



ACS 8600 Computer System

ADX Diagnostic Supplement



NOTE

THE INFORMATION IN THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. NEW EDITIONS OF THIS DOCUMENT WILL INCORPORATE CHANGES AS THEY ARE PUBLISHED.

FOREWORD

The documentation in this manual includes material on a new Altos diagnostic which is presently in development, Altos Diagnostic Executive Version 1.8. The new material is presented here for information and for use in planning and development.

For information on obtaining a later version of the ADX programs, consult your dealer or a Altos Service Representative.

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ALTOS ACS8600 COMPUTER SYSTEM
EXECUTING DIAGNOSTIC PROGRAMS

EXECUTING THE ALTOS DIAGNOSTIC EXECUTIVE PROGRAM (ADX)

GENERAL INFORMATION

This supplement provides all of the necessary information to understand and execute the ACS8600 diagnostic programs available at this time.

Not all of the ACS8600 diagnostics are on the ADX diskette. The Monitor diagnostics are located in EPROM (Eraseable-Programmable-Read-Only-Memory). They are automatically executed as the user applies power or resets to the system.

This manual will describe:

- The Diagnostic package
- Preparing the system for installing an operating system
- selected application programs
- ADX program diskette loading procedures
- ADX program functions
- Two utility programs that are included on the ADX diskette.

It is recommended that the user thoroughly review that portion of the manual that pertains to his or her intended use prior to attempting to execute any portion of the diagnostic package.

ADX PROGRAM FUNCTIONS

The mating of the hardware and software/operating system is accomplished by a program called the "Monitor". This program is a collection of programs, remaining permanently in memory (on board EPROM), providing memory mapping as well as overall coordination and control of the operating system (for further information, see the Monitor program supplement that accompanied your system).

The ADX master diskette, that came with the ACS8600, contains a group of "menu driven" programs that will test the internal computer system components, format diskettes, and copy diskettes. These programs comprise the ALTOS Diagnostic Executive program (ADX). It is imperative that the ADX program be run the first time the computer system is powered up, if the user suspects that a component is not working properly and each time a new component is added to the system.

WARNING

The user should make two backup copies of this diskette before actively testing the system components. One copy of the ADX system diskette is for daily use. The other, the back-up master, is only for making additional copies for daily use. The user should never use the 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 verification routines that comprise the ADX program are grouped into four categories. Each individual program will prompt you, via menus, for every operation that you will need to perform.

The programs perform the following functions:

- (1) format diskettes and copy diskette utilities
- (2) test the CPU (central processing unit), computer memory, internal communications structure (bus arbitration), internal to external interaction (all serial ports), and floppy drives
- (3) test hard disk functions
- (4) test the functionality of the tape/tape drive

SUGGESTED INSTALLATION TEST ORDER

NOTE

THE USER SHOULD USE THE FORMAT PROGRAM (FLPYFORM), TO FORMAT AT LEAST TWO DISKETTES, AND THE COPY PROGRAM (FLPYCOPY) TO MAKE TWO COPIES OF THIS DISKETTE BEFORE RUNNING ANY PORTION OF THIS DIAGNOSTIC PACKAGE.

Once the Monitor is loaded and complete:

- STEP 1*** Install the memory verification, MEM86, and let it go through at least two comprehensive passes
- STEP 2*** Install the serial test, SER86, and let it run for one pass of each routine
- STEP 3*** Install the floppy diskette test, FLPYTEST, for one write/read pass
- STEP 4*** Install the hard disk test, DISK86, and use the Write/Read test. Allow it to run through at least four test patterns, writing and reading
- STEP 5*** If the user has purchased the magnetic tape unit, install TAP86 and let it run through two complete passes of the comprehensive test

These suggestions are for a minimum checkout. If you have time, it would be advisable to run the comprehensive tests longer and run a hard disk test overnight.

DATA ENTRY CONVENTIONS

Data that the user is to enter will be shown in bold face type (i.e. **Y**), or by naming the key to press (i.e. "Press the Escape key"). The key name will also be capitalized. Pressing the Return key is also shown by "**<CR>**". Some examples are as follows:

Reply **Y** or **N** and press the Return key.

Reply **Y<CR>** or **N<CR>**.

Select **A** for display error summary at end of each pass, or **B** for display error summary only at the end of the test.

DATA ENTRY; CHANGING INVALID DATA

The ADX programs will accept alphabetic data in either lower case or upper case (i.e. either **mem86<CR>** or **MEM86<CR>** is acceptable).

The ADX programs, in general, follow the same conventions used by the CP/M operating system. These conventions pertain to cancelling or changing data before it is entered (i.e. pressing the Return key enters data.)

The following examples illustrate some of the basic ways of modifying or correcting entries:

- (1) **erase character**-use the Rubout or Delete keys, or a Control H (^H), depending on your keyboard, to erase the last character typed. (The erased character may be echoed; use Cntrl-R to see the true entry.)
- (2) **erase whole entry**- use a Cntrl-U or Cntrl-X.
- (3) **re-display current entry**-use Cntrl-R.

LOADING AND RUNNING THE ADX SYSTEM

- (1) "Switch on" the system and terminal on/off switches. The following Monitor message will display in approximately 3-4 seconds:

```
ALTOS COMPUTER SYSTEMS-8600
Monitor Version 1.X [01]
```

Press any key to interrupt boot

```
Disk Boot Failed, Code: C4
*
```

- (2) Place the ADX diskette into the diskette (floppy disk) drive as shown in figure ADX-1. Close the drive door until you hear a metallic click, and press the Reset button. This will load the ADX program.



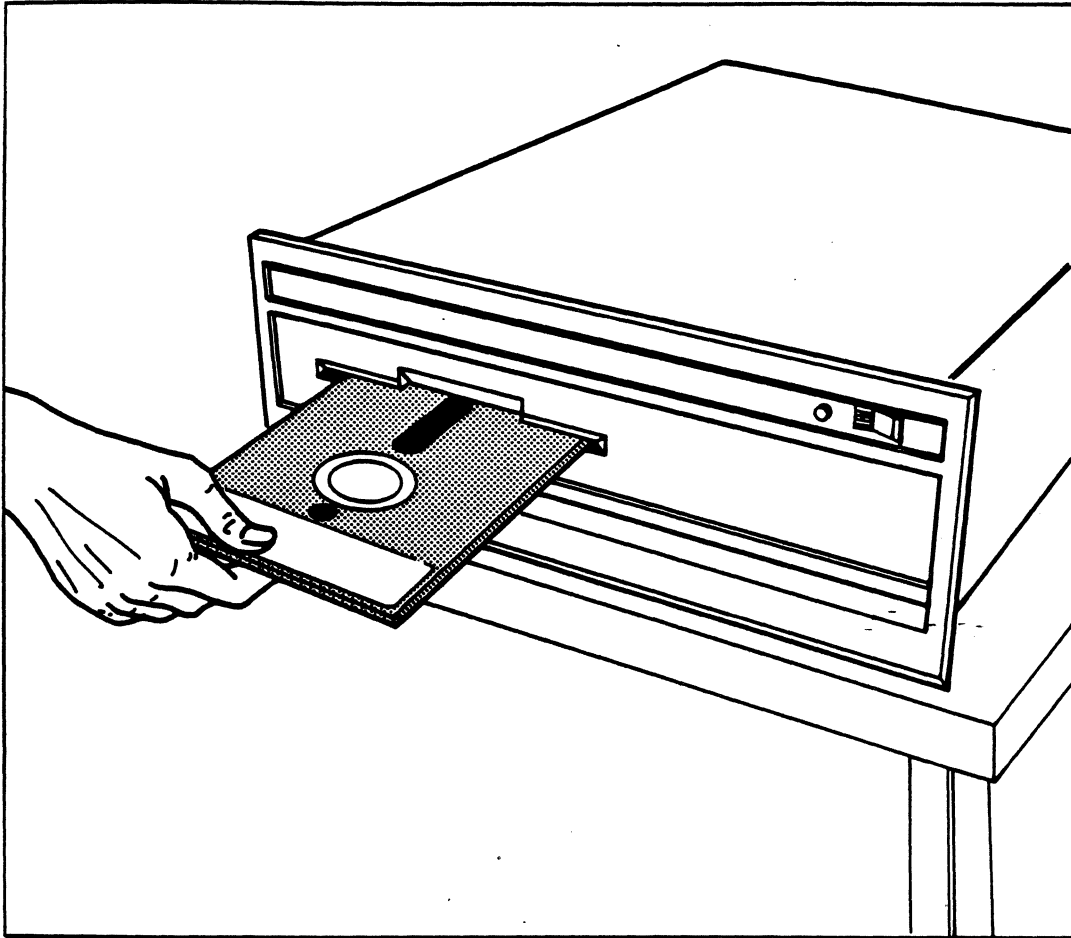


Figure ADX-1. Inserting a diskette into the floppy disk drive

The terminal screen will display the monitor message:

ALTOS COMPUTER SYSTEMS-8600
Monitor Version 1.X [01]

Press any key to interrupt boot

A L T O S D I A G N O S T I C E X E C U T I V E

ACS 8600-V1.8

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** COMMAND DIRECTORY **

FLPYCOPY
MEM86

FLPYTEST
FLPYFORM

SER36
DISK36

TAP36

Request:

Enter the name of the test desired, and press the Return key.
For example:

REQUEST:MEM86<CR>

The following is a brief description of all of the diagnostic programs and utilities:

- FLPYTEST Basic test for diskettes and diskette drives. The basic mechanical functions of the drive and its media integrity are tested for validity.
- SER86 This test provides a method to test serial path/port integrity. This test includes a terminal and intelligent I/O test.
- MEM86 Memory and system test routines. This program exercises the main CPU (8086 central processing unit), test the integrity of the data transmission portions of the system (RAM access, 8088, serial port and multibus integrity, etc.), conduct fault isolation tests (i.e. integrity of the 8087 NDP), and verify long exercise routines.
- DISK86 A collection of hard-disk utility and test routines. Utilities include formatter, routine to flag bad sectors; diagnostics include quick tests, fault isolation tests, and long exercise routines.
- FLPYFORM A program designed to format or reformat diskettes. This routine prepares the diskette surface for new data to be placed on it.
- FLPYCOPY Diskette copy utility. This will copy diskettes (8 inch floppy diskettes) verbatim and will verify those files that have been copied.
- TAP86 This program tests the validity of the magnetic tape drive, its interfaces and the reliability of the magnetic tape in the drive itself.

SPECIAL FEATURES

The ADX package is enhanced with several special features. They are designed to give the user more latitudes of control and flexibility while using these programs.

Terminal Disconnect/Reconnect

The user has the option of disconnecting and reconnecting the terminal without disrupting the integrity of the test in progress. This is useful for such exercises as initial testing of the system, overnight testing of the system after a new component has been placed in the system, etc. The software places a software "dummy load", at the connecting serial port, allowing the terminal to be removed. (NOTE: This can only be reasonably accomplished with a single terminal connected to the system.) This feature is activated/deactivated by entering a control P (^P). This will cause the following display(s) to appear on the screen:

[Disconnect]

[Reconnect]

If more than one terminal is on the system, then the terminal connected to the lowest numbered port (or the first terminal connected to the system) is designated as the 'master terminal'. It receives all test data during ADX operation. If the master terminal is removed, the terminal connected to the next highest numbered port number becomes the master terminal and controls all pertinent data from the test.

Test Start/Stop

The user may stop and restart any of the tests. The user simply enters a control S (^S) to stop the test (this will be visually apparent on the screen/printer), and a control Q (^Q) to restart the test. This routine will not harm the integrity of the test.



Error Pause

This enhancement will allow the user to select and/or adjust certain portions of the message output should an error occur during the test(s). As the user sets up the tests, he should select the Pause (for operator selection) option found in the Error Handling Menu of each Main Menu. This will enable the error to trigger a pause in the test and give the user the option to record the error if a printer is not being used. (This enhancement is also available by entering a control C (^C).) When the error pause occurs, the following menu will appear:

Error Pause

- (A) Continue (ignore all errors)
- (B) Pause (for operator selection)
- (C) Error Handling Menu
- (D) Message Severity Menu
- (E) Printer Selection Menu

MEMORY VERIFICATION TEST: MEM86

The MEM86 memory verification routines are designed and written to give the user confidence with the ACS 8600 system. It is assumed that the user have some conceptual knowledge of the computer domain. It is also assumed that the user has reviewed the hardware and software descriptions contained in the System Reference Manual.

