XEROX

XEROX 8090
Diagnostics Handbook

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1.   INTRODUCTION

About this Handbook

8090 Diagnostics Handbook is a tool to be used by Xerox Service Representatives and Systems Analysts. It contains descriptions of the diagnostic tests available on the 8090 and instructions on how to run the tests.

This handbook is designed to contain all 8090 diagnostic information required by Xerox Service Representatives and Systems Analysts.

This handbook contains very few troubleshooting procedures (located in the MP Code List) and only a few examples of when to employ some of the diagnostic tests. Its intent is to instruct the user how to run any of the available diagnostic tests and to provide an explanation of the tests.

This handbook is divided into the following major areas of 8090 Diagnostics:

- Pre-Boot Diagnostics

- Boot Diagnostics

- Extended Diagnostics

    Extended Utility

    Extended Memory

    Extended Isolation (EI) Disk

- Low Capacity Disk Diagnostics

- Cartridge Tape Diagnostics

- Multiport Communication Diagnostics

- On-Line Diagnostics

- High Capacity Configuration Utility

- High Capacity Disk Utilities

- High Capacity Disk Diagnostics

- High Capacity Cartridge Tape Diagnostics

- MP Code List

To help distinguish specific text references, the following writing conventions are used in this handbook:

- All references to actual screen messages are written in an *Italic Font*.

- Whenever input that a user must type is mentioned, it is shown in **boldface** type. And when a keyboard key is mentioned, it is shown in bracketed, boldface type. For example, "Type **<1>** and press **<Return>**."

- Significant words or statements are in boldface type to distinguish them from regular text.

There are two types of revisions to the Diagnostics Handbook: Complete Reprints and Partial Reprint Packages. A Complete Reprint is identified by a new part number that ends in "0." A Partial Reprint Package is identified by the current part number incremented by one. (For example, the first revision to handbook 700P04830 will be numbered

700P04831, the second revision will be numbered 700P04832, and so forth.)

A revision date (at the bottom center of the page) identifies a page that has been changed or added to the handbook. Areas that are new or changed are identified on each new revision page. The methods used to mark the changes on each page are:

Text: black vertical bars ( ) surround the changed information.

Changed or new figures and tables: black vertical bars surround the title name of the figure or table.

If the same page is changed by a later revision, the black vertical bars that surrounded the initial revision information are removed and new ones are added to identify the new information. only the latest revision date will be shown at the bottom of the page.

A new title page with a revision control list on it will be sent with each revision package. This list will contain the page number of each page in the manual along with the revision issue date of the page.

You can assist in creating accurate service documents by identifying errors or improvements. That information can be sent to Service Education personnel on a Publication Comment Sheet, provided on the last page of this handbook. The Publication Comment Sheet provides instructions for completion.

Notes:

2. PRE-BOOT DIAGNOSTICS

Booting a server is the process of preparing a server to accept and run operational software. The process of booting consists of a series of events that include both user input and software functions, and may also involve diagnostics testing. Diagnostic tests available during the booting sequence are called Boot Diagnostics.

At the beginning of the boot sequence, before Boot Diagnostics have run, Pre-Boot Diagnostics are automatically run. Pre-Boot Diagnostics are contained in one of the Programmable Read Only Memory (PROM) chips on the IOPB PWB and are initiated when the system is powered on or when the Boot Reset switch is pressed.

The components tested during Pre-Boot Diagnostics are the Maintenance Panel (MP), the MP Harness and the areas on the IOPB PWB needed to load software.

■The MP Codes associated with Pre-Boot Diagnostics are [ ] (a blank MP) to [0099], inclusive. The Pre-Boot Diagnostics takes approximately three seconds.■

There are two steps of Pre-Boot Diagnostics. The first step is a Dark Boot. All segments of the MP display are off. The final step of Pre-Boot either displays an error code (for you to take action) or momentarily displays [8888] on the MP. MP [8888] is a test of all segments of the four MP Light Emitting Diodes (LEDs).

From MP code [8888], the system defaults to a Diagnostics Rigid Disk Boot unless the Alternate Boot Switch is pressed.

Boot Diagnostics can be loaded from the rigid disk drive, the ethernet, or the cartridge tape drive. Boot Diagnostics are automatically initiated after successful completion of Pre-Boot Diagnostics.

Alternate Boot Selections

From MP code [8888], the system defaults to a Diagnostics Rigid Disk Boot unless the Alternate Boot Switch is pressed.

If the Alternate Boot switch is pressed and held during a Dark Boot, the MP displays a sequence of numbers [0000] to [0013] following the MP LED Test. When the Alternate Boot switch is released, the number corresponding to the desired boot selection is displayed.

The alternate boot selections are as follows.

MP DISPLAY	DESCRIPTION
■0000	Boot diagnostics from Rigid Disk Drive #1 (default).
0001	Boot from Rigid Disk Drive #1 (loads applications software without running the Boot Diagnostics).
0002	Boot from the Cartridge Tape Drive (ensure that the appropriate utility or applications cartridge tape is inserted in the cartridge tape drive).
0003	Boot Offline Diagnostics from the Ethernet.
0004	Boot diagnostics from the Ethernet.■

∎0005   Boot Offline Diagnostics from the cartridge tape
               (ensure that the diagnostic cartridge tape is
               inserted in the cartridge tape drive).

0006   Alternate Ethernet Boot. (Not used)

0007   Boot diagnostics from Rigid Disk Drive #2.

0008   Boot diagnostics from Rigid Disk Drive #3.

0009   Boot diagnostics from Rigid Disk Drive #4.

0010   Cartridge Tape Drive Retension Routine.

0011   Boot diagnostics from Rigid Disk Drive #5.

0012   Boot diagnostics from Rigid Disk Drive #6.

0013   Boot diagnostics from Rigid Disk Drive #7.∎

Boot Selections

The Boot Diagnostic Program provides a comprehensive set of tests for all hardware necessary to load the operational software. This includes the data paths and controller electronics. This program validates the major electronic portions of the processor. The PWBs tested are listed below.

- IOPB PWB

- CPX PWB

- HSIO PWB or ESCSI PWB

- MX576 PWB or MX1856 PWB

- BACKPLANE

The Boot Diagnostics exercise the processor PWBs. When Boot Diagnostics are run from the 25MB, 85MB, or 310MB Rigid Disk, and the system is started from a power down condition, there is an additional wait (up to 1.5 minutes) for the disk to reach operating speed. The MP will display [0149] during this period.

The Ethernet Interface (including the transceiver and the transceiver cable) is tested by the Boot Diagnostics if the 8090 processor is connected to an Ethernet network.

NOTE: Pre-Boot and Boot Diagnostics do not perform comprehensive tests on the peripheral devices. To test these components, Extended Diagnostics, Disk Diagnostics, and/or On-Line tests should be executed.

The MP Codes associated with Boot Diagnostics are:

[0300] to [0399]   Boot

[0400] to [0499]   EI Utilities

[0600] to [0699]   EI Memory

[0800] to [0899]   Printer Diagnostics

[9700] to [9799]   EI Disk

Boot Diagnostics also contain tests that check the configuration of the processor.

- Test 0316 builds a configuration byte which includes how much memory is installed, what type of RAM PWB is used, and which rigid disk drive is installed. This byte is referred to in later diagnostic tests to determine which tests to run (i.e., 1.1MB memory test, 1.6MB memory test or 3.6 MB memory test).

- Test 0327 reads the Control Store Configuration (i.e., 8KB ROM memory).

The Boot Diagnostics run within approximately 4.5 minutes. Each of the tests within the Boot Diagnostics runs within approximately 4 seconds, except Test 0318, which takes approximately 12 seconds.

4.   EXTENDED DIAGNOSTICS

Extended Diagnostics provide additional diagnostic
tools to help isolate faults in the 8090 Server and
the various peripheral devices.   The Extended
Diagnostics include:

● looping tests

● main memory and rigid disk drive extended
  tests

● port loopback tests

● Real Time Clock (RTC) tests

● a Host PROM Checksum Test

● tests and exercisers for the cartridge tape
  drives and local printers

Extended Diagnostics are stored on the Diagnostic
Cartridge Tape and are run after the successful
completion of Boot Diagnostics from cartridge tape.
Extended Diagnostics consist of Extended Utility,
Extended Memory, and Extended Isolation Disk.
Input to Extended Diagnostics is via the keyboard.

Extended Utility Diagnostics

The Extended Utility Diagnostics provide a
comprehensive set of tests for the Real Time Clock,
the LSEP Port, an Internal Loopback, the RS232C
Ports, the Asynchronous/Synchronous Modems, the
RS366 Port, the Character Printer Port, the Ethernet
Trim Pot Adjustment, the Cartridge Tape Drive, and
the Host PROM.

There are two Real Time Clock (RTC) tests. One is Read RTC (which is the same as Test 0323 in Boot Diagnostics), and the other is Set RTC. The Read Real Time Clock test verifies that the clock is incrementing properly, and the Set RTC verifies that the clock has been set and can be reset.

The port tests are used to perform loopback tests on any of the Extended Utility ports. When performing these loopback tests, the appropriate Universal Loopback Tool must be installed on the specific port being tested. Therefore, these tests are specifically for Service Representative use.

There are other looping tests that do not require the installation of the Universal Loopback Tool. These tests are an Internal Loopback Test and the tests for Asynchronous and Synchronous Modems.

The Cartridge Tape Drive tests provide cartridge tape CRC and checksum utility tests.

The Host PROM test is the same as Test 0324 in Boot Diagnostics, which tests the ID (Address) PROM on the IOPB PWB.

The MP Codes associated with the Extended Utility Diagnostics are [0400] to [0499], inclusive.

Extended Memory Diagnostics

Extended Memory Diagnostics perform extensive testing on the MX576 PWB, the MX1856 PWB (if installed), and the memory section of the CPX PWB. Extended Memory Diagnostics consist of tests [0600] to [0614], inclusive.

When running Extended Memory Diagnostics, any of the following can be selected:

All Single Bit Tests

Fast Single Bit Tests

All Double Bit Tests

Fast Double Bit Tests

Trap/ECC Tests

Refresh Tests

If a single bit error occurs on a memory PWB, the operating software will compensate for the error, and the user will not be aware that an error occurred. Double bit errors will cause the system to "crash." During normal troubleshooting, only the fast double bit error test will be run. If the system contains socketed memory PWBs, the Service Representative will run the fast single bit error test during troubleshooting procedures. This is done as a preventive measure. If any chips fail during troubleshooting, the Service Representative can replace the chips and possibly eliminate a future service call.

Extended Isolation (EI) Disk Diagnostics

Extended Isolation (EI) Disk Diagnostics is discussed in the next chapter. Refer to Chapter 5, Low Capacity Disk Diagnostics.

How to Run Individual Tests

1. Insert the 8090 Server Diagnostic Cartridge Tape into the cartridge tape drive and perform an Alternate Boot 0005.

2. Wait until test 0316 completes (sets the configuration of the system), then press **<BREAK>**.

When Boot Diagnostics is stopped, the MP will display [*XX*99], where *XX* depends upon which diagnostic test was running at the time.

Boot	0399
Extended Utility	0499
Extended Memory	0699
Extended Isolation Disk (Microcode)	9799

3. The system is ready for your input.

The Input Mode

Once the MP displays any of the codes listed above, the system is in the input mode. From the input mode, any of the following keys can be pressed:

CAUTION

Upper case characters are not recognized. If input seems to be ignored, ensure that the **<Caps Lock>** key is not activated.

a Load EI Disk Mesa (Boot 2).

b   Run Boot Diagnostics (Boot 2).

u   Load Extended Utility Diagnostics. (From [0499], specify the desired test and press **< Return >** to initiate.)

m   Load Extended Memory Diagnostics. (From [0699], specify the desired test and press **< Return >** to initiate.)

d   Load El Disk microcode. (From [9799], specify the desired test and press **< Return >** to initiate.)

i   Rerun the test presently in the IOPB RAM.

s   Specify a test. (From [0499], [0699], [0799], or [0899], type the number of the desired test and press **< Return >** to initiate.)

j   Jump to a test and set a loop on a test. (To get to test number 0xzz, type **< j >**, then **< x >**, press **< Return >**, type **< zz >**, press **< Return >**, and test 0xzz will run.) As an example, to run test 0613 from 0399, type **< j >**, **< 6 >**, **< Return >**, **< 13 >**, **< Return >**. Test 0613 will load and run in a loop mode.

c   Report the configuration. The configuration command displays three bytes on the MP in hexadecimal format. The **< Space Bar >** on the keyboard is pressed to go from one byte to another. The left two LEDs make up the first hex number, and the right two LEDs make up the second hex number. The numbers are then converted to binary and read from left to right. For a 25MB disk drive, bit 0 and bit 1

are reset. Bit 1 is set when a 310MB controller (ESCSI PWB) is present, bit 3 is set when the MCC PWB has 64K chips, bits 4 to 6 are not used, and bit 7 is reset for ECC memory. For the second byte, bits 0 to 7 represent the starting 64K memory bank. For the third byte, bits 0 to 7 represent the ending 64K memory bank.

The following keys are always active:

<BREAK> Stop testing, 'break Boot Diagnostics, and go to the input mode.

I Set/Reset loop on the current test (microcode tests only).

n Set/Reset loop on the contents of the IOPB RAM (microcode tests only).

o Set/Reset exit error loop after displaying each error once (microcode tests only). As an example, if test 0305 failed, the MP would alternate between [0305] and an error code. By typing **<o>**, the MP would display [0305], then the error code, then continue to test 0306. If any other tests fail, the MP would display the test number, then the error code, and continue to the next test. To get the system to return to looping on the failing test and error code, type **<o>** a second time.

y Set/Reset loop on diagnostic test (microcode tests only). As an example, if **<y>** is typed while Boot Diagnostics are running, all the Boot Diagnostics will loop until **<y>** is pressed a second time.

z   Show memory size. (If the memory size is 1.1MB, the MP displays [1100]. If the configuration is not set, the MP will display [0000].)

The following two keys are unique to Extended Memory Tests:

q   Run a memory analysis when a memory error is detected and build a memory error log. (This is only necessary when Extended Memory is run outside of Boot Diagnostics and an error is encountered. If a memory error is found during Boot Diagnostics, the system will automatically build an error log and the MP goes to [0699].)

k   Report memory error log built.

Available Tests in Extended Utility

When the MP displays [0499], any of the following tests may be run by typing **<s>**, the appropriate number, and pressing **< Return >**.

0   Read Real Time Clock Test.

1   Set Real Time Clock Test.

2   LSEP Port Loopback Test.

3   19.2K Baud RS232C Internal Loopback Test.

4   9.6K Baud RS232C Port Loopback Test.

5   56K Baud RS232C Port Loopback Test.

6   300 Baud RS232C Cable or Async Modem Loopback Test. (Install loopback cable. For testing with a Modem - start the test, then put Async Modem into the Analog Loopback position, or dial up a remote Async Modem that is in the Digital Loopback position.)

7   1200 Baud RS232C Cable or Async Modem Loopback Test. (Install loopback cable. For testing with a Modem - start the test, then put Async Modem into the Analog Loopback position, or dial up a remote Async Modem that is in the Digital Loopback position.)

8   All RS232C Synchronous Modem Test. (Start the test, then put the Synchronous Modem into the Analog Loopback position, or dial up a remote Synchronous Modem that is in the Digital Loopback position.) This test runs Synchronous Modems at any Baud Rate.

9   RS232C Loopback Test for Secondary Channels. (Not used at this time.)

10   RS366 Port Loopback Test.

11   Character Printer Port Loopback Test. (Not used at this time.)

12   Host PROM Checksum Test.

13   Ethernet Trim Pot Adjustment Test.

14   (Manufacturing Use Only.)

15   Initialize, restore, and read the CRC on all tracks of the Cartridge Tape.

16   For manufacturing use only.

17   Read and verify the CRC on all tracks of the Cartridge Tape and build and report the tape checksum. If all the CRCs are good, the checksum will alternate on the MP with [0444]. Press **<BREAK>** to return to 0499. Any other alternating codes indicate an error.

CAUTION

The following test is destructive to data on the Cartridge Tape.

31   Write, read, and verify the CRC on all tracks of the Cartridge Tape.

Available Tests In Extended Memory

When the MP displays [0699], any of the following tests may be run by typing **<s>**, the appropriate number, and pressing **<Return>**.

NOTE: Extended Memory tests may be run any time after test 0316 (set system configuration) has been run. If test 0316 has not run since the system was last booted, the system will not know whether to run the 1.1MB tests, the 1.6MB tests, or the 3.6MB tests.

0 All Single Bit Error Tests

1 Fast Single Bit Error Tests

2 All Double Bit Error Tests

3 Fast Double Bit Error Tests

4 Trap/ECC (Single Bit) Error Tests

5 Refresh (Single Bit) Error Tests

Available Tests in EI Disk Microcode

When the MP displays [9799], any of the following tests may be run by typing **<s>**, the appropriate number, and pressing **<Return>**.

0   Ready Test on ST506 drives

1   Index Test on ST506 drives

12   ST506 Quick Test (ready and index timing)

13   ST506 Long Test (ready, index timing, seek/read/verify, and DIP Switch Test)

15   Disk Seek Test on ST506 drives

35   ST506 DIP Switch Test

CAUTION

The following tests are destructive to data on the rigid disk.

5   Data ones wrap around test on ST506 drives

6   Data zeros wrap around test on ST506 drives

The Low Capacity Disk Diagnostics is a standalone, off-line diagnostic. The Low Capacity Disk Diagnostics verify proper operation of the rigid disk hardware and isolate rigid disk hardware problems.

Different Low Capacity Disk Diagnostic test selections with various capabilities are provided for the Systems Analyst and Service Representative. Both levels require passwords to use their respective tools.

NOTE: The Service Representative password is cixcos and the Analyst password is wizard.

The Technical Support level of Low Capacity Disk Diagnostics includes the following selections:

Boot
Disk Exerciser
Display Disk Info
Fault Analysis
Isolation Tools
List Bad Pages
Media Scan
Quit
Verify PV

The Systems Analyst has access to a set of potentially destructive tools which are not normally available to the Service Representative. These destructive tools, which post warning messages, require double confirmations before execution.

■Destructive Scan, New Disk Checkout, and in some cases, the Verify PV programs, use the time-of-day to create a unique universal ID for the physical volume. When selecting the Low Capacity Disk Diagnostics from the Tape/Network Executive menu, the system will ask for the date and time if they are not already entered. Always run Boot Diagnostics prior to entering the Low Capacity Disk Diagnostics. Boot Diagnostics verifies the hardware prior to running any Low Capacity Disk Diagnostic tests.■

CAUTION

The Systems Analyst tests can be destructive to customer files. These tests should only be used when specifically instructed to do so. Service Representatives should only run Analyst tools when directed to do so by the service manual procedures.

■The Systems Analyst level includes 10 additional selections:

Change Disk Description
Destructive Exerciser
Destructive Scan
Fix Header
Format
Manual Entry
New Disk Checkout
Reconstruct BPT
Show FirstLVPage
Test Bad Pages■

Rigid Disk Physical Volume

■The size and capacity of the rigid disk drive depends on the number of platters and read/write heads. Each platter is divided into tracks and sectors. A track, which is divided into sectors, is a circular tracing on a platter formed by the read/write heads. The same track on each platter defines a cylinder. A page corresponds to a particular cylinder, head, and sector of the rigid disk drive.■

Each rigid disk contains a physical volume with one or more logical volumes. The physical volume contains Pilot data structures required for the system to function. These are the physical volume root page, the bad page table, the duplicate root page, and the data lost table. All are on the first cylinder (Cylinder 0) of the drive (Figure 5-1). Cylinder 0 is guaranteed error-free from the vendor.

Figure 5-1. Cylinder 0 on the Physical Volume

- The physical volume root page resides on Page 0. It contains information about the physical volume and the logical volumes contained on the disk.

- The bad page table is located on Pages 1, 2, 3, and 4. It can contain up to 512 bad pages. A bad page on Cylinder 0 cannot be entered into the Bad Page Table. Therefore, if Cylinder 0 contains a bad page that cannot be repaired by the Test Bad Pages program or by installing software, the drive must be replaced.

- A duplicate physical volume root page resides on Cylinder 0. It is an exact copy of the physical volume root page on Page 0.

  NOTE: On High Capacity disks, it is on Page 59. On Low Capacity disks, if there are two heads, its location is the first sector and first track of Cylinder 1. If there are more than two heads, its location is the first sector and last track of Cylinder 0.

- The location of the data lost table immediately follows the duplicate root page location. It is four pages in length and can contain up to 510 data lost pages. These lost pages are automatically entered by Disk Diagnostics.

- The SDD (self describing disk) page is located on Page 14 of Cylinder 0. It is one which has its type and parameters written on the disk in a special sector called the disk shape sector. This allows the use of a variety of different rigid disks. In order to be used, the SDD page must meet the following conditions:

- The disk must be formatted.

- The disk SDD page must be readable.

- The SDD page data must be valid.

Rigid Disk Page Structure

Each page (sector) on the rigid disk consists of a header, a label, and a data field. These fields are written on the disk in a sequenced order of header, label, and data fields. Each field occupies a set amount of space for each page (sector).

The header describes the location information with reference to cylinder, head, and sector.

Labels physically exist on the 8090 rigid disks but are not used.

The data field contains the client data (user data, system software, etc.).

Rigid Disk Logical Volumes

Logical volumes also contain critical data structures for Pilot to function. They are the logical volume root page and the marker page. Other structures in the logical volume include the VAM (volume allocation map), the "ETableFiles," and the scavenger log.

- The logical volume root page resides on the first page of the logical volume (FirstLVPage). It contains information about the logical volume and its layout.

• The logical volume marker page resides on the last page of the logical volume. It contains additional information about the logical volume root page.

• The VAM and the scavenger log resides at the beginning of the logical volume. The VAM lists the logical volume pages that are used and those that are free. The scavenger log is used to verify problems.

• The "ETableFiles" resides at the middle of the logical volume. One is a primary file, which describes how files are layed out on the logical volume. The other file is a copy of the primary file.

The rigid disk is partitioned into Logical Volumes. Logical Volumes are the logical structuring of the media into specific categories such as Backstop, System, and User Areas. The boundaries for these volumes are predetermined by software and they are set when the disk is partitioned (Table 5-1).

■Table 5-1. 8090 Rigid Disk Layout■

Server	Initial Microcode	Backstop	System	User
25MB	0000-0063	0064-10564	10565-17565	17566 +
85MB	0000-0127	0128-10628	10629-20629	20630 +

Loading the Low Capacity Disk Diagnostics

The EI Disk Diagnostics test the rigid disk drive, the rigid disk controller on the HSIO PWB, and the ability of the rigid disk drive to communicate with the processor. The tests run on the rigid disk are in the 9700-9799 (microcode tests) and the 1600-1799 (Mesa tests) series.

The Low Capacity Disk Diagnostics are loaded using a cartridge tape. It has a menu-driven user interface which requires minimum typing input. Explanations are provided at all selection points when you type **<?>**.

Processor = 8003700XXXXX = 2000067000XXXXX = 8-797-015-XXX-XXX
Memory Size = 1152 Kbytes

Choices Available:
1   Help
2   LowCapacityDiskDiagnostics
3   CartridgeTapeDiagnosticsAndUtilities
4   HighCapacityDiagnosticsAndUtilities
Enter choice number, then press Carriage Return: **2 <Return>**

Figure 5-2.   EI Disk Diagnostics Menu

1. Insert the 8090 Server Diagnostics Cartridge Tape into the cartridge tape drive.

2. Perform an Alternate Boot 0002 (Cartridge Tape Drive Boot) or an Alternate Boot 0003 (Ethernet Boot).

3. Type **2** and press **<Return>** to select the Low Capacity Diagnostics.

4. Ensure that the system is in the EI Disk test with the prompt " **>** " appearing on the display. The MP Code should display [*XX*99].

5. Type **Logon** and press **<Return>**.

6. When requested, type the user name **Xerox** and press **<Return>**.

7. When requested, type the appropriate password and press **<Return>**.

8. Run any test by typing the name of the test and pressing **<Return>**.

To stop a test in progress, press **<BREAK>**. *STOP key acknowledged* appears on the display. If the disk is performing an operation, the program will complete that operation before returning control to you.

After selecting Low Capacity Disk Diagnostics, Fault Analysis and Media Scan are automatically run. If new bad pages are found, they will be listed.

Running on a 5 inch 85 Megabyte Rigid Disk.

> Fault Analysis
MP code: 5799
Examining physical volume
First page of Logical volume is 128.
> Media Scan
> List New Bad Pages
No new pages

Successful completion
>

Figure 5-3.   Fault Analysis and Media Scan

Boot

This command is available to the Service Representative and the Systems Analyst. It simulates the pressing of the Boot Reset button on the processor.

Disk Exerciser

This command is available to the Service Representative and the Systems Analyst. It detects intermittent disk errors, but does not perform any fault isolation. It is an exerciser program which produces its results in the form of an error log. Each pass consists of a series of reads to random disk locations interspersed with non-destructive writes and reads on the diagnostic cylinder. This command includes the non-destructive write portion of the test only if it considers such a test to be low risk. If the command determines the risk is too great, it will display the message *Writing disabled due to excessive risk.*

```
> Disk Exerciser  < Return >
Pass Count (1-1000): 10  < Return >

   Successful
page accesses / seeks  Page  Cyl Hd Sec  Error status  Soft/Hard
   before error
   61833/1287

0 Total Soft Errors
0 Total Hard Errors
>
```

Figure 5-4.   Disk Exerciser

Disk Exerciser Messages

The *successful ... before error* field is provided so that you can determine the percentage of disk operations that are failing. This field is also updated frequently to give an indication of progress. The location of the error is given both as a page number and as a [cylinder, head, sector] disk address. If the error occurred on the diagnostic cylinder, the cylinder field of the disk address will read *"dia."* The error status field can have one of the following values:

Data CRC: Cyclic Redundancy Check (CRC) error on the data field
Data verify: Verify error on the data field
Header CRC: CRC error on the header field
Header verify: Verify error on the header field
Label CRC: CRC error on the label field
Label verify: Verify error on the label field
Overrun error: The processor is unable to keep up with the disk
Recal error: A recalibrate command failed
Seek timeout: The disk is unable to complete a seek command
Unknown: Error does not fall into one of the above categories
Wrong cylinder: Seek error
Wrong head: Head select error
Wrong sector: Wrong sector selected

If the possibility exists that the error may be caused by the write circuitry, the error status will be appended with *"(W)."* Suspect the write circuitry only if all of the errors appear with this appendage.

The *soft/hard* field indicates whether or not the error was recoverable. If the error was recoverable (soft), two numbers appear separated by a colon. The first number indicates the retry attempt which was successful. The second number indicates the maximum number of retries allowed for the given type of error. If the error was not recoverable, only the second number appears.

Display Disk Information

This command is available to the Service Representative and the Systems Analyst. It displays information about the rigid disk.

```
> Display Disk Info  < Return >
Disk Information
    Disk Type: 85MB M1325
    Number of Cylinders: 1024
    Number of Heads: 8
    Number of Sectors per Track: 16
    Pre Comp Cylinder: not applicable
    Reduced Write Current Cylinder: not used
    Head Landing Zone: Automatic
    Drive Motor Type: Voice Coil
    Drive RPM: 3600
>
```

Figure 5-5. Display Disk Information

Fault Analysis

NOTE: This command is also invoked as part of the Boot Diagnostic sequence (see Boot Diagnostics).

This command is available to the Service Representative and the Systems Analyst. It detects and isolates hard disk errors. To select all the tests, press **< Return >**. For additional troubleshooting, *loop until error* may be selected. Individual tests may also be run. To display the list of available tests, type **< ? >** and press **< Return >**. To run an individual test, type in the appropriate test number and press **< Return >**.

If a test runs successfully, the program will ask whether to loop until it finds an error. If you type **< y >**, the program will run the test again until either it finds an error, or until you press **< BREAK >**.

If a test fails, the program will ask whether to loop on that error. If you type **< y >**, the program will loop until either the error no longer exists, or until you press **< BREAK >**.

> **Fault Analysis** **<Return>**
Enter Test Code (10-150): **<Return>**
Test MP code: XX99
Loop until error (Y/N): **Y** **<Return>**
Successful code: XX99
>

Figure 5-6. Fault Analysis

Isolation Tools

This command is available to the Service Representative and the Systems Analyst. It consists of a set of troubleshooting tests used to assist in fault isolation.

> **> Isolation Tools < Return >**
> Isolation Tool
> 1   Direction
> 2   Drive Select
> 3   Head Select
> 4   Step Pulse
> 5   Exit
> Enter choice number:__

Figure 5-7.   Isolation Tools

These tools allow the Service Representative to send signals to the drive. The signal can be sent as a static signal (unchanging) or a dynamic signal (toggling active/inactive). The step pulse tool can only send dynamic signals.

> **Isolation Tools** < **Return** >
    Isolation Tool
    1   Direction
    2   Drive Select
    3   Head Select
    4   Step Pulse
    5   Exit
    Enter choice number:__3 < **Return** >
Head select line
    1   One
    2   Two
    3   Four
    4   Eight
    5   Sixteen
    Enter choice number:__ 1 < **Return** >
    Signal state
    1   Static
    2   Dynamic
    Enter choice number:__ 2 < **Return** >
Frequency (ms) (1-10000):__ 499 < **Return** > *(1 second)*
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!

Figure 5-8. Sending Signals to the Drive

For dynamic signals, the program will provide
feedback at every low to high transition. If the
specified frequency is greater than or equal to 500
milliseconds, the feedback will be auditory.
Otherwise, the feedback will be visual (an
exclamation point displayed on the screen). Either
form of feedback is acceptable. In no case should
the user assume that the signal will be at the exact
frequency specified. The frequency values are all
relative. That is, in the above example, you can
expect to see the head select 1 line to oscillate
roughly once every second.

