Seagate

PROGRAMMABLE FIELD TEST UNIT TB2A3

with

SMD-O/SMD-E INTERFACE

GENERAL DESCRIPTION

OPERATION

USERS GUIDE

83325770

REVISION RECORD

REVISION	DESCRIPTION
01 (08-15-86)	Preliminary release
02 (11-07-86)	Preliminary release
03 (12-12-86)	Preliminary release
A (01-12-87)	Original release. Replaces general description and operation sections of pub. no. 83324740
B (10-03-88)	This revision incorporates a larger selection menu, adds newer drives, and makes other miscellaneous technical corrections.
C (03-09-90)	Editorial changes only.

REVISION LETTERS I, O, Q AND X ARE NOT USED.

Address comments concerning this manual to:
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12701 Whitewater Drive
Minnetonka, MN 55343
or use Comment Sheet in the back of this manual.

LIST OF EFFECTIVE PAGES

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New features, as well as changes, deletions, and additions to information in this manual are indicated by bars in the margins or by a dot near the page number if the entire page is affected. A bar by the page number indicates pagination rather than content has changed.

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Blank	-	B-1	A
App A Div	-	B-2	A
Blank	-	B-3	A
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A-6	B	B-9	A
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PREFACE

INTRODUCTION

This manual is prepared for disk drive maintenance personnel and provides general description and operation information for the Seagate TB2A3 Programmable Field Test Unit (PFTU).

You must be familiar with drive logic and how it controls I/O, seek, and read/write operations. You must also understand how the drive interfaces with the controller.

The information in this manual is presented as follows:

Section 1 - General Description. Describes the location and use of all controls and indicators. Describes equipment functions and specifications with controlware for SMD-O/SMD-E interface loaded in memory.

Section 2 - Operation. Provides operating procedures for setting up and running tests on a disk drive.

Appendix A - Descriptions of Set-Up Displays and Display Lines. Describes how selections or entries made on displays and display lines control tests run on a disk drive.

Appendix B - Interpretation of Read/Write Errors. Explains characteristics peculiar to the PFTU and how they affect error information displayed during read/write operations.

In addition to this manual, there is a hardware maintenance manual that contains theory of operation, maintenance, diagrams, and parts data. You may order the TB2A3 Hardware Maintenance Manual (publication No. 83324750) from:

Seagate Technology, Inc.
Customer Services
12701 Whitewater Drive
Minnetonka, MN 55343
Phone: (612) 931-8612
Fax: (612) 931-8817

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FIGURES

TABLES

Proper safety and repair is important to the safe, reliable operation of this unit. Service should be done by qualified personnel only. This maintenance manual describes procedures recommended by the manufacturer as effective methods of servicing the unit. Some of these procedures require the use of specially designed tools. For proper maintenance and safety, these specially designed tools should be used as recommended.

The procedures in this maintenance manual and labels on the unit contain warnings and cautions which must be carefully read and observed in order to minimize or eliminate the risk of personal injury. The warnings point out conditions or practices that are potentially hazardous to maintenance personnel. The cautions point out practices which, if disregarded, could damage the unit and make it unsafe for use.

For the safety of maintenance and operating personnel, the following precautions must be observed:

- Perform all maintenance by following the procedures given in this manual and using only Seagate replacement parts.
- Read and observe all cautions and warnings provided in the procedures and labeled on the unit.
- Use the special tools called out in the maintenance procedure.
- Observe sound safety practices when performing maintenance.
- Use caution when troubleshooting a unit that has voltages present. Remove power from unit before servicing or replacing components.
- Wear safety glasses when servicing units.
- Wear safety shoes when removing or replacing heavy components.

It is also important to understand that these warnings and cautions are not exhaustive. The manufacturer could not possibly know, evaluate and advise maintenance personnel of all conceivable ways in which maintenance might be performed or the possible risk of each maintenance technique. Consequently, the manufacturer has not completed any such broad evaluation. Thus, any persons who use any non-approved maintenance procedure or tool must first satisfy themselves that neither their safety nor the unit performance will be jeopardized by the maintenance techniques they select.

ABBREVIATIONS

ADD	Address
ADDR	Address
AI	Address Embedded
AM	Address Mark
AM/SI	Address Mark/Sector Index
bps	Bits Per Second
BYT	Byte
CLR	Clear
CMD	Cartridge Module Drive
CNT	Count
CONT	Continue
CRC	Cyclical Redundancy Code
CRT	Cathode Ray Tube
CTS	Clear To Send
CUR	Current
CYL	Cylinder
DECR	Decrement
DIAG	Diagnostics
DMA	Direct Memory access
DSR	Data Set Ready
DSTN	Destination
DTA	Data
DTR	Data Terminal Ready
EFM	Error Flaw Map
EMD	Eight-Inch Module Drive
ENG	Engineering
EXTND	Extended
FDD	Floppy Disk Drive
FLGD	Flagged
FLT	Fault
FSD	Fixed Storage Drive
ft	Foot
GND	Ground
HAP	Home Address Protect
HD	Head
HDR	Header
HEX	Hexadecimal
Hg	Mercury
Hz	Hertz
I/O	Input/Output

ABBREVIATIONS (Contd)

INCR	Increment
kg	Kilogram
kPa	Kilopascal
lb	Pound
LMTD	Limited
MAX	Maximum
MFM	Modified Frequency Modulation
MHz	Megahertz
mm	Millimeter
MMD	Mini Module Drive
mv	Millivolts
N	No
NA	Not Address Embedded
NONRCV	Non-Recoverable
OFST	Offset
PFTU	Programmable Field Test Unit
PREV	Previous
Prot	Protect
RAM	Random Access Memory
RD	Read or Read Data
RECOV	Recoverable
RN	Run
RPM	Revolutions Per Minute
RSD	Removable Storage Drive
RTZ	Return To Zero
SCTRS	Sectors
SEQ	Sequencer
SK	Seek
SMD	Storage Module Drive
SNC	Sync
STS	Status
TD	Transmitted Data
TRK	Track
TSTS	Tests
US	User Selected
USART	Universal Synchronous/ Asynchronous Receiver/Transmitter
WRT	Write
XMD	Expanded Module Drive
Y	Yes

SECTION 1

GENERAL DESCRIPTION

GENERAL DESCRIPTION 1

INTRODUCTION

The Seagate TB2A3 Programmable Field Test Unit (PFTU) is a portable self-contained diagnostic tool for use on disk drives. It may be programmed to test disk drives using a specific interface by loading the appropriate controlware from a floppy disk into PFTU memory. This controlware enables the PFTU to simulate off-line control functions of a disk controller and provides diagnostic routines for use when troubleshooting a disk drive. Some functions are common to all interfaces while others depend on the controlware loaded. The equipment specifications for the PFTU are listed in table 1-1.

The remainder of this section contains a general description of the PFTU and is divided into the following areas:

- Interface description -- Describes drive interfaces that may be tested using the controlware described in this manual.
- Physical description -- Describes the PFTU's physical characteristics.
- Functional description -- Describes the basic functions of the PFTU.

INTERFACE DESCRIPTION

The PFTU/floppy disk configuration described in this manual may be used to perform tests on drives with SMD-O (standard SMD) or SMD-E (extended status SMD) interfaces. Data is transferred at rates of 10, 15, or 24 MHz depending on the type of drive being tested and the type of I/O card installed in the PFTU.

TABLE 1-1. SPECIFICATIONS

CHARACTERISTIC	CONDITION	SPECIFICATION
Size	Length x Width x Height	637 x 319 x 460 mm (18 x 9 x 13 in)
Weight		11.8 kg (26 lb)
Temperature	Operating	10°C to 40°C (50°F to 104°F)
	Gradient	10°C (18°F)
	Non-Operating	-10°C to 50°C (14°F to 122°F)
Relative Humidity (No condensation)	Operating Non-Operating	20% to 80% 10% to 90%
Altitude	Operating	105 kPa to 74 kPa 31 in Hg to 22 in Hg -300 m to 2500 m (-980 ft to 8200 ft)
	Non-Operating	105 kPa to 69 kPa 31 in Hg to 20.3 in Hg -300 m to 3000 m (-980 ft to 10 000 ft)
Input Power	47 to 63 Hz	95 to 130 (±0.2%) V ac at 1.0 A when set to 115 V ac on Voltage Selection Switch. 190 to 260 (±0.2%) V ac at 0.5 A when set to 220 V ac on Voltage Selection Switch
Energy Consumption		85 watts

PHYSICAL DESCRIPTION

Figure 1-1 shows the major component assemblies contained in the PFTU. The following paragraphs describe the physical characteristics of the components used to operate the PFTU.

KEYBOARD

The membrane keyboard is used to set up and run tests. It contains all of the alphanumeric, punctuation and control keys found on a standard computer terminal keyboard. In addition, the keyboard contains twelve function keys (F1-F12).

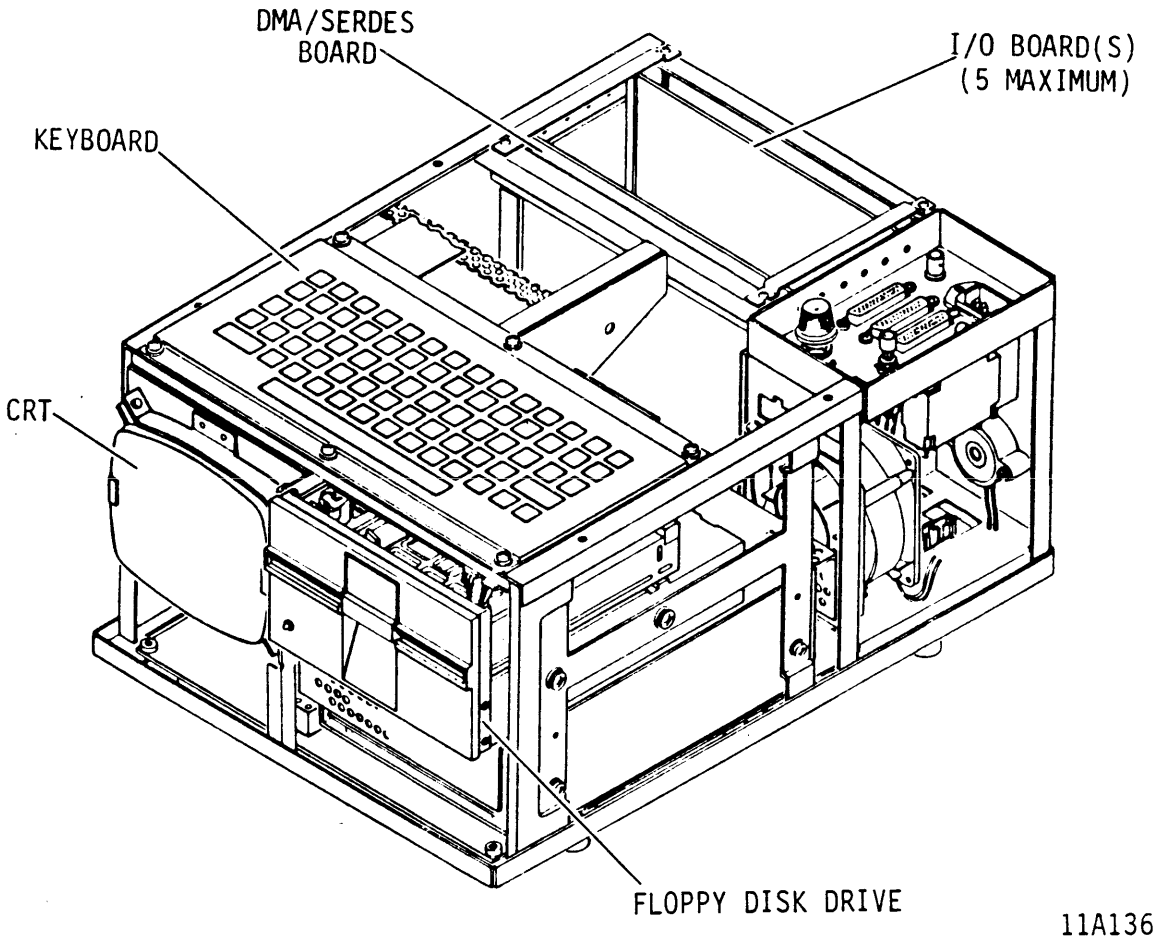


Figure 1-1. Major Assemblies

CATHODE RAY TUBE (CRT)

The CRT displays instructions and test results. It provides a 5 inch (diagonal) display surface for alphanumeric and graphic information. An adjustment knob on the operator panel controls the brightness of displayed information.

DMA/SERDES BOARD

The DMA/SERDES board processes read/write data transmitted between the PFTU and the drive being tested. During write operations, it serializes the data and generates a CRC check character that is appended to the data. During read operations, it deserializes the data and tests the CRC check character returned with the data for data integrity.

This PFTU can be used with a special kit, to test drives with the Small Computer System Interface. The DMA/SERDES board is not used in this application.

INTERFACE BOARD(S)

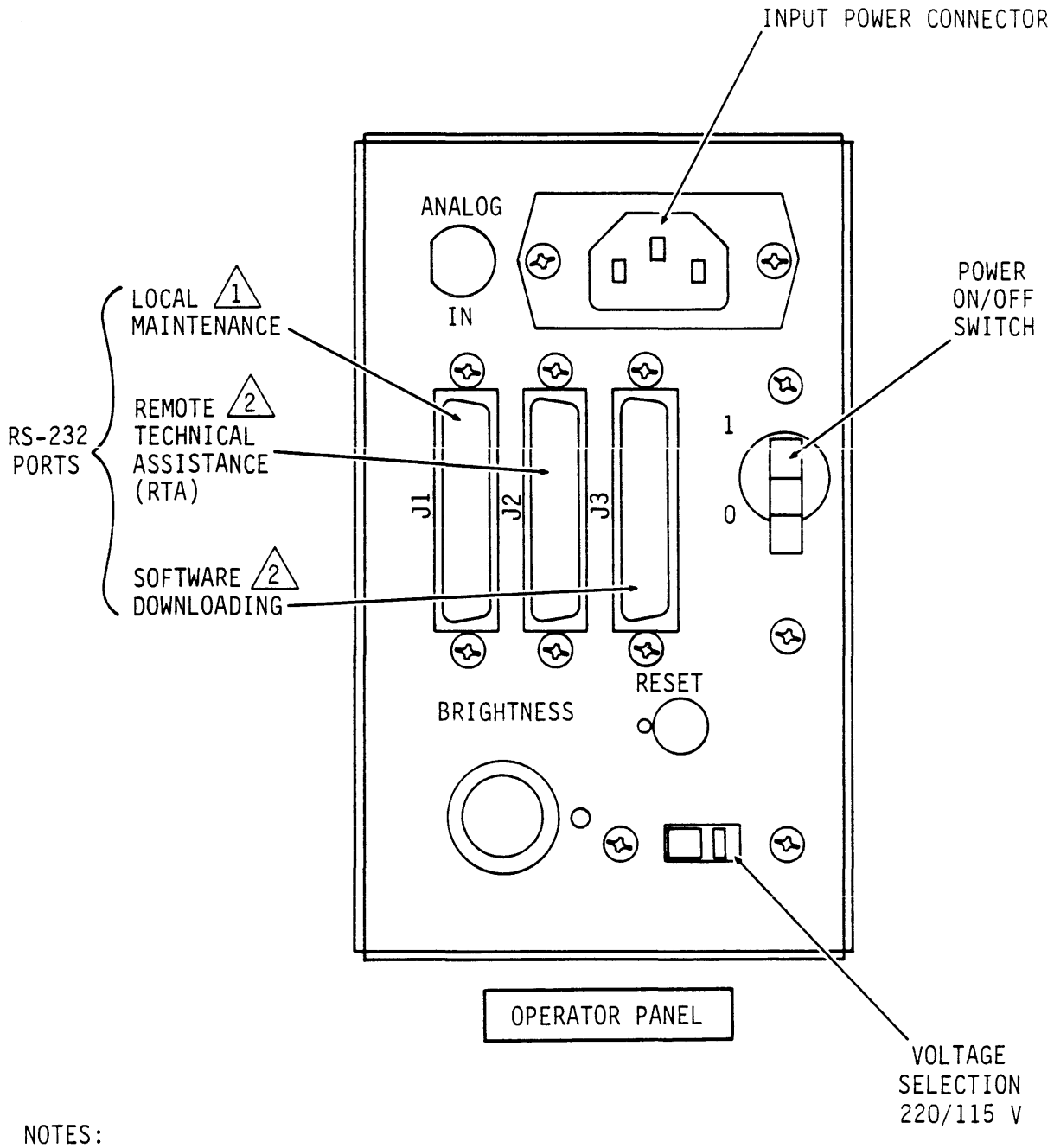
The I/O board transfers information between the PFTU and a drive. A different board is required to match the unique characteristics of each interface.

FLOPPY DISK DRIVE (FDD)

The floppy disk drive is used to enter controlware instructions into the RAM memory. A floppy disk contains these instructions for a unique interface. The media used is a standard 5.25 inch flexible diskette enclosed in a sealed jacket. The floppy disk must remain in the floppy disk drive during all testing. Return it to its protective envelope when testing is complete. An indicator located on the front of the floppy disk drive shows when the unit is selected or in use.

SWITCHES AND INDICATORS

Table 1-2 contains a functional description of the switches, indicators, and auxiliary I/O connectors located on the PFTU (see figure 1-3). All switches and indicators except the floppy disk drive activity indicator and the keyboard are located on the operator panel.



NOTES:

1. CONNECT EXTERNAL PRINTER TO THIS CONNECTOR.
2. THESE CONNECTORS NOT USED WITH SMD-O/SMD-E CONTROLLERWARE.

11A41

Figure 1-3. Controls, Indicators, and Connectors

TABLE 1-2. SWITCHES, INDICATORS, AND CONNECTORS

Description	Function
Power On/Off (1 or 0 Switch) and Circuit Breaker	This switch controls application of power to all circuit components.
RESET Switch	This momentary switch is used to initiate a master clear of all registers and control logic. Pressing the Reset switch causes the microprocessor to over-write the data stored in RAM, and re-initiate the power up self tests.
BRIGHTNESS Control	This control adjusts the brightness of characters displayed on the CRT.
Voltage Selection Switch	This switch selects the operating voltage for the PFTU. The PFTU can operate in the range from 95 to 130 V ac on the 115 V setting of the Voltage selection switch, or in the range from 190 to 260 V ac on the 220 V ac setting of the Voltage Selection switch. NOTE: The PFTU must be connected to source power using the power cord supplied with the unit.
Activity Indicator	Indicates that the floppy disk drive is selected and/or in use.
Keyboard	Used to set up and run tests by interacting with the controlware. The controlware supports uppercase alpha characters, numerics, control keys, and special function keys.

Table continued on next page

TABLE 1-2. SWITCHES, INDICATORS, AND CONNECTORS (Contd)

Description	Function
Audible Indicator	Sounds when the CRT is not functioning or is unreliable. It may also sound at other times to indicate a problem. The indicator also sounds when a key on the keyboard is pressed unless this feature is disabled on the INITIALIZATION OPTIONS display.
J1 Connector	Local Technical Assistance Data Communications Equipment (USART) port: Allows local communication via the RS232 interface. Transmission speeds may be selected from the following baud rates: • 300 bps • 1,200 bps • 2,400 bps • 9,600 bps An external printer may be connected to this connector.
J2 Connector	Not used.
J3 Connector	Not used.
ANALOG IN Connector	Used for input of an analog voltage in the range from -5 V to +5 V.

TESTS YOU CAN RUN USING SMD-O/SMD-E CONTROLWARE

When loaded into PFTU memory, the SMD-O/E interface controlware allows one or several tests to be run on a disk drive. The following general types of tests may be set up and run:

- Seeks
- Read/write operations
- Diagnostic tests
- Head alignment tests

Refer to table 1-3 for definitions of test modes available.

ACCESSING CRT DISPLAYS

Test options are shown on, or accessible via, the following CRT displays:

- SMD-O/SMD-E TEST (introductory) display.
- DRIVE SELECTION display.
- CURRENT TEST PARAMETERS display.
- ENGINEERING MODE display.
- SELECT * TIMING * SELF-TESTS display.
- RUN display.

Refer to appendix A for information on set-up displays and display lines.

TABLE 1-3. TEST MODE DEFINITIONS

Test Mode	Description
SEEK MODES	
Direct Seek	These tests perform a seek from the present cylinder to a selected destination cylinder address. This seek is executed once.
Direct Seek -- Continuous	These tests perform continuous forward and reverse seeks between selected beginning and ending cylinder numbers.
Sequential Seeks	These tests perform a series of seeks between selected beginning and ending cylinder numbers. A number entered as a seek increment sets the length of each seek. The direction of the seeks is selected as forward, reverse, or forward followed by reverse. Example: Forward sequential seeks from cylinder 10 to cylinder 25 in 5-cylinder increments are performed as follows: • The first seek moves the actuator from cylinder 10 to 15. • The next seek moves the actuator from cylinder 15 to 20. • The last seek moves the actuator from cylinder 20 to 25.

Table Continued on Next Page

TABLE 1-3. TEST MODE DEFINITIONS (Contd)

Test Mode	Description
X → N Seeks	These tests perform a unique pattern of forward and reverse seeks within a selected range of cylinder addresses. Seek lengths are increased by selected seek increments until both limits of the cylinder range are reached. Then seeks are performed with decreasing lengths until a length of zero is reached. The location of the starting cylinder with respect to beginning and ending cylinders establishes the pattern followed during X → N seeks. This pattern is not influenced by the position of the actuator prior to starting the test. Examples of X → N seek patterns are provided to show how these tests function with the starting cylinder in different locations.

Table Continued on Next Page

TABLE 1-3. TEST MODE DEFINITIONS (Contd)

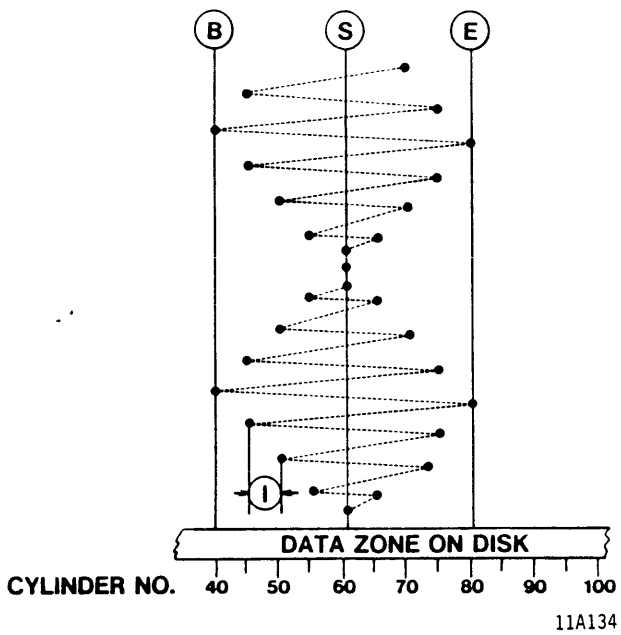
Test Mode	Description
X → N Seeks (Contd)	The following example shows a typical X → N seek pattern when the starting cylinder selected is in the middle of the cylinder range: S = Starting cylinder (60) B = Beginning of cylinder range (40) E = Ending of cylinder range (80) I = Seek increment (5) 

Table Continued on Next Page

TABLE 1-3. TEST MODE DEFINITIONS (Contd)

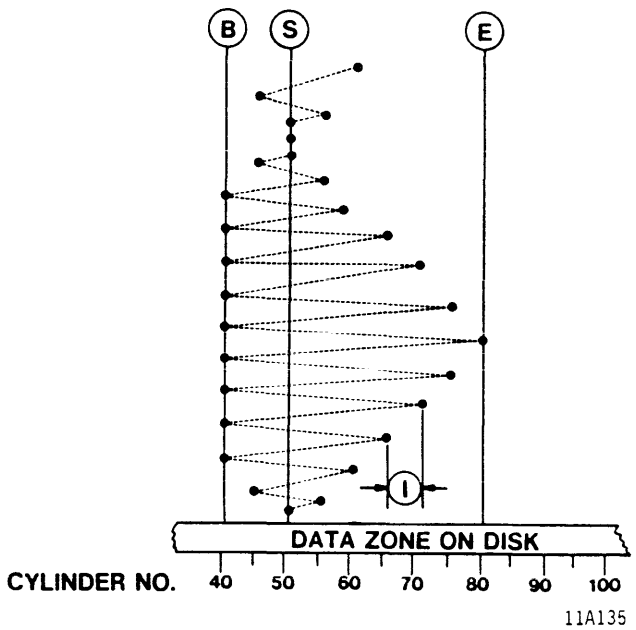
Test Mode	Description
X → N Seeks (Contd)	The following example shows a typical X → N seek pattern when the starting cylinder selected is anywhere between the beginning and ending cylinder: S = Starting cylinder (50) B = Beginning of cylinder range (40) E = Ending of cylinder range (80) I = Seek increment (5) 

Table Continued on Next Page

TABLE 1-3. TEST MODE DEFINITIONS (Contd)

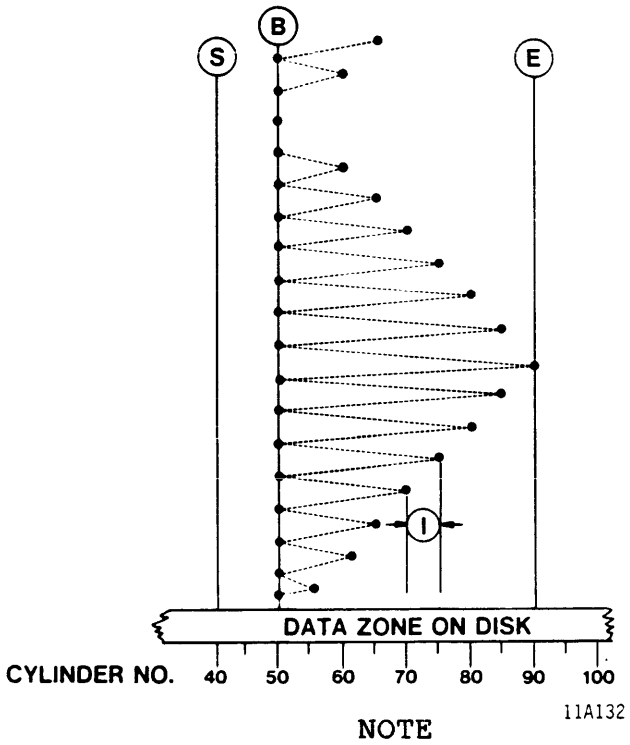
Test Mode	Description
X → N Seeks (Contd)	The following example shows a typical X → N seek pattern when the starting cylinder selected is below the beginning cylinder: S = Starting cylinder (40) B = Beginning of cylinder range (50) E = Ending of cylinder range (90) I = Seek increment (5)  NOTE Seeks do not start from the starting cylinder when it is below the beginning of the cylinder range. The actuator seeks directly to the beginning cylinder before the X → N seek pattern begins.

Table Continued on Next Page

TABLE 1-3. TEST MODE DEFINITIONS (Contd)

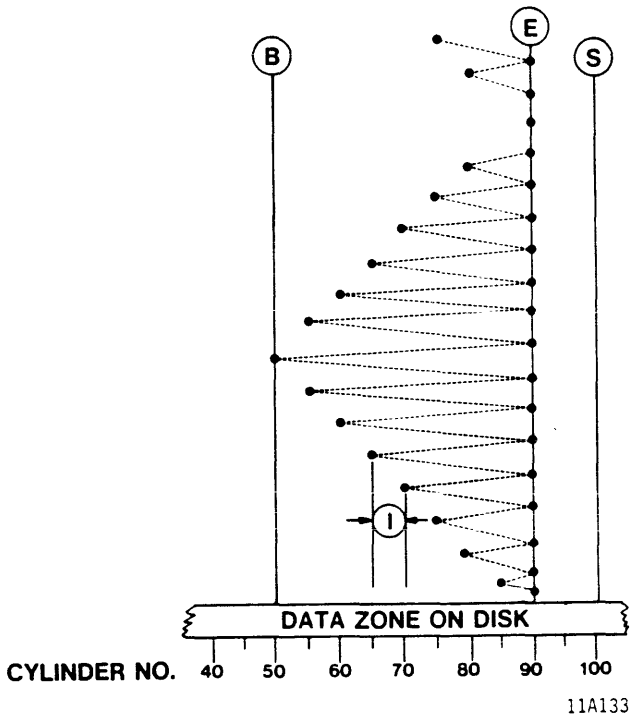
Test Mode	Description
X → N Seeks (Contd)	The following example shows a typical X → N seek pattern when the starting cylinder selected is above the ending cylinder: S = Starting cylinder (100) B = Beginning of cylinder range (50) E = Ending of cylinder range (90) I = Seek increment (5)  NOTE Seeks do not start from the starting cylinder when it is above the ending of the cylinder range. The actuator seeks directly to the ending cylinder before the X → N seek pattern begins.

Table Continued on Next Page

TABLE 1-3. TEST MODE DEFINITIONS (Contd)

Test Mode	Description
Random Seeks	These tests perform continuous seeks to randomly generated cylinder addresses. These addresses are generated within a selected range of addresses.
READ/WRITE MODES	
Seek Only	These tests disable the read/write circuitry while seeks are in progress. CAUTION Existing data is destroyed when tests are run in any of the following write modes.
Write/Read Format and Data	These tests begin by writing zeros to erase all previous data on selected track(s). Next, headers are written for each sector pulse received from the drive. The headers just written are read and checked for accuracy. Then a selected data pattern is written on selected sector(s). Only sectors that are not write-protected are written on during the write format or write data part of these tests. Finally, the data is read from the selected sector(s). Each of these operations is completed on one track before moving to the next. An Address Mark is included before the header if selected on the DRIVE SELECTION display.

Table Continued on Next Page

TABLE 1-3. TEST MODE DEFINITIONS (Contd)

Test Mode	Description
Write/Read Format	These tests begin by writing zeros to erase all previous data on selected track(s). Next, headers are written for each sector pulse received from the drive. Only sectors that are not write-protected are written on during the write part of these tests. The headers just written are read and checked for accuracy. This operation is completed on one track before moving to the next. An Address Mark is included before the header if selected on the DRIVE SELECTION display.
Write/Read Data	These tests write and then read a data pattern on selected track(s) and sector(s) that are not write-protected. A CRC code (written by the preceding write operation) is checked to verify data integrity. No direct comparison is made to a written data pattern.
Write Format	These tests begin by writing zeros to erase all previous data on selected track(s). Next, headers are written for each sector pulse received from the drive. Only sectors that are not write-protected are written on. This operation is completed on one track before moving to the next. An Address Mark is included before the header if selected on the DRIVE SELECTION display.
Write Data	These tests write a data pattern on selected sector(s) and track(s). Only sectors that are not write-protected are written on.

Table Continued on Next Page

TABLE 1-3. TEST MODE DEFINITIONS (Contd)

Test Mode	Description
User Simulation Mode	These tests force Head and sector selection to random mode when running read/write operations. Read data operations are run 90% and write/read data operations are run 10% of the time. This test simulates typical on-line use of a drive for storing and recovering data.
Read Data	These tests read data from selected cylinder(s), head(s), and sector(s). A CRC code (written by a previous write operation) is checked to verify data integrity. No direct comparison is made to a written data pattern.
DIAGNOSTIC MODES	
Current Test Status	This mode displays status information on the currently selected test when the test has stopped. Expected and received values are shown for the following: • Cylinder, head, and sector numbers. • A number indicating that the track is flagged as bad. • Number of sectors and length of sectors. • Length of data field and amount filled. • First 8 bytes of data pattern.

Table Continued on Next Page

TABLE 1-3. TEST MODE DEFINITIONS (Contd)

Test Mode	Description
Scan Interface (Status)	This mode scans Bus In lines after issuing a selected Tag with a specific Bus Out value entered. Bus Out and Bus In values are displayed in both binary and hexadecimal while Bus In lines are being scanned.
Modify Stresses	This mode enables error recovery functions in the drive. Early and late data strobe commands change the timing of Clocked Read data with respect to the Read Data clock. Servo offset commands move heads off cylinder a small distance in a forward or reverse direction.
Flaw Map Use and Flag/Clear Tracks	This mode uses error flaw map information from the first two sectors (Home Address) of a track to flag or clear flawed data tracks.
Unit Select	This test continuously selects the unit number displayed on the UNIT SELECTED line of the DRIVE SELECTION display.
Poll Devices	This test attempts to select all possible unit numbers and displays which unit number responds to the selection attempts.
Index/Number of Sectors	This test reports Index timing. The number of sectors between Index pulses is also computed.

Table Continued on Next Page

TABLE 1-3. TEST MODE DEFINITIONS (Contd)

Test Mode	Description
Sequencer RAM Memory	This is a PFTU self-test that checks sequencer (control) RAM memory locations. Ascending and descending data patterns are written and then read back to verify the integrity of these locations.
Data RAM Memory	This is a PFTU self-test that checks data RAM memory locations. Ascending and descending data patterns are written and then read back to verify the integrity of these locations.
HEAD ALIGNMENT MODES	
Low Cylinder Stabilization	This test holds the heads positioned over cylinder zero. The test should be stopped when a time period long enough to allow the heads to thermally stabilize has elapsed.
C.E. Cylinder Stabilization	This test holds the heads positioned over the C. E. (head alignment) cylinder. The test should be stopped when a time period long enough to allow the heads to thermally stabilize has elapsed.
Low Cylinder Buzz	This test performs continuous seeks within a limited range of low numbered cylinders. The test is run before running the LOW CYLINDER READ test to bring positioner components up to normal operating temperature.

Table Continued on Next Page

TABLE 1-3. TEST MODE DEFINITIONS (Contd)

Test Mode	Description
Low Cylinder Read	This test positions the drive's heads over certain low numbered cylinders and monitors the read signal. This provides the means to evaluate head alignment on these cylinders.
High Cylinder Buzz	This test performs continuous seeks within a limited range of high numbered cylinders. The test is run before running the HIGH CYLINDER READ test to bring positioner components up to normal operating temperature.
High Cylinder Read	This test positions the drive's heads over certain high numbered cylinders and monitors the read signal. This provides the means to evaluate head alignment on these cylinders.
C.E. Alignment Buzz	This test performs continuous seeks within a limited range of cylinders around the C.E. (head alignment) cylinder. The test is run before running the C.E. HEAD ALIGNMENT test to bring positioner components up to normal operating temperature.
C.E. Head Alignment	This test positions the drive's heads over the C.E. (head alignment) cylinder and monitors the read signal. This provides the means to check head alignment and evaluate head alignment while head adjustments are made.

SECTION 2

OPERATION

OPERATION 2

INTRODUCTION

This section contains the operating procedures for using the PFTU to test drives. These procedures are presented in the following order:

- How to Connect PFTU to Drive
- How to Load Controlware
- How to Select Drive
- How to Set Up Seeks
- How to Set Up Read/Write Operations
- How to Execute Seeks and Read/Write Operations
- How to Set Up and Run Diagnostic Tests
- How to Set Up and Run Select Tests, Timing Tests, Self-Tests, and Head Alignment Tests

The operating procedures describe step-by-step methods for setting up and running drive tests using the PFTU. Test options are provided to exercise and monitor all the major areas of drive operation: power, servo, read and write.

Figure 2-2 is a function chart showing an over-all picture of the operations required to set up tests. Figure 2-1 describes the symbols used on this function chart.

Setting up and running tests involves use of the keyboard on the PFTU. The following list describes frequently used keyboard operations:

- Move from one display line to another by pressing the SPACE bar.
- Move to a subordinate display from a highlighted display line by pressing RETURN.
- Move between displays by pressing designated function keys.

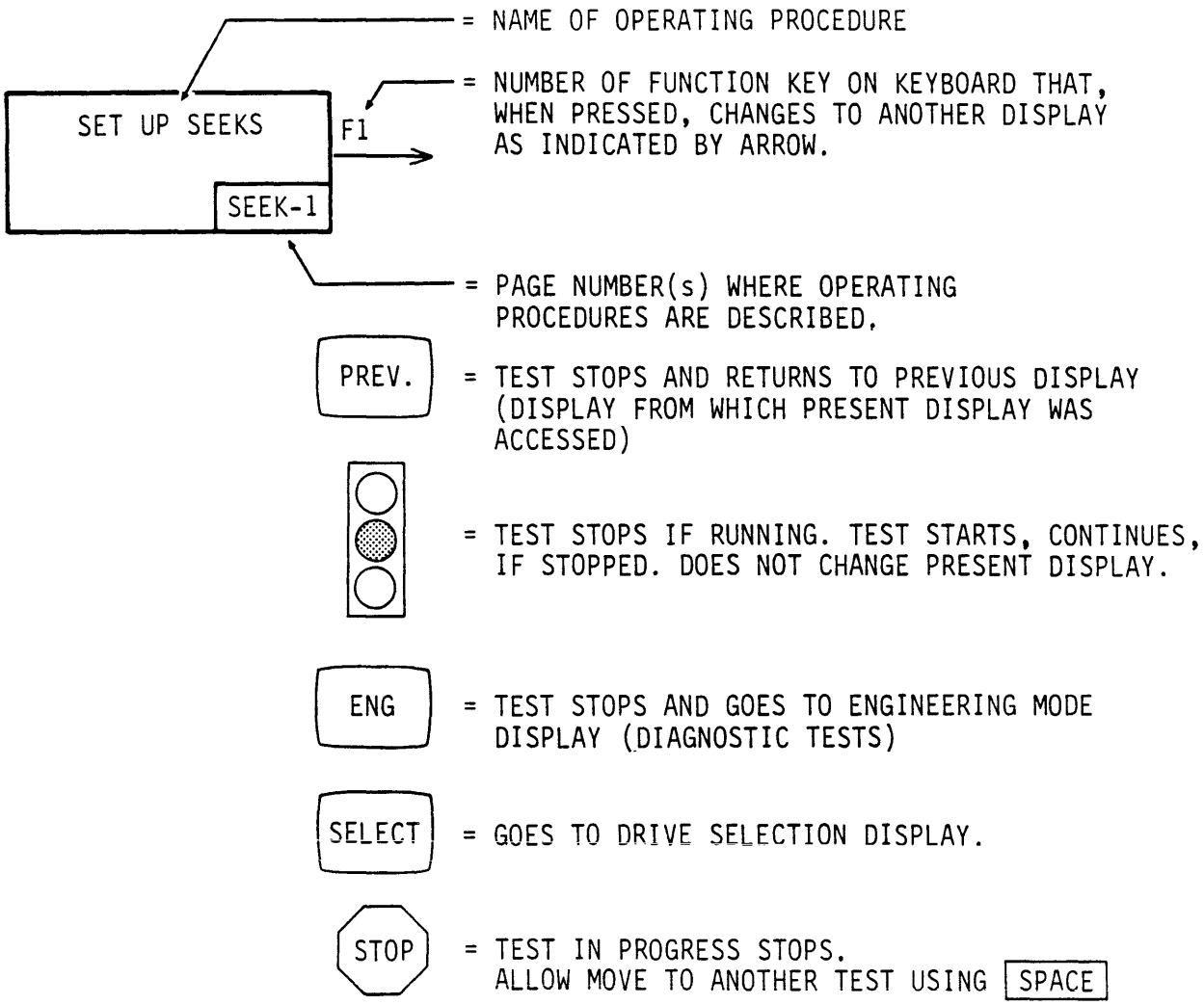
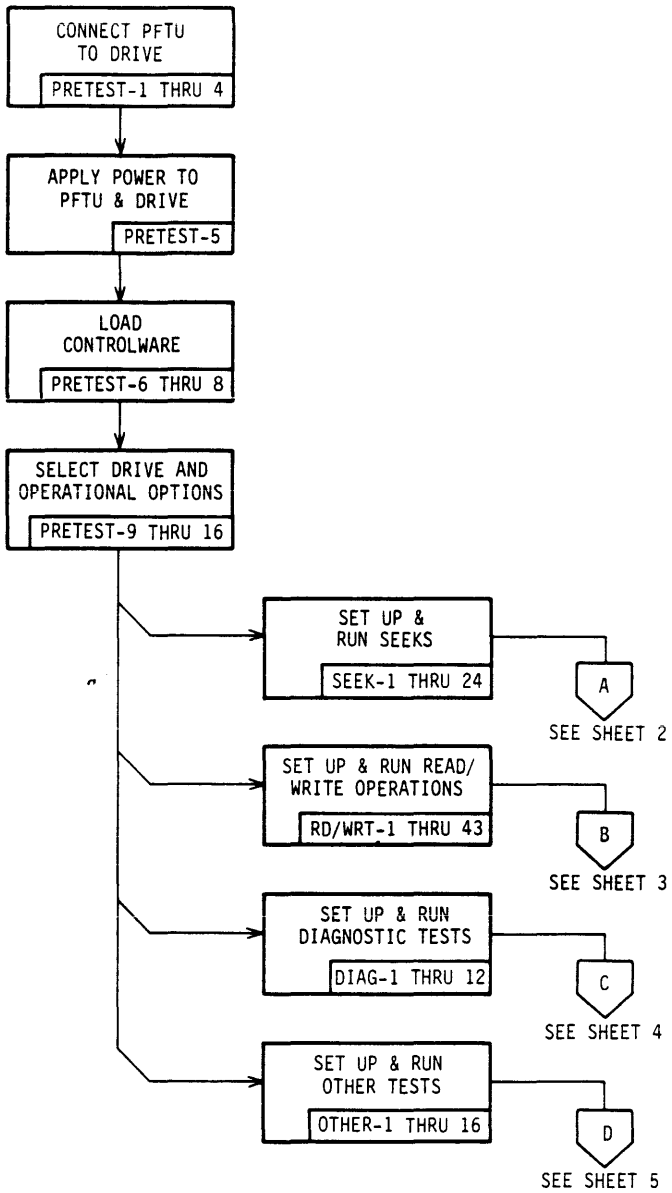


Figure 2-1. Key to Symbols used on Operating Procedure Function Chart



11A37-1

Figure 2-2. Operating Procedure Function Chart (Sheet 1 of 6)

