HEWLETT PACKARD

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7974 Magnetic Tape Drive

A-Series Exerciser Manual

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Printing History

The Printing History below identifies the Edition of this Manual and any Updates that are included. Periodically, Update packages are distributed which contain replacement pages to be merged into the manual, including an updated copy of this Printing History page. Also, the update may contain write-in instructions.

Each reprinting of this manual will incorporate all past Updates, however, no new information will be added. Thus, the reprinted copy will be identical in content to prior printings of the same edition with its user-inserted update information. New editions of this manual will contain new information, as well as all Updates.

To determine what software manual edition and update is compatible with your current software revision code, refer to the appropriate Software Numbering Catalog, Software Product Catalog, or Diagnostic Configurator Manual.

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Chapter 1
Installation

The HP 7974 Magnetic Tape Drive Exerciser is a software package for testing HP 7974 tape drives on A-Series computer systems. The purpose of the Exerciser is to allow you to diagnose a problem in a 7974 tape drive. The Exerciser uses the tape drive internal diagnostics, which are designed to isolate errors to specific Field Replaceable Units.

Exerciser Software

The Exerciser software is included as part of the HP 24398B Peripherals Diagnostics Package for HP 1000 Computer Systems. These diagnostics are bootable memory-based systems.

The relocatable modules that comprise the Exerciser are also present on the RTE-A Primary System. You can use these modules to run the Exerciser without halting the disc-based RTE-A operating system.

Disc-Based Software

The following are the modules supplied with the RTE-A Primary System, equivalent to the Exerciser software supplied on separate media.

Part Number	Name	Description
92077-16649	%MEXTR	Exerciser Main
92077-16663	%MEXPL	Self-Test Listing

Memory-Based Software

Memory-based Exerciser software is supplied on the media listed in Table 1-1. For all media except mini-cartridge tape the software is available in two versions, one version for VCP terminals using an ASIC interface, the other for VCP terminals using the MUX. Mini-cartridge tape is suitable only for booting from VCP terminals using the ASIC interface.

Table 1-1. Exerciser Software for VCP Terminal on ASIC and MUX

Medium	Part Numbers	
	ASIC	MUX
3.5-inch Microfloppy	24398-13417	24398-13425
5.25-inch Minifloppy	24398-13411	24398-13422
8-inch Flexible Disc	24398-13407	24398-13419
Mini-Cartridge Tape (CTU) No. 1	24398-13339	N/A
Mini-Cartridge Tape (CTU) No. 2	24398-13340	N/A
CS/80 Cartridge Tape (CTD)	24398-13318	24398-13318
with Primary System on CTD	02196-13301	02196-13301

Loading the Disc-Based Exerciser

The disc-based Exerciser software is supplied with the Primary System
modules in the form of two separate relocatables, %MTEXR and %MEXPL. MEXTR
is the main module; it schedules MEXPL to print an explanation of available
self tests. Thus, you must RP MEXPL before you can run MTEXR. The sequence
to run MTEXR is as follows:

    CI> LINK %MEXPL
    CI> LINK %MTEXR
    CI> RP MEXPL
    CI> RU MTEXR

Note that if executable versions of MEXPL and MTEXR already exist, the LINK
operations are not required. If MEXPL is not RPd, the Self Test Listing
(Option 43, Chapter 2) will not operate. The remaining functions of the
Exerciser, however, will not be affected.

Installing the Memory-Based Software

Installing the memory-based Exerciser software requires configuring the Processor and interface cards, then entering a boot command at the VCP terminal.

Processor and Interface Configuration

For compatibility with any of the software listed in Table 1-1, set the switches on the A-Series Processor card, the tape drive under test, and the HP-IB Interface card as directed in steps 2, 3 and 4 below. Also, do either step 5 or step 6. Step 5 applies for software on disc or CS/80 cartridge ·tape, while step 6 applies for software on mini-cartridge. Use the ASIC setting in step 6 if your terminal is connected with an ASIC card. Do step 7 if the VCP terminal in your system is on the MUX.