When sending dynamic signals, the tool will loop
indefinitely until you press **<BREAK>**. However,
the step pulse tool will only send step pulses up to
a certain limit (this is to prevent damage to the disk
drive). When stepping outward, the tool will stop
and display the message *At cylinder 000* when the
arm is positioned at the outermost cylinder. Use of
the tool for inward seeks should be done carefully
since there is no signal indicating when the arm is
positioned at the innermost cylinder.

List Bad Pages

The *Bad Page Table* is a data structure on the rigid disk containing the page numbers of pages which have, or are suspected to have, media defects. This table is initialized by manufacturing. In the discussions which follow, reference is made to an *internal bad page table*. This table is a temporary data structure that the EI Disk Diagnostic Test uses to track information about bad pages. It exists only during an EI Disk session.

This command is available to the Service Representative and the Systems Analyst. It describes the pages that the utility has entered into its internal bad page table. Pages are internally logged if they are in the bad page table or if they are scanned bad (both soft and hard errors) during a Media Scan (Technical Support privileges) or a Destructive Media Scan (Systems Analyst privileges).

The Bad Page Table is displayed when the List Bad Pages command is invoked. The columns for the List Bad Pages command are described below.

BPT Indicated by an *X* if the page is in the Bad Page Table (BPT) on the disk. Pages that have been entered into the Bad Page Table previously or during the current EI Disk session will appear in this column.

Hard---Soft Totals are kept on all CRC errors based on the hardness of the read errors. The columns indicate, respectively, the number of hard errors, almost-hard errors, and soft errors. Hard errors result when all read retries exceed the preset threshold value. Soft

read errors are those with less errors than the preset threshold value.

Page The page number of the bad page.

Cyl Hd Sec The disk address of the bad page (Cylinder, Head, Sector).

Area The field in which the first CRC error occurred. It can be either Header, Label, or Data. If the page was never scanned bad during the current El Disk session, this field will be blank.

Volume The logical volume containing the bad page. If the page does not reside in a logical volume, the physical volume is given. If El Disk does not know the state of the physical volume, *Unknown* appears. If no volumes exist, the field will be blank.

M S This field indicates the reason why the bad page is in the Bad Page Table. An *X* beneath the *M* column indicates the page is in the Bad Page Table because the user (*M*)anually entered it during this session using the Manual Entry command. An *X* beneath the *S* column indicates the page is in the Bad Page Table because it was (*S*)canned bad and the user elected to mark it bad with the Mark Bad subcommand of the Test Bad Pages command. A hyphen (–) indicates that a page is not in the Bad Page Table (i.e., a page that is scanned bad but not currently entered as bad). A question mark (?) in this field indicates the reason is unknown.

An example of a List Bad Pages display, after a Media Scan of five total scans has completed:

> **List Bad Pages <Return>**
> *BPT...Hard---Soft ....Page ....CylHdSec....Area...Volume ....MS*
>
> *X 0   0   0 .... 5....   0001 01 15 ....   Services....?*
> *X 0   0   0 .... 5....   0001 01 15 ....   Services....?*
> *X 0   0   0 .... 5....   0001 01 15 ....   Services....?*

Figure 5-9.   List Bad Pages

Media Scan

This command is available to the Service Representative and the Systems Analyst. It will scan the entire disk a user-specified number of times. In addition, you also specify the retry count. Those pages with read errors (whether hard or recoverable) are entered in a temporary internal bad page table which is displayed at the completion of the desired scans.

```
> Media Scan < Return >
     Pass count (1-1000):_5 < Return >
     Retry count (0-20):_2 < Return >

  Successful
page accesses / seeks  Page  Cyl Hd Sec  Error status  Soft/Hard
  before error
        0/0         00000       00 00 Header CRCSoft 01:02
        1339/10     13400010 03 12 Data CRC     Hard:02
     122879/960     13400010 03 12 Data CRC     Hard:02
     122879/960     13400010 03 12 Data CRC     Hard:02
     122879/960     13400010 03 12 Data CRC     Hard:02
     122879/960     13400010 03 12 Data CRC     Hard:02
>
```

Figure 5-10.   Media Scan

Quit

This command is available to the Service Representative and the Systems Analyst. It is the proper way to terminate the program before powering off the system. It terminates the program without causing a boot operation. It also moves the disk stepper arm to the diagnostic cylinder so that power off "glitches" will not harm critical data on the disk.

Verify PV

This command is available to the Service Representative and the Systems Analyst. It verifies the integrity of the physical volume. If the physical volume is inconsistent, you will be asked to confirm whether or not the physical volume is to be scavenged at this time. A physical volume needs to be scavenged either because 1) it is broken, or 2) it requires forward conversion. This command will attempt to determine the reason. If the reason is (1), the command initiates the scavenge. If the reason is (2) or indeterminate, then the command displays an appropriate warning message and requests further confirmation before initiating the scavenge.

The following messages may appear:
Drive not ready
Disk read error
Physical volume needs scavenging
Physical volume needs forward conversion
Physical volume may need forward conversion
Please reconstruct bad page table
Please re-install software
Attempting safe repair
Attempting risky repair
Internal structures repaired
Physical volume has irreparable damage

Change Disk Description

This command is available to the Systems Analyst. It rewrites the SDD (self describing disk) page. It should only be used when the disk type is known. If this command is used and the SDD page is written with the incorrect disk type, the disk may have to be reformatted if other commands are run before the error is discovered.

> **Change Disk Description** **< Return >**
Warning: This command will destroy some of the contents of this disk.
    Are you sure you want to continue (Y/N): **Y** **< Return >**

Unable to obtain disk type information from the disk.

Please enter the correct type of disk.
Supported Disk Types:
1- 25MB ST225   4- 25MB ST4026
2- 25MB TM702   5- 85MB M1325
3- 25MB TM703   6- 85MB ST4096
Enter Number of Disk Type (1-6): **5** **< Return >**
    Disk Type: 85MB M1325
    Is this the correct disk type? (Y/N): **Y** **< Return >**
>

Figure 5-11. Change Disk Description

Destructive Exerciser

This command is available to the Systems Analyst. It is a destructive version of the Disk Exerciser. Whereas the Disk Exerciser restricts its writing to the diagnostic cylinder, thus making it non-destructive, this command writes to random locations on the disk. It is an exerciser program for detecting intermittent disk errors. It consists of writing and reading random data patterns on the label and data fields of random pages. After running this exerciser, run the New Disk Checkout or format the disk. You can specify the pass count. Output is similar to that of the Disk Exerciser.

```
> Destructive Exerciser  < Return >
Warning: This command will destroy the entire contents of this disk.
    Are you sure you want to continue (Y/N): Y < Return >
    Second confirmation required.  Continue (Y/N): Y < Return >
    Pass count (1-1000):__10 < Return >

    Successful
page accesses / seeks  Page  Cyl Hd Sec  Error status  Soft/Hard
    before error
            0/0          0  0000 00 00Header CRC  Soft 01:02
          1339/10      13400010 03 12 Data CRC     Hard:02
        122879/960     13400010 03 12 Data CRC     Hard:02
        122879/960     13400010 03 12 Data CRC     Hard:02
        122879/960     13400010 03 12 Data CRC     Hard:02
        122879/960     13400010 03 12 Data CRC     Hard:02
>
```

Figure 5-12. Destructive Exerciser

Destructive Scan

This command is available to the Systems Analyst. It is a destructive version of the Media Scan. You can specify the pass and retry count. Each pass writes and reads a series of fixed data patterns on the label and data fields of all pages. After running this test, run the New Disk Checkout or format the disk. Output is similar to that of the Media Scan.

> **>Destructive Scan <Return>**
> Warning: This command will destroy the entire contents of this disk.
>   Are you sure you want to continue (Y/N): **Y <Return>**
>   Second confirmation required. Continue (Y/N): **Y <Return>**
>   Pass count (1-1000):__**10 <Return>**
>   Retry count (0-20):__**2 <Return>**
>
>   Successful
> page accesses / seeks Page Cyl Hd Sec Error status Soft/Hard
>   before error
>   0/0   0 0000 00 00Header CRC Soft 01:02
>   1339/10   13400010 03 12 Data CRC   Hard:02
>   122879/960   13400010 03 12 Data CRC   Hard:02
>   122879/960   13400010 03 12 Data CRC   Hard:02
>   122879/960   13400010 03 12 Data CRC   Hard:02
>   122879/960   13400010 03 12 Data CRC   Hard:02
> >

Figure 5-13. Destructive Scan

Fix Header

■This command repairs broken headers and is available to the Systems Analyst. The primary intent of this command is to clear *Fatal Error: Microcode problems*.

Run the PV (Physical Volume) Scavenger command before and after running the Fix Header command. Information regarding the PV Scavenger is in Section 10 of this handbook.

Use the Test Bad Pages command to fix a CRC error in the Header area. If the CRC error *still* exists, use the Fix Header command. The Fix Header command will reformat the entire track. Repairing a header on a soft sectored disk may require reformatting the corresponding track. An option is available to save the data on the page/track before rewriting the header. If the save option is selected, the command will post the result of the save attempt and request confirmation before initiating the repair.■

> Fix Header < Return >
Page number (0-XXXXX): **11936 < Return >**
Save the contents of that page (Y/N): **Y < Return >**
Warning: This command will destroy some of the contents of this disk
Are you sure you want to continue (Y/N): **Y < Return >**
Second confirmation required. Continue (Y/N): **Y < Return >**
Header repaired...Data saved

Figure 5-14. Fix Header

Format

■This command is available to the Systems Analyst and performs the following functions:

- writes the header, label, and data fields of all pages (although Pilot does not use the labels)
- creates a physical volume (this command does not create logical volumes)
- allocates disk space for the bad page table

This command exercises the entire disk. If any hard errors are encountered on cylinder 0 (which is required to be error free), they are reported and the command refuses to initialize the physical volume. You are notified if any soft errors are encountered. You are given the option to save and restore the previous bad page table. You are given the option to reconstruct the bad page table if the previous bad page table is not restored.■

> Format < Return >
Warning: This command will destroy the entire contents of this disk
Are you sure you want to continue (Y/N): **Y** **< Return >**
Second confirmation required. Continue(Y/N): **Y** **< Return >**
Disk Type: 85MB M1325
Is this the correct disk type (Y/N): **Y** **< Return >**
How many times? NOTE: Each time is equal to 10 write/verify passes
(1-32767): **1** **< Return >**
Do you wish to restore the old bad page table (T/N): **Y** **< Return >**
Format Analysis
MP Code: XX99
Formatting Disk

Figure 5-15. Format

Manual Entry

CAUTION

Pages containing customer data should be marked bad only as a last resort. There currently is no non-destructive way of removing a page from the bad page table.

This command is available to the Systems Analyst. It allows you to manually enter pages into the bad page table. The pages can be in any of the following formats:

• Page number
• Disk address [Cylinder, Head, Sector]
• Error map [Cylinder, Head, Byte-offset, Bits] (always 16 Bits)

An error map is attached to every rigid disk received from the manufacturer. The map lists those locations where the manufacturer, with its testing, believes media defects exist.

> **Manual Entry** < **Return** >
Bad spot format
1   Page number
2   Disk address
3   Error map
4   Exit
Enter choice number: **1** < **Return** >
To terminate manual entry, backspace over default and type < CR >
Page Number(0-122751): **19900** < **Return** >
[19900]   Confirm (Y/N): **Y** < **Return** >
Done

Figure 5-16.   Manual Entry

New Disk Checkout

CAUTION

This command should only be used to check disks which do not contain Bad Page Tables.

NOTE: If a disk does not have the Xerox BPT, it is assumed that it is not formatted.

This command is available to the Systems Analyst. The first phase of this command file is a test that detects and isolates hard errors. Its operation is very similar to that of Fault Analysis. It assumes the disk has never been successfully formatted.

The second phase consists of writing and verifying the label and data fields of all pages. The output is similar to that of the other exerciser programs (see Disk Exerciser and Destructive Scan).

The third phase of the command file consists of running Destructive Exerciser. Next, the Bad Page Table should be constructed.

If you have selected to reformat the disk, then the last phase runs Format.

> **New Disk Checkout < Return >**
Do you wish to reformat the disk (Y/N): **Y < Return >**
Warning: This command will destroy the entire contents of this disk
Are you sure you want to continue (Y/N): **Y < Return >**
Second confirmation required. Continue(Y/N): **Y < Return >**

Figure 5-17. New Disk Checkout

Reconstruct BPT

This command is available to the Systems Analyst. It completely erases the disk Bad Page Table and creates a new one. It is intended for those instances when you are advised by a different command to reconstruct the bad page table. This command operates in both a destructive and non-destructive mode. In the destructive mode, the command destroys the previous contents of the disk and reconstructs the bad page table from scratch. In the non-destructive mode, the command has a misleading name since it merely appends to the existing bad page table. No overwriting of the disk contents is done.

If the state of the physical volume is inconsistent and irreparable, the command will automatically enter destructive mode. Otherwise, it will ask whether you wish to run the command in the destructive or non-destructive mode.

The command will give the option to run **Media Scan** (destructive or non-destructive, depending on the mode). If any new potential bad pages appear during the scan, you are given the option to run **Test Bad Pages**. Finally, you are given the option to run **Manual Entry**.

> **>Reconstruct BPT <Return>**
Destroy the contents of this disk (Y/N): **Y <Return>**
Warning: This command will destroy the entire contents of this disk
Are you sure you want to continue (Y/N): **Y <Return>**
Second confirmation required. Continue(Y/N): **Y <Return>**

Figure 5-18.   Reconstruct BPT

Show First LV Page

This command is available to the Systems Analyst. It lists the first page of the first logical volume if it is known. If there are no logical volumes (because the disk has not been partitioned), then this command will respond that the first page of the logical volume is unknown.
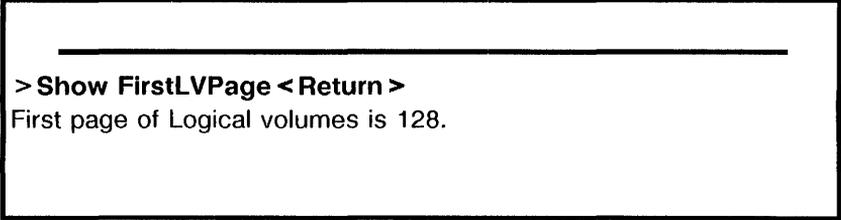
> Show FirstLVPage < Return >
First page of Logical volumes is 128.

Figure 5-19.   Show FirstLVPage

Test Bad Pages

This command is available to the Systems Analyst. It allows you to individually exercise the new potential bad pages found during a media scan. A page is considered new if it is not in the Bad Page Table. By using the Scan and Repair subcommands, you can determine which of the following causes is responsible for the read (CRC) errors:

- The page has a media defect.

- The page was written incorrectly or modified unintentionally. This is due to either bad hardware or magnetic interference.

- The disk wrote the data off-track. This is due to bad hardware.

In theory, new pages with media defects should almost never appear once the bad page table has been initialized by manufacturing. In practice, however, this appears not to be the case.

Pages which have media defects may be marked bad using the **Mark Bad** subcommand. Pages which do not have media defects may be repaired in preparation for a scavenger program.

Scan

This sub-command allows you to scan the individual page. It reports the frequency of hard errors, almost-hard errors (within two retries of being declared hard), soft errors, and successes. You use this sub-command, first, to determine the

hardness of the error. If the hardness satisfies a given criteria, you may decide to attempt a repair. In this case, you invoke this sub-command after the attempted repair to evaluate its success. If this subsequent scan fails a given criteria, you should enter the page into the bad page table using the **Mark Bad** sub-command.

The criteria should be based on vendor recommendations and field experience. However, you should also consider other factors such as the machine bad page history and operating environment.

Repair

This sub-command allows you to attempt to repair the page. It is also used to help determine the source of the read errors. The sub-command performs differently depending on whether the CRC error is in the header, label, or data field. Note that when rewriting a field, all subsequent fields of the page will also be rewritten (this is a hardware requirement). Hence, if the label field is rewritten, the data field will also be rewritten but the header field will remain intact.

If the CRC error is in the **header** field, the page (or corresponding track) must be rewritten to effect repair. Before attempting the repair, the sub-command will attempt to save the contents of pages which will be overwritten. If all readable pages could not be saved on the diagnostic cylinder, the sub-command will prompt for double confirmation. After attempting the repair, one of the following messages will appear. The *Data saved* result

indicates that all *readable* data was successfully restored.

Header repaired...Data saved

Header repaired...Data lost

Header not repaired...Data saved

Header not repaired...Data lost

The Repair sub-command also has another application. Pages with bad header fields can cause problems in scavenger programs. The successful repair of these pages may allow the scavenger to complete its task.

For CRC errors in the **label** field, the Repair sub-command invokes the Pilot Page Scavenger. The scavenger presents the "Overwrite Page" prompt, but ignores the response. If the scavenger confirms the label CRC error, it will advise the user to run the physical volume scavenger.

For CRC errors in the **data** field, the repair sub-command invokes the Pilot Page Scavenger. The scavenger will attempt to save the given page and rewrite its data field. The scavenger presents the "Overwrite Page" prompt. The scavenger uses the response only if the label field indicates the page belongs to a "client" file and the data field is unreadable. Otherwise the scavenger ignores the response and always overwrites the data field. In fact, it will overwrite the data field even when it appears that overwriting is not necessary (that is, the page was successfully read on the first attempt). When rewriting the data field, the scavenger writes whatever it read, even if the result was a CRC error.

Status is the result of the first attempt of a [verify header, read label, read data] operation on the given page. It does not reflect the success of any subsequent retry operations. Note that the values of Status do not necessarily have the same semantics as those returned by other EI Disk commands. *Good Completion* implies the operation was successful. *Data Error* indicates the occurrence of a CRC error on the data field of the given page.

Action

Action is what you should do to complete the repair of the page.

- "Fix Data CRC Error" implies that a data CRC error occurred on a "client" file page and the Overwrite Page option is not enabled.

- "Fix Hardware" indicates that the occurrence of an unexpected error or the attempted repair failed.

- "Boot" implies that the user should boot the logical volume containing the given page.

- "lv Scavenge" implies that the user should run the logical volume scavenger on the logical volume containing the given page.

- "pv Scavenge" indicates that the user should run the physical volume scavenger. If it reports no problems, then it is necessary to run the logical volume scavenger on the logical volume containing the given page.

"Contents Reliable" is equivalent to the boolean expression, (Status = good Completion). That is, if this result is TRUE, then the data field of this page was successfully read on the first attempt.

The other result parameters [File, File Page and File Type] are not intended for general use and may be ignored.

For label and data CRC errors, the **Repair** sub-command displays either *Page repaired* or *Page not repaired*. It indicates whether the page is now readable or not. Note that it does not indicate whether the page contains valid data. The **Action** result must be taken in order to make the page contain valid data.

Mark Bad

This sub-command allows you to enter the page into the bad page table. It has the same effect as the **Manual Entry** command. It prompts for confirmation.

Next Page

Next Page allows you to proceed sequentially by increasing the page number to the next qualified page in the internal bad page table. A page is qualified if it was scanned bad at least once and is not in the bad page table.

Use the following guideline for processing potential bad pages. If a page has any hard or soft errors, proceed directly to the repair phase. Otherwise,

invoke the **Scan** sub-command with a pass count of at least 100 and a retry count of 10. If the scan has only soft errors and their percentage is less than 5%, ignore the page. Otherwise, invoke the **Repair** sub-command with the overwrite option enabled. If the result is *Page not repaired*, mark the page bad. If the result is *Page repaired*, invoke the **Scan** sub-command with a pass count of at least 200 (the retry count is unimportant). If any errors occur, mark the page bad. Finally, perform whatever actions the page scavenger lists.

Notes:

6.

CARTRIDGE TAPE DIAGNOSTICS

The Cartridge Tape Diagnostics is a standalone, off-line diagnostic. The Cartridge Tape Diagnostics verify proper operation of the cartridge tape hardware, and isolate cartridge tape hardware problems.

Three levels of repair are provided. The first level is the MP Code, which points you to a FRU (Field Replaceable Unit). The second level is the Error Log, which contains the failing input/output commands and status. Finally, the third level is the Trace Table, which contains the sequence of the input/output commands executed when an error occurs.

Different Cartridge Tape Diagnostic test selections with various capabilities are provided for the Systems Analyst and Service Representative. Both levels require passwords to use their respective tools.

NOTE: The Service Representative password is **cixcos** *and the Systems Analyst password is* **wizard.**

The Technical Support level of Cartridge Tape Diagnostics includes the following selections:
   Utility Options
   Confidence test
   Tape Surface Verify
   Exerciser
   Display Options

■The Systems Analyst level includes four additional selections:

Write Known Data
Read Known Data
Command File Options
Subtest Options■

Loading the Cartridge Tape Diagnostics

The Cartridge Tape Diagnostics are loaded using a cartridge tape. It has a menu-driven user interface which requires minimum typing input. Explanations are provided at all selection points when you type **<?>**.

Processor = 8003700XXXXX = 2000067000XXXXX = 8-797-015-XXX-XXX
Memory Size = 1152 Kbytes

Choices Available:
1 Help
2 LowCapacityDiskDiagnostics
3 CartridgeTapeDiagnosticsAndUtilities
4 HighCapacityDiagnosticsAndUtilities
Enter choice number, then press Carriage Return: **3 <Return>**

Figure 6-1. El Disk Diagnostics Menu

1. Insert the 8090 Server Diagnostics Cartridge Tape into the cartridge tape drive.

■2. Perform an Alternate Boot [0002] (Cartridge Tape Drive Boot).■

3. Type the number corresponding to the Cartridge Tape Diagnostics and Utilities and press **< Return >**.

4. Type the number corresponding to the desired "Person Running the Test" and press **< Return >**.

5. When requested, type the appropriate password and press **< Return >**.

6. Type the number corresponding to the desired test and press **< Return >**.

To stop a test in progress, press **< BREAK >**. *STOP key acknowledged* appears on the display. If the disk is performing an operation, the program will complete that operation before returning control to you.

Cartridge Tape Layout

A standard cartridge tape is made up of 12 logical data streams. The logical data streams are recorded on the tape in a serpentine manner (Figure 6-2).

BOT ———————————————————————————— **EOT**
Forward direction of tape travel →

Stream 1 ——————————————————————— →
Stream 7 ——————————————————————— →
Stream 2 ——————————————————————— ←
Stream 8 ——————————————————————— ←
Stream 3 ——————————————————————— →
Stream 9 ——————————————————————— →
Stream 4 ——————————————————————— ←
Stream 10 ——————————————————————— ←
Stream 5 ——————————————————————— →
Stream 11 ——————————————————————— →
Stream 6 ——————————————————————— ←
Stream 12 ——————————————————————— ←
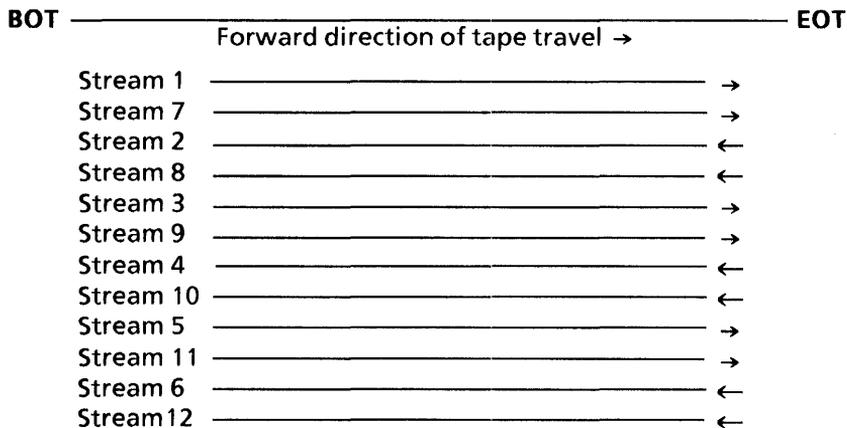
Figure 6-2. Serpentine Recording Method

Each stream is divided into 255 logical tracks. Each logical track is divided into 32 sectors (pages).

The first logical track (Track 0) of each stream is reserved for the Bad Sector (Page) Table and Diagnostics. A bad page on Track 0 cannot be entered into the Bad Sector Table; therefore, if Track 0 contains a bad page that cannot be repaired by the Scavenge Tape Utility Option, the tape must be replaced.
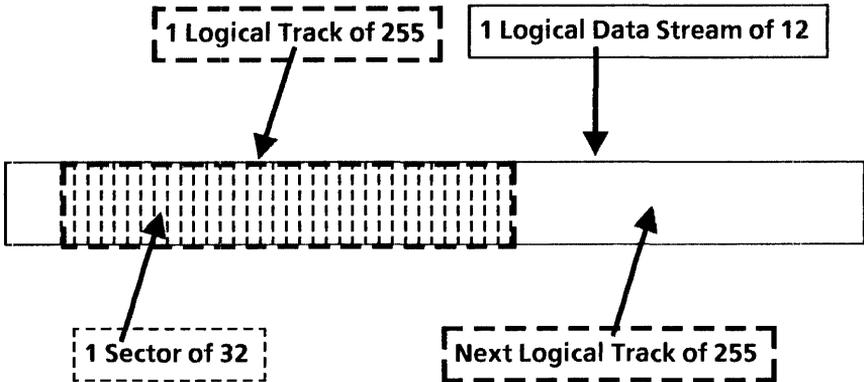
Figure 6-3. Tracks and Sectors on a Stream

Utility Options

The Utility Options are available to the Service Representative and the Systems Analyst. Pressing **< ? >** will provide an explanation of the options.
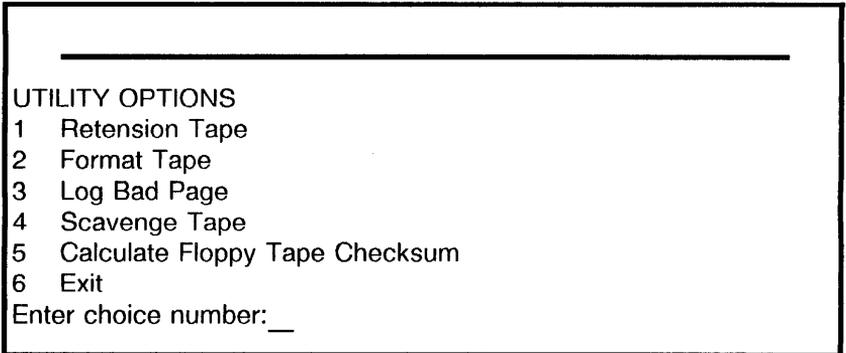
```
UTILITY OPTIONS
1   Retension Tape
2   Format Tape
3   Log Bad Page
4   Scavenge Tape
5   Calculate Floppy Tape Checksum
6   Exit
Enter choice number:__
```

Figure 6-4.   Utility Options

Retension Tape

A cartridge tape that is wound too tightly can create read errors on the tape or breakage of the tape. This utility resets the tension of the tape around the spools to the proper levels.

A tape should be retensioned:
- when it is new (the Format Utility resets the tension automatically)
- when it has been in storage
- after every eight hours of use

If a problem is encountered while this test is being run, the system will display *ERROR DETECTED* and an MP Code.

Total run time for one pass of Retension Tape is three minutes.

RETENSIONING TAPE

Passes to run:__ **1** **< Return >**

Total pass count: 1
Total run time: 3 min

SUBTEST:
Retension Tape

SUCCESSFUL COMPLETION
Type any character to continue:__

Figure 6-5. Retension Tape

Format Tape

A tape must be formatted when it is new. This command writes headers (streams, tracks and sectors) on the tape, similar to that of a floppy disk. Format ensures Track 0 is error-free, as this is the area used for the Bad Page Table. Bad sectors found during Format are automatically placed in the Bad Sector Table.

CAUTION

Formatting will destroy the contents of the tape cartridge.

After selecting this option, you will be asked to name the tape. Type in the name and press **< Return >**.

Formatting consists of three subtests: retensioning tape, formatting tape, and verifying format.

There are five errors that can be detected during this test:

Error Detected and an MP Code

Tape drive not ready

The tape cartridge is write protected

Hardware error

Bad tape

The total run time for one pass of Format Tape is 45 minutes.

FORMAT TAPE

WARNING! Formatting will destroy the contents of the tape cartridge.
Do you still wish to continue? (Yes/No): **Y** **<Return>**

Are you still sure? (Yes/No): **Y** **<Return>**

FORMAT TAPE

Please make the tape drive ready.
Type any character when this is done.__

Please enter the name of the tape. A 'RETURN' terminates the
entry.
>Tape Name <Return>

FORMAT TAPE
Total pass count: 1
Total run time: 45 mins

Figure 6-6.   Format Tape

Log Bad Page

When read errors are encountered, Tape Surface Verification should be run to identify new bad pages. These new bad pages need to be entered (logged) into the Bad Page Table. Using the Log Bad Page utility, the bad pages can be entered into the bad page table.

```
LOG BAD PAGE

Bad page number:__
Are you sure? (Yes/No): Y <Return>
More?  (Yes/No): No__
```

Figure 6-7.   Log Bad Page

Scavenge Tape

Scavenge Tape attempts to repair a broken file on the cartridge tape. If the scavenger completes sucessfully, *SUCCESSFUL REPAIR* will be displayed. If scavenge is unable to repair the file, *UNSUCCESSFUL REPAIR* will be displayed.

SCAVENGE TAPE

Running Scavenger
SUCCESSFUL REPAIR
Type any character to continue:__

Figure 6-8. Scavenge Tape

Calculate Floppy Tape Checksum

Calculate Floppy Tape Checksum reads all data on a tape and calculates a total value specific to that tape. This value can be compared against the result of subsequent runs of Calculate Floppy Tape Checksum to verify the integrity of the tapes contents. The odds are extremely high that a change in the tapes contents will affect its checksum value.