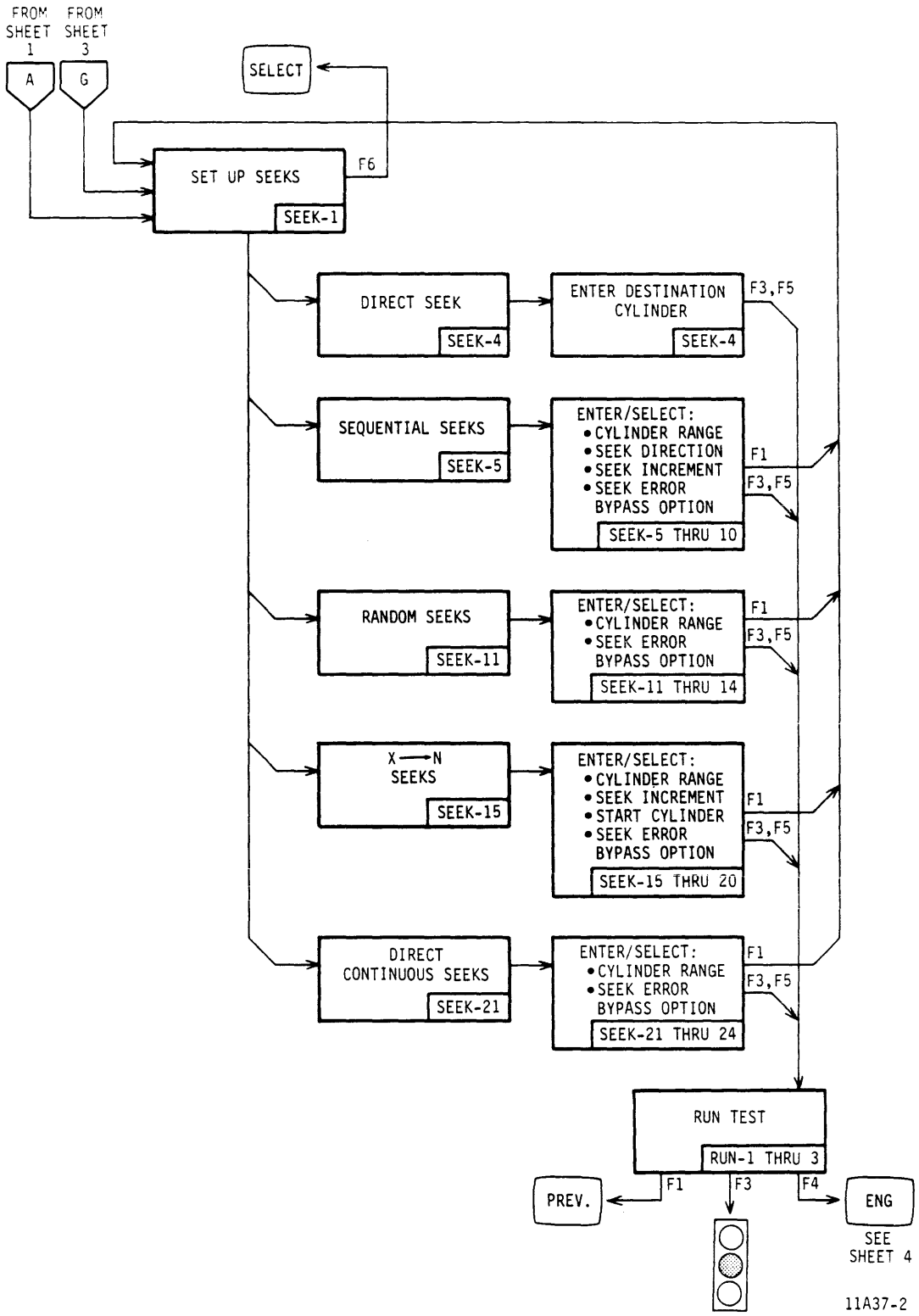


Figure 2-2. Operating Procedure Function Chart (Sheet 2)

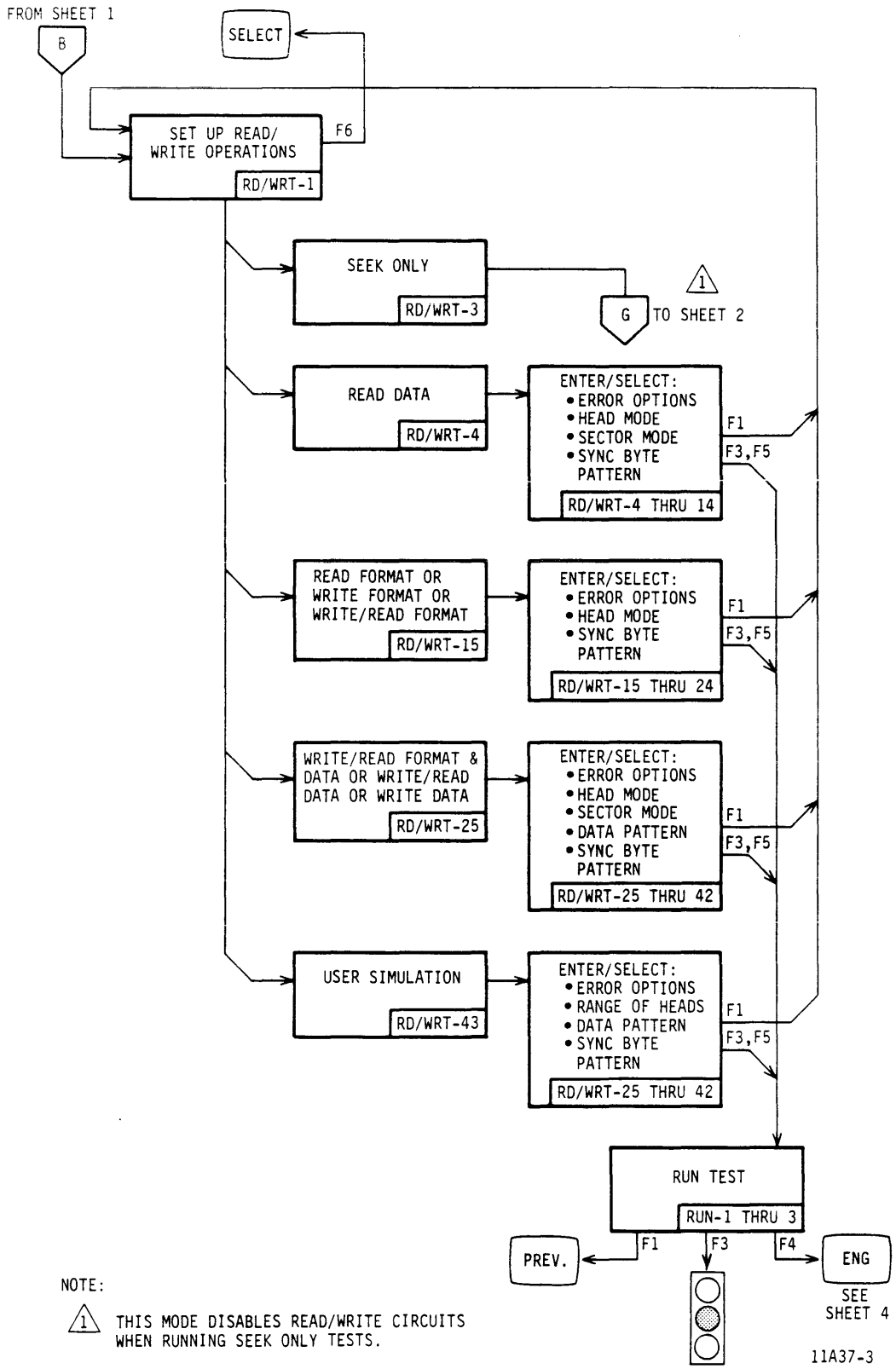


Figure 2-2. Operating Procedure Function Chart (Sheet 3)

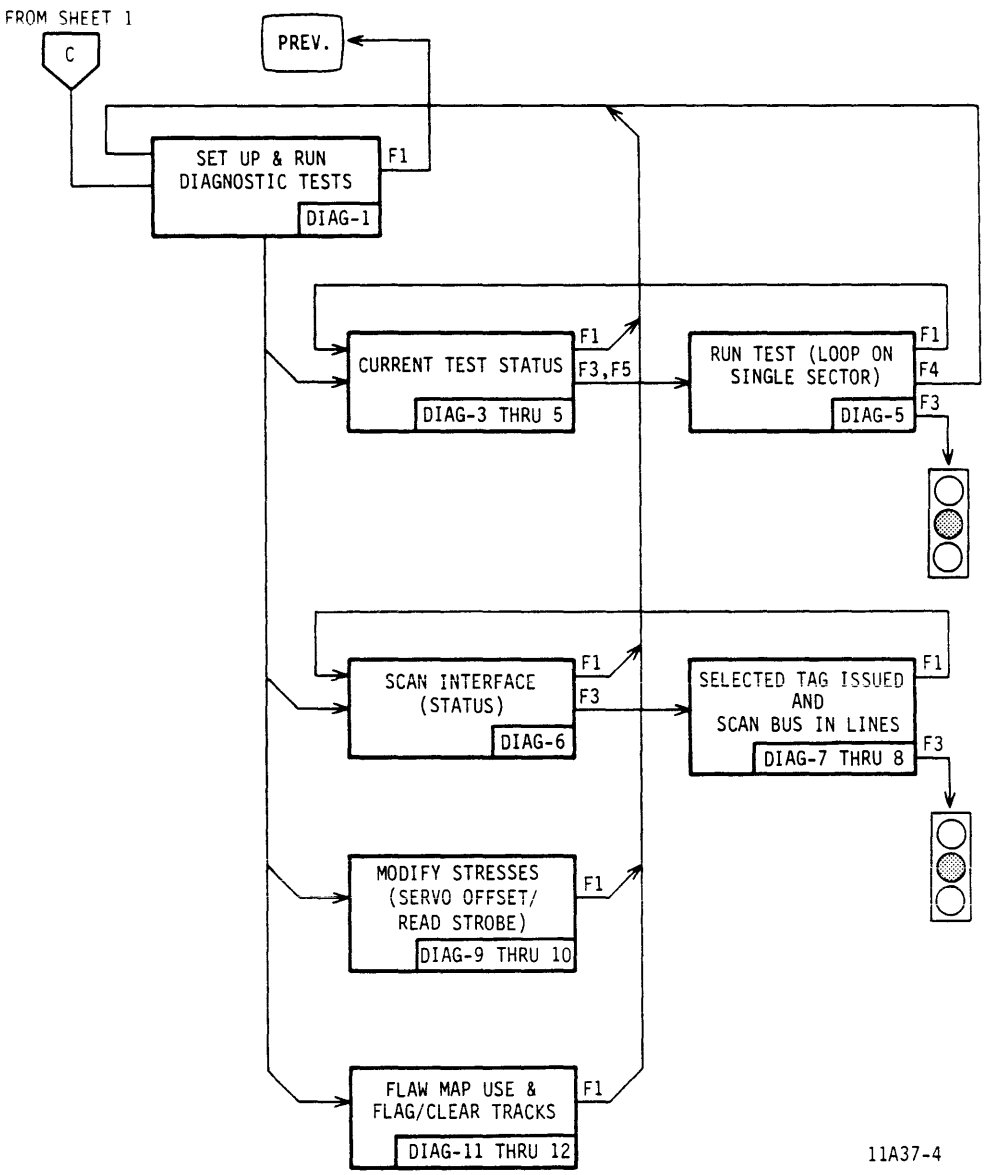


Figure 2-2. Operating Procedure Function Chart (Sheet 4)

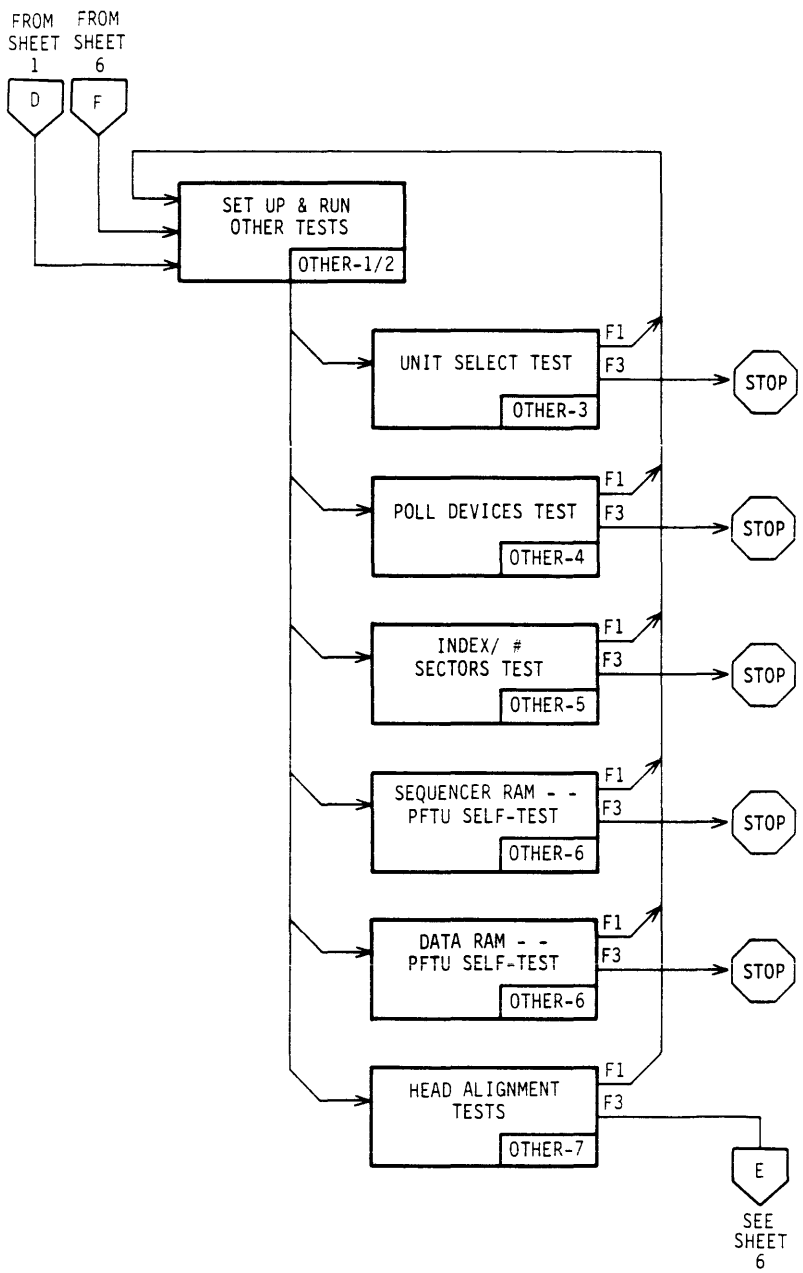


Figure 2-2. Operating Procedure Function Chart (Sheet 5)

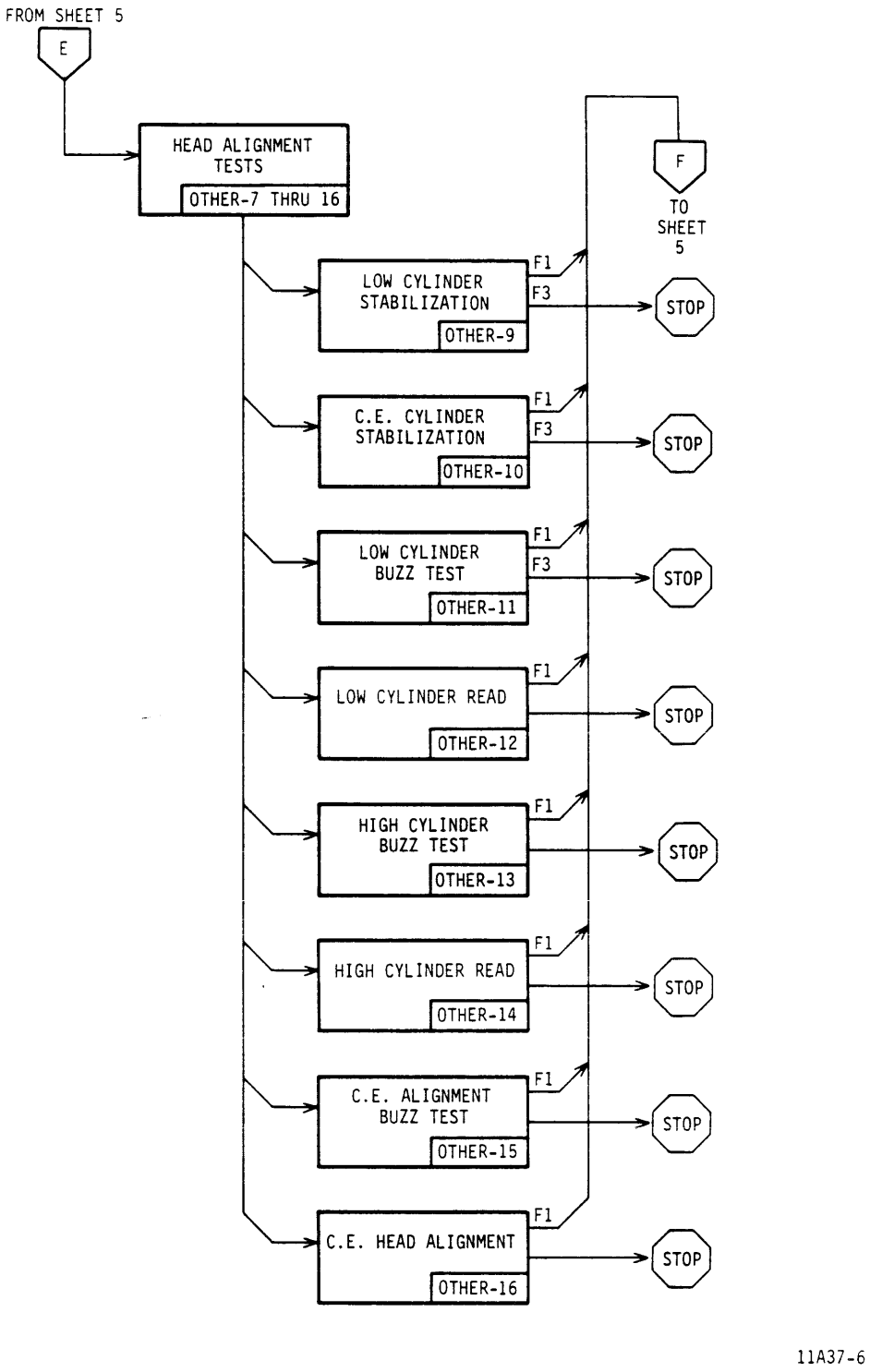


Figure 2-2. Operating Procedure Function Chart (Sheet 6)

- Select options or assign values by entering numbers or letters on highlighted display lines.

- Start test by pressing a designated function key or by pressing RETURN during head alignment tests.

- Control test functions by pressing a designated function key.

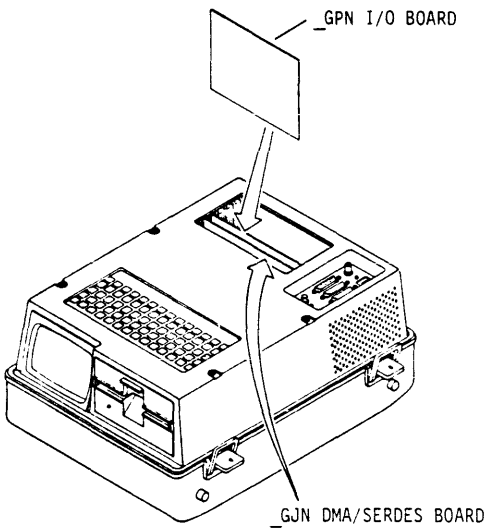
- Send information to external printer by pressing a designated function key.

Tests are set up by making selections and/or entries on CRT displays and display lines. Refer to Appendix A (Descriptions of Set-Up Displays and Display Lines) for information about individual displays and display lines.

PRETEST-1

HOW TO CONNECT PFTU TO DRIVE

Power Down Drive	Deenergize the drive to be connected to the PFTU.
Install I/O Board in PFTU	Install the _GPN I/O board in one of the first three card slots closest to the keyboard. This board provides I/O capability with drives using SMD interface. No other I/O boards should be installed in the first three card slots while SMD interface drives are being tested. Also, check to make sure the _GJN board is installed in another one of the first three card slots. This board provides Direct Memory Access and Serializer/Deserializer functions between the PFTU and drive.



NOTES:

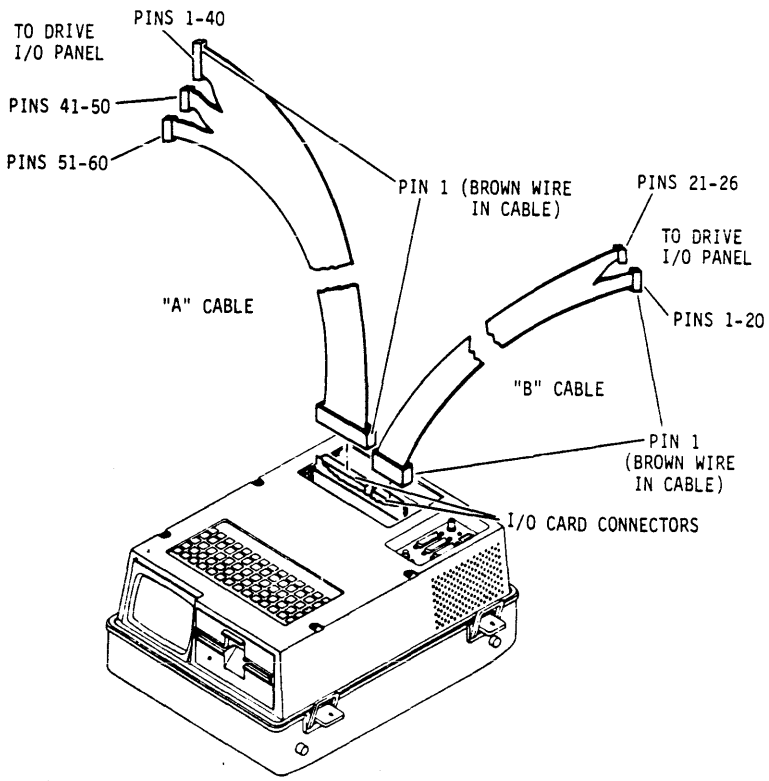
_GJN DMA/SERDES BOARD SHOWN IN CARD SLOT 2

_GPN I/O BOARD SHOWN IN CARD SLOT 3

11A38

Connect I/O cables to I/O Card

Install the non-segmented ends of the A and B cables onto connectors J60 and J61 respectively on the _GPN I/O board.



NOTES:

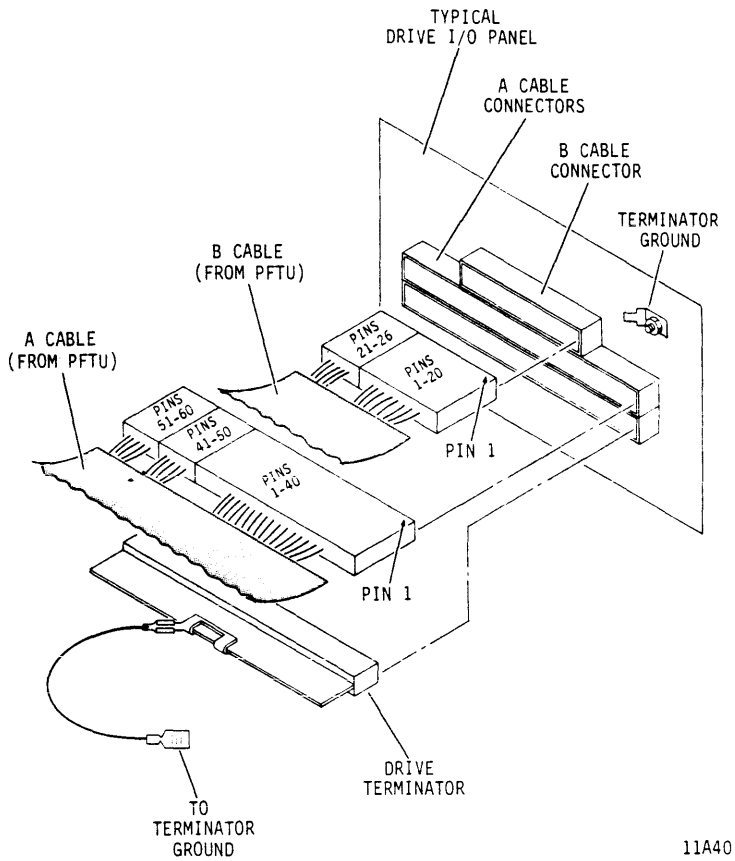
1. PIN 1 ON I/O CARD CONNECTORS AND I/O CABLE CONNECTORS IS INDICATED BY A "△" SYMBOL OR A WHITE STRIPE ON NEWER UNITS.

11A39

PRETEST-3

Connect I/O Cables to Drive

Install all the connector segments on the PFTU A and B cables onto the connectors on the drive's I/O panel. Refer to drive's hardware maintenance manual for cabling and terminator installation information.



Connect Printer to PFTU (Optional)

If you want to use the ERROR PRINTING function on the ERROR OPTIONS display, or if you want to print a hard copy of certain displays as they appear on the CRT, connect an external printer to the PFTU as follows:

Check Printer Baud Rate

The printer must be capable of accepting data from the PFTU at one of the following baud rates:

- 300 bps
- 1200 bps
- 2400 bps
- 9600 bps

Check Printer I/O Cable Wiring

Some printers require additional signals to operate properly when connected to an I/O port with a RS232 interface. The signals listed below are available at the PFTU for transmission of data via the local RS232 port (J1 on operator panel). Refer to the printer manual to determine connections required for printer operation.

RS232 SIGNALS AVAILABLE AT PFTU

	Signal Name	Pin Number
*	Protective Ground (GND)	1
	Read Data (RD)	2
*	Transmitted Data (TD)	3
*	Data Set Ready (DSR)	4
	Data Terminal Ready (DTR)	5
	Ready To Send (RTS)	6
*	Signal Ground (GND)	7
	Ready To Send (RTS)	8
	Not Used	17
*	Clear To Send (CTS)	20
	Not Used	22

* = Signals required by PFTU to transfer data over Local RS232 port (J1).

Connect I/O cable from Printer to PFTU

Install the RS232-compatible connector on the printer I/O cable onto connector J1 on the PFTU operator panel. Connect the other end of the cable to the printer by following instructions provided with the printer.

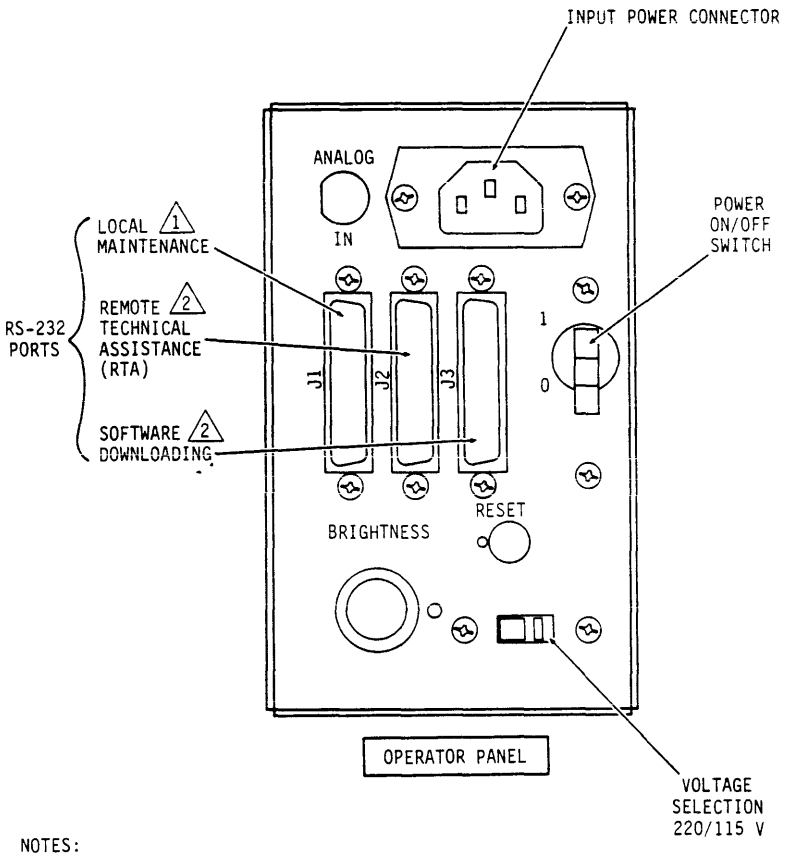
PRETEST-5

Apply Power to PFTU

Perform the following operations at the operator panel to apply power to the PFTU:

1. Set the voltage selection switch to the site power source voltage.
2. Connect one end of ac power cord to PFTU and the other end to site power source.
3. Set the POWER switch to ON position.

After a short delay, the SELECT INITIALIZATION OPTIONS display will appear on the CRT.



NOTES:

1. CONNECT EXTERNAL PRINTER TO THIS CONNECTOR.
2. THESE CONNECTORS NOT USED WITH SMD-O/SMD-E CONTROLLERWARE.

11A41

Power Up Drive

Energize drive to bring it to the READY condition.

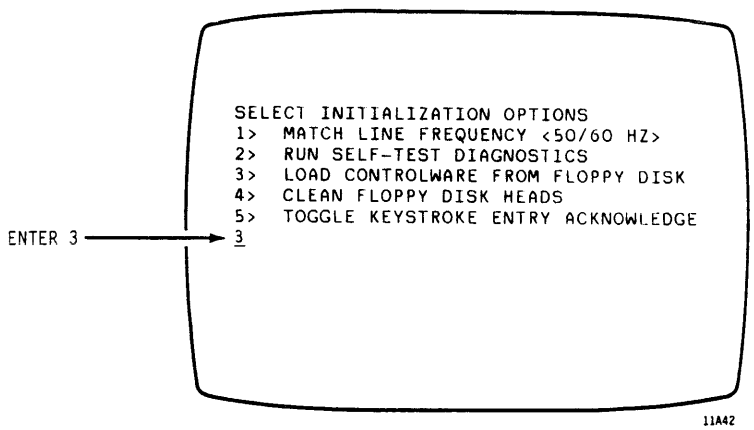
HOW TO LOAD CONTROLWARE

Start at Select Initialization Options display

This display normally appears shortly after PFTU power is switched on. You can go directly to this display from any other display by pressing the RESET button located on the operator panel.

Select Option to Load Controlware

Enter the number of the LOAD CONTROLWARE FROM FLOPPY DISK display line at the cursor location on the bottom of the display and press RETURN.



The other options listed on this display do the following:

1> Matches the CRT refresh rate to the ac power frequency used by room lighting.

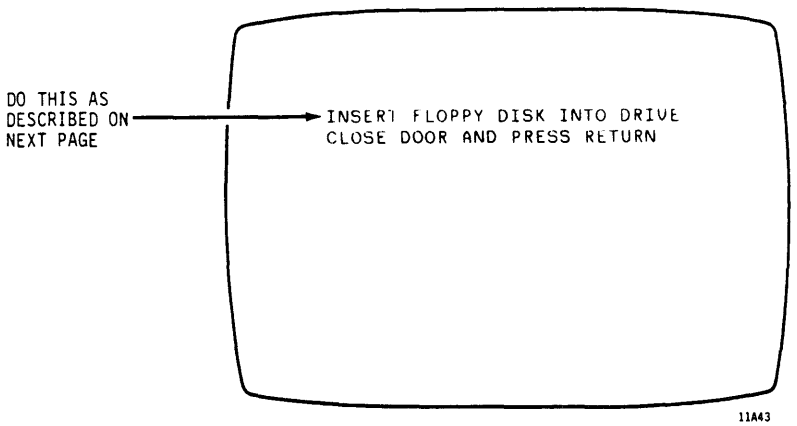
2> & 4> Refer to hardware maintenance manual on PFTU for description and use of these functions.

5> Enable or disable audible keystroke indicator.

PRETEST-7

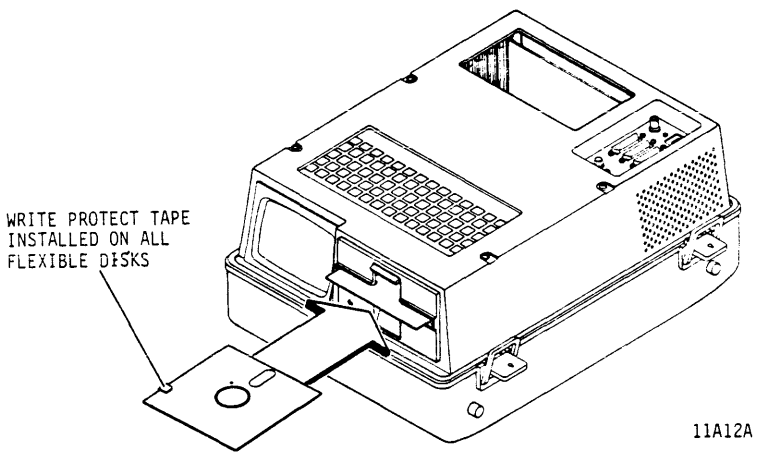
Select Option to Load Controlware (Contd)

The following message appears on a separate display as shown:



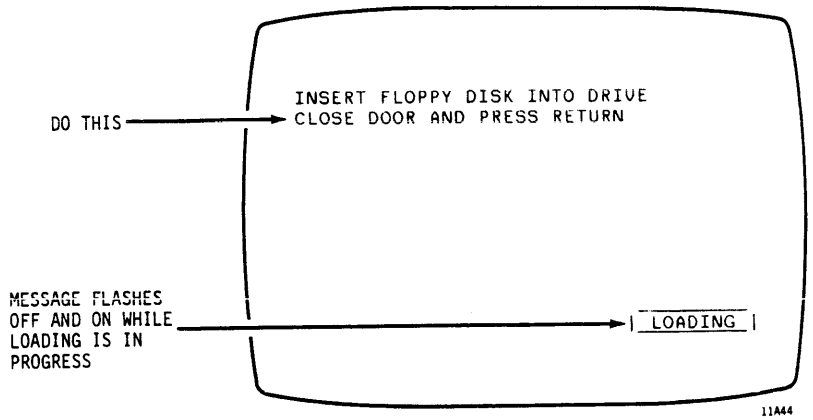
Insert Floppy Disk

Obtain a floppy disk containing revision 2.0 controlware for SMD-0/SMD-E interface testing and orient it as shown. Open door on front of floppy disk drive, insert floppy disk, and close door.



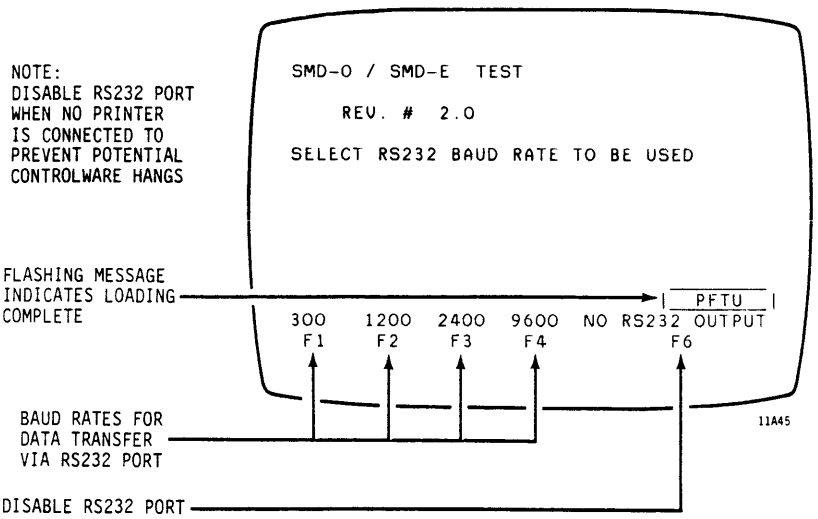
Load Controlware Into Memory

Press RETURN to load controlware from the floppy disk into PFTU memory. Do not remove the floppy disk while PFTU is in use.



SMD-0/SMD-E Display Appears

When loading is complete, a SMD-0/SMD-E display appears with a flashing "PFTU."



PRETEST-9

HOW TO SELECT DRIVE

Select Baud Rate and/or go to DRIVE SELECTION display

Make one of the following function key selections on the SMD-0/SMD-E display to go to the DRIVE SELECTION display:

- If an external printer is connected to the PFTU, select the baud rate required by pressing the corresponding function key.
- If no external printer is connected, press the NO RS232 OUTPUT function key.

Screen Printing

After the baud rate is selected, you can press F8 anytime to send screen lines 1-13 to the printer through the RS232 port.

Start at DRIVE SELECTION display

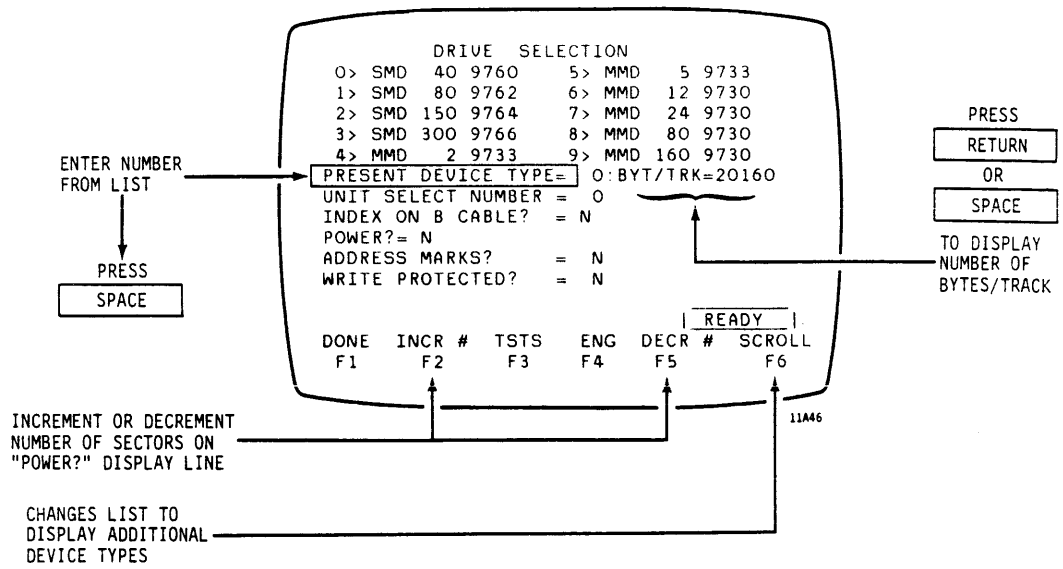
Initially, this display appears when any one of the function keys on the SMD-0/SMD-E display is pressed. You can also get to the DRIVE SELECTION display as follows:

- When on the CURRENT TEST PARAMETERS display press the F6 (SET UP) function key
- When on the ENGINEERING MODE display, press the F4 (SET UP) function key or, if ENGINEERING MODE display was accessed from DRIVE SELECTION display, press the F1 (DONE) function key.
- When on the SELECT * TIMING * SELF-TESTS display, press the F1 (DONE) function key.

Select Drive Type

Select type of drive from list and enter its number on PRESENT DEVICE TYPE display line. Only 10 drive type entries are displayed. Press F6 to scroll through the entire list.

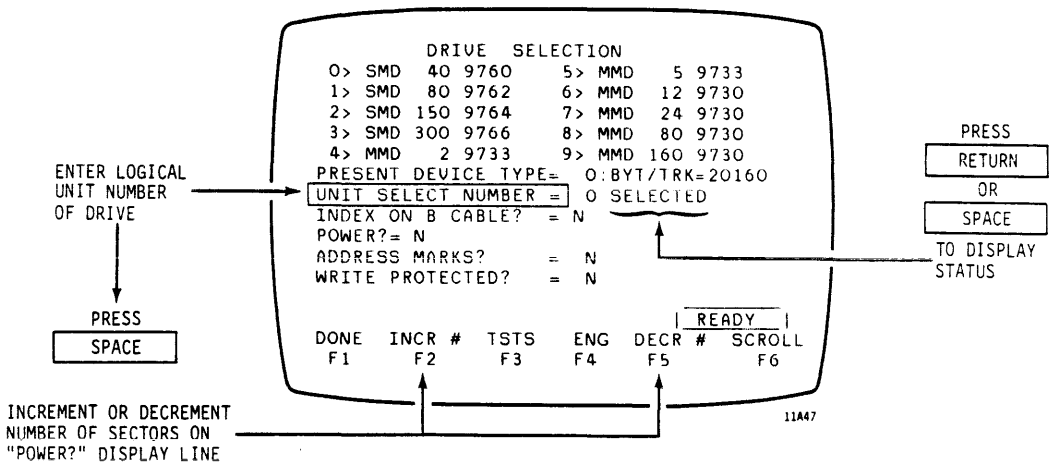
Select Drive Type
(Contd)



Determine Unit Select Number

Go to the UNIT SELECT NUMBER display line and take one of the following courses of action:

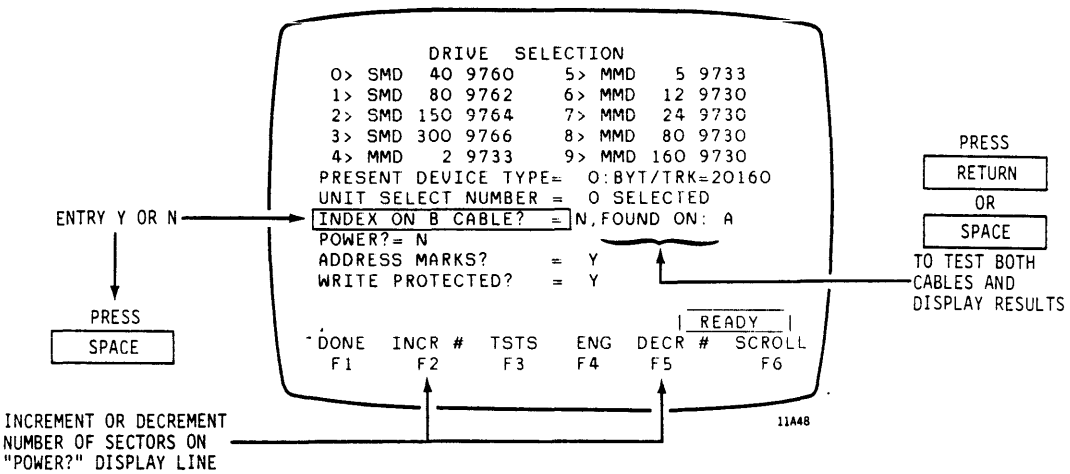
- If the DRIVE SELECTION display was accessed from the SMD-0/SMD-E display, no further action is required. Initially the PFTU finds and selects the logical unit number assigned to the drive being tested.
- If the logical unit number assigned to the drive being tested was changed during testing, enter the new number on the UNIT SELECT NUMBER display line to select the drive.



Select I/O Cable for Index Signal

Go to INDEX ON B CABLE display line and take one of the following courses of action:

- Press RETURN to test both A and B cables for index pulses and display the results.
- Enter Y if PFTU should sense Index signal on B cable.
- Enter N if PFTU should sense Index signal on A cable.