MEM86 executes a variety of dynamic tests to validate the integrity of:

- (1) the ACS 8600 microprocessor (Intel's 8086)
- (2) the onboard dynamic random access memory (both configurations of RAM-500K and 1 Megabyte)
- (3) the error correction circuitry (ECC)
- (4) memory management hardware
- (5) address and data lines to include the multibus interface and 8088 processor
- (6) the optional 8087 Numeric Data Processor

The first test that the user should perform is the Comprehensive test. This test goes through the entire validation process and identifies any trouble areas that may exist in the system. Once this test has been accomplished and any faults identified, the user can then initiate a number of selective tests that will isolate and validate specific portions of the hardware. These selective tests, within the Comprehensive Test, are broken down into modules enabling the user to exercise any, or all, portion(s) of the system he may choose.

The test itself does not "shout out" the type of fault that is occurring. It merely causes the user to look at certain areas more closely (i.e. individual chips). The user can then investigate the faults with more conventional means (i.e. logic analysers, etc.). - This kind of fault isolation is important because most of the errors that may arise are intermittent (soft errors). Although troublesome or worrisome, these soft errors are usually caused by: (1) fluctuations of power from the local utility company; (2) static from people walking over a carpet and touching the system; (3) lack of ventilation for the system and thereby causing it to overheat, etc.

Each module is fully operator selectable. The operator can not only select the module to be tested, but the type or depth of error-reporting action he may desire. This means of selective memory verification allows the user more control of the system verification and eliminate expensive down-time to the system.

MEM86 assumes that the hardware has passed the Power-Up monitor self test. It also assumes that the initial (lower) RAM used for program code and/or data variables is secure and error free for at least brief periods of time. The loading of MEM86 causes the destruction (write over) of all of the initial proprietary inputs (i.e. segment register file, reset bootstrap program jump, monitor, user interrupt routines, etc.) that were loaded upon system "boot up" and allows the system and memory to be fully checked out. It creates a modified version of the monitor, allowing all of the normal proprietary operating primitives to be used during normal system and memory testing. As the user completes the MEM86 memory verification, the system will automatically reboot the original proprietary information (the monitor) into the appropriate memory locations.

Operator Interaction

The operator communicates with the ACS 8600 via a series of preprogrammed prompts or menus. The following pages will show the proper execution of the memory verification routines using these menus.

When the the Power-Up monitor sequence is complete and the operator is assured that the system is viable, he will:

Step 1*** Insert the ADX diskette into the diskette drive as shown in figure ADX-1. Push the reset button to 'boot' the system up. One should expect to see the banner illustrated on page ADX-5. The user should now enter MEM86<CR>.

The loading of MEM86 takes approximately 8-10 seconds. The user will not see any screen change during the loading time. The screen will scroll (information will move up) and the user will see the MEM86 banner. (This banner will not be present during the setup of the test and/or adjustments made to the test during the progression of the test.)

Step 2*** The first menu that should be activated is the Printer Menu (H). This will give the user a documented verification should a step be accidentally omitted or an error be present during running of the memory verification routines.

*** ACS 8600 Memory Verification v1.X [X/X/X] ***

Processor Mode Tested.

Program Memory: XX(XXXXX) to XX(XXXXX)

Data Memory: XX(XXXXX) to XX(XXXXX)

Test Memory: XX(XXXXX) to XX(XXXXX)

Main Menu

- | | |
|------------------------|-----------------------------|
| (A) Comprehensive Test | (F) Relocation Program |
| (B) ECC Menu | (G) Error Handling Menu |
| (C) RAM Menu | (H) Printer Selection |
| (D) MGR Menu | (I) Message Severity Menu |
| (E) NDP Menu | (J) Exit to Diagnostic Disk |

Enter:H

NOTE: the user should look at the back of the ACS 8600 to see what slot (port) the printer is connected to BEFORE selecting the appropriate number in this menu. Write down the slot (port) number, match the slot number with the channel numbers in this menu and enter that letter at the Enter prompt (i.e. slot number 7 = channel 7 = selection J). If there is no printer available or the user does not wish to have a printer connected to the ACS 8600 during this test, select option (A) None.

Printer Selection Menu (A)

- | | |
|--------------------|---------------|
| (A) None (default) | (G) Channel 4 |
| (B) Channel 0A | (H) Channel 5 |
| (C) Channel 0B | (I) Channel 6 |
| (D) Channel 1 | (J) Channel 7 |
| (E) Channel 2 | (K) Channel 8 |
| (F) Channel 3 | |

Enter:x (where x is a channel letter that corresponds to a serial port number).

Step 3*** The second menu that should be activated is the Message Severity Menu option (I).

Main Menu

- | | |
|------------------------|-----------------------------|
| (A) Comprehensive Test | (F) Relocation Program |
| (B) ECC Menu | (G) Error Handling Menu |
| (C) RAM Menu | (H) Printer Selection Menu |
| (D) MGR Menu | (I) Message Severity Menu |
| (E) NDP Menu | (J) Exit to Diagnostic Disk |

Enter:I

Message Severity Menu (C)

- | | |
|--------------|---------------------|
| (A) errors | (D) info |
| (B) warnings | (E) traces |
| (C) passes | (F) extended traces |

Enter: D

This minor modification will enable the user to monitor the test and its progress through the verification routines.

Step 4*** The next menu that should be activated, especially the first time that the system is powered-up or a new component is installed, is the Message Severity Menu.

Main Menu

- | | |
|------------------------|-----------------------------|
| (A) Comprehensive Test | (F) Relocation Program |
| (B) ECC Menu | (G) Error Handling Menu |
| (C) RAM Menu | (H) Printer Selection Menu |
| (D) MGR Menu | (I) Message Severity Menu |
| (E) NDP Menu | (J) Exit to Diagnostic Disk |

Enter: G

Error Handling Menu (A)

- | | |
|-----------------------------------|---------------------------------|
| (A) Continue(ignore all errors) | (D) Display Error Summary |
| (B) Pause(for operator selection) | (E) Display History |
| (C) Loop(retry all errors) | (F) Clear History/Error Summary |

Enter: B

This modification will automatically stop the test if an error should be present (see Special Features, Error Pause, for further information.)

Step 5*** Once the user has accomplished the previous steps the Comprehensive Test should be activated.

Main Menu

- | | |
|------------------------|-----------------------------|
| (A) Comprehensive Test | (F) Relocation Program |
| (B) ECC Menu | (G) Error Handling Menu |
| (C) RAM Menu | (H) Printer Selection Menu |
| (D) MGR Menu | (I) Message Severity Menu |
| (E) NDP Menu | (J) Exit to Diagnostic Disk |

Enter: A



The following is a depiction of what should appear during a two pass Comprehensive Test that does not find any errors during this test.

```
*** Comprehensive Test, pass #1
RAM Test
ECC Mode = B
RAM quick test
RAM byte ripple test
RAM word ripple test
RAM odd word ripple test
MGR Test
MGR page mapping test
MGR access control test
Device Timeout Test
System Write Violation Test
Segment Access Violation Test
DMA Access Violation Test
Multibus Access Violation Test
User Stack Boundry Violation Test
MGR user mode test
Relocating program from 01000 to 72000
```

```
*** ACS 8600 Memory Verification vX.X [X/X/X] ***
```

```
Processor Modes Tested.
Program Memory = 72 (72000) to 78 (786B4)
Data Memory = 78 (786BA) to 7D (7D69A)
Test Memory = 01 (00000) to 71 (70FFF)
```

```
*** Comprehensive Test, pass #2
```

```
RAM Test
ECC Mode = B
RAM quick test
RAM byte_ripple test
RAM word ripple test
RAM odd word test
MGR Test
MGR page mapping test
MGR access control test
Device Timeout Test
System Write Violation Test
User Read/Write Violation Test
Segment Access Violation Test
DMA Access Violation Test
Multibus Access Volation Test
User Stack Boundry Violation Test
MGR user mode test
Relocating program from 72000 to 01000
```

Step 6*** After Comprehensive Test pass number 3 is displayed on the screen, enter <ESC> to exit to the MEM86 Main Menu. (Press the Reset button to exit from MEM86.)

The following will give the user an idea of what may be expected should an error occur during the test.

```
Comprehensive test, pass #1
ECC Mode = B
RAM test
RAM quick test
*** ERROR #1/22-- RAM quick: read ascending, loc=0ACDC, wrote
4E6E, read back CD6E
```

Error Pause:

- | | |
|----------------------------------|---------------------------|
| (A) Continue (ignore this error) | (C) Message Severity Menu |
| (B) Loop (retry this error) | (D) Printer Menu |
| (C) Error Handling Menu | |

Enter: B

```
RAM byte ripple test
RAM word ripple test
RAM odd word ripple test
MGR Test
MGR page mapping test
MGR access control test
Device Timeout Test
System Write Violation Test
User Read/Write Violation Test
Segment Access Violation Test
DMA Access Violation Test
Multibus Access Violation Test
User Stack Boundry Violation Test
MGR user mode test
Relocating program from XXXXX to XXXXX
```

This is an example of a soft, or sporadic, error. This type of error is not detrimental to the system or to the integrity of the program that the user is using. Should this type of error occur during testing, it should be of little concern to the user.

The next example is that of a hard error, or one that will be detrimental to the system/storage medium/program. This type of error will "NOT JUST GO AWAY" as the soft error. If one of these errors is evident during testing, the user should notify his Customer Service Representative as soon as possible. Make note of the error exactly as it is portrayed on the screen (or have the print out of the error available for the Customer Service Representative).

```
*** Comprehensive Test, pass #1
RAM Test
ECC Mode = B
RAM quick test
*** ERROR #1/1 -- RAM quick: read ascending, loc=0ACDC, wrote
4E6E, read back CD6E
*** ERROR #2/1 --RAM quick: read ascending, loc=0ACDC, wrote
4E6E, read back CD6E
*** ERROR #3/1 -- RAM quick: read ascending, loc=0ACDC, wrote
4E6E, read back CD6E
*** ERROR #4/1 -- RAM quick: read ascending, loc=0ACDC, wrote
4E6E, read back CD6E
*** ERROR #5/1 -- Ram quick: read ascending, loc=0ACDC, wrote
4E6E, read back CD6E
*** ERROR #6/1 -- RAM quick: read ascending, loc=0ACDC, wrote
4E6E, read back CD6E
*** ERROR #7/1 -- RAM quick: read ascending, loc=0ACDC, wrote
4E6E, read back CD6E
*** ERROR #8/1 --RAM quick: read ascending, loc=0ACDC, wrote
4E6E, read back CD6E
*** ERROR #9/1 -- RAM quick: read ascending, loc=0ACDC, wrote
4E6E, read back CD6E
*** ERROR #10/1 -- RAM quick: read ascending, loc=0ACDC, wrote
4E6E, read back CD6E
```

This type of error must be reported to the Service Representative as soon as possible.

MENU DESCRIPTION

The need for full and complete documentation is paramount for the user to have complete control of the system and what is happening within it. The following is a list of brief definitions that will assist the user in comprehending the memory verification routines.

Comprehensive Test- a system intensive test that circulates a dynamic testing pattern within the confines of that system to determine if there are any hard or soft faults present. This test uses the attributes of nearly all of the items on the Main Menu to complete its given task:

(1) ECC Menu

ECC Menu (A)

- | | |
|---------------------------------|---------------------------------|
| (A) All | (D) ECC Normal (cor on, no NMI) |
| (B) ECC Disabled | (E) ECC Scrub (cor on, NMI on) |
| (C) ECC Detect (no cor, NMI on) | |

This menu controls the error correction capability for the system. This menu normally defaults to an off position until the Comprehensive test is selected. Once this test is selected it starts at selection "B", ECC Disabled (no cor, no NMI). This means that the error correction circuitry is disabled (ECC Disabled), there is no correction being done (no cor), and there will not be any nonmaskable interrupts (no NMI) initiated. The ECC Menu will increment each selection during each pass and effectively loop the entire ECC Menu selections.

(2) Ram Test Menu

RAM Test Menu (A)

- | | |
|----------------------|---------------------------|
| (A) All (default) | (D) Word Ripple Test |
| (B) Checkout Test | (E) Odd Word Ripple Test |
| (C) Byte Ripple Test | (F) Check Bit Ripple Test |

This test validates all of the onboard RAM (both 500K and 1 Meg configurations) in the system for its data capture and retention capability. This menu also allows the user to select specific tests to clear any RAM errors through exercise and/or find where, within the RAM, the error is located. (See Ram Test section for further explanation of the individual tests.)

(3) MGR Test Menu

MGR Test Menu (A)

- | | |
|------------------------------------|------------------------------------|
| (A) All (default) | (G) Segment Access Violation Test |
| (B) Page Base Ripple Test | (H) DMA Access Violation Test |
| (C) Access Violation Ripple Test | (I) Multibus Access Violation Test |
| (D) Device Time Out Test | (J) User Stack Boundry Violation |
| (E) System Write Violation Test | (K) User Mode Program Exception |
| (F) User Read/Write Violation Test | |

This validates the capability of the memory management hardware to, effectively and effciently, access all portions of the system (i.e. RAM, Multibus, ports, etc.). This menu also allows the user to select additional tests to clear any memory manager errors through exercise and/or find where, within the memory manager environment, the error is located. (See Manager Test section for further explanation of these tests.)