Calculate Floppy Tape Checksum incorporates all sectors on the tape into its checksum with the following exceptions:

● Sectors entered in the Bad Page Table

● Sectors beyond the end of data on the tape

● Diagnostic areas of diagnostic tapes

CALCULATE FLOPPY TAPE CHECKSUM

Floppy Tape Checksum = 56054
Type any character to continue:___
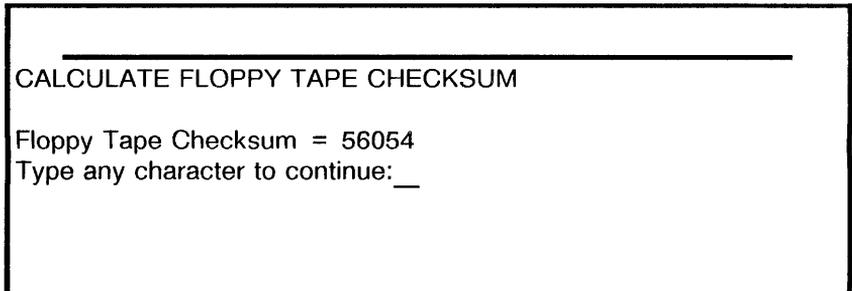
Figure 6-9.   Calculate Floppy Tape Checksum

Confidence Test

The Confidence Test is available to the Service Representative and the Systems Analyst. It is a thorough verification of the cartridge tape drive. This test looks for hard errors, hard read errors, and excessive soft read errors. This test should be run when any type of problem is suspected in the cartridge tape system.

CAUTION

This test requires the Diagnostic Cartridge Tape.

NOTE: This test requires a Diagnostic Tape Cartridge.
Any other tape cartridge will create erroneous results.

CONFIDENCE TEST

Passes to run: **1 < Return >**
Please insert a Diagnostic Tape Cartridge into the drive.
Type any character when this is done__

Total pass count: 1
Total run time: 25 mins

SUBTEST:
The title of each subtest is displayed on the screen.

Figure 6-10. Confidence Test

Tape Surface Verification

Tape Surface Verification is available to the Service Representative and the Systems Analyst. It evaluates how well the cartridge tape data can be read. It can also identify drives that are not reading correctly. This test reads all the data on the tape and accumulates the soft and hard read errors. Any time the test encounters a soft or hard read error, the error is displayed on the screen. When Surface Verification completes sucessfully, a summation of the errors is displayed on the screen. (Sectors containing read errors need to be entered into the Bad Page Table.)

SURFACE VERIFICATION

Please make the tape drive ready.
Type any character when this is done._

SURFACE VERIFICATION

Total pass count: 1
Total run time: 25 mins

SUBTEST:
Retention Tape
SUBTEST:
Surface verification stream 1...2...3...4...5...6...7...8...9...10...11...12

SUCCESSFUL COMPLETION
NO SOFT ERRORS DETECTED
Type any character to continue:_

Figure 6-11. Tape Surface Verification

Exerciser

The Exerciser is available to the Service Representative and the Systems Analyst. It does a thorough verification of the cartridge tape drive and cartridge tape controller by executing extensive read and write commands.

CAUTION

The Exerciser destroys the contents of the tape. Be sure to use a scratch tape.

This exerciser looks for hard errors and extensive read errors. It should be run after replacing a cartridge tape drive or the IOPB PWB to ensure that the new hardware will not destroy a good data tape. Any time the exerciser encounters a soft or hard read error, the error is displayed on the screen. When the Exerciser completes sucessfully, a summation of the soft errors is displayed on the screen.

EXERCISER

Passes to run:__

WARNING! The exerciser will destroy the contents of the tape.
Do you still wish to continue? (y/n): No__

EXERCISER

Total pass count: 1
Total run time: 25 mins

SUBTEST:
Retention Tape
SUBTEST:
The title of each subtest is displayed on the screen.

SUCCESSFUL COMPLETION

Type any character to continue:__
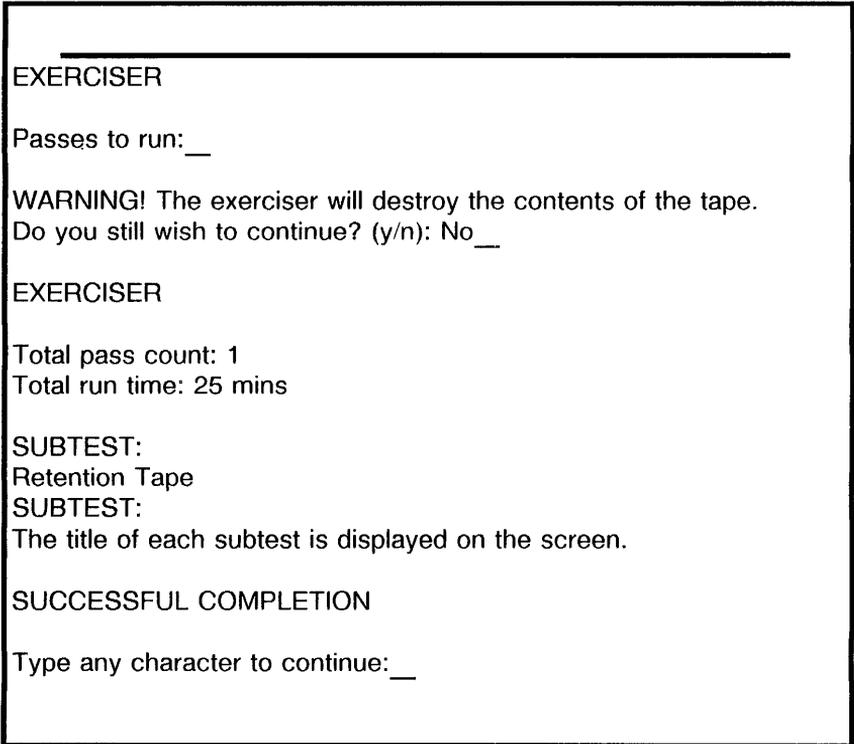
Figure 6-12.   Exerciser

Display Options

The Display Option are available to the Service Representative and the Systems Analyst. Pressing <?> will provide an explanation of the tests.

DISPLAY OPTIONS
1   Display Error Log
2   Display soft read errors
3   Display hard read errors
4   Display Trace Table
5   Display read ID buffer
6   Display Write Buffer
7   Display Read Buffer
8   Display Bad Page Table
9   Exit
Enter choice number:___
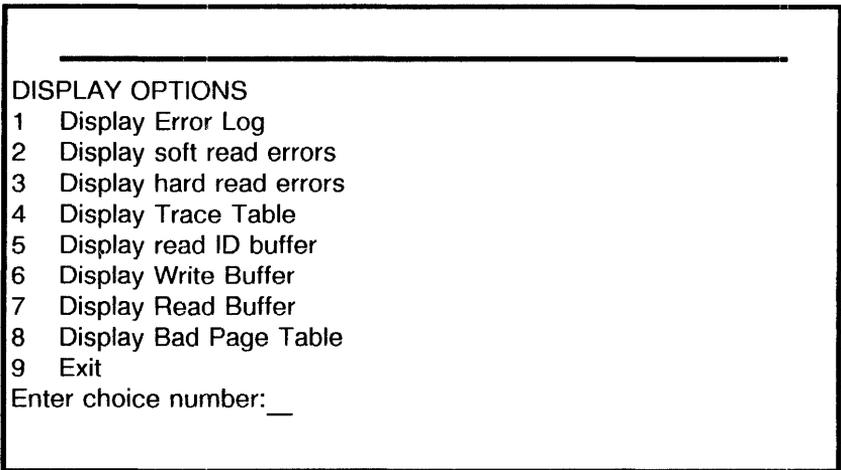
Figure 6-13.   Display Options

Display Error Log

The error log stores each read/write error in sequence. It is a tool to help isolate hardware problems. The error log can hold 64 errors. When the error log is full, it overwrites earlier errors and starts at the beginning again. Each log entry contains the IO command, all parameters for the IO command, and all the returned status parameters when the IO command fails. Each log also contains an entry count, a time stamp, a remaining pass count, and a subtest number.

ENTRY NUMBER:...12   Remaining pass count...1
Time: 13:04:35   Subtest number: 48

COMMAND:
ReadSector [track:1494, sector: 1, use single buffer (y/n): No,
sector count: 128, clear buffer first (y/n): Yes, verify read data (y/n):
yes, data type: diagnostic, try count: 1};
RETURNED PARAMETERS:
track: 1494, sector: 20, remaining sector count: 109,
times retried: 0
RETURNED STATUS: Data error
TOO MANY SOFT ERRORS IN SUBTEST

Type any character to continue:__

Figure 6-14. Display Error Log

After the first error log is displayed, typing any character will show another Display Options menu. From this Display Options menu, the entire Error Log can individually be displayed.
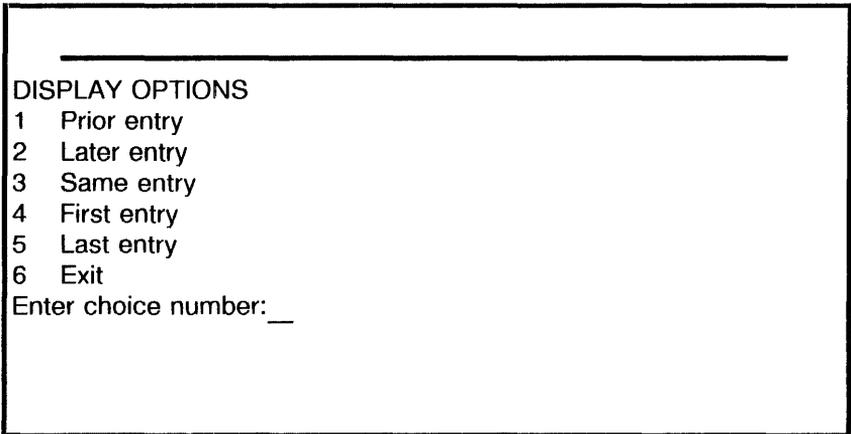
```
DISPLAY OPTIONS
1   Prior entry
2   Later entry
3   Same entry
4   First entry
5   Last entry
6   Exit
Enter choice number:__
```

Figure 6-15.   Display Option Entries

Display Soft Read Errors

This log allows you to analyse the soft read errors.

```
SOFT READ ERROR DISPLAY
Page: 14272, stream: 02, track: 201, sector: 01, times failed: 1
Page: 31472, stream: 05, track: 003, sector: 17, times failed: 2
Page: 38504, stream: 05, track: 223, sector: 09, times failed: 1
Page: 57728, stream: 08, track: 089, sector: 01, times failed: 1
Page: 88030, stream: 12, track: 055, sector: 31, times failed: 5
Type any character to continue:__
```

Figure 6-16. Display Soft Read Errors

Display Hard Read Errors

This log allows you to analyse the hard read errors.

```
HARD READ ERROR DISPLAY
Page: 14272, stream: 02, track: 201, sector: 01
Page: 31472, stream: 05, track: 003, sector: 17
Page: 38504, stream: 05, track: 223, sector: 09
Page: 57728, stream: 08, track: 089, sector: 01
Page: 88030, stream: 12, track: 055, sector: 31
Type any character to continue:_
```

Figure 6-17. Display Hard Read Errors

Display Trace Table

The trace table stores each IO command in the sequence that it was executed. It is a tool to help isolate hardware problems. The trace table can hold 64 entries. When the trace table is full, it starts at the beginning again, overwriting earlier error entries. Each table contains the IO commands, all parameters for the IO commands, and all the returned status parameters for the IO command. Each entry also contains an entry count, a time stamp, a remaining pass count, and a subtest number.

```
ENTRY NUMBER:...12              Remaining pass count...1
Time: 13:04:35                  Subtest number: 48

COMMAND:
ReadSector [track:1494, sector: 1, use single buffer (y/n): No,
sector count: 128, data type: constant, hex data: 0000, try count:1]
RETURNED PARAMETERS:
track: 1494, sector: 20, remaining sector count: 109,
times retried: 0
RETURNED STATUS: Data error
TOO MANY SOFT ERRORS IN SUBTEST

Type any character to continue:__
```

Figure 6-18.   Display Trace Table

After the first trace table is displayed, typing any character will show another Display Options menu. From this Display Options menu, the entire Trace table can individually be displayed.

DISPLAY OPTIONS
1   Prior entry
2   Later entry
3   Same entry
4   First entry
5   Last entry
6   Exit
Enter choice number:__
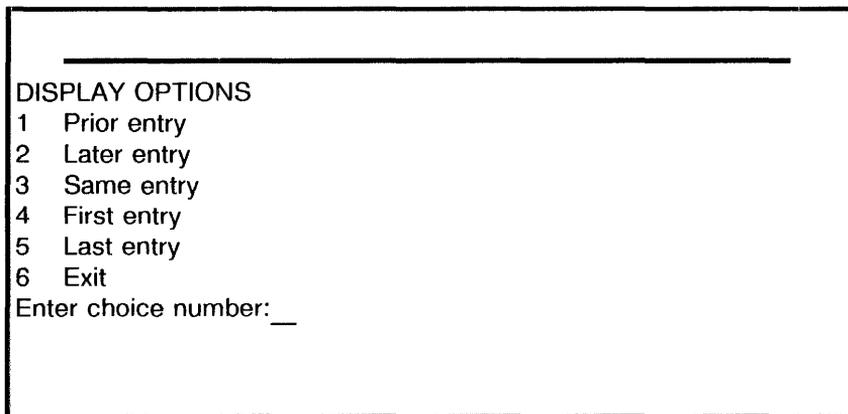
Figure 6-19.   Display Option Entries

Display Read ID Buffer

The Display Read ID Buffer displays 128 words of the read ID buffer. To isolate a bit failure, the data and the byte count are displayed in hexadecimal.

ID BUFFER DISPLAY

HEX COUNT	0	1	2	3	4	5	6	7
******	*****	*****	*****	*****	*****	*****	*****	*****
0000	0000	0102	CA6F	0000	0000	0000	0000	0000
0008	0000	0000	0000	0000	0000	0000	0000	0000
0010	0000	0000	0000	0000	0000	0000	0000	0000
0018	0000	0000	0000	0000	0000	0000	0000	0000
0020	0000	0000	0000	0000	0000	0000	0000	0000
0028	0000	0000	0000	0000	0000	0000	0000	0000
0030	0000	0000	0000	0000	0000	0000	0000	0000
0038	0000	0000	0000	0000	0000	0000	0000	0000
0040	0000	0000	0000	0000	0000	0000	0000	0000
0048	0000	0000	0000	0000	0000	0000	0000	0000
0050	0000	0000	0000	0000	0000	0000	0000	0000
0058	0000	0000	0000	0000	0000	0000	0000	0000
0060	0000	0000	0000	0000	0000	0000	0000	0000
0068	0000	0000	0000	0000	0000	0000	0000	0000
0070	0000	0000	0000	0000	0000	0000	0000	0000
0078	0000	0000	0000	0000	0000	0000	0000	0000

Type any character to continue:__

Figure 6-20. Display Read ID Buffer

Display Write Buffer

The Display Write Buffer displays data in the write buffer. To isolate a bit failure, the data and the byte count are displayed in hexadecimal.

WRITE BUFFER DISPLAY								
HEX COUNT	0	1	2	3	4	5	6	7
*******	*****	*****	*****	*****	*****	*****	*****	*****
0000	0001	0203	0405	0607	0809	0A0B	0C0D	0E0F
0008	1011	1213	1415	1617	1819	1A1B	1C1D	1E1F
0010	2021	2223	2425	2627	2829	2A2B	2C2D	2E2F
0018	3031	3233	3435	3637	3839	3A3B	3C3D	3E3F
0020	4041	4243	4445	4647	4849	4A4B	4C4D	4E4F
0028	5051	5253	5455	5657	5859	5A5B	5C5D	5E5F
0030	6061	6263	6465	6667	6869	6A6B	6C6D	6E6F
0038	7071	7273	7475	7677	7879	7A7B	7C7D	7E7F
0040	0001	0203	0405	0607	0809	0A0B	0C0D	0E0F
0048	1011	1213	1415	1617	1819	1A1B	1C1D	1E1F
0050	2021	2223	2425	2627	2829	2A2B	2C2D	2E2F
0058	3031	3233	3435	3637	3839	3A3B	3C3D	3E3F
0060	4041	4243	4445	4647	4849	4A4B	4C4D	4E4F
0068	5051	5253	5455	5657	5859	5A5B	5C5D	5E5F
0070	6061	6263	6465	6667	6869	6A6B	6C6D	6E6F
0078	7071	7273	7475	7677	7879	7A7B	7C7D	7E7F
More? (y/n):__								

Figure 6-21. Display Write Buffer

Display Read Buffer

The Display Read Buffer displays data in the read buffer. To isolate a bit failure, the data and the byte count are displayed in hexadecimal.

```
READ BUFFER DISPLAY
HEX COUNT     0     1     2     3     4     5     6     7
*******      *****  *****  *****  *****  *****  *****  *****  *****
0000         0001   0203   0405   0607   0809   0A0B   0C0D   0E0F
0008         1011   1213   1415   1617   1819   1A1B   1C1D   1E1F
0010         2021   2223   2425   2627   2829   2A2B   2C2D   2E2F
0018         3031   3233   3435   3637   3839   3A3B   3C3D   3E3F
0020         4041   4243   4445   4647   4849   4A4B   4C4D   4E4F
0028         5051   5253   5455   5657   5859   5A5B   5C5D   5E5F
0030         6061   6263   6465   6667   6869   6A6B   6C6D   6E6F
0038         7071   7273   7475   7677   7879   7A7B   7C7D   7E7F
0040         0001   0203   0405   0607   0809   0A0B   0C0D   0E0F
0048         1011   1213   1415   1617   1819   1A1B   1C1D   1E1F
0050         2021   2223   2425   2627   2829   2A2B   2C2D   2E2F
0058         3031   3233   3435   3637   3839   3A3B   3C3D   3E3F
0060         4041   4243   4445   4647   4849   4A4B   4C4D   4E4F
0068         5051   5253   5455   5657   5859   5A5B   5C5D   5E5F
0070         6061   6263   6465   6667   6869   6A6B   6C6D   6E6F
0078         7071   7273   7475   7677   7879   0000   0000   0000
More? (y/n):__
```

Figure 6-22. Display Read Buffer

Display Bad Page Table

Display Bad Page Table shows each bad page in the bad page table, including its location by stream, track, and sector number.

```
BAD PAGE DISPLAY
Page: 14272, stream: 02, track: 201, sector: 01
Page: 31472, stream: 05, track: 003, sector: 17
Page: 38504, stream: 05, track: 223, sector: 09
Page: 57728, stream: 08, track: 089, sector: 01
Page: 88030, stream: 12, track: 055, sector: 31
Type any character to continue:__
```
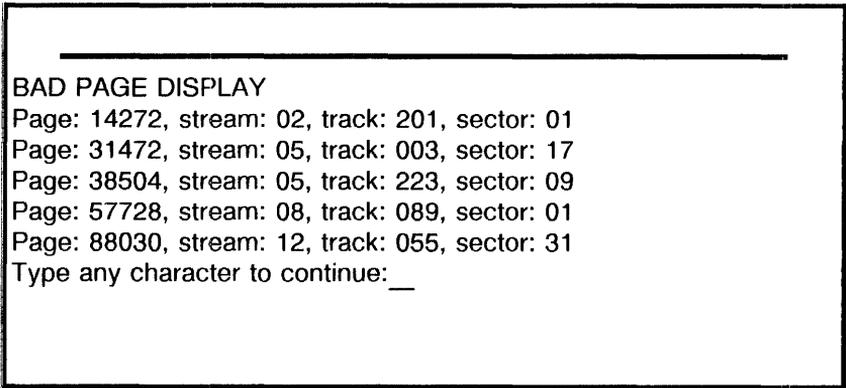
Figure 6-23. Display Bad Page Table

Write Known Data

Write Known Data is available to the Systems Analyst. This test must be used in conjuction with READ KNOWN DATA to verify compatibility between drives. This test writes a known data pattern on the entire tape surface. The data pattern consists of a sector location plus an incrementing data pattern. If the test locates a bad page, the page is logged into the bad page table.

WRITE KNOWN DATA

Passes to run: 10
Total run time: 15 hours

WARNING! Write Known Data will destroy the contents of the tape.
Do you still wish to continue? (y/n): y

SUBTEST:
The title of each subtest is displayed on the screen.

Soft read error:
Page: 9723, stream: 2, track: 58, sector: 27
Hard read error:
Page: 3044, stream: 1, track: 95, sector: 4, tries: 5, times failed: 5

Figure 6-24. Write Known Data

Read Known Data

Read Known Data is available to the Systems Analyst. This test must be used in conjuction with WRITE KNOWN DATA to verify compatibility between drives. This test reads the data pattern written on the tape by the Write Known Data test.

READ KNOWN DATA

Passes to run: 10
Total run time: 10 hours

SUBTEST:
The title of each subtest is displayed on the screen.

Soft read error:
Page: 9723, stream: 2, track: 58, sector: 27
Hard read error:
Page: 3044, stream: 1, track: 95, sector: 4, tries: 5, times failed: 5

Figure 6-25. Read Known Data

Command File Options

The Command File Options are available to the Systems Analyst. These options allow the creation of IO command loops, to examine the results, to collect error data, and to troubleshoot hardware problems. If parameters are required with the command, a prompt with the required parameters is given automatically. If you do not understand the parameters or you do not know the limits, pressing **<?>** explains the parameters.
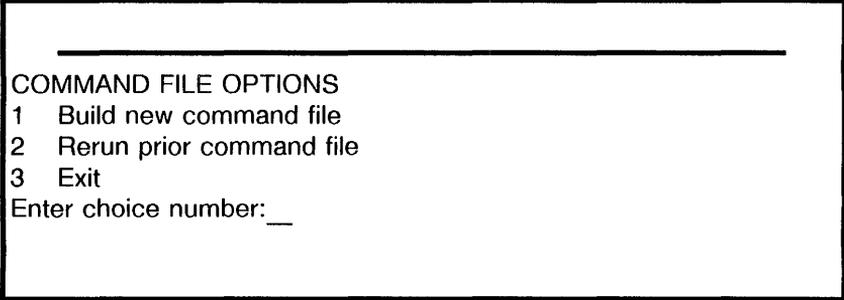
```
COMMAND FILE OPTIONS
1   Build new command file
2   Rerun prior command file
3   Exit
Enter choice number:__
```

Figure 6-26. Command File Options

Subtest Options

The Subtest Options are available to the Systems Analyst. These options are used for debugging hardware. They allow for the creation of IO command loops to collect error data, and to troubleshoot hardware problems. The subtests keep you from having to build your own command files. There are 56 Subtests available. Pressing **<?>** will display the parameters of the tests.

```
SUBTEST OPTIONS
1  Display subtests
2  Enter subtests
3  Run subtests
4  Exit
Enter choice number:__
```
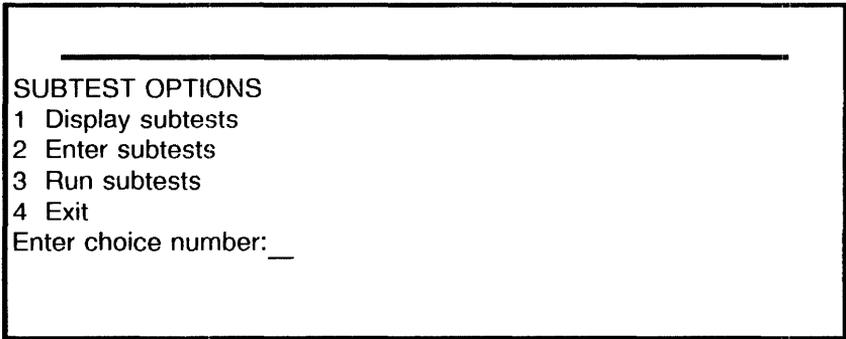
Figure 6-27. Subtest Options

7.
MULTIPORT COMMUNICATION (MPCO) DIAGNOSTICS

The Multiport Communication (MPCO) Diagnostics is a standalone, off-line diagnostic. The MPCO Diagnostics verify proper operation of the RS232C and RS366 hardware and isolate RS232C and RS366 hardware problems.

Three levels of repair are provided. The first level is the MP Code, which points to a FRU (Field Replaceable Unit). The second level is the Error Log, which contains the failing input/output commands and status. Finally, the third level is the Trace Table, which contains the sequence of the input/output commands executed when an error occurs.

Different MPCO Diagnostic test selections with various capabilities are provided for the Service Representative and the Systems Analyst. Both levels require passwords to use their respective tools.

NOTE: The Service Representative password is **cixcos** *and the Systems Analyst password is* **wizard**.

The Technical Support level of MPCO Diagnostics includes the following selections:

RS232C internal loopback

RS232C turnaround tool loopback

RS232C modem loopback

RS366 turnaround tool loopback

Display Options

■The Systems Analyst level includes two additional selections:

Command File Options

Subtest Options■

CAUTION

The System Administrator tests should only be used by a person with knowledge about RS232C and RS366 hardware, or when specifically instructed to do so.

Loading the MPCO Diagnostics

The MPCO Diagnostics are loaded using a cartridge tape. It has a menu-driven user interface which requires minimum typing input. Explanations are provided at all selection points when you type **< ? >**.

1. Insert the 8090 Multiport Server Diagnostics cartridge tape into the cartridge tape drive.

2. Perform an Alternate Boot 0002 (Cartridge Tape Drive Boot). Upon successful reading, the MP code displays [2800] and the screen displays:

RS232C AND RS366 DIAGNOSTICS
A '?' will further explain the menu options.
A 'BREAK' will return to the prior menu.

PERSON RUNNING THE TEST
1   User
2   System Administrator
3   Technical Support
Enter choice number:__

Figure 7-1.   Person Running the Test

3. Type the number corresponding to the desired "Person Running the Test" and press **< Return >**.

4. Type the appropriate password, if necessary, and press **< Return >**.

5.   Type the number corresponding to the desired test and press **< Return >**.

To stop a test in progress, press **< BREAK >**. *STOP key acknowledged* appears on the display. If the disk is performing an operation, the program will complete that operation before returning control to you.

RS232C Internal Loopback Test

This test is available to the Service Representative and the Systems Analyst. It verifies the RS232C port access, register access, asynchronous transmits, asynchronous receives, and the maximum bandwith. This test does not require any loopback tools. This test does not verify any of the cable drivers or receivers.

RS232C INTERNAL LOOPBACK TEST

Passes to run: 1
Running: All ports   Run time: 6 mins.

SUBTEST

SUCCESSFUL COMPLETION
Type any character to continue:__

Figure 7-2.   RS232C Internal Loopback Test

RS232C Turnaround Tool Loopback

This test is available to the Service Representative and the Systems Analyst. It verifies the RS232C asynchronous transmit and receive, including the drivers and receivers. This test requires a loopback tool. This test does not verify the receive clock and the transmit clock receivers.

Note: The RS232C turnaround tool must be installed on the port to be tested.
RS232C TURNAROUND TOOL LOOPBACK TEST

Port to be selected
0   Port 0
1   Port 1
2   Port 2
3   Port 3
4   Exit
Enter choice number:__

Passes to run: 1
Running port: 1   Run time: 2 mins.

SUBTEST

SUCCESSFUL COMPLETION
Type any character to continue:__

Figure 7-3.   RS232C Turnaround Tool Loopback

RS232C Modem Loopback

This test is available to the Service Representative and the Systems Analyst. It verifies the RS232C bit synchronous transmit, bit synchronous receive, and it verifies the receive clock and the transmit clock receivers.

This test requires a modem or a loopback tool connected to the RS-232-C port. To run the test with the modem in its normal transmitting mode, a second modem and telephone line are required (the remote modem would be placed in Digital Loopback). The modem provides a clock pulse which is necessary for bit-synchronous testing.

```
Note:  The modem or modem eliminator must be in the loopback
mode.
RS232C MODEM LOOPBACK TEST

Port to be selected
0    Port 0
1    Port 1
2    Port 2
3    Port 3
4    Exit
Enter choice number:__

Passes to run: 1
Running port: 1                Run time: 5 mins.
Modem clock frequency: 56K
SUBTEST

SUCCESSFUL COMPLETION
Type any character to continue:__
```

Figure 7-4.   RS232C Modem Loopback

RS366 Turnaround Tool Loopback

This test is available to the Service Representative and the Systems Analyst. It does a thorough verification of all the RS366 circuitry by driving and receiving bit patterns. This test requires a loopback tool.

Note: The RS366 loopback tool must be installed and the test selection must match the switch setting on the turnaround tool. If no test switch is available, only test 1 can be run.
RS366 TEST OPTIONS
1   Run test 1
2   Run test 2
3   Exit
Enter choice number:__

RS366 TEST 1
Passes to run: 1   Run time: 26 sec.
SUBTEST

SUCCESSFUL COMPLETION
Type any character to continue:__

Figure 7-5.   RS366 Turnaround Tool Loopback

Display Options

The Display Options menu is available to the Service Representative and the Systems Analyst. It provides the person running the diagnostic with a menu of displays that contain additional error data to further isolate a hardware problem.

CAUTION

Some of these options (Display Error Log, Display Trace Table, Display Transmit Buffer and Display Receive Buffer) should be used only by a person with knowledge of RS232C and/or RS366 hardware.

```
DISPLAY OPTIONS
1   Display Summary Log
2   Display Error Log
3   Display Trace Log
4   Display transmit buffer
5   Display receive buffer
6   Exit
Enter choice number:__
```

Figure 7-6.   Display Options

Display Summary Log

This test displays a summary of all the RS232C transmit operations, RS232C receive operations, status returned, and bytes transmitted in the executed test. This log allows you to readily identify the status of the hardware.