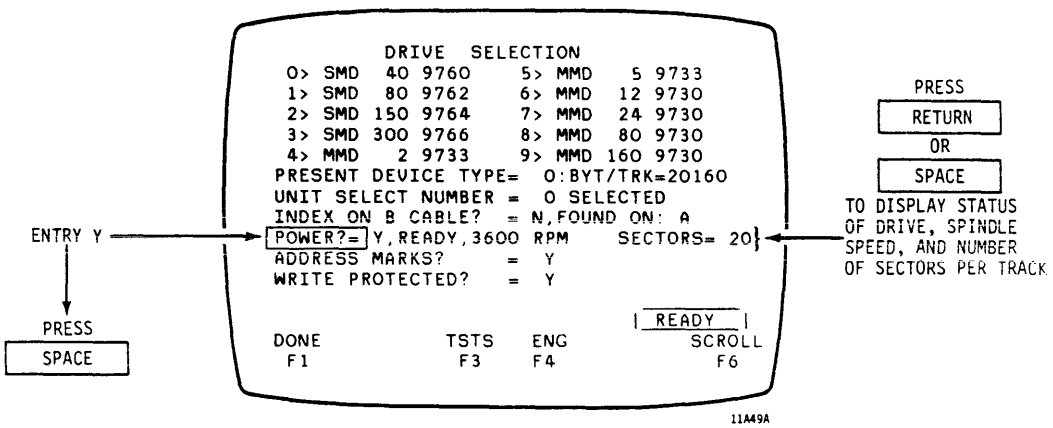


PRETEST-13

Select Spindle Power Up Option

Go to the POWER display line and enter Y. Entering N on this line prevents the test from running. The following Table shows the effects on spindle motor when drive is in remote power sequence mode:

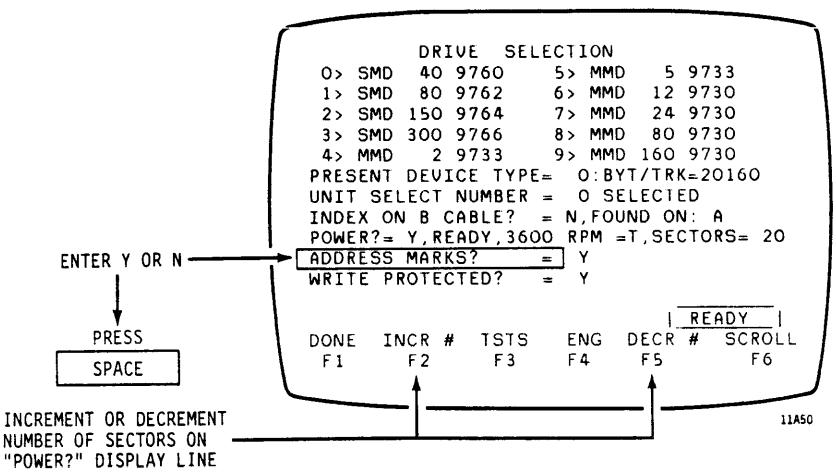
ENTRY ON "POWER" DISPLAY LINE	START/STOP SWITCH POSITION	
	START	STOP
Y	Motor On	Motor Off
N	Motor Off	Motor Off



Select Address Marks

Go to ADDRESS MARKS display line and make one of the following entries:

- Enter Y to write/read address marks at the beginning of the headers for each sector during all write/read format operations.
- Enter N to allow sector pulses to be recognized as the starting point for headers during all write/read format operations.



Select Write Protect

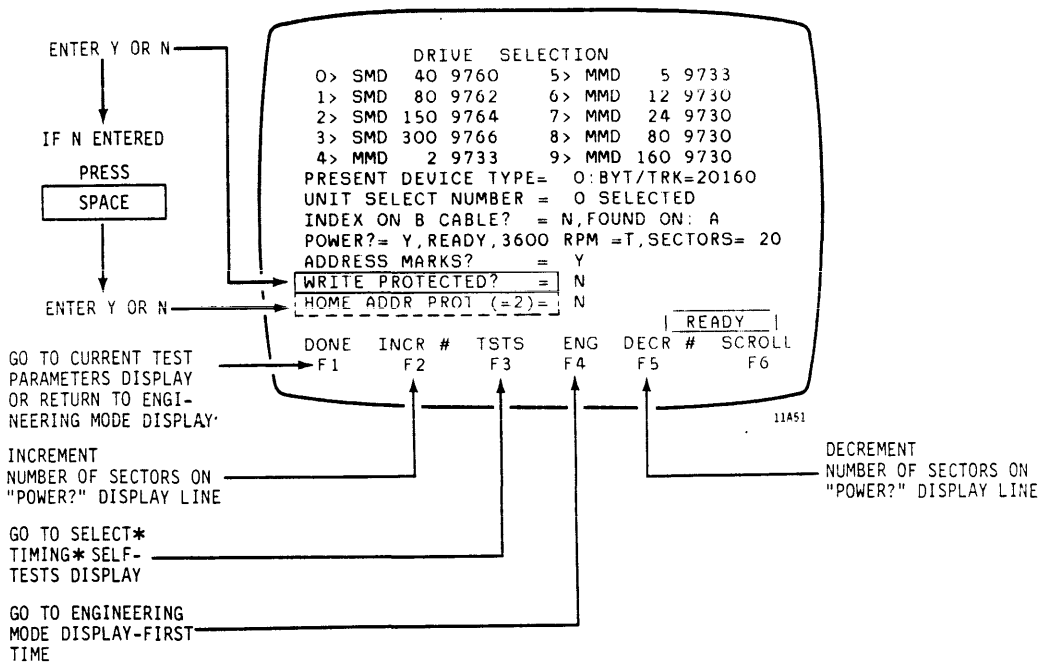
Go to WRITE PROTECTED display line and make one of the following entries:

- Enter a Y to prevent write operations.
- Enter a N to permit write operations.

Select Home Address Protect

If N is entered on WRITE PROTECTED display line, Home Address Protect (HOME ADDR PROT (=2)) display line appears. Go to this display line and make one of the following entries:

- Enter a Y to prevent write operations on the first two sectors (Home address) of each track.
- Enter a N to permit write operations on the first two sectors (Home address) of each track.



If DRIVE SELECTION display was accessed from SMD-0/SMD-E display and you press F1 (DONE), go to page 2-26 (SEEK-1) to set up seek tests or, go to page 2-50 (RD/WRT-1) to set up read/write tests.

(Continued on Next Page)

If DRIVE SELECTION display was accessed from ENGINEERING MODE display and you press F1 (DONE), go to page 2-96 (DIAG-1) to set up and run diagnostic tests.

If you press F3 (TSTS), go to page 2-108 (OTHER-1) to set up and run other tests.

If you press F4 (ENG), go to page 2-96 (DIAG-1) to set up and run diagnostic tests. This function key allows access to the ENGINEERING MODE display when the DEVICE SELECTION display is accessed from the SMD-0/SMD-E display. Under these circumstances, the F1 (DONE) key does not provide access to the ENGINEERING MODE display.

SEEK-1

HOW TO SET UP SEEKS

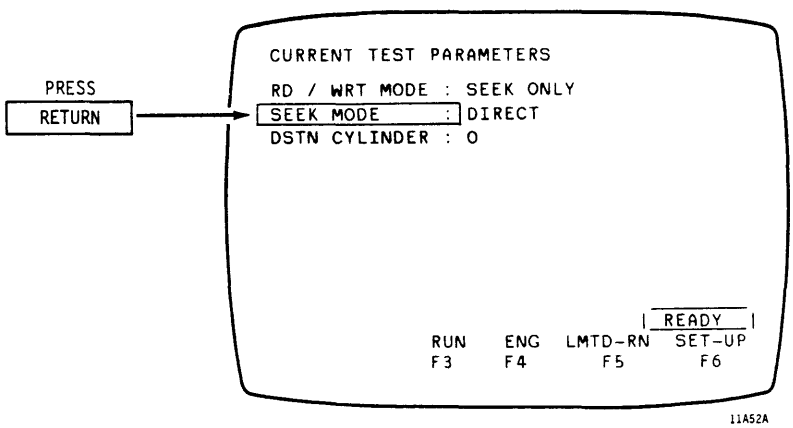
Start at Current Test Parameters Display

When tests are being set up for the first time, this display appears when the F1 (DONE) function key is pressed while on the DRIVE SELECTION display. You can also get to the CURRENT TEST PARAMETERS display as follows:

- When the ENGINEERING MODE display was accessed from the CURRENT TEST PARAMETERS display, press the F1 (DONE) function key to return to the CURRENT TEST PARAMETERS display.
- When the RUN display was accessed from the CURRENT TEST PARAMETERS display, press the F1 (DONE) function key to return to the CURRENT TEST PARAMETERS display.
- When any of the subordinate set-up displays are accessed from the CURRENT TEST PARAMETERS display, press the F1 (DONE) function key to return to the CURRENT TEST PARAMETERS display.

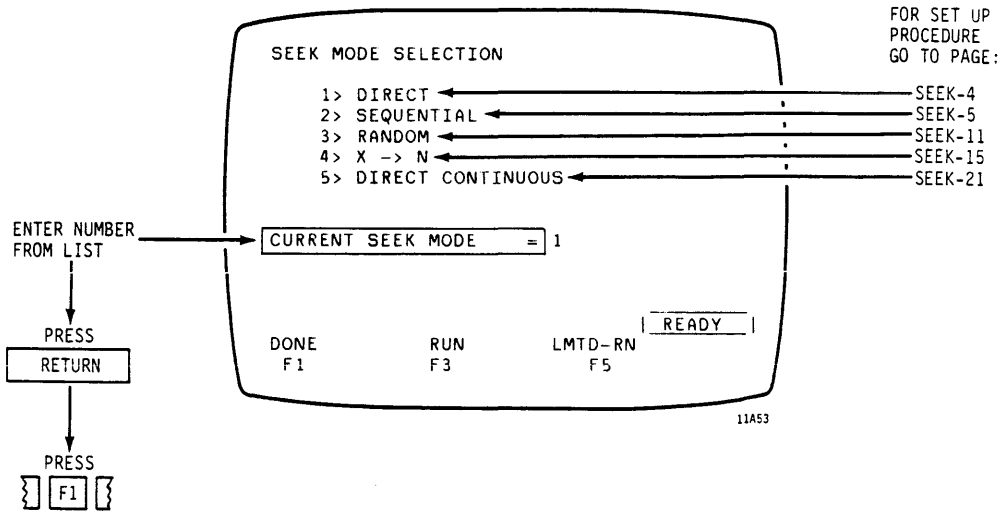
Go to Seek Mode Selection Display

Go to SEEK MODE display line and press RETURN key to go to the SEEK MODE SELECTION display.



Select Seek Mode

Select seek mode from list and enter number on CURRENT SEEK MODE display line. Press F1 (DONE) function key to go to CURRENT TEST PARAMETERS display.



NOTE

If no change to the existing seek mode is required, go to page 2-50 (RD/WRT-1).

SEEK-4 = Page 2-29
SEEK-5 = Page 2-30
SEEK-11 = Page 2-36
SEEK-15 = Page 2-40
SEEK-21 = Page 2-46

Select Mode for Extended Cylinder Addressing

This display line appears only when a device type for a drive with more than 1024 cylinders is entered on the DEVICE SELECTION display. Some of these drives provide two methods (Tag 2 or Tag 1) for addressing high numbered cylinders. Refer to the drive's hardware maintenance manual to determine which method is used by the drive being tested and make one of the following entries:

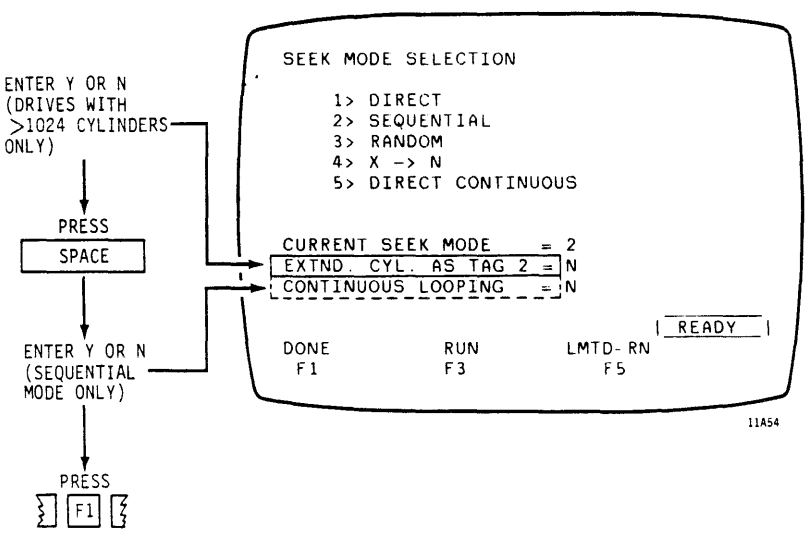
- Enter Y if Tag 2 extended addressing is used.
- Enter N if Tag 1 extended addressing is used.

Select Continuous Looping

This display line appears only when sequential seek mode is selected. Go to the continuous looping display line and make one of the following entries:

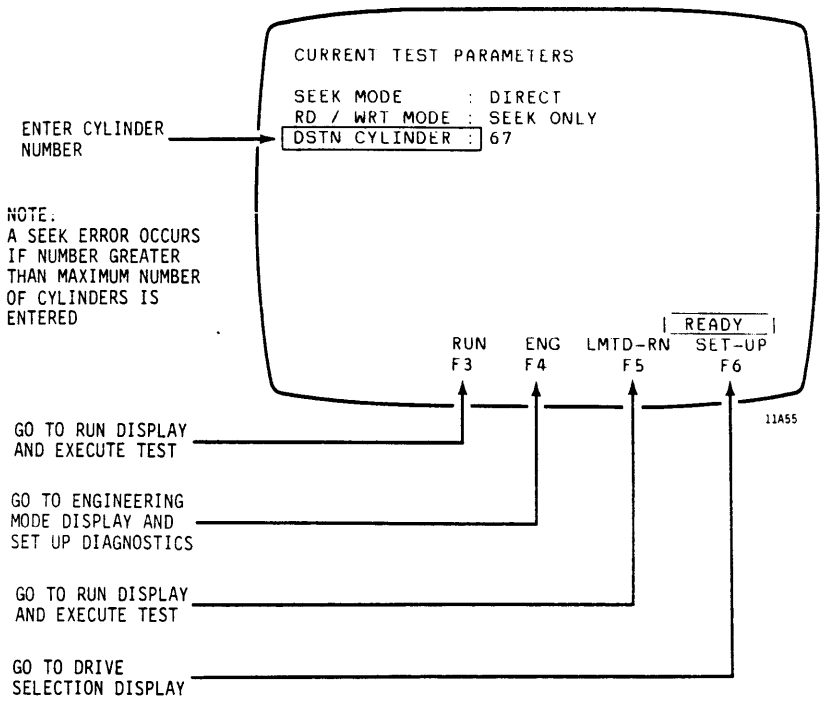
- Enter Y to execute sequential seeks continuously when F3 (RUN) or F5 (LMTD-RN) function keys are pressed.
- Enter N to execute one complete series of sequential seeks when F3 (RUN) or F5 (LMTD-RN) function keys are pressed.

Press F1 (DONE) function key to go to CURRENT TEST PARAMETERS display.



DIRECT SEEK

Select Mode	See SEEK MODE SELECTION page 2-27 (SEEK-2).
Enter Destination Cylinder Number	Go to DESTINATION CYLINDER display line and enter a cylinder number.



If you press F3 or F5, go to page 2-93 (RUN-1).

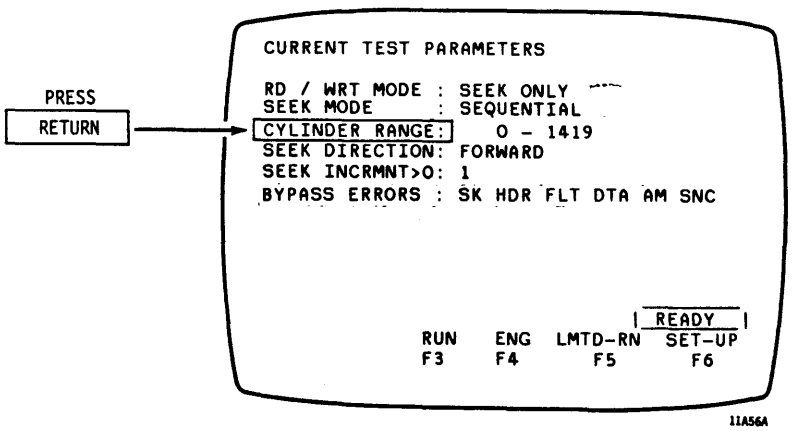
If you press F4, go to page 2-96 (DIAG-1).

If you press F6, go to page 2-18 (PRETEST-9).

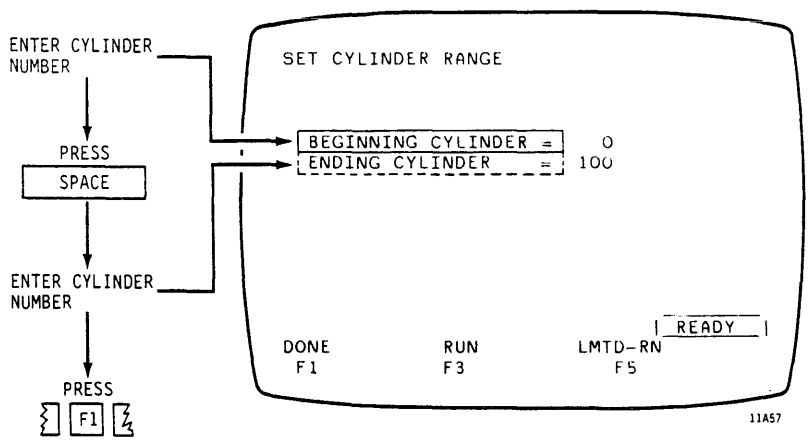
SEEK-5

SEQUENTIAL SEEK

Select Mode	See SEEK MODE SELECTION page 2-27 (SEEK-2).
Go to SET CYLINDER RANGE Display	Go to CYLINDER RANGE display line and press RETURN key to go to SET CYLINDER RANGE display.



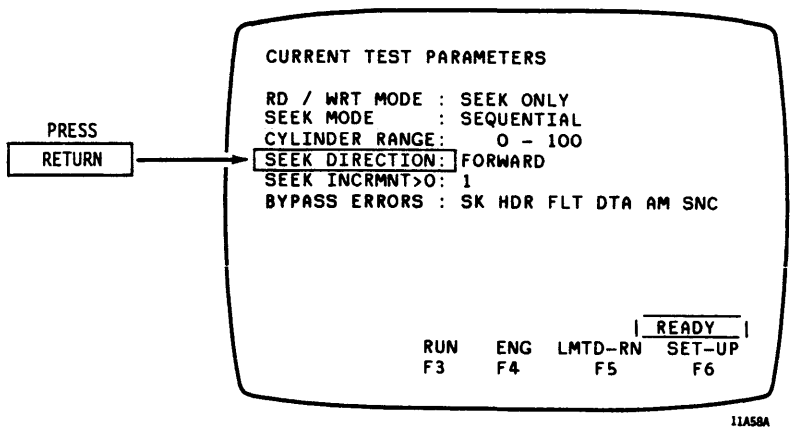
Enter Cylinder Range	Go to BEGINNING CYLINDER display line and enter a cylinder number. Go to ENDING CYLINDER display line and enter a cylinder number. Press F1 (DONE) function key to return to CURRENT TEST PARAMETERS display.



SEQUENTIAL SEEK (CONTD)

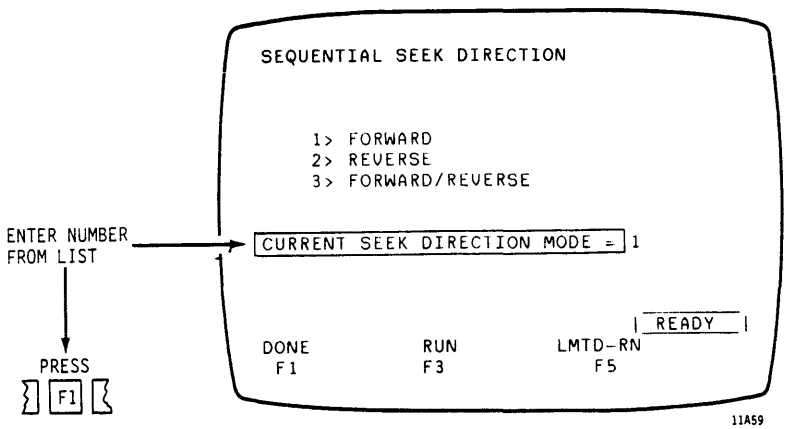
Go to SEQUENTIAL SEEK DIRECTION Display

Go to SEEK DIRECTION display line and press RETURN key to go to SEQUENTIAL SEEK DIRECTION display.



Select and Enter Seek Direction Mode

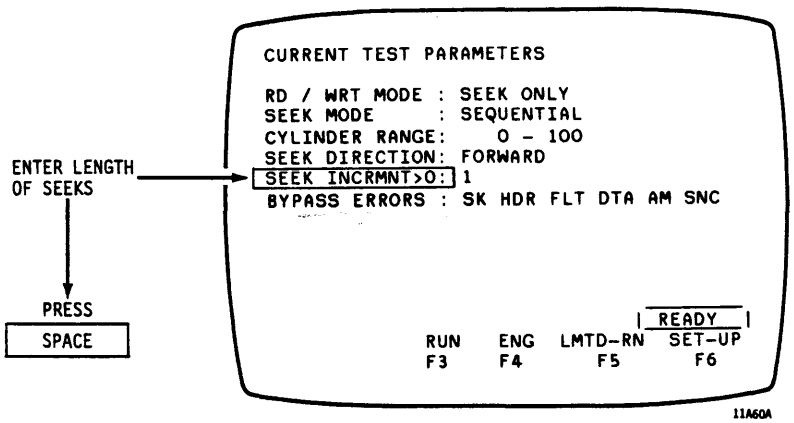
Go to CURRENT SEEK DIRECTION MODE display line and enter number for seek direction mode. Press F1 (DONE) function key to return to CURRENT TEST PARAMETERS display.



SEEK-7

SEQUENTIAL SEEK (CONTD)

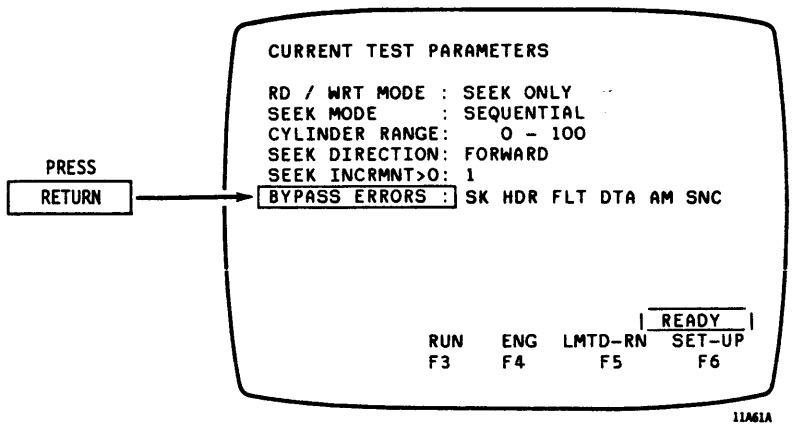
Define Length of Seeks — Go to SEEK INCREMENT display line and enter the seek length (number of tracks to be crossed during each seek).



SEQUENTIAL SEEK (CONTD)

Go to ERROR OPTIONS Display

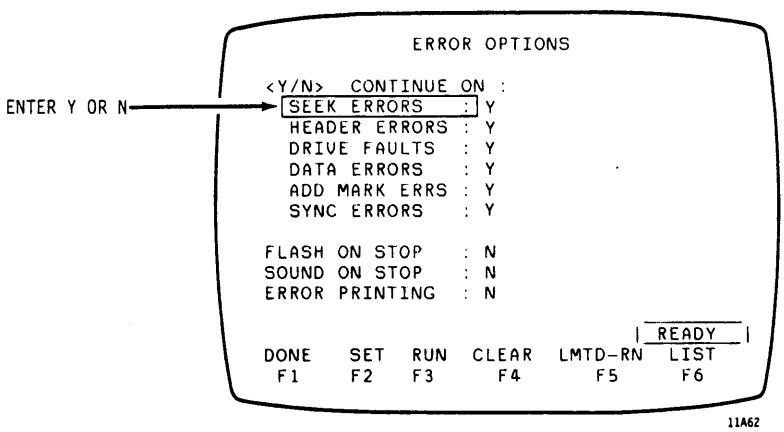
Go to BYPASS ERRORS display line and press RETURN to go to ERROR OPTIONS display.



Select Seek Error Option

Go to the SEEK ERROR display line and make one of the following entries:

- Enter Y to permit testing to continue when a seek error occurs.
- Enter N to stop test when a seek error occurs.



Select Other Error Options

If read/write operations are being included as part of the test being set up, other listed error options may also be selected at this time.

SEQUENTIAL SEEK (CONTD)

Make Display Flash When Error Occurs

Go to the FLASH ON STOP display line and make one of the following entries:

- Enter Y to make display flash off and on when testing is stopped by an error.
- Enter N to disable this option.

Sound Warning When Error Occurs

Go to the SOUND ON STOP display line and make one of the following entries:

- Enter Y to sound an audible warning when testing is stopped by an error.
- Enter N to disable this option.

NOTE

The following option is not displayed unless one of the baud rate function keys (F1-F4) was pressed on the SMD-0/SMD-E TEST display. An external printer must be connected as described on page 2-12 (PRETEST-3) to use this option.

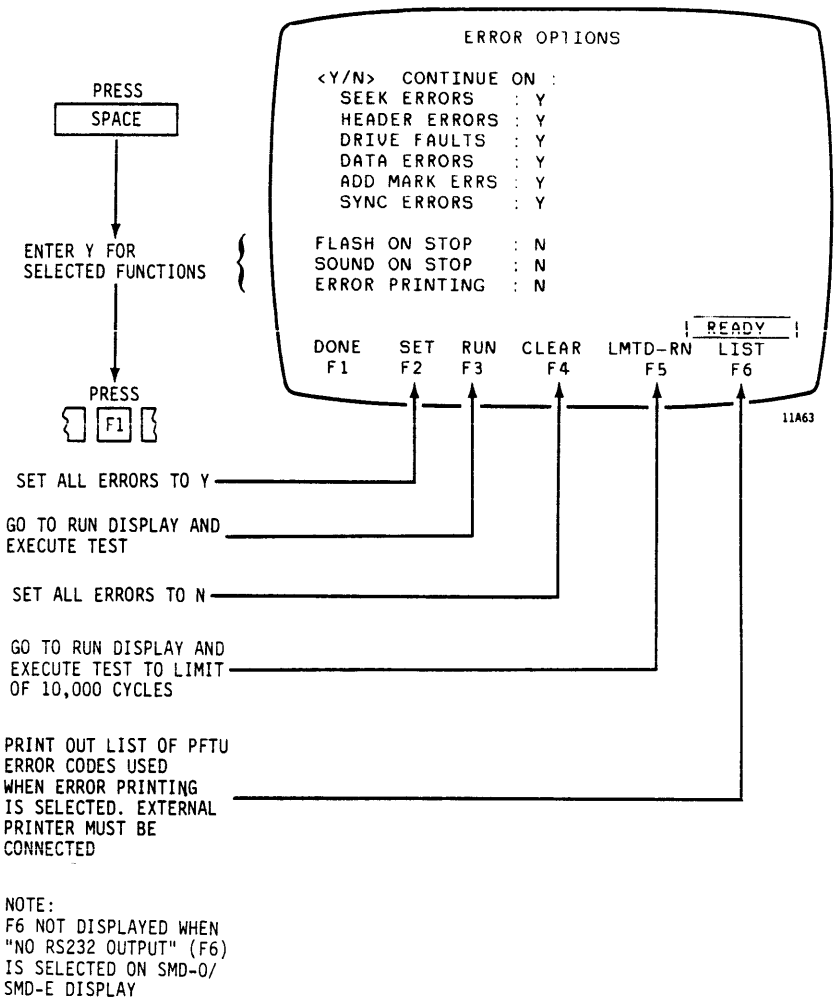
Print Errors While Test is Running

Go to the ERROR PRINTING display line and make one of the following entries:

- Enter Y to print out a hard copy of the CURRENT TEST PARAMETERS display and errors found while a test is running. Do not select this option if no printer is connected to the PFTU. If you do, the PFTU may hang, preventing further testing. If it hangs, press the reset button on the operator panel and reload controlware to clear the hang condition.
- Enter N to disable this option.

Press F1 (DONE) function key to return to CURRENT TEST PARAMETERS display.

SEQUENTIAL SEEK (CONTD)



If you press F1, go to page 2-50 (RD/WRT-1).

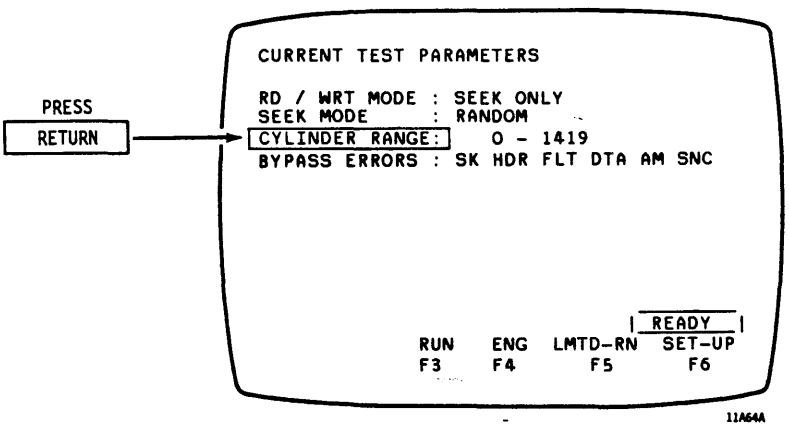
If you press F3 or F5, go to page 2-93 (RUN-1).

SEEK-11

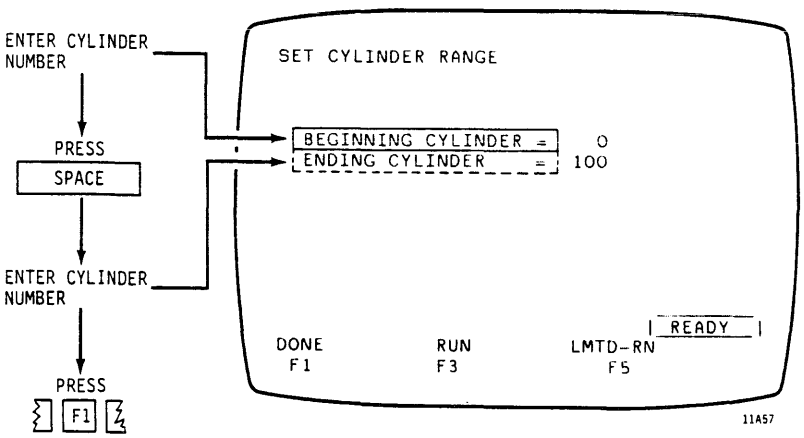
RANDOM SEEK

Select Mode — See SEEK MODE SELECTION page 2-27 (SEEK-2).

Go to Set Cylinder Range Display — Go to CYLINDER RANGE display line and press RETURN key to go to SET CYLINDER RANGE display.



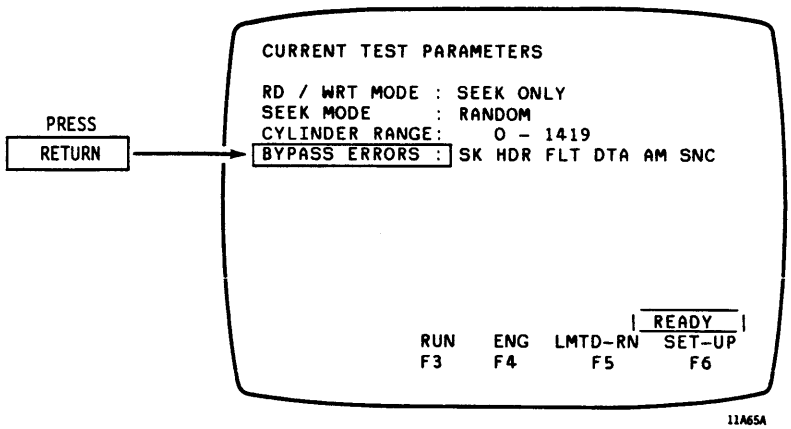
Enter Cylinder Range — Go to BEGINNING CYLINDER display line and enter a cylinder number. Go to ENDING CYLINDER display line and enter a cylinder number. Press F1 (DONE) function key to return to CURRENT TEST PARAMETERS display.



RANDOM SEEK (CONTD)

Go to ERROR OPTIONS Display

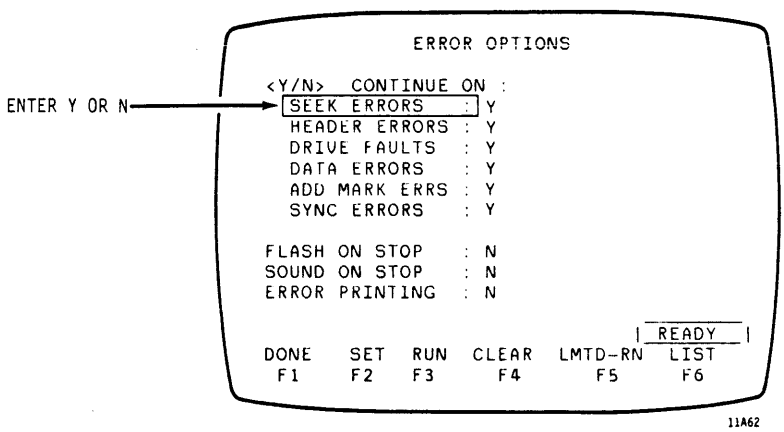
Go to BYPASS ERRORS display line and press RETURN to go to ERROR OPTIONS display.



Select Seek Error Option?

Go to the SEEK ERROR display line and make one of the following entries:

- Enter Y to permit testing to continue when a seek error occurs.
- Enter N to stop test when a seek error occurs.



Select Other Error Options

If read/write operations are being included as part of the test being set up, other listed error options may also be selected at this time.

RANDOM SEEK (CONTD)

Make Display Flash When Error Occurs

Go to the FLASH ON STOP display line and make one of the following entries:

- Enter Y to make display flash off and on when testing is stopped by an error.
- Enter N to disable this option.

Sound Warning When Error Occurs

Go to the SOUND ON STOP display line and make one of the following entries:

- Enter Y to sound an audible warning when testing is stopped by an error.
- Enter N to disable this option.

NOTE

The following option is not displayed unless one of the baud rate function keys (F1-F4) was pressed on the SMD-O/SMD-E TEST display. An external printer must be connected as described on page 2-12 (PRETEST-3) to use this option.

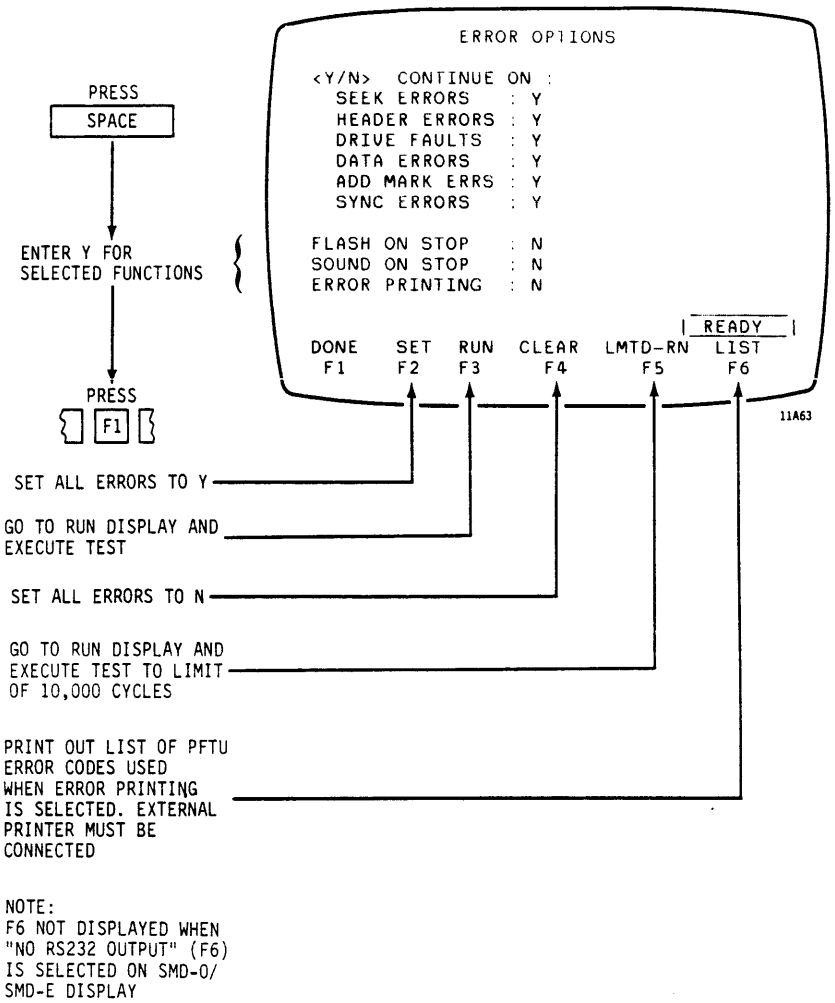
Print Errors While Test is Running

Go to the ERROR PRINTING display line and make one of the following entries:

- Enter Y to print out a hard copy of the CURRENT TEST PARAMETERS display and errors found while a test is running. Do not select this option if no printer is connected to the PFTU. If you do, the PFTU may hang, preventing further testing. If it hangs, press the reset button on the operator panel and reload controlware to clear the hang condition.
- Enter N to disable this option.

Press F1 (DONE) function key to return to CURRENT TEST PARAMETERS display.

RANDOM SEEK (CONTD)



If you press F1, go to page 2-50 (RD/WRT-1).

If you press F3 or F5, go to page 2-93 (RUN-1).

SEEK-15

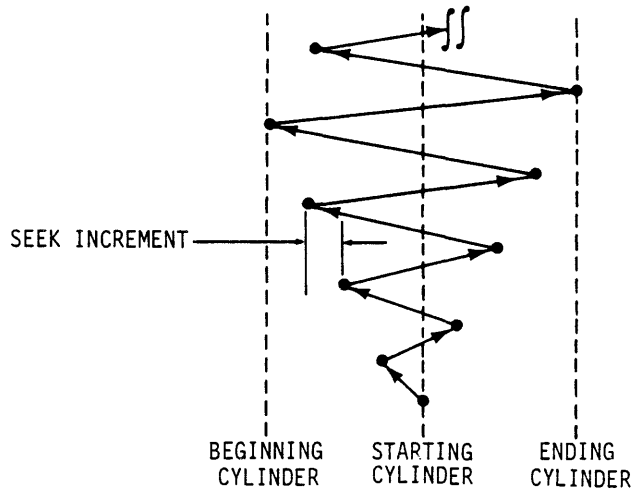
X→N SEEK

Select Mode

See SEEK MODE SELECTION page 2-27 (SEEK-2).

Typical X → N Seek Pattern

This test performs alternating forward and reverse seeks as follows:



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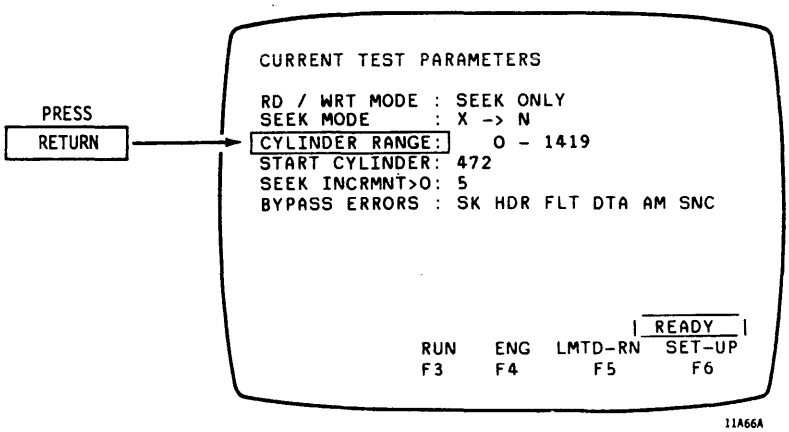
Refer to Table 1-3 in section 1 of this manual for more information about X → N seek patterns.

Go to SET CYLINDER RANGE Display

Go to CYLINDER RANGE display line and press RETURN key to go to SET CYLINDER RANGE display.



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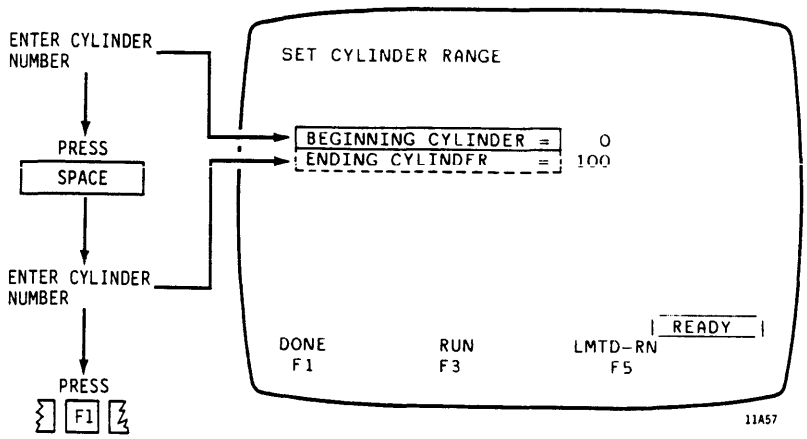
X→N SEEK (CONTD)

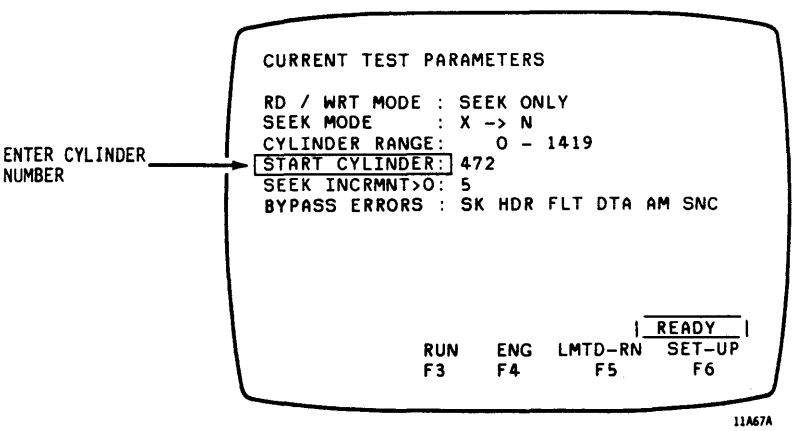
Enter Cylinder Range

Go to BEGINNING CYLINDER display line and enter a cylinder number. Go to ENDING CYLINDER display line and enter a cylinder number. Press F1 (DONE) function key to return to CURRENT TEST PARAMETERS display.



Enter Starting Cylinder Number

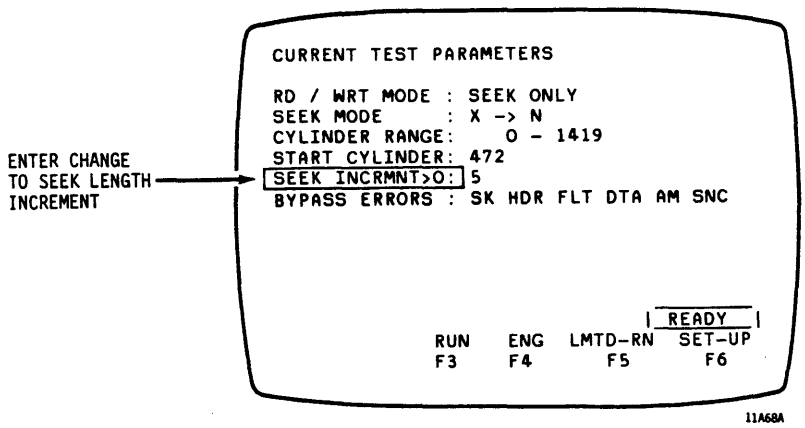
Go to STARTING CYLINDER display line and enter a cylinder number.