(4) NDP Menu

NDP Test Menu (A)

- | | |
|-----------------------|-------------------------------|
| (A) Disable NDP Tests | (D) NDP Wake Up Test |
| (B) Enable NDP Tests | (E) NDP Access Violation Test |
| (C) All | |

This menu, when the 8087 option is purchased, allows the user to select additional tests to clear any 8087 errors that may have occurred. The tests are designed to exercise the 8087 much the same way the 8086 is exercised during the full complement of memory verification routines. This routine is not normally included in the memory verification cycle because of it being an option of the system.

(5) Relocation Program

The Comprehensive Test automatically increments the program and test memory locations after each successive test pass. This program provides such a vehicle for the memory verification routines to test all of the RAM and associated hardware. To see exactly what this program does, enter letter "G" at the Main Menu prompt and watch the numbers change for the Test Memory and Program Memory in the Main Menu banner.

(6) Error Handling Menu

Error Handling Menu (A)

- | | |
|------------------------------------|---------------------------------|
| (A) Continue (ignore this error) | (D) Display Error Summary |
| (B) Pause (for operator selection) | (E) Display History |
| (C) Loop (retry all errors) | (F) Clear History/Error Summary |

This menu provides the user with the tool to tell the Comprehensive Test exactly how to proceed in testing the system. It also provides a vehicle to capture all data and errors that have occurred during the start (last 5000 characters) of the of the test; this is true no matter which test, or portion thereof, was selected.

(7) Printer Selection Menu

Printer Selection Menu (A)

- | | |
|--------------------|---------------|
| (A) None (default) | (G) Channel 4 |
| (B) Channel 0A | (H) Channel 5 |
| (C) Channel 0B | (I) Channel 6 |
| (D) Channel 1 | (J) Channel 7 |
| (E) Channel 2 | (K) Channel 8 |
| (F) Channel 3 | |

Enter:

This menu allows the user the options of whether or not to hook up a printer and to what ever port he may choose.

(8) Message Severity Menu

Message Severity Menu (C)

- | | |
|--------------|---------------------|
| (A) Errors | (D) Info |
| (B) Warnings | (E) Traces |
| (C) Passes | (F) Extended Traces |

This menu provides a means of communication for the Comprehensive Test to the outside world. The user may select an option that will denote what depth of error/test reporting is desired.

(9) Exit to Diagnostic Disk

This routine is currently not available.

The Comprehensive Test will continue to circulate the memory verification routines until the user stops it by pressing the escape (ESC) key.

The letter, in parenthesis, just after the menu title tells the user what the last selection was in that particular menu. This bit of information helps the user eliminate duplication of routines/selections that have already been selected. The user may also note that some of the other menus do not default, or automatically have, the "A" selection chosen. The default, or predetermined, selections have been carefully chosen to give the user maximum use of the Memory Verification. This has been done because the user may not have a written or verbal description of the verification at his immediate disposal.

RAM TESTS

Checkout Test

This test is designed to be a simple, overall checkout for the RAM and its associated hardware. Not only is the RAM and its associated hardware exercised, but the I/O capability of the microprocessor, the Bus Interface Unit (BIU) and Execution Unit (EU) are also thoroughly tested. The test accomplishes this by supplying data to the processor, having it executed by the EU, interfaced to the RAM by the BIU and addressed to and retrieved from both the high and low banks of the 1 Mbyte RAM. This process blankets the RAM, its address and data lines on both high and low banks, insuring that the odd/even storage/retrieval capability of the system is good and that there are no hard or soft errors within the RAM or its associated hardware. The testing algorithm is as follows:

- (1) Write a numerically corresponding 16bit word into all memory locations. (e.g. 0000(H) to location 0, 0001(H) to loc. 2, 0003(H) to loc. 4, ..., (N-1)/2 to loc. (N-1), N/2 to loc. N)
- (2) Read each word in memory and verify that it is the correct value.
- (3) Starting at the highest memory address and working in reverse order, write the complement, or opposite, of the numerically corresponding 16-bit word into all memory locations (e.g. (FFF(H)-N/2) to loc. N, (FFFF(H)-(N-1)/2) to loc. (N-1), ..., FFFE(H) to loc. 2, FFFF(H) to loc. 0)
- (4) Read each word in memory and verify that it is the correct value.

Byte Ripple Test

This test looks for byte exclusive data bit errors. The memory is accessed, one byte at a time, and verified. The testing algorithm is as follows:

- (1) Write 00(H) into all memory locations.
- (2) Verify, in ascending address order, that 00(H) is read from each memory location. Once this has been verified, write FF(H) into each memory location in ascending address order.
- (3) Verify, in descending address order, that FF(H) is read from each memory location. Once this has been accomplished, write 00(H) into each memory location in descending address order.

Word Ripple Test

This test looks for word exclusive data bit errors. The memory is accessed, a word at a time, and verified. The testing algorithm is as follows:

- (1) Write 0000(H) into all memory locations.
- (2) Verify, in ascending address order that 0000(H) is read from each memory location. Once verified, write FFFF(H) into each memory location in ascending address order.
- (3) Verify, in descending address order, that FFFF(H) is read from each memory location. Once verified, write 0000(H) into each memory location in descending address order.

Odd Word Ripple Test

This test looks for data bit errors within odd words. Each word of data is fetched from the odd memory location boundaries within the high bank of the memory and verified. This test is not applicable if one only has 500K of memory. The memory that would normally be tested would be the upper bank or second 500K of RAM. The testing algorithm is as follows:

- (1) Write 00(H) into all high bank memory locations.
- (2) Verify that 00(H) has been read from memory location 0. Write FF(H) into memory location 0.
- (3) Verify, in ascending address order, that 0000(H) was read from each memory location. Once verified, write FFFF(H) into each memory location in ascending order.
- (4) Verify that 00(H) was read from the last even memory location. Write FF(H) into this location.
- (5) Verify that FF(H) was read from the last even memory location. Write 00(H) into this location.
- (6) Verify, in descending address order, that FFFF(H) was read from every odd memory location. Once verified, write 0000(H) into each odd memory location in descending order.
- (7) Verify that FF(H) was read from the last even memory location. Write 00(H) into this location.

Check Bit Ripple Test

This test validates the ECC check bits as data bits. This is done to allow the user see if there are any problems with the ECC correction capabilities. The system can read in check bits to the memory but does not have the capability to see if this operation was successful. This test therefore "turns off" the error correction capability within the system and artificially forces the check bits to be specific values within memory. By doing this, the ECC hardware is validated to the users satisfaction.

- (1) Write a 16-bit word oriented address into all memory locations. (e.g. 0000(H) to location 0, 0001(H) to loc. 2, 0003(H) to loc. 4, ..., (N-1)/2 to loc. (N-1), N/2 to loc. N)
- (2) Read each word in memory and verify that it is the correct value.
- (3) Starting with the highest memory location and working in reverse order, write the complement of the numerically corresponding word oriented address into all memory locations. (e.g. (FFFF(H)-N/2) to loc. N, (FFFF(H)-(N-1)/2) to loc. (N-1), ..., FFFE(H) to loc. 2, FFFFH to loc. 0)
- (4) Read each word in memory and verify that it is the correct value.
- (5) Write 00(H) into all memory locations.
- (6) Verify, in ascending address order, that 00(H) was read from each memory location. Once verified, write FF(H) into each memory location in ascending order.
- (7) Verify, in descending address order, that FF(H) was read from each memory location. Once verified, write 00(H) into each memory location in descending order.

ECC Tests

These tests are designed to validate all of the ECC hardware. The Check Bit Test tested only the check bit portion of the ECC. These tests will check out the entire ECC system. The tests assume that the RAM has been fully tested and that some arbitrary RAM locations may be required to aid in the checkout of this area.

Sliding Check Bit Test

This test slides forced data check bits, both 1's and 0's, across the check bit data path, to locate any bits that may be faulty, e.g., open or crossed over.

Single Bit Error Test

This test artificially forces a single bit error in each of the 22 data/check bits. Once accomplished, it verifies the correct response of the ECC hardware.

Double Bit Error Test

This test artificially forces a double bit error in each of the 22 data/check bits. Once accomplished, it verifies the correct response of the ECC hardware. (Note: The number of patterns is $22!/2!20!$ or $23!$.)

Syndrome Word Sliding Bit Test

This test will force bit errors to slide 1's and 0's across the ECC syndrome word.

MEMORY MANAGER TESTS

These tests check out the memory manager hardware. This hardware is an I/O link from the memory to the central or master (8086) microprocessor. It is not an I/O link in the usual sense of I/O but is an extension of the 8086 capabilities. These capabilities are:

- (a) write protection
- (b) access protection
- (c) limit protection
- (d) non-contiguous memory allocation

These extensions make a significant difference to the microprocessor and the user. These functions protect the users software so that it cannot be written over unless the user wishes to do so. The software can be accessed (e.g. special interrupts set up) by the user in the Monitor by automatically stringing stacks or files together to insure the continuity of the data. The Memory Manager can insure that segments of the memory are not violated by crossing the boundaries. These are a few of the capabilities of the memory manager hardware.

There are other capabilities that lie somewhat below the surface and need to be examined. Examples of these are the bus arbitration and memory-lockout functions. These are both a function of hardware and software and must be thoroughly tested to insure the integrity of the system. This insures that its means of communicating and processing information to the outside world is correct.

Through testing of this hardware is essential to field reliability of the system and insure a minimum of down time is experienced by the user. As one tests the memory management hardware, he will not only exercise the hardware but will also check the software for soft errors. The soft errors are the type that might have inadvertently appeared in the memory itself from such sources as disk contamination, accidental disk demagnetization, or other anomalies, such as input power line surges, and maintenance by unqualified personnel.

Page Base Address Ripple Test

This test will ripple the base addresses, of all virtual pages, to insure that they are able to span all physical pages.

Device Access Violation Test

This test will insure that the access restriction bits (system mode, user mode, DMA, arithmetic processor, code, data, stack, extra, stack bound) function correctly on all pages.

User Mode Program Operation Exception Test

This test insures that all 8086 operations that are illegal in user mode (I/O operations, clearing the interrupt flag, or processor halt) generate the appropriate hardware interrupts.

SERIAL TEST: SER86

The serial verification test, SER86, is one of the most vital tests for communication validation within the ACS8600 diagnostic package. Serial communication is vital because most items that talk to the system (i.e. terminal, printer, etc.) are on serial channels.

NOTE 1. The special features described on pp. 8-9 are not supported by SER86.

NOTE 2. Only ports with serial devices actually present will be tested.

Initializing the serial verification routines is accomplished by the following steps:

STEP 1*** Load the diskette as described in the ADX loading procedures.

STEP 2*** Enter SER86 at the request prompt and press the return key. The system will start loading the test into the on board RAM within the system (loading time-approximately 15-20 seconds). The following presentation will appear on the screen:

*** ACS 8600 Serial Intelligent Channel Verification [X/X/X]

Program Memory: (XXXXX) to (XXXXX)
 Data Memory: (XXXXX) to (XXXXX)
 Test Memory: (XXXXX) to (XXXXX)

Main Menu

(A) IOC Configuration Menu	(E) Error Handling Menu
(B) Wake Up Test	(F) Printer Selection Menu
(C) Mode Menu	(G) Message Severity Menu
(D) Terminal Test Menu	(H) Exit to Diagnostic Disk

Enter:

STEP 3*** Enter E at the prompt to display the Error Handling Menu. The following will display:

Error Handling Menu (A)

(A) Continue(ignore all errors)	(D) Display Error Summary
(B) Pause(for operator selection)	(E) Display History
(C) Loop(retry all errors)	(F) Clear History/Error Summary

Enter:

Enter B enabling the Error Pause function of the Serial verification routines. This function allows the user to see any error if and when it occurs.

STEP 4*** Enter D to display the Terminal Test Menu. The

following will appear on the screen:

Terminal Test Menu (A)

- (A) All (C) Output Barber Pole Test
(B) System Timer Test

Enter:

Enter A and the serial test will begin.

Step 5*** After the tests complete, press the Reset button to exit to the ADX Command Directory.

MENU DESCRIPTION

IOC Configuration Menu (A)

- (A) Single IOC (8 channels) (B) Twin IOC'S (16 channels)

Enter:

This menu enables the user to validate either a single or twin input/output controller(s) (IOC). The system will automatically confirm (test to see if the system contains two if that selection is made) your selection and notify the user should the selection be in error.

Wake Up Test

This is a single test that addresses the Host/Controller Communications area of the IOC (see description of Host/Controller) area later in this section). This area is normally in a psyto dormant or asleep state. The Wake Up test validates the proper reaction to stimulus.

Mode Menu (A)

- (A) All (F) rcv=buf/poll xmt=poll
(B) rcv=tty/poll xmt=poll (G) rcv=buf/poll xmt=intr
(C) rcv=tty/poll xmt=poll (H) rcv=buf/intr xmt=poll
(D) rcv=tty/intr xmt=poll (I) rcv=buf/intr xmt=intr
(E) rcv=tty/intr xmt=intr

Enter:

This menu allows the user to configure the way the terminal test is to be run. The test allows the user to test the receiving (rcv) ports, or buffers (buf), to either receive or transmit (xmit) on a polling (poll) protocol or vectored interrupt (intr) basis.

Terminal Test Menu (A)

- (A) All (C) Output Barber Pole Test
(B) System Timer Test

Enter:

The Terminal Test provides the user with tests that will:

(1) verify the timing/arbitration interface of the terminal(s) with the system by checking each port accessibility/validity with the IOC

(2) verify that the interface can and does receive all of the ASCII characters the terminal can provide in a sequential pattern

The remaining menu items are identical in nature to those in the memory verification routines of the same name. Refer to MEM86 for those descriptions.

HARDWARE DESCRIPTION

The communications between the system and the peripheral controller is accomplished by means of registers. The first register that the system "sees" is a single 24-bit register called the "Initialization Register." This register is located at location 1FFFC(H). It contains a pointer to a group of registers. This group of registers may exist anywhere in memory (assuming they are addressable by an external Multi-bus host). When the Peripheral Controller is interrupted, the initialization register is read. From this point, initialization is accomplished according to the parameters in the register. It will be read only after the controller is interrupted, allowing the reserved locations to be reused by the host unless reinitialization is required.

(Note: Multi-byte registers containing 16-bit counts or 24-bit addresses are always stored in reverse order, low byte first, high byte last.)

REGISTER DEFINITION

Initialization Register

The IOC and the 8086 communicate via a single 24 bit register called an initialization register. This register, normally located at 1FFFC(H), contains the pointer to the array of registers in the I/O controller. This array of registers can be anywhere that is acceptable to the Multibus host. It is normally a firmware type register and can only be written into, by the 8086, under stringent circumstances. Before the system is initialized, the 8086 should write a zero into the register. This zero will be replaced by a version number once the system initialization is complete. It is a method of finding an uninitialized controller or system that has not gone through full initialization.



System Registers**Firmware Version Register**

The firmware version register is normally a read-only register containing the level of the firmware in the controller. There is only one case where the host will write into this location. The host (8086) should store a zero into this location, and the System Command register, before system initialization. When initialization is complete, the actual firmware version number will be stored in this location. This location may be tested to identify an uninitialized controller (or initialization in progress). Version numbers will be in the range of (1-63). (0-7) where the version number occupies the five most significant bits, subversion the three least significant bits.

:v:v:v:v:v: :s:s:s:

System Command Register

The system command register is an 8-bit register used to pass commands to all channels simultaneously. Handshaking is accomplished by setting bit 7 of the command. The host should insure that the last command has been executed (bit 7 = 0) before issuing a new command. Commands are:

Commands

0	disable controller
1	enable controller
2	disable interrupts
3	enable interrupts
4	reset interrpts
5-127	unused

System Status Register

The system status register is an 8-bit register used to pass status to the host concerning channel-independent information. The status bits are defined as follows:

bit 0	Controller Enabled
bit 1	Interrpts enabled
bit 2	Interrupt pending (not qualified by inter. enabled)
bit 3	Bus error
bit 4-7	not used-always 0

Interrupt Vector Register

Interrupt Vector Register is a 16-bit register containing data allowing a quick response to an interrupting condition. The register is logically divided into four fields.

bits 0-2	interrupting modem channel number
bit 3	modem interrupt
bits 4-6	interrupting receiver
bit 7	receive interrupt
bits 8-10	interrupting transmitter channel number
bit 11	transmit interrupt
bits 12-14	other interrupting device number
bit 15	other device interrupt

New Command Register

The new command register is an eight bit register used to indicate the existance of a new command. This register should be incremented any time a command is written into the system command register, the floppy disk command register, or any of the eight channel command register.



Communication Channel Registers

Channel Parameter Register

The channel parameter register is a 16-bit register containing the following information:

bit		async	sync
0		parity enable	CRC enable
1		parity even	not used
2-3	=0	illegal	0 ms - min. RTS/CTS delay
	=1 1	stop bit	7 ms
	=2 1.5	stop bits	150 ms
	=3 2	stop bits	600 ms
4-5	=0 5	bits per character	not used
	=1 7	bits per character	
	=2 6	bits per character	
	=3 8	bits per character	
6		=0 (asynchronous mode)	=1 (synchronous mode)
7		ring buffer receiver enable/-TTY	not used
8-11	=0	selectable rate	
	=1	75 bps	
	=2	110 bps	
	=3	134.5 bps	
	=4	150 bps	
	=5	300 bps	
	=6	600 bps	
	=7	1200 bps	
	=8	1800 bps	
	=9	2000 bps	
	=10	2400 bps	
	=11	3600 bps	
	=12	4800 bps	
	=13	7200 bps	
	=14	9600 bps	
	=15	19.2K bps	
12		unused	not used
13		unused	not used
14		CTS control	RTS (special cable)
15		DSR control	DTR (special cable)



Channel Status Register

The channel status register is a 16-bit register containing the following information:

bit	asnc	sync
0	transmitter empty	transmitter empty
1	Data Terminal ready	DSR (special cable)
2	not used	no clk or CTS for 2 sec
3	Request to Send	CTS
4	parity error	receive CRC error
5	receive data lost (SIO Ovrn)	receive data lost (SIO ovrn)
6	framing error	not used
7	parity/ovrn/frame error recv	CRC/no clk error
8	receive character(s) ready	receive blk ready
9	unused-always 0	sync established
10	unused-always 0	not used
11	unused-always 0	not used
12	transmitter ready/active	transmitter ready/active
13	unused-always 0	*none*
14	unused-always 0	*none*
15	unused-always 0	*none*

Channel Command Register

The channel command register is a 8-bit register used to pass commands to the controller. Bit 7 is used to indicate the existence of a valid command. The host should test bit 7 to insure the the last command has been executed. The controller will clear bit 7 after reading the command. At this time, the four least significant bits will also be cleared, while bits 4-6 will retain their values. Bits 4-6 contain the logic level corresponding to the interrupt enable status. The commands available are:

0	no operation
1	initialize channel
2	start transmitter
3	acknowledge receiver
4	abort transmitter
5	enter hunt mode (not yet implemented-sync mode)
6-7	reserved
8	change parameters
9	reset error conditions
10	reset modem interrupt request
11	execute from Multibus
12	enable Sync mode
13	Sync transmit
14	Sync receive
15	Auto Sync transmit-then receive
bit 7	command valid
bit 6	transmit interrupt enable
bit 5	receive interrupt enable
bit 4	modem interrupt enable

Transmit Data Buffer Address Register

The transmit data buffer address register is a 24-bit register containing the address of the data to be transmitted. After transmit termination, this register will contain the address of the last character transmitted + 1.

Transmit Data Buffer Length Register

The transmit data buffer length register is a 16 bit register containing the number of bytes to be transmitted. After a transmit termination, this register will contain the number of characters in the buffer NOT transmitted. (Note: this value will be 0 unless the transmission was aborted.)

Receive Data Buffer Address Register

The receive data buffer address register is a 24-bit register containing the address of the receive buffer when receiving in "ring buffer receive" mode.



Receive Data Buffer Length Register

The receive data buffer length register is a 16-bit register containing the length of the receive data buffer. The receive buffer length may be in the range of 2-32768 bytes.

Receive Buffer Input Pointer Register

The receive buffer input pointer register is a 16-bit register containing a pointer (relative to the receive data buffer address) to the first empty location in the receive buffer. As characters are received, the controller will store the character at the specified location, and increment this pointer module buffer length. Bit 15 is the "counter invalid" bit. When this bit is set, the contents of the counter is in the process of being updated. This bit may be ignored if the buffer is ≤ 255 bytes in length.

Receive Buffer Output Pointer Register

The receive buffer output pointer register is a 16-bit register containing a pointer (relative to the receive data buffer address) to the first full location in the receive buffer. As characters are removed from the buffer, the host will increment this pointer module buffer length. When the input pointer is equal to the output pointer, the buffer is empty. Bit 15 is the "counter invalid" bit. When this bit is set, the contents of the counter in the process of being updated. This bit may be ignored if the buffer is ≤ 255 bytes in length.

TTY Receive Register

The TTY receive register is an 8-bit register used to receive data in applications not required multiple-byte ring-buffering. In TTY receive mode, the byte is simply stored in the TTY receive register.

Selectable Rate Register

The selectable rate register is a 16-bit register used to transfer a 16-bit value directly to the bit rate generator. When the rate is specified through this register, the SIO controller is programmed for clock/16 mode. The value to store in this location can be calculated by the formula:

$$(8600/68000) \text{ value} = 115200/\text{desired bit rate}$$

Expansion Register

An 8-bit register is included at the end of each channel register array to complete the array, which may or may not be located on a word boundary, to one of an even number of bytes. It is used for some programming/computer languages which cannot, or cannot easily, generate/support multiple occurrence arrays that contain an odd number of bytes. The register is also reserved for future expansion.

FLOPPY DISK DRIVE TEST PROGRAM: FLPYTEST

This test verifies the basic function of the floppy disk drive, or the diskette in it. The user does have the option to select whether he would like a volatile (destroying, by writing over the information on the disk) or non-volatile (retaining the information on the disk and checking the addresses, tracks, and sectors).

The following paragraphs will describe a logical and comprehensive routine and explanation to validate this important portion of your system.

Step 1*** Load the ADX program as described in the ADX loading procedure. The ADX Command Directory will now display on the terminal screen.

Step 2*** Enter FLPYTEST<CR> after the "REQUEST" prompt.

The terminal will display the FLPYTEST menu:

*** ACS 8600 Disk Verification V2.0 [X/X/X] ***

ALTOS COMPUTER SYSTEMS
Floppy disk test and Analysis

**** Hit ESC to exit this test ****

ALTOS FLOPPY DISK ROUTINE

- (A) Standard single density format (single side)
- (B) Standard single density format (double side)
- (C) Double density for cpm, xenix or diagnostic disk (single side)
- (D) Double density for cpm, xenix or diagnostic disk (double side)
- (E) Double density for mpm (single side)
- (F) Double density for mpm (double side)
- (G) End this program

Enter:

CAUTION

The user should read the configuration information in the Operating System Supplement to make sure that the proper density format is requested. The format of the diskette under test must match the format chosen from the menu shown above.

Once the correct format has been determined, select the appropriate letter from the menu and input that selection at the Enter prompt followed by a carriage return (<CR>).

Once the user has pushed the carriage return, the following message will display on the screen just under the Enter prompt:

Do you want media test [N]?

This question allows the user to select a volatile or non-volatile test. A "N" response will start a non-volatile read test. The following messages will appear just under the "...media test" prompt:

Load diskette in the drive to be tested

Hit any key when ready to start

When the user pushes any key the following message will appear just under the "Hit any key..." prompt:

```
Pass=1  
READ PHASE  
[]
```

This indicates that the diskette is being read and it is in the first pass. The highlighted block, just under this message, shows the user the exact track number that the test is reading at that particular moment. This test will continue until the user presses the escape key to end the test and return to the main Flpytest Menu.

Should the user select the "Y<CR>" option, the prompts will appear as follows:

Load diskette in the drive to be tested

Hit any key when ready to start

CAUTION

If the volatile tests are chosen (i.e., if Y is entered) the data on the diskette under test will be lost.

The following message will appear:

Is diskette really scratch [N]?



If you reply N (no), you will see:

Load diskette in the drive to be tested

Hit any key when ready to start

When you reply Y (yes), you see:

Is diskette scratch [N]?

If you again respond "Y<CR>", the following message will appear on the screen just under the last message:

```
Pass=1
WRITE PHASE
[]
```

This is the start of the volatile disk test. First a data pattern ('E5 in hexadecimal-1110 0101 binary) is written on all portions of the diskette (block under the word WRITE indicates the track number that is being written to at that moment), and then the entire diskette is read and compared. During the read phase of the test, the track indicator block will shift down and the words READ PHASE will display just under WRITE PHASE.

The "WRITE PHASE", "READ PHASE" messages indicate the start of each portion of the operation. The "WRITE PHASE" is the input of the 'E5' pattern on to the diskette medium. The "READ PHASE" is the verification process; seeing if that was actually the data input to the diskette surface. The test will continue to alternate between these two phases until you have pressed the Escape key (ESC). This action will return the user to the ADX menu. A minimum complete test cycle is to do one write phase and one read phase. When the "WRITE PHASE" message displays for the second time, this minimum test is complete.

If an error message is suspected to have been caused by a bad diskette, try another diskette to see whether it is the diskette or the drive.

HARD DISK UTILITIES AND DIAGNOSTICS: DISK86

DISK86 is a collection of hard-disk utility and diagnostic programs. All ADX programs for the hard disk are in DISK86.

To execute DISK86, the user should follow the ADX loading procedures and enter DISK86<CR> after the "REQUEST" prompt.

The following display will appear on the terminal:

```
*** ACS8600 Disk Verification v1.3 [X/X/X] ***
```

```
Specify the HARD DISK size
(A) 20 Megabytes      (B) 40 Megabytes
Enter:
```

As soon as the user selects this option the prompt

```
Recalibrate drive....
```

will appear and the user will note that a low whirring noise is coming from the system. This is nothing to be alarmed about. The system is recalibrating itself according to the information the user has supplied. This process will take approximately 4 to 5 seconds. If the user has selected erroneously an error message, stating that the disk size was incorrect try again, will appear. The prompt is repeated enabling the correct response to be entered (consult the original order form specifying the size/type of your hard disk, should the question arise). Once you have specified the disk size, the following menu will appear on the screen just under the Recalibrate drive.... message

```
**** Hard Disk Test Facility 1982 ****
```

- (A) Format Disk Drive
- (B) Verify Addresses for all Sectors
- (C) Seek test with optional Verify
- (D) Write entire Disk
- (E) Read entire Disk
- (F) Set Flag Byte for a Specific Sector
- (G) Hard Disk Write/Read Error Test
- (H) Miscellaneous Functions
- (I) drive unit reselection

Enter:

Enter a choice from A-I.



Menu Descriptions

The following is a brief description of each of the menu functions. Complete descriptions, for each program choice, are located on the adjacent pages.

A. Format Disk Drive. The hard disk was formatted before the system was shipped 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 would have to be run also.

B. Verify Addresses for all Sectors. This reads the addressing information (drive, head, cylinder, sector, buffer, etc.) on the disk to verify their availability and integrity. No data is read or destroyed in this program. This is a good, quick test of format integrity.

C. Seek Test with optional Verify. This test allows the user to specify two cylinders that the disk controller will access alternately and continually. The main use of this test is for cylinder address/data fault isolation. It would typically be run while using electronic test equipment.

D. 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 diskette.

E. 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.

F. Set Flag Byte For A Sector. This program will flag a sector as bad and not to be used for storing data. All known bad sectors have been flagged before the system was shipped from the factory. This feature can be used in the field in case a bad spot develops on the disk, or if the disk has been re-formatted.

G. Hard Disk Write/Read Test. This test writes a user or factory specified pattern over the entire disk, reads it back, and compares the data for integrity. The test can also be used as an exerciser to work the disk for an extended period of time (i.e., overnight) and report on the results at the end of the period and/or at the end of each pass of the test.

H. Miscellaneous Functions. There are two functions. The first suppresses or enables the display of the disk status error message. This can be disabled while running some repetitive operation and checking it with electronic test equipment. The second function displays the contents of a selected sector on the screen in hexadecimal and ASCII.

I. Drive Unit Reselection. This returns to the reconfiguration options of the test to allow any necessary changes to be made.

Format Disk Drive

```
*****
* WARNING: THIS HARDTEST FUNCTION *
* WILL CHANGE DATA ON THE HARD *
* DISK AND MAY CAUSE LOSS OF USER *
* DATA *
*****
```

The disk has been formatted before the system is shipped 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 will destroy any prior data on the disk.

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

When you select program A, the screen displays:

```
*** DO NOT RUN THIS TEST WITHOUT PERMISSION FROM -ALTOS-
LOCAL DEALER ***
Do you want to continue?          PW = SOTLA
```

Password entry is used to protect the system and the data stored on it. To obtain the password call your local distributor, explain the problem you are having, and if warranted, obtain the password from him. The distributor will attempt to determine whether formatting the hard disk is actually necessary before the password is given. Call ALTOS customer service only if your distributor suggests it.

If you are not going to reformat the disk, enter <CR> to return the user to the DISK86 menu.

If you are going to reformat the hard disk, enter the password and press <CR>. The screen will display:

```
*** THIS TEST WILL ERASE FILES ON THE HARD DISK. ***
Do you want to continue? [N]?
```

To continue, enter Y.

The format process will then start. Each cylinder number is shown on the screen as it is formatted. The count will range from 0 to 511.

When the disk has been formatted, the following message will appear on the screen:

"entire disk formatted"

The program will then return to the DISK86 menu.

Note: Flagging Bad Sectors

The user must, to insure data integrity, flag any bad sectors before inputting any data to the newly-formatted hard disk. The original error map, for your hard disk, is taped to the bottom of the drive unit and is visible when the bottom cover is removed from the system chassis (same cover removed to lock/unlock the drive for shipping). Instructions for removing the cover are provided in the ACS 8600 Users Manual.

Verify Addresses for All Sectors on Disk

This test reads the addressing information for every sector of every cylinder on the disk to verify their 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, buffer, head, drive, and sector numbers. This test reads and verifies those numbers. If that information cannot be read, the sector should not be used and should be flagged as bad.

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

As the user selects program B, the screen will display:

Press any key when ready to start this test.

The verification process then starts. Each cylinder number is shown as it is verified. (The count goes from 0 to 511.)

When verification is complete, the message

"sector verification complete"

will display on the screen and the program will return to the DISK86 menu.

NOTE: The "Set Flag Byte" program can be used to flag bad sectors. Sectors listed as "Expected Errors", however, should not be flagged; they are already flagged as bad.

When the pattern has been selected by specification or by default, the program expands it to fill a 512-byte sector and writes it to all sectors. It displays the cylinder number, from 0 to 511, as it writes to the disk. Once the entire disk has been written to, the following will display on the terminal screen:

Entire disk write complete

When the program is finished, it returns to the DISK36 menu. A companion program, "Read Entire Disk" (selection E), allows reading and verifying the pattern just written.

(Note: This test will not detect that a bad data block has been written, so long as the sector identification is good and the CRC character is developed correctly. The data may be stored incorrectly or the CRC may be stored incorrectly. Running the "Read Entire Disk" test will verify that the pattern was correctly written.)



Write Entire Disk

This writes a user or factory specified pattern to all sectors on the disk. The companion program, "Read Entire Disk," enables the verification of the data retention of the disk.

When the user selects program D, the screen will display:

```
*** THIS TEST WILL ERASE FILES ON THE HARD DISK ***  
Do you wish to continue [N]?
```

If you reply N, the program returns to the DISK86 menu. If you reply Y, this screen displays:

```
Do you want to write a specific pattern [N]?
```

```
If you reply <CR> the default patterns are:
```

```
0000(H)  
6DB6(H)  
AAAA(H)  
DE^D(H)
```

If you reply Y you are prompted to choose a pattern.

Patterns can be specified by entering:

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

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

Select pattern:

Specifying 1<CR> selects a 256-byte block of all hexadecimal values from 00-FF as the pattern.

The one or two byte patterns are specified as follows. For all specifications, leading zeros are supplied:

Binary: Up to 8 or 16 binary digits, 0s and 1s, ending in "B" or "b". Example: 100101001010011b<CR>

Octal: Up to four octal digits (0-7) ending in "O" or "o" (alphabetic). Example: 7007o<CR>.

Decimal: One to three numbers, 0 - 255. The number is converted to its hexadecimal equivalent. Example: 127<CR>.

Hexadecimal: One to four hexadecimal values (0-9, A-F), ending in "H" or "h". Example: A55Ah<CR>.



Read Entire Disk

This reads the data from every sector on the disk, and if desired can compare that data to a specified pattern. It can be used after the program, "Write entire disk," to verify that the write operation was successful. Before each sector is read into a memory buffer, the buffer is set to all ones (hexadecimal FF). This is done to ensure that the contents are read accurately.

When you select program E, the screen displays:

Hard Disk read display options are:

- A. DO NOT Display data if any error,
- B. Display data only if a STATUS error,
- C. Display data only if a COMPARE error,
- D. Display data if a STATUS or COMPARE error.

Select option by number:

Selections A and B provide a sector read only routine. Selections C and D provide a read and compare routine, for each sector, to a specified pattern. The pattern would usually be one written by the "Write Entire Disk" program. The following is a detailed explanation of the four options:

- A. All sectors are read, no errors are displayed.
- B. All sectors are read, but the data is not checked. Status errors are displayed. They occur when the controller cannot locate or properly identify a sector, or when there is a CRC error (the CRC value is invalid). Error display shows both status and sector data.
- C. The user selects a pattern for comparison. Each sector is read and compared against that pattern. Any comparison errors are displayed. The display will show both status and sector data. Status errors are not displayed, except for the unlikely case of a CRC error where the data is correct and the CRC value is invalid.
- D. The user selects a pattern for comparison. Each sector is read and compared against that pattern. The status and comparison errors will be displayed. The display will always include sector data.

If the user selects options C or D, you will be prompted to specify a pattern. If you wrote a pattern with the "Write Entire Disk" program, choose the same pattern. The default pattern of the write program are specified on the screen in hexadecimal. There is no default read pattern. Specify the pattern, either the factory or user, that was written to enable the read to continue unrestricted.



The following is the prompt sequence for specifying a pattern:

Patterns can be specified by entering:

*1 - for 256 pattern (hex 00....FF)
one of two byte pattern - enter pattern in binary, octal, decimal, or hex.

Select pattern:

Specifying *A selects a 256-byte block of all hexadecimal values from 00-FF as the pattern.

The one or two byte patterns are specified as follows. For all specifications, leading zeros are supplied:

Binary: Up to 8 or 16 binary digits, 0s and 1s, ending in "B" or "b". Example: 1100101001010011b<CR>.

Octal: Up to four octal digits (0-7) ending in "O" or "o" (alphabetic). Example: 7007o<CR>.

Decimal: One to three numbers, 0 - 255. The number is converted to its hexadecimal equivalent. Example: 127<CR>.

Hexadecimal: One to four hexadecimal values (0-9, A-F), ending in "H" or "h". Example: A55Ah<CR>.

When the pattern has been selected, the program expands it to fill a 512-byte buffer for comparison. Then it reads each sector and compares the pattern to the data.

The program displays each cylinder number as it reads the disk. The cylinder count goes from 0 to 511.

When the program is finished, it returns to the DISK35 menu.



Set Flag Byte for a Specific Sector

This utility flags a sector as bad, that is, not to be used for storing data. Usually, any bad sectors have already been flagged before the system was shipped. 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. As shown on the error map provided with your system, by track, head, byte count, and length in bits.
2. By cylinder, head, and sector address. (This is the way DISK86 normally displays errors.)

For information on removing the error map from within your system, see the note at the end of this section.

When you select program F, the screen displays:

```
*** THIS TEST WILL ERASE FILES ON THE HARD DISK. ***  
Do you want to continue[N]?
```

If you reply N, the program returns to the DISK86 menu.
If you reply Y, this prompt is displayed:

```
Hit ESC key to terminate this test
```

```
Hard Disk "Flag Bad Sector" Options are:
```

- (A) Disk Error Map
- (B) Cylinder, Head, Sector

```
Enter A or B
```

For option A, you can read the information off the disk error map and enter it in the same form. You will be prompted to enter the track (TRK), head (HD), byte count and length in bits. Enter the information and press <CR>.

For option B, you can enter the information in the form used by error messages given by other DISK86 programs, that is, by cylinder, head, and sector addresses.



When you have flagged a sector you are asked to reselect options A or B. When all bad sectors have been flagged, exit this test by pressing ESC in response to the A/B menu shown above.

Note: The Hard Disk Error Map

This map is taped to the bottom of the drive inside the system when it is shipped from the factory. Any bad sectors shown on the map were flagged before the system was shipped. The only time this map would be needed to flag sectors is after reformatting the hard disk or for verification that all bad sectors have been flagged.

The map is usually found taped to the bottom cover under the hard disk drive, but may be in other locations near the disk drive. Instructions for removing the chassis bottom cover are provided in the ACS8600 Users Manual.

Note: Assigning Alternate Sectors

This program flags bad sectors but does not allocate alternate sectors to be accessed in their place. This function is handled differently by different operating systems. See the Operating System Supplement in this manual for information.

Hard Disk Write/Read Error Test

This test writes a specified pattern over the entire disk, reads it back, and compares. You can specify a pattern or have the program use a comprehensive series of patterns. The test can be used as an exerciser, to work the disk for a long time (such as overnight), and report on the results at the end.

This test has two phases. The first writes and reads a variety of patterns to all sectors of the disk. This phase continues until you end it by simultaneously pressing the Control and A keys (shown as CNTL-A). The program then completes its current write/read pass and begins the second phase.

In the second phase, the program erases all sectors and automatically flags all "bad sectors." It will display the final error count and give you an opportunity to print it.

Explanation of terminology:

Soft Error. An unsuccessful attempt to read data, shown as a CRC error. The operation is retried. If the operation succeeds on the first or second retry, each prior failure is counted as a "soft error."