The Summary Log maintains a count of transmit IO commands, receive IO commands, IO status, the transmitted byte count, and the received byte count. Loopback transmit and receive IO commands are displayed simultaneously.

The maintained IO commands are:
Transmit asynchronous Port 0
Transmit asynchronous Port 1
Transmit asynchronous Port 2
Transmit asynchronous Port 3
Receive asynchronous Port 0
Receive asynchronous Port 1
Receive asynchronous Port 2
Receive asynchronous Port 3
Transmit bit synchronous Port 0
Transmit bit synchronous Port 1
Transmit bit synchronous Port 2
Transmit bit synchronous Port 3
Receive bit synchronous Port 0
Receive bit synchronous Port 1
Receive bit synchronous Port 2
Receive bit synchronous Port 3
The maintained IO status is:
Successful completions
Command time outs
Data compare errors
Bytecount errors
Data losts
Device errors
Frame timeouts

Checksum errors

Parity errors

Async frame errors

Invalid characters

Invalid frames

Aborts

Disasters

The maintained bytes to transfer:

Sum of all the bytes to transfer.

The maintained bytes received:

Sum of all the bytes received.

Display Error Log

This test displays the last errors encountered. This log allows you to further isolate a hardware problem.

Display Trace Table

This test displays the last executed IO commands. This log allows you to identify and isolate IO command sequence problems.

Display Transmit Buffer

This test displays the last transmitted data. This display allows you to compare the transmit data to the receive data for better isolation of data errors.

Display Receive Buffer

This test displays the last received data. This display allows you to compare the receive data to the transmit data for better isolation of data errors.

Command File Options

The Command File Options command is available to the Systems Analyst. It provides Systems Analysts with the option to build their own subtest to further identify and/or isolate a hardware problem.

CAUTION

The Command File Options should be used only by a person with knowledge of RS232C and/or RS366 hardware.

```
COMMAND FILE OPTIONS
1    Build new command file
2    Rerun prior command file
3    Exit
Enter choice number:__
```

Figure 7-7. Command File Options

Subtest Options

The Subtest Options are available to the Systems Analyst. These options are used for debugging hardware. They allow for the creation of IO command loops, examining the results, collecting error data, and troubleshooting hardware problems. The subtests keep you from having to build your own command files. There are 56 Subtests available. Pressing **<?>** will display the available subtests.

CAUTION

The Subtest Options should only be used by a person with knowledge about RS232C and RS366 hardware.

```
SUBTEST OPTIONS
1 Display subtests
2 Enter subtests
3 Run subtests
4 Exit
Enter choice number:__
```

Figure 7-8. Subtest Options

8.   ON-LINE DIAGNOSTICS

The On-Line Diagnostics are stored on the rigid disk and are accessed through the operating software.

The On-Line Diagnostics provide diagnostic programs for testing the Cartridge Tape Drive, the 873 Communication Interface Unit (CIU), the Dialer, the Ethernet (communication interfaces), and the RS232C port. And, if the system is installed with a high capacity peripheral cabinet, High Capacity Cartridge Tape Diagnostics will also be available.

Loading the On-Line Diagnostics

The On-Line Diagnostics are loaded from the rigid disk. Explanations are provided at all selection points when you type < ? >.

1.   Perform an Alternate Boot 0001 (rigid disk boot).

2.   Type **Y** and press **< Return >** to the "Normal startup?" prompt. After the system is booted, the MP should display [*8000*].

```
All rights reserved. Restart reason: User restart
    Normal startup? (Y/N): Y <Return>
Opening volume...done
Server is attached to network number xx-xxx
Server Name: XXXXX:XXXXX:XXXXX
Server Description: XXXXX
Validating server registration...Server entry validated.
>
```

Figure 8-1.   On-Line Diagnostics

3. Type **Test** and press **<Return>**.

4. Type the name of the desired test and press **<Return>**.

> **Test** **<Return>**
The Diagnostics commands are now available.
Test > **?** **<Return>**
    Cartridge, CIU, Dialer, Echo, High, List, RS232C, Show

    List, Logon, Reset, Show
Test >
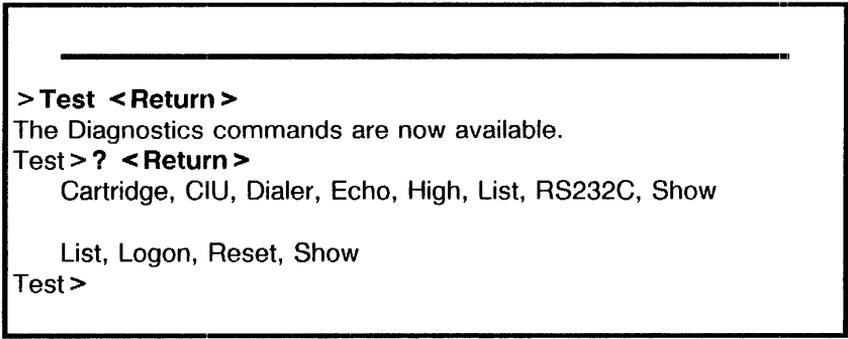
Figure 8-2. Test

Cartridge Tape Test

The cartridge tape operations allow you to reset the tension of the tape, erase the tape, format the tape, test and analyse the operation of the Cartridge Tape Drive, log bad sectors, display the bad sector table, and scavenge the tape.

NOTE: The Cartridge Tape Tests can be run when the server is active.

These tests are the same as the Cartridge Tape Diagnostics. Refer to Section 6 for explanations of the tests.

Test > **Cartridge Tape** < **Return** >
  Choose which Cartridge Tape Online Utility
  1   Retension
  2   Erase
  3   Format
  4   Verify Read Operation
  5   Log Bad Sector
  6   Display Bad Sector Table
  7   Scavenge
  Enter choice number: 1

Figure 8-3.   Cartridge Tape

CIU Test

The CIU Test is for use with the 873 (CIU) Communication Interface Unit. It verifies the Ethernet connection, and communication within the 873 and between the External Communication Service on the Communication Server.

Dialer Test

The Dialer Test is used to check the function of an Automatic Calling Unit that is attached to a local RS366 port of the Communication Server or an RS232C port on an 873 CIU controlled by a Communication Server.

Echo Test

When the Echo Test is selected, the host server transmits a sequence of packets and expects the remote server to echo the packets. Each packet has a sequence number which determines the length and contents of the packet by a predetermined algorithm. The size of each packet, the contents of the packet, the rate of sending packets, and the time to wait for each packet to be echoed, are all set to default values - there is no requirement for the user to assign them.

If the supplied ID of the test partner is the same as that of the host machine, the message *Echo to self is not allowed* will appear in the command line, and the system will wait for a new number to be entered. If the address for the host or test partner machine is not valid, the message *Network address invalid* will appear until correct address is entered. If the supplied Server ID is zero, the message *Server ID is invalid or out of range* will appear in the command line, and the system will wait for a new number to be entered. When the default packet size is not used and the value entered for the packet size is out of range, the message *Packet Size is out of range* will appear.

After sending a packet and before sending the next packet, the host machine waits for its echo from the remote machine or waits for a user specified amount of time. After the Echo Test is executed, intermediate results will be displayed approximately every 45 seconds; or, if *Display Real Time Feedback* has been selected, a character will be displayed for every packet transmitted.

Without the display per packet, the test is able to operate at maximum speed and thus stress the hardware more effectively. For these reasons this is the recommended mode for running the Echo Test.

When the Real Time Feedback mode is used, different characters indicate the status of the transmission and response. With this mode a Real Time Feedback Key is displayed, which explains the meaning of each of the possible feedback characters.

Test > **Echo** **< Return >**
Echo Source:
1   Local
2   Remote
Enter choice number: **1** **< Return >**
Echo destination name or address: **XXXXX**
Display real-time feedback? (Y/N): **Y** **< Return >**
Data Pattern:
1   Incrementing
2   All 0's
3   All 1's
4   Constant
Enter Choice number: **1** **< Return >**
Minimum packet size in bytes (2..512): **2** **< Return >**
Maximum packet size in bytes (2..512): **512** **< Return >**
Wait for response before sending next packet (Y/N): **N**
< Return >
Enter delay between packets in milliseconds (0..32767): **100**
< Return >

Figure 8-4.   Echo Test

High Capacity Cartridge Tape Test

The high capacity cartridge tape tests allow you to initialize the tape, erase the tape, run a confidence test of the tape, scavenge the tape, and save valid files.

NOTE: The "Save Valid Files" utility is not used at this time.

These tests are the same as the High Capacity Cartridge Tape Diagnostics. Refer to Section 12 for explanations of the tests.

Test > **High** < **Return** >
Choose which Cartridge Tape Online Utility
1   Initialize
2   Erase
3   Confidence Test
4   Scavenge
5   Save Valid Files
Enter choice number:

Figure 8-5.   Cartridge Tape Online Utility

List Servers Command

This command will list all of the servers registered in the Clearinghouse Service (CHS) under a particular domain and organization. It is used to help determine an echo destination for the Echo Test. The default domain and organization are from the local server's name. By specifying other domains and organizations, you can have other server lists. The List Servers command may not succeed if there are communication problems between the local server and the nearest CHS that holds a copy of the specified domain and organization lists.

Test > **List ?**
   List Servers

   List Executives, Scavenger Logs, Services, Volumes
Test > **List Servers**
   Pattern: * **< Return >**
Servers matching
   A list of the servers is given for running the echo tests.

Figure 8-6. List Servers

RS232C Test

The RS232C Test uses an echo to test the timing portion and modem associated with an RS232C port. The RS232C Test generates frames of information that are transmitted through the RS232C port. These frames return to the port through a modem placed in an analog loopback mode or a loopback tool. Each frame received is checked for validity of its content, its sequence number, and the condition of the transmitter and receiver loop.

During the test execution one or more of three informational messages about the Data Set Ready (DSR) or the Clear To Send (CTS) signals may appear. The three messages are *Waiting for DSR*, *DSR Signal is now on*, and *CTS signal is now on*. There are two error conditions with accompanying messages that may occur. If there is no RS232C hardware installed or in the event of a fatal hardware or software failure, the message *No Hardware* will appear. When a text parameter is entered with an invalid or out-of-range value, the message *Invalid Parameter* (followed by the parameter name) will appear.

*NOTE: The RS232C Test **always** requires a modem, modem eliminator or loopback tool connected to the RS232C port. On an 873 RS232C port, the modem must also be able to supply the signal Data Set Ready (DSR) in loopback mode. The DSR signal is optional on single RS232C port Comm Servers. To run the test with the modem in its normal transmitting mode, a second modem and telephone line are required (the remote modem would be placed in Digital Loopback). The modem*

provides a clock pulse which is necessary for bit-synchronous testing.

Show Ethernet Statistics Command

The Show Ethernet Statistics command is not a test. It indicates the status of the server communication activity by giving statistics since rebooting or since resetting the statistics counters. These statistics can then be used for comparison purposes.

Test > **Show Ethernet Statistics** < **Return** >
    Internal choices:
    1   Statistics since server was booted
    2   Incremental statistics since reset
    3   Reset statistics counter
    Enter choice number: **1** < **Return** >
Statistics at Date and Time since server was booted

XX minutes, XX seconds (since server was booted)
        427   Echo server packets echoed
    108868   Echo server bytes echoed
        561   Packets Received
      62034   Words Received
        497   Packets sent
      60154   Words Sent
        497   Packets sent after 0 collisions
Done.

Figure 8-7.   Show Ethernet Statistics

Notes:

9. HIGH CAPACITY CONFIGURATION UTILITY

■The High Capacity Configuration Utility provides the options to set up, update, or display the SCSI configuration stored on an EEPROM located on the ESCSI PWB. To access this utility, select SCSI Configuration Utilities in diagnostics.■

Different High Capacity Configuration Utility selections with various capabilities are provided for the Systems Analyst and Service Representative. Both levels require passwords to use their respective tools.

NOTE: The Service Representative password is **cixcos** *and the Systems Analyst password is* **wizard.**

The Technical Support level of High Capacity Configuration Utilities includes the following selections:
   Display High Capacity Configuration
   Initialize High Capacity Configuration
   Update High Capacity Configuration

■The Systems Analyst level includes an additional selection:
   Display EEPROM contents in hexadecimal■

Loading the High Capacity Configuration Utility

The High Capacity Configuration Utility is loaded using a cartridge tape. It has a menu-driven user interface which requires minimum typing input. Explanations are provided at all selection points when you type **< ? >**.

1. Insert the 8090 Server Diagnostic Cartridge Tape into the cartridge tape drive.

■2. Perform an Alternate Boot [0002] (Cartridge Tape Drive Boot). The display will show the following upon successful completion.■

Processor Information
Memory Size = 1152 K bytes

Scanning cartridge tape directory (please wait)....Done

Choices Available:
1 Help
2 LowCapacityDiskDiagnostics
3 CartridgeTapeDiagnosticsAndUtilities
4 HighCapacityDiagnosticsAndUtilities
Enter choice number, then press Carriage Return: **4 < Return >**
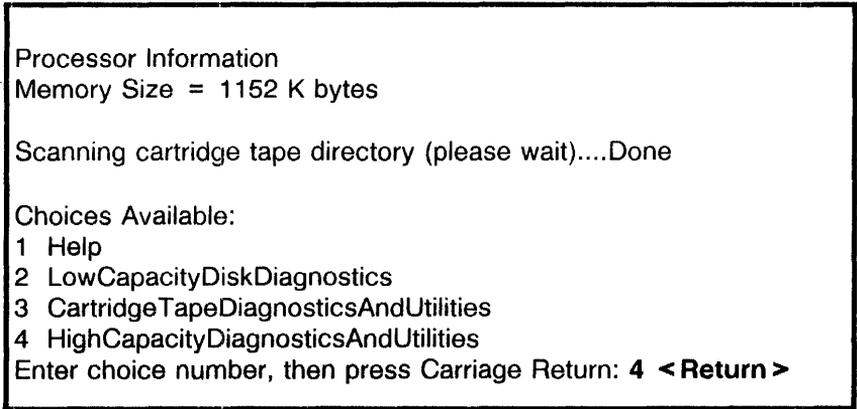
Figure 9-1. Tape Executive Menu

3. Type the number corresponding to the High Capacity Diagnostics and Utilities and press **< Return >**.

4. Type the number corresponding to the desired "Person Running the Test" and press **< Return >**.

5. When requested, type the appropriate password and press **< Return >**.

Before the Diagnostic and Utility Selections are displayed, a configuration is shown. The purpose of the display is to validate that the configuration is set to indicate the actual hardware.

6. Type **Y** and press **< Return >** to confirm the configuration. The High Capacity Utilities and Diagnostic Menu is displayed on the screen.

*NOTE: Always type **Y**, even if the configuration is incorrect.*

HIGH CAPACITY UTILITIES AND DIAGNOSTICS
HIGH CAPACITY CONFIGURATION DISPLAY

ID7: First Disk Drive, Type = Siemens 310MB
ID6: Empty
ID5: Empty
ID4: Empty
ID3: Empty
ID2: Empty
ID1: First Tape Drive, Type = Fujitsu 130MB
ID0: Processor

Is the above configuration correct? (Yes/No): **Y** **< Return >**

Figure 9-2.   Configuration Display

---

7. Type **1** and press **<Return>** to select the SCSI Configuration Utility.

8. Type the number corresponding to the desired utility and press **<Return>**.

HIGH CAPACITY UTILITIES AND DIAGNOSTIC SELECTION

1. SCSI Configuration Utility
2. High Capacity Disk Utilities
3. High Capacity Disk Diagnostics
4. High Capacity Cartridge Tape Diagnostics
5. Exit
Enter choice number:__
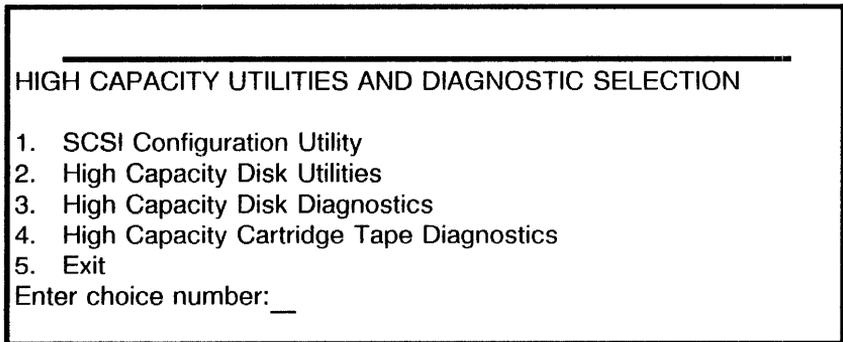
Figure 9-3. High Capacity Utilities and Diagnostics Menu

To stop a test in progress, press **<BREAK>**. *STOP key acknowledged* appears on the display. If the disk is performing an operation, the program will complete that operation before returning control to you.

Display High Capacity Configuration

The Display High Capacity Configuration utility is available to the Service Representative and the Systems Analyst. This utility displays the present High Capacity Configuration from the EEPROM.

HIGH CAPACITY CONFIGURATION DISPLAY
ID0: Xerox Dlight Processor
ID1: Fujitsu M2451A 130MB Cartridge Tape
ID2: Empty
ID3: Empty
ID4: Empty
ID5: Empty
ID6: Empty
ID7: Siemens 2300 310MB Disk

Type any character to continue:__

Figure 9-4. Display High Capacity Configuration

Initialize High Capacity Configuration

This utility is available to the Service Representative and the Systems Analyst. It provides a menu for you to input the description of the devices connected to each ID. It ignores the contents of the EEPROM. It also allows you to view the modification being made. This utility should be used when you replace the EEPROM.

```
NEW CONFIGURATION
ID0: Empty
ID1: Empty
ID2: Empty
ID3: Empty
ID4: Empty
ID5: Empty
ID6: Empty
ID7: Empty
HIGH CAPACITY CONFIGURATION MODIFICATION OPTIONS
1    Modify Device for ID 0
2    Modify Device for ID 1
3    Modify Device for ID 2
4    Modify Device for ID 3
5    Modify Device for ID 4
6    Modify Device for ID 5
7    Modify Device for ID 6
8    Modify Device for ID 7
9    Store New Configuration
10  Exit
Enter choice number:__
```

Figure 9-5. Initialize High Capacity Configuration

If Modify Device for ID is selected, a menu containing the different High Capacity device types will be displayed.

NOTE: Although various devices are shown on the display, only selections 2 and 11 are supported by the software.

```
HIGH CAPACITY CONFIGURATION MODIFICATION OPTIONS
Modify Device for ID 1
Enter choice number for Device type:
1   Empty
2   Siemens 2300 310MB Disk
3   MicroPolis 1578 380MB Disk
4   Control Data Wren IV 300MB Disk
5   Priam 728 280MB Disk
6   Priam 738 380MB Disk
7   Maxtor 3380 380MB Disk
8   Nikon Optical 7.2GB Disk
9   Fujitsu 2249 300MB Dsik
10  Fujitsu M2452E 219MB Cartridge Tape
11  Fujitsu M2451A 130MB Cartridge Tape
12  Anritsu 2150C Open Reel Tape
13  Xerox DLight Processor
14  Xerox SCSI Loopback Tool
15  Toshiba XM2000A CD-ROM
16  Other
17  Exit
Enter choice number to device type:__
```

Figure 9-6.   High Capacity Configuration Modification Options

After the changes have been entered, the modifications are reflected in the New Configuration.

If the new configuration is correct, the new configuration must be stored. Type **<9>** and press **<Return>**.

```
NEW CONFIGURATION
ID0: Xerox Dlight Processor
ID1: Fujitsu M2451A 130MB Cartridge Tape
ID2: Empty
ID3: Empty
ID4: Empty
ID5: Empty
ID6: Empty
ID7: Siemens 2300 310MB Disk
HIGH CAPACITY CONFIGURATION MODIFICATION OPTIONS
1    Modify Device for ID 0
2    Modify Device for ID 1
3    Modify Device for ID 2
4    Modify Device for ID 3
5    Modify Device for ID 4
6    Modify Device for ID 5
7    Modify Device for ID 6
8    Modify Device for ID 7
9    Store New Configuration
10   Exit
Enter choice number:__
```

Figure 9-7. Store New Configuration

Type **Y** and press **<Return>** to confirm the new configuration. Once the new configuration is stored, reboot the system.

STORE NEW CONFIGURATION
Are you sure? (Yes/No): **Y <Return>**

NEW CONFIGURATION WRITTEN SUCESSFULLY

Note: The system must be rebooted before the configuration change will take affect.

Type any character to continue:__

Figure 9-8.   Confirm the New Configuration

Update High Capacity Configuration

This utility is available to the Service Representative and the Systems Analyst. It provides a menu for you to modify the description of the devices connected to each ID. It should be used when a device is added, removed, or replaced with a different device. It also allows you to view the modification being made.

When the Update High Capacity Configuration selection is entered, the program first reads the High Capacity Configuration from the EEPROM, and then computes and verifies the checksum.

If the checksum is good, the program displays the High Capacity Configuration Modification Options menu plus the New Configuration with the entries containing the EEPROM configuration.

NEW CONFIGURATION
ID0: Xerox Dlight Processor
ID1: Fujitsu M2451A 130MB Cartridge Tape
ID2: Empty
ID3: Empty
ID4: Empty
ID5: Empty
ID6: Empty
ID7: Siemens 2300 310MB Disk

HIGH CAPACITY CONFIGURATION MODIFICATION OPTIONS
1   Modify Device for ID 0
2   Modify Device for ID 1
3   Modify Device for ID 2
4   Modify Device for ID 3
5   Modify Device for ID 4
6   Modify Device for ID 5
7   Modify Device for ID 6
8   Modify Device for ID 7
9   Store New Configuration
10 Exit
Enter choice number:__

Figure 9-9.   Update High Capacity Configuration

If Modify Device for ID is selected, a menu
containing the different High Capacity device types
will be displayed.

HIGH CAPACITY CONFIGURATION MODIFICATION OPTIONS
Modify Device for ID 1
Enter choice number for SCSI Device type:
1   Empty
2   Siemens 2300 310MB Disk
3   MicroPolis 1578 380MB Disk
4   Control Data Wren IV 300MB Disk
5   Priam 728 280MB Disk
6   Priam 738 380MB Disk
7   Maxtor 3380 380MB Disk
8   Nikon Optical 7.2GB Disk
9   Fujitsu 2249 300MB Dsik
10   Fujitsu M2452E 219MB Cartridge Tape
11   Fujitsu M2451A 130MB Cartridge Tape
12   Anritsu 2150C Open Reel Tape
13   Xerox DLight Processor
14   Xerox SCSI Loopback Tool
15   Toshiba XM2000A CD-ROM
16   Other
17   Exit
Enter choice number to device type:__

Figure 9-10. High Capacity Configuration Modification Options

After the changes have been entered, the modifications are reflected in the New Configuration. If the configuration is correct, type **<9>** and press **<Return>** to store the new configuration.

NEW CONFIGURATION
ID0: Xerox Dlight Processor
ID1: Fujitsu M2451A 130MB Cartridge Tape
ID2: Empty
ID3: Empty
ID4: Empty
ID5: Empty
ID6: Empty
ID7: Siemens 2300 310MB Disk

HIGH CAPACITY CONFIGURATION MODIFICATION OPTIONS
1   Modify Device for ID 0
2   Modify Device for ID 1
3   Modify Device for ID 2
4   Modify Device for ID 3
5   Modify Device for ID 4
6   Modify Device for ID 5
7   Modify Device for ID 6
8   Modify Device for ID 7
9   Store New Configuration
10   Return to prior menu
Enter choice number:__

Figure 9-11.   Update High Capacity Configuration

Type **Y** and press **<Return>** to confirm the updated configuration. Once the new configuration is stored, reboot the system.

STORE NEW CONFIGURATION
Are you sure? (Yes/No): **Y** **<Return>**

New Configuration Written Successfully

Note: The system must be rebooted before the configuration change will take affect.

Type any character to continue:__

Figure 9-12. Confirm the Updated Configuration

Display EEPROM Contents

The Display EEPROM Contents command is available to the Systems Analyst. It displays the 64 word contents of the EEPROM in hexadecimal. Use this command to examine the data in the High Capacity Configuration EEPROM.

```
EEPROM CONTENTS DISPLAY
HEX COUNT      0     1     2     3     4     5     6     7
*******      *****  *****  *****  *****  *****  *****  *****  *****

0000         0001  0203  0405  0607  0809  0A0B  0C0D  0E0F
0008         1011  1213  1415  1617  1819  1A1B  1C1D  1E1F
0010         2021  2223  2425  2627  2829  2A2B  2C2D  2E2F
0018         3031  3233  3435  3637  3839  3A3B  3C3D  3E3F
0020         FFFF  FFFF  FFFF  FFFF  FFFF  FFFF  FFFF  FFFF
0028         FFFF  FFFF  FFFF  FFFF  FFFF  FFFF  FFFF  FFFF
0030         FFFF  FFFF  FFFF  FFFF  FFFF  FFFF  FFFF  FFFF
0038         FFFF  FFFF  FFFF  FFFF  FFFF  FFFF  FFFF  AF02

Type any character to continue:__
```

Figure 9-13.   Display EEPROM Contents

Notes:

The High Capacity Disk Utilities is a standalone, off-line diagnostic. The High Capacity Disk Utilities verify proper operation of the rigid disk hardware, and isolate rigid disk hardware problems.

Additionally, it provides utilities for scavenging the Physical Volume, for installing new drives, for formatting drives, for running government clearing and declassification procedures, and for adding bad pages into the Bad Page Table.

Different High Capacity Disk Utilities with various capabilities are provided for the Systems Analyst and Service Representative. Both levels require passwords to use their respective tools.

NOTE: The Service Representative password is **cixcos** *and the Systems Analyst password is* **wizard**.

The Technical Support level of High Capacity Disks Utilities includes the following selections:

> **Physical Volume Scavenger**
> **New Disk Installation**
> **Log Bad Page**
> **Display the Physical Vol. Bad Page Table**
> **Display the Manufacturing Bad Page Table**

■The Systems Analyst level includes four additional selections:

> **Disk Clearing Procedure**
> **Disk Declassification Procedure**
> **Format Disk**
> **Display firmware version**■

Rigid Disk Physical Volume

∎The size and capacity of the rigid disk drive depends on the number of platters and read/write heads. Each platter is divided into tracks and sectors. A track, which is divided into sectors, is a circular tracing on a platter formed by the read/write heads. The same track on each platter defines a cylinder. A page corresponds to a particular cylinder, head, and sector of the rigid disk drive.∎

Each rigid disk contains a physical volume with one or more logical volumes. The physical volume contains Pilot data structures required for the system to function. These are the physical volume root page, the bad page table, the duplicate root page, and the data lost table. All are on the first cylinder (Cylinder 0) of the drive (Figure 10-1). Cylinder 0 is guaranteed error-free from the vendor.

Figure 10-1. Cylinder 0 on the Physical Volume

- The physical volume root page resides on Page 0. It contains information about the physical volume and the logical volumes contained on the disk.

- The bad page table is located on Pages 1, 2, 3, and 4. It can contain up to 512 bad pages. A bad page on Cylinder 0 cannot be entered into the Bad Page Table. Therefore, if Cylinder 0 contains a bad page that cannot be repaired by the Test Bad Pages program or by installing software, the drive must be replaced.

- A duplicate physical volume root page resides on Cylinder 0. It is an exact copy of the physical volume root page on Page 0.

  NOTE: On High Capacity disks, it is on Page 59. On Low Capacity disks, its location is the first sector and last track of Cylinder 0.

- The location of the data lost table immediately follows the duplicate root page location. It is four pages in length and can contain up to 510 data lost pages. These lost pages are automatically entered by Disk Diagnostics.

- The SDD (self describing disk) page is located on Page 14 of Cylinder 0. It is one which has its type and parameters written on the disk in a special sector called the disk shape sector. This allows the use of a variety of different rigid disks. In order to be used, the SDD page must meet the following conditions:

  - The disk must be formatted.

  - The disk SDD page must be readable.

• The SDD page data must be valid.

Rigid Disk Page Structure

Each page (sector) on the rigid disk consists of a header and a data field. These fields are written on the disk in a sequenced order of header, label, and data fields. Each field occupies a set amount of space for each page (sector).

The header describes the location information with reference to cylinder, head, and sector.

On the ST506 internal disk drive, labels physically exist on the 8090 rigid disks, but are not used.

The data field contains the client data (user data, system software, etc.).

Rigid Disk Logical Volumes

Logical volumes also contain critical data structures for Pilot to function. They are the logical volume root page and the marker page. Other structures in the logical volume include the VAM (volume allocation map), the "ETableFiles," and the scavenger log.

•   The logical volume root page resides on the first page of the logical volume (FirstLVPage). It contains information about the logical volume and its layout.

•   The logical volume marker page resides on the last page of the logical volume. It contains additional information about the logical volume root page.

- The VAM and the scavenger log reside at the beginning of the logical volume. The VAM lists the logical volume pages that are used and those that are free. The scavenger log is used to verify problems.

- The ETableFiles reside at the middle of the logical volume. One is a primary file, which describes how files are layed out on the logical volume. The other file is a copy of the primary file.

The rigid disk is partitioned into Logical Volumes. Logical Volumes are the logical structuring of the media into specific categories such as Backstop, System, and User Areas. The boundaries for these volumes are predetermined by software and they are set when the disk is partitioned (Table 10-1).

■Table 10-1. 8090 Rigid Disk Layout■

Server	Initial Microcode	Backstop	System	User
310MB	0000-0174	0175-10675	10676-30676	30677 +

Loading the High Capacity Disk Utilities

The High Capacity Disk Utilities are loaded using a cartridge tape. It has a menu-driven user interface which requires minimum typing input. Explanations are provided at all selection points when you type **<?>**.