SEEK-17

X→N SEEK (CONTD)

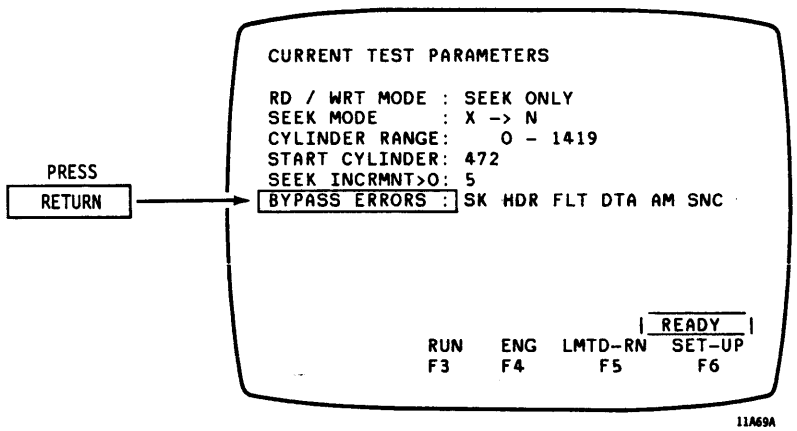
Enter Seek Length Increments	Go to SEEK INCREMENT display line and enter the number of tracks by which the seek lengths are to be increased and decreased.



X→N SEEK (CONTD)

Go to ERROR OPTIONS Display

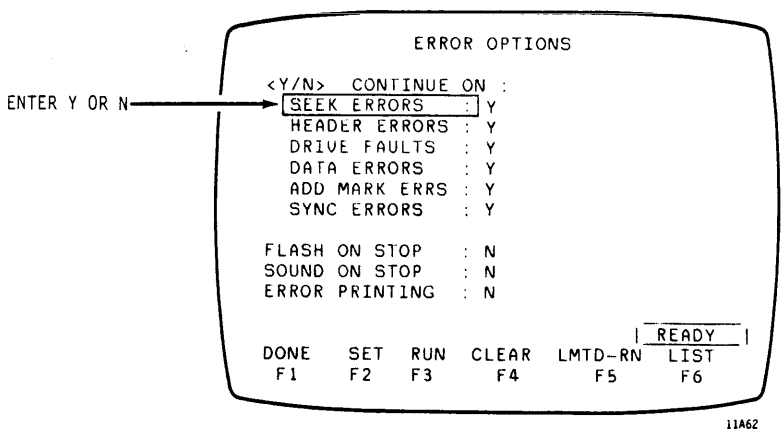
Go to BYPASS ERRORS display line and press RETURN to go to ERROR OPTIONS display.



Select Seek Error Option?

Go to the SEEK ERROR display line and make one of the following entries:

- Enter Y to permit testing to continue when a seek error occurs.
- Enter N to stop test when a seek error occurs.



Select Other Error Options

If read/write operations are being included as part of the test being set up, other listed error options may also be selected at this time.

X→N SEEK (CONTD)

Make Display Flash When Error Occurs

Go to the FLASH ON STOP display line and make one of the following entries:

- Enter Y to make display flash off and on when testing is stopped by an error.
- Enter N to disable this option.

Sound Warning When Error Occurs

Go to the SOUND ON STOP display line and make one of the following entries:

- Enter Y to sound an audible warning when testing is stopped by an error.
- Enter N to disable this option.

NOTE

The following option is not displayed unless one of the baud rate function keys (F1-F4) was pressed on the SMD-0/SMD-E TEST display. An external printer must be connected as described on page 2-12 (PRETEST-3) to use this option.

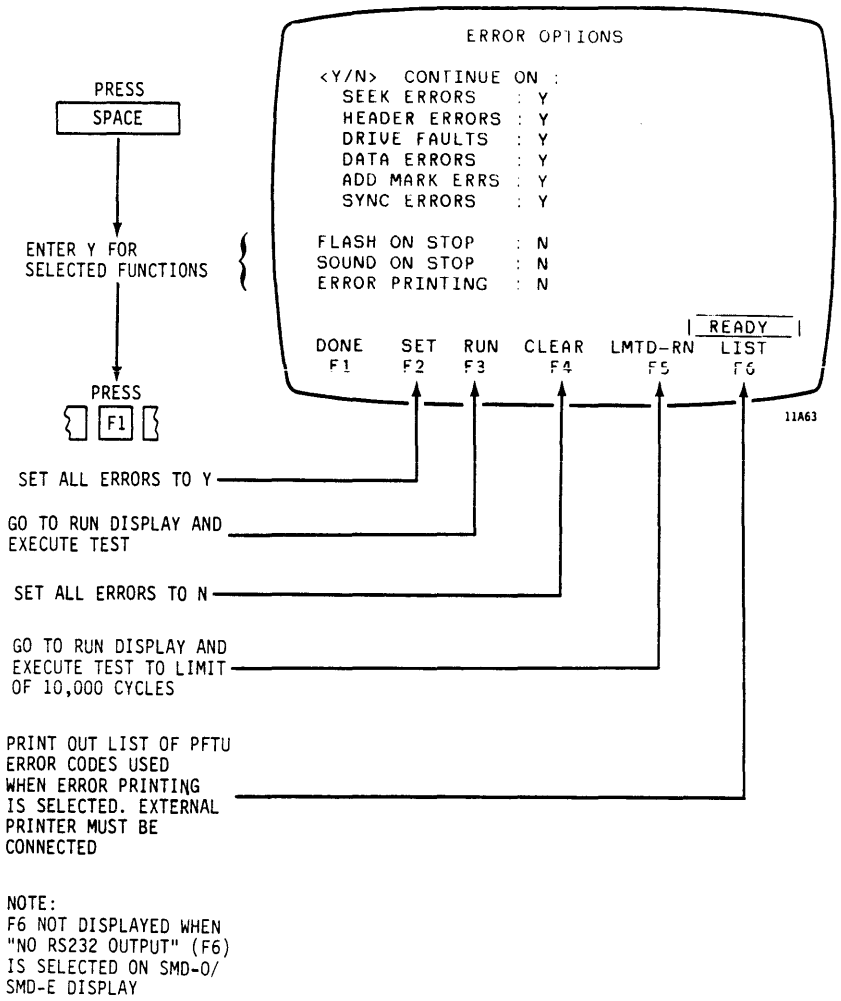
Print Errors While Test is Running

Go to the ERROR PRINTING display line and make one of the following entries:

- Enter Y to print out a hard copy of the CURRENT TEST PARAMETERS display and errors found while a test is running. Do not select this option if no printer is connected to the PFTU. If you do, the PFTU may hang, preventing further testing. If it hangs, press the reset button on the operator panel and reload controlware to clear the hang condition.
- Enter N to disable this option.

Press F1 (DONE) function key to return to CURRENT TEST PARAMETERS display.

X→N SEEK (CONTD)



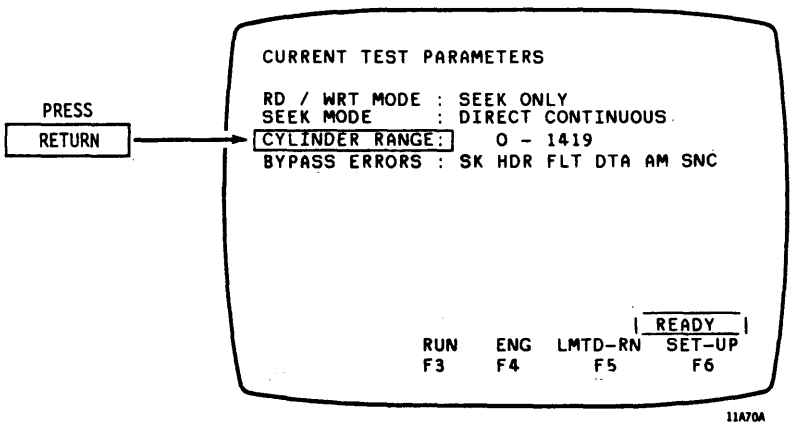
If you press F1, go to page 2-50 (RD/WRT-1).

If you press F3 or F5, go to page 2-93 (RUN-1).

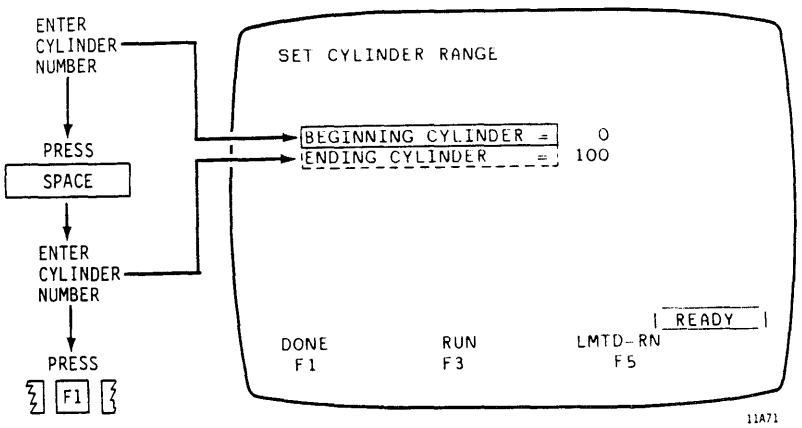
SEEK-21

DIRECT CONTINUOUS SEEK

Select Mode	See SEEK MODE SELECTION page 2-27 (SEEK-2).
Go To SET CYLINDER RANGE Display	Go to CYLINDER RANGE display line and press RETURN key to go to SET CYLINDER RANGE display.



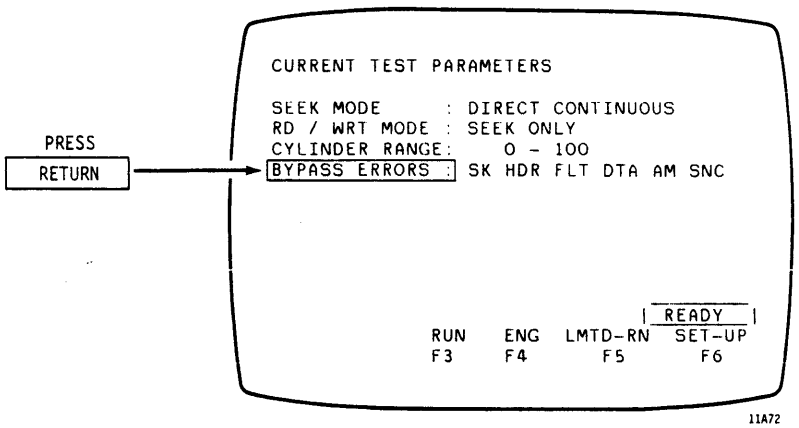
Enter Cylinder Range	Go to BEGINNING CYLINDER display line and enter a cylinder number. Go to ENDING CYLINDER display line and enter a cylinder number. Press F1 (DONE) function key to return to CURRENT TEST PARAMETERS display.



DIRECT CONTINUOUS SEEK (CONTD)

Go to ERROR OPTIONS Display

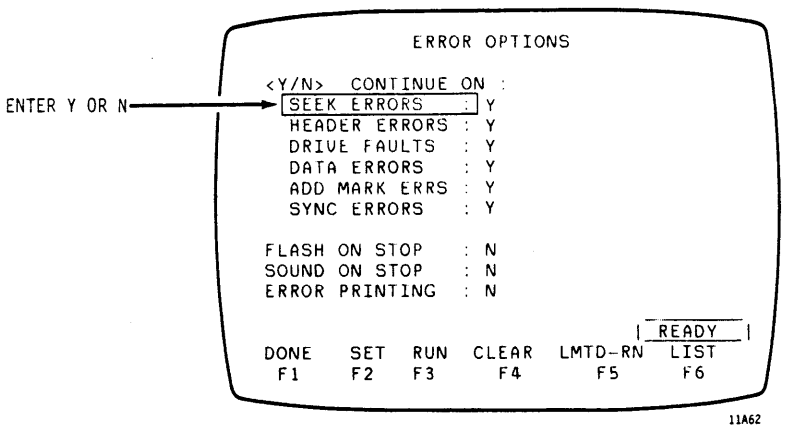
Go to BYPASS ERRORS display line and press RETURN to go to ERROR OPTIONS display.



Select Seek Error Option?

Go to the SEEK ERROR display line and make one of the following entries:

- Enter Y to permit testing to continue when a seek error occurs.
- Enter N to stop test when a seek error occurs.



Select Other Error Options

If read/write operations are being included as part of the test being set up, other listed error options may also be selected at this time.

DIRECT CONTINUOUS SEEK (CONTD)

Make Display Flash When Error Occurs

Go to the FLASH ON STOP display line and make one of the following entries:

- Enter Y to make display flash off and on when testing is stopped by an error.
- Enter N to disable this option.

Sound Warning When Error Occurs

Go to the SOUND ON STOP display line and make one of the following entries:

- Enter Y to sound an audible warning when testing is stopped by an error.
- Enter N to disable this option.

NOTE

The following option is not displayed unless one of the baud rate function keys (F1-F4) was pressed on the SMD-0/SMD-E TEST display. An external printer must be connected as described on page 2-12 (PRETEST-3) to use this option.

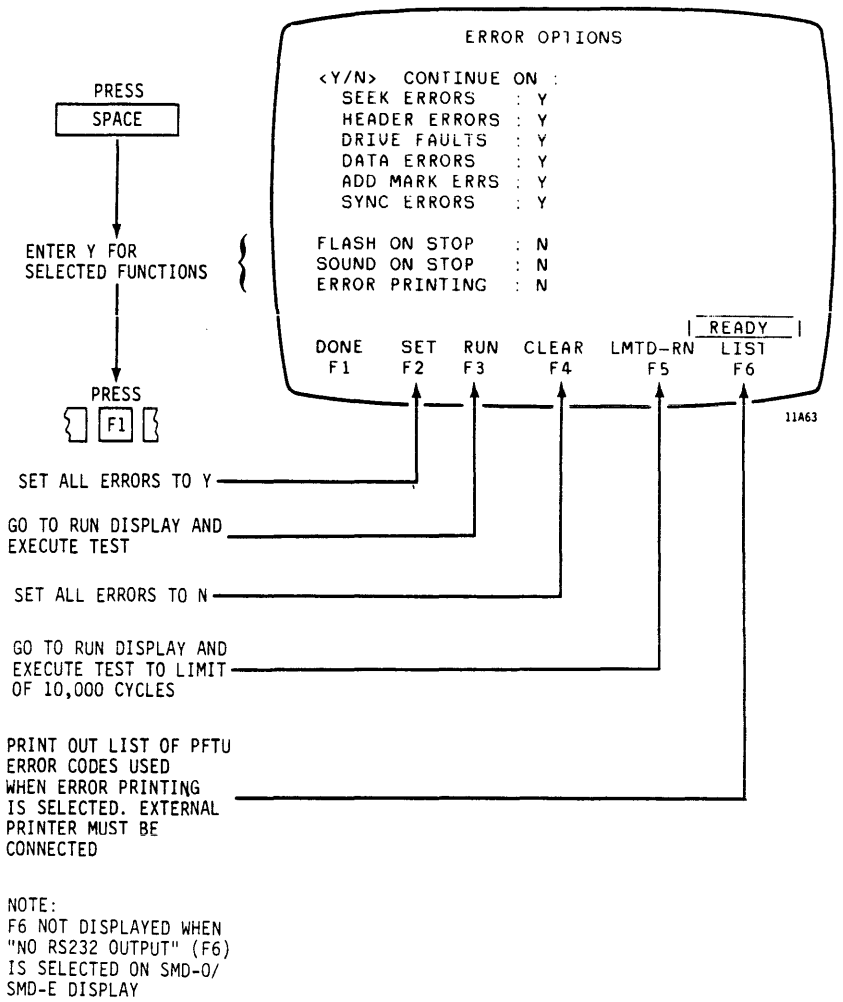
Print Errors While Test is Running

Go to the ERROR PRINTING display line and make one of the following entries:

- Enter Y to print out a hard copy of the CURRENT TEST PARAMETERS display and errors found while a test is running. Do not select this option if no printer is connected to the PFTU. If you do, the PFTU may hang, preventing further testing. If it hangs, press the reset button on the operator panel and reload controlware to clear the hang condition.
- Enter N to disable this option.

Press F1 (DONE) function key to return to CURRENT TEST PARAMETERS display.

DIRECT CONTINUOUS SEEK (CONTD)



If you press F1, go to page 2-50 (RD/WRT-1).

If you press F3 or F5, go to page 2-93 (RUN-1).

HOW TO SET UP READ/WRITE OPERATIONS

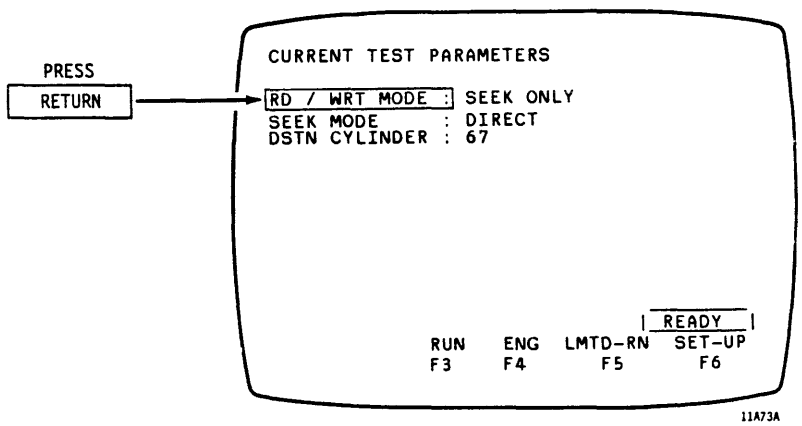
Start at CURRENT TEST PARAMETERS DISPLAY

When tests are being set up for the first time, this display appears when the F1 (DONE) function key is pressed while on the DRIVE SELECTION display. You can also get to the CURRENT TEST PARAMETERS display as follows:

- When the ENGINEERING MODE display was accessed from the CURRENT TEST PARAMETERS display, press the F1 (DONE) function key to return to the CURRENT TEST PARAMETERS display.
- When the RUN display was accessed from the CURRENT TEST PARAMETERS display, press the F1 (DONE) function key to return to the CURRENT TEST PARAMETERS display.
- When any of the subordinate set-up displays are accessed from the CURRENT TEST PARAMETERS display, press the F1 (DONE) function key to return to the CURRENT TEST PARAMETERS display.

Go to READ/WRITE MODE SELECTION Display

Go to RD / WRT MODE display line and press RETURN to go to the READ/WRITE MODE SELECTION display.

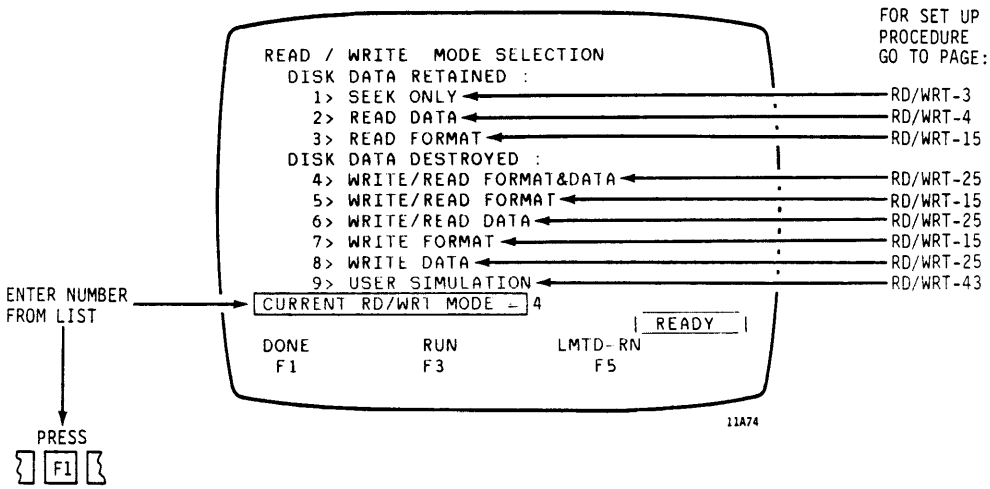


Select Read/Write Mode

Select desired read/write mode from list and enter number on CURRENT RD/WRT MODE display line. Press F1 (DONE) function key to return to CURRENT TEST PARAMETERS display.

CAUTION

The modes that involve write operations destroy existing data written on a track. To avoid possible loss of customer data, select cylinder(s) and head(s) that result in data being written on unused track(s).



Do not press F3 (RUN) or F5 (LMTD-RN) until all seek and read/write functions are set up to run only desired tests.

RD/WRT-3 = Page 2-52
RD/WRT-4 = Page 2-53
RD/WRT-15 = Page 2-64
RD/WRT-25 = Page 2-74
RD/WRT-43 = Page 2-92

RD/WRT-3

SEEK ONLY

Select Mode	See READ/WRITE MODE SELECTION on page 2-51 (RD/WRT-2).
No Further Action Required	Refer to page 2-26 (SEEK-1) for procedure on how to set-up seeks.

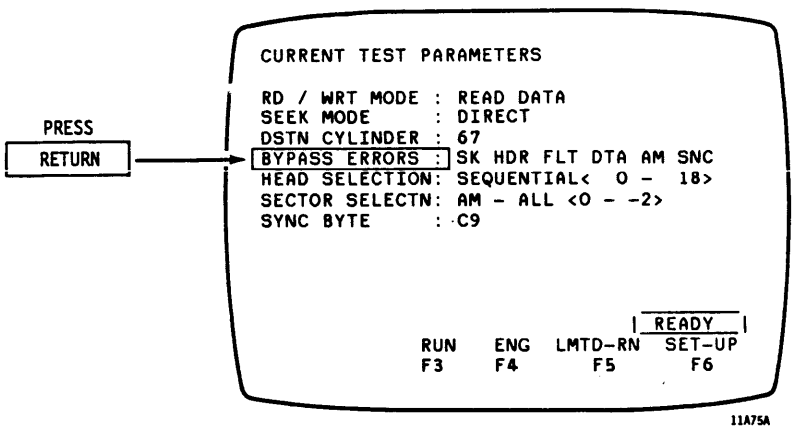
READ DATA

Select Mode

See READ/WRITE MODE SELECTION on page 2-51 (RD/WRT-2).

Go to ERROR OPTIONS Display

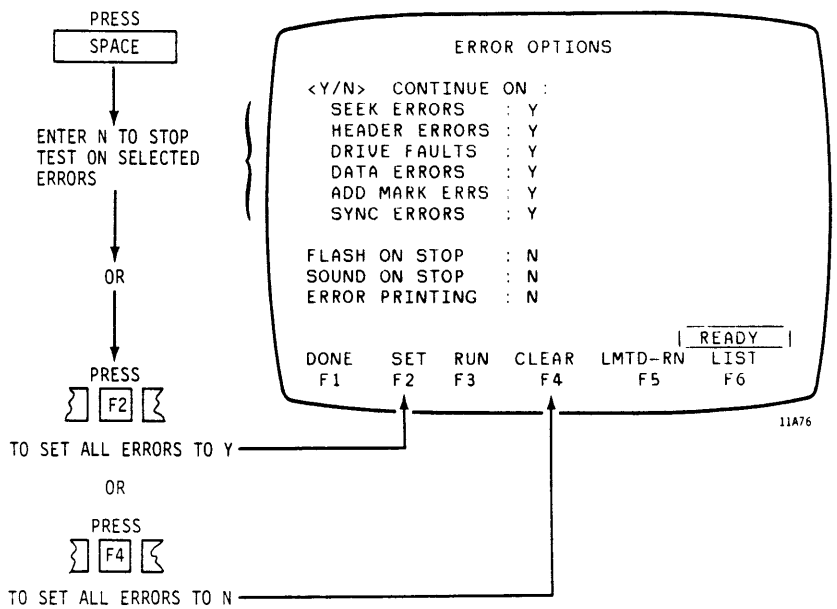
Go to BYPASS ERRORS display line and press RETURN to go to ERROR OPTIONS display.



Select Error Options

Go to selected individual display lines and make one of the following entries:

- Enter Y to permit testing to continue when an error occurs.
- Enter N to stop test when an error occurs.



READ DATA (CONTD)

Make Display Flash When Error Occurs

Go to the FLASH ON STOP display line and make one of the following entries:

- Enter Y to make display flash off and on when testing is stopped by an error.
- Enter N to disable this option.

Sound Warning When Error Occurs

Go to the SOUND ON STOP display line and make one of the following entries:

- Enter Y to sound an audible warning when testing is stopped by an error.
- Enter N to disable this option.

NOTE

The following option is not displayed unless one of the baud rate function keys (F1-F4) was pressed on the SMD-O/SMD-E TEST display. An external printer must be connected as described on page 2-12 (PRETEST-3) to use this option.

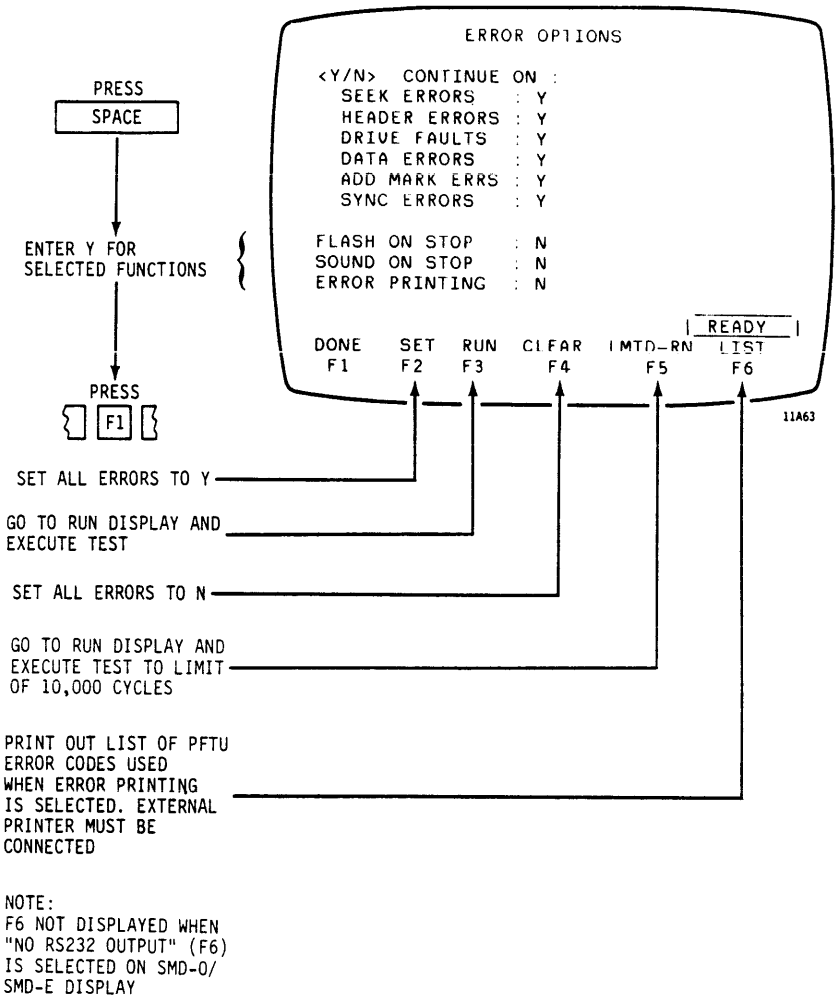
Print Errors While Test is Running

Go to the ERROR PRINTING display line and make one of the following entries:

- Enter Y to print out a hard copy of the CURRENT TEST PARAMETERS display and errors found while a test is running. Do not select this option if no printer is connected to the PFTU. If you do, the PFTU may hang, preventing further testing. If it hangs, press the reset button on the operator panel and reload controlware to clear the hang condition.
- Enter N to disable this option.

Press F1 (DONE) function key to return to CURRENT TEST PARAMETERS display.

READ DATA (CONTD)



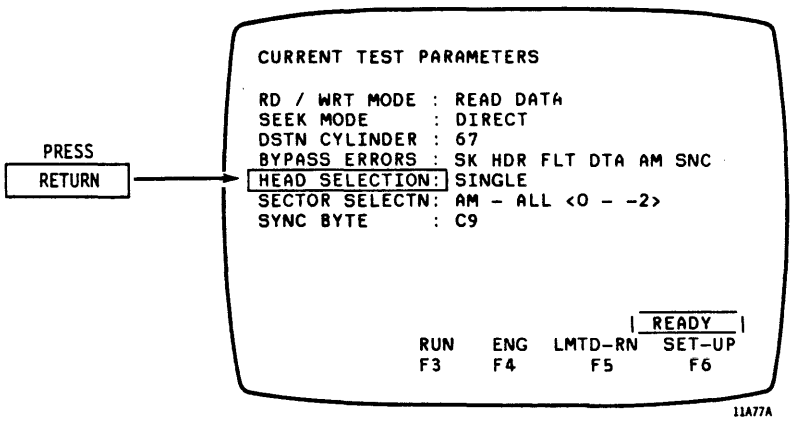
NOTE

Do not press F3 (RUN) or F5 (LMTD-RN) at this point. Wait until test set up is complete.

READ DATA (CONTD)

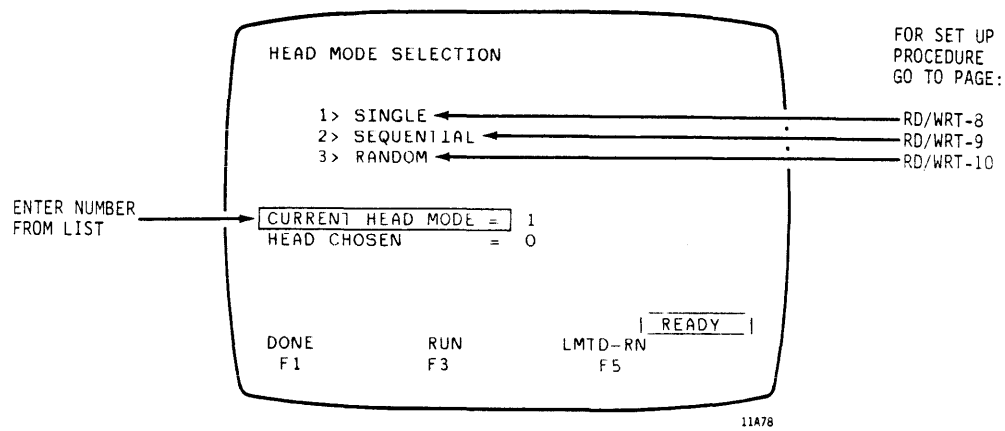
Go to HEAD MODE SELECTION Display

Go to HEAD SELECTION display line and press RETURN to go to HEAD MODE SELECTION display.



Select Head Mode

Select head mode from list and enter number on CURRENT HEAD MODE display line.

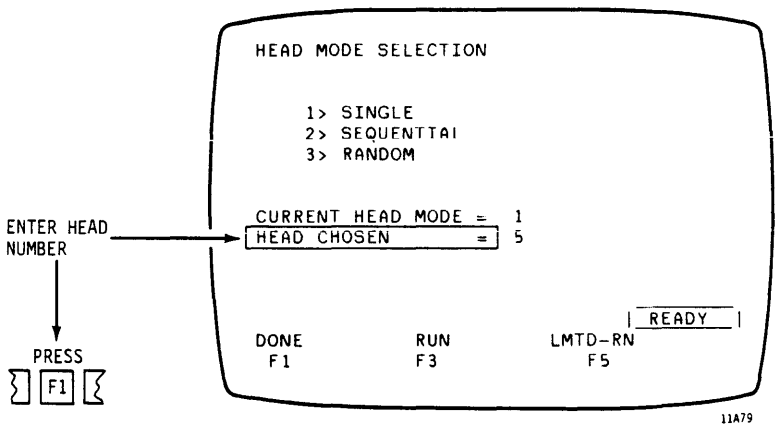


RD/WRT-8 = Page 2-57
RD/WRT-9 = Page 2-58
RD/WRT-10 = Page 2-59

READ DATA (CONTD)

Single Head Selected

Enter Number of Head Selected	Go to HEAD CHOSEN display line and enter the number of the head to be used to read data. Press F1 (DONE) function key to return to CURRENT TEST PARAMETERS display.

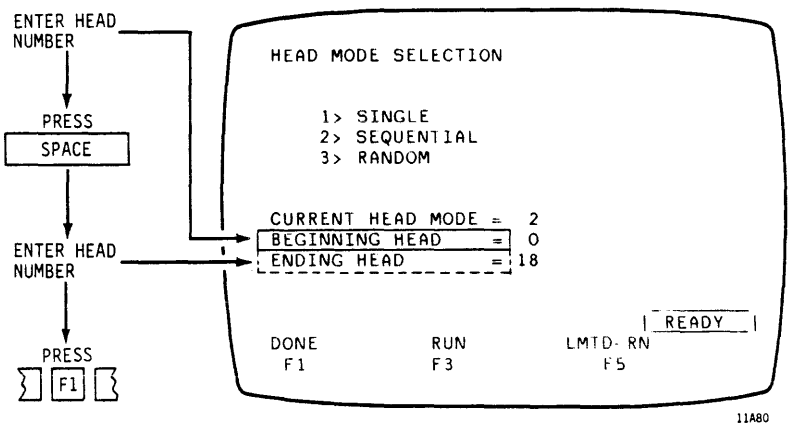


READ DATA (CONTD)

Sequential Head Selection

Enter Range of Heads to be Selected

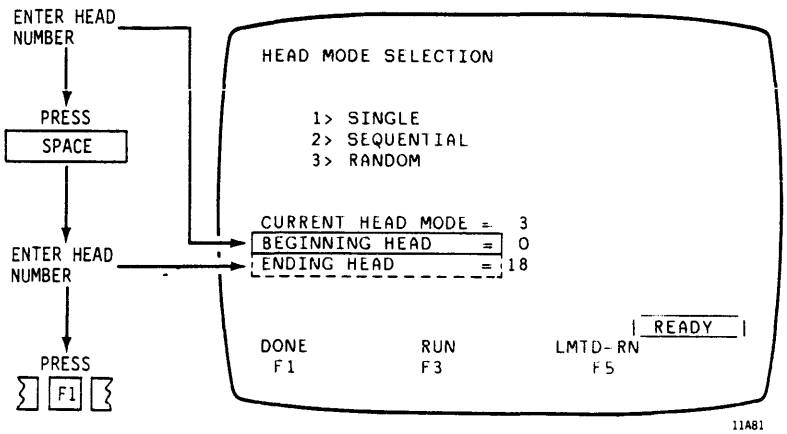
Go to BEGINNING HEAD display line and enter a head number. Go to the ENDING HEAD display line and enter a head number. Press F1 (DONE) function key to return to CURRENT TEST PARAMETERS display.



READ DATA (CONTD)

Random Head Selection

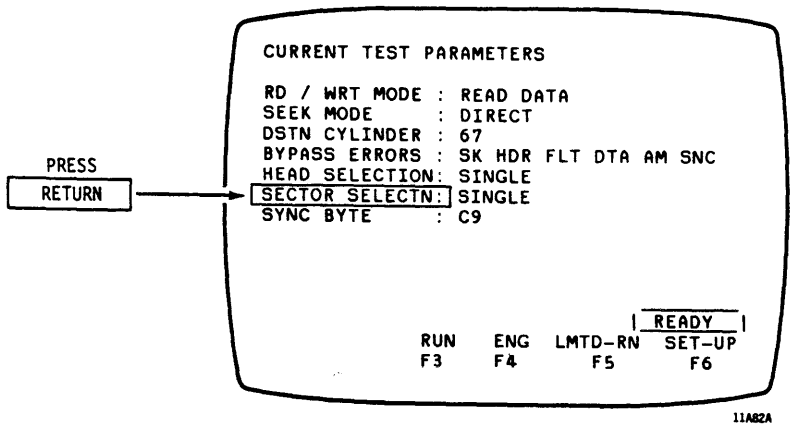
Enter Range of Heads to be Selected	Go to BEGINNING HEAD display line and enter a head number. Go to the ENDING HEAD display line and enter a head number. Press F1 (DONE) function key to return to CURRENT TEST PARAMETERS display.



READ DATA (CONTD)

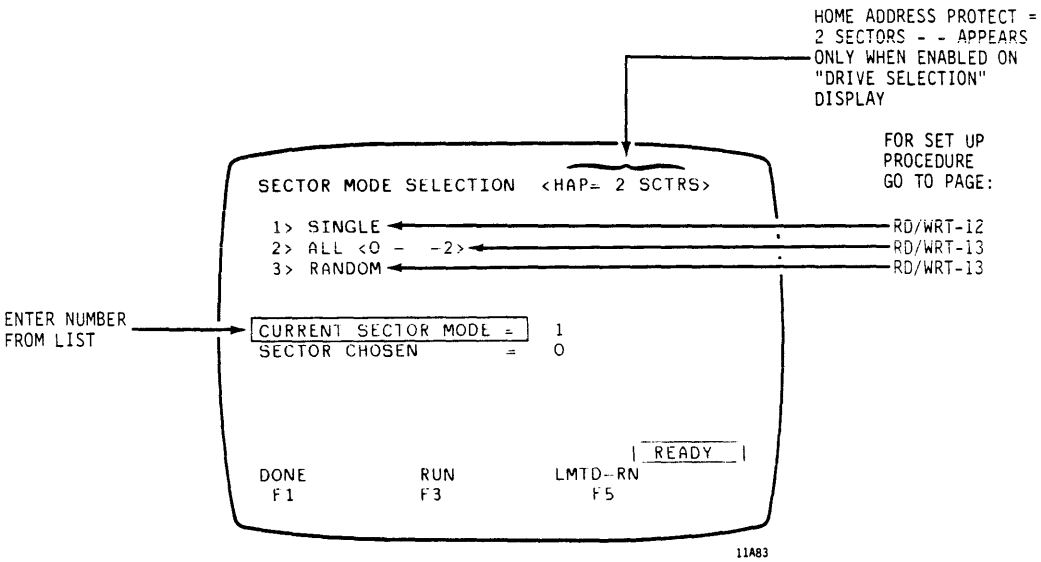
Go to SECTOR MODE SELECTION Display

Go to SECTOR SELECTION display line and press RETURN to go to SECTOR MODE SELECTION display.



Select Sector Mode

Select sector mode from list and enter number on CURRENT SECTOR MODE display line.

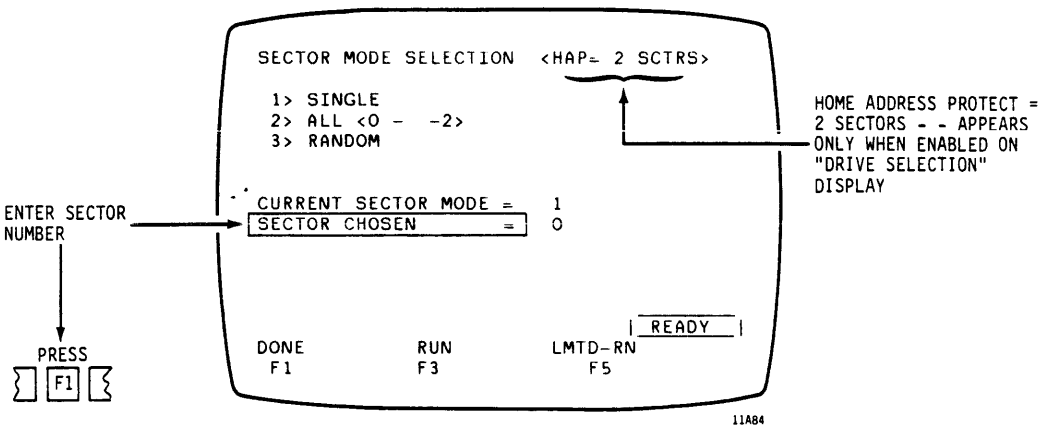


RD/WRT-12 = Page 2-61
RD/WRT-13 = Page 2-62

READ DATA (CONTD)

Single Sector Selected

Enter Number of Sector Selected	Go to SECTOR CHOSEN display line and enter the number of the sector to be read. Press F1 (DONE) function key to return to CURRENT TEST PARAMETERS display.



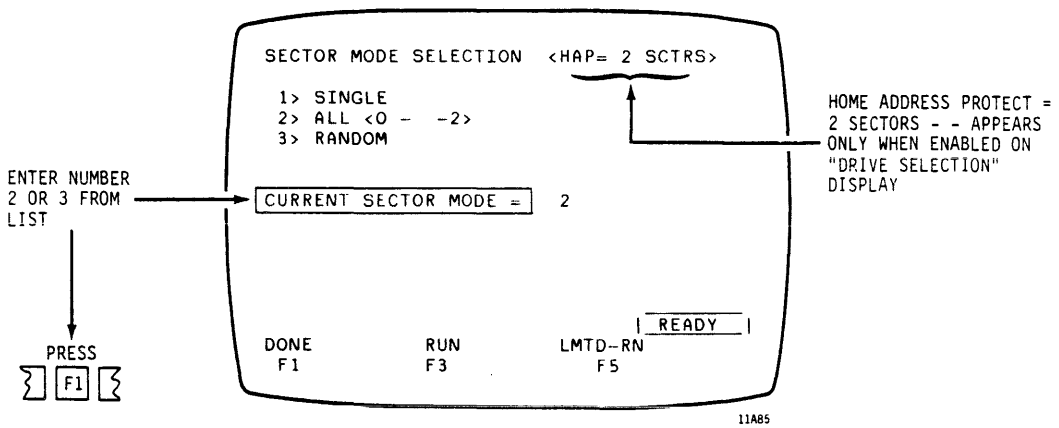
READ DATA (CONTD)

All Sectors Mode Selected

No Further Entries Required	Each available sector on a track is sequentially selected. Press F1 (DONE) function key to return to CURRENT TEST PARAMETERS display.

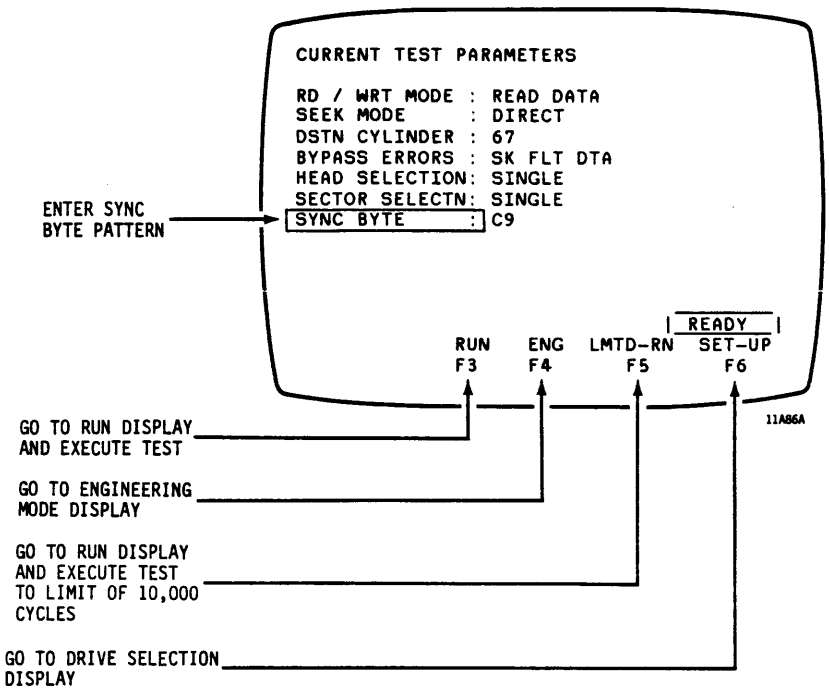
Random Sector Mode Selected

No Further Entries Required	Each available sector on a track is randomly selected. Press F1 (DONE) function key to return to CURRENT TEST PARAMETERS display.