1. Turn the power switches on the computer and the terminal OFF.

2. Set the Processor card switch to enter the VCP routine on power-up:

        Processor switch Bootsel (U1)   # 1 2 3 4 5 6 7 8
        1 = open = up, 0 = closed = down   1 0 0 0 0 0 0 1

3.· Connect the tape drive to be tested to a 12009A HP-IB interface card. Set the HP-IB address on the tape drive to 3. To set the HP-IB address to 3, do the following:

    a. Press the address key.
    b. Press the unit key until you see a 3.

4. Locate the select-code switch (U1) on the HP-IB card. U1 is the switch pack facing the rear of the card cage. Set the select code to octal 27 as follows:

        12009A Interface switch U1   # 1 2 3 4 5 6 7 8
        1 = open = up, 0 = closed = down   1 0 0 1 0 1 1 1

    The memory-based Exerciser software expects the tape drive under test to be at select code 27, address 3, LU 7.

    Switch U16 (facing the side of the card cage) can be set to any configuration. It does not affect Exerciser operation.

5. If the memory-based Exerciser software is on disc or cartridge tape, connect the disc drive or CTD from which you will boot to the HP-IB card. Set the HP-IB address on the boot device to 2.

    Note that the boot device can be on a select code other than 27 and the HP-IB address can be other than 2, provided you use the actual numbers in the boot string. The tape drive under test, however, must be at select code 27 for compatibility with the memory-based Exerciser system. The examples in the boot procedures that follow use address 2 and select code 27 for the boot device.

6. If the memory-based Exerciser software is on mini-cartridge tape, boot from a cartridge tape unit (CTU) in a 264x terminal with an ASIC interface. Locate switch U1 on the 12005A/B interface card to which the terminal with the CTU is connected. U1 is the switch facing the rear of the card cage. Set U1 as follows:

        12005A/B Interface switch U1   # 1 2 3 4 5 6 7 8
        1 = open = up, 0 = closed = down   x 0 0 1 0 0 0 0
        x=0 if VCP, x=1 if not VCP

    Set U21 for normal operation of the terminal (U21 faces the side of the card cage).

7. If the Exerciser software is for a VCP terminal on the MUX, set the address switch on the 12040B MUX card as follows:

        12040B MUX address switch   # 1 2 3 4 5 6 7 8
        1 = open = up, 0 = closed = down   0 0 0 1 0 0 1 1

Boot Procedures

Use one of the following four procedures to boot the Exerciser system, depending on the memory-based Exerciser software medium. The first procedure given is for floppy disc, either 3.5-inch or 5.25-inch.

Booting from 3.5-Inch or 5.25-Inch Disc

If your software is on 3.5-inch microfloppy or 5.25-inch minifloppy, use the following procedure to boot the Exerciser system. You need to know the select code (an octal number) of the 12009A HP-IB interface card to which the disc drive is connected, and the HP-IB address to which the drive address switch is set.

1. Turn power ON.

2. Insert the disc in the drive (either, if there are two).

3. Press BREAK to get the VCP prompt:

    VCP>

4. Enter the following:

    VCP> %BDCffbusc

    %BDC   means boot from disc; enter as shown, in upper or lower case. Leave no embedded blanks; use BACKSPACE to correct errors.

    ffbusc is a string of octal digits; leading zeros can be omitted. Leave no blanks.

    ff = media file number: zero for ASIC or MUX Exerciser software on minifloppy or microfloppy.

    b = HP-IB address (0-7) of disc drive from which you want to boot.

    u = disc drive unit number:
         0 for single drive or left drive
         1 for right drive

    sc = select code (octal) of the 12009A HP-IB interface card to which the disc drive is connected.

5. Press RETURN.

For example, to boot from the left side of a dual minifloppy drive set to HP-IB address 2 with the HP-IB interface card set to select code 27:

    VCP> %bdc2027

The Exerciser will begin execution, asking you for the LU number of the tape drive to be tested. For the memory-based Exerciser, this LU number is 7.

Booting from 8-Inch Flexible Disc

If your software is on an 8-inch flexible disc, use the following procedure
to boot the Exerciser system. You need to know the select code of the 12009A
HP-IB card to which the disc drive is connected, and the HP-IB address to
which the drive address switch is set. You will be choosing the file to be
booted according to whether the VCP terminal is ASIC or MUX interfaced.