1. Insert the 8090 Server Diagnostic Cartridge Tape into the cartridge tape drive.

■2. Perform an Alternate Boot [0002] (Cartridge Tape Drive Boot). Upon successful completion, the following will be displayed.■

```
Processor Information
Memory Size = 1152 K bytes

Scanning cartridge tape directory (please wait)....Done

Choices Available:
1 Help
2 LowCapacityDiskDiagnostics
3 CartridgeTapeDiagnosticsAndUtilities
4 HighCapacityDiagnosticsAndUtilities
Enter choice number, then press Carriage Return: 4 < Return >
```

Figure 10-2. Tape Executive Menu

3. Type the number corresponding to the High Capacity Diagnostics and Utilities and press **< Return >**.

4. Type the number corresponding to the desired "Person Running the Test" and press **< Return >**.

5. When requested, type the appropriate password and press **< Return >**.

Before the Diagnostic and Utility Selections are displayed, a configuration is shown. The purpose of the display is to validate that the configuration is set to indicate the actual hardware.

6. Type **Y** and press **< Return >** to confirm the configuration. The High Capacity Utilities and Diagnostic Menu is displayed on the screen.

NOTE: Always type **Y**, *even if the configuration is incorrect.*

HIGH CAPACITY UTILITIES AND DIAGNOSTICS
HIGH CAPACITY CONFIGURATION DISPLAY

ID7: First Disk Drive, Type = Siemens 310MB
ID6: Empty
ID5: Empty
ID4: Empty
ID3: Empty
ID2: Empty
ID1: First Tape Drive, Type = Fujitsu 130MB
ID0: Processor

Is the above configuration correct? (Yes/No): **Y < Return >**

Figure 10-3. Configuration Display

7.   Type **2** and press **<Return>** to select the High Capacity Disk Utilities.

8.   Type the number corresponding to the desired utility and press **<Return>**.

HIGH CAPACITY UTILITIES AND DIAGNOSTIC SELECTION

1   SCSI Configuration Utility
2   High Capacity Disk Utilities
3   High Capacity Disk Diagnostics
4   High Capacity Cartridge Tape Diagnostics
5   Exit
Enter choice number:__
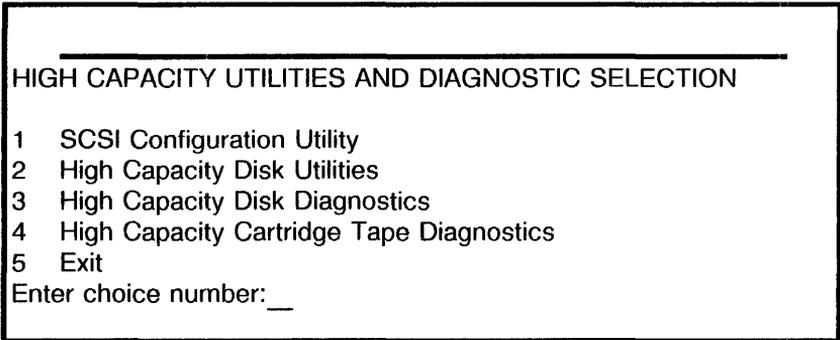
Figure 10-4.   High Capacity Utilities and Diagnostics Menu

9.   If there is more than one disk drive on the
      SCSI bus, type the number corresponding to
      the drive/drives to be tested and press
      < Return >.

TEST NAME

DRIVE TO BE SELECTED
1   First Drive
2   Second Drive
3   Third Drive
4   Exit
Enter choice number:__

Figure 10-5.   Drive to be Selected

To stop a test in progress, press **< BREAK >**.
STOP key acknowledged appears on the display. If
the disk is performing an operation, the program will
complete that operation before returning control to
you.

Physical Volume Scavenger

This utility is available to the Service Representative and the Systems Analyst. This utility performs a basic hardware verification, and then attempts to repair the physical volume.

PHYSICAL VOLUME SCAVENGE   First Drive

Total pass count: **1 < Return >**
Total run time: 05 mins

SUBTESTS:
The title of each subtest is displayed on the screen.

NO PROBLEM FOUND
Type any character to continue:__
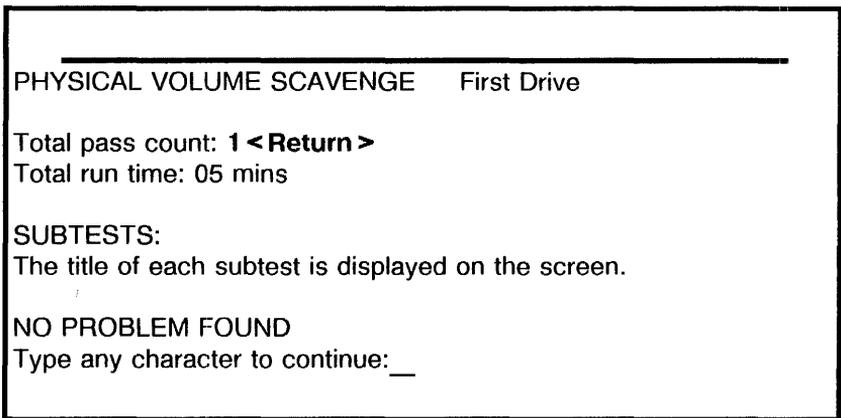
Figure 10-6.   Physical Volume Scavenger

New Disk Installation

This utility is available to the Service Representative and the Systems Analyst. It should be run when a new High Capacity Disk Drive is installed into a system.

New Disk Installation performs a basic hardware verification, reads the Manufacturing Bad Page Table, writes a physical volume on the rigid disk, and generates a physical volume bad page table.

If Hard Errors are detected during this utility, they should be entered into the Bad Page Table by using the Log Bad Page Utility.

```
NEW DISK INSTALLATION              First Drive
Passes to run: 1 < Return >
Warning! This test will destroy the contents of the selected
drive/drives.
Do you still wish to continue? (Yes/No): Y < Return >
Are you still sure? (Yes/No): Y < Return >

NEW DISK INSTALLATION              First Drive
Total pass count: 1
Total run time: 20 min
SUBTESTS:
The title of each subtest is displayed on the screen.

SUCCESSFUL COMPLETION
Drive 1: No errors detected
Type any character to continue:__
```

Figure 10-7. New Disk Installation

Log Bad Page

This utility is available to the Service Representative and the Systems Analyst. A page on the rigid disk may become unusable due to hardware problems, electrical noise, or disk surface deterioration. If the page is unusable, it is a Hard Error. You enter Hard Errors (bad pages) into the Bad Page Table by using the Log Bad Page Utility.

LOG BAD PAGE   SECOND DRIVE

Bad page number: **2453** **< Return >**
Are you sure? (y/n): **Y** **< Return >**
More? (y/n): **N** **< Return >**
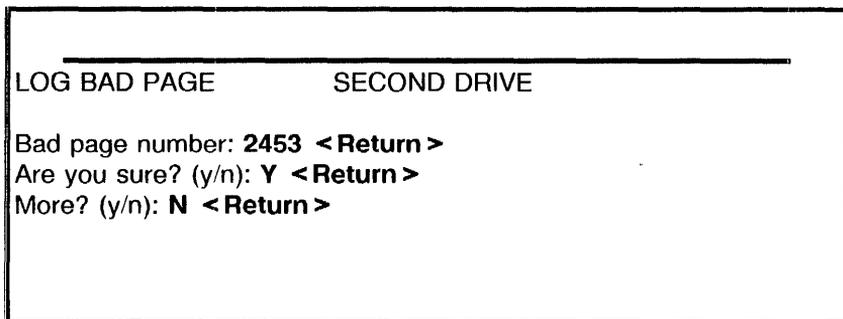
Figure 10-8. Log Bad Page

Physical Volume Bad Page Table Display

This utility is available to the Service Representative and the Systems Analyst. This utility displays the number of bad pages and where the bad pages are located on the rigid disk.

PHYSICAL VOLUME BAD PAGE TABLE DISPLAY   First Drive

1 Page:	21244,	Cylinder:	50,	Heads:	6, Sector:	32
2 Page:	35425,	Cylinder:	84,	Heads:	4, Sector:	5
3 Page:	52388,	Cylinder:	124,	Heads:	8, Sector:	28
4 Page:	157736,	Cylinder:	374,	Heads:	6, Sector:	26
5 Page:	339672,	Cylinder:	808,	Heads:	8, Sector:	52

Type any character to continue:__

Figure 10-9. Physical Volume Bad Page Table Display

Manufacturing Bad Page Table Display

This utility is available to the Service Representative and the Systems Analyst. During testing performed by the manufacturer, pages are sometimes identified as bad. Those pages are entered into the Manufacturing Bad Page Table. This utility displays those bad pages and where they are located on the rigid disk.

MANUFACTURING BAD PAGE TABLE DISPLAY   First Drive

1 Page:	21244,	Cylinder:	50,	Heads:	6, Sector:	32
2 Page:	35425,	Cylinder:	84,	Heads:	4, Sector:	5
3 Page:	52388,	Cylinder:	124,	Heads:	8, Sector:	28
4 Page:	157736,	Cylinder:	374,	Heads:	6, Sector:	26
5 Page:	339672,	Cylinder:	808,	Heads:	8, Sector:	52

Type any character to continue:__

Figure 10-10.   Manufacturing Bad Page Table Display

Disk Clearing Procedure

This utility is available to the Systems Analyst. It is used to destroy data on the rigid disk.

The Disk Clearing Procedure saves the physical volume bad page table and writes the entire rigid disk with alternate 1s and 0s. The utility then verifies that the entire rigid disk was written with alternate 1s and 0s, writes a new physical volume, and generates the Physical Volume Bad Page Table again.

CAUTION

This procedure will destroy the contents of the disk.
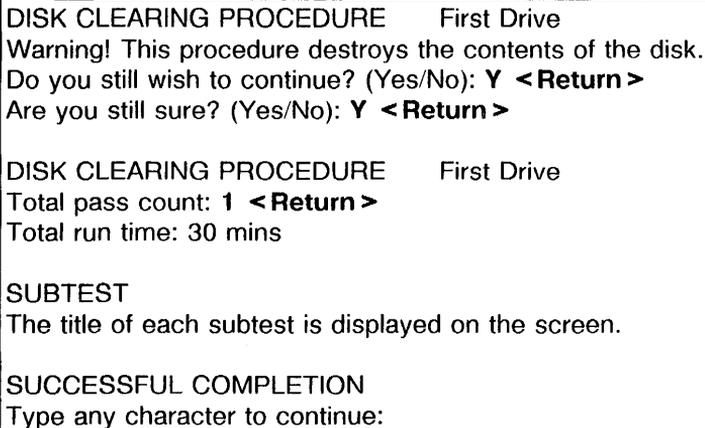
DISK CLEARING PROCEDURE   First Drive
Warning! This procedure destroys the contents of the disk.
Do you still wish to continue? (Yes/No): **Y <Return>**
Are you still sure? (Yes/No): **Y <Return>**

DISK CLEARING PROCEDURE   First Drive
Total pass count: **1 <Return>**
Total run time: 30 mins

SUBTEST
The title of each subtest is displayed on the screen.

SUCCESSFUL COMPLETION
Type any character to continue:__

Figure 10-11.   Disk Clearing Procedure

Disk Declassification Procedure

This utility is available to the Systems Analyst. It is used to thoroughly destroy classified data on the rigid disk.

The Disk Declassification Procedure saves the physical volume bad page table, writes the entire rigid disk six times with alternate 1s and 0s (alternating between hexadecimal As and 5s), and verifies the data each time the rigid disk is written. The utility then writes one additional pass of random data, writes a new physical volume, and generates the Physical Volume Bad Page Table again.

CAUTION

This procedure will destroy the contents of the disk.

DISK DECLASSIFICATION PROCEDURE
Warning! This procedure destroys the contents of the disk.
Do you still wish to continue? (Yes/No): **Y** **< Return >**
Are you still sure? (Yes/No): **Y** **< Return >**

DISK DECLASSIFICATION PROCEDURE   First Drive
Total pass count: 1
Total run time: 3 hours, 30 mins.
SUBTEST:
The title of each subtest is displayed on the screen.

SUCCESSFUL COMPLETION
Type any character to continue:__

Figure 10-12. Disk Declassification Procedure

Format Disk

The Format Disk utility is available to the Systems Analyst. This command is only used for error recovery procedures when a rigid disk has a large number of Header errors.

NOTE: Typically, for a large number of Data CRC errors, use the New Disk Installation command.

The Format Disk utility writes headers on the entire rigid disk. It performs 16 write/verify passes per pass on cylinder 0, performs 16 write/verify passes per pass on the rest of the rigid disk and collects the bad pages encountered while doing the write/verify passes. This utility also creates a physical volume and generates a Physical Volume Bad Page Table.

CAUTION
This procedure will destroy the contents of the disk.

FORMAT DISK   First Drive

Passes to run: **1** **< Return >**
WARNING! Formatting will destroy the contents of the disk drive.
Do you still wish to continue (y/n): **Y < Return >**
Are you still sure? (Yes/No): **Y < Return >**

FORMAT DISK   First Drive

Total pass count: 1
Total run time: 1 hour
SUBTEST:
The title of each subtest is displayed on the screen.

SUCCESSFUL COMPLETION
Type any character to continue:__

Figure 10-13.   Format Disk

Display Firmware Version

This utility is available to the Systems Analyst. It displays the Siemens firmware version as an aid in troubleshooting. You would update the disk drive firmware version when firmware problems are resolved.

DISPLAY FIRMWARE VERSION   First Drive
Version: 3C of 12/14/87
Type any character to continue:__

Figure 10-14.   Display Firmware Version

Notes:

The High Capacity Disk Diagnostics is a standalone, off-line diagnostic. The High Capacity Disk Diagnostics verify proper operation of the rigid disk hardware and isolate rigid disk hardware problems.

Different High Capacity Disk Diagnostics with various capabilities are provided for the Systems Analyst and Service Representative. Both levels require passwords to use their respective tools.

NOTE: The Service Representative password is **cixcos** *and the Systems Analyst password is* **wizard.**

The Technical Support level of High Capacity Disk Diagnostics includes the following selections:

Confidence Test
Disk Surface Verify
Display Options

■The Systems Analyst level includes three additional selections:

Exerciser
Command File Options
Subtest Options■

Loading the High Capacity Disk Diagnostics

The High Capacity Disk Diagnostics are loaded using a cartridge tape. It has a menu-driven user interface which requires minimum typing input. Explanations are provided at all selection points when you type **< ? >**.

1.   Insert the 8090 Server Diagnostic Cartridge Tape into the cartridge tape drive.

■2.   Perform an Alternate Boot [0002] (Cartridge Tape Drive Boot). The display will show the following upon successful completion. ■

Processor Information
Memory Size = 1152 K bytes

Scanning cartridge tape directory (please wait)....Done

Choices Available:
1 Help
2 LowCapacityDiskDiagnostics
3 CartridgeTapeDiagnosticsAndUtilities
4 HighCapacityDiagnosticsAndUtilities
Enter choice number, then press Carriage Return: **4 < Return >**

Figure 11-1.   Tape Executive Menu

3.   Type the number corresponding to the High Capacity Diagnostics and Utilities and press **< Return >**.

---

4.   Type the number corresponding to the desired "Person Running the Test" and press **< Return >**.

5.   When requested, type the appropriate password and press **< Return >**.

Before the Diagnostic and Utility Selections are displayed, a configuration is shown. The purpose of the display is to validate that the configuration is set to indicate the actual hardware.

6.   Type **Y** and press **< Return >** to confirm the configuration. The High Capacity Utilities and Diagnostic Menu is displayed on the screen.

NOTE: Always type Y, even if the configuration is incorrect.

HIGH CAPACITY UTILITIES AND DIAGNOSTICS
HIGH CAPACITY CONFIGURATION DISPLAY

ID7: First Disk Drive, Type = Siemens 310MB
ID6: Empty
ID5: Empty
ID4: Empty
ID3: Empty
ID2: Empty
ID1: First Tape Drive, Type = Fujitsu 130MB
ID0: Processor

Is the above configuration correct? (Yes/No): **Y < Return >**

Figure 11-2.   Configuration Display

---

7.   Type **3** and press **<Return>** to select the High Capacity Disk Diagnostics.

8.   Type the number corresponding to the desired test and press **<Return>**.

HIGH CAPACITY UTILITIES AND DIAGNOSTIC SELECTION

1   SCSI Configuration Utility
2   High Capacity Disk Utilities
3   High Capacity Disk Diagnostics
4   High Capacity Cartridge Tape Diagnostics
5   Exit
Enter choice number:__
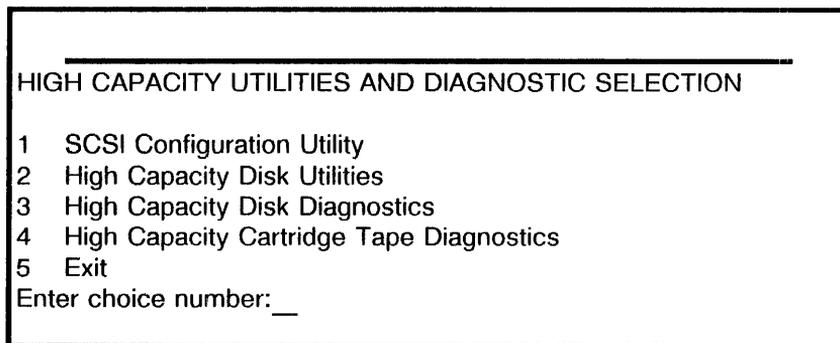
Figure 11-3.   High Capacity Utilities and Diagnostics Menu

9. If there is more than one disk drive on the
    SCSI bus, type the number corresponding to
    the drive/drives to be tested and press
    < Return >.

TEST NAME

DRIVE TO BE SELECTED
1   First Drive
2   Second Drive
3   Third Drive
4   Exit
Enter choice number:__

Figure 11-4. Drive to be Selected

To stop a test in progress, press **< BREAK >**.
STOP key acknowledged appears on the display. If
the disk is performing an operation, the program will
complete that operation before returning control to
you.

Confidence Test

This test is available to the Service Representative and the Systems Analyst. It performs a thorough verification of one or more High Capacity Disk Drives. It looks for hard errors, hard read errors, and excessive soft read errors. This test should be run when any type of problem is suspected on a High Capacity Disk Drive.

If multiple drives are installed, the Multi Drive selection can be used to test all of the drives simultaneously.

```
CONFIDENCE TEST        First Drive

Passes to run: 3
Total run time: 48 mins.

SUBTEST:
The title of each subtest is displayed on the screen.

SUCCESSFUL COMPLETION
Type any character to continue:__
```
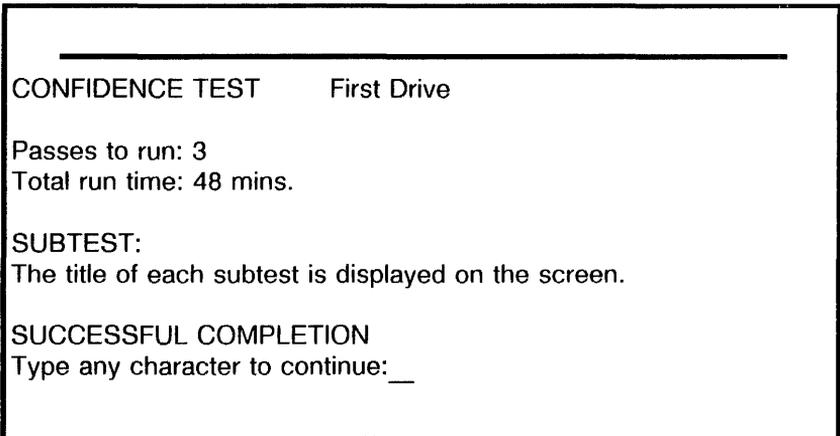
Figure 11-5. Confidence Test

Disk Surface Verify

Surface Verification is available to the Service
Representative and the Systems Analyst. It
evaluates how well the disk data can be read. It
also identifies drives that are not reading correctly.
The test reads all the data on the disk surface, then
displays the soft and hard read errors.

SURFACE VERIFICATION   First Drive

Passes to run: 3
Total run time: 27 mins

SUBTEST:
The title of each subtest is displayed on the screen.

SUCCESSFUL COMPLETION
Type any character to continue:__
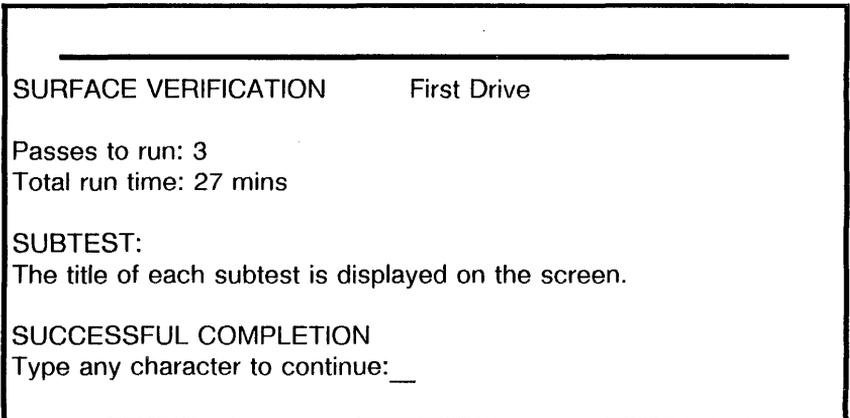
Figure 11-6.   Disk Surface Verify

Display Options

The Display Options menu is available to the Service Representative and the Systems Analyst. It contains the following selections:

```
DISPLAY OPTIONS
1   Display the Manufacturing Bad Page Table
2   Display the Physical Volume Bad Page Table
3   Display Error Log
4   Display Soft Read Errors
5   Display Hard Read Errors
6   Display Trace Table
7   Display Read Buffer
8   Display Write Buffer
9   Display Information Buffer ·
10  Exit
Enter choice number:__
```
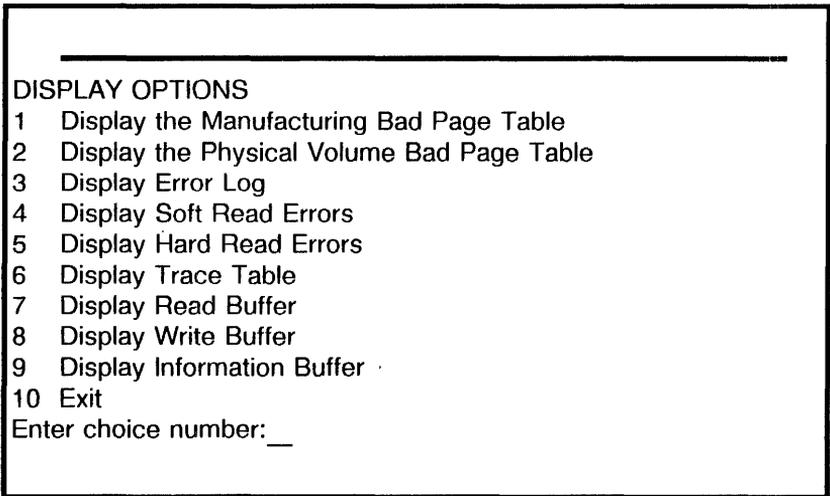
Figure 11-7.   Display Options

Display The Manufacturing Bad Page Table

During testing performed by the manufacturer, pages are sometimes identified as bad. Those pages are entered into the Manufacturing Bad Page Table. This option displays those bad pages and where they are located on the rigid disk.

```
MANUFACTURING BAD PAGE TABLE DISPLAY       First Drive

1 Page:     21244,   Cylinder:   50,  Heads:  6, Sector:    32
2 Page:     35425,   Cylinder:   84,  Heads:  4, Sector:     5
3 Page:     52388,   Cylinder:  124,  Heads:  8, Sector:    28
4 Page:    157736,   Cylinder:  374,  Heads:  6, Sector:    26
5 Page:    339672,   Cylinder:  808,  Heads:  8, Sector:    52

Type any character to continue:__
```

Figure 11-8.   Display the Manufacturing Bad Page Table

Display the Physical Volume Bad Page Table

This option displays the number of bad pages and where the bad pages are located on the rigid disk.

PHYSICAL VOLUME BAD PAGE TABLE DISPLAY   First Drive

1 Page:	21244,	Cylinder:	50,	Heads:	6, Sector:	32
2 Page:	35425,	Cylinder:	84,	Heads:	4, Sector:	5
3 Page:	52388,	Cylinder:	124,	Heads:	8, Sector:	28
4 Page:	157736,	Cylinder:	374,	Heads:	6, Sector:	26
5 Page:	339672,	Cylinder:	808,	Heads:	8, Sector:	52

Type any character to continue:__

Figure 11-9.   Display the Physical Volume Bad Page Table

Display Error Log

The error log stores each read/write error in sequence. It is a tool to help isolate hardware problems. The error log can hold 32 errors. When the error log is full, it starts at the beginning again, overwriting earlier errors. Each log contains all the failing IO commands, all parameters for the IO commands, and all the returned status parameters when the IO command fails. Each log also contains an entry count, a time stamp, a subtest number being run during the failure and a remaining pass count.

```
ENTRY NUMBER:...12              Subtest: 82
Time: 13:04:35                  Pass count: 3

COMMAND:
Read[track:2, sector: 4, use single buffer (y/n): Yes,
clear buffer first (y/n): Yes, verify read data (y/n): yes,
data type: diagnostic, try count: 15];
RETURNED STATUS:
Data ECC Error

Type any character to continue:__
```

Figure 11-10.   Display Error Log

After the first error log is displayed, typing any character will show another Display Options menu. From this Display Options menu, the entire Error Log can be displayed individually.

DISPLAY OPTIONS
1   Prior entry
2   Later entry
3   Same entry
4   First entry
5   Last entry
6   Exit
Enter choice number:__
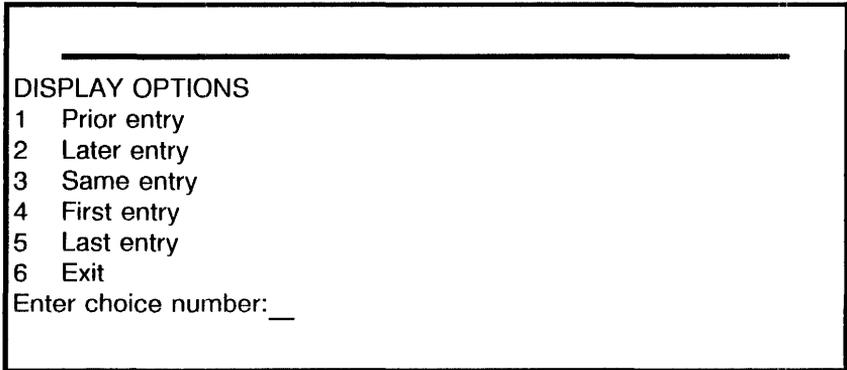
Figure 11-11.   Display Option Entries

Display Soft Read Errors

This log allows you to analyse the soft read errors.

```
SOFT READ ERROR DISPLAY

Disk Drive: 1, page: 5632
Disk Drive: 1, page: 43728
Disk Drive: 1, page: 45390
Disk Drive: 1, page: 62974
Disk Drive: 3, page: 224

Type any character to continue:__
```

Figure 11-12.   Soft Read Error Display

Display Hard Read Errors

This log allows you to analyse the hard read errors.

HARD READ ERROR DISPLAY

Disk Drive : 1, page: 5632
Disk Drive : 3, page: 43728
Disk Drive : 3, page: 53898
Disk Drive : 5, page: 156
Disk Drive : 6, page: 98034

Type any character to continue:__

Figure 11-13. Hard Read Error Display

Display Trace Table

The trace table stores each IO command in the sequence that it was executed. It is a tool to help isolate hardware problems. The trace table can hold 32 entries. When the trace table is full, it starts at the beginning again, overwriting earlier error entries. Each table contains all the IO commands, all parameters for the IO commands, and all the returned status parameters when the IO command fails. Each table also contains an entry count.

```
ENTRY NUMBER:...12                    Subtest: 82
Time: 13:04:35                        Pass count: 3

COMMAND:
ReadSector [unit: 2, page: 11, use single buffer (y/n): Yes,
sector count:32, clear buffer first (y/n):Yes, verify read data (y/n):
yes, data type: diagnostic, try count:15];

RETURNED STATUS:
Data CRC error

Type any character to continue:__
```

Figure 11-14.   Display Trace Table

After the first trace table is displayed, typing any character will show another Display Options menu. From this Display Options menu, the entire Trace table can individually be displayed.