Enter Sync Byte Pattern	Go to SYNC BYTE display line and enter two hexadecimal numbers to be used as the sync byte pattern. Remember that a binary sync byte pattern must be expressed as its hexadecimal value. EXAMPLES: • To enter a pattern of alternating binary ones and zeros, enter As (hex. A = binary 1010) on the SYNC BYTE display line. • To enter a pattern of all binary ones, enter Fs (hex. F = binary 1111) on the SYNC BYTE display line.

READ DATA (CONTD)



NOTE

Press F8 twice to print a hard copy of the CURRENT TEST PARAMETERS display when a printer is connected and enabled. This function is not shown on the display.

If you press F3 or F5, go to page 2-93 (RUN-1).

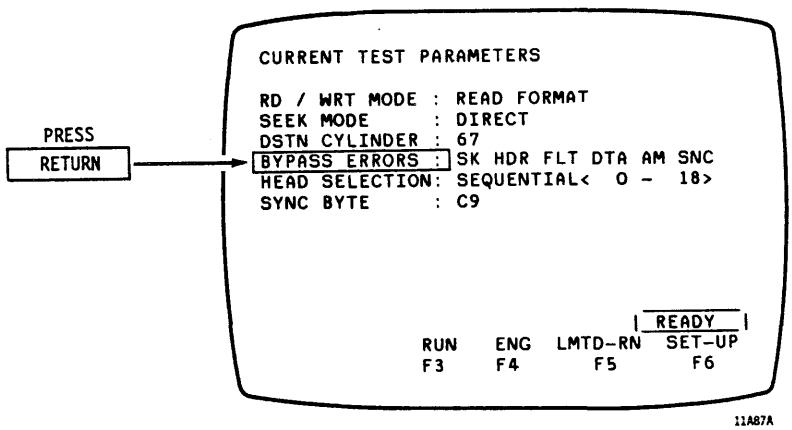
If you press F4, go to page 2-96 (DIAG-1).

If you press F6, go to page 2-18 (PRETEST-9).

RD/WRT-15

READ FORMAT OR WRITE/READ FORMAT OR WRITE FORMAT

Select Mode	See READ/WRITE MODE SELECTION on page 2-51 (RD/WRT-2).
Go to ERROR OPTIONS Display	Go to BYPASS ERRORS display line and press RETURN to go to ERROR OPTIONS display.

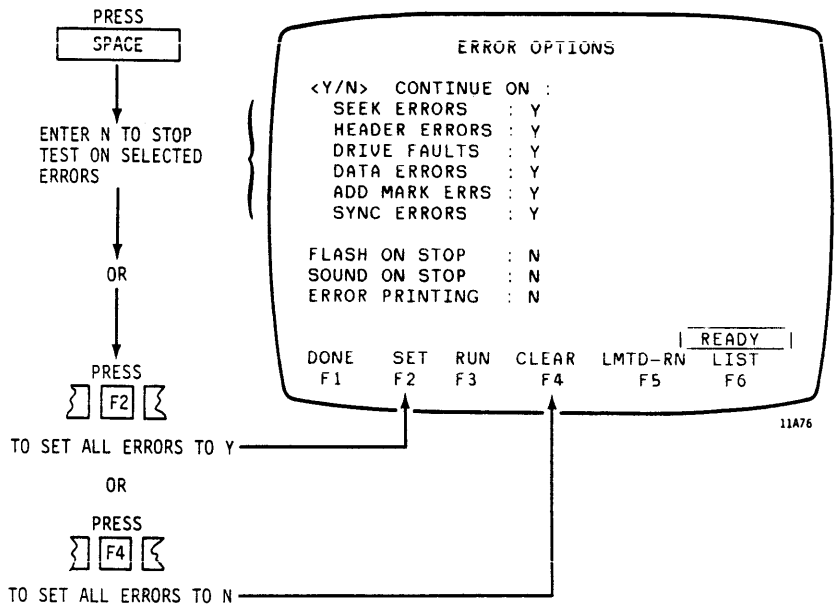


READ FORMAT OR WRITE/READ FORMAT OR WRITE FORMAT (CONTD)

Select Error Options

Go to selected individual display lines and make one of the following entries:

- Enter Y to permit testing to continue when an error occurs.
- Enter N to stop test when an error occurs.



READ FORMAT OR WRITE/READ FORMAT OR WRITE FORMAT (CONTD)

Make Display Flash When Error Occurs

Go to FLASH ON STOP display line and make one of the following entries:

- Enter Y to make display flash off and on when testing is stopped by an error.
- Enter N to disable this option.

Sound Warning When Error Occurs

Go to SOUND ON STOP display line and make one of the following entries:

- Enter Y to sound an audible warning when testing is stopped by an error.
- Enter N to disable this option.

NOTE

The following option is not displayed unless one of the baud rate function keys (F1-F4) was pressed on the SMD-0/SMD-E TEST display. An external printer must be connected as described on page 2-12 (PRETEST-3) to use this option.

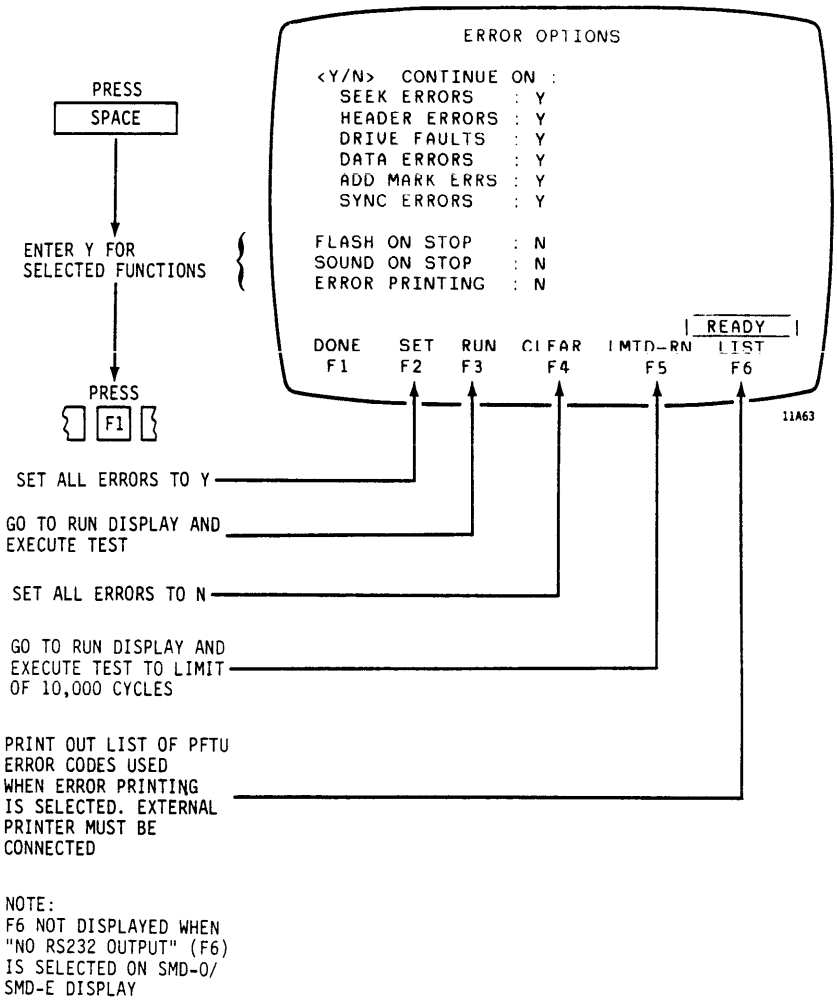
Print Errors While Test is Running

Go to ERROR PRINTING display line and make one of the following entries:

- Enter Y to print out a hard copy of the CURRENT TEST PARAMETERS display and errors found while a test is running. Do not select this option if no printer is connected to the PFTU. If you do, the PFTU may hang, preventing further testing. If it hangs, press the reset button on the operator panel and reload controlware to clear the hang condition.
- Enter N to disable this option.

Press F1 (DONE) function key to return to CURRENT TEST PARAMETERS display.

READ FORMAT OR WRITE/READ FORMAT OR WRITE FORMAT (CONTD)



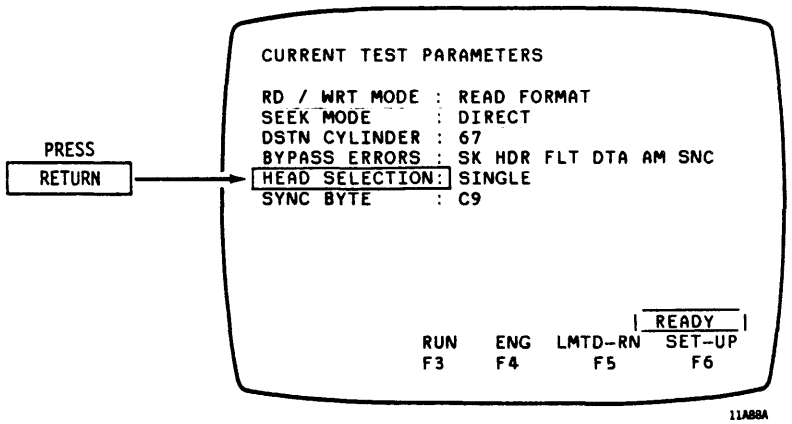
NOTE

Do not press F3 (RUN) or F5 (LMTD-RN) at this point. Wait until test set up is complete.

READ FORMAT OR WRITE/READ FORMAT OR WRITE FORMAT (CONTD)

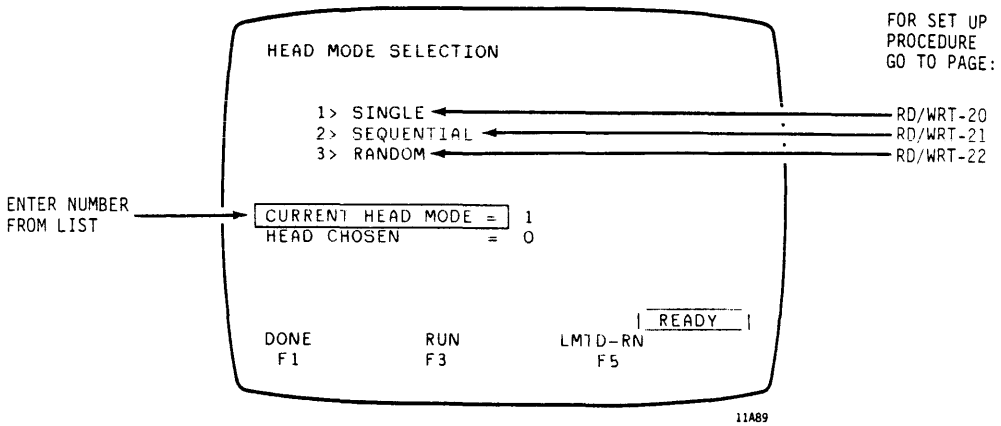
Go to HEAD MODE SELECTION Display

Go to HEAD SELECTION display line and press RETURN to go to HEAD MODE SELECTION display.



Select Head Mode

Select head mode from list and enter number on CURRENT HEAD MODE display line.

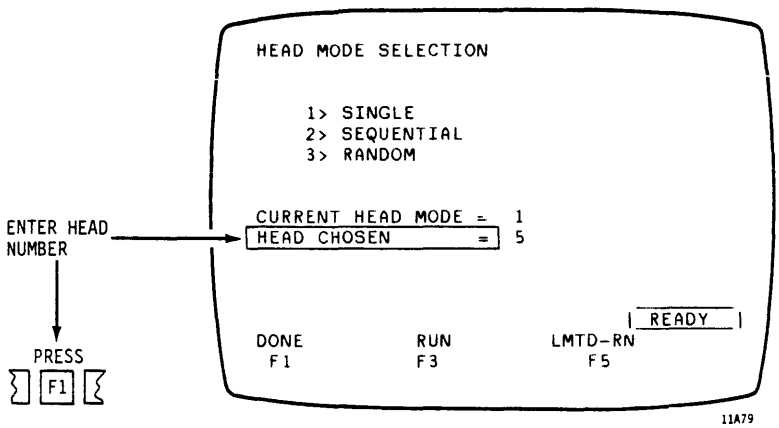


RD/WRT-20 = Page 2-69
RD/WRT-21 = Page 2-70
RD/WRT-22 = Page 2-71

READ FORMAT OR WRITE/READ FORMAT OR WRITE FORMAT (CONTD)

Single Head Selected

Enter Number of Head Selected	Go to HEAD CHOSEN display line and enter the number of the head to be used to write/read format. Press F1 (DONE) function key to return to CURRENT TEST PARAMETERS display.

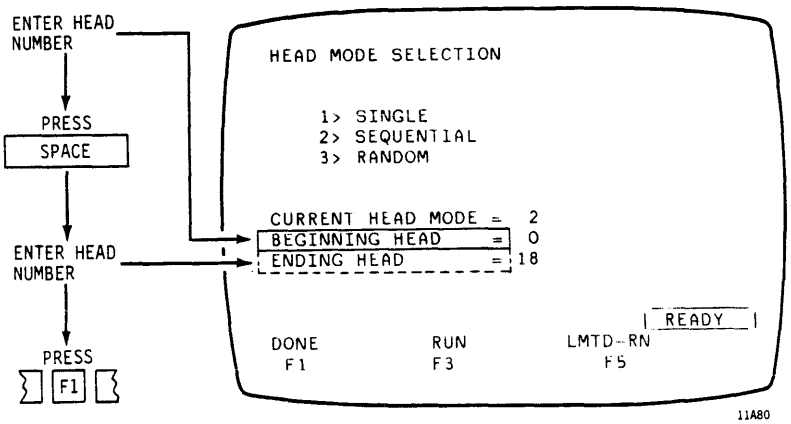


READ FORMAT OR WRITE/READ FORMAT OR WRITE FORMAT (CONTD)

Sequential Head Selection

Enter Range of Heads to be Selected

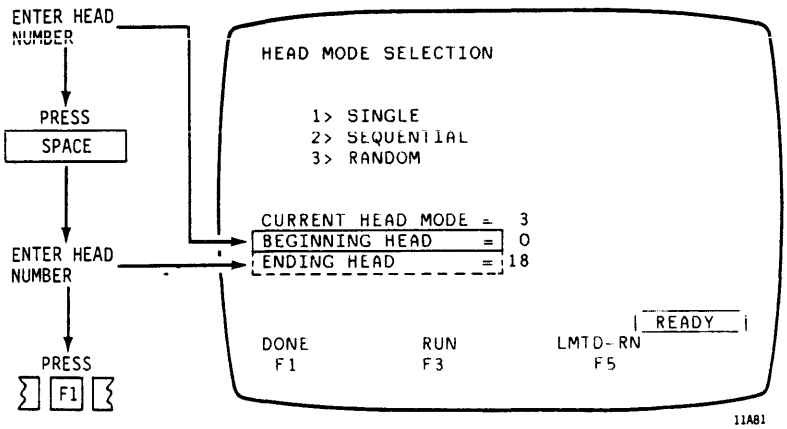
Go to BEGINNING HEAD display line and enter a head number. Go to the ENDING HEAD display line and enter a head number. Press F1 (DONE) function key to return to CURRENT TEST PARAMETERS display.



READ FORMAT OR WRITE/READ FORMAT OR WRITE FORMAT (CONTD)

Random Head Selection

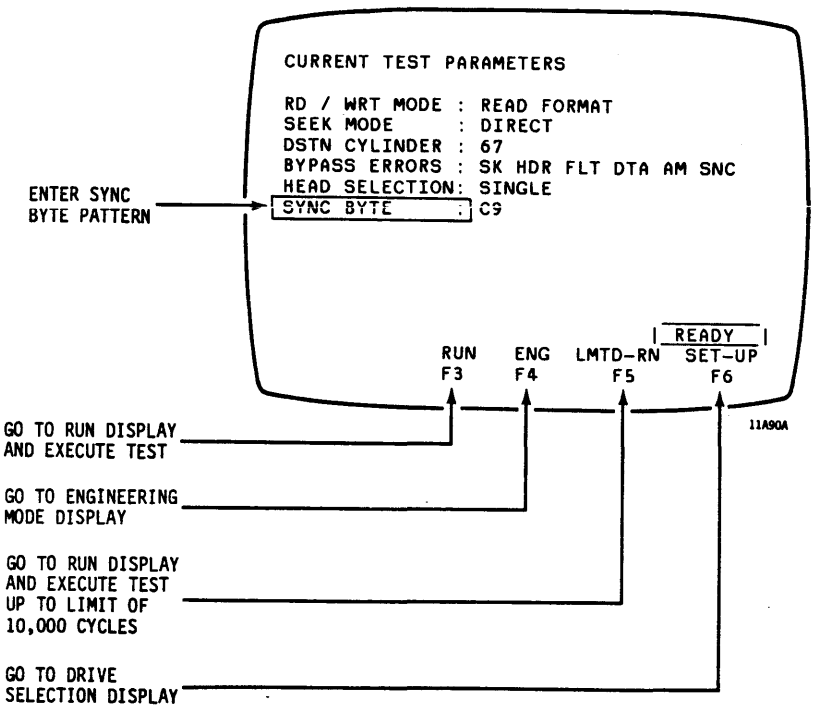
Enter Range of Heads to be Selected	Go to BEGINNING HEAD display line and enter a head number. Go to the ENDING HEAD display line and enter a head number. Press F1 (DONE) function key to return to CURRENT TEST PARAMETERS display.



READ FORMAT OR WRITE/READ FORMAT OR WRITE FORMAT (CONTD)

Enter Sync Byte Pattern	Go to SYNC BYTE display line and enter two hexadecimal numbers to be used as the sync byte pattern. Remember that a binary sync byte pattern must be expressed as its hexadecimal value. EXAMPLES: • To enter a pattern of alternating binary ones and zeros, enter As (hex. A = binary 1010) on the SYNC BYTE display line. • To enter a pattern of all binary ones, enter Fs (hex. F = binary 1111) on the SYNC BYTE display line.

READ FORMAT OR WRITE/READ FORMAT OR WRITE FORMAT (CONTD)



NOTE

Press F8 twice to print a hard copy of the CURRENT TEST PARAMETERS display when a printer is connected and enabled. This function is not shown on the display.

If you press F3 or F5, go to page 2-93 (RUN-1).

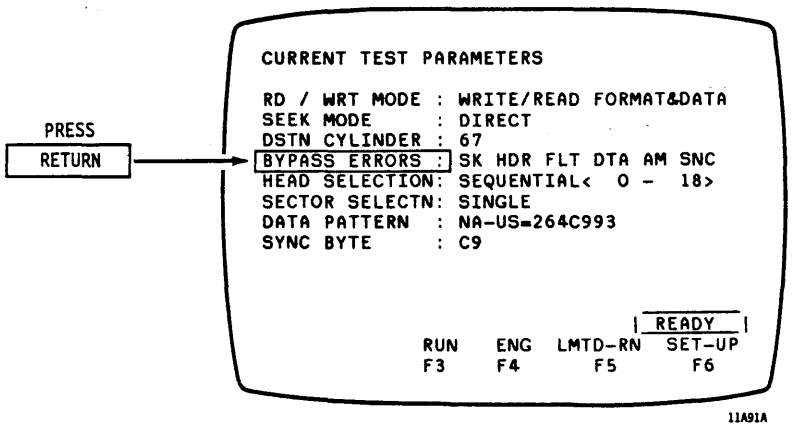
If you press F4, go to page 2-96 (DIAG-1).

If you press F6, go to page 2-18 (PRETEST-9).

RD/WRT-25

WRITE/READ FORMAT AND DATA OR WRITE/READ DATA OR WRITE DATA

Select Mode	See READ/WRITE MODE SELECTION on page 2-51 (RD/WRT-2).
Go to ERROR OPTIONS Display	Go to BYPASS ERRORS display line and press RETURN to go to ERROR OPTIONS display.

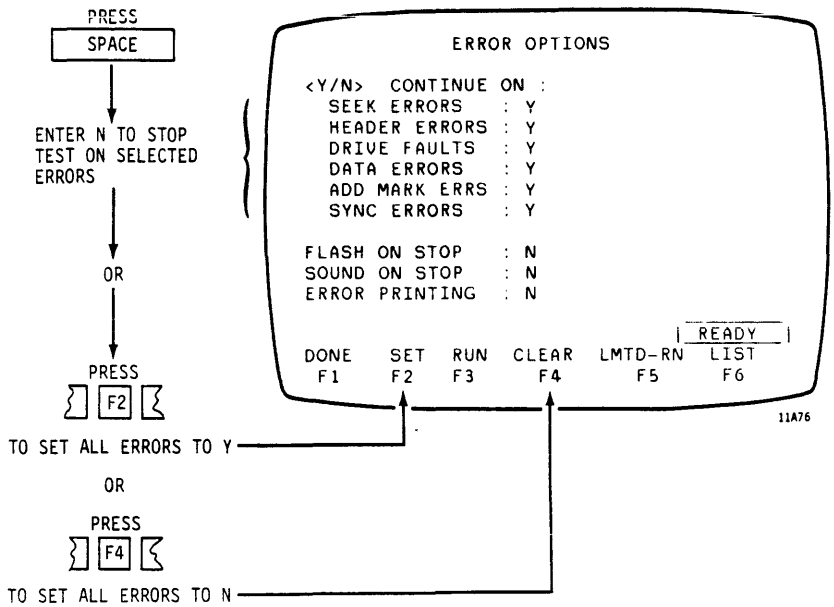


WRITE/READ FORMAT AND DATA OR WRITE/READ DATA OR WRITE DATA (CONTD)

Select Error Options

Go to selected individual display lines and make one of the following entries:

- Enter Y to permit testing to continue when an error occurs.
- Enter N to stop test when an error occurs.



WRITE/READ FORMAT AND DATA OR WRITE/READ DATA OR WRITE DATA (CONTD)

Make Display Flash When Error Occurs

Go to FLASH ON STOP display line and make one of the following entries:

- Enter Y to make display flash off and on when testing is stopped by an error.
- Enter N to disable this option.

Sound Warning When Error Occurs

Go to SOUND ON STOP display line and make one of the following entries:

- Enter Y to sound an audible warning when testing is stopped by an error.
- Enter N to disable this option.

NOTE

The following option is not displayed unless one of the baud rate function keys (F1-F4) was pressed on the SMD-0/SMD-E TEST display. An external printer must be connected as described on page 2-12 (PRETEST-3) to use this option.

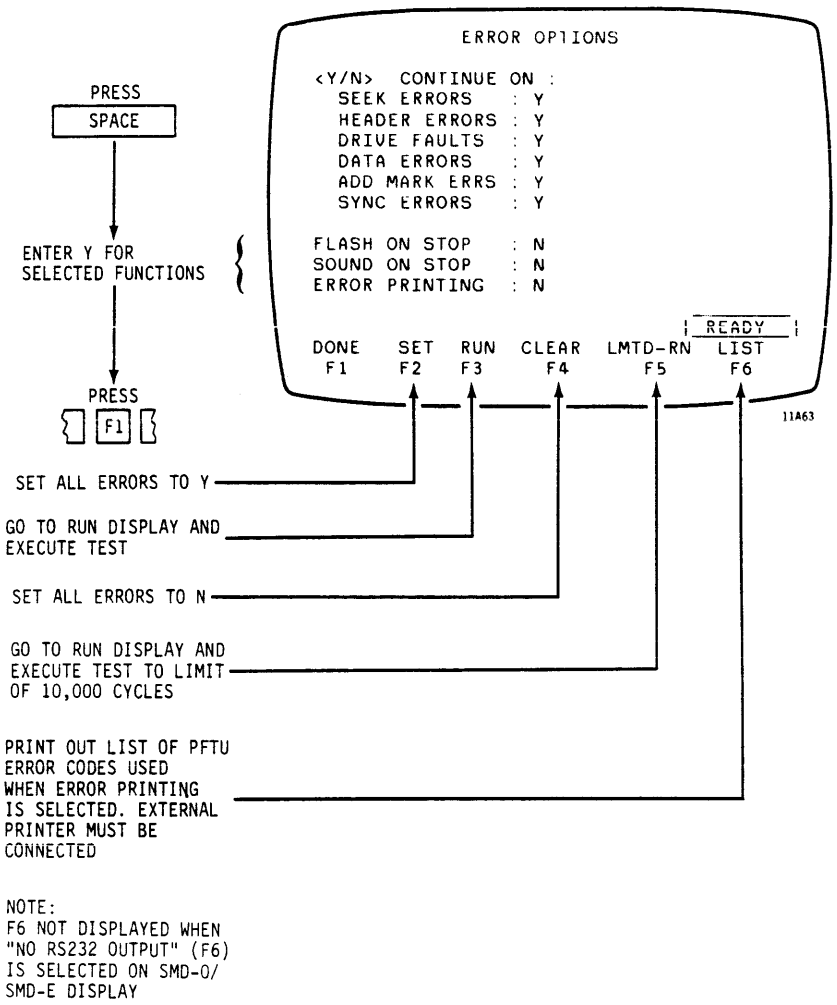
Print Errors While Test is Running

Go to ERROR PRINTING display line and make one of the following entries:

- Enter Y to print out a hard copy of the CURRENT TEST PARAMETERS display and errors found while a test is running. Do not select this option if no printer is connected to the PFTU. If you do, the PFTU may hang, preventing further testing. If it hangs, press the reset button on the operator panel and reload controlware to clear the hang condition.
- Enter N to disable this option.

Press F1 (DONE) function key to return to CURRENT TEST PARAMETERS display.

WRITE/READ FORMAT AND DATA OR WRITE/READ DATA OR WRITE DATA (CONTD)



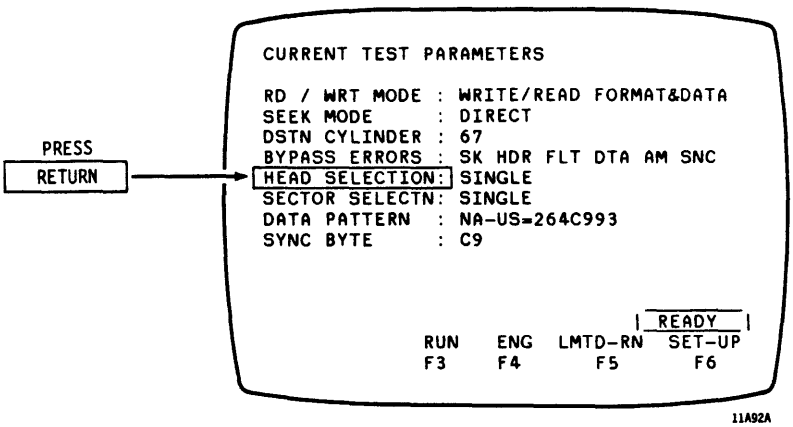
NOTE

Do not press F3 (RUN) or F5 (LMTD-RN) at this point. Wait until test set up is complete.

WRITE/READ FORMAT AND DATA OR WRITE/READ DATA OR WRITE DATA (CONTD)

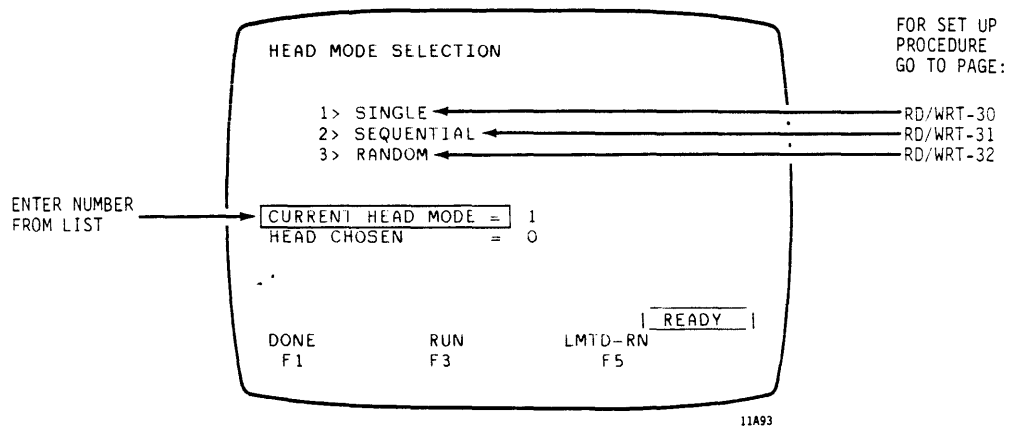
Go to HEAD MODE SELECTION Display

Go to HEAD SELECTION display line and press RETURN to go to HEAD MODE SELECTION display.



Select Head Mode

Select head mode from list and enter number on CURRENT HEAD MODE display line.

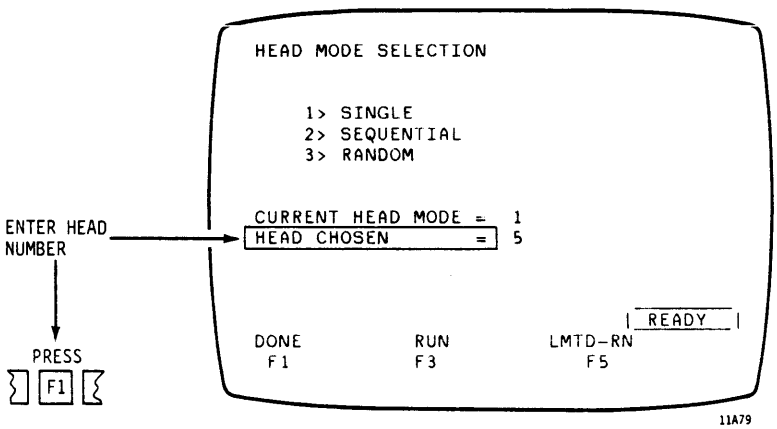


RD/WRT-30 = Page 2-79
RD/WRT-31 = Page 2-80
RD/WRT-32 = Page 2-81

WRITE/READ FORMAT AND DATA OR WRITE/READ DATA OR WRITE DATA (CONTD)

Single Head Selected

Enter Number of Head Selected	Go to HEAD CHOSEN display line and enter the number of the head to be used to write/read data. Press F1 (DONE) function key to return to CURRENT TEST PARAMETERS display.

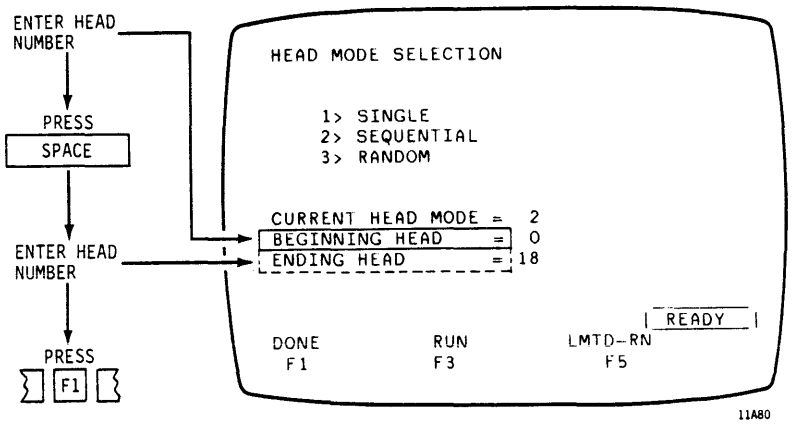


WRITE/READ FORMAT AND DATA OR WRITE/READ DATA OR WRITE DATA (CONTD)

Sequential Head Selection

Enter Range of Heads to be Selected

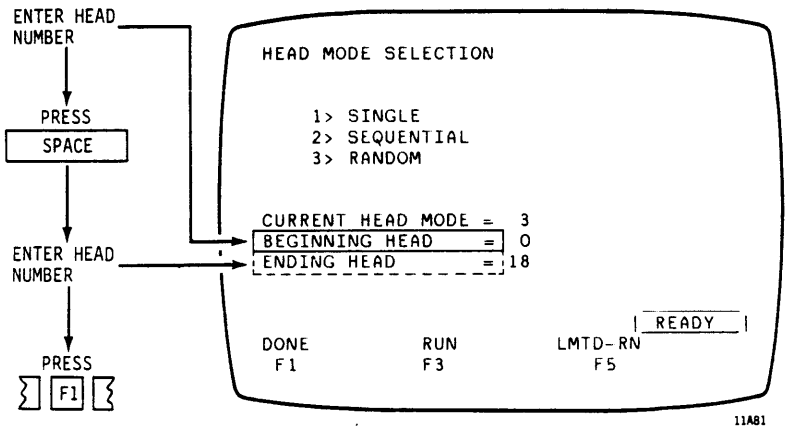
Go to BEGINNING HEAD display line and enter a head number. Go to the ENDING HEAD display line and enter a head number. Press F1 (DONE) function key to return to CURRENT TEST PARAMETERS display.



WRITE/READ FORMAT AND DATA OR WRITE/READ DATA OR WRITE DATA (CONTD)

Random Head Selection

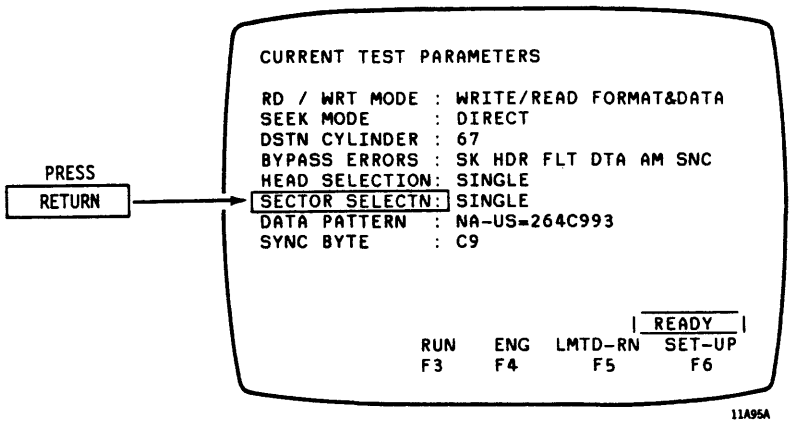
Enter Range of Heads to be Selected	Go to BEGINNING HEAD display line and enter a head number. Go to the ENDING HEAD display line and enter a head number. Press F1 (DONE) function key to return to CURRENT TEST PARAMETERS display.



WRITE/READ FORMAT AND DATA OR WRITE/READ DATA OR WRITE DATA (CONTD)

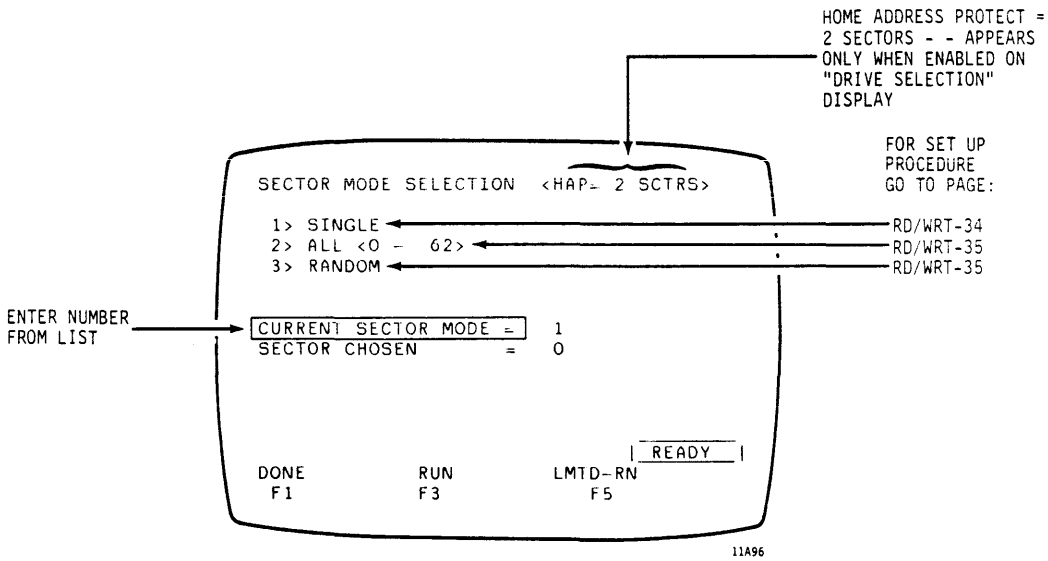
Go to SECTOR MODE SELECTION Display

Go to SECTOR SELECTION display line and press RETURN to go to SECTOR MODE SELECTION display.



Select Sector Mode

Select sector mode from list and enter number on CURRENT SECTOR MODE display line.

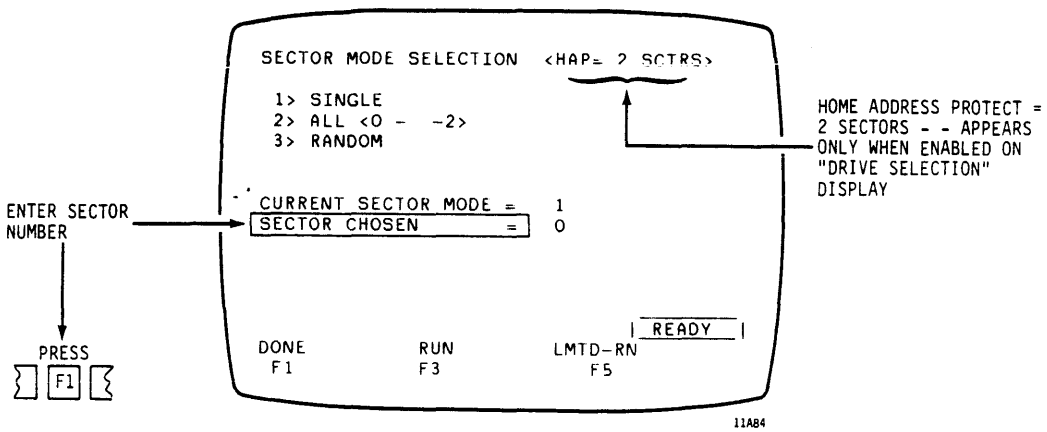


RD/WRT-34 = Page 2-83
RD/WRT-35 = Page 2-84

WRITE/READ FORMAT AND DATA OR WRITE/READ DATA OR WRITE DATA (CONTD)

Single Sector Selected

Enter Number of Sector Selected	Go to SECTOR CHOSEN display line and enter the number of the sector to be written and/or read. Press F1 (DONE) function key to return to CURRENT TEST PARAMETERS display.



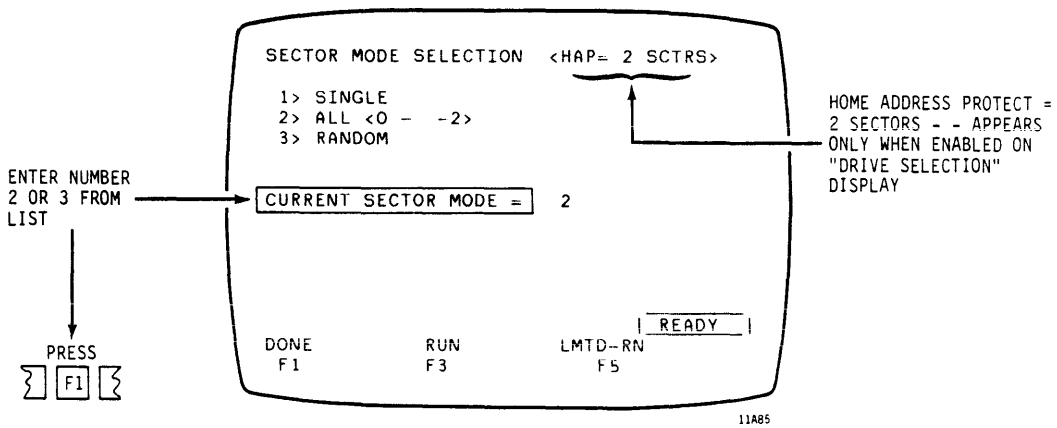
WRITE/READ FORMAT AND DATA OR WRITE/READ DATA OR WRITE DATA (CONTD)

All Sectors Mode Selected

No Further Entries Required	Each available sector on a track is sequentially selected. Press F1 (DONE) function key to return to CURRENT TEST PARAMETERS display.

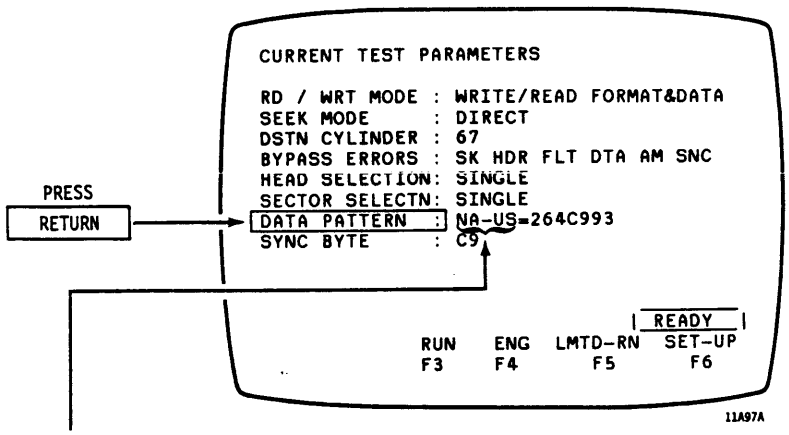
Random Sector Mode Selected

No Further Entries Required	Each available sector on a track is randomly selected. Press F1 (DONE) function key to return to CURRENT TEST PARAMETERS display.



WRITE/READ FORMAT AND DATA OR WRITE/READ DATA OR WRITE DATA (CONTD)

Go to Data Pattern Display	Go to DATA PATTERN display line and press RETURN to go to DATA PATTERN SELECTION display.

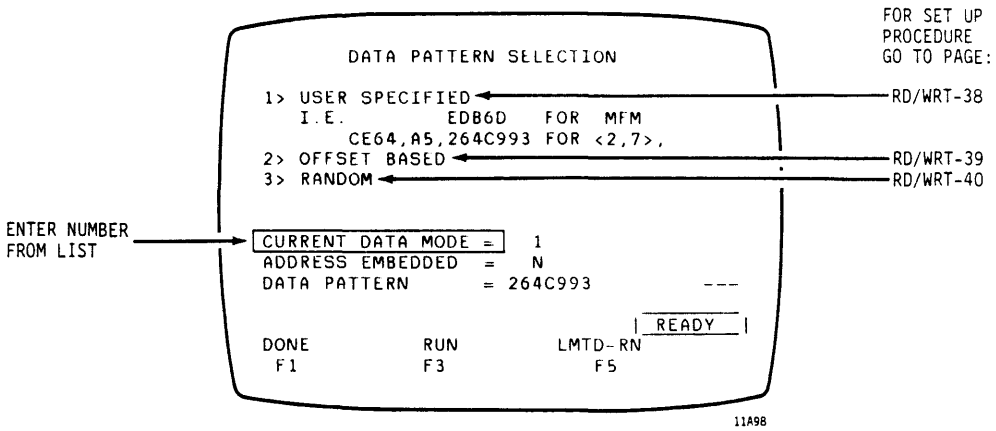


DATA PATTERN CODES:

AI = ADDRESS EMBEDDED
NA = NOT ADDRESS EMBEDDED
US = USER SELECTED DATA PATTERN

WRITE/READ FORMAT AND DATA OR WRITE/READ DATA OR WRITE DATA (CONTD)

Select Data Pattern Mode	Select data pattern mode from list and enter number on CURRENT DATA MODE display line.