1. Turn power ON.

2. Insert the disc in either drive.

3. Press BREAK to get the VCP prompt:

   VCP>

4. Enter the following:

   VCP> %BDCbuscFILENAME

   %BDC   means boot from disc; enter as shown, in upper or lower case.
           Leave no embedded blanks; use BACKSPACE to correct errors.

   busc   is a string of octal digits; leading zeros can be omitted.
           Leave no blanks.

           b = HP-IB address (0-7) of disc drive from which you want to
                boot.

           u = disc drive unit number:
                   0 for single drive or left drive
                   1 for right drive

           sc = select code (octal) of the 12009A HP-IB interface card to
                which the disc drive is connected.

   FILENAME is the name of the Exerciser system to be loaded.

   MTEXR for VCP terminals ASIC interfaced.

   MTEXRM for VCP terminals MUX interfaced.

5. Press RETURN.

For example, using an ASIC-interfaced VCP terminal to boot from the left
side of a dual flexible disc drive set to HP-IB address 2, with the HP-IB
interface card set to select-code 27:

   VCP> %bdc2027MTEXR

The Exerciser will begin execution, asking you for the LU number of the tape drive to be tested. For the memory-based Exerciser, this LU number is 7.

Booting from Mini-Cartridge Tape

If your software is on mini-cartridge tape, use the following procedure to boot the Exerciser system. You need to know the select code of the 12005A ASIC card to which the terminal with the tape drives is connected. The left drive is unit 0 and the right drive is unit 1.

1. Turn power ON.

2. Insert cartridge Number 1 in either drive.

3. Press BREAK to get the VCP prompt:

   VCP>

4. Enter the following:

   VCP> %LCTffbusc

   %LCT   means load from mini-cartridge tape but do not start the system. Enter as shown, use upper or lower case letters. Leave no embedded blanks; use BACKSPACE to correct errors.

   ffbusc is a string of octal digits in which leading zeros can be omitted. Leave no blanks.

           ff = media file number; zero for Exerciser software on mini-cartridge.

           b = zero for mini-cartridge tape.

           u = tape drive unit number:
                   0 for left drive
                   1 for right drive

           sc = select code (octal) of the interface to the terminal with the mini-cartridge tape drives.

5. Press RETURN. The first tape will load.

6. When the first tape has loaded, the VCP prompt will appear. Remove the first tape, insert the second, then enter the following:

   VCP> %BCTffbusc

   %BCT   means boot from mini-cartridge tape and start the system.

ffbusc   is the same   string as you used in   step 3, if you use the same
         tape drive.

For example, to boot from the left drive of a terminal that is on select
code 20:

1. Insert first tape, then enter:

        VCP> %LCT20

2. Change tapes, then enter:

        VCP> %BCT20

If you were to put the second tape in the right drive, you would use the
boot string %BCT120.

After the second tape has loaded, the Exerciser starts execution by asking
you for the LU number of the tape drive to be tested. For the memory-based
Exerciser, this LU number is 7.

Booting from CS/80 Cartridge Tape

If your software is on a CS/80 Cartridge, use the following procedure to
boot the Exerciser system.   You need to know the select code of the 12009A
HP-IB card to which the CS/80 drive is connected, and the HP-IB address to
which the drive address switch is set. You will be choosing the file to be
booted according to whether the VCP terminal is ASIC or MUX interfaced.

1. Turn power ON.

2. Insert the tape cartridge in the drive.

3. Press BREAK to get the VCP prompt:

        VCP>

4. Enter the following:

        VCP> %BDCffbusc

    %BDC   means boot from CTD; enter as shown, in upper or lower case.
            Leave no embedded blanks; use BACKSPACE to correct errors.

    busc   is a string of octal digits in which leading zeros can be
            omitted. Leave no blanks.

            ff = file number:
                 octal 14 if the VCP terminal is ASIC interfaced,
                 octal 34 if the terminal is on the MUX.

    b = HP-IB address (0-7) of the CS/80 drive.

    u = CS/80 drive unit number: 1 for CTD.

    sc = select code (octal) of the 12009A HP-IB interface card to
         which the CS/80 drive is connected.

For example, to boot the ASIC Exerciser system from a CTD at HP-IB address
2, select code 27:

        VCP> %BDC142127

The Exerciser will begin execution, asking you for the LU number of the tape
drive to be tested. For the memory-based Exerciser, this LU number is 7.

The Exerciser bootable systems are also on CS/80 Primary System cartridges.
If you do not have the 24398B software, but you do have the RTE-A primary on
CS/80 cartridge (and the drive to read it), you can boot the Exerciser by
using the same procedure as that given above, except that the file numbers
are different.   On the Primary System, the ASIC Exerciser is octal file
number 30; the MUX version is octal 50.

Chapter 2
Operation

The Exerciser is menu driven in order to deliver maximum diagnostic results while requiring minimum knowledge on your part of the Exerciser itself. The Exerciser asks for the information it needs, and requests operator intervention when assistance is needed, such as mounting a tape.

Main Menu

After you have given the LU number of the tape drive to be tested, as described at the end of each boot procedure in Chapter 1, the exerciser verifies the drive type, then displays the following warning and main menu:

```
┌─────────────┐
│   NOTE      │
└─────────────┘
```

Some of these options are destructive to
tape contents and require a SCRATCH tape

```
 1  Test All
 2  Clear
 3  Identify
 4  Loopback
 5  Power-on Self Test
 6  Status
 7  Internal Device Error Logs
20  Selectable Self Tests
30  Selectable Tape Movement Commands
40  Selectable Tape Write Commands
45  Selectable Tape Read Commands
50  Service Utilities

 0  Exit the Exerciser

Enter the desired option number:
```

Select one of the options by number, press RETURN, then the Exerciser will proceed to execute that option. Within the option, there may be another menu to select particular functions.

Note that you can always select 0 to exit. Enter 0 in any option menu to return to the main menu. Enter 0 in the main menu to exit the Exerciser.

Options

There are twelve Exerciser options selectable from the main menu. Error messages displayed during the execution of an option will, in some cases, list a possible offending Field Replaceable Unit (FRU). If the option finds more than one possible offending FRU, the candidates will be listed in order, with the most probable offender first.

Test All (Option 1)

Mount a scratch tape on the drive before running this option.

Test All (Option 1) is designed to be run first, executing a fairly thorough set of drive diagnostics. The approximate run time for a pass condition is up to eight minutes for the 7974. After locating the general area where the failure has occurred, use the other options to isolate the exact cause of the problem.

First, the loopback test executes (as described in Option 4); second, the power-on self test (Option 5) executes; finally, the option executes a battery of the drive's built-in self tests.

Clear (Option 2)

Clear (Option 2) puts the drive into a known state:

*   Restarts drive protocol.
*   Purges internal command and report queues.
*   Clears data buffer.

Tape position and on-line/off-line status are not affected.

This option does not test the drive's responses to the above actions. Use other options (identify, loopback, status) to verify these responses.

Identify (Option 3)

Identify (Option 3) checks the drive's identity and prints an error message if the drive fails to respond or is of an incorrect type. Identify is run automatically when the Exerciser is initiated.

Loopback (Option 4)

Loopback (Option 4) tests the HP-IB communication link between the host and the drive. The following units are tested:

*   HP-IB (ABI) chip
*   HP-IB bus transceivers
*   Data buffer
*   Handshake logic
*   Buffer logic

A test data pattern is sent to the drive (write loopback) and then returned from the drive (read loopback). If the drive finishes the write loopback and the read loopback, the sent bytes are compared to the returned bytes. Three separate types of error message can be generated:

1. Write loopback failed.

2. Write and read loopback failed (sent bytes were different from returned bytes).

3. Drive timed out on request.

In each case, the potential offending FRUs are listed in order of probability.

Power-On Self Test (Option 5)

Power-On Self Test (Option 5) executes a test similar to the test executed whenever the drive is powered on (Self Test Number 5, Appendix C). This test, in turn, calls selected other self tests.

Once again, the 7974 can execute this option while the drive is either on line or off line. The option requires approximately 30 seconds for the pass condition.

Status (Option 6)

Status (Option 6) displays the status (contained in six status bytes) of the drive. The following hardware is tested:

*   HPIB Circuitry
*   Master Controller

Status is not evaluated as good or bad, but is merely displayed. You are given three options in selecting the form of output displayed:

1. Show the status bytes in their binary form.

2. Show the messages associated with each bit set in the status bytes (decode the bytes).

3. Show both representations.

An example of the binary display is:

```
BYTE         DIO LINES
        8  7  6  5  4  3  2  1
        -  -  -  -  -  -  -  -
   1    0  0  0  0  0  0  1  0
   2    1  0  0  0  0  0  0  1
   3    0  0  0  0  0  0  0  0
   4    0  0  0  0  0  1  1  1
   5    0  0  1  0  1  0  0  1
   6    0  0  0  0  0  0  1  0
```

Each of the above rows contains one of the status bytes (decoded into binary form). The message form displays the corresponding message for each of the set bits in the status bytes. For example, the following message display corresponds to the bit pattern above.

```
Status byte number 1:
          DIO line 2: Unrecoverable Data or
                      Format Error- See Byte 5

Status byte number 2:
          DIO line 8: In GCR (6250 BPI) Mode
          DIO line 1: Immediate Response Mode

Status byte number 3:
                      Is All Zeros

Status byte number 4:
          retry count:  7

Status byte number 5: Tape Velocity Was Out of
                      Specification

Status byte number 6: 2 Commands Issued Since
                      Failure
```

For a complete listing of the messages generated for each status byte, see Appendix A.

Internal Device Error Logs (Option 7)

Internal Device Error Logs (Option 7) allows you to examine the contents of two different error logs. The menu is as follows:

    14   Read Internal Bus Error Log
    15   Read Tape Log
    16   Decode Self-Test Status

     0   Return to Main Menu

Read Internal Bus Error Log (Option 14)

The Internal Bus Error Log (Option 14) contains the ten most recent diagnostic error messages. The format is:

TIME	DIAGNOSTIC ERROR MESSAGE
(Hr:Min:Sec.mSec)	(Hex)
0002:34:21.120	3F5A
0002:57:56.458	D459
.	.
.	.
.	.

TIME is when the error occurred relative to power-on. Use Option 16 to get an explanation of the Hex codes.

Read Tape Log (Option 15)

The Tape Log (Option 15) details error occurrences for the last twenty tapes. The format is:

TAPE	TIME FROM POWER-ON	HARD ERROR COUNT	SOFT ERROR COUNT	COMMANDS PROCESSED
1	0002:01:36.968	4	18	4643
2	0004:46:21.412	0	2	2711
3	0007:12:47.452	1	9	1634
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.

The hard error count is the number of data blocks the drive was unable to read or write. The soft error count is the number of data blocks successfully retried by the drive. Commands processed is the number of commands executed since the tape was loaded.

Decode Self-Test Status (Option 16)

Decode Self-Test Status (Option 16) decodes the four-character hexadecimal self-test error codes. When self tests are executed in Option 20, the error codes are decoded into messages at the time of occurrence. These errors are stored in the internal bus error log (Option 14). Option 14 reports only the hexadecimal code for the error; Option 16 asks you to input this code, then explains it to you.

Selectable Self Tests (Option 20)

Selectable Self Tests (Option 20) allows you to execute predefined sets of the drive's diagnostic self tests.

        Option 20 - Selectable Self Tests

        31 Master Controller Tests
        32 Transport Tests
        33 Transport Servo/Capstan
        34 Error Detection Circuitry
        35 Loop Write/Read Tests
        36 Write/Backspace/Read Tests
        37 Stop/Start Write Tests
        38 Streaming Write Tests
        42 Run a Specific Self Test
        43 Self Test Listing

         0 Return to Main Menu

Option 42 allows you to run any one specific self test.

Option 43 displays a complete list of self tests for the drive being tested. A brief explanation of the test (similar to Appendix C) is provided for each test. As explained in the load instructions, Option 43 schedules a program (MEXPL) to print the list.

If you are running the Exerciser by loading and running the relocatable copy of MTEXR, you will get an error message if you attempt to execute Option 43 without first RPing MEXPL. You will then be allowed to exit MTEXR (in order to RP MEXPL) or to proceed without the availability of this option.

Each of the other options executes one or more of the drives' diagnostic self tests. Appendix B contains a comprehensive list of the options and which self tests they execute.

Some of the self tests require a mounted scratch tape. If a tape is not already mounted, you are prompted to do so. As a test is being executed, its number is displayed on the screen. The status of a test (pass or fail) is displayed after the test has completed. In the event of a failure, the diagnostic error code is decoded and messages isolating the problem to a single FRU are displayed. In addition, You are allowed to retrieve the drive's status at this time.

Tape Movement Commands (Option 30)

Tape Movement Commands (Option 30) allows you to move the tape in any of the standard ways. If a tape is not mounted and on line, you are prompted to mount a written (and preferably scratch) tape, then the following menu is displayed:

```
56  Forward Space One File
57  Back Space One File
58  Forward Space One Record
59  Back Space One Record
60  Rewind

 0  Return to Main Menu
```

Status is returned after each command if an error occurred.

Note that forward-space record and back-space record commands will not always cause the tape to move. The first such command allows the drive to store several records into an internal buffer. Thus, additional similar requests can be handled without tape movement. The tape will be moved again when the buffer is exhausted or when a different type of command is issued.

Backward tape movements initiated when the tape is already at the load point (BOT) will finish immediately without action. Attempts to advance the tape past the last written record will be treated as errors (status will be returned).

Tape Write Commands (Option 40)

Tape Write Commands (Option 40) allows you to execute various writing operations. If a tape is already mounted (but not at the load point), it is rewound to BOT+ otherwise, you are prompted to put the drive on line and mount a write-enabled scratch tape.

Note that this option is destructive to the current contents of the tape. Thus, if a tape with good data is mounted, remove it before executing this option and replace it with a scratch tape.

With a write-enabled tape mounted, you are prompted for a density selection. Note that the 7974 supports the PE (1600 bpi) mode and, optionally, the NRZI (800 bpi) mode. It is possible, however, to specify NRZI mode on a non-NRZI drive. The Exerciser cannot detect the error until the first write is attempted. At that time, the error will be flagged.

After density selection, the Exerciser displays the following menu:

```
83  Write a File - Long Records
84  Write a File - Short Records
85  Write a File Mark
86  Write a Record Gap

 0  Return to Main Menu
```

The Exerciser generates random data for the write file operations. Short records are defined as being 500 bytes in length. Long records are 16K (16,384) bytes in length. In either case, a file contains fifty records. Status is checked after each record is written. If an error has occurred, status will be displayed and the command will be aborted.

Tape Read Commands (Option 45)

Tape Read Commands (Option 45) allows you to read data from a tape. If a tape is already mounted (but not at the load point), it is rewound to BOT; otherwise, you are prompted to mount a previously-written tape (any tape with some files on it will do) and to put the drive ON LINE. After this is accomplished, you are prompted to either issue a read file command or to terminate the option.

Status is checked after each record is read; a message is printed if an error occurred. If the mounted tape's density is not supported by the drive, an error is detected when the first read operation is attempted.

Service Utilities (Option 50)

Service Utilities (Option 50) allows you to get more details about the drive's internal status. The menu is:

    106 Read HPIB Address
    107 Read Amount of Tape Across Head
    108 Read Master Controller Firmware Revision
    111 Display Internal Status Log

      0 Return to Main Menu

Option 111 allows you to examine the entire internal status log. This log is large: 2062 words in length. You are allowed to specify any starting address (in increments of 100). Two hundred words are displayed on the screen in hex format. You can step through the log by typing RETURN, or exit by typing 0 (zero). If you are running the disc-based version of the Exerciser, you can specify a second device (typically a printer) to dump the log to.

Appendix A
Status Registers

Status Register 1

DIO Lines
    8 = End-of-File (EOF) Detected
    7 = At Load Point
    6 = Beyond the End-of-Tape (EOT)
    5 = Error Correction or Retries Have Occurred
    4 = Command Rejected-See Byte 4
    3 = Loaded Tape is Write Protected
    2 = Unrecoverable Data or Format Error-See Byte 5
    1 = On-Line

Status Register 2

DIO Lines
    8 = Reserved
    7 = Unknown Density on Tape
    6 = Data Parity Error
    5 = Data Error (Timing)
    4 = Tape Runaway
    3 = Reserved
    2 = Reserved
    1 = Immediate Response Mode

Status Register 3

DIO Lines
    8 = In PE (1600 BPI) Mode
    7 = In NRZI (800 BPI) Mode
    6 = Power Has Been Restored
    5 = HPIB Command Parity Error
    4 = Tape Position is Unknown (Unrecovered)
    3 = Tape Drive Formatter Error-See Byte 5
    2 = Tape Drive Servo Error-See Byte 5
    1 = Tape Drive Controller Error-See Byte 5

Status Register 4

```
DIO Lines
  1-5 = Retry Count
  6-8 = Command Rejected Error Detail
        0 = No Further Detail
        1 = No Further Detail
        2 = Device Reject-See Byte 5
        3 = Protocol Reject-See Byte 5
        4 = No Further Detail
        5 = Prior Error Reject-See Byte 5
        6 = No Further Detail
        7 = Self Test Failure
```

Status Register 5

This byte contains binary coded information regarding the specific error encountered.

Status Register 6

This byte is used only with transparent status messages of soft and hard errors in immediate response mode. It contains the number of commands pending at the time of the error.

Appendix B
Option 20 Self Test Calls

Option	Description	Self Tests Called
31	Master Controller Tests	6,8,9,10,11,19
32	Transport Tests	101
33	Transport Servo/Capstan	110,104,105,106, 123,130,109,105, 106,123,130
34	Error Detection Circuitry	107,110,124
35	Loop Write/Read Tests	108
36	Write/Backspace/Read Tests	109,117,110,117
37	Stop/Start Write Tests	110,114,118,119, 109,114,119
38	Streaming Write Tests	110,114,120,121, 109,114,120,121

Appendix C
Self Tests

#	Access	Test
0	L	Display Most Recent Error Code
1	L	Display Error Log
2	LR	Clear Error Log
5	LR	MC Power-on Self Test
6	LR	Kernal MC Tests
7	LR	Front Panel Display
8	LR	Walking RAM Tests
9	LR	Timer Tests
10	LR	EEPROM Read Test
11	LR	Data Buffer Tests
13	LR	HPIB Internal Loopback
14	LR	HPIB DB Loopback
19	LR	EEPROM Write Test
20	L	Front Panel Confidence Test
25	L	Set to Single Looping
26	L	Set to Infinite Looping
27	L	Display MC Revision
28	L	Display Tape Odometer
29	L	Display Densities Supported
30	L	Local Firmware Update
100	LR	Drive Interface Test
101	LR	Automatic Program Sequencer
103	LR	Data Channel Present
104	LR	Servo Test
105	LR	Capstan Test
106	LR	Fwd/Rev Speed Check
107	LR	Test Error Detection Circuitry
108	LR	Write/Read Test
109	LR	Select High Speed
110	LR	Select Low Speed
113	LR	Select Data Pattern 1

114	LR	Select Random Data Pattern
117	LR	Write/Backspace/Read Data Check
118	LR	Write Short Records (start/stop)
119	LR	Write Long Records (start/stop)
120	LR	Write Short Records (streaming)
121	LR	Write Long Records (streaming)
123	LR	Repositioning Ramps Test
124	LR	Test Error Detection Circuitry (Data to Tape)
126	LR	Clear Sense Byte Registers
127	LR	NRZI Select
128	LR	PE Select
130	LR	Rewind
210	LR	Recompute Checksums

Access Codes:
    L = Local (Front Panel)
    R = Remote (Host via HP-IB)

MC = Master Controller

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