DISPLAY OPTIONS
1   Prior entry
2   Later entry
3   Same entry
4   First entry
5   Last entry
6   Exit
Enter choice number:__
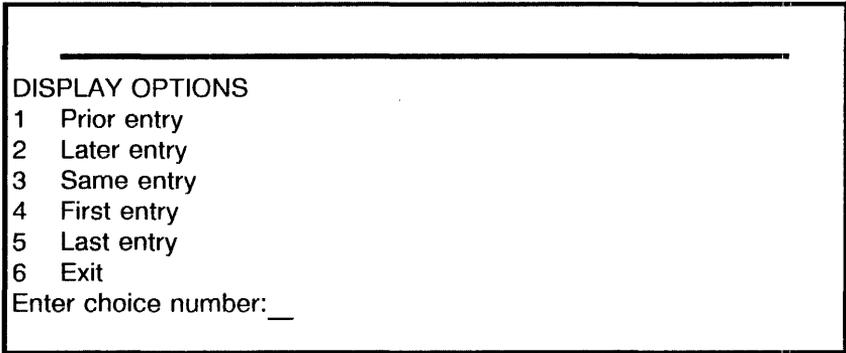
Figure 11-15.   Display Option Entries

Display Read Buffer

The Display Read Buffer displays data in the read buffer. To isolate a bit failure, the data and the byte count are displayed in hexadecimal.

```
READ BUFFER DISPLAY
HEX COUNT      0     1     2     3     4     5     6     7
*******      *****  *****  *****  *****  *****  *****  *****  *****
0000         0001  0203  0405  0607  0809  0A0B  0C0D  0E0F
0008         1011  1213  1415  1617  1819  1A1B  1C1D  1E1F
0010         2021  2223  2425  2627  2829  2A2B  2C2D  2E2F
0018         3031  3233  3435  3637  3839  3A3B  3C3D  3E3F
0020         4041  4243  4445  4647  4849  4A4B  4C4D  4E4F
0028         5051  5253  5455  5657  5859  5A5B  5C5D  5E5F
0030         6061  6263  6465  6667  6869  6A6B  6C6D  6E6F
0038         7071  7273  7475  7677  7879  7A7B  7C7D  7E7F
0040         0001  0203  0405  0607  0809  0A0B  0C0D  0E0F
0048         1011  1213  1415  1617  1819  1A1B  1C1D  1E1F
0050         2021  2223  2425  2627  2829  2A2B  2C2D  2E2F
0058         3031  3233  3435  3637  3839  3A3B  3C3D  3E3F
0060         4041  4243  4445  4647  4849  4A4B  4C4D  4E4F
0068         5051  5253  5455  5657  5859  5A5B  5C5D  5E5F
0070         6061  6263  6465  6667  6869  6A6B  6C6D  6E6F
0078         7071  7273  7475  7677  7879  0000  0000  0000
More? (y/n):__
```

Figure 11-16.   Display Read Buffer

Display Write Buffer

The Display Write Buffer displays data in the write
buffer. To isolate a bit failure, the data and the byte
count are displayed in hexadecimal.

```
WRITE BUFFER DISPLAY
HEX COUNT      0     1     2     3     4     5     6     7
*******       *****  *****  *****  *****  *****  *****  *****  *****
0000          0001  0203  0405  0607  0809  0A0B  0C0D  0E0F
0008          1011  1213  1415  1617  1819  1A1B  1C1D  1E1F
0010          2021  2223  2425  2627  2829  2A2B  2C2D  2E2F
0018          3031  3233  3435  3637  3839  3A3B  3C3D  3E3F
0020          4041  4243  4445  4647  4849  4A4B  4C4D  4E4F
0028          5051  5253  5455  5657  5859  5A5B  5C5D  5E5F
0030          6061  6263  6465  6667  6869  6A6B  6C6D  6E6F
0038          7071  7273  7475  7677  7879  7A7B  7C7D  7E7F
0040          0001  0203  0405  0607  0809  0A0B  0C0D  0E0F
0048          1011  1213  1415  1617  1819  1A1B  1C1D  1E1F
0050          2021  2223  2425  2627  2829  2A2B  2C2D  2E2F
0058          3031  3233  3435  3637  3839  3A3B  3C3D  3E3F
0060          4041  4243  4445  4647  4849  4A4B  4C4D  4E4F
0068          5051  5253  5455  5657  5859  5A5B  5C5D  5E5F
0070          6061  6263  6465  6667  6869  6A6B  6C6D  6E6F
0078          7071  7273  7475  7677  7879  7A7B  7C7D  7E7F
More? (y/n):__
```

Figure 11-17. Display Write Buffer

Display Information Buffer

The Display Information Buffer displays data in the read and write buffers. To isolate a bit failure, the data and the byte count are displayed in hexadecimal.

```
INFORMATION BUFFER DISPLAY
HEX COUNT      0     1     2     3     4     5     6     7
*******       *****  *****  *****  *****  *****  *****  *****  *****
0000          0001  0203  0405  0607  0809  0A0B  0C0D  0E0F
0008          1011  1213  1415  1617  1819  1A1B  1C1D  1E1F
0010          2021  2223  2425  2627  2829  2A2B  2C2D  2E2F
0018          3031  3233  3435  3637  3839  3A3B  3C3D  3E3F
0020          4041  4243  4445  4647  4849  4A4B  4C4D  4E4F
0028          5051  5253  5455  5657  5859  5A5B  5C5D  5E5F
0030          6061  6263  6465  6667  6869  6A6B  6C6D  6E6F
0038          7071  7273  7475  7677  7879  7A7B  7C7D  7E7F
0040          0001  0203  0405  0607  0809  0A0B  0C0D  0E0F
0048          1011  1213  1415  1617  1819  1A1B  1C1D  1E1F
0050          2021  2223  2425  2627  2829  2A2B  2C2D  2E2F
0058          3031  3233  3435  3637  3839  3A3B  3C3D  3E3F
0060          4041  4243  4445  4647  4849  4A4B  4C4D  4E4F
0068          5051  5253  5455  5657  5859  5A5B  5C5D  5E5F
0070          6061  6263  6465  6667  6869  6A6B  6C6D  6E6F
0078          7071  7273  7475  7677  7879  7A7B  7C7D  7E7F
More? (y/n):__
```

Figure 11-18. Display Information Buffer

Exerciser

This test is available to the Systems Analyst. It performs a thorough verification of one or more High Capacity Disk Drives. The test executes extensive write and read IO commands.

This test should be run to verify the hardware when a new High Capacity Disk Drive is installed.

If multiple drives are installed, the Multi Drive selection can be used to test all of the drives sequentially.

CAUTION

This test will destroy the contents of the selected drive/drives.

EXERCISER   First Drive

Passes to run: **10< Return>**
WARNING: This test will destroy the contents of the selected drive/drives.
Do you still wish to continue (y/n): **Yes < Return>**

Total pass count: 10
Total run time: 2 hours 30 mins

SUBTEST:
The title of each subtest is displayed on the screen.

SUCCESSFUL COMPLETION
Type any character to continue:__

Figure 11-19. Exerciser

Command File Options

The Command File Options command is available to the Systems Analyst. These options allow the Systems Analyst to:

● create IO command loops

● examine the results

● collect error data

● troubleshoot hardware problems

If required, a prompt with the required parameters is automatically given. Otherwise, (if the parameter is not understood or the limits are not known), press **<?>** for an explanation of the parameters.

```
COMMAND FILE OPTIONS
1   Build new command file
2   Rerun prior command file
3   Exit
Enter choice number:__
```

Figure 11-20.   Command File Options

Subtest Options

The Subtest Options command is available to the Systems Analyst. These options are used for debugging hardware. They allow for the creation of IO command loops, examining the results, collecting error data, and troubleshooting hardware problems. The subtests keep you from having to build your own command files. There are 52 subtests available. Pressing < ? > will give an explanation of the tests.

```
SUBTEST OPTIONS
1  Display Subtests
2  Enter Subtests
3  Run Subtests
4  Exit
Enter choice number:__
```
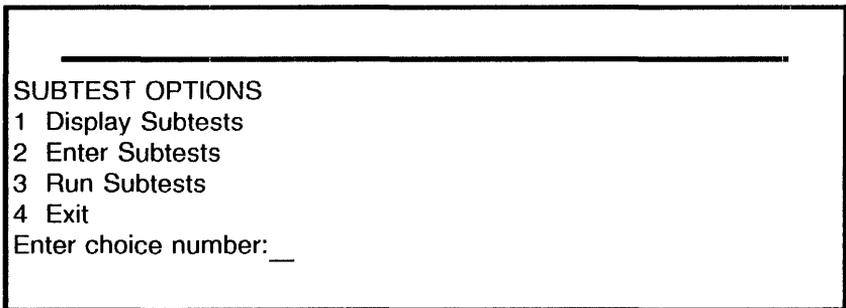
Figure 11-21. Subtest Options

HIGH CAPACITY
CARTRIDGE TAPE
DIAGNOSTICS

The High Capacity Cartridge Tape Diagnostics is a standalone, off-line diagnostic. The High Capacity Cartridge Tape Diagnostics verify proper operation of the cartridge tape hardware and isolate cartridge tape hardware problems.

Three levels of repair are provided. The first level is the MP Code, which points to a FRU (Field Replaceable Unit). The second level is the Error Log, which contains the failing input/output commands and status. Finally, the third level is the Trace Table, which contains the sequence of the input/output commands executed when an error occurs.

High Capacity Cartridge Tape Diagnostics are provided for the Systems Analyst and Service Representative. Both levels require passwords to use their respective tools.

NOTE: The Service Representative password is **cixcos** *and the Systems Analyst password is* **wizard**.

■Both the Technical Support and the Systems Analyst levels of High Capacity Cartridge Tape Diagnostics includes the following selections:
   Confidence test
   Exerciser
   Write Known Data
   Read Known Data
   Display Options
   Command File Options
   Subtest Options
   Create Diagnostic Tape■

Loading the High Capacity Cartridge Tape Diagnostics

The High Capacity Cartridge Tape Diagnostics are loaded using a cartridge tape. It has a menu-driven user interface which requires minimum typing input. Explanations are provided at all selection points when you type **< ? >**.

1. Insert the 8090 Server Diagnostic Cartridge Tape into the cartridge tape drive.

■2. Perform an Alternate Boot [0002] (Cartridge Tape Drive Boot). Upon successful completion, the following menu will be displayed.■

```
Processor Information
Memory Size = 1152 K bytes

Scanning cartridge tape directory (please wait)....Done

Choices Available:
1  Help
2  LowCapacityDiskDiagnostics
3  CartridgeTapeDiagnosticsAndUtilities
4  HighCapacityDiagnosticsAndUtilities
Enter choice number, then press Carriage Return: 4 < Return >
```

Figure 12-1. Tape Executive Menu

3. Type the number corresponding to the High Capacity Diagnostics and Utilities and press **< Return >**.

4.   Type the number corresponding to the desired "Person Running the Test" and press **< Return >**.

5.   When requested, type the appropriate password and press **< Return >**.

Before the Diagnostic and Utility Selections are displayed, a configuration is shown. The purpose of the display is to validate that the configuration is set to indicate the actual hardware.

6.   Type **Y** and press **< Return >** to confirm the configuration. The High Capacity Utilities and Diagnostic Menu is displayed on the screen.

*NOTE: Always type **Y**, even if the configuration is incorrect.*

```
HIGH CAPACITY UTILITIES AND DIAGNOSTICS
HIGH CAPACITY CONFIGURATION DISPLAY

ID7: First Disk Drive, Type = Siemens 310MB
ID6: Empty
ID5: Empty
ID4: Empty
ID3: Empty
ID2: Empty
ID1: First Tape Drive, Type = Fujitsu 130MB
ID0: Processor

Is the above configuration correct? (Yes/No): Y < Return >
```

Figure 12-2.   Configuration Display

7.   Type **4** and press **<Return>** to select the High Capacity Cartridge Tape Diagnostics.

8.   Type the number corresponding to the desired test and press **<Return>**.

HIGH CAPACITY UTILITIES AND DIAGNOSTIC SELECTION

1   SCSI Configuration Utility
2   High Capacity Disk Utilities
3   High Capacity Disk Diagnostics
4   High Capacity Cartridge Tape Diagnostics
5   Exit
Enter choice number:__
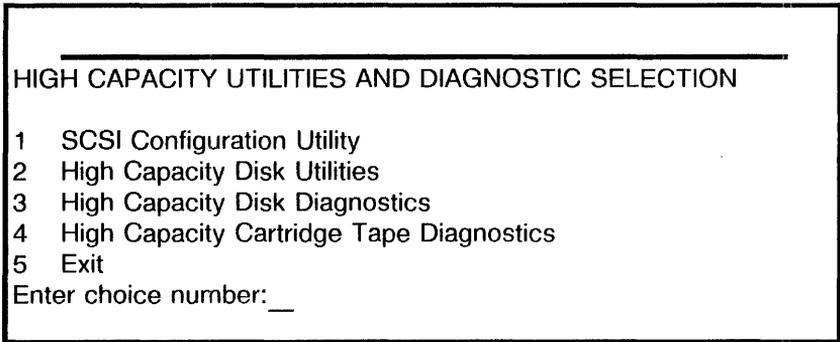
Figure 12-3.   High Capacity Utilities and Diagnostics Menu

■9. If there is more than one tape drive on the
SCSI bus, type the number corresponding to
the tape drive to be tested and press
< Return >.■

```
TEST NAME

DRIVE TO BE SELECTED
1   First Drive
2   Second Drive
3   Third Drive
4   Exit
Enter choice number:__
```

Figure 12-4.   Drive to be Selected

To stop a test in progress, press **< BREAK >**.
STOP key acknowledged appears on the display. If
the disk is performing an operation, the program will
complete that operation before returning control to
you.

Confidence Test

This test is available to the Service Representative and the Systems Analyst. The Confidence test is a thorough verification of the cartridge tape drive. This test looks for hard errors, hard read errors, and excessive soft read errors. This test should be run when any type of problem is suspected in the cartridge tape system.

CAUTION

The Confidence Test requires the Diagnostic Cartridge Tape. You may create a diagnostics tape by using the Create Diagnostic Tape command.

CONFIDENCE TEST   First Drive

Passes to run: **1** **< Return >**

Please insert the Diagnostics Tape.
Any other tape will create erroneous results.
Type any character when this is done:___

CONFIDENCE TEST

Total pass count: 1
Total run time: 18 mins

SUBTEST:
The title of each subtest is displayed on the screen.
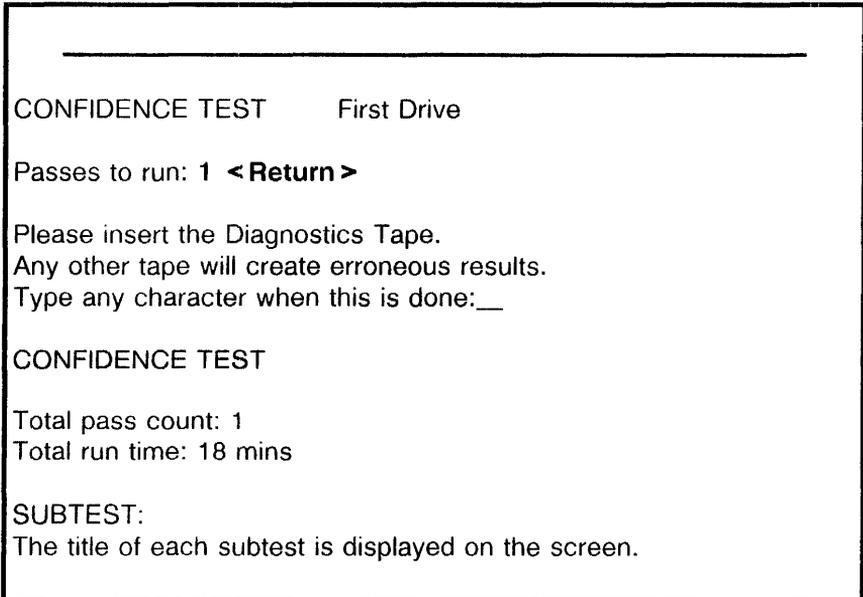
Figure 12-5. Confidence Test

Exerciser

This test is available to the Service Representative and the Systems Analyst. The Exerciser does a thorough verification of the cartridge tape drive and the cartridge tape controller by executing extensive read and write commands. This test looks for hard errors and extensive read errors. It should be run after replacing a high capacity cartridge tape drive or the tape drive controller to ensure that the new hardware will not destroy a good data tape. Any time the test encounters a soft or hard read error, the error is displayed on the screen. When the Exerciser completes successfully, a summation of the soft errors is displayed on the screen.

CAUTION

This test will destroy the contents of the cartridge tape.

EXERCISER   First Drive

Passes to run: **1** **<Return>**
WARNING! The exerciser will destroy the contents of the tape.
Do you still wish to continue? (y/n): No__ **Y** **<Return>**

EXERCISER
Total pass count: 1
Total run time: 15 mins
SUBTEST:
The title of each subtest is displayed on the screen.
SUCCESSFUL COMPLETION
Type any character to continue:__

Figure 12-6. Exerciser

Write Known Data

This test is available to the Service Representative and the Systems Analyst. This command must be used in conjunction with the Read Known Data command to verify the compatibility between the drives. This test writes a known data pattern on the entire tape surface. The data pattern consists of a sector location plus an incrementing data pattern. If the test locates a bad page, it is automatically logged into the Bad Page Table.

CAUTION

This test will destroy the contents of the cartridge tape.

```
WRITE KNOWN DATA     First Drive

Passes to run: 10
Total run time: 1 hour 40 mins.

WARNING! This test will destroy the contents of the tape.
Do you still wish to continue? (y/n): y

SUBTEST:
The title of each subtest is displayed on the screen.

Soft read error:
Page: 9723, stream: 2, track: 58, sector: 27
Hard read error:
Page: 3044, stream: 1, track: 95, sector: 4, tries: 5, times failed: 5
```
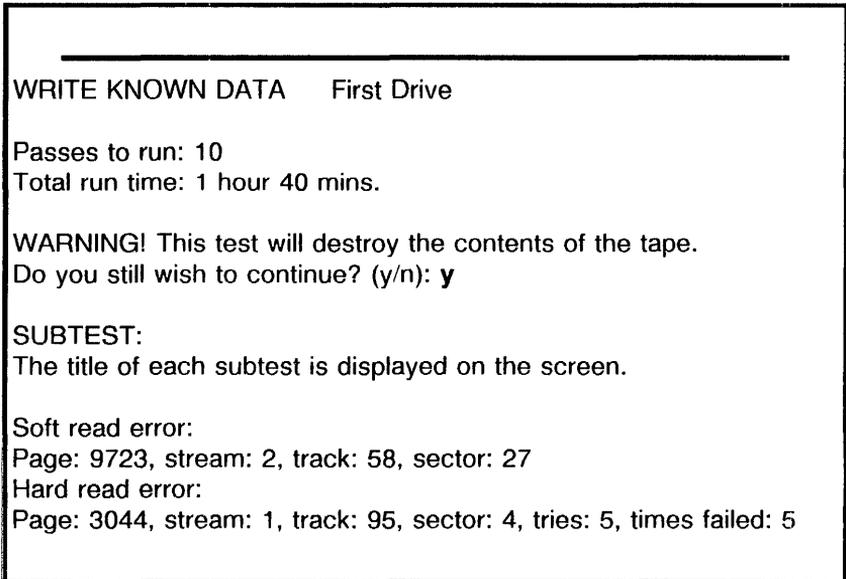
Figure 12-7. Write Known Data

Read Known Data

This test is available to the Service Representative and the Systems Analyst. This command must be used in conjunction with the Write Known Data command to verify the compatibility between the drives. This test reads the data pattern written on the tape by the Write Known Data command.

READ KNOWN DATA   First Drive

Passes to run: 10
Total run time: 1 hour 40 mins

SUBTEST:
The title of each subtest is displayed on the screen.

Soft read error:
Page: 9723, stream: 2, track: 58, sector: 27
Hard read error:
Page: 3044, stream: 1, track: 95, sector: 4, tries: 5, times failed: 5
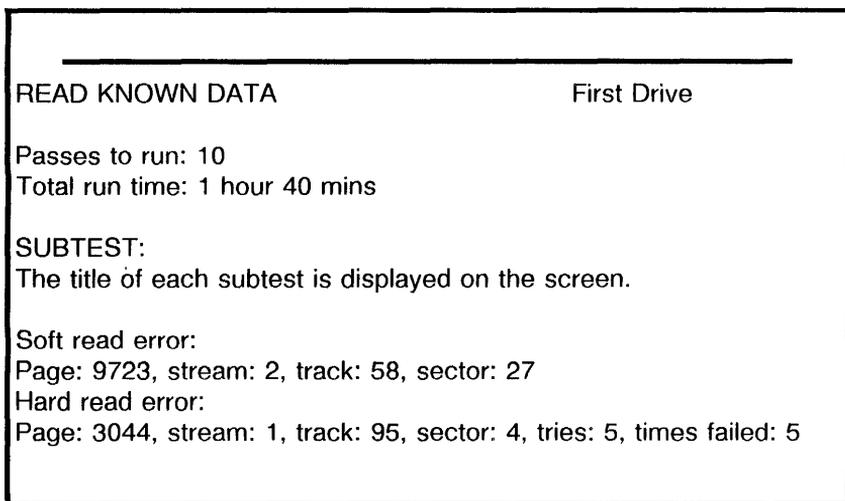
Figure 12-8.   Read Known Data

Display Options

This test is available to the Service Representative and the Systems Analyst. The Display Options command has the following selections. Pressing **<?>** will provide an explanation of each option.

```
DISPLAY OPTIONS
1   Display Error Log
2   Display Soft Read Errors
3   Display Hard Read Errors
4   Display Trace Table
5   Display Read Buffer
6   Display Write Buffer
7   Exit
Enter choice number:__
```

Figure 12-9.   Display Options

Display Error Log

The error log stores each read/write error in sequence. It is a tool to help isolate hardware problems. The error log can hold 64 errors. When the error log is full, it starts at the beginning again, overwriting earlier errors. Each log contains all the IO commands, all parameters for the IO commands, and all the returned status parameters when the IO command fails. Each log also contains an entry count, a time stamp, a remaining pass count, and a subtest number.

```
ENTRY NUMBER:...12              Subtest: 82
Time: 13:04:35                  Pass count: 3

COMMAND:
Read[track:2, sector: 4, use single buffer (y/n): Yes
clear buffer first (y/n): Yes, verify read data (y/n): yes
data type: diagnostic, try count: 15];
RETURNED STATUS:Data ECC Error

Type any character to continue:_
```

Figure 12-10. Display Error Log

After the first error log is displayed, typing any character will show the Display Options menu. From this Display Options menu, each entry can individually be displayed.

```
DISPLAY OPTIONS
1   Prior entry
2   Later entry
3   Same entry
4   First entry
5   Last entry
6   Exit
Enter choice number:__
```

Figure 12-11. Display Option Entries

Display Soft Read Errors

This log allows you to analyse the soft read errors.

```
SOFT READ ERROR DISPLAY

Unit: 1, track: 02, block: 01
Unit: 1, track: 02, block: 02
Unit: 1, track: 02, block: 11
Unit: 1, track: 02, block: 32
Unit: 1, track: 02, block: 33

Type any character to continue:_
```

Figure 12-12.   Display Soft Read Errors

Display Hard Read Errors

This log allows you to analyze the hard read errors.

HARD READ ERROR DISPLAY

Unit: 1, track: 02, block: 01
Unit: 1, track: 02, block: 02
Unit: 1, track: 02, block: 11
Unit: 1, track: 02, block: 32
Unit: 1, track: 02, block: 33

Type any character to continue:__

Figure 12-13.   Display Hard Read Errors

Display Trace Table

The trace table stores each IO command in the sequence that it was executed. It is a tool to help isolate hardware problems. The trace table can hold 64 entries. When the trace table is full, it starts at the beginning again, overwriting earlier errors entries. Each table contains all the IO commands, all parameters for the IO commands, and all returned status parameters when the IO command fails. Each table also contains an entry count, a time stamp, a remaining pass count, and a subtest number.

ENTRY NUMBER:...12   Subtest: 48
Time: 13:04:35   Pass count: 3

COMMAND:
ReadSector [unit: 2, track: 11, use single buffer (y/n): Yes,
sector count:32, clear buffer first (y/n):Yes, verify read data (y/n):
yes, data type: diagnostic, try count:15];

RETURNED STATUS:
Data CRC error

Type any character to continue:__

Figure 12-14. Display Trace Table

After the first trace table is displayed, typing any character will show the Display Options menu. From this Display Options menu, each entry can individually be displayed.

```
DISPLAY OPTIONS
1   Prior entry
2   Later entry
3   Same entry
4   First entry
5   Last entry
6   Exit
Enter choice number:__
```
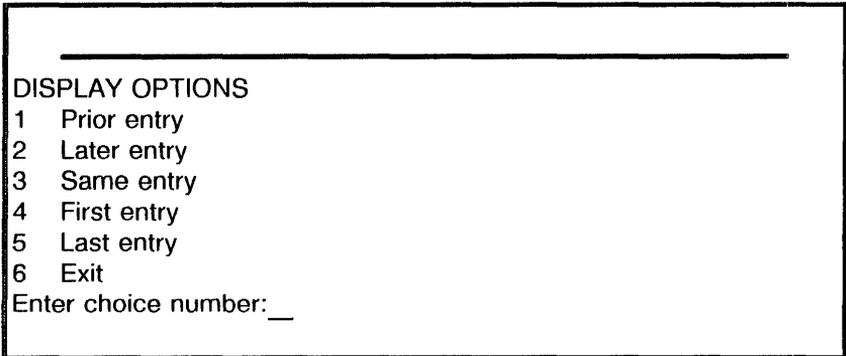
Figure 12-15. Display Option Entries

Display Read Buffer

The Display Read Buffer displays data in the read buffer. To isolate a bit failure, the data and the byte count are displayed in hexadecimal.

```
READ BUFFER DISPLAY
HEX COUNT    0     1     2     3     4     5     6     7
*******     *****  *****  *****  *****  *****  *****  *****  *****
0000        0001  0203  0405  0607  0809  0A0B  0C0D  0E0F
0008        1011  1213  1415  1617  1819  1A1B  1C1D  1E1F
0010        2021  2223  2425  2627  2829  2A2B  2C2D  2E2F
0018        3031  3233  3435  3637  3839  3A3B  3C3D  3E3F
0020        4041  4243  4445  4647  4849  4A4B  4C4D  4E4F
0028        5051  5253  5455  5657  5859  5A5B  5C5D  5E5F
0030        6061  6263  6465  6667  6869  6A6B  6C6D  6E6F
0038        7071  7273  7475  7677  7879  7A7B  7C7D  7E7F
0040        0001  0203  0405  0607  0809  0A0B  0C0D  0E0F
0048        1011  1213  1415  1617  1819  1A1B  1C1D  1E1F
0050        2021  2223  2425  2627  2829  2A2B  2C2D  2E2F
0058        3031  3233  3435  3637  3839  3A3B  3C3D  3E3F
0060        4041  4243  4445  4647  4849  4A4B  4C4D  4E4F
0068        5051  5253  5455  5657  5859  5A5B  5C5D  5E5F
0070        6061  6263  6465  6667  6869  6A6B  6C6D  6E6F
0078        7071  7273  7475  7677  7879  0000  0000  0000
More? (y/n):__
```

Figure 12-16.   Display Read Buffer

Display Write Buffer

The Display Write Buffer displays data in the write buffer. To isolate a bit failure, the data and the byte count are displayed in hexadecimal.

```
WRITE BUFFER DISPLAY
HEX COUNT     0     1     2     3     4     5     6     7
*******      *****  *****  *****  *****  *****  *****  *****  *****
0000         0001  0203  0405  0607  0809  0A0B  0C0D  0E0F
0008         1011  1213  1415  1617  1819  1A1B  1C1D  1E1F
0010         2021  2223  2425  2627  2829  2A2B  2C2D  2E2F
0018         3031  3233  3435  3637  3839  3A3B  3C3D  3E3F
0020         4041  4243  4445  4647  4849  4A4B  4C4D  4E4F
0028         5051  5253  5455  5657  5859  5A5B  5C5D  5E5F
0030         6061  6263  6465  6667  6869  6A6B  6C6D  6E6F
0038         7071  7273  7475  7677  7879  7A7B  7C7D  7E7F
0040         0001  0203  0405  0607  0809  0A0B  0C0D  0E0F
0048         1011  1213  1415  1617  1819  1A1B  1C1D  1E1F
0050         2021  2223  2425  2627  2829  2A2B  2C2D  2E2F
0058         3031  3233  3435  3637  3839  3A3B  3C3D  3E3F
0060         4041  4243  4445  4647  4849  4A4B  4C4D  4E4F
0068         5051  5253  5455  5657  5859  5A5B  5C5D  5E5F
0070         6061  6263  6465  6667  6869  6A6B  6C6D  6E6F
0078         7071  7273  7475  7677  7879  7A7B  7C7D  7E7F
More? (y/n):__
```

Figure 12-17. Display Write Buffer

Command File Options

The Command File Options allow the creation of IO command loops, examining the results, collecting error data, and troubleshooting hardware problems.

If required, a prompt with the required parameters is given automatically. Otherwise, (if the parameter is not understood or the limits are not known), press **<?>** for an explanation of the parameters.

```
COMMAND FILE OPTIONS
1   Build new command file
2   Rerun prior command file
3   Exit
Enter choice number:__
```
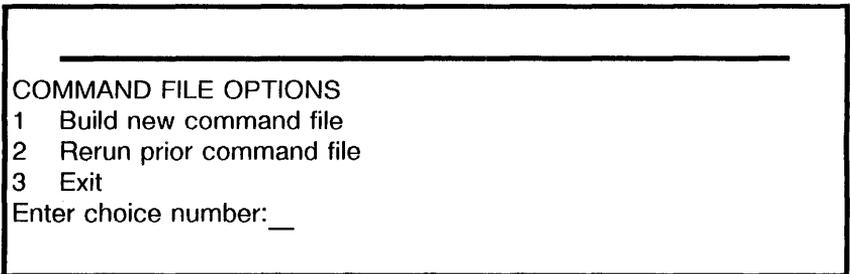
Figure 12-18. Command File Options

Subtest Options

The Subtest Options are used for debugging
hardware. They allow for the creation of IO
command loops, examining the results, collecting
error data, and troubleshooting hardware problems.
The subtests are available so that you need not
build your own command files. There are 56
subtests available. Pressing **< ? >** will give an
explanation of the tests.