RD/WRT-38 = Page 2-87
RD/WRT-39 = Page 2-88
RD/WRT-40 = Page 2-89

WRITE/READ FORMAT AND DATA OR WRITE/READ DATA OR WRITE DATA (CONTD)

User Specified Data Pattern

Track Address Embedded in Data Pattern?

Go to ADDRESS EMBEDDED display line and make one of the following entries:

- Enter Y to include track address in first four bytes of data pattern.
- Enter N to disable this option.

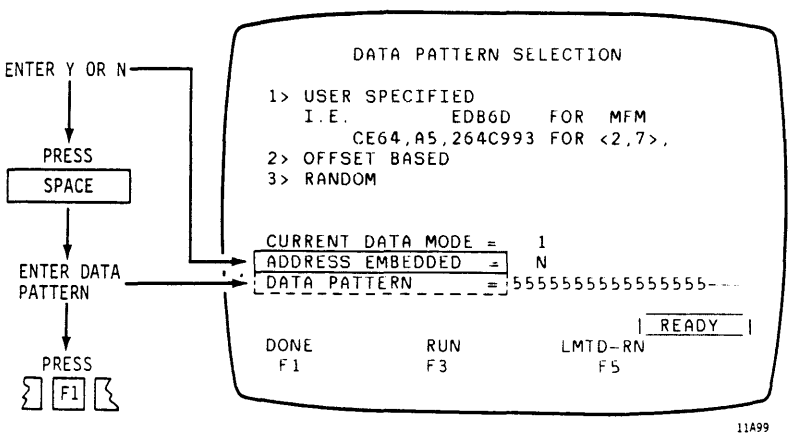
Enter Data Pattern

Go to DATA PATTERN display line and enter up to 16 hexadecimal characters to be used as the data pattern. Remember that a binary data pattern must be expressed as its hexadecimal value.

EXAMPLES:

- To enter a pattern of alternating binary ones and zeros, enter As (hex. A = binary 1010) on the DATA PATTERN display line.
- To enter a pattern of all binary ones, enter Fs (hex. F = binary 1111) on the DATA PATTERN display line.

Press F1 (DONE) function key to return to CURRENT TEST PARAMETERS display.



WRITE/READ FORMAT AND DATA OR WRITE/READ DATA OR WRITE DATA (CONTD)

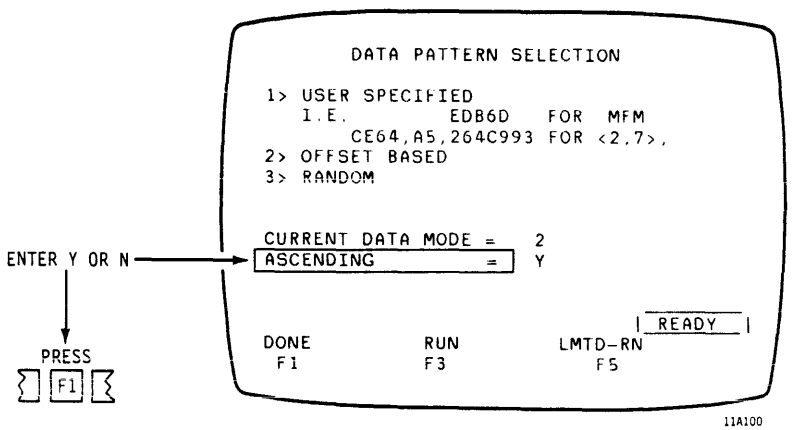
Offset Based Data Pattern

Select Ascending or Descending Data Pattern

Go to ASCENDING display line and make one of the following entries:

- Enter Y to select a sequentially ascending data pattern.
- Enter N to select a sequentially descending data pattern.

Press F1 (DONE) function key to return to CURRENT TEST PARAMETERS display.



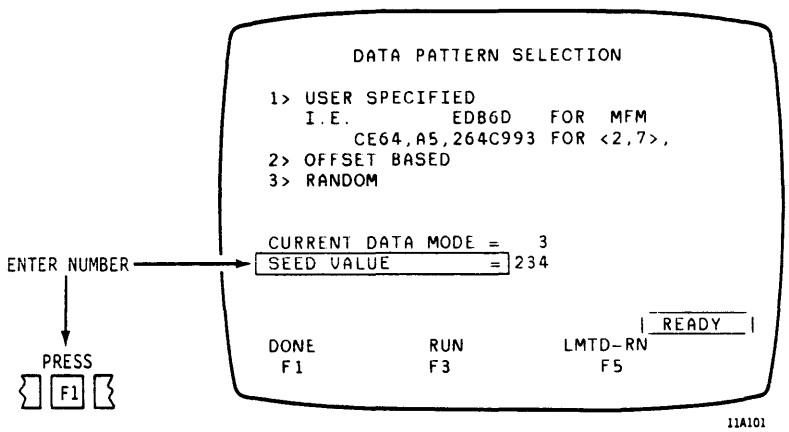
WRITE/READ FORMAT AND DATA OR WRITE/READ DATA OR WRITE DATA (CONTD)

Random Based Data Pattern

Enter a Seed Value Number

Go to SEED VALUE display line and enter a decimal number from 0 - 999 to act as a starting point for the random data generator.

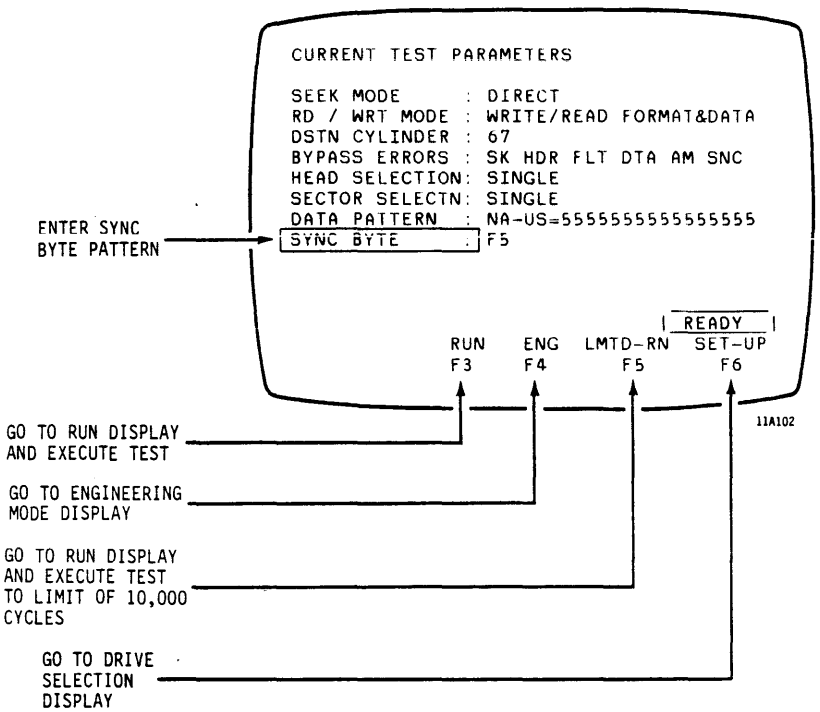
Press F1 (DONE) function key to return to CURRENT TEST PARAMETERS display.



WRITE/READ FORMAT AND DATA OR WRITE/READ DATA OR WRITE DATA (CONTD)

Enter Sync Byte Pattern	Go to SYNC BYTE display line and enter two hexadecimal numbers to be used as the sync byte pattern. Remember that a binary sync byte pattern must be expressed as its hexadecimal value. EXAMPLES: • To enter a pattern of alternating binary ones and zeros, enter As (hex. A = binary 1010) on the SYNC BYTE display line. • To enter a pattern of all binary ones, enter Fs (hex. F = binary 1111) on the SYNC BYTE display line.

WRITE/READ FORMAT AND DATA OR WRITE/READ DATA OR WRITE DATA (CONTD)



If you press F3 or F5, go to page 2-93 (RUN-1).

If you press F4, go to page 2-96 (DIAG-1).

If you press F6, go to page 2-18 (PRETEST-9).

RD/WRT-43

USER SIMULATION

Select Mode	See READ/WRITE MODE SELECTION on page 2-51 (RD/WRT-2).
Refer to Procedure for Write/Read Format and Data or Write/Read Data or Write Data	Set up this test by following the preceding procedure (starting at RD/WRT-25) except for head and sector mode selection. This test forces head and sector selection to random mode and randomly selects a Read Data operation or a Write/Read data operation.

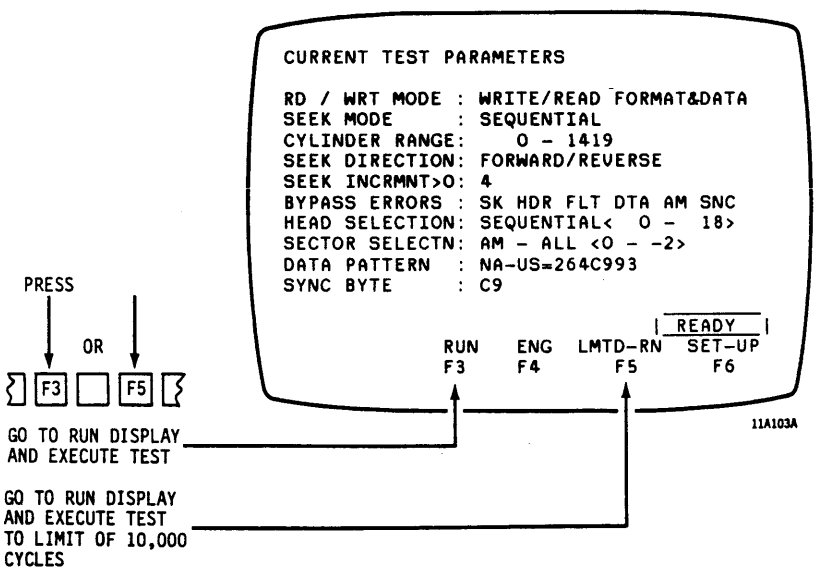
HOW TO EXECUTE SEEKS AND READ/WRITE OPERATIONS

Start at a Seek or Read/Write Set-Up Display

When tests are being set up for the first time, the CURRENT TEST PARAMETERS display appears when the F1 (DONE) function key is pressed while on the DRIVE SELECTION display. Any display used to set up seek or read/write operations may be accessed by going to its display line on the CURRENT TEST PARAMETERS display and pressing RETURN.

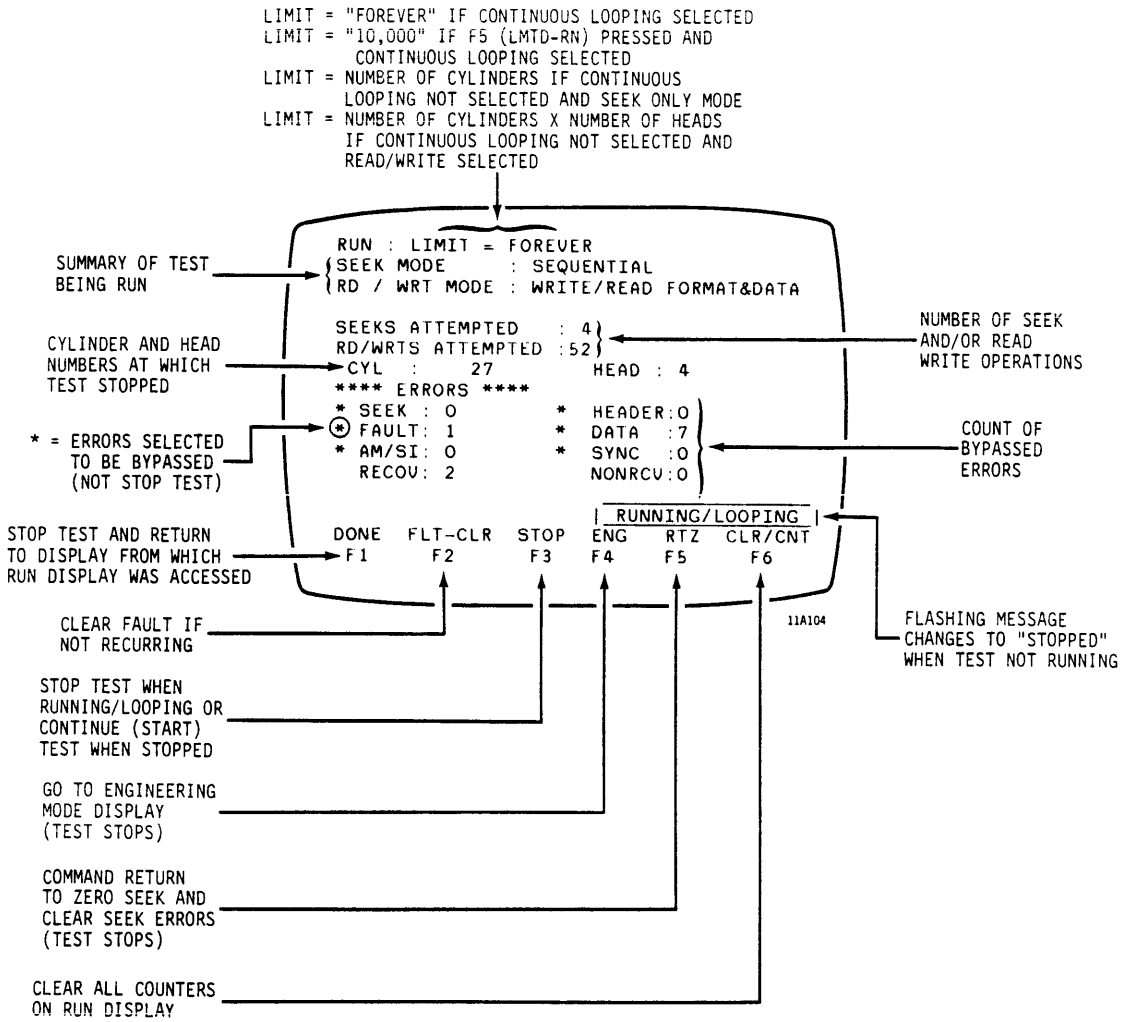
Select a Run Function

On any seek or Read/Write set-up display, press RUN function key (F3) or LMTD-RN function key (F5) to start test and go to RUN display.



RUN-2

Observe Run Display for Test Status	The RUN display lists seek and read/write modes selected and shows operating and error status for the test.
	NOTE If the test stops because of a read/write error, you may want to go to the CURRENT TEST STATUS display (see DIAG-3 on page 2-98) to locate the erring sector. Press F4 (ENG) to get there via the ENGINEERING MODE display.
Control Test Execution	Select function keys as required to control test execution. When done running test, press function key F1 (DONE) to stop test and return to the display from which the RUN display was accessed.



If you press F1, go to the Operating Procedure Function Chart on pages 2-3 through 2-8 and locate the procedure for the setup display from which the RUN display was accessed.

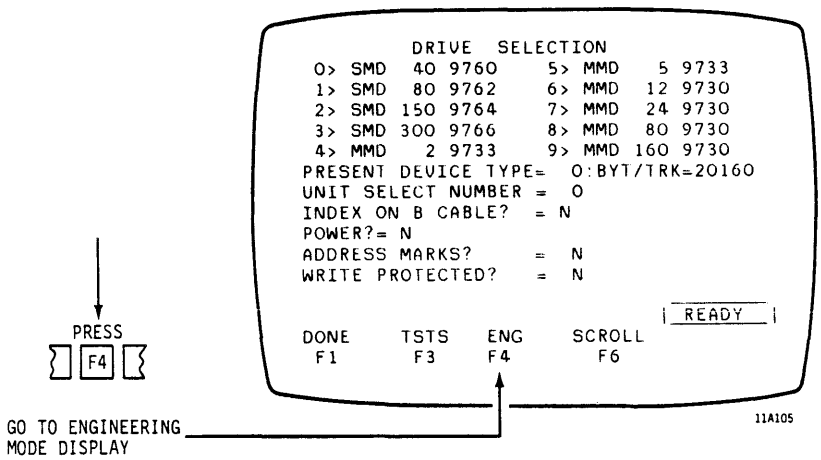
If you press F4, go to page 2-96 (DIAG-1).

HOW TO SET UP AND RUN DIAGNOSTIC TESTS

Start At Drive Selection Display, Current Test Parameters Display, or Run Display

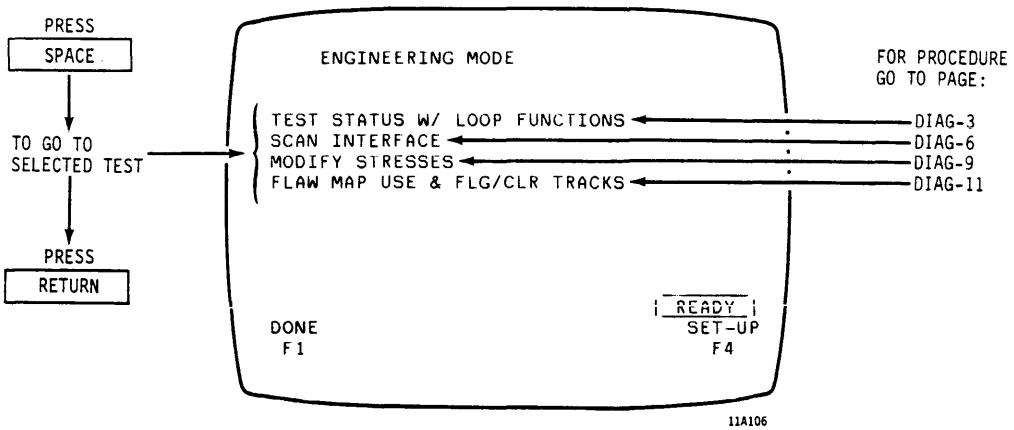
Select Engineering Mode Function

On DRIVE SELECTION, CURRENT TEST PARAMETERS, or RUN displays, press the ENG function key (F4) to go to ENGINEERING MODE display



Select Test

Go to the display line for the test to be performed and Press RETURN key to go to its display.



NOTE

A delay occurs while different controlware is loaded from the floppy disk into PFTU when the following actions are taken:

- RETURN is pressed to go to one of the ENGINEERING MODE displays.
- Function key F1 (DONE) is pressed to return to the display from which the ENGINEERING MODE display was accessed.

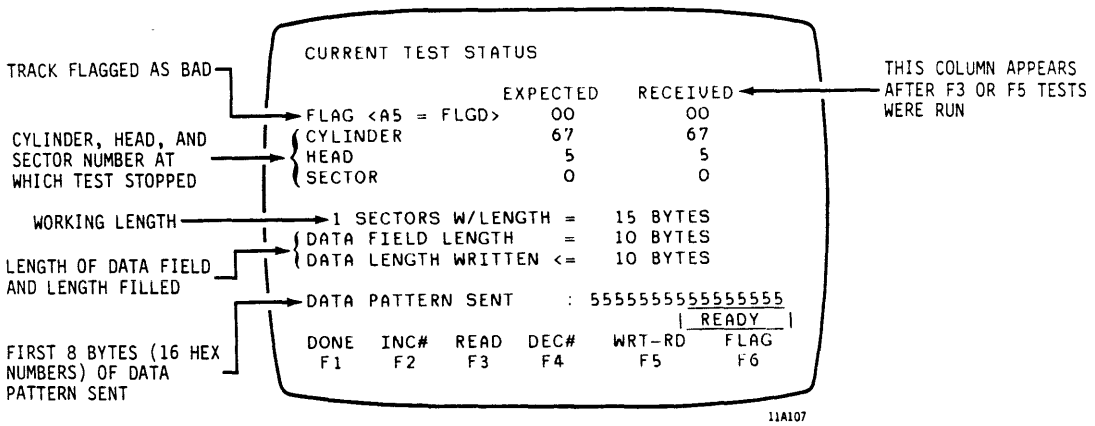
DIAG-3 = Page 2-98
DIAG-6 = Page 2-101
DIAG-9 = Page 2-104
DIAG-11 = Page 2-106

DIAG-3

CURRENT TEST STATUS DISPLAY SELECTED

Observe Displayed Status

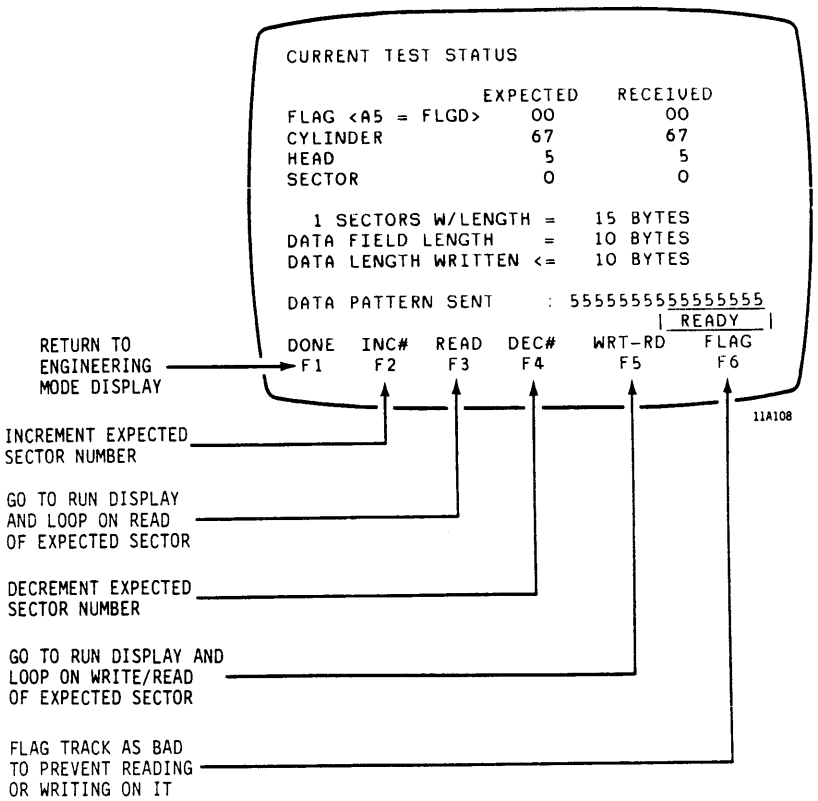
This display lists information used to locate data errors on a specific cylinder, head, and sector at which a read/write test stopped.



CURRENT TEST STATUS DISPLAY SELECTED (CONTD)

Control Test Execution

Select function keys as required to control test execution. When done running test press F1 (DONE) function key to stop test and return to the ENGINEERING MODE display.



If you press F1, go to page 2-97 (DIAG-2).

If you press F3 or F5, go to page 2-100 (DIAG-5).

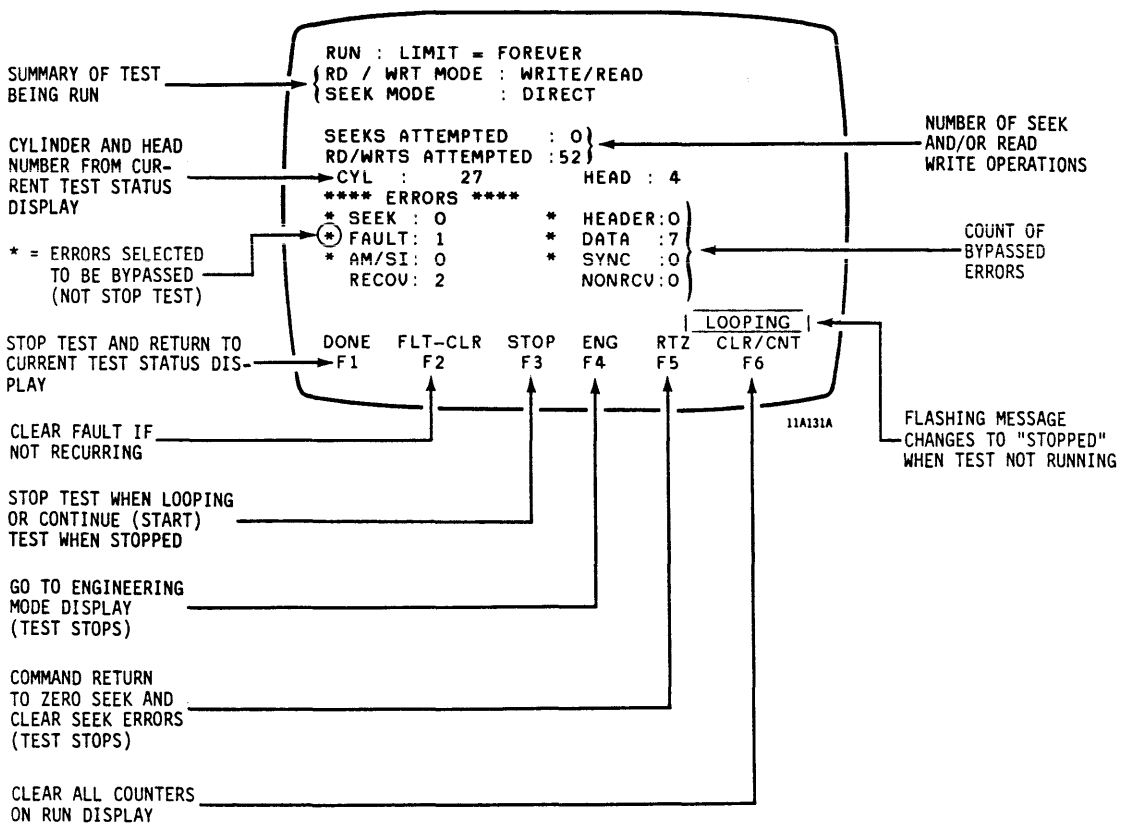
CURRENT TEST STATUS DISPLAY SELECTED (CONTD)

Observe RUN Display for Test Status

When F3 (READ) or F5 (WRITE/READ) function keys are pressed, the selected test runs continuously (looping) on the sector where the read/write test stopped as shown on the CURRENT TEST STATUS display. The RUN display shows the operating and error status for the test being run on the single sector. When done looping, press function key F1 (DONE) to return to the CURRENT TEST STATUS display.

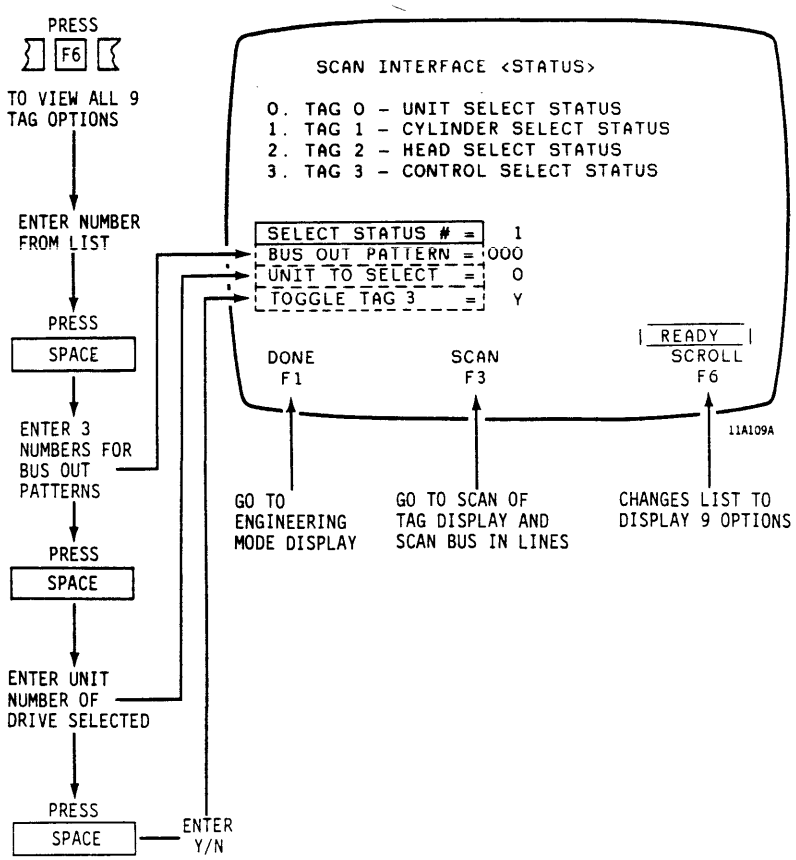
NOTE

Check the accuracy of the sector number shown as defective by referring to Appendix B for information on interpreting read/write errors.



SCAN INTERFACE (STATUS) DISPLAY SELECTED

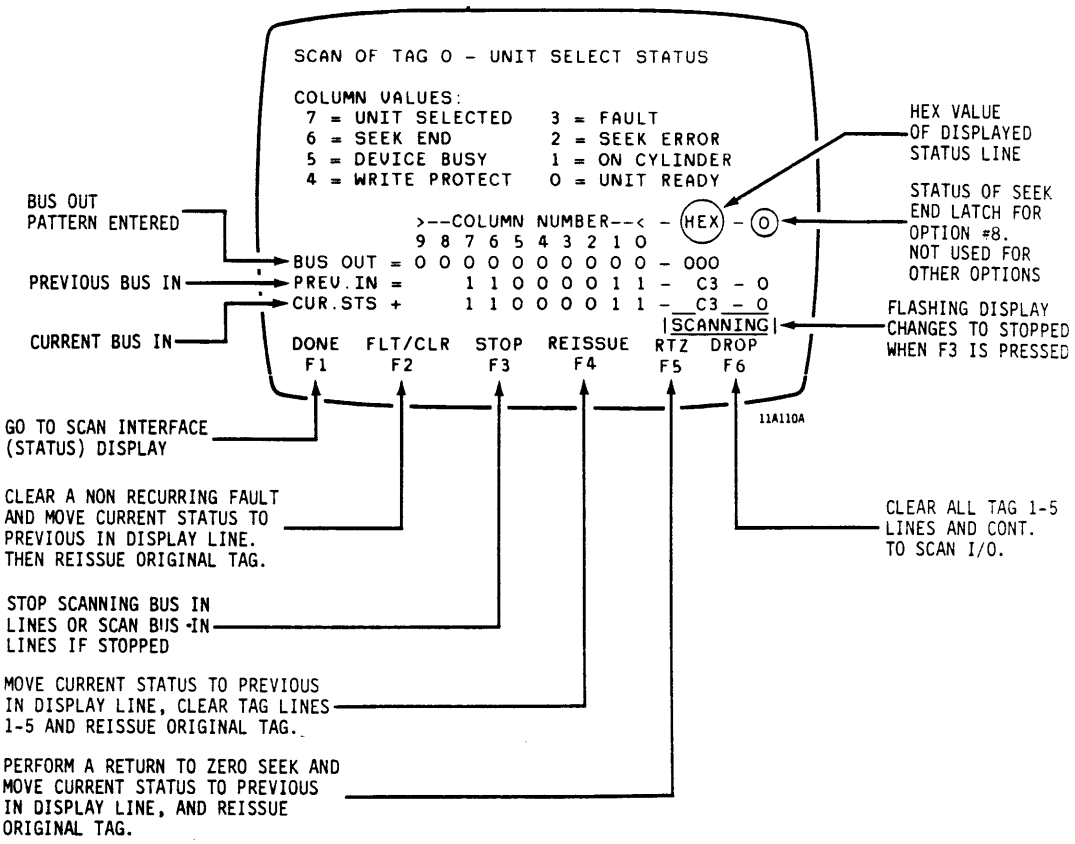
Select Tag Number	Select the Tag to be issued, prior to scanning Bus In lines, from the list on the SCAN INTERFACE (STATUS) display and enter number on SELECT STATUS # display line.
Enter Bus Out Pattern	Go to BUS OUT PATTERN display line and enter three hexadecimal numbers to be used as Bus Out pattern. Not displayed when value predetermined by tag selected.
Enter Unit Number of Drive Selected	Go to UNIT TO SELECT display line and enter the logical unit number of the drive selected. Go to TOGGLE TAG 3 display line and enter Y to toggle Tag 3 immediately or N to hold tag active.



SCAN INTERFACE (STATUS) DISPLAY SELECTED (CONTD)

	If you press F1, go to page 2-97 (DIAG-2).
	If you press F3, go to page 2-102 (DIAG-7).
Scan Bus In Lines	Press the F3 (SCAN) function key to go to the selected SCAN OF TAG display and continuously scan Bus In lines.
Control Bus In Scanning	Select function keys as required to control scanning. When done scanning Bus In lines, press F1 (DONE) function key to stop scan and return to the SCAN INTERFACE (STATUS) display.

SCAN INTERFACE (STATUS) DISPLAY SELECTED (CONTD)



- If you press F1, go to page 2-101 (DIAG-6).
- Function key designations for F2, F4, F5, and F6 disappear when F3 is pressed to stop scanning. Press F3 a second time to resume scanning and cause F2, F4, F5, and F6 to reappear.

DIAG-9

STRESS FUNCTIONS DISPLAY SELECTED

Enable Stress Functions During Test Execution

Select function keys as required to enable stress functions during test execution. When done selecting stress functions press F1 (DONE) function key to return to the ENGINEERING MODE display.

Select Early or Late Data Strobe

Go to EARLY DATA STROBE and LATE DATA STROBE display lines and make one of the following entries:

- Enter Y to condition the timing of Clocked Read Data early or late relative to the Read Data clock. Entering Y on either display line forces the other to N.
- Enter N on both display lines to return to normal Clocked Read Data timing.

Select Forward or Reverse Servo Offset

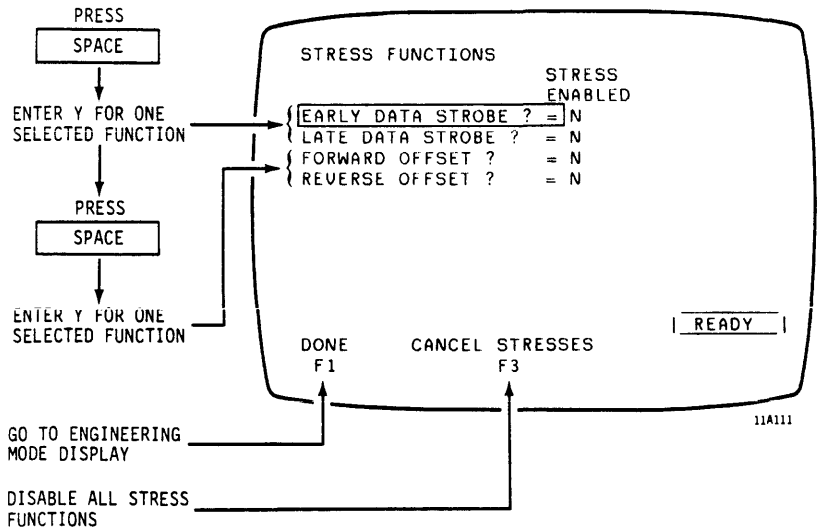
Go to FORWARD OFFSET or REVERSE OFFSET display lines and make one of the following entries:

CAUTION

Do not write while in offset mode because it may damage data on an adjacent track.

- Enter Y to move read/write heads off cylinder a small predetermined distance. Entering Y on either display line forces the other to N.
- Enter N on both display lines to return read/write heads to normal on cylinder position..

STRESS FUNCTIONS DISPLAY SELECTED (CONTD)



If you press F1, go to page 2-97 (DIAG-2).

CAUTION

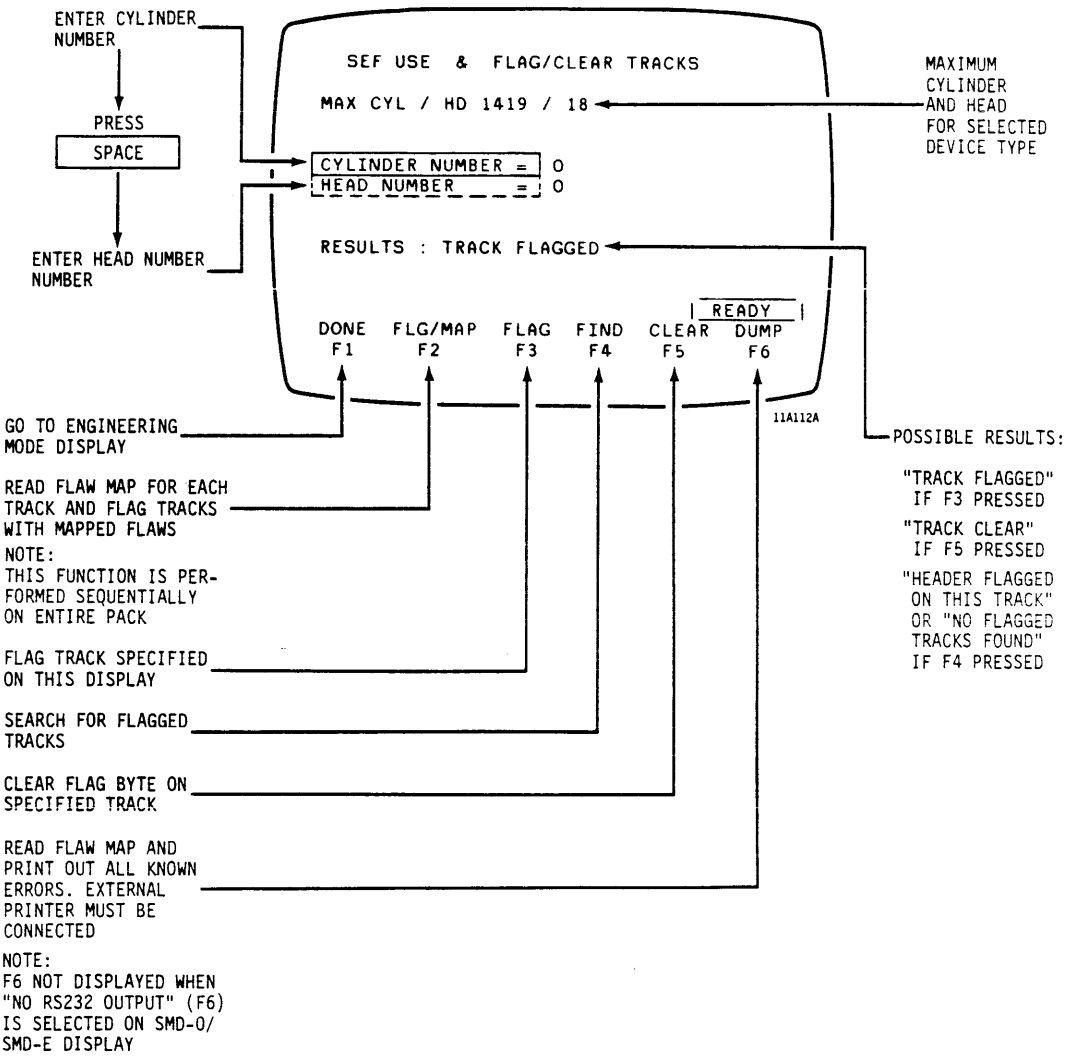
Cancel stress functions before returning to standard seek and read/write operations. These functions are intended for temporary use as a diagnostic aid. Unless manually cancelled, they remain enabled during all seek and read/write operations and may cause invalid errors to occur.

DIAG-11

SEF USE & FLAG/CLEAR TRACKS DISPLAY SELECTED

Enter Cylinder Number	Go to CYLINDER NUMBER display line and make one of the following entries: • Enter the number of the cylinder containing the track to be flagged or cleared. • Enter the number of the cylinder to be used as a starting point in a search for the next flagged track.
Enter Head Number	Go to HEAD NUMBER display line and make one of the following entries: • Enter the number of the head positioned over the track to be flagged or cleared. • Enter the number of the head positioned over the track to be used as a starting point in a search for the next flagged track.

SEF USE & FLAG/CLEAR TRACKS DISPLAY SELECTED (CONTD)



If you press F1, go to page 2-97 (DIAG-2).

OTHER-1

HOW TO SET UP AND RUN SELECT TESTS, TIMING TESTS, SELF-TESTS AND HEAD ALIGNMENT TESTS

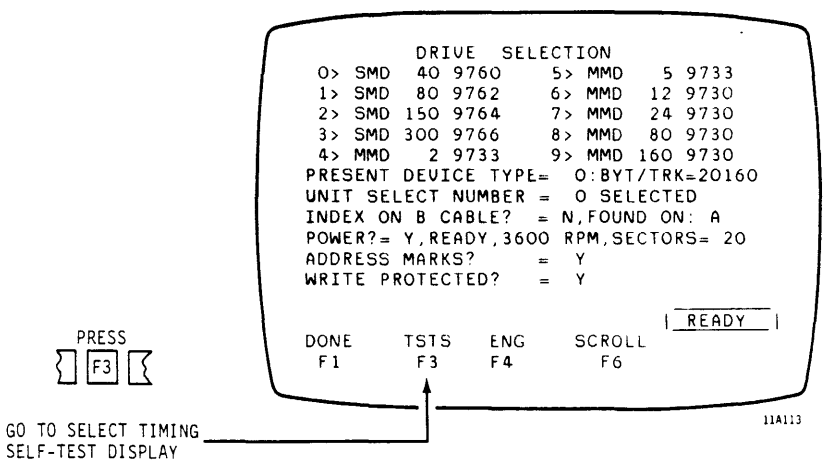
Start at Drive Selection Display

When tests are being set up for the first time, this display appears when any one of the function keys on the SMD-0/SMD-E display is pressed. You can also get to the DRIVE SELECTION display as follows:

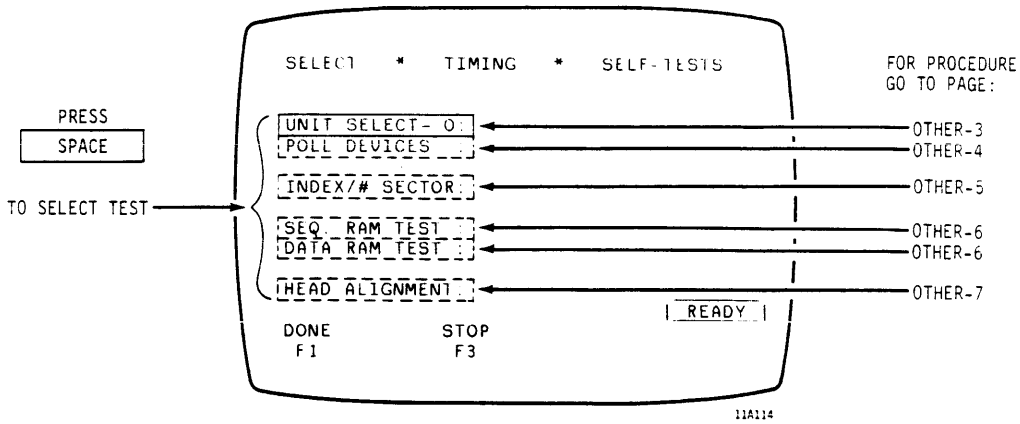
- When on the CURRENT TEST PARAMETERS display press the F6 (SET UP) function key
- When on the ENGINEERING MODE display, press the F4 (SET UP) function key or, if ENGINEERING MODE display was accessed from DRIVE SELECTION display, press the F1 (DONE) function key.
- When on the SELECT * TIMING * SELF-TESTS display, press the F1 (DONE) function key.

Go to the SELECT * TIMING * SELF-TEST Display

While on DRIVE SELECTION display, press the TSTS function key (F3) to go to SELECT * TIMING * SELF-TESTS display.



Select Test — Go to the display line for the test to be performed.