Hard Error. If the third retry at a read fails, the sector is considered to have a "hard error."

Bad Sector. A sector that has a hard error is flagged as a "bad sector," not to be used for data storage. This is done in the final phase of the test.

When you select program G, the screen displays:

```
*** THIS TEST WILL ERASE FILES ON THE HARD DISK ***  
Do you want to continue [N]?
```

If you reply N, the program returns to the DISK36 menu.
If you reply Y, the following message is displayed:

```
Press any key when ready to start the test
```

When a key is pressed, the display options are shown.

```
Hard disk Reliability error display options:
```

```
(A) Display error summary at the end of each pass.
```

```
(B) Display error summary only at the end of the test.
```

```
Enter:
```


Option A writes an updated display at the end of each pass. Option B allows the test to be run without a terminal. You can remove the terminal after starting the test and reconnect it when you wish to end the test.

If you select option A, the following prompt is displayed:

Do you want to display data if a CRC error [N]?

In case of a CRC error, you can choose whether to display the data buffer. If you intend to run the test without being present, reply N, because the program waits after displaying the buffer for you to tell it to continue.

The next prompt (or first prompt with option B) is:

Do you want to write a specific pattern [N]?

If you reply N, the program will use four pre-defined data patterns. If you reply Y, this prompt shows:

As many as four (4) patterns may be specified, as follows:
Enter a one or two byte pattern in binary, octal, decimal, or hex. Press RETURN to bypass a pattern selection:

Patterns are specified as explained in the instructions for one or two byte patterns in the Write test and the Read test preceding these instructions. Pressing <CR> specifies one of the pre-defined patterns. When all patterns are specified, the test automatically begins writing the first pattern. - - -

It will continue writing and reading until you stop it by pressing the CMTL-A. At that point it displays:

```
Pass count:      1
Finishing Current Pass
```

It will stop at the end of the current write or read pass and display the results.

Soft error statistics:

Pattern	write fault	CRC error	RNF	bad sector	cmp error
0000H	0	0	0	0	0
6DB6H	0	0	0	0	0
AAAAH	0	0	0	0	0
DB6DH	0	0	0	0	0

Hard error statistics:

Pattern	write fault	CRC error	RNF	bad sector	cmp error
0000H	0	0	0	0	0
6DB6H	0	0	0	0	0
AAAAH	0	0	0	0	0
DB6DH	0	0	0	0	0

Hit any key to display more information

Pressing a key will display the soft error summary. If no soft errors are recorded, the following message is displayed:

Hit any key to display more information

Pressing a key will display the hard error summary. Both soft and hard error summaries are shown in the following display format:

Cylinder	head	sector	status	count
----------	------	--------	--------	-------

The test displays the following messages:

Hit any key to continue this test.

Pressing a key will continue the test; the following messages are displayed:

A pause of several minutes occurs while the test executes. The program finishes by erasing the disk. It writes a pattern of hexadecimal E5s to all sectors. At this time it also flags as bad any sectors that had hard errors. The following message is displayed as the test ends:

The program returns to the DISK86 Main Menu.

Miscellaneous Functions

There are two functions. The first suppresses or enables the display of the disk status error message for DISK86 programs. This is ordinarily enabled, but might be disabled while running some repetitive operation and checking it with electronic test equipment. The second function displays the contents of a selected sector on the screen in hexadecimal and ASCII.

When you select program H, the screen displays:

Miscellaneous Menu

- (A) Select disk error STATUS display option
- (B) Display a sector
- (C) Terminate this test

Enter:

1. If you select A, this prompt shows:

Do you want the Disk Error STATUS message displayed [N]?

Reply Y or N to enable or suppress display of status errors for DISK86 programs. The program then returns to the DISK86 menu.

2. If you select B, this prompt shows:

* DISPLAY HARD DISK SECTOR *

Enter Cylinder Number:

Enter a value and press Return. The range is 0-511.

Enter Head Number:

Enter a value and press Return. The range is 0-3 for 20-megabyte disk drives, 0-7 for 40-megabyte drives.

Enter Sector Number:

Enter a value and press Return. The range is 0-16.

The contents of the sector are then displayed on the screen, shown in hexadecimal on the left, ASCII on the right if displayable. Sixteen bytes are shown per line. Hexadecimal numbers on the left aid in locating the exact displacement of any byte in the sector, from 0 to 01F0H. (Only the first half of the sector contents are displayed on the screen; press any key to display the second half. The displacement numbers for the second half are a duplicate of the first half.)

3. If you select C, the program returns to the DISK86 menu.

Drive Unit Reselection

This selection will return the user to the initial prompts of DISK86. This allows the user to reselect and define the disk to be tested without rebooting the test. This would typically be used when errors are made during initial definition.

To invoke, enter I.



DISKETTE FORMAT PROGRAM: FLPYFORM

The FORMAT utility program formats, or reformats, diskettes. This program erases all data previously stored on a diskette.

Proceed as follows to run the FLPYFORM program:

Step 1*** Insert the ADX diskette in the diskette drive as shown in figure ADX-1. Close the drive door and press the system Reset button. The ADX menu will now display on the terminal screen.

Step 2*** Enter FLPYFORM<CR> after the "REQUEST" prompt. The terminal will display the FORMAT prompt message:

.... ALTOS FLOPPY DISK FORMAT ROUTINES

1. Standard single density format
2. Double density format for CP/M, XENIX, or diagnostic disk
3. Double density format for MP/M
4. End this program

Step 3*** Select the format option by number: n

Explanation: Select according to the intended use of the diskette. If you are unsure of the right type of format to select, consult the Operating System Manual for details.

After you have selected 1, 2, or 3, and <CR> the following will appear on the terminal screen:

Select format option by number

- 1 = single sided no verify
- 2 = single sided verify
- 3 = double sided no verify
- 4 = double sided verify

Select option by number n

NOTE:Verifying the format is making sure that all sector addresses on the diskette are valid and that nothing has been omitted. The program is competent enough not to have to be verified but this option is installed for the convenience of the user.

Place disk to be formatted in drive A:,
remove diagnostic disk if necessary.
When ready to proceed,
Reply with <Y>:



Step 4*** Insert the diskette into the drive as shown in figure ADX-1, close the drive door, and press Y and Return (Y<CR>). The system will start formatting the diskette, displaying the cylinder numbers, at the bottom of the terminal screen, as it proceeds.

Hit <esc> to abort format in progress
[] [] [] []

When formatting is complete, the program repeats the menu (1-4) shown above, and the following message is displayed on the screen:

format complete

You can format as many diskettes, at one time, as you wish. To exit, select option 4. This will display:

Place a system or diagnostic disk in 'A:'
Hit <CR> when ready

Insert the diagnostic diskette and press Return to boot from that disk.

DISKETTE COPY UTILITY: FLPYCOPY

This utility copies a diskette, verbatim, by reading the entire contents into memory, sizing the task and writing those contents to the new diskette. The user should insure that properly formatted diskettes are available prior to running this program.

STEP 1*** Enter FLPYCOPY at the Request prompt. The following will appear on the screen:

Hit Escape Key to terminate this test.

DISKETTE COPY ROUTINES VERSION 1.0

1. Standard single density format(single side)
2. Standard single density format(double side)
3. Double density(non-MP/M single side)
4. Double density(non-MP/M double side)
5. Double density for MP/M (single side)
6. Double density for MP/M (double side)

Enter selection by number:

STEP 2*** Enter the appropriate selection at the prompt and press the <CR>. If the selection is a little unclear, consult the ACS8600 Operating System supplement and the Users Manual to:

- (1) determine the density of your particular system
- (2) determine the number of sides you will need to transfer the data to (one or two)
- (3) determine the operating system(if applicable) you are working with

Once these questions are answered and the selection is made, the following will appear on the screen:

Insert the diskette to be copied from
Press any key when ready

STEP 3*** Place the diskette to be copied from into the drive and press the **space bar**. The user will note that the system is making a clicking sound (the diskette drive "stepping across the diskette tracks") and that two numbers (diskette track numbers in hexadecimal) have appeared just under the Press any key... prompt. The clicks and number changes will be synchronous until the count reaches 4C when the prompt:

Insert the diskette to be copied to
Press any key when ready

appears on the screen.



STEP 4*** Remove the diskette, that the information has been copied from, from the diskette drive and insert the diskette, that the information will be copied to, into the drive. Press the space bar. The clicking and numbers will reappear just under this prompt and continue until the diskette has been fully copied. At this point, the prompt:

will appear on the screen.

STEP 5*** The user makes this decision, enters the appropriate response which yields one of the following two displays:

(1) Y<CR>

Insert the diskette to be copied to
Press any key when ready

(2) N<CR>

Hit Escape Key to terminate this test.

DISKETTE COPY ROUTINES VERSION 1.0

1. Standard single density format(single side)
2. Standard single density format(double side)
3. Double density(non-MP/M single side)
4. Double density(non-MP/M double side)
5. Double density for MP/M (single side)
6. Double density for MP/M (double side)

Enter selection by number:

The user has the option of making another copy or removing the diskette and rebooting the system for other tasks.

MAGNETIC TAPE VERIFICATION: TAP86

The magnetic tape verification routines, TAP86, are designed to test and validate the ACS 8600 Magnetic Tape Unit and all of its associated interface equipment.

NOTE

DO NOT ATTEMPT TO RUN THIS TEST IF YOUR SYSTEM DOES NOT HAVE A MAGNETIC TAPE UPGRADE PROPERLY INSTALLED

STEP 1*** Power-up the ACS8600 and load the diagnostic diskette, as shown in ADX figure 1., into the diskette drive. Push the **reset button** and wait (approximately 5-10 seconds) for the diagnostic command directory to appear on the screen (see example in ADX loading procedures).

STEP 2*** Load a tape cassette, enter Tap86, at the request prompt, and push the carriage return <CR>. It will take approximately 5-8 seconds to load the tape verification routines. Once TAP86 is loaded, you will see:

*** ACS 8600 Tape Verification v1.0 [X/X/X] ***

Program Memory = 01 (01000) to 07 (07DFE)

Data Memory = 07 (07E04) to 0E (0EAAA)

Test Memory = 0F (0F000) to 7F (7FFFF)

Selecting drive 1/1

Main Menu

- | | |
|--------------------------|-------------------------------|
| (A) Drive Selection Menu | (G) Tape Command Menu |
| (B) Track Selection Menu | (H) Error Handling Menu |
| (C) Retry Threshold Menu | (I) Printer Selection Menu |
| (D) Block Start Menu | (J) Message Severity Menu |
| (E) Block Count Menu | (K) Exit to Diagnostic Disk - |
| (F) Block Size Menu | |

Enter:

You will notice that the tape itself is starting to run without any apparent command from the diagnostics. This is the initial tape stress test. It is done automatically upon boot-up of the diagnostics. What it does is a Manufacturer's recommended stress test on the tape (a fast forward and fast rewind that will stress the tape for maximum recording/reproduction quality and performance).

STEP 3*** It would be advisable to use a printer to document the errors that may be present during this test. If you are going to use a printer, continue reading this step. If you are not going to use a printer, go to STEP 4***.

Select the Printer Selection Menu (option I). The following will appear on the screen:

Printer Selection Menu (A)

- | | |
|--------------------|---------------|
| (A) None (default) | (G) Channel 4 |
| (B) Channel 0A | (H) Channel 5 |
| (C) Channel 0B | (I) Channel 6 |
| (D) Channel 1 | (J) Channel 7 |
| (E) Channel 2 | (K) Channel 8 |
| (F) Channel 3 | |

Enter:

Connect the printer to one of the ports on the back of the ACS8600 and match that port number with the numbers in the Printer Selection Menu. Enter the letter appropriate at the Enter Prompt. You will now see the main menu again (see below).

Main Menu

- | | |
|--------------------------|-----------------------------|
| (A) Drive Selection Menu | (G) Tape Command Menu |
| (B) Track Selection Menu | (H) Error Handling Menu |
| (C) Retry Threshold Menu | (I) Printer Selection Menu |
| (D) Block Start Menu | (J) Message Severity Menu |
| (E) Block Count Menu | (K) Exit to Diagnostic Disk |
| (F) Block Size Menu | |

Enter:

STEP 4*** Select the Error Handling Menu (option H). The following menu will now appear on the screen:

Error Handling Menu (A)

- | | |
|------------------------------------|---------------------------------|
| (A) Continue (ignore this error) | (D) Display Error Summary |
| (B) Pause (for operator selection) | (E) Display History |
| (C) Loop (retry this error) | (F) Clear History/Error Summary |

Enter:

As you can see, this menu has many things that will make troubleshooting easier. At this time, select option B, Pause (for operator selection). When you do this the main menu will come up on the screen (see below).

Main Menu

- | | |
|--------------------------|-----------------------------|
| (A) Drive Selection Menu | (G) Tape Command Menu |
| (B) Track Selection Menu | (H) Error Handling Menu |
| (C) Retry Threshold Menu | (I) Printer Selection Menu |
| (D) Block Start Menu | (J) Message Severity Menu |
| (E) Block Count Menu | (K) Exit to Diagnostic Disk |
| (F) Block Size Menu | |

Enter:

STEP 5*** Select the Message Severity Menu (option J). The following will now appear on the screen:

Message Severity Menu (C)

- | | |
|--------------|---------------------|
| (A) Errors | (D) Info |
| (B) Warnings | (E) Traces |
| (C) Passes | (F) Extended Traces |

Enter:

The proper selection will be option D, Info. This will give you the information needed to complete the troubleshooting without too much unnecessary software jargon. Once you select this, the main menu will appear on the screen (see below).

Main Menu

- | | |
|--------------------------|-----------------------------|
| (A) Drive Selection Menu | (G) Tape Command Menu |
| (B) Track Selection Menu | (H) Error Handling Menu |
| (C) Retry Threshold Menu | (I) Printer Selection Menu |
| (D) Block Start Menu | (J) Message Severity Menu |
| (E) Block Count Menu | (K) Exit to Diagnostic Disk |
| (F) Block Size Menu | |

Enter:

STEP 6*** Select the Tape Command Menu, option G. The following will appear on the screen:

Tape Command Menu (L)

- | | |
|------------------------|--------------------------------|
| (A) Comprehensive Test | (G) Write/Verify Test |
| (B) Tape Motion Test | (H) Write/Verify/Read Test |
| (C) Track Motion Test | (I) Write/Read CRC-Test |
| (D) Write Test | (J) Write/Verify/Read CRC Test |
| (E) Read Test | (K) Calculate I.R.G. Test |
| (F) Write/Read Test | (L) Erase Tape |

Enter:

The proper selection will be the Comprehensive Test, option A. This will give the tape, tape drive, tape controller, and the software a good shakedown.

Generally, it would be best to run at least three passes of the comprehensive test. If any trouble is detected during any period of time, run an extended test to fully exercise the tape drive.

MENU AND TEST DESCRIPTIONS

Understanding the menus and tests that they will accomplish is a great part of what gives the user the confidence to exercise and validate the item/partsystem/subsystem in question. The following paragraphs are designed to give the user insight into what these tests will accomplish and what can be expected.

First, to form a picture in the users mind, we will present the main menu:

Main Menu

- | | |
|--------------------------|-----------------------------|
| (A) Drive Selection Menu | (G) Tape Command Menu |
| (B) Track Selection Menu | (H) Error Handling Menu |
| (C) Retry Threshold Menu | (I) Printer Selection Menu |
| (D) Block Start Menu | (J) Message Severity Menu |
| (E) Block Count Menu | (K) Exit to Diagnostic Menu |
| (F) Block Size Menu | |

Enter:

This menu contains all of the tests/actions that can be accomplished by the TAP36 verification procedures. Most of these menus are to setup or configure the tests to the exact needs of the user as will be noted in the following narrative descriptions.

Drive Selection Menu (B)

- | | |
|-------------|-------------|
| (A) All | (F) Drive 5 |
| (B) Drive 1 | (G) Drive 6 |
| (C) Drive 2 | (H) Drive 7 |
| (D) Drive 3 | (I) Drive 8 |
| (E) Drive 4 | |

Enter:

This menu allows the user to specify the drive(s) to be tested. The term "All" means that if there are more than one drive to be tested, each drive, in sequence, will be tested in a polling (one after another), or first drive accessible to the computer, fashion. This menu assumes that the drive is included (if the user has purchased the Magnetic Tape option with the ACS 3600) is drive 1. All subsequent drives that are added will be subordinate to that drive.

Track Selection Menu (A)

- (A) All
- (B) Track 1
- (C) Track 2
- (D) Track 3
- (E) Track 4

Enter:

This menu will allow the user to select a particular track of the tape to test. All will test each track and validate the entire tape.

Retry Threshold Menu

- (A) 1
- (B) 2
- (C) 5
- (D) 10
- (E) 20
- (F) 50

Enter:

This menu allows the user to specify how many tries the validation routines should attempt to read/write a block before causing an error indication to be output. It should be noted that selecting 1, 2 or 5 (options A, B or C respectively) may not yield a fair and representative look at the tape/tape drive if the test in question comprises the validation series for the respective tape/tape drive. It may be noted that if all characteristics (i.e. head bias, flux density, time base error) this particular characteristic must denote a reasonable ratio of electrical/electromechanical/mechanical tradeoff and integrity, etc.) of the tape and tape drive have been accomplished and certified as valid and competent for the ACS 8600, a minimal retry threshold may be selected to expedite the test (error/failure) analysis.

Block Start Menu

This menu allows the user to start the test at a specific block to validate a trouble/particular area. It is usually used should a problem arise and a particular area of the tape is in question. This could also be user to check the seek capabilities of the tape drive and its associated circuitry for high speed forward seeks.

When the user specifies this particular menu, the following will appear on the screen:

Enter Starting Block (decimal):

The user would simply enter the block number (in decimal format) and press the carriage return (<CR>) to activate this selection.

Block Count Menu

This option is similar to the Block Start Menu. It will count the desired number of blocks the user desires and stop. It is primarily used to determine the total number of blocks on the particular tape in question. To activate this selection, simply enter the number of blocks to be counted (or Full Tape) after the prompt:

Enter Block Count (decimal):

and press the carriage return (<CR>) to start the procedure.

Block Size Menu

This allows the user to specify the size of block that will be tested. The user simply enters the block size after the prompt:

Enter Block Size (decimal):

and presses the carriage return (<CR>).

Tape Command Menu (L)

- | | |
|--------------------------|--------------------------------|
| (A) Comprehensive Test | (G) Write/Verify Test |
| (B) Tape Motion Test | (H) Write/Verify/Read Test |
| (C) Track Selection Test | (I) Write/Read CRC Test |
| (D) Write Test | (J) Write/Verify/Read CRC Test |
| (E) Read Test | (K) Calculate I.R.G. Test |
| (F) Write/Read Test | (L) Erase Tape |

Enter:

The Tape Command Menu contains the exercising portion of the TAP86 verification routines. These are as follows:

- (A) Comprehensive Test-this test contains options B,C and J.
- (B) Tape Motion Test-this test does the manufacturers recommended stress test (fast forward/rewind). This test correctly positions/engages the tape for reception of the data to be transferred. It also sizes the tape according to capacity (number of feet, seconds and bytes available).
- (C) Track Selection Test-this test forces the selection of every track (1-4) to validate the switching capability of the tape controller board and the tape drive unit itself.
- (D) Write Test-this test writes a predetermined pattern to the tape.

- (E) Read Test-this test reads data that is on tape at that particular time. It should be done after a write test to insure integrity.
- (F) Write/Read Test-this is a combination of selections D and E.
- (G) Write/Verify Test-this test will write a pattern to the tape and verify that it has been correctly entered.
- (H) Write/Verify/Read Test-this test is the same as option G and includes a read sequence to further verify results.
- (I) Write/Read CRC Test-this test writes a predetermined pattern to the tape, reads that information for validity and adds a CRC (cyclic redundancy check-a complex mathematical algorithm used to determine receiver reception fidelity) character to further validate this test.
- (J) Write/Verify/Read CRC Test-this test is the same as option I and adds the additional verification step for data integrity.
- (K) Calculate I.R.G. Test-this test calculates the gap between each block of information.
- (L) Erase Tape-this function erases the tape.

Error Handling Menu (A)

- (A) Continue (ignore this error) (D) Display Error Summary
- (B) Pause (for operator selection) (E) Display History
- (C) Loop (retry this error) (F) Clear History/Error Summary

Enter:

This menu allows the operator to decide what the computer should do if an error should occur during the test.

- (A) Continue (ignore this error)-this option will show all errors, as they occur, but will not stop the test when an error does show up during the test.
- (B) Pause (for operator selection)-this test will stop the test and show the following Error Pause menu:

Error Pause:

- (A) Continue (ignore all errors) (D) Message Severity Menu
- (B) Pause (for operator selection) (E) Printer Selection Menu
- (C) Error Handling Menu

Enter:

As the user can see, this additional menu contains selections A and B from the Error Handling Menu, the Error

Handling Menu itself, Message Severity Menu and the Printer Selection Menu (see the Message Severity Menu and Printer Selection Menus for additional information).

- (C) Loop (retry this error)-this selection will continue to try a particular pattern until the user releases it from this task (hard error-non recoverable), or it breaks free from the task by itself (soft error-intermittent failure usually not damaging to the system).
- (D) Display Error Summary-this selection will display the count of any errors (both hard and soft errors together) that have occurred during the test.
- (E) Display History-this will display the last 5000 characters that have been output by the system test.
- (F) Clear History/Error Summary-this resets the areas holding the information for options D and E of this menu.

Printer Selection Menu (A)

- (A) None (default)
- (B) Channel 0A
- (C) Channel 0B
- (D) Channel 1
- (E) Channel 2
- (F) Channel 3
- (G) Channel 4
- (H) Channel 5
- (I) Channel 6
- (J) Channel 7
- (K) Channel 8

Enter:

This menu provides a means for the user to connect a printer to the ACS 8600. Once the user has connected the printer cable to the back of the system, noted which channel the printer is connected to, he merely matches the number of the channel to the list in the -printer selection menu, selects the appropriate letter, presses the carriage return (<CR>) and the printer is connected.

Main Menu

- A) Drive Selection Menu
- B) Track Selection Menu
- C) Retry Threshold Menu
- D) Block Start Menu
- E) Block Count Menu
- F) Block Size Menu
- G) Tape Command Menu
- H) Error Handling Menu
- I) Printer Selection Menu
- (J) Message Severity Menu
- (K) Exit to Diagnostic Disk

Enter:

Message Severity Menu (C)

- (A) Errors
- (B) Warnings
- (C) Passes
- (D) Info
- (E) Traces
- (F) Extended Traces

Enter:

ERROR HANDLING

ERROR-a nemesis that rears its ugly head at the wrong time, wrong place and usually under the wrong circumstances.

The error phenomenon is the nightmare of people around the world. It always happens during the time that they can be least compensated for and costs, in real or theoretical terms, the most to all concerned.

This portion of the manual is designed to yield a mode of identifying ADX errors, making a rational decision regarding the likely cause of the message, should be done to identify them and keep the flow of business intact. The error messages, and their explanations, will be presented in the following order:

MEMORY VERIFICATION TEST: MEM86
SERIAL TEST: SER86
FLOPPY DISK TEST: FLPYTEST
HARD DISK TEST: DISK86
MAGNETIC TAPE TEST: TAP86
DISKETTE FORMAT PROGRAM: FLPYFORM
DISKETTE COPY UTILITY: FLPYCOPY

MEMORY VERIFICATION TEST: MEM86**MEM86 Errors**

There are two basic types of errors in the MEM86 verification routines, hard errors and soft errors. Hard errors are catastrophic to the well being of the system and its components. When they occur, they will continue to persist at the same location and have to be remedied by a qualified field service representative or factory/distributor. An example of this type of error listing would be:

*** ERROR #1/1-- RAM quick, ascending, loc 0AFFF, wrote 0FFFF, read back 0AAAA

*** ERROR #2/1-- RAM quick, ascending, loc 0AFFF, wrote 0FFFF, read back 0AAAA

*** ERROR #3/1-- RAM quick, ascending, loc 0AFFF, wrote 0FFFF, read back 0AAAA

*** ERROR #4/1-- RAM quick, ascending, loc 0AFFF, wrote 0FFFF, read back 0AAAA

*** ERROR #5/1-- RAM quick, ascending, loc 0AFFF, wrote 0FFFF, read back 0AAAA



*** ERROR #6/1-- RAM quick, ascending, loc 0AFFF, wrote 0FFFF, read back 0AAAA

*** ERROR #7/1-- RAM quick, ascending, loc 0AFFF, wrote 0FFFF, read back 0AAAA

*** ERROR #8/1-- RAM quick, ascending, loc 0AFFF, wrote 0FFFF, back 0AAAA

*** ERROR #9/1-- RAM quick, ascending, loc 0AFFF, wrote 0FFFF, read back 0AAAA

*** ERROR #10/1-- RAM quick, ascending, loc 0AFFF, wrote 0FFFF, read back 0AAAA

This type of redundancy denotes a hard failure. You will note that each error message is the same except that the decimal number next to the number (#) sign.

Soft errors are intermittent, in nature, and only occur sporadically. This type of error is bothersome and should be of no real concern to the user. The error message would appear similar to:

*** ERROR #1/1-- RAM quick, ascending, loc 0AFFF, wrote 0FFFF, read back 0AAAA

A thorough description of every error possible in the memory verification routines would necessitate a separate volume in its self. This is due to the fact that the memory verification routines test all of the primary circuitry of the ACS8600. This is an awesome feat and should be left to the maintenance professionals. The complete error message/fault isolation will be placed in the ACS8600 Maintenance Manual along with the guides to troubleshoot to the port level/firmware level. The information that will be presented in this manual is that information that the user can provide to the field service representative/factory repair service to expedite repairs to the system, should they become necessary.

The error messages, in the memory verification routines, are structured out of modules that relate directly to each individual test and subportion thereof. This fact states that each test (denoted in the testing routines as Traces) instruction probes an individual area of the system and provides a go or no go (error) result that validates that particular location and its associated routing circuitry. The user, once he has looked at and studied the error message structure (on the following page) will see the relationship between the tests and errors generated by each software probe (this concept may be a little difficult for the novice user to fully comprehend).



Explanation of error messages:

Error Symbol	Description
***ERROR	This describes what happened
#1/1--	The first number describes the error number. The second number describes the test pass number that the error occurred. For example, #3/46 means that the third error (#3/) occurred on the forty-sixth (/46) pass of a test.
RAM byte ripple	This denotes the type of test that failed due to a software or hardware fault (software-the media that allows the computer to do tasks at extremely fast speeds hardware-the physical portions of the computer, i.e. the computer chips, the printed circuit boards, etc. fault-a failure that can be either momentary or permanent in nature).
:ascending	The sub-portion of the test (if any). This allows the user to further define the problem to its appropriate hardware/software area(s).
,loc=0AFFF	This is the actual physical location in memory that the error exists. The location notation is in hexadecimal (0-9 and A-F) which is more computer compatible than the normal decimal system we all use.
write "0FFFF"	This is what the computer wrote into the memory location in hexadecimal notation.
readback"04FFC"	This is what the computer read from the memory location in question. It must be an exact duplication of what is wrote into the memory location or it will be regarded as an error.



SERIAL TEST: SER86**IOC INVALID INTERRUPT**

This interrupt occurs if the system is not making full contact (not interfacing properly) with the controller. The user notification is:

ERROR, "IOC--Invalid Interrupt"

IOC UNKNOWN INTERRUPT

This interrupt indicates that the system has received an interrupt via the IOC and cannot decipher where it is originating (i.e. terminal, printer, etc.). The system will display:

ERROR, "IOC--Unknown Interrupt"

If this happens, install the serial diagnostics, SER86, and let the verification routine seek out the problem. If this does not identify the problem to the users satisfaction, contact your local field service representative.

SYSTEM TIMER ERROR

Should the system become dissynchronous (the timing circuits not function properly), the following error-message will be displayed on the screen:

System timer error: expected range=(XXX to XXX) actual=XXX

If this occurs, contact your local service representative and give him the expected and actual ranges shown in the error message.

BIT TOGGLE FAILURE

If the IOC is not working properly, the following message will appear:

ERROR, "IOC XXXX bit toggle failure for sc=XXX"

If this occurs, contact your local service representative and give him the exact contents of the error message.



FLOPPY DISK DRIVE TEST: FLPYTEST

This test attempts to find/exercise error conditions that may occur within the confines of the diskette (floppy disk) drive and diskette (floppy disk) itself.

DISKETTE DRIVE WILL NOT ACTIVATE

The first error, that the user may encounter, is that the diskette will not activate in the drive (diskette will not boot). The only indication will be a repeated Monitor signature, each time the user depresses the system reset button, trying to boot the diskette. The screen presentation will be similar to:

ALTOS COMPUTER SYSTEMS
Monitor Version x.xx

Press any key to interrupt boot

ALTOS COMPUTER SYSTEMS
Monitor Version x.xx

Press any key to interrupt boot

ALTOS COMPUTER SYSTEMS
Monitor Version x.xx

Press any key to interrupt boot

ALTOS COMPUTER SYSTEMS
Monitor Version x.xx

Press any key to interrupt boot

The only thing the user can do at this point is call the local service representative and tell the representative that the diskette drive will not boot.

ABORTED TEST

The diskette test will automatically abort if the wrong version is put into the system (i.e. a diskette test for an ACS 8000 will not function on the ACS8600 and will therefore abort). The user will see the following messages appear on the screen:

YOU ARE USING THE WRONG VERSION OF FLPYTEST
******* FLPYTEST ABORTED *******

An audible tone will follow the above display.



ERROR SUMMARY

Once the diskette test has completed testing the drive/diskette in question, it will display an error summary similar to the following:

FLPYTEST ERROR SUMMARY

TOTAL TRACKS PASSED XXXX
DISK:A READ XXXX WRITE XXXX

If any errors were found on the diskette, an additional message will be printed on the screen. This message, in conjunction with the previous message would be similar to the following:

****** READ PHASE ERROR CNT=XX WRITE PHASE ERROR CNT=XX ******

Note: the following display will appear only if there are I/O errors and compare errors

DETECTED I/O ERROR, STATUS=XX
COMPARE ERROR TRACK XX, SECTOR XX

The status codes, with their appropriate explanations, are as follows:

status 17-read error
status 24-low byte error
status 29-write error



HARD DISK TEST: DISK86

I/O ERRORS

The following error message will appear on the screen, if an input/output error should occur:

*** ERROR *** Drive:XX Cyl:XX Head:XX Sector:XX Status:XX

Status bit meanings:

These errors are an integral part of fully diagnosing any problem that may plague the hard disk unit entotal. Not only can the user determine what type of error but with a little thought, can determine if the error is recoverable and if it is the head or disk.

Explanation of error messages:

*** ERROR *** -- This is what has happened

Drive: XX-- This is the hard disk that the error occurred on (i.e. 01 = hard disk that will be in the main ACS 8600 system enclosure, 02 = hard disk that will be in the upgrade kit, or secondary enclosure)

Cyl: XX-- a specific portion of the memory usually designated in thousands of bytes (i.e. 4K byte for Shugart SA1004 disk)

Head: XX-- a device used to place data on or recover data from a magnetic device/medium (i.e. hard disk, flexible/floppy diskette, magnetic tape, etc.)

Sector: XX-- a specific portion of the disk that is addressable

Status: XX-- what, exactly, is the cause/nature of the error

Status codes:

NOT*RDY = disk not ready to receive data. Hard disk drives need approximately two minutes to get up to speed, much like the commercial phonograph turntable. If this time is not allowed, the possibility of errors occurring are tremendous.

WR FLT = write fault

CRC ERR = cyclic redundancy check error, an error caused by data, during the store/recover cycle, not having the correct structure (character placed into memory not being the same as was input into that particular space)

227000

6111

6108

6105

6102

6099

6096

6093

6090

6087

6084

6081

6078

6075

6072

6069

6066

6063

6060

6057

6054

RNF = record not found. This indicates that the file was not found in four revolutions of the disk. If this occurs just after the user has received a hard disk back from repairs, it may be necessary to reformat the disk itself. The trouble may be that the disk number (disk 1-for internal system disks; disk 2 for external or secondary disks) was not specified by the user and the system cannot "find" the rigid disk in question. If the user has specified a cylinder and the system "can't find it", the problem may be that that particular cylinder address is faulty. Try another cylinder to see if the problem was only the cylinder address and not a system error.

BD SECT = bad sector

NOT*TC = task not complete. This indicates that the requested command has not been carried out.

BUZY = disk controller in the process of a data operation

ADDRESS ERRORS

The user will probably encounter address errors during the reformatting of the hard disk. These are "normal errors" that pertain to the cosmetic flaws in the disk surface. The error message should be displayed similar to:

****** Address Error **** expected XX, actual XX**

The amount of errors should be minimal and should coincide with the error map that is tapped to the bottom of the disk drive.

INVALID CYLINDER NUMBER

This error is caused by the user entering a invalid cylinder number. The error message will appear similar to:

Invalid Cylinder Number, please try again.

This error is not one that will cause injury to the system. There are two types of 10 megabyte rigid disks shipped by Altos: (1) Shugart and; (2) Quantum. The Shugart disks have 256 cylinders and the Quantum have 512. Each disk starts at "0", not "1". The user has to select numbers from 0-255/511 to be correct in the cylinder number entered.

STATUS ERROR

This error will appear during the disk read sequence. The message will appear as follows:

****** STATUS ERROR ******

For explanation of status, see status codes in the I/O error section.

COMPARE ERROR

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

****** COMPARE ERROR ******

This is an CRC error (see I/O errors in this section).

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MAGNETIC TAPE TEST: TAP86**DRIVE NOT ON-LINE**

The first error message, if any, that will appear is as follows:

(Drive not on-line)(cartridge not loaded)(data transfer unsafe)

This type of error message is psuedo definitive. The first thing that the user should do is reinsert the tape cartridge into the tape drive and retry the test. If the message persists, the error was caused by the magnetic tape interface cables not being seated properly.

SERIAL STATUS ERROR

This type of error denotes an error has occurred on the tape controller board or on the magnetic tape itself. They will appear as follows:

initial serial status check

This is not an error but simply alerting the user that the system is in the process of initializing the communications from the system to the tape unit.

Serial data ripple error: expected=XXXX actual=XXXX

This error can be caused by the interface connections not being properly seated.

```

-----
;   Serial status #1       I check the tape controller;
;                           I board interface line and ;
;                           I reset the system          ;
-----
;   Serial status #2       I check the tape controller;
;                           I board interface line and ;
;                           I reset the system          ;
-----
;   Serial status #3       I tape drive error-call    ;
;                           I local field service rep  ;
-----
;   Serial status #4       I tape drive error-call    ;
;                           I local field service rep  ;
-----

```

(S) [Illegible text]
 (S) [Illegible text]
 (S) [Illegible text]
 (S) [Illegible text]
 (S) [Illegible text]
 (S) [Illegible text]
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(S) [Illegible text]
 (S) [Illegible text]
 (S) [Illegible text]

(S) [Illegible text]

TAPE MOTION ERRORS

```

-----;
; Tape Motion Status #11 I Error cause-bad tape or;
;                               I tape controller board ;
-----;
; Tape Motion Status #12 I replace tape controller;
;                               I board ;
-----;
; Tape Motion Status #13 I replace tape controller;
;                               I board ;
-----;
; Tape Motion Status #14 I replace tape controller;
;                               I board ;
-----;
; Tape Motion Status #22 I replace tape controller;
;                               I board ;
-----;
; Tape Motion Status #23 I replace tape controller;
;                               I board ;
-----;
; Tape Motion Status #24 I replace tape controller;
;                               I ;
-----;

```

TRACK MISMATCH ERROR

This error occurs during the Track Selection Test. If the tape drive unit or tape controller unit receives/sends the wrong signal, the following message will display on the terminal screen:

```
***ERROR--Track mismatch: selected=X/X id read=X/X
```

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DISKETTE FORMAT ROUTINE: FLPYFORM

This program aligns the surface of the diskette thus allowing data/information to be placed on the medium.

INVALID FORMAT

If the user has entered a number other than 1-4, an error message similar to:

Invalid option, please respecify

will appear on the screen. The user should look at the menu selections and select the correct option for his needs.

HOMING ERROR

This error will occur when the first portion of the diskette is faulty. If the Format routine cannot start the sequence of operations, it will display the following message:

**PERMANENT SOURCE DISK ERROR EXIT
PERMANENT DESTINATION DISK ERROR EXIT
FUNCTION FAILED
UNABLE TO HOME DEVICE**

This type of error is unrecoverable.

TRACK WRITE ERROR

This error indicates a media storage problem on the diskette surface that probably will not be recoverable. A message will appear on the screen as follows:

ERROR DURING FULL TRACK WRITE, STATUS = XX

If the diskette fails during this mode of operation, the diskette will not be able to satisfactorily capture and retain information on the diskette surface.

HEAD STEP ERROR

This error indicates that the heads are having trouble accessing the full domain of the recordable diskette surface. If this happens, a message will appear on the screen as follows:

ERROR DURING HEAD STEP OPERATION, STATUS = XX

The possibility of contamination of the diskette/head surface is good to excellent. Discard the diskette and clean the heads.

ROUTING

1000

and notes in connection with the

1000

1000

1000

to (discussed below) the error
and (discussed below) the error
program and attempt to find the
error. Use the ERROR program

to (discussed below) the error
and (discussed below) the error
program and attempt to find the
error. Use the ERROR program

DISKETTE COPY ROUTINE: FLPYCOPY

If the user happens to enter a selection in error, the display will look similar to this:

Insert the diskette to be copied from

Press any key when ready

XX

error cyl = XX head = XX sector = XX status = XX

Place a system or diagnostic diskette in A: and type <CR>

This is stating that the diskette is not formatted correctly or that the diskette has a bad sector (permanente disk error). The user should go to the FLPYTEST program and attempt to find the problem. Should this prove fruitless, use the FLPYFORM program to reformat the diskette.







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