SUBTEST OPTIONS
1 Display subtests
2 Enter subtests
3 Run subtests
4 Exit
Enter choice number:___
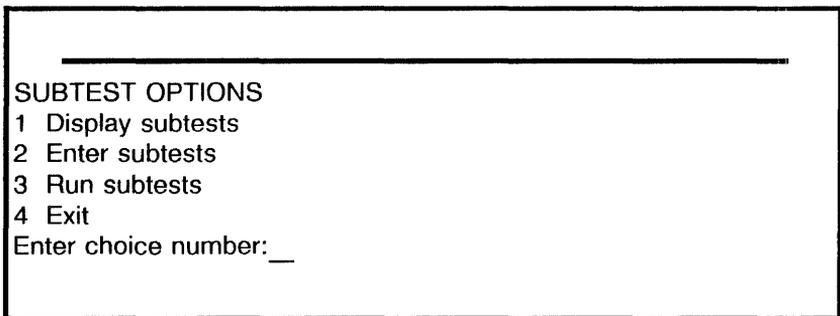
Figure 12-19. Subtest Options

Create Diagnostic Tape

Create Diagnostic Tape requires a scratch tape. It writes known data patterns on two tracks of the tape. This diagnostic tape is required for the Confidence Test.

CAUTION

Use a scratch tape to create the diagnostics tape. This function will destroy the contents of the cartridge tape.
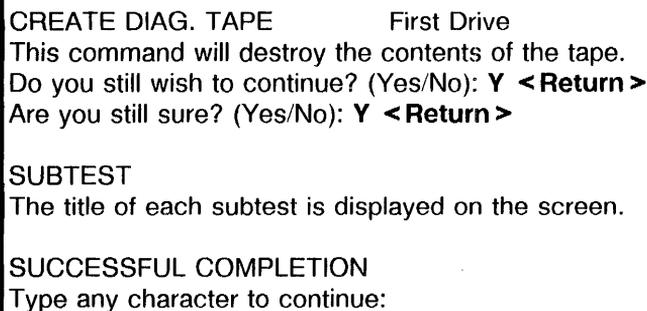
CREATE DIAG. TAPE   First Drive
This command will destroy the contents of the tape.
Do you still wish to continue? (Yes/No): **Y** **< Return >**
Are you still sure? (Yes/No): **Y** **< Return >**

SUBTEST
The title of each subtest is displayed on the screen.

SUCCESSFUL COMPLETION
Type any character to continue:__

Figure 12-20.   Create Diagnostic Tape

Notes:

The following list provides a description of the individual MP codes. It contains very few troubleshooting or repair analysis procedures.

The terms contained within this list are used by the developers. Service Representatives and Systems Analysts should consider this list additional reference material.

Code	**Description**
0000-0013	From MP code [8888], the system defaults to a Diagnostics Rigid Disk Boot unless the Alternate Boot Switch is pressed.

If the Alternate Boot switch is pressed and held during a Dark Boot, the MP displays a sequence of numbers [0000] to [0013] following the MP LED Test. When the Alternate Boot switch is released, the number corresponding to the desired boot selection is displayed.

The alternate boot selections are as follows.

■0000   Boot diagnostics from Rigid Disk Drive #1 (Default).

Before a Dark Boot takes place, this code indicates that the IOPB is hung up. Booting will not proceed until this is cleared.

0001   Boot from Rigid Disk Drive #1 (loads applications software without running the Boot Diagnostics).

0002   Boot from the Cartridge Tape Drive (ensure that the appropriate utility or applications cartridge tape is inserted in the cartridge tape drive).■

Code	Description
∎0003	Boot Offline Diagnostics from the Ethernet.
0004	Boot diagnostics from the Ethernet.
0005	Boot Offline Diagnostics from the cartridge tape (ensure that the diagnostic cartridge tape is inserted in the cartridge tape drive).
0006	Alternate Ethernet Boot. (Currently not used.)
0007	Boot diagnostics from Rigid Disk Drive #2.
0008	Boot diagnostics from Rigid Disk Drive #3.
0009	Boot diagnostics from Rigid Disk Drive #4.
0010	Cartridge Tape Drive Retension Routine.
0011	Boot diagnostics from Rigid Disk Drive #5.
0012	Boot diagnostics from Rigid Disk Drive #6.
0013	Boot diagnostics from Rigid Disk Drive #7.∎
0060	Cartridge Tape Controller reset failed. (The Cartridge Tape Controller is located on the IOPB PWB.)
0061	Cartridge Tape Controller seek test failed. (The Cartridge Tape Controller is located on the IOPB PWB.)
0062	Cartridge Tape Controller remained busy after reset. (The Cartridge tape Controller is located on the IOPB PWB.)
0063	Cartridge Tape Head Load Test never completed.
0065	Cartridge Tape Change Status fails high.

Code	Description
0066	Direct Memory Access End Count fails high. (Cartridge Tape Drive subsystem.)
0067	Cartridge Tape Drive not selected.
0068	Ready fails high with Cartridge Tape Drive not selected.
0069	Write Protect fails high with Cartridge Tape Drive not selected.
0070	Cartridge Tape Drive Head Loaded fails high after a Reset.
0072	Cartridge Tape Drive CRC error fails after a reset.
0073	Track 00 fails high with Cartridge Tape Drive not selected.
0075	Cartridge Tape Drive Busy fails high after a reset.
∎0081 - 0082	Index pulse failure. Index pulse signal from the cartridge tape drive was not received.∎
0087	Cartridge Tape Drive track number is too big.
0089	Cartridge Tape Drive Controller Track Register is incorrect.
0090	Cartridge Tape Drive is not ready.
0091	Cartridge Tape Drive Restore failed.
0099	Pre-boot Diagnostics are complete.
0100	Start Phase 0. The source of this code is the Boot EPROM on the IOPB PWB.

Code	Description
∎0111	Rigid disk booting specified, but no disk is found. The source of this code is the boot EPROM.∎
0112	Multi disks found. Rigid disk booting specified, but multi disks bits in Mem 0. The source of this code is the boot code.
0113	Not implemented Alternate Boot device. The source of this code is the boot code.
0114	Invalid boot type. The source of this code is the boot code.
0115	Not implemented boot source. The source of this code is the boot code.
∎0117	Unknown special boot file block. The source of this code is the boot code.
0118	Something is wrong with the IOPB block byte count. The source of this code is the boot code.
0120	Track number too big (cartridge tape). The source of this code is the boot code.
0121	Track number negative (cartridge tape). The source of this code is the boot code.
0122	Hardware track register incorrect (cartridge tape). The source of this code is the boot code.
0123	Seek hard error (cartridge tape), probably the drive is not ready. The source of this code is the boot code.
0124	Restore failure (cartridge tape). (Cannot verify Track 0 or Track 0 bit is not true.) The source of this code is the boot code.∎

Code	Description
■0125	Seek failure (cartridge tape). The source of this code is the boot code.■
0135	Finish Phase 0 (IOPB PWB). The source of this code is the boot microcode (Domino).
■0136	Transfer of Control Store Image completed. The source of this code is the boot microcode (Domino).
0137	Transfer of TPC Image completed. The source of this code is the boot microcode (Domino).■
0138	Start CP Kernel (IOPB PWB). The source of this code is the boot microcode (Domino).
0139	Start CP Phase 0 (IOPB PWB). The source of this code is the boot microcode (Domino).
■0140	Boot devices detected in main memory 0 by IOPB PWB. The source of this code is the boot microcode (Domino).
0141	Inform CP. CP U-registers set up. Boot Device, and Host address transmitted to CP PWB. The source of this code is the boot microcode (Domino). The SCSI boot PROM is installed on the ESCSI PWB.■
0142	Cartridge tape initialized for cartridge booting (IOPB PWB). The source of this code is the boot microcode (Domino).

Code	Description
▌0149	Waiting for Phase 1 boot file to be read in from boot device. This is an early code during the booting sequence and should display for only a few seconds. During disk booting, this code will be displayed up to 90 seconds after initial power on. The source of this code is the boot EPROM.
0150	Commence interpreting Phase 1 boot file. The source of this code is the boot EPROM.
0151	CP error in reading from boot device. This frequently occurs when booting after switching on power. Rebooting usually clears this code. The source of this code is the boot code.
0154	Illegal IOPB port command. The source of this code is the boot code.
0155	CP Trap through Control Store 0 (CS parity, or double-bit memory error). The source of this code is the boot code.
0167	Unknown special boot file block. The source of this code is the boot code.
0168	Something wrong with IOPB block byte count. The source of this code is the boot code.
0169	LoadU specified not in Phase 0. The source of this code is the boot code.▌
0170	Track Too Big Phase 1 (IOPB PWB). The source of this code is the boot code.
0171	Track Number Negative Phase 1 (IOPB PWB). The source of this code is the boot code.

Code	Description
0172	Command Track Error Phase 1 (IOPB PWB). Hardware track register incorrect. The source of this code is the boot code.
0173	Type 1 Hard Error Phase 1 (IOPB PWB). Seek hard error, probably disk not ready. Ensure that the cartridge tape is in the drive and in a "ready" state.
0174	Restore Failure Phase 1 (IOPB PWB). The source of this code is the boot code.
0175	Seek Failure Phase 1 (IOPB PWB). The source of this code is the boot code.
0176	Read Sector Failure Phase 1 (IOPB PWB). The source of this code is the boot code.
0177	Read Hard Error Phase 1 (IOPB PWB). The source of this code is the boot code.
0178	No DMA End Count 1 Phase 1 (IOPB PWB). No internal DMA completion. The source of this code is the boot code.
0179	No DMA End Count 2 Phase 1 (IOPB PWB). No external DMA completion. The source of this code is the boot code.
∎0190	Commence completion of Phase 1. The source of this code is the EPROM.∎
0191	CP Stopped Phase 1. The source of this code is the boot EPROM.
∎0192	Transfer of Control Store image completed. The source of this code is the boot EPROM.∎

Code	Description
▊0193	Transfer of TPC image completed. The source of this code is the boot EPROM.
0194	CP execution of Initial started. The source of this code is the boot EPROM.
0199	Waiting for Phase 2 boot file to be read in from boot device. The source of this code is the boot code.▊
0200	Interpret Boot File Phase 2 (IOPB PWB). The source of this code is the boot code.
▊0201	CP error in reading from boot device. The source of this code is the boot code.
0202	Null Germ slot in Physical Volume Root Page (PVRP). The source of this code is the boot code.▊
0203	CP Broken Chain Phase 2. Error in rigid disk block chain. The source of this code is the boot code.
▊0204	Illegal IOPB port command. The source of this code is the boot code.
0205	CP Trap through Control Store 0 (CS parity, or double-bit memory error). The source of this code is the boot code.
0206	A boot sequence was initiated which includes running diagnostics, but no diagnostic microcode file is installed on the rigid disk. PVRP pointer is zero.
0207	No Pilot microcode file is installed on the rigid disk. PVRP pointer is zero.
0208	No boot loader file is installed on the rigid disk. PVRP pointer is zero.▊

Code	Description
0209	Failed to read self describing page.
0210	Head count of 0 in self describing page.
0211	Bad seal in self describing page.
0212	Bad version # in self describing page.
▮0217	Unknown special boot file block. The source of this code is the boot code.
0218	Something is wrong with the IOPB block byte count. The source of this code is the boot code.
0219	LoadU specified not in Phase 0. The source of this code is the boot code.▮
0220	Track too big phase 2. The source of this code is the boot code.
▮0221	Track negative phase 2. The source of this code is the boot code.▮
0222	Command track error phase 2. Hardware track register incorrect. The source of this code is the boot code.
0223	Type 1 hard error phase 2. Seek hard error, disk probably not ready. The source of this code is the boot code.
0224	Restore failure phase 2. The source of this code is the boot code.
0225	Seek failure phase 2. The source of this code is the boot code.
0226	Read sector failure phase 2. The source of this code is the boot code.

Code	Description
0227	Read hard error phase 2. The source of this code is the boot code.
0228	No DMA end count 1 phase 2. No internal DMA completion. The source of this code is the boot code.
0229	No DMA end count 2 phase 2. No external DMA completion. The source of this code is the boot code.
∎0240	Commence completion of phase 2. The source of this code is the boot code.∎
0241	CP stopped phase 2. The source of this code is the boot code.
0242	Transfer control storage image phase 2. The source of this code is the boot code.
0243	Transfer TPC image phase 2. The source of this code is the boot code.
0244	Start CP phase 2. CP execution of Mesa emulator started. The source of this code is the boot code.
0249	Wait for Floppy Initial to complete in CP. The source of this code is the boot Code.
∎0250	Commence reading PVRP from floppy. The source of this code is the boot Microcode (Domino).
0251	The germ disk address is 0.
0252	The soft microcode disk address is 0. The Pilot (soft) microcode disk address is 0.
0253	The hard microcode (diag file) disk address is 0.∎

Code   **Description**

0260   Start Interpretation of Germ/Boot from cartridge
                    tape. The source of this code is the boot code.

0270   Memory initialization: Track number too big. While
                    the memory was being initialized with the
                    germ/Othello file from the cartridge tape, the
                    cartridge tape track number was found to be too
                    big. The source of this code is the boot code.

0271   Memory initialization: Track number negative.
                    While the memory was being initialized with the
                    germ/Othello file from the cartridge tape, the
                    cartridge tape track number was found to be
                    negative. The source of this code is the boot code.

0272   Memory initialization: Hardware track register
                    incorrect. While the memory was being initialized
                    with the germ/Othello file from the cartridge tape,
                    the cartridge tape track register was found to be
                    incorrect. The source of this code is the boot code.

0273   Memory initialization: Seek hard error. While the
                    memory was being initialized with the germ/Othello
                    file from the cartridge tape, the cartridge tape got a
                    hard error while trying to seek. Disk probably not
                    ready. The source of this code is the boot code.

0274   Memory initialization: Restore failure. While the
                    memory was being initialized with the germ/Othello
                    file from the cartridge tape, the cartridge tape was
                    unable to do a restore. The source of this code is
                    the boot code.

Code	Description
0275	Memory initialization: Seek failure. While the memory was being initialized with the germ/Othello file from the cartridge tape, the cartridge tape was unable to do a seek. The source of this code is the boot code.
0276	Memory initialization: Read sector failure. While the memory was being initialized with the germ/Othello file from the cartridge tape, the cartridge tape was unable to read a sector. The source of this code is the boot code.
0277	Memory initialization: Hard read failure. While the memory was being initialized with the germ/Othello file from the cartridge tape, the cartridge tape had a hard read error. The source of this code is the boot code.
0278	Memory initialization: No internal DMA completion. While the memory was being initialized with the germ/Othello file from the cartridge tape, the internal DMA did not complete. The source of this code is the boot code.
0279	Memory initialization: No external DMA completion. While the memory was being initialized with the germ/Othello file from the cartridge tape, the external DMA did not complete. The source of this code is the boot code.
▮0285	Commence completion of Phase 2 cartridge tape. The source of this code is the boot code.
0286	Pilot (Soft) microcode cartridge tape address set. The source of this code is the boot code.▮

Code	Description
∎0287	Diagnostic (Hard) microcode cartridge tape address set. The source of this code is the boot code.∎
0301	Terminal Diagnostic Test.
0302	Control Store Constant data (ones) Test.
0303	Control Store Constant data (zero) Test.
0304	TPC constant/Random data Test.
0305	Control Store Address data Test.
0306	Control Store Random data Test.
0307	Register and Branch Test.
0308	Branch on cyc2 Test.
0309	Port In Test.
0310	Port Out Test.
0311	DMA Port In Test.
0312	DMA Port Out Test.
0313	CP Branches Test.
0314	CP Bus Data Rotation Test.
0315	CP Registers Test.
0316	CP Instruction Buffer Test.
0317	CP Trap and Error Handling Test.
0318	CPMEM Test.
0319	CURSOR Test.

Code	Description
0320	Cycle Test.
0321	Task TC Test.
0322	Ethernet test.
∎0323	The diagnostics will display 0323 on MP if the clock is not incrementing properly.∎
0324	Host Prom test.
0325	CS mostly 0 Access test.
0326	CS mostly 1 Access test.
0327	Extended CS Bank Reg test.
0328	Extended CS Constant data (ONES) test.
0329	Extended CS Constant data (ZERO) test.
0330	Extended CS Address data test.
0331	Extended CS Random data test.
0332	Extended CS mostly 0 Access test.
0333	Extended CS mostly 1 Access test.
0334	Extended Bank Isolation test.
0335	Any Mouse switch stuck on test.
0339	SCSI Non-DMA test.
0340	SCSI DMA test.
∎0380	Keyboard Loopback test.
0381	Keyboard test: No Data Set Ready.∎

Code	Description
∎0382	Keyboard test: No TxReady.
0383	Keyboard test: No RxReady. ∎
0399	Boot Diagnostic Monitor Input Mode. The Boot diagnostic is waiting for some input from the keyboard. "B" runs the regular Boot diagnostic (rather than Memory or Disk diagnostics). See Section 4 of this handbook for more details.
0400	El-Utility: Read RTC Test.
0401-0407	El-Utility: Set RTC Test.
0408-0412	El-Utility: LSEP Test.
∎0413	El-Utility: 19.2K baud RS232C Internal Loopback test.
0414	El-Utility: 9.6K baud RS232C Port Loopback test.
0415	El-Utility: 56K baud RS232C Cable Loopback test.
0416	El-Utility: 300 Baud RS232C Cable or Async Modem Loopback test.
0417	El-Utility: 1200 Baud RS232C Cable or Async Modem Loopback test.
0418	El-Utility: All RS232C Synchronous Modem Loopback test.
0419	El-Utility: Secondary Channels RS232C Cable Loopback test.
0420-0424	El-Utility: RS366 test.
0425-0429	El-Utility: Character Printer Port Loopback test. ∎

Code	Description
0430	El-Utility: Host Prom Checksum test.
∎0431	Not applicable.
0432-0435	Not applicable.∎
0436	El-Utility: Initialize and restore cartridge tape.
0437	El-Utility: Read all cylinders on side 0.
0438	El-Utility: Read all cylinders on side 1.
0439	El-Utility: Initialize and restore cartridge tape.
0499	Boot Diagnostic El-Utility Input Mode. The Boot Diagnostic is waiting for some input from the keyboard.
0500	The operational IOPB code (Domino) has started. The source of this code is the operational IOPB code.
∎0501	Domino starting to read the time-of-day clock.
0502	Domino completed reading the time-of-day clock. The next MP codes will come from Mesa Software.∎
0505	CS parity error detected. The source of this code is the operational IOPB code.
0506	Burdock attempted to use EtherKludge. The source of this code is the operational IOPB code. It flashes when displayed on the MP, indicating the presence of an error.

Code   **Description**

0507   CP attempted to use EtherKludge. The source of
                  this code is the operational IOPB code. It flashes
                  when displayed on the MP, indicating the presence
                  of an error.

0508   IOPB breakpoint found, but no IOPB kernel to catch
                  it. A breakpoint was found while the IOPB code
                  was executing, but there was not an IOPB kernel in
                  the PROM to catch the breakpoint. The source of
                  this code is the operational IOPB code. It flashes
                  when displayed on the MP, indicating the presence
                  of an error.

■0509   An Illegal IOPB interrupt was attempted.

0510   The Map entry was incorrect for the IOPB page
                  access. The source of this code is the operational
                  IOPB code. It flashes when displayed on the MP,
                  indicating the presence of an error.

0511   CP DMA operation failed to complete. The source
                  of this code is the operational IOPB code. It flashes
                  when displayed on the MP, indicating the presence
                  of an error.■

0512   CP DMA channel not specified.

■0513   Read CPPort timed out; the CP was not responding.

0514   Write CPPort timed out; the CP was not responding.

0520   A task's stack has overflowed.■

0565   Invalid keyboard tone generator command.

Code	Description
∎0570	Command value in Processor CSB was invalid. The source of the code is the operational IOPB code. It flashes when displayed on the MP, indicating the presence of an error.
0571	Not implemented command in Processor CSB.∎
∎0572	The Time-Of-Day could not be set correctly in the hardware TOD clock. The time was still indicated as invalid. The source of this code is the operational IOPB code. It flashes when displayed on the MP, indicating the presence of an error. The time was still indicated as invalid.∎
0576	LSEP Control CSB Overrun. The source of this code is the operational IOPB code. It flashes when displayed on the MP, indicating the presence of an error.
∎0580	Invalid IOCB command. The source of this code is the operational IOPB code. It flashes when displayed on the MP, indicating the presence of an error.∎
0581	IOCB Command not implemented. Not implemented Cartridge tape Command. The source of this code is the operational IOPB code. It flashes when displayed on the MP, indicating the presence of an error.
0582	Invalid Escape command. The source of this code is the operational IOPB code. It flashes when displayed on the MP, indicating the presence of an error.

Code	Description
∎0583	Track register is not correct. The source of this code is the operational IOPB code. It flashes when displayed on the MP, indicating the presence of an error.∎
0584	Track number too large. The source of this code is the operational IOPB code. It flashes when displayed on the MP, indicating the presence of an error.
∎0585	Could not program Cartridge tape DMA Controller channel. The source of this code is the operational IOPB code. It flashes when displayed on the MP, indicating the presence of an error.
0586	External DMA End Count not set. The source of this code is the operational IOPB code. It flashes when displayed on the MP, indicating the presence of an error.
0587	Internal DMA End Count not set. The source of this code is the operational IOPB code. It flashes when displayed on the MP, indicating the presence of an error.∎
0600	EI Memory 1 pass of all zeros store and check.
0601	EI Memory 1 pass of all FFFF store and check.
0602	EI Memory 1 pass of all AAAA store and check.
0603	EI Memory 1 pass of all 5555 store and check.
0604	EI Memory 128 passes of block patterns store and check.
0605	EI Memory 8 passes of store and check all 64k bank selection logic.

Code	Description
0606	El Memory 2 passes address test no display.
0607	El Memory 4 passes address test with a display.
0608	El Memory 128 passes random data 2 store and check.
0609	El Memory 128 passes random data 3 store and check.
0610	El Memory 255 passes checking trap logic using address 0.
0611	El Memory 128 passes ecc test using block patterns.
0612	El Memory 128 passes ecc test using random data 2 store and check.
0613	El Memory 128 passes ecc test using random data 3 store and check.
0614	El Memory 2 passes refresh counter test store delay check.
0699	Boot Diagnostic El-Memory Input Mode. The Boot diagnostic is waiting for some input from the keyboard. See Section 4 of this handbook for details.
0799	Boot Diagnostic El-Disk Input Mode. The Boot diagnostic is waiting for some input from the keyboard. See Section 4 of this handbook for details.
0900	Boot loader started loading boot file. cGerm.

Code   **Description**

∎0901   The Pilot boot loader has received a frame fault. This could be caused by hardware, by client code overwriting the boot loader, by the boot mesa file (given to MakeBoot when the boot loader was created) specifying an inadequate distribution of frames, or . by a boot loader software bug. cGermAllocFault. ∎

0902   Boot loader received unexpected trap or kernel function call. The Pilot boot loader got a trap or kernel function call for which it does not provide a handler. This could be caused by hardware, client code overwriting the boot loader, or by a boot loader software bug. In the development environment only, this code can be caused by the following: From the time that you press the boot button until Pilot moves the Germ into the display bank, you can only teledebug. You cannot use a local debugger because it is installed with the germ in the display bank, and if called when the germ is not in the display bank, the inload of Copilot will smash the germ resulting in MP 902. cGermControlTrap.

0903   Boot loader attempting to start an already started module. The Pilot boot loader got a start trap on a module which has already been started. This could be caused by hardware, client code overwriting the boot loader, or by a boot loader software bug. cGermStartFault. .

0904   Boot loader page or write-protect fault. The pilot boot loader got a page fault or write fault. This could be caused by hardware, client code overwriting the boot loader, or by a boot loader software bug. cGermMemoryFault.

Code	Description
0905	Boot loader is wrong for current initial microcode. The boot loader has detected that it is not compatible with the initial microcode which it is running on. This could also be caused by hardware, or client code overwriting the boot loader. cWrongGerm.
0906	Boot loader and boot file have different version numbers. The Pilot boot loader has discovered that it is not compatible with the Pilot that just called it. This could also be caused by hardware, client code overwriting the boot loader, or by a boot loader software bug. cGermWrongPilot.
0907	Boot loader disk reschedule trap. The pilot boot loader got a page fault, write fault, or frame fault. This could be caused by hardware, client code overwriting the boot loader, or by a boot loader software bug. cGermRescheduleTrap.
0909	Boot loader SIGNAL or ERROR. The Pilot boot loader got a Mesa SIGNAL or ERROR. This could be caused by hardware, client code overwriting the boot loader, or by a boot loader software bug. cGermError.
0910	Boot loader running, doing inLoad or outLoad. cGermAction.
0911	Boot loader not compatible with the physical volume. cGermBadPhysicalVolume.

Code	Description

0912   Boot loader incompatible with MakeBoot used for boot file. The version of MakeBoot which was used to produce the boot file being loaded is incompatible with the boot loader being used (i.e. different versions of StartList.mesa). cGermBadBootFileVersion.

0913   No physical boot file installed. The boot loader has been instructed to boot the system physical volume boot file but there is none installed. cGermNoPhysicalBootFile.

0914   Boot file contains invalid data. The boot loader has detected bad data in the boot file it is loading. cGermBadBootFile.

0915   Ethernet debuggee server in control. The system is waiting to talk to a remote Ethernet debugger. A local debugger is not being used because either (1) the "5" boot switch has been used, or (2) Copilot was not correctly installed in a volume of the next higher type, or (3) it is too early in initialization to find the local debugger. cTeledebugServer.

If 0915 occurs during the installation of software, the problem could be a bad page on the rigid disk, or the system cannot read the cartridge tape, or a hardware failure.

0916   Boot file will not fit in real memory. The boot file that the boot loader is loading is too large to fit into real memory. cGermInsufficientRealMemory.

0917   Machine is being remote debugged. The system is being debugged by another machine over the Ethernet. This indicates status only.

Code   **Description**

■0918 - 0919   Boot loader has transferred control to caller, who has hung. The boot loader has finished the action that its client requested, and it has transferred control back to its client. The client has not managed to change the MP code, and is presumed to have hung. cGermFinished.■

0920   Boot loader device driver running (disk, ether, cartridge tape). cGermDriver.

0921   Boot loader device error on device being booted. cGermDeviceError.

0922   Operation on boot device not completed in expected time. Typically, this is reported by an Ethernet operation when the source of the data being read has stopped supplying data. cGermTimeout.

■0923   Not applicable.■

0924   Ethernet boot server not responding. cGermNoServer.

0925   Unexpected Ethernet packet sequence number or size. The boot loader received a packet from the Ethernet which contains an unexpected packet sequence number or size. cGermFunnyPacket.

0926   The cartridge tape from which you are trying to boot needs its tension reset. Germ posts this. cGermMediaProblem.

0927   Boot file ends before it should. The germ has found no more boot file to load when it expected more, likely due to a broken link. Reinstall the boot file and try again. cGermShortBootFile.

Code	Description
0928	Waiting for any boot server to respond. Pilot displays this code while it is waiting for a response from any server. cWaitingForBootServer.
0929	Bootfile descriptor page does not look like one (bootfile installed non-labelless, bootfile pointers not set, bootfile not really there, or descriptor page trashed). Reinstall the boot file, reset physical volume boot pointers, and try again. cGermDescriptorError.
0930	Pilot control and Mesa runtime systems being initialized. cControl.
0931	Pilot not compatible with MakeBoot which produced boot file. A Pilot boot file has received control, but discovered that the software it contains is incompatible with the version of MakeBoot which produced that boot file (i.e., different versions of StartListmesa). cBadBootFileVersion.
0932	Trap before trap handler initialized. Pilot has gotten a trap very early in its initialization before the handler for the trap has been initialized. cEarlyTrap.
0933	Pilot not compatible with boot loader. The Pilot inside the boot file which has just started running has discovered that it is incompatible with the boot loader that loaded it (i.e. different versions of Boot.mesa). cBadBootGermVersion.
0934	Boot file StartList contains bad data. The Pilot in the boot file which has just started running has found bad data in the StartList in that boot file. cBadBootFile.

Code	Description
0935	Need Ethernet debuggee server but boot loader cannot. The boot loader being used has been requested to act as an Ethernet debuggee server but it does not have that capability. cCantSwap.
0936	Waiting for microcode debugger. Pilot is spinning in a loop, waiting to be debugged by an attached microcode debugger (Burdock or Midas). This behavior is invoked by trying to go to the debugger when Pilot was booted with the "&" or "/376/" boot switch. cHang.
0937	Attempting to set the time via Ethernet or the hardware clock. Pilot is attempting to get the time of day from an Ethernet Time Server. If none responds, it attempts to get the time from the hardware clock. The system will wait displaying this MP Code until the time is available from one of these sources. cTimeNotAvailable.
0938	Stopping devices before boot or visit to debugger. Pilot has begun shutting down the I/O devices ("running cleanup procedures") in preparation for booting another system or going to the debugger. If this code persists for more than a moment, some software or hardware has hung up. cCleanup.
0939	System Power Off called, and no power control relay. cPowerOff.
0940	Pilot Store component being initialized. cStorage.

Code	Description
0941	Bad Load State version. cBadLoadStateVersion.
0947	Pilot displays this code when the disk drive, containing the system being booted, is not ready. cDriveNotReady.
0948	System physical volume needs scavenging. cPVNeedsScavenging.
▌0949	Pilot is unable to complete scavenging due to a hardware error trying to access the disk. cDiskHardwareError▌
0950	Logical volume being scavenged. If a logical volume being booted or opened is in an inconsistent state, Pilot will display this MP Code while it scavenges, that is, verifies the contents of the volume. The amount of time required depends on the size, occupancy, and fragmentation of the logical volume. Not applicable to 8090 systems. Still may occur on labelled systems. cScavenging.
0951	Alternate code for progress of logical volume scavenging. This is an alternate to cScavenging, available for additional feedback on the progress of the logical volume scavenger. Indicates status only. Not applicable to 8090 systems. Still may occur on labelled systems. cScavengingAlternate.
0952	Alternate code for additional passes of LV scavenger. This code is an alternate to cScavenging and cScavenging Alternate, to indicate additional passes during logical volume scavenging. Indicates status only.Not applicable to 8090 systems. Still may occur on labelled systems. cScavengingPassAlternate.