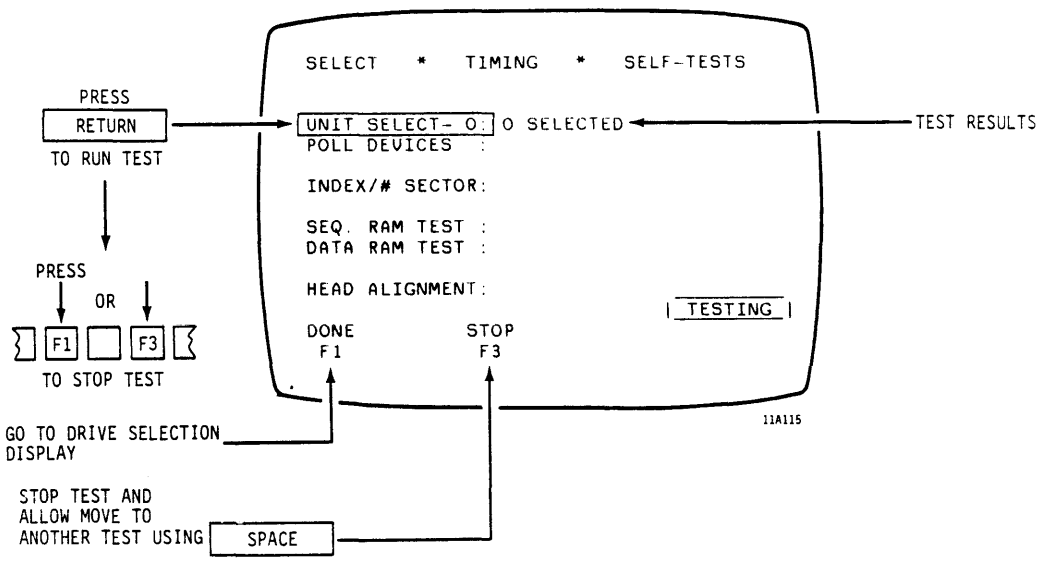
OTHER-3 = Page 2-110
OTHER-4 = Page 2-111
OTHER-5 = Page 2-112
OTHER-6 = Page 2-113
OTHER-7 = Page 2-114

OTHER-3

UNIT SELECT TEST SELECTED

Execute Test

Press RETURN to cause PFTU to repeatedly attempt selection of the unit number entered on the DRIVE SELECTION display.

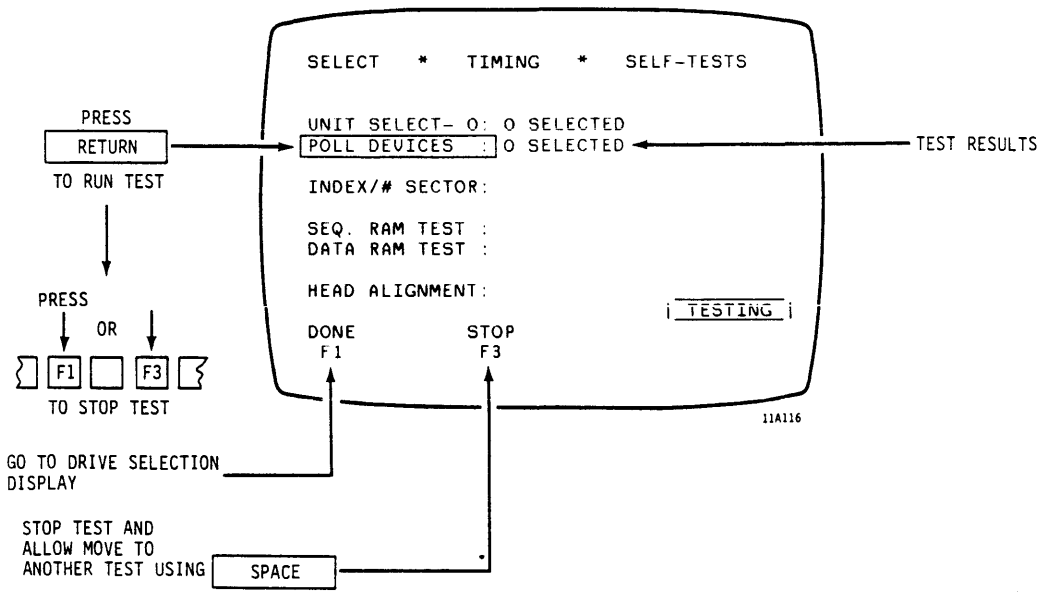


If you press F1 (DONE), go to page 2-18 (PRETEST-9).

POLL DEVICES TEST SELECTED

Execute Test

Press RETURN to cause PFTU to attempt selection of all possible unit numbers.



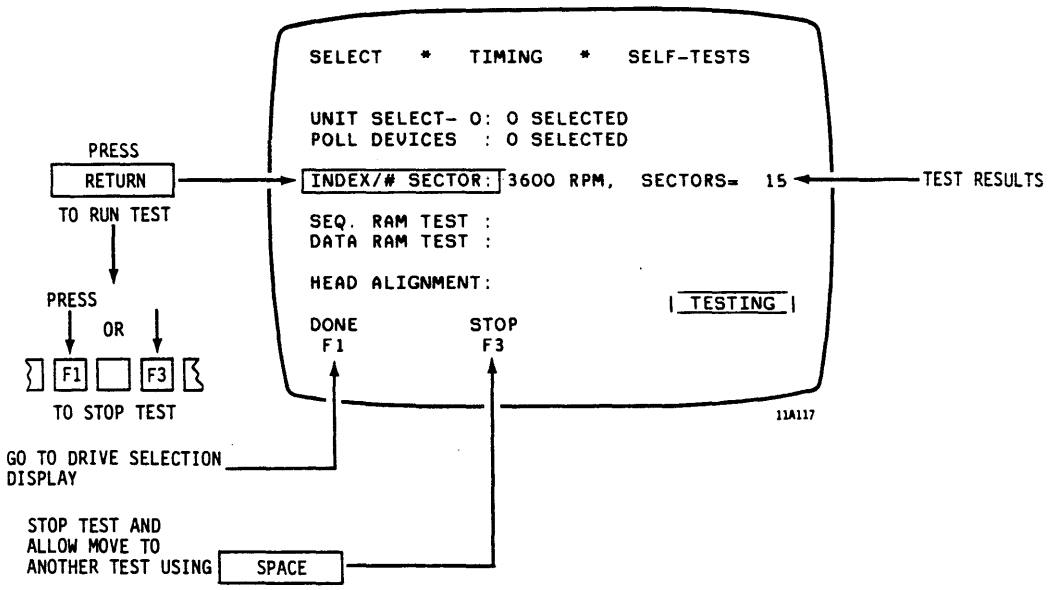
If you press F1 (DONE), go to page 2-18 (PRETEST-9).

OTHER-5

INDEX/# SECTORS TEST SELECTED

Execute Test

Press RETURN to run a test that checks and displays both Index timing (shown in revolutions per minute) and the number of sectors counted between Index pulses.



NOTE

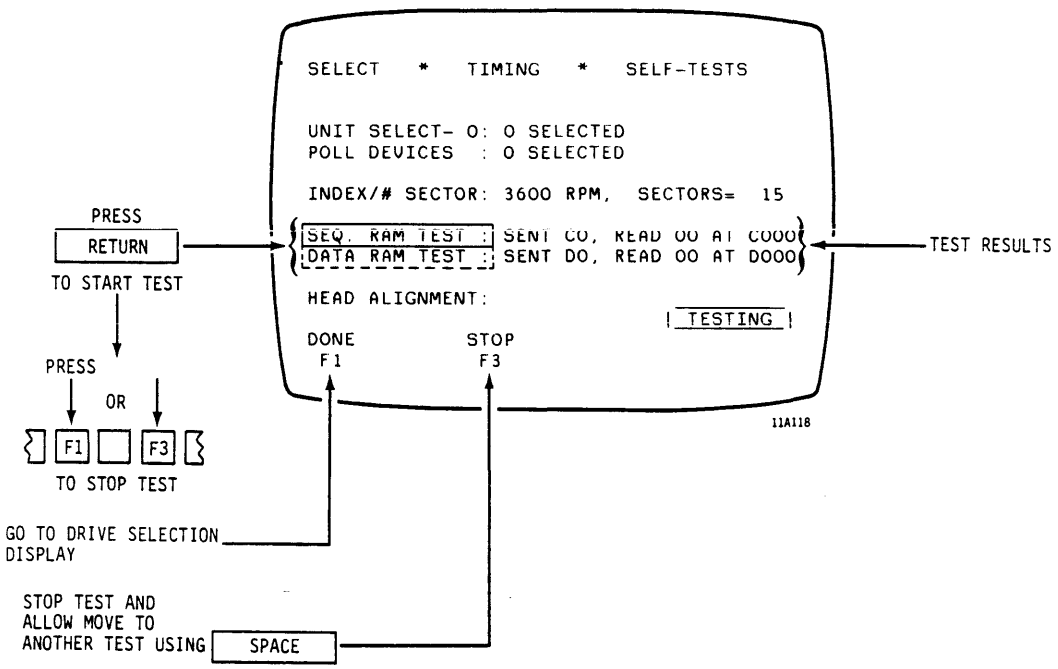
Press F8 twice to print a hard copy of the SELECT * TIMING * SELF-TESTS display when a printer is connected and enabled. This function is not shown on the display.

If you press F1 (DONE), go to page 2-18 (PRETEST-9).

SEQ. RAM TEST OR DATA RAM TEST SELECTED

Execute Tests

Press RETURN to perform PFTU self tests that check Sequencer (control) or Data RAM memory locations and displays the results



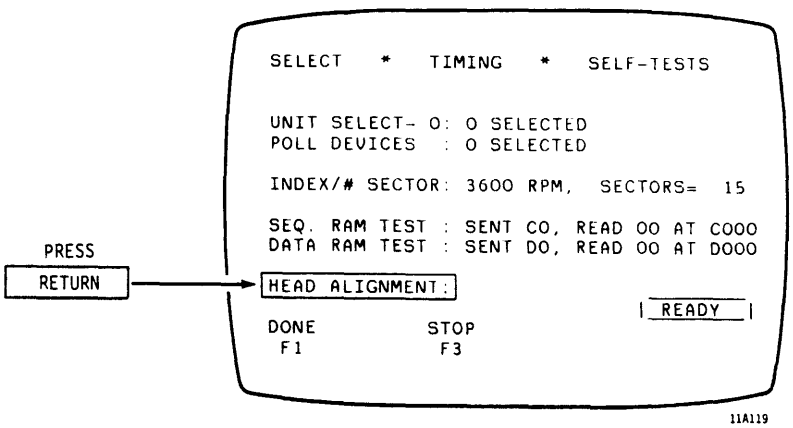
If you press F1 (DONE), go to page 2-18 (PRETEST-9).

OTHER-7

HEAD ALIGNMENT TESTS SELECTED

Go to Head Alignment Display

Press RETURN to go to the HEAD ALIGNMENT display.



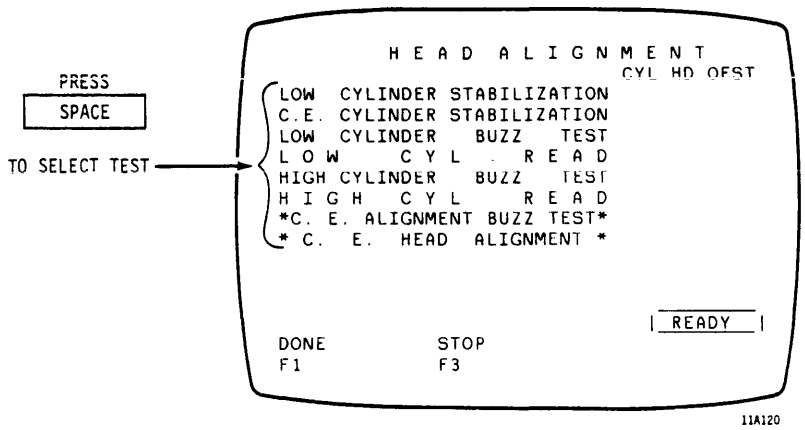
Connect PFTU Analog Input to Head Alignment Board on Drive

Use the analog cable assembly provided with the PFTU or obtain a standard X1 scope probe. Connect the connector end of the cable to the ANALOG IN connector on the PFTU operator panel. Connect leads on the other end to the test points or connector pins designated for null meter connection.

HEAD ALIGNMENT TESTS SELECTED (CONTD)

Select Head Alignment Tests

Refer to the head alignment procedure contained in the hardware maintenance manual for the drive connected to the PFTU. Follow the head alignment procedure given in the manual using features available via the PFTU to replace the null meter and to provide stabilization, seek, and read functions as required.

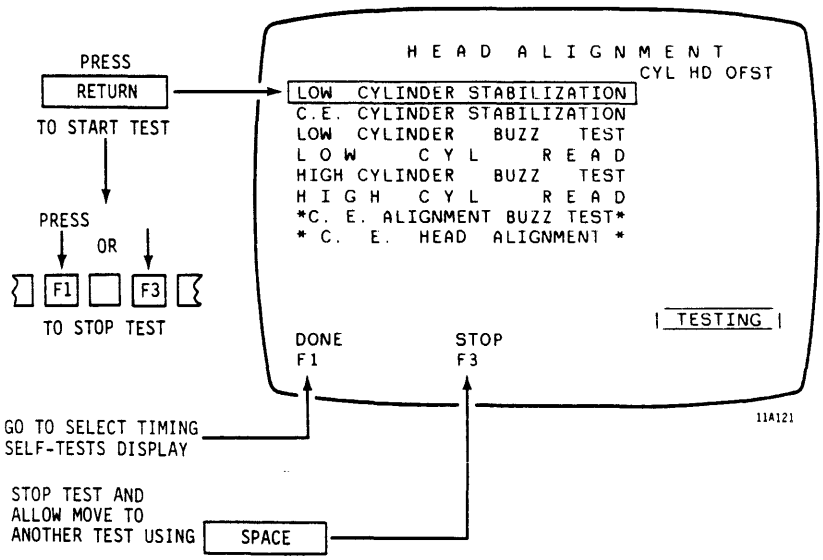


OTHER-9

Low Cylinder Stabilization Test Selected

Execute Test

Press RETURN to command drive to seek to cylinder zero and stay there until the F1 (DONE) or F3 (STOP) function key is pressed. This test ensures that the drive, C.E. pack, and PFTU are thermally stabilized prior to performing other low cylinder head alignment tests.

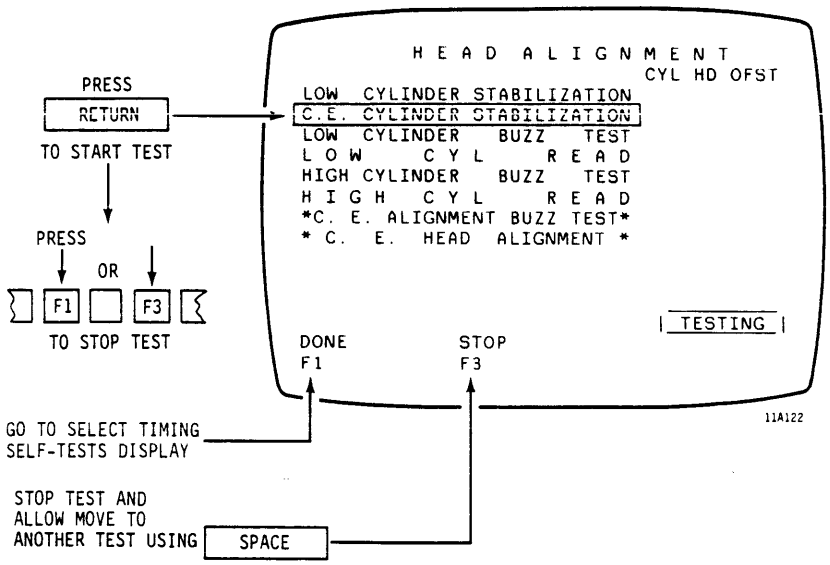


If you press F1 (DONE), go to page 2-108 (OTHER-1).

C. E. Cylinder Stabilization Test Selected

Execute Test

Press RETURN to command drive to seek to the C.E. (head alignment) cylinder and stay there until the F1 (DONE) or F3 (STOP) function key is pressed. This test ensures that the drive, C.E. pack, and PFTU are thermally stabilized prior to performing other C.E. cylinder head alignment tests.



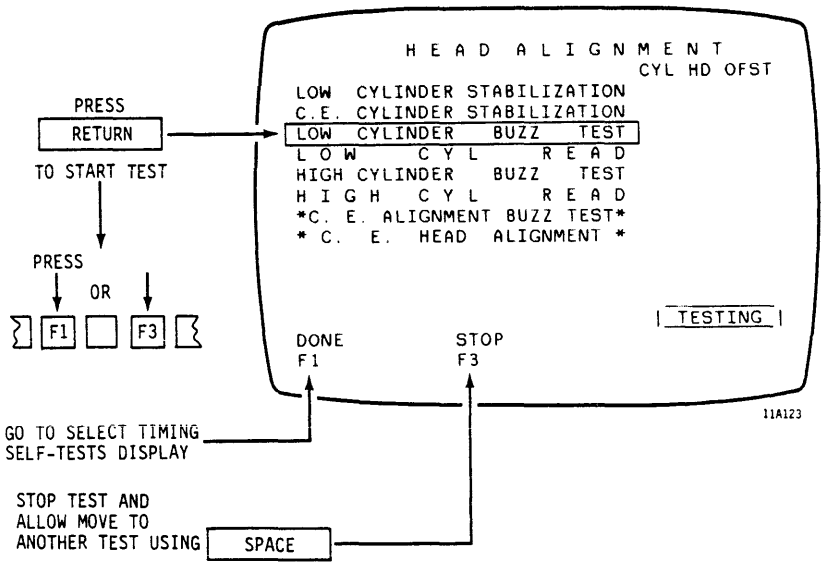
If you press F1 (DONE), go to page 2-108 (OTHER-1).

OTHER-11

Low Cylinder Buzz Test Selected

Execute Test

Press RETURN to command drive to continuously perform seeks within a limited range of low numbered cylinders until the F1 (DONE) or F3 (STOP) function key is pressed. This test brings positioner components to normal operating temperature when preparing to perform a read operation from low numbered cylinders.

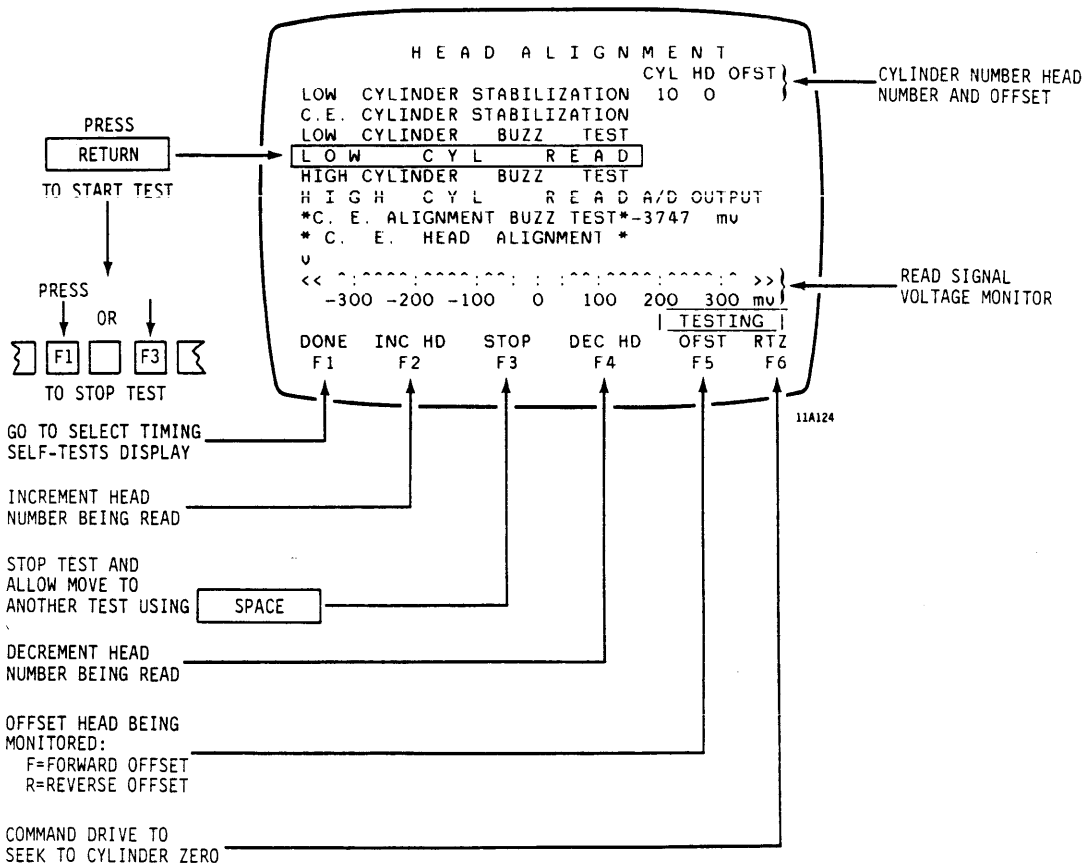


If you press F1 (DONE), go to page 2-108 (OTHER-1).

Low Cylinder Read Test Selected

Execute Test

Press RETURN to monitor the signal read at cylinder 10 on RSD, cylinder 0 on CMD, or cylinder 4 on SMD. This test continues until the F1 (DONE) or F3 (STOP) function key is pressed.



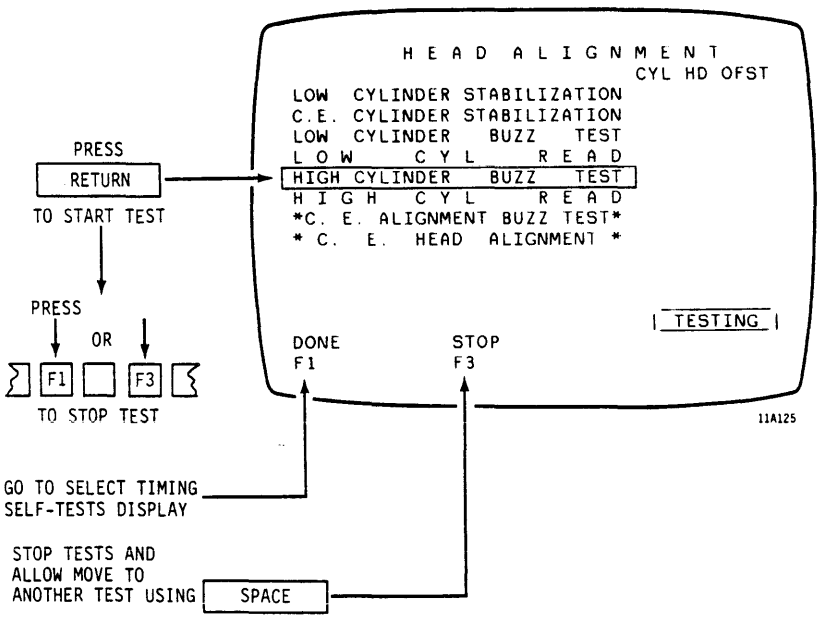
If you press F1 (DONE), go to page 2-108 (OTHER-1).

OTHER-13

High Cylinder Buzz Test Selected

Execute Test

Press RETURN to command drive to continuously perform seeks within a limited range of high numbered cylinders until the F1 (DONE) or F3 (STOP) function key is pressed. This test brings positioner components to normal operating temperature when preparing to perform a read operation from high numbered cylinders.

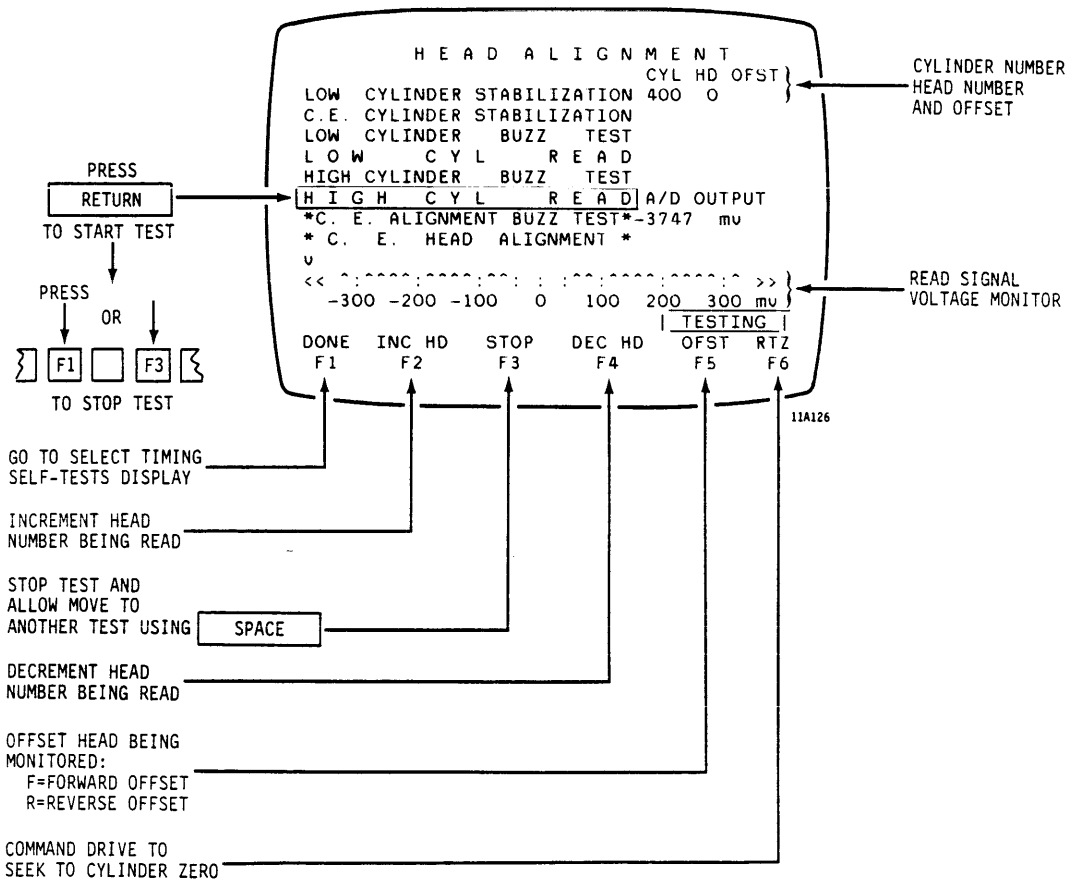


If you press F1 (DONE), go to page 2-108 (OTHER-1).

High Cylinder Read Test Selected

Execute Test

Press RETURN to monitor the signal read at cylinder 800 on RSD, cylinder 822 on CMD, or cylinder 5 on SMD. This test continues until the F1 (DONE) or F3 (STOP) function key is pressed.



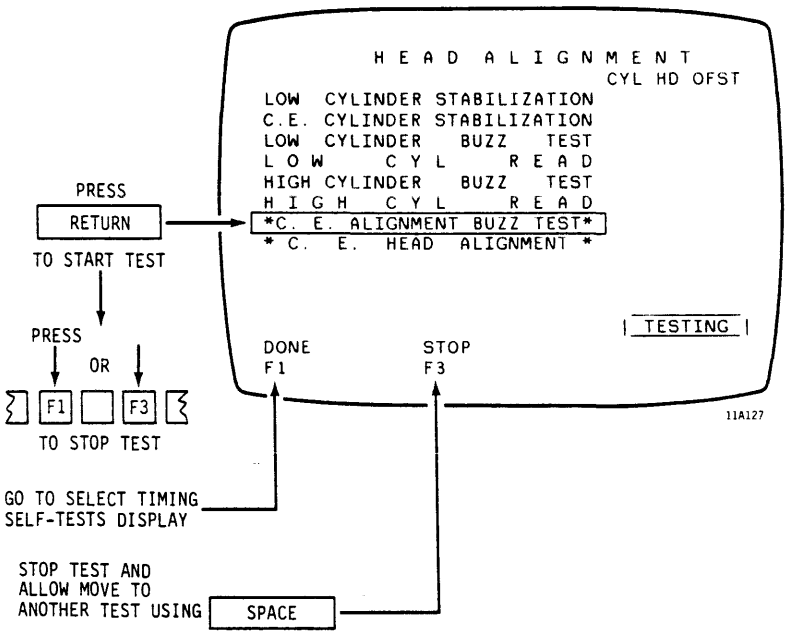
If you press F1 (DONE), go to page 2-108 (OTHER-1).

OTHER-15

C. E. Alignment Buzz Test Selected

Execute Test

Press RETURN to command drive to continuously perform seeks within a limited range around the C.E. cylinder until the F1 (DONE) or F3 (STOP) function key is pressed. This test brings positioner components to normal operating temperature when preparing to perform a head alignment check at the C.E. cylinder.

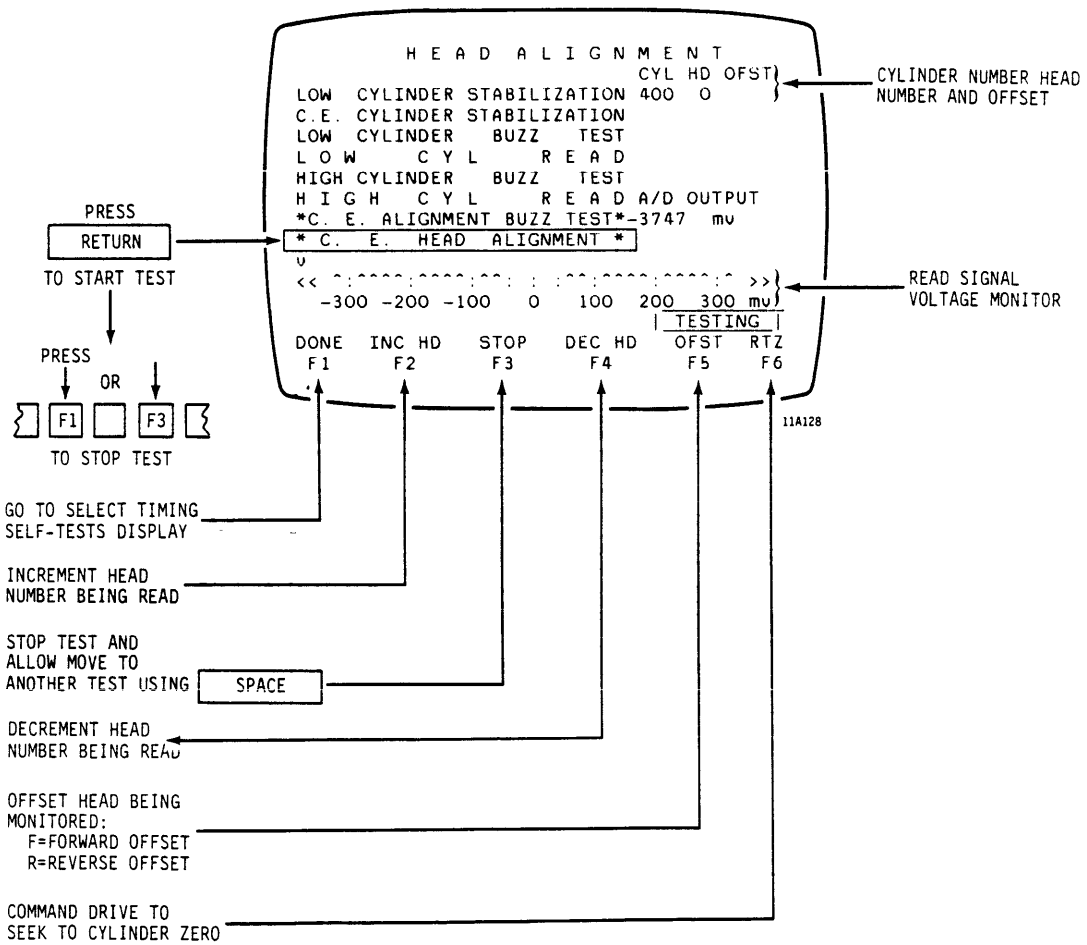


If you press F1 (DONE), go to page 2-108 (OTHER-1).

C. E. Head Alignment Selected

Execute Test

Press RETURN to monitor the signal read at the C.E. (head alignment) cylinder for the purpose of checking head alignment. This test continues until the F1 (DONE) or F3 (STOP) function key is pressed.



If you press F1 (DONE), go to page 2-108 (OTHER-1).

APPENDIX A

DESCRIPTIONS OF SET-UP DISPLAYS AND DISPLAY LINES

DESCRIPTIONS OF SET-UP DISPLAYS AND DISPLAY LINES A

ADDRESS MARKS Display Line	Address marks are used to mark the beginning of the header for each sector when this option is enabled. They are written and/or read during write format, write/read format, and read format operations. When this option is disabled, sector pulses are used as the starting point for headers.
C.E. ALIGNMENT BUZZ TEST Display Line	This test performs continuous seeks within a limited range of cylinders around the C.E. (head alignment) cylinder. The test is run just before aligning heads to bring positioner components up to normal operating temperature. The time required to reach normal operating temperature is given in the maintenance manual for the drive being tested. The test should be stopped when this period of time has elapsed.
C.E. CYLINDER STABILIZATION Test Display Line	This test holds the heads positioned over the C.E. (head alignment) cylinder for a period of time long enough to allow the heads to thermally stabilize. The drive's positioner seeks to the C.E. (head alignment) cylinder and remains there until the test is stopped. The time required to stabilize the heads is given in the maintenance manual for the drive being tested. The test should be stopped when this period of time has elapsed.

C.E. HEAD ALIGNMENT Display Line

To check head alignment, this test positions the drive's heads over the C.E. (head alignment) track and monitors the read signal. The procedure for aligning heads is provided in the maintenance manual for the drive being tested. The following functions are available while running this test:

- The number of the head being monitored may be incremented or decremented.
- Heads may be offset in forward or reverse directions Head offsets are cleared when other functions are performed.
- A return to zero seek may be performed. The positioner returns to the original cylinder after seeking to cylinder zero.

This test continues running until F3 (STOP) function key is pressed.

CLEAN FLOPPY DISK HEADS Display Line

This initialization option provides a test routine for cleaning heads in the floppy disk drive. A head cleaning kit is required to use this option. Refer to the Hardware Maintenance manual for information on the head cleaning kit. Instructions for cleaning heads are provided with the head cleaning kit.

NOTE

Normally, head cleaning is not a required procedure for the PFTU. It should only be used on units that are exposed to unusually dirty conditions.

CONTINUOUS LOOPING Display Line

Sequential seeks run continuously when this function is enabled. Only one sequence of seeks is run when this function is disabled.

CURRENT TEST PARAMETERS Display

This display lists options for selecting operating modes and entering values required to run seek and/or read/write tests on a drive. Only options that apply to the drive being tested are listed. Selected options allow entry of values within the operating limits of the drive.

CURRENT TEST STATUS Display

The following status information on the currently selected test is displayed:

- Flag, cylinder, head, and sector numbers expected. Flag always expected as zero/clear.
- Flag, cylinder, head, and sector numbers received. Flag is zero/clear except when track is flagged.
- Number of sectors and length (in bytes) of sectors.
- Total length of data field and amount of data field filled (both displayed in bytes) by a write data operation.
- First 8 bytes (16 hexadecimal characters) of data pattern used.

This display lists functions that flag expected track, loop on a read or write/read of displayed expected sector, or change the expected sector number. The expected sector number may be increased or decreased to use the looping functions on a sector other than the one originally displayed. A read or write/read operation is performed on the sector shown on the CURRENT TEST STATUS display. The RUN display shows status during the test. A flashing LOOPING message appears on the RUN display instead of the flashing RUNNING message shown during seek or read/write operations.

DATA PATTERN SELECTION Display

Data pattern modes for use during read/write operations are listed on this display. A user-specified, random, or offset-based data pattern may be selected. These modes require the following selections or entries to set up the desired data pattern:

- User Specified - A string of up to 16 hexadecimal characters may be entered. If an odd number of characters is entered, an invisible "0" is added to maintain an even number of characters. If no entries are made, the characters shown after I.E. on the display line are used as the data pattern.

- Offset Based - Numbers that change their value in an ascending or descending direction are used as the data pattern. The change of value direction (ascending or descending) may be selected. If no entry is made, an ascending data pattern is selected.

- Random - Numbers that change their value randomly are used for the data pattern. A seed value (starting point) for the random number generator may be entered. If no entry is made, the number zero is used as a starting point.

DATA RAM TEST Display Line	This is a PFTU self-test that checks data RAM memory locations. The test writes an ascending and descending series of data patterns over existing data. This data is then read back to check the integrity of the RAM memory locations that store the data. The display shows the data sent to RAM and the data read back. It is an error if the data read differs from the data sent. The display shows the difference in data read versus the data sent, along with the address of the first RAM location where the error occurred. If there are no errors, the test continues running. The display shows the address range for the memory locations tested. To stop the test, press the STOP function key or else leave the display by pressing the DONE function key.
DIRECT Seek Display Line	These tests perform a seek from the present cylinder to a selected destination cylinder address. This seek is executed once.
DIRECT CONTINUOUS Seeks Display Line	These tests perform continuous forward and reverse seeks between selected beginning and ending cylinder numbers.
DSTN (Destination) CYLINDER Display Line	When a direct seek is selected on the SEEK MODE display, the desired destination cylinder number may be entered on this line. If no entry is made, the destination cylinder is set to zero.
DRIVE SELECTION Display	The top half of this display shows a list of the devices that may be tested using the controlware loaded in the PFTU. The entire list of device types that can be tested may be viewed by pressing the F6 (SCROLL) function key. The bottom half of the display lists functions that must be selected or entered to select the drive and begin setting up tests.

SEF USE & FLAG/CLEAR TRACKS Display

This feature uses error flaw map information from the first two sectors (Home Address) of a track to flag or clear flawed data tracks as follows:

FLAG (MAP) - Reads flaw map for each track and flags any tracks where known errors exist. Current track address is displayed and updated until all data tracks on the drive have been tested. This may take a long time to complete.

FLAG TRACK - Reformats track identified by CYLINDER NUMBER and HEAD NUMBER display lines by setting flag byte to A5 (track flagged).

FIND NEXT - Searches for next flagged track starting at the next track after the track identified by the CYLINDER NUMBER and HEAD NUMBER display lines. All tracks are checked until a flagged track is found or all tracks have been read. Current track address is displayed and updated while the test is in progress. This may take a long time to complete.

CLEAR TRACK - Reformats track identified by the CYLINDER NUMBER and HEAD NUMBER display lines to clear its flag byte (sets byte's value to 00).

DUMP MAP - Reads flaw map for each track on a drive and prints out, via external printer, all listed errors. Current track address is displayed and updated while the test is in progress. This may take a long time to complete.

ENGINEERING MODE Display

This display lists a series of diagnostic tests for use when isolating problems. The following drive functions may be tested:

- Current test status may be checked after an error stops a test.
- A looping write and/or read test may be run on a single sector.
- Bus In lines may be scanned while one of the listed Tags is issued. Drive error recovery functions may be tested.
- Flawed tracks may be flagged or cleared using data from the Error Flaw map for each track.

ERROR OPTIONS Display

This display lists errors that normally stop a test when they occur. These errors may be bypassed to prevent the test from stopping on error. Errors may be bypassed individually or collectively to allow the test to continue. Errors are counted and the count is displayed on the RUN display during continuous seek and read/write operations.

Special options are listed that sound an audible warning and/or cause the display to flash off and on when a test stops. If a printer is connected to the PFTU, an ERROR PRINTING option is listed. This option enables printing of the CURRENT TEST PARAMETERS display with a coded list of errors that occurred during a test. A list of these error codes and their meanings may be printed by pressing the F6 function key.

EXTND. CYL. AS TAG 2
Display Line

Tag 2 or Tag 1 may be selected as the method by which high order cylinder address bits are sent to drives with more than 1024 cylinders. The following paragraphs describe these Tags and their selection:

- When this option is enabled, cylinders above 1024 are addressed using a Tag 2 command followed by a Tag 1 command. The PFTU issues a Tag 2 command to send high order cylinder address bits followed by a Tag 1 command to send the remaining low order cylinder address bits to the drive on Bus Out lines.

- When this option is disabled, cylinders above 1024 are addressed using a Tag 1 command. The drive must be configured to use Bus In lines 30 and 60 (Tag 4 lines) for sending the high order cylinder address bit (2^{10}) to the cylinder address register. Do not use this option if the drive is not set up for Tag 1 addressing. If the drive is not properly configured, the actuator seeks to an unknown cylinder address below cylinder 1024 when a Tag 1 command is issued. Check to see if the drive being tested is configured for Tag 1 extended addressing by referring to the hardware maintenance manuals for the drive.

This option is not displayed when drives with less than 1024 cylinders are selected.

HEAD ALIGNMENT Tests Display

This display lists a series of tests used for aligning read/write heads. Some of these tests bring positioner components up to normal operating temperature while others display a readout of offset voltage for each head selected. When properly used, these tests provide an easier and more efficient method for aligning heads. They may be used to replace similar, but less efficient, tests called for by the procedure for aligning read/write heads presented in the maintenance manual for the drive.

Only drives with removable media require head alignment. The head alignment option is not displayed for fixed media drives.

A maximum of eight tests may be listed on the HEAD ALIGNMENT display. Some drives do not require all of these tests. Only the tests applicable to the drive selected are listed on this display.

HEAD MODE SELECTION Display

Read/write operations may be performed using a single selected head, sequentially selected heads, or randomly selected heads. This display allows selection of one of these modes for head selection. If no entry is made, the head mode is set to single head selected. A number for the head chosen may be entered for the single head selected mode. If no entry is made, the head chosen number is set to zero. Beginning and ending head numbers may be entered for sequential and random modes. If no entry is made, the beginning head number is set to zero and the ending head number is set to the maximum head number for the drive selected.

HIGH CYLINDER BUZZ TEST Display Line

This test performs continuous seeks within a limited range of high numbered cylinders. The test is run just before running the HIGH CYLINDER READ test to bring positioner components up to normal operating temperature. The time required to reach normal operating temperature is given in the maintenance manual for the drive being tested. The test should be stopped when this period of time has elapsed.

HIGH CYLINDER READ Test Display Line

This test positions the drive's heads over cylinder 800 on RSD, cylinder 822 on CMD, or cylinder 5 on the SMD and monitors the read signal to evaluate head alignment on these cylinders. The following functions are available while running this test:

- The number of the head being monitored may be incremented or decremented.
- Heads may be offset in forward or reverse direction. Head offsets are cleared when other functions are performed.
- A return to zero seek may be performed. The positioner returns to the original cylinder after seeking to cylinder zero.

This test continues running until F3 (STOP) function key is pressed.

HOME ADDRESS PROTECT Display Line

The first two sectors (Home Address) on all data tracks are write protected when this option is enabled. The CDC OEM customer format uses these two sectors to store Error Flaw Map (EFM) data for each data track. This data is destroyed when write operations are performed on Home Address sectors. Disabling this option permits write operations on these sectors.

INDEX ON B CABLE Display Line	This display line is used to identify which I/O cable carries the Index signal from the drive to the PFTU. Enabling this option causes the PFTU to sense Index on a B cable signal line. Disabling this option causes the PFTU to sense Index on an A cable signal line. While on this display line, pressing RETURN runs a test that checks both cables for Index pulses and displays the results. The Index on B cable option must be enabled or disabled to reflect these results to permit read/write operations.
INDEX/# SECTORS Test Display Line	This test checks and displays Index timing. Index pulses are timed and the results are displayed in revolutions per minute. The number of sectors between Index pulses are also calculated and the results displayed.
LOAD CONTROLWARE FROM FLOPPY DISK Display Line	This initialization option loads controlware instructions into PFTU memory. These instructions are read from a floppy disk inserted in the PFTU's floppy disk drive. Messages appears on the CRT telling when to insert the floppy disk, and when loading is in progress.

LOW CYLINDER BUZZ TEST Display Line

This test performs continuous seeks within a limited range of low numbered cylinders. The test is run just before running the LOW CYLINDER READ test to bring positioner components up to normal operating temperature. The time required to reach normal operating temperature is given in the maintenance manual for the drive being tested. The test should be stopped when this period of time has elapsed.

LOW CYLINDER READ Test Display Line

This test positions the drive's heads over cylinder 10 on RSD, cylinder 0 on CMD, or cylinder 4 on the SMD and monitors the read signal to evaluate head alignment on these cylinders. The following functions are available while running this test:

- The number of the head being monitored may be incremented or decremented.
- Heads may be offset in forward or reverse directions Head offsets are cleared when other functions are performed.
- A return to zero seek may be performed. The positioner returns to the original cylinder after seeking to cylinder zero.

This test continues running until F3 (STOP) function key is pressed.

LOW CYLINDER STABILIZATION Test Display Line	This test holds the heads positioned over cylinder zero for a period of time long enough to allow the heads to thermally stabilize. The drive's positioner seeks to cylinder zero and remains there until the test is stopped. The time required to stabilize the heads is given in the maintenance manual for the drive being tested. The test must be stopped when this period of time has elapsed.
MATCH LINE FREQUENCY (50/60 HZ) Display Line	This initialization option matches the CRT refresh rate to the power frequency used by room lighting. A mismatch can cause information displayed on the CRT to appear unstable making it difficult to read. The PFTU is matched to 60 Hz when power is applied. For 50 Hz operations, it should be changed using this option.
POLL DEVICES Display Line	This test attempts to select all possible unit numbers and displays which unit number responds to the selection attempts. The test runs continuously until the STOP function key (F3) is pressed.

POWER Display Line

This option allows a drive set for remote power sequencing to be powered up or down from the tester. It also affects the running of tests. This option must be enabled for drives set for either remote or local power sequencing or tests will not run.

If a drive is set for remote power sequencing and its START switch is on, the spindle motor may be powered up or down by enabling or disabling this option.

If a drive is set for local power sequence operation, enabling or disabling the POWER option displayed on the PFTU has no effect on the spindle motor. The drive's spindle motor must be powered up and down by the START switch on the drive. A message stating that the drive is already powered up appears on the display if the POWER option is enabled when drive's START switch is on.

When the RETURN key is pressed, the test waits up to 30 seconds for the drive to come up to speed. If the drive comes up to speed, READY, spindle speed in revolutions per minute, and sector count are displayed. If the drive does not come up to speed within 30 seconds, one of several messages describing drive status is displayed.

PRESENT DEVICE TYPE Display Line

The top half of the DRIVE SELECTION display lists the device types that may be tested using the controlware loaded in the PFTU. Enter the number of the device type that corresponds to the drive connected to the PFTU on this display line. When RETURN or SPACE is pressed, the following constants are set up within the operating system:

- Only options that apply to the drive selected are displayed.
- The data transfer rate is set.
- Default values are assigned to some options for use if no entry is made.

RANDOM Seeks Display Line

These tests perform continuous seeks to randomly generated cylinder addresses. These addresses are generated within a selected range of addresses.

READ DATA Mode Display Line

During this mode of operation data is read from the data field at selected sector(s) on selected track(s). A CRC (Cyclical Redundancy Code) check is done on the data read to test its accuracy. Data read is not compared to data written.

READ FORMAT Mode Display Line

During this mode of operation, header data is read from all sectors on selected track(s). A CRC (Cyclical Redundancy Code) check is done on the data read to test its accuracy. Address Marks are used to mark the start of sectors if enabled on the DRIVE SELECTION display.

READ/WRITE MODE SELECTION Display

This display lists the modes available for setting up read/write operations. One of the following read/write modes may be selected:

- Seek Only
- Read Data
- Read Format
- Write/Read Format Data
- Write/Read Format
- Write/Read Data
- Write Format
- Write Data
- User Simulation

Tests may be set up to include both seek and read/write operations. Read/write operations are completed on one cylinder before seeking to another.

Tests set up to check read/write functions of a drive should begin with a Write Format, Write/Read Format, or Write/Read Format and Data operation. These operations write unique headers for all sectors on tracks selected to be tested. Before a test is run to read data, a known data pattern should be written using a Write Data, Write/Read Data, or Write/Read Format and Data operation. These operations write data on a selected sector, all sectors, or random sectors on a track.

Data is transmitted to the drive at a rate set by the Servo Clock received from the drive.

NOTE

During a read operation, headers are checked by CRC Hardware and by controlware for a header miscompare (difference from expected values). Data fields read are checked by CRC hardware only. When enabled on the DRIVE SELECTION display, Address Marks precede headers and are written only during format operations. Headers are read before data is written or read.

RUN Display

The RUN display appears whenever the function keys labeled RUN or LMTD-RN (Limited Run) are pressed while viewing any seek or read/write set-up display. Pressing the READ or WRT/RD function keys while viewing the CURRENT TEST STATUS display also causes the RUN display to appear.

The RUN display responds to errors in one of two ways. If the error bypass is not enabled, the test stops. If the error bypass is enabled, the RUN display updates an error counter and the test continues running. The test may also be stopped by pressing the STOP function key (F3). Pressing this key a second time restarts (continues) the test. A flashing RUNNING/LOOPING or STOPPED message appears on the display indicating whether or not the test is running.

Function keys labeled FLT/CLR (fault clear), ENG (engineering mode), RTZ (return to zero seek), and CNT/CLR (Count Clear) are provided to control test execution while in the RUN mode. Descriptions of these function keys and their effect on test execution are presented in the following list:

- FLT/CLR - Clears a fault that occurred while test was running but no longer exists. This is done by issuing a Tag 3 (Control Select) command with Bus Out bit 4 active.

RUN Display (Contd)

- (CONT) STOP - If pressed while test is running, the test stops and the function key is redefined as (CONT) (continue). Pressing the key a second time restarts the existing test.

  NOTE:

  If the RUN display showed a limited number of test cycles to be run on the RUN LIMIT display line before the STOP key was pressed, restarting the test using the function key changes the limit to FOREVER. To reinstate the original limit, you must press the DONE function key to return to the display from which RUN was entered and then press the LMTD-RN function key to reenter RUN.

- ENG - Goes to the ENGINEERING MODE display.

- RTZ - Commands a Return to Zero seek to clear seek errors. This is done by issuing a Tag 3 (Control Select) command with Bus Out bit 6 active.

- CNT/CLR - Clears all counters on the RUN mode display.

RUN SELF-TEST DIAGNOSTICS Display line

This initialization option lists a series of self-test diagnostics that may be run on the PFTU. Refer to the Hardware Maintenance manual for descriptions of these tests.

SCAN INTERFACE Display

This test allows scanning of Bus In lines after issuing a selected Tag with a specific Bus Out value entered. The Bus Out and Bus In values are displayed in both binary and hexadecimal while Bus In lines are being scanned. Only the ten least significant bits of the Bus Out value entered are used.

When the Scan function key is pressed, the Bus In lines are scanned and results displayed until F2, F3, F4, F5, or F6 is pressed. Pressing the STOP function key (F3) stops scanning until it is pressed a second time to resume scanning. Each of these update the PREV IN line. F2 and F5 then drop the current tag (if Tag was 1-5), raise Tag 3, raise appropriate Bus Out Bit, drop the same bit, and then drop Tag 3. F4 and F6 clear the current Tag lines (1-5). F2, F4, and F5 will then reissue the original tag.

SECTOR MODE SELECTION Display

Data may be written on or read from a single sector, all sectors, or random sectors. This display allows you to choose one of these sector selection modes. If no entry is made, the mode is set for all sectors.

NOTE

Write operations are not permitted on the first two sectors after Index if the Home Address Protect function was enabled on the DRIVE SELECTION display. If enabled, the following message appears at the top of the SECTOR MODE SELECTION display:
(HAP = 2 SCTRS)

SEEK INCRMNT (Increment) Display Line

This display line is used to enter a number to be used for one of the following purposes:

- When tests are being set up to run in the sequential seek mode, seek increment is the length of each seek. For example: a seek from cylinder 10 to cylinder 15 has a length of 5 cylinders.
- When tests are set up to run in the X → N seek mode, seek increment is the number of cylinders seek length increases or decreases from one seek to the next.

SEEK MODE SELECTION Display

This display lists the modes available for setting up seeks. A direct seek, sequential seeks, random seeks, X→N seeks, or direct continuous seeks may be selected from this list. The following options are also listed on this display:

- An option that requires the selection of one of two methods for extended addressing when a drive with more than 1024 cylinders is being tested.
- An option that runs sequential seeks continuously when enabled.

The CURRENT TEST PARAMETERS display lists other options that apply to the seek mode selected.

SEEK ONLY Mode Display Line

This read/write mode permits selection of seek mode functions with read/write functions disabled.

SELECT, TIMING, SELF-TESTS Display	This display lists a series of tests used to check drive selection, Index timing, number of sectors, PFTU memory integrity, and head alignment.
SELECT INITIALIZATION OPTIONS Display	This display lists an option that loads controlware from a floppy disk into memory. The instructions contained in the controlware direct all tests run on a drive. This display also lists options that modify or test PFTU functions. Any of these PFTU options may be selected and run without loading controlware. The following options may be selected: • MATCH LINE FREQUENCY (50/60 HZ) • RUN SELF-TEST DIAGNOSTICS • LOAD CONTROLWARE FROM FLOPPY DISK • CLEAN FLOPPY DISK HEADS • TOGGLE KEYSTROKE ENTRY ACKNOWLEDGE
SET CYLINDER RANGE Display	The beginning and ending cylinder numbers for sequential, random, or X → N seeks are entered on this line. If no entry is made, the cylinder range is set from cylinder zero to the maximum cylinder number for the drive selected. Entering an ending cylinder number higher than maximum causes a seek error to occur.

SEQ. RAM TEST Display Line

This is a PFTU self test that checks sequencer (control) RAM memory locations. An ascending and descending series of data patterns are written over existing data This data is then read back to verify the integrity of the RAM memory locations used to store sequencer data. The display shows the data sent to the RAM and the data read back. It is an error if the data read back differs from the data sent. The display shows the difference in data read versus data sent, along with the address of the first RAM location where the error occurred. If there are no errors, the test continues running. The display shows the address range for the memory locations tested. To stop the test, press the STOP function key or leave the display by pressing the DONE function key to stop test.

SEQUENTIAL Seeks Display Line

These tests perform a series of seeks between selected beginning and ending cylinder numbers. A number entered as a seek increment sets the length of each seek. The direction of the seeks is selected as forward, reverse, or forward followed by reverse.

Example:

Forward sequential seeks from cylinder 10 to cylinder 25 in 5-cylinder increments are performed as follows:

- The first seek moves the actuator from cylinder 10 to 15.
- The next seek moves the actuator from cylinder 15 to 20.
- The last seek moves the actuator from cylinder 20 to 25.

SEQUENTIAL SEEK DIRECTION Display

If sequential seeks are being set up, the seek direction is selected from a list of options and entered on the CURRENT SEEK DIRECTION MODE line on this display. The options are forward, reverse, and forward followed by reverse. If no entry is made, the seek direction mode is set to forward.

STARTING CYLINDER Display Line

A cylinder number for use as a starting point during X → N seeks is entered on this display line. This starting point along with the cylinder range entry determine the seek pattern followed. Refer to section 1 in this manual for examples of typical X → N seeks.

STRESS FUNCTIONS Display

This feature enables error recovery functions in the drive. Early and late data strobe commands change the timing of Clocked Read Data with respect to the Read Data Clock. Servo offset commands move heads off cylinder a small distance in a forward or reverse direction. These error recovery functions remain in effect during all read/write tests until disabled via this display. Do not write data while in the offset mode because it may adversely affect data on an adjacent track.

These functions are used during drive operations that involve reading data from locations where data errors have occurred. Stress tests are used to verify that data strobe and servo offset functions are working and that the drive reads data under error recovery conditions.

SYNC BYTE Display Line	This line displays a two-character hexadecimal number to be used as a sync byte during read/write operations. If no entries are made, the characters C9, shown on the display line, are used as the sync pattern.
TOGGLE KEYSTROKE ENTRY ACKNOWLEDGE Display Line	This initialization option disables the audible indicator preventing it from sounding when keyboard keys are pressed. Selecting this option a second time enables the indicator.
UNIT SELECT NUMBER Display Line	The logical unit number assigned to the drive being tested is displayed on the line labeled UNIT SELECT NUMBER. The number shown is determined by polling the drive during the transfer from the SMD-0/SMD-E display to the DRIVE SELECTION display. This unit number is established at a drive by switches that are activated by a logic plug, or set manually. Because the drive is polled only once during the transfer from the Introductory display to the DRIVE SELECTION display, changing the logical unit number at the drive does not change the unit number displayed.
UNIT SELECT Test Display Line	This test continuously selects the unit number displayed on UNIT SELECTED line of the DRIVE SELECTION display. A message appears on the display telling whether or not selection occurs. The selection operation is repeated until the test is stopped using the STOP function key.
USER SIMULATION Mode	Head and sector selection are forced to random mode when running read/write operations in this mode. Read data operations are run 90% and write/read data operations are run 10% of the time. This test simulates typical on-line use of a drive for storing and recovering data.

WRITE DATA Mode Display Line	Tests run in this mode write a data pattern on selected sector(s) and track(s) that are not write protected. Existing data is destroyed when tests are run in this mode.
WRITE FORMAT Mode Display Line	Tests run in this mode write zeros followed by headers for all sectors on selected tracks that are not write protected. This operation is completed on one track before moving to the next. An Address Mark is written before the header if enabled on the DRIVE SELECTION display.
WRITE PROTECTED Display Line	Enabling this option prevents any write operations from being performed. It is used to protect existing data from being destroyed while running tests. Disabling this option permits write operations to be performed on all sectors of all data tracks unless HOME ADDRESS PROTECT is enabled. The first two sectors of all data tracks are write protected when HOME ADDRESS PROTECT is enabled.
WRITE/READ DATA Mode Display Line	Tests run in this mode write and then reads a data pattern on selected sector(s) and track(s) that are not write protected.
WRITE/READ FORMAT & DATA Mode Display Line	Tests run in this mode write zeros followed by headers for all sectors on selected tracks that are not write protected. Next, the headers just written are read. Then, a selected data pattern is written on selected sector(s). Finally, the data is read from the selected sector(s). Each of these operations is completed on one track before moving to the next. An Address Mark is included before the header if selected on the DRIVE SELECTION display.

WRITE/READ FORMAT Mode Display Line	Tests run in this mode write zeros followed by headers for all sectors on selected tracks that are not write protected. Then, the headers just written are read. Each of these operations is completed on one track before moving to the next track. An Address Mark is included before the header if enabled on the DRIVE SELECTION display.
X → N Seeks Display Line	These tests perform a unique pattern of forward and reverse seeks within a selected range of cylinder addresses. Seek lengths are increased by selected seek increments until both limits of the cylinder range are reached. Then seeks are performed with decreasing lengths until a length of zero is reached. The location of the starting cylinder with respect to beginning and ending cylinders establishes the pattern followed during X → N seeks. This pattern is not influenced by the position of the actuator prior to starting the test. Refer to table 1-3 (Test Mode Definitions) in section 1 of this manual for examples of typical X → N seek patterns.

APPENDIX B

INTERPRETATION OF READ/WRITE ERRORS

INTERPRETATION OF READ/WRITE ERRORS B

INTRODUCTION

The PFTU has some unique operating characteristics you should understand before running tests on a drive. This appendix points out and explains characteristics peculiar to the PFTU and how they affect error information displayed during read/write operations.

The track(s) being tested must have headers and data written using PFTU Write Format and Write Data operations to provide meaningful error information. Attempts to read data written prior to using the PFTU will result in false error reporting.

Discrepancies in displayed error information can occur when read/write operations are performed on single or multiple sectors. These discrepancies must be considered when the RUN display indicates that a test was stopped by one or more of the following errors:

- Header Error
- Data Error
- Address Mark Error
- Sync Error

To help determine the actual location of an error, The following PFTU characteristics are discussed in this appendix:

- Home Address -- Describes Home Address Sectors and how displayed error information is affected.
- Header To Data Field Gap -- Describes the gap between a sector's header and data field and how displayed error information is affected.
- How to Locate the Actual Defective Sector -- Provides a procedure for verifying that a reported sector is defective, or for locating the actual defective sector.

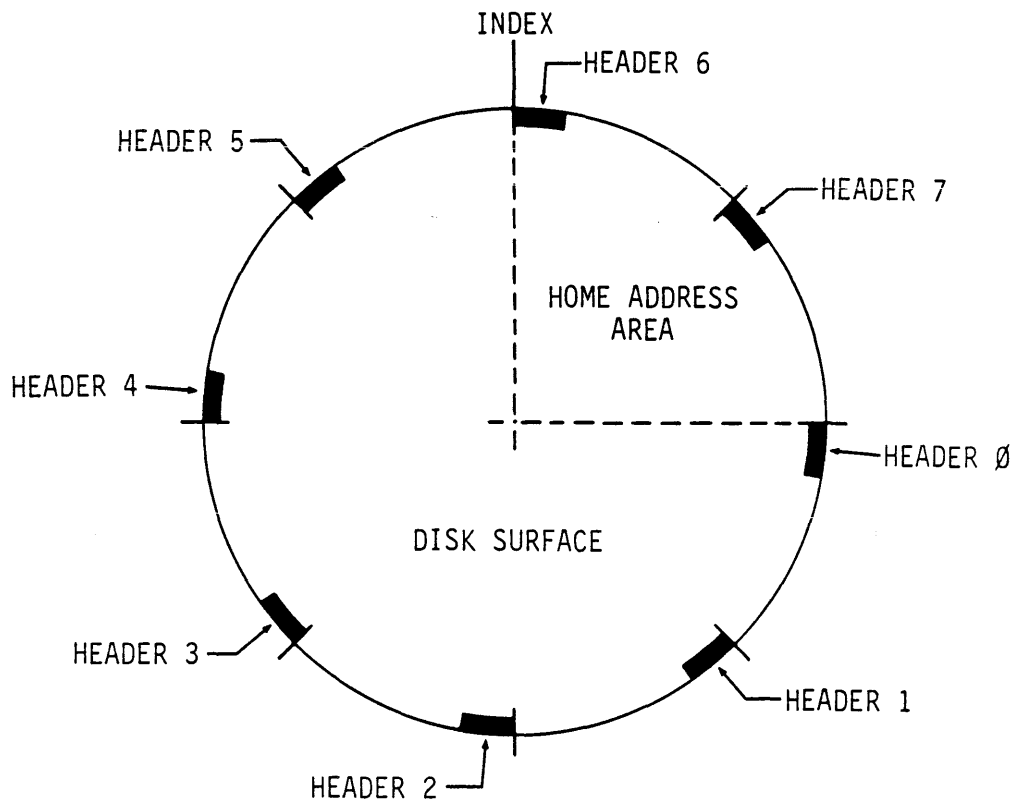
HOME ADDRESS

The first two sectors after Index are designated as Home Address sectors by PFTU controlware. These Home Address sectors determine the way sectors are arranged and counted.

HOW HOME ADDRESS GAP AFFECTS SECTOR ARRANGEMENT

The PFTU always leaves a two sector Home Address gap between Index and sector zero when counting sector pulses. Home Address may be used to store error flaw map data for the previous track or it may be used for ordinary data storage. When used for error flaw map storage, Home Address should be protected from damage by enabling WRITE PROTECT or HOME ADDRESS PROTECT functions on the DRIVE SELECTION display.

EXAMPLE:



NOTE:

8 SECTORS (NUMBERED 0-7) SHOWN FOR CLARITY.

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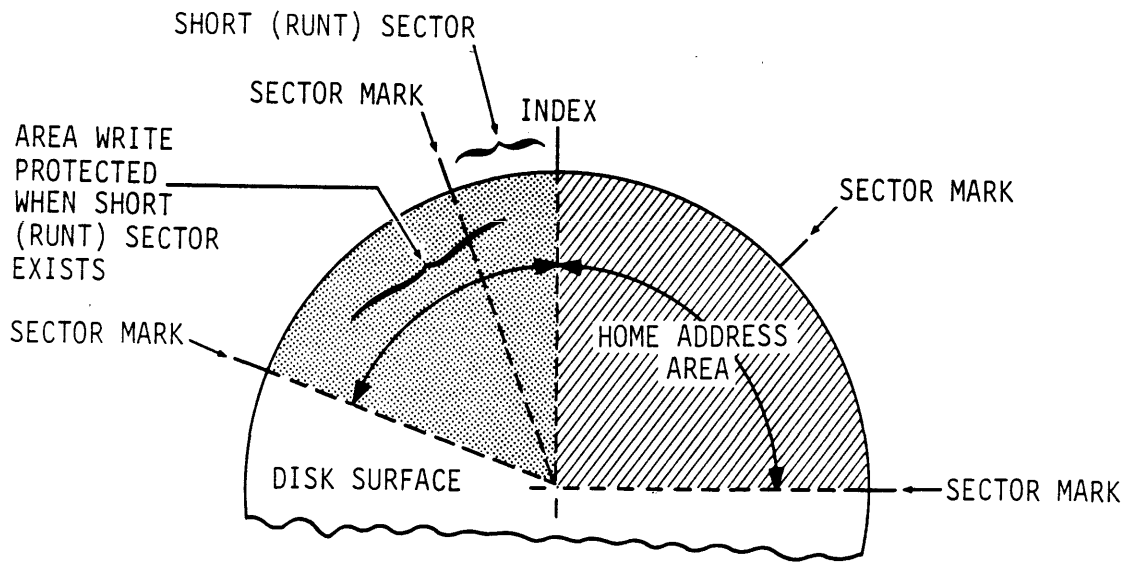
HOW HOME ADDRESS PROTECT IS USED FOR SHORT (RUNT) SECTORS

When a short (runt) sector is present at the end of a track, the controlware enables HOME ADDRESS PROTECT to prevent writing on the last two sectors prior to Index. If the HOME ADDRESS PROTECT option was enabled while setting up the test, the two sectors after Index are also write protected. As a result, the last four sectors on a track are write protected when a short (runt) sector is present and HOME ADDRESS PROTECT is enabled.

When in the SINGLE SECTOR mode, it is possible to choose either one of the two write protected sectors prior to Index and attempt to run read/write tests. During these tests, miscellaneous errors are reported that do not reflect defects in the drive. To avoid these false errors, run read/write tests in the ALL SECTORS mode when a short (runt) sector is present. Tests run in the ALL SECTORS mode skip all four write protected sectors. To determine if a short (runt) sector exists on the drive being tested, refer to the procedure for sector switch settings in volume 1 of the hardware maintenance manual for the drive .

EXAMPLE:



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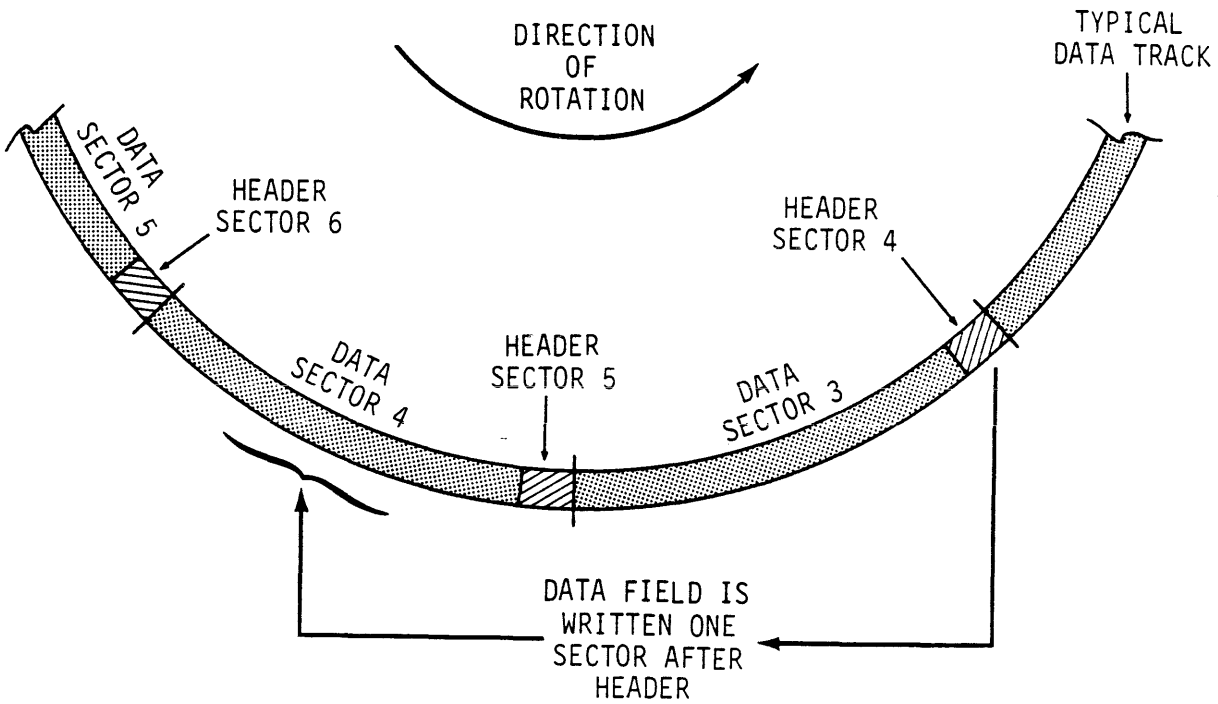
HOW TO LOCATE ERRORS REPORTED DURING READ/WRITE TESTS

REASONS FOR DISCREPANCIES

When formatted using a PFTU, a sector's header precedes its data field location by one sector. This header-to-data field relationship must be considered when attempting to isolate a sector reporting errors.

EXAMPLE:



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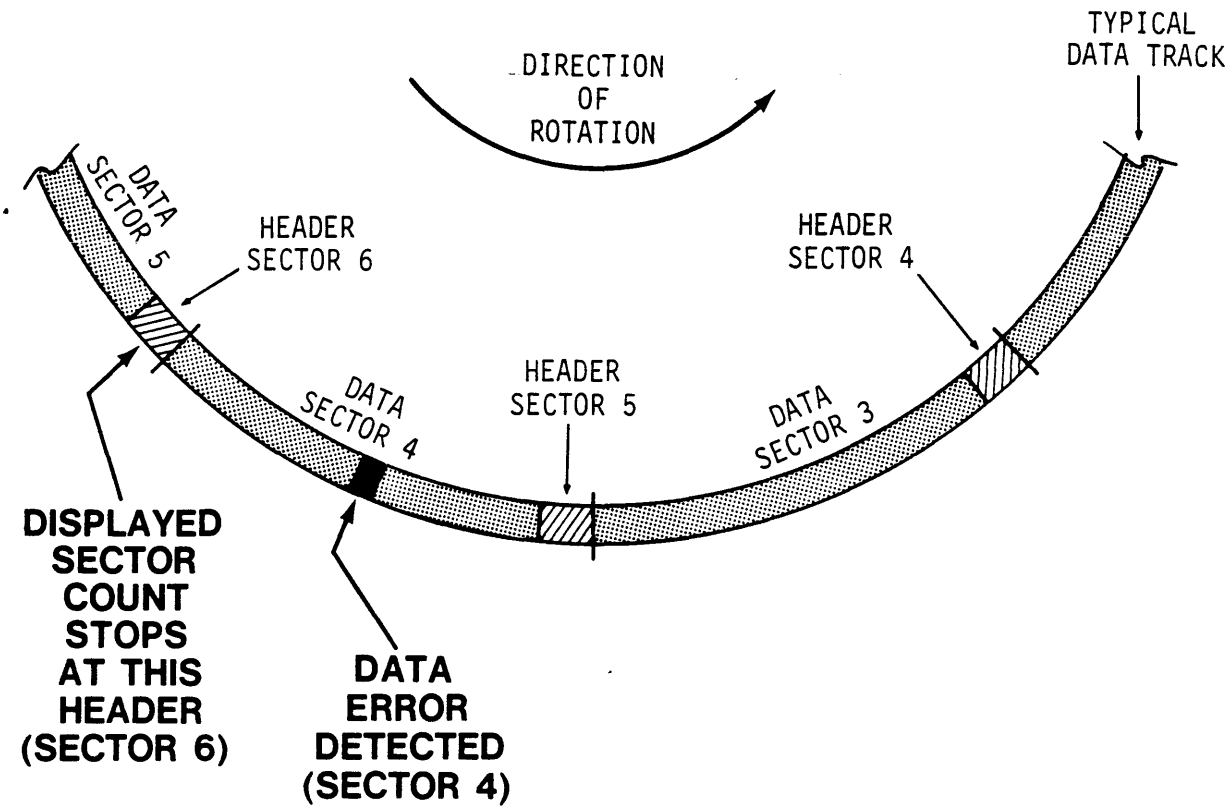
The CURRENT TEST STATUS display is used to locate errors on a specific cylinder, head, and sector at which a multiple sector read/write test has stopped. The sector number shown on this display is not always the number of the defective sector. The following factors influence the sector number displayed as defective:

- When a header error occurs, the sector number displayed is the actual defective sector. Since there is no header-to-data field difference to consider, the sector number displayed on the CURRENT TEST STATUS display is correct.

- When a Data error or Sync Byte error occurs, the sector number displayed as defective is not necessarily the actual defective sector. As discussed earlier, there is a header-to-data field difference to consider when an error occurs in the data field. Because of this difference, the sector pulse and header following the data field is counted and displayed as the defective sector number. The result is a two-sector difference between the displayed and the actual defective sector.

EXAMPLE:



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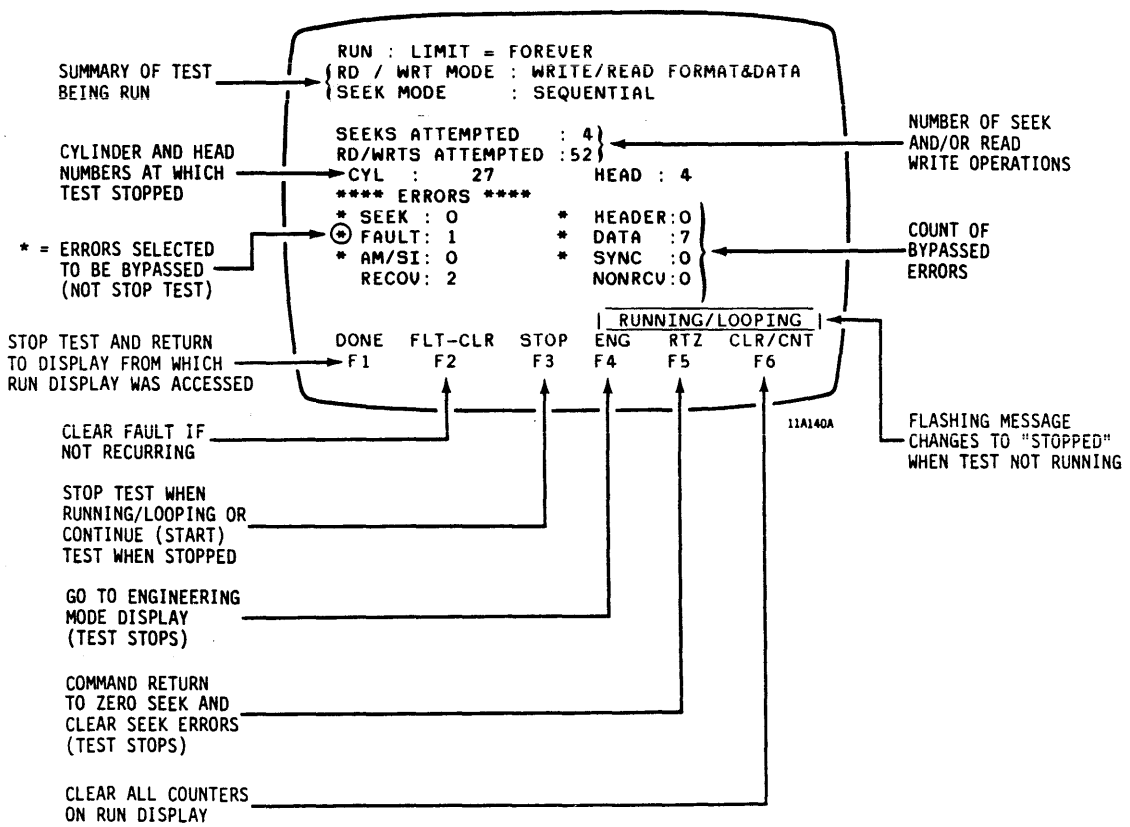
HOW TO LOCATE THE CORRECT DEFECTIVE SECTOR

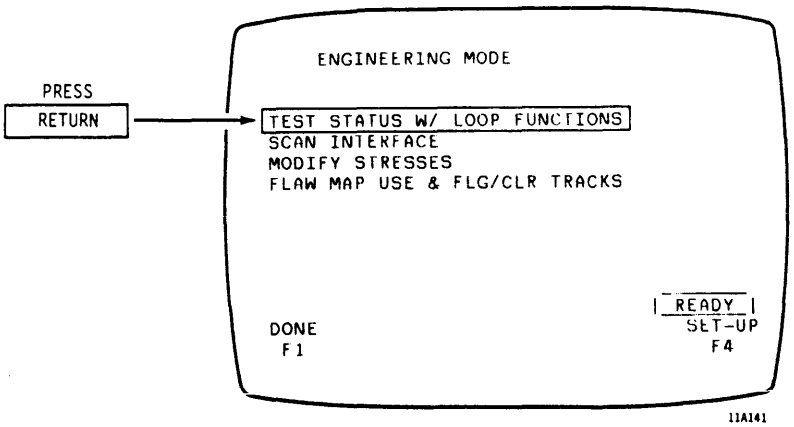
The cylinder and head number are displayed on the RUN display when a test stops because of an error. You can find the sector number at which the test stops displayed on the CURRENT TEST STATUS display. Options available on the CURRENT TEST STATUS display may be used to determine if the sector number displayed is actually defective.

By following the procedure below, you can verify that a reported sector is defective or search for the actual defective sector. This is done by performing a looping (continuous) read or write/read operation on the sector shown on the CURRENT TEST STATUS display. The sector is defective if errors are reported on the RUN display. If necessary, the sector number can be decremented or incremented until the actual defective sector is found.

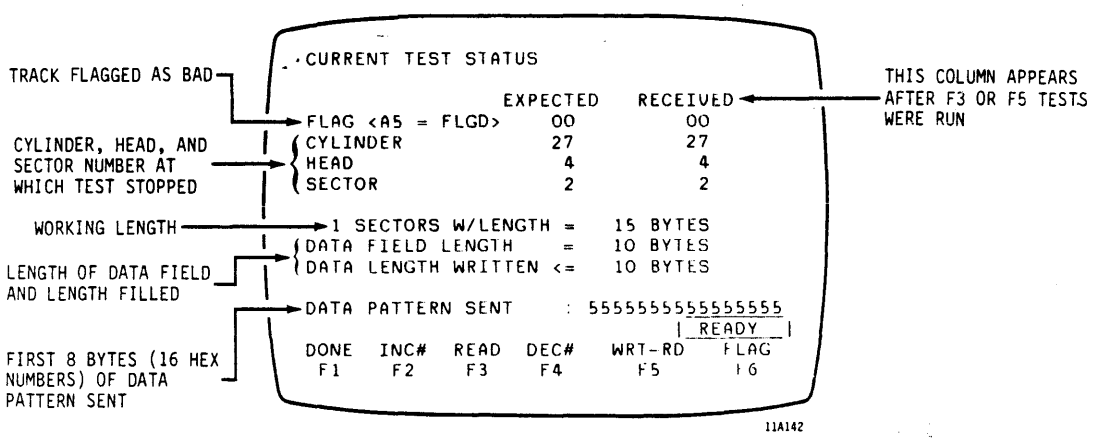
1. Go from the RUN display to the ENGINEERING MODE display by pressing the F4 (ENG) function key. Note that in the example testing stopped at cylinder 27 head 4.



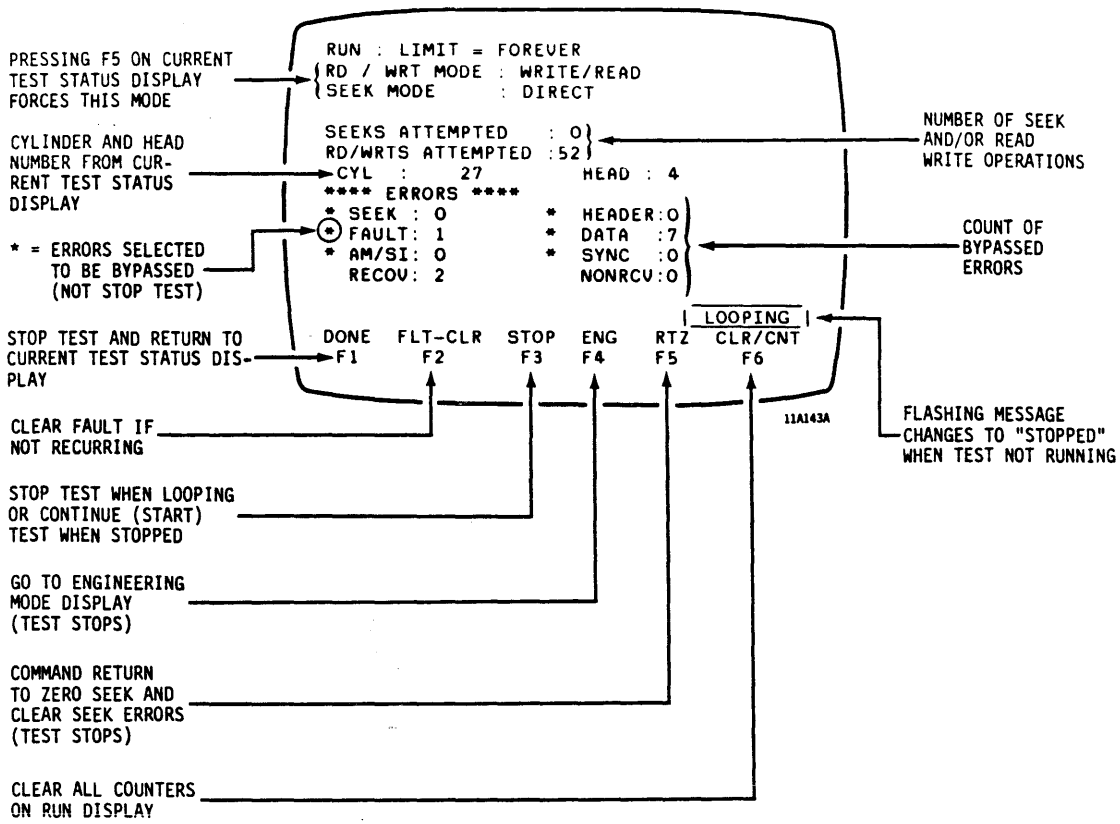
2. Go to the TEST STATUS W/ LOOP FUNCTIONS display line and press RETURN to go to the CURRENT TEST STATUS display.



3. Notice that the cylinder and head numbers (27 and 4) displayed on the RUN display are also displayed on the CURRENT TEST STATUS display as shown below. Write down the sector number (2 used in example) shown on the CURRENT TEST STATUS display.



4. Press function key F3 (READ) or F5 (WRT-RD) to go to the RUN display and run a continuous read or write/read operation on the sector displayed (sector 2 used in example) on the CURRENT TEST STATUS display as shown above. These operations are run in the single sector mode and all errors are bypassed.



NOTE

The error counters shown on the RUN display increment continuously when errors are detected. This happens because the read or write/read test is performed repeatedly (looping) on the sector reporting the errors.

5. If errors are now being reported on the RUN display, the sector number recorded in step 3 is correct. No further action is necessary.

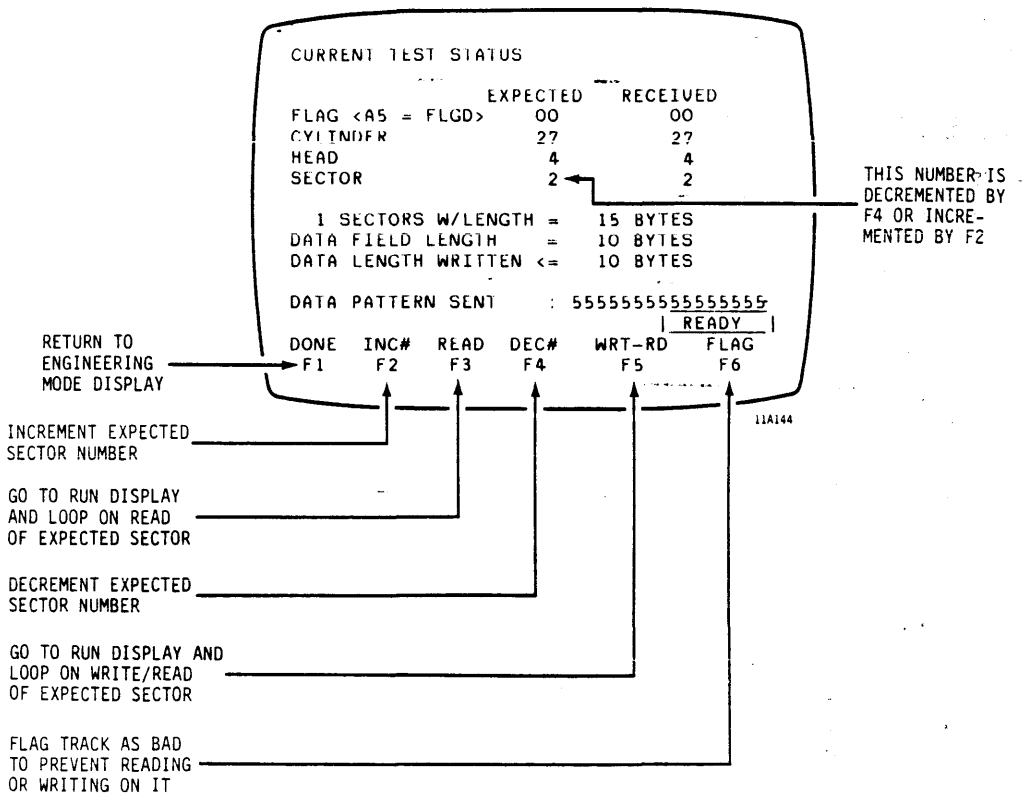
6. Press function key F1 (DONE) to stop test and return to CURRENT TEST STATUS display.

7. If no errors are now being reported on the RUN display, the sector number recorded in step 3 is incorrect. The sector number shown on the CURRENT TEST STATUS display increased by one (that means it is now 3 in example) when you return from the RUN display. The number of the sector that was actually read is one less than the number displayed. Complete the remaining steps of this procedure.

8. Press function key F4 (DEC#) to decrement the displayed sector number by one (it will now read 2 in the example).

9. Repeat steps 4 through 8 until an error is reported on the RUN display.

10. Function key F2 (INC#) can be used to increment the displayed sector number if necessary to locate the actual defective sector.



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