCTION
CHANGES DATA ON THE HARD DISK
AND MAY CAUSE LOSS OF USER DATA
Do you wish 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 an unflagged bad sector may cause a CRC error display if the ID block and CRC bytes are also bad.
3. 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.
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 on the contents of the data block 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 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 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 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 press [RETURN]. If you select option #1, you will be prompted to enter TRK, HD, byte count and length in bits. Type your selection and press [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
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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. Run HRDINIT5 to allocate alternate sectors.

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 attempts 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.

Type 7 [RETURN] to select test #7. The display will inform you that the test will erase files on the hard disk and ask if you want to continue (Y or N). Type Y [RETURN]. The display will then prompt you to press any key when you are ready to start the test.

WARNING; THIS HARDTEST FUNCTION
CHANGES DATA ON THE HARD DISK
AND MAY CAUSE LOSS OF USER DATA
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 press [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	0	CRC Err	0	RNF Err	0	BAD SEC	0
Chars: 5555H	CMP Err	0	CRC Err	0	RNF Err	0	BAD SEC	0
Chars: AAAAH	CMP Err	0	CRC Err	0	RNF Err	0	BAD SEC	0
Chars: FFFFH	CMP Err	0	CRC Err	0	RNF Err	0	BAD SEC	0

Hard Errors

Chars: E5E5H	CMP Err	0	CRC Err	0	RNF Err	0	BAD SEC	0
Chars: 5555H	CMP Err	0	CRC Err	0	RNF Err	0	BAD SEC	0
Chars: AAAAH	CMP Err	0	CRC Err	0	RNF Err	0	BAD SEC	0
Chars: FFFFH	CMP Err	0	CRC Err	0	RNF Err	0	BAD SEC	0

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.