Code	Description
0953	Debugger pointers are invalid. Reset or clear debugger pointers, or install the debugger and repeat the operation. cBadDebuggerPointers.
0960	System Volume is being opened, temporary files from previous run being deleted, and Verifier being run. cDeleteTemps.
0965	Insufficient file space for Pilot data space backing store. This MP Code is caused by the booting agent (usually the operator, talking to Othello, Prometheus, etc.) specifying a boot switch ("[","!","]", or none of them) which specifies a size for the pilot data space backing storage cache but there is not enough free space on the system volume to provide the requested file space. This error can only happen when the size specified is larger than that specified during the previous boot session. cInsuffBackingStore.
0966	Insufficient file space for file lock nodes file. Try specifying a smaller backing file to allow room for this file. cInsuffFileLockStorage.
0970	Spaces being created for non-bootloaded code & data. cMap.
0980	Communication being initialized. cCommunication.
0981	Waiting for a Pup/EthernetOne 8-bit address. This occurs only on processors operating in the development environment, never in customer environments. cFindPupAddress.
0982	Cannot determine ARPA 32 bit host address. cNoArpaHostAddress.

Code	Description
0990	PilotClient.Run has been called. cClient.
1515	Task did not wakeup or took too long to complete.
2000-2190	Server Terminal on-line diagnostics. See Section 8 of this handbook.
2800	Running Multiport Diagnostics, no errors encountered.
■2801	RS232C hardware problem. Suspect: MPCO, Mesa Processor, Backplane. Internal loopback subtests.
2802	RS232C hardware problem. Suspect: MPCO, Harness/connector, loopback tool. Turnaround tool loopback subtests.
2803	RS232C hardware problem. Suspect: MPCO, Harness/connector, cable, modem. Modem loopback subtests.
2804	RS232C hardware problem. Suspect: MPCO, Harness/connector, cable, Mesa Processor, Backplane. All (Command timeout occurred). *NOTE: This is a possible microcode hang-up and the cartridge tape diagnostic may have to be rebooted.*
2806	RS366 hardware problem. Suspect: IOP, MPCO, Backplane, Harness and/or connector, loopback tool. RS366 loopback subtests.■
2808	Software problem. Call the Xerox Systems Analyst.
■2809	Realtime clock problem. Suspect: IOPB.■

Code	Description
∎2820	Cartridge Tape Diagnostics loaded. ∎
2821	Cartridge Tape Hardware Error.
2822	Cartridge Tape Hardware Error.
2823	Cartridge Tape Media or Hardware Error: too many soft read errors.
2824	Cartridge Tape Media or Hardware Error: too many hard read errors.
2825	Cartridge Tape: IO command has timed out.
2826	Cartridge Tape: Retension failure.
2827	Cartridge Tape: Reading the Bad Page Table failed.
∎2829	Reboot. If the MP code remains on [2829] for more than two minutes, a Real Time Clock failure is indicated. ∎
3900	El-Disk Diagnostic: Unknown ST506 Disk Program running
	A Server whose self describing disk page (SDD page) is initially damaged will display MP code [3900]. After the SDD page has been fixed (via the Change Disk Description, New Disk Checkout, or Format commands), the MP code will continue to display [3900] until a Format has been run, or the diagnostics are rebooted.

Code	Description
3910	Unknown ST506 Disk Fault Analysis Interface test: Test running.
3911	Unknown ST506 Disk Fault Analysis Interface test: No interface signals.
3912	Unknown ST506 Disk Fault Analysis Interface test: Not ready, no index, no sector.
3913	Unknown ST506 Disk Fault Analysis Interface test: Not ready, no index.
3914	Unknown ST506 Disk Fault Analysis Interface test: Not ready, no sector.
3915	Unknown ST506 Disk Fault Analysis Interface test: Not ready.
3916	Unknown ST506 Disk Fault Analysis Interface test: No index, no sector.
3917	Unknown ST506 Disk Fault Analysis Interface test: No index.
3918	Unknown ST506 Disk Fault Analysis Interface test: No sector.
3930	Unknown ST506 Disk Fault Analysis Seek Complete Test: Test running.
3931	Unknown ST506 Disk Fault Analysis Seek Complete Test: Seek incomplete.
3940	Unknown ST506 Disk Fault Analysis Recal Seek Test: Test running.

Code	Description
3941	Unknown ST506 Disk Fault Analysis Recal Seek Test: Incorrect track00 status / Seek error.
3942	Unknown ST506 Disk Fault Analysis Recal Seek Test: Seek error.
3970	Unknown ST506 Disk Fault Analysis Read Test: Test running.
3971	Unknown ST506 Disk Fault Analysis Read Test: Bad electronics.
3972	Unknown ST506 Disk Fault Analysis Read Test: Bad head.
3980	Unknown ST506 Disk Fault Analysis Verify Test: Test running.
3981	Unknown ST506 Disk Fault Analysis Verify Test: Verify error.
3990	Unknown ST506 Disk Fault Analysis Head Select Test: Test running.
3991	Unknown ST506 Disk Fault Analysis Head Select Test: Wrong head selected.
4000	Unknown ST506 Disk Fault Analysis Sector Test: Test running.
4002	Unknown ST506 Disk Fault Analysis Sector Test: Wrong sector selected.
4010	Unknown ST506 Disk Fault Analysis Extended Seek Test: Test running.
4013	Unknown ST506 Disk Fault Analysis Extended Seek Test: Seek error.

Code	Description
4020	Unknown ST506 Disk Fault Analysis Extended Read Test: Test running.
4021	Unknown ST506 Disk Fault Analysis Extended Read Test: Bad media.
4040	Unknown ST506 Disk Fault Analysis Write Test: Test running.
4041	Unknown ST506 Disk Fault Analysis Write Test: Bad electronics.
4042	Unknown ST506 Disk Fault Analysis Write Test: Bad head.
4043	Unknown ST506 Disk Fault Analysis Write Test: Not run due to excessive risk.
4050	Unknown ST506 Disk Fault Analysis Write Seek Test: Test running.
4051	Unknown ST506 Disk Fault Analysis Write Seek Test: Write error.
4091	Unknown ST506 Disk Fault Analysis Fatal Error: Write fault.
4092	Unknown ST506 Disk Fault Analysis Fatal Error: Microcode wakeup problem.
4093	Unknown ST506 Disk Fault Analysis Fatal Error: Memory fault.
4099	Unknown ST506 Disk Fault Analysis Test ran successfully.
4110	Unknown ST506 Disk Format Analysis Interface Test: Test running.

Code	Description
4111	Unknown ST506 Disk Format Analysis Interface Test: No interface signals.
4112	Unknown ST506 Disk Format Analysis Interface Test: Not ready, no index, no sector.
4114	Unknown ST506 Disk Format Analysis Interface Test: Not ready, no sector.
4115	Unknown ST506 Disk Format Analysis Interface Test: Not ready.
4116	Unknown ST506 Disk Format Analysis Interface Test: No index, no sector.
4117	Unknown ST506 Disk Format Analysis Interface Test: No index.
4118	Unknown ST506 Disk Format Analysis Interface Test: No sector.
4130	Unknown ST506 Disk Format Analysis Seek Complete Test: Test running.
4131	Unknown ST506 Disk Format Analysis Seek Complete Test: Seek incomplete.
4140	Unknown ST506 Disk Format Analysis Recal Seek Test: Test running.
4141	Unknown ST506 Disk Format Analysis Recal Seek Test: Incorrect track00 status / Seek error.
4142	Unknown ST506 Disk Format Analysis Recal Seek Test: Seek error.
4160	Unknown ST506 Disk Format Analysis Write Read Test: Test running.

Code	Description
4161	Unknown ST506 Disk Format Analysis Write Read Test: Bad electronics.
4162	Unknown ST506 Disk Format Analysis Write Read Test: Bad head.
4165	Unknown ST506 Disk Format Analysis Verify Test: Test running.
4166	Unknown ST506 Disk Format Analysis Verify Test: Verify error.
4170	Unknown ST506 Disk Format Analysis Head Select Test: Test running.
4171	Unknown ST506 Disk Format Analysis Head Select Test: Wrong head selected.
4180	Unknown ST506 Disk Format Analysis Extended Seek Test: Test running.
4181	Unknown ST506 Disk Format Analysis Extended Seek Test: Seek error.
4190	Unknown ST506 Disk Format Analysis Sector Test: Test running.
4192	Unknown ST506 Disk Format Analysis Sector Test: Wrong sector selected.
4195	Unknown ST506 Disk Format Analysis Extended Format Test: Test running.
4197	Unknown ST506 Disk Format Analysis Extended Format Test: Bad cylinder 000.
4199	Unknown ST506 Disk Format Analysis Test ran successfully.

Code	Description
4200	Echo Test Started.
4201	Echo Test Initiated.
4202	Echo Test Sent out packet.
4203	Echo Test checking.
4500	On-line RS232C diagnostic. Indicates the beginning of the test.
4501	RS232C On-line Diagnostic. Inability to create a communication channel with the RS232C port. Code indicates RS232C port appears non-existent or busy to the machine.
4510	RS232C On-line Diagnostics. Indicates the successful start of the on-line RS232C echo test.
4520	No Data Set Ready raised. On-line RS232C echo test waits for the signal DSR to be raised to make the connection. If the signal is not raised in 30 seconds, the test will time out and abort.
4527	Begin dialing portion of RS232C test. Indicates the dialer test has been chosen and is beginning.
4528	Performing RS232C dialer test. Indicates the dialing process is happening.
4529	User has canceled the dialer test. User has pressed Control-C to end test while On-line RS232C dial test was dialing.
4540	RS232C On-line test is finishing. The test is cleaning up the space it used.

Code	Description
4545	First frame has been received. In the RS232C test, the first frame sent is more carefully monitored than successive frames. When this frame has completely been sent, this code will appear. No more frames will be sent until the continue question has been answered yes in the display.
4598	Ending receive process. In the RS232C On-line test, this code shows that the receive process has ended and is joining the other processes.
4599	Ending send process. In the RS232C On-line test, this code shows that the send process has ended and is joining the other processes.
4600	EI-Disk Diagnostic: 25MB Fault Analysis Program running.
4610	25MB Fault Analysis Interface test: Test running.
4611	25MB Fault Analysis Interface test: No interface signals.
4612	25MB Fault Analysis Interface test: Not ready, no index, no sector.
4613	25MB Fault Analysis Interface test: Not ready, no index.
4614	25MB Fault Analysis Interface test: Not ready, no sector.
4615	25MB Fault Analysis Interface test: Not ready.
4616	25MB Fault Analysis Interface test: No index, no sector.
4617	25MB Fault Analysis Interface test: No index.

Code	Description
4618	25MB Fault Analysis Interface test: No sector.
4630	25MB Fault Analysis Seek Complete Test: Tes running.
4631	25MB Fault Analysis Seek Complete Test: Seek incomplete.
4640	25MB Fault Analysis Recal Seek Test: Test running.
4641	25MB Fault Analysis Recal Seek Test: Incorrect track00 status / Seek error.
4642	25MB Fault Analysis Recal Seek Test: Seek error.
4670	25MB Fault Analysis Read Test: Test running.
4671	25MB Fault Analysis Read Test: Bad electronics.
4672	25MB Fault Analysis Read Test: Bad head.
4680	25MB Fault Analysis Verify Test: Test running.
4681	25MB Fault Analysis Verify Test: Verify error.
4690	25MB Fault Analysis Head Select Test: Test running.
4691	25MB Fault Analysis Head Select Test: Wrong head selected.
4700	25MB Fault Analysis Sector Test: Test running.
4702	25MB Fault Analysis Sector Test: Wrong sector selected.
4710	25MB Fault Analysis Extended Seek Test: Test running.
4713	25MB Fault Analysis Extended Seek Test: Seek error.

Code	Description
4720	25MB Fault Analysis Extended Read Test: Test running.
4721	25MB Fault Analysis Extended Read Test: Bad media.
4740	25MB Fault Analysis Write Test: Test running.
4741	25MB Fault Analysis Write Test: Bad electronics.
4742	25MB Fault Analysis Write Test: Bad head.
4743	25MB Fault Analysis Write Test: Not run due to excessive risk.
4750	25MB Fault Analysis Write Seek Test: Test running.
4751	25MB Fault Analysis Write Seek Test: Write error.
4791	25MB Fault Analysis Disk Fatal Error: Write fault.
4792	25MB Fault Analysis Disk Fatal Error: Microcode wakeup problem.
4793	25MB Fault Analysis Disk Fatal Error: Memory fault.
4799	25MB Fault Analysis Test ran successfully.
4810	25MB Format Analysis Interface Test: Test running.
4811	25MB Format Analysis Interface Test: No interface signals.
4812	25MB Format Analysis Interface Test: Not ready, no index, no sector.
4814	25MB Format Analysis Interface Test: Not ready, no sector.
4815	25MB Format Analysis Interface Test: Not ready.
4816	25MB Format Analysis Interface Test: No index, no sector.

Code	Description
4817	25MB Format Analysis Interface Test: No index.
4818	25MB Format Analysis Interface Test: No sector.
4830	25MB Format Analysis Seek Complete Test: Test running.
4831	25MB Format Analysis Seek Complete Test: Seek incomplete.
4840	25MB Format Analysis Recal Seek Test: Test running.
4841	25MB Format Analysis Recal Seek Test: Incorrect track00 status / Seek error.
4842	25MB Format Analysis Recal Seek Test: Seek error.
4860	25MB Format Analysis Write Read Test: Test running.
4861	25MB Format Analysis Write Read Test: Bad electronics.
4862	25MB Format Analysis Write Read Test: Bad head.
4865	25MB Format Analysis Verify Test: Test running.
4866	25MB Format Analysis Verify Test: Verify error.
4870	25MB Format Analysis Head Select Test: Test running.
4871	25MB Format Analysis Head Select Test: Wrong head selected.
4880	25MB Format Analysis Extended Seek Test: Test running.
4881	25MB Format Analysis Extended Seek Test: Seek error.
4890	25MB Format Analysis Sector Test: Test running.

Code	Description
4892	25MB Format Analysis Sector Test: Wrong sector selected.
4895	25MB Format Analysis Extended Format Test: Test running.
4897	25MB Format Analysis Extended Format Test: Bad cylinder 000.
4899	25MB Format Analysis Test ran successfully.
5600	El-Disk Diagnostic: 85MB Fault Analysis Program running.
5610	85MB Fault Analysis Interface test: Test running.
5611	85MB Fault Analysis Interface test: No interface signals.
5612	85MB Fault Analysis Interface test: Not ready, no index, no sector.
5613	85MB Fault Analysis Interface test: Not ready, no index.
5614	85MB Fault Analysis Interface test: Not ready, no sector.
5615	85MB Fault Analysis Interface test: Not ready.
5616	85MB Fault Analysis Interface test: No index, no sector.
5617	85MB Fault Analysis Interface test: No index.
5618	85MB Fault Analysis Interface test: No sector.
5630	85MB Fault Analysis Seek Complete Test: Test running.
5631	85MB Fault Analysis Seek Complete Test: Seek incomplete.
5640	85MB Fault Analysis Recal Seek Test: Test running.

Code	Description
5641	85MB Fault Analysis Recal Seek Test: Incorrect track 00 status/Seek error.
5642	85MB Fault Analysis Recal Seek Test: Seek error.
5670	85MB Fault Analysis Read Test: Test running.
5671	85MB Fault Analysis Read Test: Bad electronics.
5672	85MB Fault Analysis Read Test: Bad head.
5680	85MB Fault Analysis Verify Test: Test running.
5681	85MB Fault Analysis Verify Test: Verify error.
5690	85MB Fault Analysis Head Select Test: Test running.
5691	85MB Fault Analysis Head Select Test: Wrong head selected.
5700	85MB Fault Analysis Sector Test: Test running.
5702	85MB Fault Analysis Sector Test: Wrong sector selected.
5710	85MB Fault Analysis Extended Seek Test: Test running.
5713	85MB Fault Analysis Extended Seek Test: Seek error.
5720	85MB Fault Analysis Extended Read Test: Test running.
5721	85MB Fault Analysis Extended Read Test: Bad media.
5740	85MB Fault Analysis Write Test: Test running.
5741	85MB Fault Analysis Write Test: Bad electronics.
5742	85MB Fault Analysis Write Test: Bad head.

Code	Description
5743	85MB Fault Analysis Write Test: Not run due to excessive risk.
5750	85MB Fault Analysis Write Seek Test: Test running.
5751	85MB Fault Analysis Write Seek Test: Write error.
5791	85MB Fault Analysis Disk Fatal Error: Write fault.
5792	85MB Fault Analysis Disk Fatal Error: Microcode wakeup problem.
5793	85MB Fault Analysis Disk Fatal Error: Memory fault.
5799	85MB Fault Analysis Test ran successfully.
5810	85MB Format Analysis Interface Test: Test running.
5811	85MB Format Analysis Interface Test: No interface signals.
5812	85MB Format Analysis Interface Test: Not ready, no index, no sector.
5814	85MB Format Analysis Interface Test: Not ready, no sector.
5815	85MB Format Analysis Interface Test: Not ready.
5816	85MB Format Analysis Interface Test: No index, no sector.
5817	85MB Format Analysis Interface Test: No index.
5818	85MB Format Analysis Interface Test: No sector.
5830	85MB Format Analysis Seek Complete Test: Test running.
5831	85MB Format Analysis Seek Complete Test: Seek incomplete.
5840	85MB Format Analysis Recal Seek Test: Test running.

Code	Description
5841	85MB Format Analysis Recal Seek Test: Incorrect track 00 status/Seek error.
5842	85MB Format Analysis Recal Seek Test: Seek error.
5860	85MB Format Analysis Write Read Test: Test running.
5861	85MB Format Analysis Write Read Test: Bad electronics.
5862	85MB Format Analysis Write Read Test: Bad head.
5865	85MB Format Analysis Verify Test: Test running.
5866	85MB Format Analysis Verify Test: Verify error.
5870	85MB Format Analysis Head Select Test: Test running.
5871	85MB Format Analysis Head Select Test: Wrong head selected.
5880	85MB Format Analysis Extended Seek Test: Test running.
5881	85MB Format Analysis Extended Seek Test: Seek error.
5890	85MB Format Analysis Sector Test: Test running.
5892	85MB Format Analysis Sector Test: Wrong sector selected.
5895	85MB Format Analysis Extended Format Test: Test running.
5897	85MB Format Analysis Extended Format Test: Bad cylinder 000.
5899	85MB Format Analysis Test ran successfully.
6000	High Capacity Tape Off-Line Diagnostics are running with no errors encountered.

Code	Description
∎6001	High capacity tape drive: the device is not ready for operation. Ensure that the power to the peripheral cabinet is connected and that the power switch is ON. Ensure that the cartridge tape is correctly inserted into the drive and that the tape drive door is fully closed. (*NOTE: The door closes only if the tape is correctly inserted.*)
6002	High capacity tape drive: hardware error.
6003	High capacity tape drive: unknown error.
6005	High capacity tape drive: file mark found.
6006	High capacity tape drive: wrong request bytes.
6007	High capacity tape drive: end of tape.
6008	High capacity tape drive: end of data.
6009	High capacity tape drive: beginning of tape.∎

Code	Description
■6010	High capacity tape drive: recovered error.
6011	High capacity tape drive: cartridge not ready.
6012	High capacity tape drive: wrong cartridge.
6013	High capacity tape drive: drive power is off.
6014	High capacity tape drive: cartridge is not loaded.
6015	High capacity tape drive: load failure occured.
6016	High capacity tape drive: unrecoverable media error occured.
6017	High capacity tape drive: media error occured during tape erasure.
6018	High capacity tape drive: controller hardware error.
6019	High capacity tape drive: drive interface error.
6020	High capacity tape drive: drive hardware error.
6021	High capacity tape drive: DB parity error was detected in SCSI.
6022	High capacity tape drive: parity error occurred in the controller buffer.
6023	High capacity tape drive: invalid contents in the CDN or parameter data.
6024	High capacity tape drive: unit attention.
6025	High capacity tape drive: writing was attempted on a write protected tape.
6026	High capacity tape drive: unformatted tape was read and no block could be detected.■

Code	Description
∎6027	High capacity tape drive: the controller aborted a command.
6028	High capacity tape drive: volume overflow.
6029	High capacity tape drive: bus has been reset.
6030	High capacity tape drive: cartridge has been changed.
6031	High capacity tape drive: data error.
6032	High capacity tape drive: too many soft read errors.
6033	High capacity tape drive: too many hard read errors.

NOTE: The MP codes for the first high capacity tape drive were covered in the previous section (6001-6033). The MP code descriptions are the same for the second through the fourth tape drives. For example, MP code 6001 for the first high capacity tape drive would be equivalent to 6051 for the second tape drive, 6101 for the third drive and 6151 for the fourth tape drive.

6051-6083	The second high capacity tape drive.
6101-6133	The third high capacity tape drive.
6151-6183	The fourth high capacity tape drive. ∎

Code	Description
6200	High Capacity Disk Off-Line Diagnostics are running with no errors encountered.
∎6211	High capacity disk drive: hardware problem. Ensure that the power to the SCSI box is connected and that the power switch is ON.
6212	High capacity disk drive: media problem. Run Disk Surface Verification test.
6213	High capacity disk drive: media or hardware problem (too many soft read errors). Run Disk Surface Verification test.
6214	High capacity disk drive: media or hardware problem (too many hard read errors).
6215	High capacity disk drive: IO Command timed out. Reboot the system.
6216	High capacity disk drive: bad spot on cylinder 0.
6217	High capacity disk drive: reading the manufacturing bad page table failure.
6218	High capacity disk drive: drive spindle motor start up too slow, the drive will soon fail. Back up the data. Run the Confidence test.
6219	High capacity disk drive: Physical Volume problem. Run the Confidence test, then run Physical Volume Scavenge.
6221-6279	Second through seventh high capacity disk drive.

NOTE: The MP codes for the first high capacity disk drive were covered in the previous section (6211-6219). For the second through the seventh drives, the MP codes will be represented in the form of 62NX, where N = the drive number and X = codes 1 through 9.

For example, the MP code 6216 for the first high capacity disk drive would be equivalent to 6226 for the second disk drive; 6236 for the third disk drive, etc.∎

Code	Description
6300	High Capacity Configuration Utility is running with no error encountered.
6301	High Capacity Configuration Utility: Checksum error detected after a read operation.
6302	High Capacity Configuration Utility: Checksum error detected after a write operation.
6303	High Capacity Configuration Utility: EEPROM space exceeded.
6305	High Capacity Configuration Utility: Person running the diagnostics claims that the Configuration EEPROM contents are not valid.
■6308	Reboot. If the MP code remains on [6308] for more than two minutes, a Real Time Clock failure is indicated.■
7001	Backstop needs to be initialized.
7002	Backstop unable to initialize itself.
7003	Uncaught signal from Backstop.
7004	Backstop Looping. The file server is raising an error during its recovery, causing the infinite loop from file server error to Backstop to file server restart to file server error.
7500	The scavenger program is running. No action is required.
7505	Need to run the Configuration Utility Cartridge Tape. Contact the Xerox Systems Analyst to run the Configuration Utility.

Code   **Description**

7512   Fault (software error).   A software error has been
                      found that prevents the 8090 from proceeding. Four
                      codes will cycle as [7512], [gggg], [00gg],
                      [0mmm], where [gggg] is the global frame address
                      and mmm is the octal code for the first letter of the
                      CallDebugger message giving further information
                      about the problem.

                      Record the code and retry the operation.   If the
                      retry succeeds, treat the code as an intermittent
                      failure.

■7513   Hardware Error.   Four MP codes will cycle as
                      [7513], [gggg], [oogg], [0mmm], where [gggg] is
                      the global frame address and mmm is the octal
                      code for the first letter of the CallDebugger
                      message giving further information about the
                      problem.

                      [7513] [0130] [0004] [0107]

                      GMT clock not set: GetUniversalID

                      Record the codes and retry the operation.   If the
                      retry succeeds, treat the code as an intermittent
                      failure.■

Code	Description

■7516   Unrecoverable disk error. Four MP codes will cycle with the following meanings:

[7516] [0000] [0000] [0125]

Unrecoverable disk error: Error

[7516] [00XX] [0XXX] [0125]

Unrecoverable disk error on page XXXXX.

Record all four codes, but DO NOT reboot the system. If the problem occurs repeatedly, call for assistance.■

7520   Break Point. A breakpoint has been encountered. MP codes will cycle as [7520], [0ggg], [0ggg], and [pppp], where gggggg is the global frame of the module and [pppp] is the program counter of the instruction where the breakpoint is set.

7521   Bug. An internal error has occurred in the operating system. MP codes will cycle as [7521], [0ggg], [0ggg], and [pppp], [bbbb] where gggggg is the global frame of the module, [pppp] is the program counter of the instruction at which the error is encountered and [bbbb] is the bug parameter number.

7522   Call Debugger. A program has asked to go to the debugger. MP codes will cycle as [7522], [0ggg], [0ggg], [pppp], [mmmm], and [nnnn], where gggggg is the global frame of the module, [pppp] is the program counter of the instruction at which the debugger was called, and mmmm and nnnn are the octal codes of the first two characters of the message parameter.

Code	Description
7524	Interrupt. Some program has called Runtime.Interrupt. MP codes will cycle as [7524], [0ggg], [0ggg], and [pppp], where gggggg is the global frame of the module and pppp is the program counter of the current instruction.
7525	Visit Debugger. Some program has called SpecialRuntime.VisitDebugger. MP codes will cycle as [7525], [0ggg], [0ggg], and [pppp], where gggggg is the global frame of the module and [pppp] is the program counter of the current instruction.
7526	Return. (This MP code is only used by the debugger and should never occur with the debugger substitute.) It indicates the return from an interpret-call. MP codes will cycle as [7526], [0ggg], [0ggg], and [pppp], where gggggg is the global frame of the module and pppp is the program counter of the current instruction.
7527	Return Aborted. (This MP code is only used by the debugger and should never occur with the debugger substitute.) It indicates the return from an unsuccessful interpret-call. MP codes will cycle as [7527], [0ggg], [0ggg], and [pppp], where gggggg is the global frame of the module and [pppp] is the program counter of the current instruction.
7528	Address fault. A program has tried to access an address that is not mapped. MP codes will cycle as [7528], [0ggg], [0ggg], [pppp], and [xaaa], where gggggg is the global frame of the module and pppp is the program counter of the current instruction. x is the high order octal digit of the address, and aaa is the number of octal digits in the address.

Code	Description

7529

Write Protect Fault. A program has tried to write into an address that is read-only. MP codes will cycle as [7529], [0ggg], [0ggg], [pppp], and [xaaa], where gggggg is the global frame of the module and pppp is the program counter of the current instruction. x is the high order octal digit of the address, and aaa is the number of octal digits in the address.

7530

Uncaught Signal. A program has raised an error or signal that was not caught. MP codes will cycle as [7530], [0ggg], [0ggg], [pppp], [0hhh], [0hhh], [0iii], and [0sss], where gggggg is the global frame of the module and pppp is the program counter of the current instruction. hhhhhh is the global frame of the signal and iii is the index of the signal in that frame. sss is the first word of the signal argument.

7531

Unrecoverable Disk Error. There is a disk page which contains invalid data. MP codes will cycle as [7531], [0ggg], [0ggg], [pppp], [0aaa], [0aaa], and [0aaa], where gggggg is the global frame of the module and [pppp] is the program counter of the current instruction. aaaaaaaaa is the decimal address of the bad disk page.

7539

Other - Debugger Substitute. The debugger substitute has been called with one of the swap reasons used only by Copilot. (This should never happen.) MP codes will cycle as [7539], [0ggg], [0ggg], and [pppp], where gggggg is the global frame of the module and pppp is the program counter of the current instruction.

Code	Description
8000	8000-series application software is running ok. The maintenance panel displays this code during normal operation.
■8888	Lamp test for all the segments on the MP.
9700	25MB ST506 Drive Sequence, Ready Test.
9701	25MB ST506 Drive, Index Timing Test.
9702	25MB ST506 Drive, Seek/Read/Verify Cylinder Zero.
9703	25MB ST506 Drive, Seek/Read/Verify Diagnostic Cylinder.
9704	25MB ST506 Drive, Dip Switch Test.
9705	25MB ST506 Drive Controller Sequence, All Ones Test.
9706	25MB ST506 Drive Controller Sequence, All Zeros Test.
9707	25MB ST506 Drive Controller Sequence, All Ones Test.
9708	25MB ST506 Drive Controller Sequence, All Zeros Test.
9718	85MB ST506 Drive Sequence, Ready Test.
9719	85MB ST506 Drive, Index Timing Test.
9720	85MB ST506 Drive, Seek/Read/Verify Cylinder Zero.
9721	85MB ST506 Drive, Seek/Read/Verify Diagnostic Cylinder.■

Code	Description
■9722	85MB ST506 Drive, Dip Switch Test.
9723	85MB ST506 Drive Controller Sequence, All Ones Test.
9724	85MB ST506 Drive Controller Sequence, All Zeros Test.
9725	85MB ST506 Drive Controller Sequence, All Ones Test.
9726	85MB ST506 Drive Controller Sequence, All Zeros Test.
9950	Running the Development environment files system scavenger. This code is for informational purposes only.
9999	The debugger substitute has been called. This is a result of an abnormal error condition and may require Systems Analyst/Technical Support Center assistance. Run Boot Diagnostics (boot 5 from cartridge tape) and repair as indicated. After performing the repair action, reboot. If the problem persists, call for assistance.■

NOTES: