

Online Diagnostics Subsystem Manual, Volume IV: Disks/Printers

**HP 3000 Series 900 Computers
HP 9000 Series 800 Computers**



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The software code printed alongside the date indicates the version level of the software product at the time the manual or update was issued. Many product updates and fixes do not require manual changes and, conversely, manual corrections may be done without accompanying product changes. Therefore, do not expect a one-to-one correspondence between product updates and manual updates.

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All	March 1991
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iii	July 1991
iv	July 1991
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Safety and Regulatory Information

For your protection this product has been tested to various national and international regulations and standards. The scope of this regulatory testing includes electrical/mechanical safety, radio frequency interference, ergonomics, acoustics, and hazardous materials. Where required, approvals obtained from third-party test agencies are shown on the product label. In addition, various regulatory bodies require some of the information under the following headings.

USA Radio Frequency Interference

The United States Federal Communications Commission (in 47CFR Subpart J, of Part 15) has specified that the following notice be brought to the attention of the users of this product:

Warning



This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested for compliance with the limits for Class A computing devices pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

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取扱説明書に従って正しい取り扱いをして下さい。

Japanese Radio Frequency Notice

Safety Considerations

This product and related documentation must be reviewed for familiarization with safety markings and instructions before operation. The following figure shows some of the safety symbols used on the product to indicate various safety considerations.

SAFETY SYMBOLS



Instruction manual symbol: the product will be marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect the product against damage.



Indicates hazardous voltages.



Indicates earth (ground) terminal (sometimes used in manual to indicate circuit common connected to grounded chassis).

Warning



The **WARNING** sign denotes a hazard. It calls attention to a procedure, practice, or the like, which, if not done correctly or adhered to, could result in injury. Do not proceed beyond a **WARNING** sign until the indicated conditions are fully understood and met.

Caution



The **CAUTION** sign denotes a hazard. It calls attention to an operating procedure, practice, or the like, which, if not done correctly or adhered to, could damage or destroy part or all of the product. Do not proceed beyond a **CAUTION** sign until the indicated conditions are fully understood and met.

Preface

This manual contains information about the Online Diagnostics Subsystem Disk/Printer Diagnostics for the HP 3000 Series 900 and HP 9000 Series 800 computer systems. It is intended to be used as technical support hardware documentation for Hewlett-Packard CEs, CEC Engineers, SEs, and other qualified support personnel. The procedures and software described are focused primarily on the hardware troubleshooting environment and require specific training for correct and safe usage. Specifically, this manual describes the Online Diagnostics Subsystem Disk/Printer diagnostic programs currently supported, and descriptions of the subsystem under MPE XL and HP-UX.

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CS/80 Disk Diagnostic

Introduction

The CS/80 Disk Diagnostic (CS80DIAG) is designed to provide a means of testing CS/80 disks on any system that supports the Online Diagnostic Subsystem. The disks that are tested using this diagnostic are those that utilize the Command Set 80 (CS/80) message protocol for communication with the SPU. The types of tests that are provided can:

- Perform an extensive fault isolating diagnostic trouble tree on the disk and its system interface. Defects encountered are relayed to the user.
- Verify the integrity of the HP-IB data path to the selected disk.
- Identify the product type of the selected disk.
- Perform the internal selftest on the disk.
- Obtain and decode status messages from the disk.
- Test common transactions that are used in communication between the disk and CPU to determine the integrity of these transactions.

In addition, an external exerciser has been implemented, which provides an interactive environment through which the user can access internal disk diagnostics, logs and utilities .

CS80DIAG tests the following disk drives:

- HP7907A
- HP7911, 7912, 7914
- HP7933H, 7933XP, 7935H, 7935XP, 7936H, 7936XP, 7937H, 7937XP
- HP7957A, 7957B, 7958A, 7958B, 7959B
- HP7961B, 7962B, 7963B
- HPC2200A, HPC2202A, HPC2203A

Note



This diagnostic does not test the HP9122D, 9122S, and the 9127A SS/80 disk drives. Refer to the SS/80 Disk Diagnostic (SS80DIAG) in this manual to test those drives.

Also, this diagnostic does not test the HPC2201A, HPC2204A, HP7936FL or HP7937FL Flex disk drives. Refer to the Fiber Link Exchange (FLEX) Disk Diagnostic (FLEXDIAG) in this manual to test these drives.

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This diagnostic runs on any HP Precision Architecture RISC computer system that supports Online Diagnostic Subsystem programs and is capable of detecting failures of one or more Field Replaceable Units (FRUs). The CS/80 Disk Diagnostic will:

- Identify the product type of the selected disk
- Run internal diagnostics on the disk (including selftest)
- Obtain and decode status messages from the disk
- Obtain and decode information from the disk error logs
- Isolate and identify one or more defective FRUs.
- Test common transactions used in communication between the disk and CPU to determine their integrity.
- Test certain CS/80 functions with a reserve area if available.
- Provide a CS/80 Disk External Exerciser

Defects and Enhancements

Submit defect reports and enhancement requests concerning this diagnostic through the STARS database referencing product number 30600-10001.

Minimum Configuration

The hardware required to run the diagnostic consists of an HP Precision Architecture RISC computer system with a supported (see above) CS/80 disk drive connected to it. The CS/80 disk under test must contain internal selftests that are capable of detecting failed Field Replaceable Units (FRU's) in the disk drive.

Operating Instructions

There is no special security level needed in order to run this diagnostic. However, any sections or steps of the diagnostic that have the potential to compromise system integrity will be restricted to certain security levels. Refer to the section on the DUI for information on the available security levels and test modes, and how each are determined.

Default Tests

If the user did not specify sections and steps to be run, the default section will be executed. The default section is section 10, the fault isolating diagnostic trouble tree.

Section 10 Diagnostic Trouble Tree

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RUN Command

To bring up the Online Diagnostic subsystem, enter the following command to the system prompt:

% sysdiag

The system responds with the following Diagnostic User Interface prompt:

DUI >

Typing **HELP** causes a summary of the DUI and its commands to be printed. Refer to the DUI Section of this manual for details.

Note



The device to be tested must be powered up and on line. Device physical locations (pdev) shown in the **RUN** commands are those of the devices on the "typical A1002A" system configuration described in the chapter on DUI. The pdev value entered must be correct for the system being tested.

For example, to run the diagnostic, you might enter:

```
DUI >RUN CS80DIAG pdev=4.1.0 <RUN Command Options>
```

```
|  
| none required for  
| default test suite  
|
```

*insert physical location of
device to be tested here;
for MPE XL, type the ldev number;
for HP-UX, type the devfile name*

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Test Execution

Various error options are used by the RUN command. A detailed description can be obtained by referring to the DUI section of this chapter. Enter the desired run parameters at this point. The diagnostic responds with the following header and welcome message:

```
*****
****
****          CS/80 DISC DIAGNOSTIC          ****
****          ****
**** (C) Copyright Hewlett Packard Co. 1987,1988,1989 ****
****          All Rights Reserved.          ****
****          Version A.02.01              ****
****          ****
*****
Welcome, Today is FRI, Aug 5, 1982 7:39 AM
```

At this point, the diagnostic calls *IO_Path_Test*, which is a diagnostic procedure that tests the I/O path to the device. If the status returned from this procedure call is *fail*, the following message will be output:

```
*** WARNING -- THE I/O PATH TO THE DISK MAY NOT BE FUNCTIONING
PROPERLY (CS80ERR 100)
```

Otherwise, the diagnostic issues a *describe* to the specified device to determine whether or not it is a CS/80 disk. If the device does not respond to the *describe* command, the following message will be output:

```
*** DEVICE FAILED TO RESPOND TO DESCRIBE COMMAND IN ALLOTTED TIME
(CS80ERR 101)
```

A second *describe* command is then issued. If this command fails, the following messages are displayed:

```
*** DEVICE FAILED TO RESPOND TO DESCRIBE COMMAND IN ALLOTTED TIME
(CS80ERR 101)
```

```
*** CS/80 DESCRIBE COMMAND FAILED.  DEVICE MAY NOT BE CS/80 OR
DESCRIBE INFORMATION RETURNED MAY BE ERRONEOUS.  CS80DIAG MAY NOT
FUNCTION PROPERLY (CS80ERR 207)
```

```
Do you wish to continue (Y/N) [N]?
```

If the user answers no, the diagnostic will terminate immediately.

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At this point, the sections specified by the user will be executed, and the results will be output. If the user did not specify sections to be run, the default section (Section 10, the fault isolating diagnostic trouble tree) will be executed. If CS80DIAG is run as an autodiagnostic by the system, the default section will be run. If at any time, the number of errors generated reaches the limit specified by the user in the ERRCOUNT parameter of the run command, the following message will be output:

***** THE MAXIMUM NUMBER OF ERROR MESSAGES HAS BEEN EXCEEDED
(CS80ERR 110)**

The diagnostic will then terminate execution. If the ERRPAUSE option of the run command was set "on", the diagnostic will stop after each error is generated and ask the user if the test should continue:

Continue (Y/N) ? [Y]

If the response is "Y", then the test will be resumed if possible; if the response is "N", the diagnostic will terminate. The "[Y]" indicates that "Y" will be the default response if the user hits <CR> in reply to the prompt. If the sections and steps specified by the user were executed the number of times specified in the LOOP parameter of the run command without the number of errors exceeding the ERRNUM value, the diagnostic will terminate normally and the following message will be output:

CS80DIAG Disk Diagnostic Exiting . . .

Upon termination of CS80DIAG, control will return to the diagnostic subsystem.

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Test Section Descriptions

There are two diagnostic program sections which are available for user selection.

Section 10	Diagnostic Trouble Tree
Section 17	CS/80 External Exerciser (Interactive Section)

A description of each section will be given, along with the expected output from that section.

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Section 10—DIAGNOSTIC TROUBLE TREE

This section will execute the fault isolating diagnostic trouble tree. The algorithm follows:

1. Perform a Write Loopback followed by a Read Loopback to test the channel.
2. Issue an internal power-on SELFTEST to the device.
3. Read sector twice and compare the data.
4. Read the device FAULT LOGS and decode any entries.
5. Read the device RUN LOGS, if entries exist perform an RO ERT on the suspect block.
If the RO ERT generates an error type output the block address and the error type generated.

Output:

```
Section 10 -- Diagnostic Trouble Tree

Write Loopback Completed

Read Loopback Completed

Device Selftest Completed

Read Sector Completed

FAULT LOG

No Drive Faults To Report
  {or}
{For HP791X, HP7933/35}
There are nnnn entries in this log

Fault log values:

      Current          Target
      Cyl  Head Sect  Cyl  Head Sect  HFR  Fault Code
      ====  ====  ====  ====  ====  ====  =====
* nnnn  nnnn  nnnn  * nnnn  nnnn  nnnn  BBBBBBBB  DERR nnnn
                                           {or}
                                           TERR nnnn
.
. Repeat for each entry in the log
.
nnnn  nnnn  nnnn  nnnn  nnnn  nnnn  BBBBBBBB  DERR nnnn
                                           {or}
                                           TERR nnnn

"*" Indicates a PHYSICAL address -- DO NOT attempt
to spare this address
```


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{If any entries were printed}

The HFR values are:

01234567

=====

XXXXXXX1 The spindle speed is down

XXXXXX1X The heads are off track

XXXX1XXX Track follower PLL error

XXX1XXXX The top door is open

XX1XXXXX Emergency Retract is set

X1XXXXXX Power failure occurred

1XXXXXXX Read/Write fault occurred

{Note: The above table is specific to HP7933/35 drives.
The values in this table will be changed
appropriately for other drive types.}

RUN Log

No Drive Run Log Entries

{or}

Performing RO ERT On Run Log Entries

{If error type found}

Logical			Error			
Cyl	Head	Sect	Type	Count	Error	
====	====	====	====	====	=====	
nnnn	nnnn	nnnn	XXX	nnnn	BBBBBBBB	
nnnn	nnnn	nnnn	XXX	nnnn	BBBBBBBB	
.	Repeat for each entry generated					
.	nnnn	nnnn	nnnn	XXX	nnnn	BBBBBBBB

The error types are:

COR = ECC correctable error

UNC = ECC uncorrectable error

CRC = only CRC detected an error

F/S = formatter/separator error

*** = decode error manually

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The Error values are :

XXXXXX00 ECC found correctable error
XXXXXX01 ECC found uncorrectable error
XXXXXX10 ECC did not detect an error
XXXXXX1X error is in sector header not body
XXXXXXXX CRC did not detect an error
XXXXXXXX first retry didn't get data
XXXXXXXX extra offset was used
XXXXXXXX Formatter/Separator error

*{Note: The above table is specific to HP7933/35 drives.
The values in this table will be changed
appropriately for other drive types.}*

End of Section 10 -- Diagnostic Trouble Tree

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Possible Error Messages:

*** ERROR IN TRANSMISSION DETECTED DURING READ
LOOPBACK TEST: (CS80ERR 115)

Byte #	Octal Value Transmitted	Octal Value Received	Bit Positions In Error
=====	=====	=====	=====
12	56	54	00000010
33	127	63	01100100
.			
.			
241	74	72	00000110

{Note: -- entries in the preceding table will be printed
for as many errors as were detected, unless the
ERRNUM value is exceeded}

*** DEVICE ENCOUNTERED AN ERROR WHILE EXECUTING THE
CS/80 INITIATE DIAGNOSTIC COMMAND (CS80ERR 109)

STATUS = { status }

{Note: -- This status printout will include the failing field
replaceable unit(s) as specified by the device}

*** IDENTICAL READS FROM DISK RETURNED NON-IDENTICAL
DATA (CS80ERR 121)

Section 17—CS/80 External Exerciser

The CS/80 External Exerciser is an interactive section that provides the user with access to the set of internal diagnostics, logs, and utilities within a CS/80 disk. This section explains what different kinds of data the exerciser can provide, how that information is generated and describes the commands available to the user. To run the External Exerciser select Section 17 of the CS/80 diagnostic. The CS80DIAG> prompt appears indicating that the Exerciser is waiting for a command from the user. Refer to the Command Descriptions and the Exerciser Command Format explanations below for further details.

Error-Rate Testing

Error-rate tests are powerful tools used to determine media integrity within a CS/80 device. These tests can find correctable and uncorrectable read errors and provide information concerning each error, such as the address where the error occurred, the type of error, and the number of times it has occurred. This information can be displayed to the user and/or logged on the disk maintenance tracks, which are reserved for such use. These tracks provide non-volatile storage, not only for error-rate test errors, but also for spare track addresses, drive faults, and special worst case data patterns which are written on the disk in certain error-rate tests.

All error rate tests allow the user to input a loop count when requesting the test. Each time an error is detected during the test, the test will stop, report the error, and then resume testing until the loop count has been satisfied. The loop count is not a count of the number of errors, but rather the number of passes the device will execute during the error-rate test. The following information will be reported for each error that occurs:

- The current logical address.
- The error type.
- The loop count when the error occurred.
- An error information byte.

There are two general types of error rate tests that can be performed. The first type, called a read only error rate test, is a non-destructive test which reads data from the disk and attempts to detect any read errors that occur. There are two tests available in this category:

1. **Read Only Error-Rate Test**—Sequentially reads the current data on the disk in a specified area of the media.
2. **Random Read Only Error-Rate Test**—Reads 256 random sectors of random length data. This allows read errors to be detected on a large portion of the media in a minimum amount of time.

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The second type of error-rate test, called a write-then-read error-rate test, is a destructive test which writes data onto the media and subsequently reads it back, attempting to detect such things as sensitive bit patterns, read errors, and media defects. When requesting an error-rate test in this category, the user is allowed to specify a pattern to be used in the test. This pattern can be defined and edited via the **SET PATTERN** command. If the user chooses not to enter a pattern, a choice will also be given to use worst case data patterns already residing on the disk maintenance tracks, or random data generated by the disk. There are three types of write-then-read error rate tests available to the user:

1. **Pattern Write-Then-Read Error-Rate Test**—Sequentially writes a specified data pattern over a specified area of the media and then reads back all of the data that was written.
2. **Random Write-Then-Read Error-Rate Test**—Writes-then-reads 256 randomly generated data patterns of random length at random locations on the media. This test locates errors that occur over a large area of the media in a minimum amount of time.
3. **Short Write-Then-Read Error-Rate Test**—Executes a combination of random error-rate tests on the inner 100 cylinders of the disk. This test provides a quick verification of the media (For HP791X and HP793X drives only).

Error Logging

During run-time, the error correction circuitry of the drive is enabled. If an error is detected that cannot be corrected by this circuitry, it will be logged to an area of random access memory (RAM) on the drive is used to record up to 5 uncorrectable data errors. If this area becomes full during run-time, which is defined to be any time in which a test, diagnostic, or utility is not being performed, the device requests release so that it can log the error information in the run-time drive error log on the maintenance tracks. All error logging is done automatically by the drive.

When error-rate tests are run, the error correction circuitry is disabled, thus allowing correctable and uncorrectable errors to be logged. These errors are logged in the same manner as run-time errors, assuming the user requested errors to be logged, except when the RAM is full in which case the drive requests release and logs the errors to the error-rate test log, also on the maintenance tracks. When the error-rate test begins, a preset drive utility is issued, which forces any errors recorded in the RAM area to be logged to the maintenance tracks, and then the RAM area is cleared, thus avoiding confusion between old errors and ones detected during the error-rate test.

In addition to run-time and error-rate test logging capabilities, an error summary is maintained by HP791X drives, which is an accumulation of all test errors (TERRORS) that have occurred since the last time the logs were cleared. Each device has its own list of TERRORS provided in the service manual for that particular device.

One additional log exists on the maintenance tracks that has not been mentioned, the fault log. This log is used to store all drive and controller faults which have occurred since the last time the logs were cleared.

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Sparing

All CS/80 disk drives provide the means to replace defective sectors or tracks with good ones. This operation is referred to as "sparing". Each track on a CS/80 drive contains one extra sector which does not appear in the user's data space. This sector is set aside as a spare sector to be used in the event that a bad sector is found somewhere on the track and needs to be removed. By using the CS/80 SPARE BLOCK command, the spare sector can be substituted for the bad sector. If more than one bad sector appears on the track, the entire track would be spared using one of several spare tracks on the disk set aside for this purpose. An option is provided with the SPARE BLOCK command to either retain data or not. If data retention is specified, all data on the track will be retained, with the exception of the target sector that is being spared. If no data retention is specified, no data on the track being spared will be retained.

The CS8ODIAG EXTERNAL EXERCISER SPARE command attempts to perform pseudo intelligent sparing. Following is the data retention portion of the spare algorithm:

1. Attempt to read the data from the target sector to be spared.
2. Spare the sector retaining track data.
3. Attempt to write the target sector data back to the new address of the spared sector.
4. If spare retaining data fails, and user has DESTRUCTIVE ACCESS prompt to perform a spare not retaining data.

HP7907 drives provide the option of sparing a maintenance track. Two types of maintenance tracks can be spared, logging or scratch. Scratch maintenance tracks are used by the sparing operation to hold the data of the target track while the operation takes place. Logging maintenance tracks are used by the drive to store ERT patterns and drive logs.

The CS8ODIAG EXTERNAL EXERCISER SPARE command will conform to the following algorithm:

{ The following is for MPE/XL only }

1. Attempt to read the data from the target sector.
2. If data was recovered, then attempt a spare retaining data command.
3. If the spare retaining data command was successful, rewrite the data to the target sector.

{ The following is executed for DESTRUCTIVE access }

1. If an HP7907, ask user if a maintenance track should be spared.
2. If not a maintenance track spare, then attempt to recover target sector data.
3. If data was recovered, perform a spare retaining track data and rewrite target sector data.
4. If data was not recovered, warn of data loss and prompt to continue.
5. If spare retaining data failed, warn of data loss and prompt to perform a spare not retaining track data.
6. Attempt a spare not retaining data command.

Command Descriptions

When the external exerciser is invoked, the following prompt will be displayed to the user:

CS80DIAG>

When the prompt appears, the exerciser is waiting for a command from the user. The available commands are listed in this section in alphabetical order accompanied by descriptions. Each command description is in the following format:

COMMAND NAME

Explanation of what the command does and when it should be used.

Input:

CS80DIAG>COMMAND NAME

The prompt for this exerciser is "CS80DIAG>". The appearance of this prompt indicates that the exerciser is waiting for the user to input a command.

Output:

Information printed as a result of this command being executed

Any error messages that may be worth noting are listed in this area.

There are several conventions used throughout this section in the command formats. They are as follows:

nnnn refers to a decimal number of any magnitude that is output by the diagnostic.

vvvv refers to a decimal number of variable magnitude that must be input by the user.

H refers to a hexadecimal digit (0-F).

O refers to an octal digit (0-8).

B refers to a binary digit (0-1).

Any text enclosed in parenthesis indicates that the user is expected to input that text in response to a query from the diagnostic. Text enclosed in square brackets indicates the default response that will be assumed if the user simply hits Return in response to the query. For example, the user may be asked if the program should continue by the following question:

Do you wish to continue (Y/N) [N]?

The text enclosed in the parenthesis (i.e. "Y / N") indicates that the user is to type either a "Y" or an "N" in response to the question. Each option is separated by a "/". The default response in this case would be "N", as indicated by the [N] prior to the question mark. If there is no default response listed (enclosed in square brackets), the user will not be allowed to "default" the input by only entering a Return.

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Comments in the input and output sequences are enclosed in curly brackets and are not output by the program. For example, following the question in the previous example, the input sequence would probably look something like the following:

{if response was N this command will terminate}

Error messages will be preceded by three asterisks (***) and will be in all upper case letters. Other messages will not be all upper case and will not be preceded by the asterisks.

If the user enters a command in response to a prompt and that command is not recognized as an exerciser command, the following message will be displayed:

*****YOUR RESPONSE WAS INVALID**

CS80DIAG>

This message simply means that the command entered is not part of the command set for the external exerciser.

When the user enters a command that is recognized by the external exerciser, that command will be processed according to the corresponding command description given in the following sections of this document. If an error is encountered as a result of issuing a CS/80 command to the device, the status that is returned by the device will be displayed to the user. The status display will consist of some device identification information followed by several categorized error messages. The categories are:

Reject Errors indicate illegal interaction with the device such as an opcode error. These errors result when commands are sent to the device but not recognized by it.

Fault Errors indicate hardware failures.

Access Errors indicate media absence, formatting problems, or operator intervention.

Information Errors indicate potential problems or performance irregularities in the device.

The format of the output status message follows:

Status =

Unit = nnnn Volume = nnnn

No units with pending status

or

Unit nnnn has status pending

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{One or more of the following status messages may be printed}

```
>>>>>>>> REJECT ERRORS <<<<<<<<<<
Received a command without odd parity
Received an unrecognized opcode
Received an illegal volume or unit address
Received an address which exceeds device bounds
Received an illegal parameter
Received a parameter of the wrong length
Received a message out of sequence
Received a message of the wrong length

>>>>>>>> FAULT ERRORS <<<<<<<<<
Error occurred during copy data transaction --
  Units experiencing errors are :
    nnnn, nnnn, nnnn, nnnn
Controller hardware fault
Unit hardware fault
Hardware failed diagnostic --
  Failed part numbers are : nnnn, nnnn
  Test error numbers = nnnn, nnnn
Power failed or drive just powered on
Auto Release has been completed -- Retransmit last command

>>>>>>>> ACCESS ERRORS <<<<<<<<<
Illegal parallel operation
Media has not been initialized or is unusable
Spare Block cannot be executed -- No spare media available
Drive is not ready for access
The selected volume is write protected
A block accessed during a read has not been written
Multiple unrecoverable data errors have occurred
Unrecoverable data has been detected --
  Address of bad data is:
    Block address = nnnn
    or
    Vector address =
      Cylinder = nnnn   Head = nnnn   Sector = nnnn
End of file encountered
End of volume encountered
```

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```
>>>>>>>> INFORMATION ERRORS <<<<<<<<<
Device is requesting operator release
Device is requesting diagnostic release
Device is requesting maintenance release
Only one spare track remains on the disc
A latency was introduced during the transfer due to slow
transfer rate or seek retry
A defective block has been automatically spared
Multiple recoverable data errors have occurred
A latency was introduced to correct a data error --
Address of bad block is:
Block address = nnnn
or
Vector address =
cylinder = nnnn head = nnnn sector = nnnn

New Target address is:
Block address = nnnn
or
Vector address =
cylinder = nnnn head = nnnn sector = nnnn
```

*{if one of the drive errors is a 64 (for HP791X/HP793X)
then the following messages will be output:}*

Hardware Fault Register = BBBBBBBB
The Hardware Fault Register values should be interpreted as:

```
HFR
=====
XXXXXXXX1 The spindle speed is down
XXXXXXXX1X The heads are off track
XXXX1XXX Track follower PLL error
XXX1XXXX The top door is open
XX1XXXXX Emergency retract is set
X1XXXXXX Power failure occurred
1XXXXXXX Read/Write fault occurred
```

The above table is specific to HP7933/35 drives. The values in this table will be changed appropriately for other types of drives.

Only the portions of the above status display that correspond to errors indicated by the hardware status variable will be output. This means, for example, that if no Access Errors were indicated by the status, none of the messages listed under that heading would be output.

In order to exit the exerciser, the EXIT command should be entered (see EXIT command description).

Command Summary

The following is a list and brief description of each of the commands available to the CS/80 External Exerciser:

ADDRESS	Allows the user to convert block addresses to 3-vector addresses and vice versa.
AHA	Issues a PRESET command, followed by a Read-Only Error-Rate Test (RO ERT).
CACHE LOG	Allows the user to access the Cache Memory Error Test Log.
CACHEOFF	Allows the user to disable the disk controller cache memory.
CACHEON	Allows the user to enable the disk controller cache memory.
CACHE SIZE	Allows the host to change the read cache page size.
CLEAR COMMAND	Performs a CLEAR operation on the disk.
CACHE STATS	Allows the user to access the Cache Statistic Table.
CLEAR LOGS	Clears the Run-Time Data Error Log, the Error-Rate Test Data Log and the Drive Fault Log.
DESCRIBE	Obtains a CS/80 describe message from the device being tested and displays the contents to the user in text form.
DIAG	Initiates internal diagnostic tests which reside in the disk drive.
ERSUM	Lists all test errors that have occurred in the device.
ERT LOG	Allows the user to access the Error-Rate Test Data Error Log.
EXIT	Terminates the External Exerciser.
FAULT LOG	Allows the user to access the Drive Fault Log.
HELP	Provides access to information concerning the commands that are available in the external exerciser.
INIT MEDIA	Allows the user to format the disk media.
LOOPBACK	Performs a write loopback of 256 bytes of data.
MEDIA TEST	Enables the user to test the hardware/data path of the drive.
PRESET	Forces errors stored in the drives RAM to be logged to the maintenance track.
PRINT PHYSICAL	Enables the printing of <i>physical</i> addresses in the FAULT logs.

FOR HP INTERNAL USE ONLY

READ	Allows the user to access any data block on the selected device.
READCACHEOFF	Allows the user to disable the disk controller read cache memory.
READCACHEON	Allows the user to enable the disk controller read cache memory.
RESET STATS	Resets the Cache Statistics Table.
REV	Allows the user to read the revision numbers of the ROMs.
RFSECTOR	Allows the user to read a full sector of data from the disk starting at any valid address.
RO ERT	Initiates a read only error-rate test.
RUN LOG	Allows the user to access the Run-Time Data Error Log.
SENSE	Allows the user to read the Hardware and Read/Write Fault registers.
SERVO TEST	Executes the drives internal butterfly seek routine.
SET PATTERN	Allows the user to define and edit a pattern to be used in the write-then-read error-rate tests.
SPARE	Allows the user to spare a block or sector to an address which is reserved for sparing.
SUSPEND	Suspends CS80DIAG and returns to the DUI.
TABLES	Provides access to information tables which reside in the drive.
UNIT	Allows the user to set the unit number within the drive.
WRITECACHEOFF	Allows the user to disable disk controller write cache memory.
WRITECACHEON	Allows the user to enable disk controller write cache memory.
WTR ERT	Initiates a write then read error-rate test.

The following pages provide a detailed description of the available CS/80 External Exerciser commands. The description includes information about input and output command formats, and possible error messages.

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ADDRESS

The ADDRESS command is a **Normal Mode** command which allows the user to convert block addresses to 3-vector addresses and vice versa. The conversion will be made using the maximum address for the device that is currently selected. This maximum address will be obtained via the CS/80 DESCRIBE command which will be issued before the conversion is made if it has not been done so earlier.

Input:

CS80DIAG>ADDRESS

Convert from block or 3-vector
addresses (B/V) [V]?

{if response was B}

Enter block address (<cr> to keep current value) --
Block address = nnnn?

{if response was V}

Enter 3-vector address (<cr> to keep current values) --
Cylinder address = nnnn?
Head address = nnnn?
Sector address = nnnn?

Output:

ADDRESS UTILITY

Selected device is an HPXXXX disk drive

{for block addresses to 3-vector addresses}

Block address nnnn is equivalent to 3-vector address:
Cylinder = nnnn Head = nnnn Sector = nnnn

{for 3-vector addresses to block addresses}

3-vector address:
Cylinder = nnnn Head = nnnn Sector = nnnn
is equivalent to block address nnnn

ADDRESS UTILITY COMPLETED

FOR HP INTERNAL USE ONLY

AHA

This **Normal Mode** command, unique to HP7933 and HP7935 disk drives, issues a PRESET command, followed by a Read-Only Error-Rate Test (RO ERT). The error-rate test checks random addresses.

Input:

```
CS80DIAG> AHA
```

```
Input the loop count (nnnn <= count <= nnnn) [nnnn]?
```

Output:

```
AUTO HEAD ALIGNMENT UTILITY  
Selected device is an HPXXXX disk drive.  
  
AUTO HEAD ALIGNMENT UTILITY COMPLETED
```

FOR HP INTERNAL USE ONLY

CACHE LOG

This **Normal Mode** command allows the user to access the Cache Memory Error Test Log which contains the number of cache memory correctable errors and cache memory uncorrectable errors.

Input:

CS8ODIAG> CACHE LOG

Output:

```
READ CACHE ERROR LOG UTILITY
Selected device is an HPXXXX disk drive.

Cache Memory Error Test Log
=====
Number of cache memory correctable errors = nnnn
Number of cache memory uncorrectable errors = nnnn

READ CACHE ERROR LOG UTILITY COMPLETED
```

FOR HP INTERNAL USE ONLY

CACHEOFF

This **Normal Mode** command allows the user to disable disk controller cache memory.

Input:

```
CS80DIAG> CACHEOFF
```

Output:

```
CACHE CONTROL UTILITY  
Selected device is an HPXXXX disk drive.
```

```
{If write cache is present}  
Write cache stopped  
Read cache stopped
```

```
CACHE CONTROL UTILITY COMPLETED
```


FOR HP INTERNAL USE ONLY

CACHEON

This **Normal Mode** command allows the user to enable disk controller cache memory.

Input:

```
CS8ODIAG> CACHEON
```

Output:

```
    CACHE CONTROL UTILITY  
    Selected device is an HPXXXX disk drive.  
  
    Read cache started  
    {If write cache is present}  
    Write cache started  
  
    CACHE CONTROL UTILITY COMPLETED
```

FOR HP INTERNAL USE ONLY

CACHE SIZE

This **Normal Mode** command allows the user to modify the read cache page size for HPC2202A disk products.

Input:

```
CSBODIAG> CACHE SIZE

*****
*                CAUTION                *
*      This command may affect system performance.      *
*****

Do you wish to continue (Y/N) [N]?

{If response was Y}
Read Cache Page Sizes:
  2 - 4096 bytes
  3 - 8192 bytes
  4 - 16384 bytes
  5 - 32768 bytes
Input cache size (2 <= size <= 5) [2]?
```

Output:

```
SET READ CACHE PAGE SIZE UTILITY
Selected device is an HPXXXX disk drive

Cache Page Size Has Been Set

SET READ CACHE PAGE SIZE UTILITY COMPLETED
```

FOR HP INTERNAL USE ONLY

CACHE STATS

This **Normal Mode** command allows the user to access the Cache Statistic Table.

Input:

```
CS80DIAG> CACHE STATS
```

Output:

```
CACHE STATISTICS TABLE UTILITY
Selected device is an HPXXXX disk drive.

Cache Statistic Table
-----
Read cache enabled
{if write cache is present}
Write cache enabled

Cache page size (bytes) = nnnn
number of pages = nnnn

number of reads = nnnn
number of read hits = nnnn

{If write cache is present}
number of writes = nnnn
{If write cache is present}
number of write hits = nnnn

{If write cache is present}
number of write cache hits = nnnn

read hit % = nnnn
{If write cache is present}
write hit % = nnnn
{If write cache is present}
write cache hit % = nnnn
read % = nnnn

CACHE STATISTICS TABLE UTILITY COMPLETED
```

FOR HP INTERNAL USE ONLY

CLEAR COMMAND

This **Destructive Mode** command performs a CLEAR operation on the disk. It basically resets the disk to its power-on state. Prior to issuing the CLEAR COMMAND, a CS/80 PRESET command is issued to force all errors currently stored in RAM to be logged. This is necessary because the CLEAR COMMAND will clear this RAM. The CLEAR COMMAND sent will be a CS/80 SELECTED DEVICE CLEAR. The following actions are taken as a result of executing this section:

- Log all errors stored in the drive RAM to the error logs on the maintenance tracks.
- Clear all clearable device or interface conditions currently asserted.
- Reset all complementary parameters to their power-on values.
- Reset the status reported from the device.

Input:

```
CS80DIAG> CLEAR COMMAND
```

Output:

```
CLEAR COMMAND UTILITY  
Selected device is an HPXXXX disk drive.  
  
CLEAR COMMAND UTILITY COMPLETED
```

FOR HP INTERNAL USE ONLY

CLEAR LOGS

This **Normal Mode** command is used to clear the Run-Time Data Error Log, the Error-Rate Test Data Error Log, the Cache Error Log and the Drive Fault Log.

Input:

```
CS80DIAG> CLEAR LOGS
```

```
*****  
*                               *  
*           CAUTION             *  
* This command will destroy service related *  
* information.                   *  
*                               *  
*****
```

```
Do you wish to continue (Y/N) [N]?
```

```
Clear logs:
```

```
0 - all logs
```

```
1 - ERT logs
```

```
{For HP7907, HP795X or HP796X}
```

```
2 - run and fault logs
```

```
{For cache drives}
```

```
3 - cache error log
```

```
Which log [0]?
```

Output:

```
CLEAR LOGS UTILITY
```

```
Selected device is an HPXXXX disk drive.
```

```
All logs cleared
```

```
or
```

```
ERT logs cleared
```

```
or
```

```
RUN/FAULT logs cleared
```

```
or
```

```
Cache logs cleared
```

```
CLEAR LOGS UTILITY COMPLETED
```

FOR HP INTERNAL USE ONLY

DESCRIBE

The DESCRIBE command is a Normal Mode command used to obtain a CS/80 describe message from the device being tested and display the contents to the user in text form. The information in the describe message includes such things as device parameters that are used by system drivers.

Input:

```
CS80DIAG> DESCRIBE
```

Output:

```
DESCRIBE UTILITY
Selected device is an HPXXXX disk drive.

Describe Information:
Unit nnnn installed
Maximum transfer rate = nnnn Kbytes per second
Controller type =
    Integrated Single-Unit
    {or} Integrated Multi-Unit
    {or} Integrated Multi-Port
Device is a nnnn fixed-disc
    {or} removable disc
Block size = nnnn bytes
Buffer size = nnnn blocks
Burst mode is not recommended
    {or}
Recommended burst size = nnnn bytes
Block transfer time = nnnn microseconds
Average transfer rate = nnnn Kbytes per second
Optimal retry time = nnnn 10's of milliseconds
Maximum access time to data = nnnn 10's of milliseconds
Maximum interleave = nnnn
Fixed volumes nnnn installed
    {or}
There are no fixed volumes
Removable volume nnnn installed
    {or}
There are no removable volumes

      Maximum Addresses          Sector
    Cyl   Head  Sect   Block   Interleave
====   ====   ====   =====   =====
nnnn    nnnn   nnnn   nnnn      nnnn

DESCRIBE UTILITY COMPLETED
```

FOR HP INTERNAL USE ONLY

DIAG

The DIAG command is a **Normal Mode** command used to initiate internal diagnostic tests which reside in the disk drive. The tests which can be run are device dependent and are described in the disk drive manuals.

Input:

```
CS80DIAG> DIAG
*****
*                CAUTION                *
*   This command MAY tie up the system for   *
*   long as it takes to fo finish the test.   *
*****
```

Do you wish to continue (Y/N) [Y]?

{If response was Y}

Input the diag # (nnnn <= diag <= nnnn) [nnnn]?

Input the loop count (nnnn <= count <= nnnn) [nnnn]?

Output:

```
INITIATE DIAGNOSTIC UTILITY
Selected device is an HPXXXX disk drive.
```

Loop = nnnn, Diag # = nnnn, Unit # = nnnn

```
INITIATE DIAGNOSTIC UTILITY COMPLETED
```

Possible Error Messages:

```
*** DEVICE ENCOUNTERED AN ERROR WHILE EXECUTING THE
CS/80 INITIATE DIAGNOSTIC COMMAND
{status - including failing FRU if any}
```

FOR HP INTERNAL USE ONLY

ERRSUM

The **ERRSUM** command, a **Normal Mode** command unique to HP 791X drives, outputs a list of all test errors (**TERRORS**) which have occurred since the last power-on sequence or self test operation. The device keeps a record of the last four error summaries on the disk maintenance tracks. The **CLEAR LOGS** command clears the error summaries only if the disk unit is selected. These summaries provide useful information for intermittent problems.

Input:

CS8ODIAG> ERRSUM

Do you want the current of previous summaries (C/P)? [C]

Output:

ERROR SUMMARY UTILITY
Selected device is an HPXXXX disk drive

{If response was C}
Current Error Summary

There are no error summary values
or
The following errors have occurred:

HHH HHH HHH HHH HHH HHH HHH HHH
... until all errors are displayed

{If response was P}
Previous Error Summary #1

There are no error summary values
or
The following errors have occurred:

HHH HHH HHH HHH HHH HHH HHH HHH
... until all errors are displayed

Previous Error Summary #2
. . .

Previous Error Summary #3
. . .

Previous Error Summary #4
. . .

ERROR SUMMARY UTILITY COMPLETED

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ERT LOG

The ERT LOG command is a **Normal Mode** command used to access the Error-Rate Test Data Error Log which contains an accumulation of all read errors which were detected during error-rate tests. These errors accumulate until the CLEAR LOGS command is used to clear them. The errors in this log are organized according to head number.

Input:

CS80DIAG> ERT LOG

Display the errors for all heads (Y/N)[Y]?

{if response was N}

Input head number (nnnn <= head <= nnnn) [nnnn]?

Output:

ERT LOG UTILITY

Selected device is an HPXXXX disk drive

Error Rate Test Log values

=====

Head number = nnnn

Number of sectors read = nnnn

{For HP791X or HP793X}

Correctable errors = nnnn

{For HP791X or HP793X}

Uncorrectable errors = nnnn

There are no log entries

{or}

	Logical		Error		
Cyl	Head	Sect	Type	Count	Error
=====	=====	=====	=====	=====	=====
nnnn	nnnn	nnnn	XXX	nnnn	BBBBBBBB
nnnn	nnnn	nnnn	XXX	nnnn	BBBBBBBB

. Repeat for each entry in the log

nnnn nnnn nnnn XXX nnnn BBBBBBBB

{if any entries were printed}

Do you wish to see error byte decoding information (Y/N)[N]?

{if yes}

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The error types are:

COR = ECC correctable error
UNC = ECC uncorrectable error
CRC = only CRC detected the error
F/S = formatter/separator error
*** = decode error manually

The Error values are:

XXXXXX00 ECC found correctable error
XXXXXX01 ECC found uncorrectable error
XXXXXX10 ECC did not detect an error
XXXXX1XX error is in sector header not body
XXXX1XXX CRC did not detect an error
XXX1XXXX first retry didn't get data
XX1XXXXX extra offset was used
X1XXXXXX Formatter/Separator error

*{Note: The above table is specific to 7933/7935
drives. The values in this table will be
changed appropriately for other drive types.}*

ERT LOG UTILITY COMPLETED

FOR HP INTERNAL USE ONLY

EXIT

The **EXIT** command is a **Normal Mode** command used to terminate execution of the CS80 External Exerciser.

Input:

```
CS80DIAG> EXIT
```

Output:

```
End of Section 17 - External Exerciser
```

FOR HP INTERNAL USE ONLY

FAULT LOG

The **FAULT LOG** command is a **Normal Mode** command used to access the Drive Fault Log which contains an accumulation of all faults that have occurred on the drive since the last **Clear Logs** command was executed. Note, that if the cylinder address in any of the log entries has an "*" following it, then the address is physical. Thus, a spare must not be attempted using this address since the spare command uses only logical addresses. Fault Code values are displayed in decimal.

Input:

CS80DIAG> FAULT LOG

Output:

FAULT LOG UTILITY
Selected device is an HPXXXX disk drive.

No drive faults to report

{or}

There are nnnn entries in this log

Fault log values:

Current			Target			HFR	Fault Code
Cyl	Head	Sect	Cyl	Head	Sect		
=====			=====			=====	=====
* nnnn	nnnn	nnnn	* nnnn	nnnn	nnnn	BBBBBBBB	DERR nnnn or TERR nnnn
.	Repeat for each entry in the log						.
.	nnnn	nnnn	nnnn	nnnn	nnnn	BBBBBBBB	DERR nnnn or TERR nnnn

* Indicates a Physical address -- DO NOT attempt to spare this address

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{if any entries were printed}

Do you wish to see HFR decoding information (Y/N)[N]?

{if response was Y}

The HFR values are:

01234567

=====

XXXXXX1 The spindle speed is down

XXXXX1X The heads are off track

XXXX1XXX Track follower PLL error

XXX1XXXX The top door is open

XX1XXXXX Emergency Retract is set

X1XXXXXX Power failure occurred

1XXXXXXX Read/Write fault occurred

{Note: The above table is specific to HP7933/35 drives.

*The values in this table will be changed
appropriately for other drive types.}*

FAULT LOG UTILITY COMPLETED

FOR HP INTERNAL USE ONLY

HELP

The **HELP** command is a **Normal Mode** command used to access information concerning the commands that are available in the CS/80 external exerciser. The user may request a list of the available commands accompanied by a brief description of each, or a description of any individual command.

Input:

CS80DIAG> HELP [command name or <cr>]

Output:

{If no command name was given (i.e. <cr>)}

The following commands are available:

ADDRESS - converts block addresses to 3-vector and visa versa

AHA - auto head alignment (7933/35)

.

.

WTR ERT - performs a write-then-read error rate test on
the device

{If a command was given}

Do you want a description or just syntax (D/S)[D]?

{If response was D}

COMMAND DESCRIPTION:

Description of the command

Syntax of the command

{If response was S}

COMMAND SYNTAX:

Syntax of the command

FOR HP INTERNAL USE ONLY

INIT MEDIA

The **INIT MEDIA** command is used to format the disk media. Initialize Maintenance Tracks is the **Normal Mode** command; all other options are **Destructive Mode** commands. The user will be given the option to retain all spares that have been made on the disk, or retain only factory spares. For HP791X and HP793X devices, the maintenance track initialization option is provided. For HP795X and HP796X devices, the read/write header initialization option is provided. All data on the disk may be destroyed by this command. It is essential that extensive error-rate testing be performed and all questionable sectors spared after executing this command.

Input:

```
CS8ODIAG> INIT MEDIA
{If NORMAL mode access}
    Initialize maintenance tracks (Y/N) [N]?
{or}
{If DESTRUCTIVE mode access}
*****
*                          CAUTION                          *
*      This command may destroy user data.                  *
*****
    Do you wish to continue (Y/N) [N]?

    Do you want to:
      A = retain all spares
      P = retain only primary spares
{For HP791X or HP793X}
      M = initialize the maintenance tracks
{For HP795X or HP796X}
      R = read/write headers (destructive)
    Which option would you like [A]?
```

Output:

```
INIT MEDIA UTILITY

format - retain all spares
      {or}
format - retain primary spares
      {or}
format - initialize maintenance tracks
      {or}
format - read/write headers (destructive)

Media is being initialized -- may take several minutes

Media has been successfully initialized.

INIT MEDIA UTILITY COMPLETED
```

FOR HP INTERNAL USE ONLY

LOOPBACK

This **Normal Mode** command will perform a write loopback of 256 bytes of data on the channel using the pattern—255,0,1, . . . ,254. This operation will be followed by a read loopback of 256 bytes, which will be compared with the expected pattern to verify correct transmission. The pattern sent in the read loopback is generated from Read-Only Memory (ROM) in the disk drive, and should be the same as the pattern specified in the write loopback above.

Input:

CS80DIAG> LOOPBACK

Output:

LOOPBACK UTILITY
Selected drive is an HPXXXX disk drive

Write Loopback Completed

Read Loopback Completed

LOOPBACK UTILITY COMPLETED



POSSIBLE ERROR MESSAGES

*** ERROR IN TRANSMISSION DETECTED DURING READ
LOOPBACK TEST: (CS80ERR 115)

Byte #	Octal Value Transmitted	Octal Value Received	Bit Positions In Error
12	56	54	00000010
33	127	63	01100100
.			
.			
241	74	72	00000110

{Note: -- entries in the preceding table will be printed for as many errors as were detected, unless the ERRNUM value is exceeded}

FOR HP INTERNAL USE ONLY

MEDIA TEST

This **Destructive Mode** command enables the user to test the hardware/data path of the drive. This is done by performing variable length and variable location writes followed by reads of the same length and location. The user is given the choice of testing a selected area or a random area. The option is also provided of selecting internal pattern, user input pattern, or random pattern data to be used in the test. This command will destroy data on the disk.

Input:

CS80DIAG> MEDIA TEST

```
*****  
*                               WARNING                               *  
*           This command may destroy user data           *  
*****
```

Do you wish to continue (Y/N)[N]?

Clear the drive logs (Y/N)[N]?

Types of media tests:
P = selected area media test
R = random area media test
Enter the test type [P]?

{If not random area}
Do you want block or 3-vector addresses (B/V)[V]?

{If response was B}
Enter new address (<cr> to keep current value)
Block address (nnnn - nnnn) = nnnn?

{If response was V}
Enter new address (<cr> to keep current value)
Cylinder address (nnnn - nnnn) = nnnn?
Head address (nnnn - nnnn) = nnnn?
Sector address (nnnn - nnnn) = nnnn?

FOR HP INTERNAL USE ONLY

Test Area:
{For HP7907 drives}
V = volume
T = track
S = sector
{For Other drives}
V = volume
H = head
C = cylinder
T = track
S = sector
Enter the test area [T]?

Do you want:
R = random transfer length
U = user input transfer length
Which option would you like (R/U) [U]?

{If response was U}
Input transfer length (nnnn <= sectors <= nnnn) [nnnn]?

The sources for the data pattern to be used here:
I - Internal pattern
R - Random pattern
U - User input pattern
Which pattern source would you like (I/R/U) [I]?

{If response was U}
Input the pattern in hex

Input the loop count (nnnn<= count <=nnnn)[nnnn]?

FOR HP INTERNAL USE ONLY

Output:

```
MEDIA TEST UTILITY
Selected device is an HPXXXX disk drive

Preset in progress...
Preset was successful

{If clear logs}
All log(s) cleared

Test Area = Volume starting at Cyl = nnnn, Head = nnnn, Sec = nnnn
                {or}
Test Area = Head starting at Cyl = nnnn, Head = nnnn, Sec = nnnn
                {or}
Test Area = Cyl starting at Cyl = nnnn, Head = nnnn, Sec = nnnn
                {or}
Test Area = Track starting at Cyl = nnnn, Head = nnnn, Sec = nnnn
                {or}
Test Area = Track starting at Cyl = nnnn, Head = nnnn, Sec = nnnn

{If no errors detected}
No errors were detected in the media test

MEDIA TEST UTILITY COMPLETED
```

FOR HP INTERNAL USE ONLY

Possible Error Messages:

{If errors were detected}

*** ERROR IN TRANSMISSION DETECTED DURING WRITE/READ
MEDIA TEST: (CS80ERR 124)

Cyl	Hd	Sect	Byte	Trns	Recd	Hex Value	Hex Value	Bit Positions In Error	Time Error Occurred
=====				====	====	=====	=====	=====	=====
nnnn	nnnn	nnnn	nnnn	HH	HH	BBBBBBBB		BBBBBBBB	FRI, DEC 16, 1988 9:03 PM
nnnn	nnnn	nnnn	nnnn	HH	HH	BBBBBBBB		BBBBBBBB	FRI, DEC 16, 1988 9:03 PM

. Repeat for each occurrence

.
nnnn nnnn nnnn nnnn HH HH BBBBBBBB FRI, DEC 16, 1988 9:03 PM

MEDIA TEST UTILITY COMPLETED

FOR HP INTERNAL USE ONLY

PRESET

This **Normal Mode** command is used to force the errors stored in the drives RAM to be logged to the maintenance track.

Input:

```
CS80DIAG> PRESET
```

Output:

```
PRESET DRIVE UTILITY  
Selected device is an HPXXXX disk drive  
  
PRESET DRIVE UTILITY COMPLETED
```

FOR HP INTERNAL USE ONLY

PRINT PHYSICAL

This **Normal Mode** command is used to enable the printing of **PHYSICAL** addresses in the **RUN**, **ERT**, and **FAULT** logs.

Input:

```
CS80DIAG> PRINT PHYSICAL
```

Output:

```
Print physical address enabled  
{or}  
Print physical address disabled
```

FOR HP INTERNAL USE ONLY

READ

The READ command is a **Normal Mode** command used to access any data block on the selected device. Due to a potential security compromise, the user is required to possess level 0 security to use this command.

Input:

```
CS80DIAG> READ

Do you want block or 3-vector addresses (B/V)[V]?

    {if response was B}
Enter new address (<cr> to keep current value) --
Block address = nnnn?

    {if response was V}
Enter new address (<cr> to keep current value) --
Cylinder address = nnnn?
Head address     = nnnn?
Sector address   = nnnn?
```

Output:

```
READ UTILITY
Selected device is an HPXXXX disk drive

The data follows (Hex):

    0 1 2 3 4 5 6 7 8 9
0: HH HH HH HH HH HH HH HH HH HH . . . . .
10: HH HH HH HH HH HH HH HH HH HH . . . . .
.
.
.
250 HH HH HH HH HH HH . . . . .

{NOTE -- the dots in the preceding table represent non-alpha-numeric
ASCII characters. Alpha-numeric characters will be printed}

READ UTILITY COMPLETED
```

FOR HP INTERNAL USE ONLY

READCACHEOFF

This **Normal Mode** command allows the user to disable disk controller read cache memory.

Input:

```
CS80DIAG> READCACHEOFF
```

Output:

```
CACHE CONTROL UTILITY  
Selected device is an HPXXXX disk drive  
  
Read cache stopped  
  
CACHE CONTROL UTILITY COMPLETED
```


FOR HP INTERNAL USE ONLY

READCACHEON

This **Normal Mode** command allows the user to enable disk controller read cache memory.

Input:

```
CS8ODIAG> READCACHEON
```

Output:

```
CACHE CONTROL UTILITY  
Selected device is an HPXXXX disk drive  
  
Read cache started  
  
CACHE CONTROL UTILITY COMPLETED
```

FOR HP INTERNAL USE ONLY

RESET STATS

This **Normal Mode** command allows the user to reset the Cache Statistic Table.

Input:

```
CS8ODIAG> RESET STATS
*****
*                CAUTION                *
*   This command will destroy performance *
*   related information.                 *
*****
Do you wish to continue (Y/N) [N]?
```

Output:

```
CLEAR CACHE STATISTICS UTILITY
Selected device is an HPXXXX disk drive

Cache Statistic Table cleared

CLEAR CACHE STATISTICS UTILITY COMPLETED
```

FOR HP INTERNAL USE ONLY

REV

The **REV** command is a **Normal Mode** command allows the user to read the revision numbers of the firmware ROMs installed in the device. The command is not supported on the HP7907.

Input:

```
CS80DIAG> REV
```

Output:

```
REVISION UTILITY  
Selected device is an HPXXXX disk drive
```

```
Firmware Revision Values:  
Part Number      Revision Number  
=====          =====  
nnnn             nnnn - nnnn  
nnnn             nnnn - nnnn  
.  
.  
.  
.  
nnnn             nnnn - nnnn
```

```
REVISION UTILITY COMPLETED
```

FOR HP INTERNAL USE ONLY

RFSECTOR

The RFSECTOR command is a **Normal Mode** command used to read a full sector of data from the disk starting at any valid address. This command is unique to HP791X, HP793X, and HPC220XA drives. The sector header, as well as the data field, is displayed. Due to potential security compromises, the user will need to possess level 0 security to use this command.

Input:

CS80DIAG> RFSECTOR

{For HP7936/7937 and HPC220XA}

Do you want to access PHYSICAL addresses (Y/N) [N]?

{If response was Y}

Enter new address (<cr> to keep current value)

PHYSICAL cylinder address (nnnn - nnnn) = nnnn?

PHYSICAL head address (nnnn - nnnn) = nnnn?

PHYSICAL sector address (nnnn - nnnn) = nnnn?

{For non PHYSICAL addresses and HP791X/33/35}

Do you want block or 3-vector addresses (B/V) [V]?

{if response was B}

Enter new address (<cr> to keep current value)

Block address (nnnn - nnnn) = nnnn?

{if response was V}

Enter new address (<cr> to keep current value)

Cylinder address (nnnn - nnnn) = nnnn?

Head address (nnnn - nnnn) = nnnn?

{For HP7936/37 and HPC220XA drives}

PHYSICAL sector address (nnnn - nnnn) = nnnn?

{For other drives}

Sector address (nnnn - nnnn) = nnnn?

FOR HP INTERNAL USE ONLY

Output:

READ FULL SECTOR UTILITY
Selected device is an HPXXXX disk drive

Physical spare = nnnn
Physical sector = nnnn
Head = nnnn

{For HP7933/7935}

Physical Cylinder = nnnn
Logical spare = nnnn

No sector sparing has occurred

{NOTE -- Sector Status will be 1 for tracks that have not used the spare sector. Otherwise it will be the physical spare sector}

Header values(Hex):

	0	1	2	3	4	5
0:	81	3F	00	69	00	5C

The data follows (Hex):

	0	1	2	3	4	5	6	7	8	9	
0:	HH	HH	HH	HH	HH	HH	HH	HH	HH	HH	.....
10:	HH	HH	HH	HH	HH	HH	HH	HH	HH	HH	.....
.											
.											
250	HH	HH	HH	HH	HH	HH					.....

{NOTE -- the dots in the preceding table represent non-alpha-numeric ASCII characters, Alpha-numeric characters will be printed}

READ FULL SECTOR UTILITY COMPLETED

FOR HP INTERNAL USE ONLY

RO ERT

The RO ERT command is a **Normal Mode** command used to initiate a read only error-rate. Two types of tests are available through this command. The first is standard read only error-rate test which allows the user to specify the address at which the test is to start. This test will sequentially read data starting at this address in an attempt to detect any read errors. The second type of test is a random read only error-rate test which uses random addresses and lengths of reads in attempt to detect any read errors.

Input:

```
CS80DIAG> RO ERT

*****
*                          CAUTION                          *
*   This command MAY tie up the system for                 *
*   long as it takes to fo finish the test.                 *
*****

Do you wish to continue (Y/N) [Y]?

Clear the ERT logs (Y/N)[N]?

Types of RO ERT's:
  S = selected area
  R = random area
Enter the test type (S/R)[S]?

Do you want block or 3-vector addresses (B/V)[V]?

{If response was B}
Enter new address (<cr> to keep current value) --
Block address (nnnn - nnnn) = nnnn?

{If response was V}
Enter new address (<cr> to keep current value) --
Cylinder address (nnnn - nnnn) = nnnn?
Head address (nnnn - nnnn) = nnnn?
Sector address (nnnn - nnnn) = nnnn?
```

FOR HP INTERNAL USE ONLY

Test Area:

{For HP7907 drives}

V = volume
T = track
S = sector

{For Other drives}

V = volume
H = head
T = track
C = cylinder
S = sector

Enter the test area [T]?

Input the loop count (nnnn<= count <=nnnn)[nnnn]?

{For HP791X, HP7933/35}

Do you want to enter an offset (Y/N)[N]?

{If response was Y}

Enter desired offset (nnnn<= offset <= nnnn)[nnnn]?

Log or Print errors (L/P)[P]?

FOR HP INTERNAL USE ONLY

Output:

RO ERT UTILITY
Selected device is an HPXXXX disk drive

Preset in progress...
Preset was successful!

{If clear ERT logs}
ERT log(s) cleared

Test Area = Volume starting at Cyl = nnnn, Head = nnnn, Sec = nnnn
 {or}
Test Area = Head starting at Cyl = nnnn, Head = nnnn, Sec = nnnn
 {or}
Test Area = Cyl starting at Cyl = nnnn, Head = nnnn, Sec = nnnn
 {or}
Test Area = Track starting at Cyl = nnnn, Head = nnnn, Sec = nnnn
 {or}
Test Area = Sec starting at Cyl = nnnn, Head = nnnn, Sec = nnnn

{If no errors detected}
No errors were detected in the ERT

{If errors were detected}
RO ERT results:

Logical			Error	Loop	
Cyl	Head	Sect	Type	Count	Error
====	====	====	=====	=====	=====
nnnn	nnnn	nnnn	XXX	nnnn	BBBBBBBB
nnnn	nnnn	nnnn	XXX	nnnn	BBBBBBBB
.	Repeat for each entry in the log				
.					
nnnn	nnnn	nnnn	XXX	nnnn	BBBBBBBB

{If any errors were printed}
Do you wish to see error byte decoding information(Y/N)[N]?

FOR HP INTERNAL USE ONLY

{If yes}

The error types are:

COR = ECC correctable error
UNC = ECC uncorrectable error
CRC = only CRC detected an error
F/S = formatter/separator error
*** = decode error manually

The Error values are :

XXXXX00 ECC found correctable error
XXXXX01 ECC found uncorrectable error
XXXXX10 ECC did not detect an error
XXXXX1X error is in sector header not body
XXXXiXXX CRC did not detect an error
XXiXXXX first retry didn't get data
XiXXXXX extra offset was used
XiXXXXX Formatter/Separator error

{Note: The above table is specific to HP7933/35 drives.
The values in this table will be changed
appropriately for other drive types.}

RO ERT UTILITY COMPLETED

FOR HP INTERNAL USE ONLY

RUN LOG

This RUN LOG command is a **Normal Mode** command used to access the Run-Time Data Error Log which contains an accumulation of all run-time data errors that have been logged since the last time the log was cleared.

Input:

CS80DIAG> RUN LOG

Do you wish to see the errors for all heads (Y/N)[Y]?

{if response was N}

Input the head number (nnnn <= head <= nnnn) [nnnn]?

Output:

RUN LOG UTILITY

Head number = nnnn

Number of sectors read = nnnn

{For HP791X or HP793X}

Correctable errors = nnnn

{For HP791X or HP793X}

Uncorrectable errors = nnnn

There are no entries for this head

{or}

Logical			Error		
Cyl	Head	Sect	Type	Count	Error
=====	=====	=====	=====	=====	=====
nnnn	nnnn	nnnn	xxx	nnnn	BBBBBBBB
nnnn	nnnn	nnnn	xxx	nnnn	BBBBBBBB

. Repeat for each entry in the log

. nnnn nnnn nnnn xxx nnnn BBBBBBBB

{if any entries were printed}

Do you wish to see error byte decoding information (Y/N)[N]?

{if yes}

The error types are:

COR = ECC correctable error

UNC = ECC uncorrectable error

CRC = only CRC detected the error

F/S = formatter/separator error

*** = decode error manually

FOR HP INTERNAL USE ONLY

The error values are:

XXXXXX00 ECC found correctable error
XXXXXX01 ECC found uncorrectable error
XXXXXX10 ECC did not detect an error
XXXXX1XX error is in sector header not body
XXXX1XXX CRC did not detect an error
XXX1XXXX first retry didn't get data
XX1XXXXX extra offset was used
X1XXXXXX Formatter/Separator error

{NOTE -- The above table is specific to 7933/7935 drives.
The values in this table will be changed appropriately
for other drive types.}

RUN LOG UTILITY COMPLETED

FOR HP INTERNAL USE ONLY

SENSE

The **SENSE** command is a **Normal Mode** command used to read the values of the temperature and pressure sensors in the drive as well as the Hardware and Read/Write Fault Registers. This command is unique to 793X drives.

Input:

```
CS80DIAG> SENSE
```

Output:

```
READ SENSORS UTILITY
Selected device is an HPXXXX disk drive

Exhaust temperature = nnnn deg. C (+/- 3 deg. C)
Actuator coil temperature = nnnn deg. C (+/- 3 deg. C)
Hardware fault register value(s) are: BBBBBBBB
Read/Write fault register = BBBBBBBB
The HFR value should be interpreted as:

The HFR values are:
01234567
=====
XXXXXXXX1 The spindle speed is down
XXXXXXXXX The heads are off track
XXXX1XXX Track follower PLL error
XXX1XXXX The top door is open
XX1XXXXX Emergency Retract is set
X1XXXXXX Power failure occurred
1XXXXXXX Read/Write fault occurred

The Read/Write Fault Register should be interpreted as:

RFWR

01234567
=====
XXXXXXXX1 Write without AC write current
XXXXXXXXX DC write current without write
XXXX1XXX Write without DC write current
XXXX1XXX Multiple heads are selected

READ SENSORS UTILITY COMPLETED
```

FOR HP INTERNAL USE ONLY

SERVO TEST

The SERVO TEST command is a **Normal Mode** command which allows the user to execute the drives internal butterfly seek routine. For HP7936/37 drives, it will allow the test to be performed on one or all of the drive heads. There is no data transferred with use of this command. Command is not supported on HP791X or HP7933/35 drives.

Input:

CS80DIAG> SERVO TEST

```
*****
*                CAUTION                *
*   This command MAY tie up the system for   *
*   long as it takes to fo finish the test.   *
*****
```

Do you wish to continue (Y/N) [Y]?

Input the loop count (nnnn <= count <= nnnn) [nnnn]?

{For HP7936/37 drives:}

Test all heads(Y/N) [N] ?

{if response was N}

Input head number (nnnn <= head <= nnnn) [nnnn]?

Output:

SERVO TEST UTILITY

Selected device is an HPXXXX disk drive

{For HP7907, HP795X and HP796X drives:}

nnnn seeks completed

SERVO TEST UTILITY COMPLETED

SET PATTERN

The **SET PATTERN** command is a **Normal Mode** command used to define and edit a pattern to be used in write-then-read error-rate tests. The pattern must be input in hex and is restricted to 64 digits in length. If less than 64 digits are input, the pattern that was input will be duplicated as many times as necessary to produce 64 digits. If no pattern has been defined, the pattern that is input will be stored for use in a *WTR ERT*. If a pattern has been previously defined, via this command, that pattern will be displayed and the user can then edit that string. Valid edit characters are:

- R** for replace.
R will replace the characters in the pattern with the characters following the R, starting at the pattern character under which the R is typed.
- I** for insert.
I will insert the characters following the I into pattern following the character in the pattern under which the I is typed.
- D** for delete.
D will delete the pattern character under which the D is typed. Multiple D's may be typed to delete a succession of characters and other editing characters may follow a D (i.e. Dlab) will delete one character and insert the string "ab" at that point in the pattern).

Following each typed edit string, the resulting edited pattern will be re-displayed and the user will be given another opportunity to edit it. This process may be terminated by simply inputting a Return for the edit string.

Input:

CS80DIAG> SET PATTERN

*{if no previous pattern has been defined}
Input the pattern in hex:*

*{if pattern contains all valid hex characters this
command will terminate}*

*{if a previous pattern has been defined or the initial pattern
input contained invalid characters}*

Input the changes (<cr> to stop):
{previous pattern is displayed here}

*{if the input edit pattern is not valid then the pattern will
again be displayed and a new edit string will be requested}*

*{this process will be repeated until user inputs a <cr>
only for the edit string}*



FOR HP INTERNAL USE ONLY

Output

```
SET PATTERN UTILITY
Selected device is an HPXXXX disk drive

SET PATTERN UTILITY COMPLETED
```

FOR HP INTERNAL USE ONLY

SPARE

The SPARE command (a **Normal Mode** command for MPE/XL; a **Destructive Mode** command for HP-UX) is used to spare a block or sector to an address which is reserved for sparing. The user is given the option to retain data or to not retain data from the area affected by the spare. This command should not be used unless the block or sector being spared is known to be defective. This implies that error-rate tests have been run on the suspected area and it consistently generates errors.

For HP7907 drives, the user is giving the option of sparing a maintenance track. Two types of maintenance tracks exist on an HP7907, logging or scratch. Logging maintenance tracks are used by the drive to store ERT test patterns and drive logs. Scratch maintenance tracks are used in the sparing operation to store the data of the target track during the operation.

Input:

```
CS80DIAG> SPARE

  {If MPE/XL and NORMAL MODE access}
Do you want block or 3-vector addresses(B/V)[V]?
  {If response was B}
Enter new address (<cr> to keep current value)
Block address (nnnn - nnnn) = nnnn?

  {If response was V}
Enter new address (<cr> to keep current values --
Cylinder address (nnnn - nnnn) = nnnn?
Head address (nnnn - nnnn) = nnnn?
Sector address (nnnn - nnnn) = nnnn?

  {For DESTRUCTIVE MODE access}
*****
*                CAUTION                *
*          This command may destroy data          *
*****

Do you wish to continue (Y/N)[N]?
```


FOR HP INTERNAL USE ONLY

{For HP7907 drives}

Do you wish to spare a maintenance track (Y/N)[N]?

{If response was Y}

Logging or Scratch maintenance track (L/S)[L]?

{For HP795XB drives}

Auto sparing is being disabled. Do not break from this command

{If not a maintenance track spare}

Do you want block or 3-vector addresses(B/V)[V]?

{If response was B}

Enter new address (<cr> to keep current value) --

Block address (nnnn - nnnn) = nnnn?

{If response was V}

Enter new address (<cr> to keep current values) --

Cylinder address (nnnn - nnnn) = nnnn?

Head address (nnnn - nnnn) = nnnn?

Sector address (nnnn - nnnn) = nnnn?

Number of read retries (1 <= retries <= 10)[1]?

{If target sector data not recovered}

```
*****
* The SECTOR could not be read.  If you continue, the DATA *
* IN THE TARGET SECTOR WILL NOT BE RECOVERED, and DATA *
* RECOVERY PROCEDURES MUST BE PERFORMED *
*****
```

Do you wish to continue (Y/N)[N]?

{If spare retaining track data failed}

Spare (retain data) failed --

Do you wish to perform a spare without retaining track
data (Y/N)[N]?

FOR HP INTERNAL USE ONLY

Output:

SPARE UTILITY

Attempting to read data of target sector . . .

{If data was not recovered and not DESTRUCTIVE mode}
Data was not recovered from target sector. Destructive
mode is required to continue

{If data was recovered}
Data was successfully recovered from target sector

*{If continue with target sector data loss or target sector data
was recovered}*
Attempting spare (retain track data option) . . .

{If spare retaining no track data}
Attempting spare (retain no track data option) . . .

{If target sector data recovered}
Data was successfully rewritten to target sector

{If spare was performed}
Spare (retain track data option) was successful
{or}
Spare (not retain track data option) was successful
Data recovery procedures must be performed
{or}
Spare maintenance track operation was successful

{status -- including address of track affected by spare}

{If no spare performed}
No spare was performed

{For HP795XB drives}
Auto sparing enabled

SPARE UTILITY COMPLETED

FOR HP INTERNAL USE ONLY

SUSPEND

The **SUSPEND** command is a **Normal Mode** command which allows the user to suspend CS80DIAG and return to the DUI. The user enters **RESUME** at the DUI prompt to return to CS80DIAG.

Input:

```
CS80DIAG> SUSPEND
```

Output:

```
DUI>
```

FOR HP INTERNAL USE ONLY

TABLES

The TABLES command is a **Normal Mode** command used to provide access to the various tables which reside in the drive. These tables are the:

Configuration Table	The Configuration table contains a list of current values of the complementary variables.
Head Value Table	The Head Value table contains the head alignment values, circumferential skew values, and the current cylinder offset for each head.
Runout Table	The Runout table contains information on the amount of eccentric runout (radial shift) for each head.
Spare Track Table	The Spare Track table contains a list of all logical tracks which have been spared for each head.

Only the 7933/7935 drives have Head Value, Configuration, and Runout tables. All others have only the Spare Track table.

Input:

```
CS80DIAG> TABLES
```

```
{For HP7933 or HP7935:}
```

```
The available drive tables are:
```

- Spare Track Table
- Head Value Table
- Configuration Table
- Runout Table

```
Which table do you want (S/H/C/R) [S]?
```

```
{Other drives output the spare track table}
```

```
{For spare track table}
```

```
Do you want to see the spare sectors (Y/N) [N]?
```

```
{If response is Y}
```

```
*****  
*                          CAUTION                          *  
*   This command MAY tie up the system for                   *  
*   long as it takes to fo finish the test.                   *  
*****
```

```
Do you wish to continue (Y/N) [N]?
```

FOR HP INTERNAL USE ONLY

Output:

TABLES UTILITY
Selected device is an HPXXXX disk drive

Spare Track Table:

{for each head}
Head Number = nnnn
Number of spare operations = nnnn
Number of spare tracks used = nnnn
Number of logical tracks spared = nnnn
{for each cylinder/scalar}

CYL	TYPE	SCALAR
====	=====	=====
nnnn	secondary	nnnn
nnnn	primary	nnnn

{If spare sectors option}
Locations of spared sectors:

Logical	Spare		
Cyl	Head	Sect	Type
====	====	====	=====
nnnn	nnnn	nnnn	secondary
nnnn	nnnn	nnnn	primary
.			
.	Repeat for each entry		
.			
nnnn	nnnn	nnnn	primary

Head Value Table:

Head Alignment Offset Table:

Head	Band	Delta	Band	Delta	Band
====	====	=====	====	=====	====
nnnn	nnnn	nnnn	nnnn	nnnn	nnnn
nnnn	nnnn	nnnn	nnnn	nnnn	nnnn

. For each entry in the table
. nnnn nnnn nnnn nnnn nnnn nnnn

FOR HP INTERNAL USE ONLY

Circumferential Skew Table:

Head	Band	Delta	Band	Delta	Band
====	0	0-1	1	1-2	2
====	====	=====	====	=====	====
nnnn	nnnn	nnnn	nnnn	nnnn	nnnn
nnnn	nnnn	nnnn	nnnn	nnnn	nnnn

. For each entry in the table

nnnn nnnn nnnn nnnn nnnn nnnn

Current Cylinder Offset Table:

Head	Offset
====	=====
nnnn	nnnn

. For each entry in the table

nnnn nnnn

Band 0 = outside diameter

Band 1 = middle diameter

Band 2 = inside diameter

All numbers represent 6.25 microinch increments

=====

FOR HP INTERNAL USE ONLY

Configuration Table:

Transfer Length = nnnn bytes of Full Volume
Burst Length = nnnn blocks
Retry Time = nnnn 10's of milliseconds
Status Mask = !MH HH HH HH HH HH HH HH hex
RPS is disabled
{or}
RPS Window = nnnn microseconds
RPS Time to Target = nnnn microseconds
Device Will (or Will Not) Automatically Release During Idle Time
Release Timeout is enabled (or disabled)
Options flag = BBBBBBBB
Burst with EOI Flag is on (or off)
Return Addressing Mode is block (or 3-vector)
=====

Runout Table:

Head	Runout
====	=====
0	nnnn
1	nnnn
2	nnnn
3	nnnn
4	nnnn
5	nnnn
6	nnnn
7	nnnn
8	nnnn
9	nnnn
10	nnnn
11	nnnn
12	nnnn

TABLES UTILITY COMPLETED

FOR HP INTERNAL USE ONLY

UNIT

The **UNIT** command is a **Normal Mode** command used to set the unit number within the drive. This command is required for multi-unit drives so that the user can specify which unit is to be tested.

Input:

```
CS80DIAG> UNIT
```

```
Input unit number (nnnn <= unit <= nnnn) [nnnn]?
```

Output:

```
SET UNIT UTILITY
```

```
Selected device is an HPXXXX disk drive
```

```
Unit nnnn of the device has been successfully set
```

```
SET UNIT UTILITY COMPLETED
```


FOR HP INTERNAL USE ONLY

WRITECACHEOFF

This **Normal Mode** command allows the user to disable disk controller write cache memory.

Input:

```
CS80DIAG>WRITECACHEOFF
```

Output:

```
CACHE CONTROL UTILITY  
Selected device is an HPXXXX disk drive  
  
Write cache stopped  
  
CACHE CONTROL UTILITY COMPLETED
```

FOR HP INTERNAL USE ONLY

WRITECACHEON

This **Normal Mode** command allows the user to enable disk controller write cache memory.

Input:

```
CS80DIAG>WRITECACHEON
```

Output

```
CACHE CONTROL UTILITY  
Selected device is an HPXXXX disk drive  
  
Write cache started  
  
CACHE CONTROL UTILITY COMPLETED
```

FOR HP INTERNAL USE ONLY

WTR ERT

The WTR ERT command is a **Destructive Mode** command used to initiate a write-then-read error-rate test. Three types of tests are available through this command (all three of which will destroy data on the disk):

- Pattern ERT** performs incremental writes followed by reads across a data area specified by the user.
- Random ERT** performs random length writes followed by reads at random locations on the disk.
- Short ERT** performs a short combination of the first two tests. In this test, a series of random writes and reads are performed, as in the first type of test, followed by a series of incremental writes and reads, like the second type of test, starting at a predefined inner cylinder which is device dependent.

Input:

```
CS80DIAG> WTR ERT
*****
*                CAUTION                *
*      This command may destroy user data      *
*****

Do you wish to continue (Y/N) [Y]?

Clear the ERT logs (Y/N) [N]?

Types of RO ERT's:
  P = selected area pattern WTR ERT
  R = random area WTR ERT
{For HP791X and HP793X}
  S = short WTR ERT

Enter the test type [P]?

{If not random area}
Do you want block or 3-vector addresses (B/V) [V]?

{If response was B}
Enter new address (<cr> to keep current value) --
Block address (nnnn - nnnn) = nnnn?

{If response was V}
Enter new address (<cr> to keep current value) --
Cylinder address (nnnn - nnnn) = nnnn?
Head address (nnnn - nnnn) = nnnn?
Sector address (nnnn - nnnn) = nnnn?
```

FOR HP INTERNAL USE ONLY

Test Area:

{For HP7907 drives}

V = volume
T = track
S = sector

{For Other drives}

V = volume
H = head
C = cylinder
T = track
S = sector

Enter the test area [T]?

The sources for the data pattern to be used are:

I - Internal pattern
R - Random pattern
U - User input pattern

Which pattern source would you like (I/R/U)[I]?

{For HP795X or HP796X if user pattern}

Available patterns:

1 = 39CE7
2 = C30
3 = 30E61CC3987
4 = B8F32E3CC
5 = CC
6 = DB6
7 = 33F94CFE5

{For HP7907 if user pattern}

Available patterns:

1 = CD
2 = E739
3 = 33
4 = DB6DB6
5 = 4933
6 = FF
7 = 00

Input pattern number (1 <= pattern <= 7)[1]?

{For other devices if user pattern}

Input the pattern in hex:

Input the loop count (nnnn<= count <=nnnn)[nnnn]?

FOR HP INTERNAL USE ONLY

{For HP791X, HP7933/35}

Do you want to enter an offset (Y/N)[N]?

{If response was Y}

Enter desired offset (nnnn<= offset <= nnnn)[nnnn]?

Log or Print errors (L/P)[P]?

Output:

WTR ERT UTILITY

Selected device is an HPXXXX disk drive

Preset in progress...

Preset was successful!

{If clear ERT logs}

ERT log(s) cleared

Test Area = Volume starting at Cyl = nnnn, Head = nnnn, Sec = nnnn

{or}

Test Area = Head starting at Cyl = nnnn, Head = nnnn, Sec = nnnn

{or}

Test Area = Cyl starting at Cyl = nnnn, Head = nnnn, Sec = nnnn

{or}

Test Area = Track starting at Cyl = nnnn, Head = nnnn, Sec = nnnn

{or}

Test Area = Sec starting at Cyl = nnnn, Head = nnnn, Sec = nnnn

{If no errors detected}

No errors were detected in the ERT

{If errors were detected}

WTR ERT results:

Logical			Error	Loop	
Cyl	Head	Sect	Type	Count	Error
====	====	====	=====	=====	=====
nnnn	nnnn	nnnn	XXX	nnnn	BBBBBBBB
nnnn	nnnn	nnnn	XXX	nnnn	BBBBBBBB

. Repeat for each entry in the log

. nnnn nnnn nnnn XXX nnnn BBBBBBBB

{If any errors were printed}

Do you wish to see error byte decoding information(Y/N)[N]?

FOR HP INTERNAL USE ONLY

{If yes}

The error types are:

COR = ECC correctable error
UNC = ECC uncorrectable error
CRC = only CRC detected an error
F/S = formatter/separator error
RET = first retry didn't get data
*** = decode error manually

The Error values are :

XXXXXX00 ECC found correctable error
XXXXXX01 ECC found uncorrectable error
XXXXXX10 ECC did not detect an error
XXXXX1XX error is in sector header not body
XXXX1XXX CRC did not detect an error
XXX1XXXX first retry didn't get data
XX1XXXXX extra offset was used
X1XXXXXX Formatter/Separator error

*{Note: The table above is specific to HP7933/35 drives.
The values in this table will be changed
appropriately for other drive types.}*

WTR ERT UTILITY COMPLETED

Error Messages

The following is a list of error messages which may appear when using CS80DIAG. Other diagnostic error messages may appear at any time. Error messages without the (CS80ERR #) trailer are generated by the Online diagnostic subsystem or the operating system. Listed below each error message are a probable cause and recommended action statement. The actual cause and action may differ from this list depending upon the particular circumstances of a given situation. The "!" indicates that a parameter of some sort will replace the exclamation point when the message is displayed.

100	*** WARNING -- THE I/O PATH MAY NOT BE FUNCTIONING PROPERLY (CS80ERR 100)
CAUSE	An error was detected by the Io_Path_Test service while testing the modules on the i/o path preceding the selected device.
ACTION	Execute the appropriate diagnostics on the modules preceding the selected device on the i/o path, especially on those that may have been reported as faulty in error messages immediately preceding this message. Note that the results of the execution of this instance of CS80DIAG may be invalid.
101	*** DEVICE FAILED TO RESPOND TO ! COMMAND IN ALLOTTED TIME (CS80ERR 101)
CAUSE	No response to an i/o was received prior to the expiration of the allotted time.
ACTION	Verify that the selected disk drive is actually connected to the system. Rnn SYSMAP, if available, to confirm the presence of the device.
102	*** CS80DIAG IS UNABLE TO DIAGNOSE THE SELECTED DEVICE (CS80ERR 102)
CAUSE	The selected device identified itself as something other than a CS/80 drive.
ACTION	Determine type of selected device and run the appropriate diagnostic on it.
103	*** CS/80 DISC DIAGNOSTIC TERMINATING (CS80ERR 103)
CAUSE	A fatal error has been encountered.
ACTION	The specific error that was encountered should have been reported immediately prior to this message. Follow the action instructions for that error message.
104	*** A RESERVE AREA IS NOT AVAILABLE ON THIS DRIVE -- NO OPERATION WAS PERFORMED. (CS80WARN 104)
CAUSE	There is no available area on the disk that can be written to without corrupting user data. This can happen if no such area is provided by the system, or if the diagnostic is running in destructive mode, in which the location of the reserve area is unknown to the system since the drive is locked for diagnostics.
ACTION	For systems which do not support a reserve area (e.g. HP-UX), reserve area operations are not supported.

FOR HP INTERNAL USE ONLY

106	*** DESTRUCTIVE MODE REQUIRED TO EXECUTE THIS COMMAND (CS80ERR 106)
CAUSE	The diagnostic does not have access to the drive in the mode necessary to execute the selected command.
ACTION	The mode granted to a diagnostic for a selected device is system dependent. Use the HELP LDEV command at the DUI for more information.
<hr/>	
108	*** ! COMMAND IS NOT IMPLEMENTED ON THIS DRIVE/SYSTEM (CS80ERR 108)
CAUSE	The selected operation is either not implemented on the selected drive or the system does not provide access to it.
ACTION	This operation is unavailable.
<hr/>	
109	*** DEVICE ENCOUNTERED AN ERROR WHILE EXECUTING THE CS/80 ! COMMAND (CS80ERR 109)
CAUSE	The drive reported an error as a result of executing the selected operation.
ACTION	The hardware status that is displayed immediately following this message should indicate what sort of problem occurred, including a failing FRU if one is reported. If an FRU is reported, replace it and re-execute this diagnostic.
<hr/>	
110	*** THE MAXIMUM NUMBER OF ERRORS HAS BEEN EXCEEDED (CS80ERR 110)
CAUSE	The user specified error limit has been reached.
ACTION	If more errors are desired, re-run the diagnostic assigning a larger value to the ERRCOUNT parameter of the run command.
<hr/>	
111	*** UNRECOGNIZED COMMAND -- TYPE "HELP" FOR A LIST OF VALID COMMANDS (CS80ERR 111)
CAUSE	The specified command is not a valid command.
ACTION	Use the help facility to obtain a list of the commands that are valid and enter the desired command.
<hr/>	
112	*** UNRECOGNIZED REPLY WAS FOUND (CS80ERR 112)
CAUSE	The reply that was entered in response to a prompt by the diagnostic is not valid.
ACTION	Refer to the prompt that was displayed and enter a response that is within the specified list of valid responses.
<hr/>	
113	*** A NUMERICAL INPUT WAS EXPECTED BUT NOT RECEIVED (CS80ERR 113)
CAUSE	The reply that was entered in response to a prompt by the diagnostic is not a valid number.
ACTION	Re-enter number using only numeric characters and valid special characters (e.g. +, -, , etc.).
<hr/>	

FOR HP INTERNAL USE ONLY

114 ***** AN UNEXPECTED ERROR OCCURRED IN THE ID_CS80 DAR (CS80ERR 114)**
 CAUSE A call to the CS/80 device access routine resulted in an unexpected status return.
 ACTION Please enter an SR. Within the text of the SR report all information returned by the
 Diagnostic User Interface. Also state operating system, version number, DUI version
 and diagnostic version.

115 ***** ERROR IN TRANSMISSION DETECTED DURING READ LOOPBACK TEST: (CS80ERR 115)**

	Octal Value	Octal Value	Bit Positions
Byte #	Transmitted	Received	In Error
=====	=====	=====	01234567
			=====

CAUSE One or more bytes of data that were received from the disk as a result of a loopback
 operation did not contain the expected value(s).
 ACTION Data is most likely being corrupted along the data path between the host and the
 drive. Check all cable connections along the path and re-execute the diagnostic. If
 errors persist, execute appropriate diagnostics against the modules that lay in the path
 between the host and the device.

118 ***** ERROR -- EXPECTED ! BYTES FROM THE DEVICE AND RECEIVED ! BYTES (CS80ERR 118)**
 CAUSE The number of bytes in the reply from the device was not what was expected. This is
 most likely a result of executing the diagnostic on a drive which is not supported by it.
 ACTION Verify that the selected device is in the list of supported devices for the diagnostic
 (LIST ALL from the DUI). If it is, report the problem to support personnel.

119 ***** THIS COMMAND IS NOT SUPPORTED ON THIS DEVICE (CS80ERR 119)**
 CAUSE The specified operation is not supported by the selected device.
 ACTION While other devices supported by the diagnostic may support the specified command,
 the selected device does not.

120 ***** FILE SYSTEM ERROR ENCOUNTERED WHILE RETRIEVING A MESSAGE (CS80ERR 120)**
 CAUSE An error was returned while attempting to obtain a message from the catalog. The
 actual error will have been displayed prior to this message.
 ACTION Please enter an SR. Within the text of the SR report all information returned by the
 Diagnostic User Interface. Also state operating system, version number, DUI version
 and diagnostic version.

FOR HP INTERNAL USE ONLY

121	*** IDENTICAL READS FROM DISC RETURNED NON-IDENTICAL DATA (CS80ERR 121)																																
CAUSE	A read operation was performed on the same sector twice and the data from both reads did not match exactly.																																
ACTION	This is most likely a hardware problem with the drive. If loopback executes correctly, the read/write board in the drive is the probable cause of the error.																																
<hr/>																																	
122	*** DATA READ FROM DISC DID NOT MATCH DATA PREVIOUSLY WRITTEN (CS80ERR 122)																																
CAUSE	A sector was written to the disk and immediately read back. The data read did not match exactly the data written.																																
ACTION	This is most likely a hardware problem with the drive. If loopback executes correctly, the read/write board in the drive is the probable cause of the error.																																
<hr/>																																	
123	*** SELECTED DEVICE IS NOT A RECOGNIZED HP DEVICE (CS80ERR 1123)																																
CAUSE	The selected device does not identify itself with a recognized Hewlett-Packard product number or the version of diagnostic does not recognize or support the product.																																
<hr/>																																	
124	*** ERROR IN TRANSMISSION DETECTED DURING READ/WRITE MEDIA TEST: (CS80ERR 124)																																
	<table border="0"> <thead> <tr> <th></th> <th></th> <th></th> <th></th> <th>Hex</th> <th>Hex</th> <th>Bit</th> <th></th> </tr> <tr> <th></th> <th></th> <th></th> <th></th> <th>Value</th> <th>Value</th> <th>Positions</th> <th></th> </tr> <tr> <th>Cyl</th> <th>Hd</th> <th>Sect</th> <th>Byte</th> <th>Trns</th> <th>Recd</th> <th>01234567</th> <th>Time Error Occurred</th> </tr> </thead> <tbody> <tr> <td>=====</td> <td></td> <td></td> <td></td> <td>====</td> <td>====</td> <td>=====</td> <td>=====</td> </tr> </tbody> </table>					Hex	Hex	Bit						Value	Value	Positions		Cyl	Hd	Sect	Byte	Trns	Recd	01234567	Time Error Occurred	=====				====	====	=====	=====
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				Value	Value	Positions																											
Cyl	Hd	Sect	Byte	Trns	Recd	01234567	Time Error Occurred																										
=====				====	====	=====	=====																										
CAUSE	Data written to the disk does not agree with the data read.																																
ACTION	Verify the data path to the device using the LOOPBACK command and WTR ERT on the target sector.																																
<hr/>																																	
140	*** NO OPERATION WAS PERFORMED (CS80ERR 140)																																
CAUSE	Due to a previous error, which has already been reported, no operation was performed.																																
ACTION	Refer to action instructions for previously reported error.																																
<hr/>																																	
200	*** AN ERROR WAS ENCOUNTERED WHILE ATTEMPTING TO SEND/RECEIVE INFORMATION FROM THE USER (CS80ERR 200)																																
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to communicate with the user interface process.																																
ACTION	Refer to action instructions for previously reported error.																																
<hr/>																																	

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201	*** AN ERROR WAS ENCOUNTERED IN ATTEMPTING TO RETRIEVE A MESSAGE FROM THE CATALOG (CS80ERR 201)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to extract a message from its message catalog.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
202	*** AN ERROR WAS ENCOUNTERED IN ATTEMPTING TO CONVERT A NUMBER TO A STRING (CS80ERR 202)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to convert a number to a string.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
203	*** AN ERROR WAS ENCOUNTERED IN ATTEMPTING A BIT EXTRACTION OPERATION (CS80ERR 203)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to extract one or more bits from a number.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
204	*** THE SELECTED DEVICE COULD NOT BE OBTAINED FOR TESTING (CS80ERR 204)
CAUSE	The DUI was unable to obtain access to the device. Device may be held exclusively by another process.
ACTION	Determine the access status of the device and make the corrective requirements.
<hr/>	
205	*** DUE TO PROBLEMS WITH RETURN ADDRESSING MODE, ADDRESSES REPORTED WITH STATUS INFORMATION MAY BE INACCURATE (CS80ERR 205)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to set the return address mode on the drive.
ACTION	Refer to action instructions for previously reported error. Also, if hardware status is displayed later in the diagnostic run, the address portion of the status could be displayed in both block and 3-vector formats since the diagnostic cannot determine the mode that the disk is currently in.
<hr/>	
206	*** DUE TO PROBLEMS WITH SET BLOCK DISPLACEMENT, CS80DIAG WILL TERMINATE TO AVOID POTENTIAL DESTRUCTION OF USER DATA (CS80ERR 206)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to successfully set the block displacement value on the drive. Since the diagnostic no longer knows what the displacement value is, it must terminate to avoid destroying data.
ACTION	Refer to action instructions for previously reported error.
<hr/>	

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207	*** CS/80 DESCRIBE COMMAND FAILED. DEVICE MAY NOT BE CS/80 OR DESCRIBE INFORMATION RETURNED MAY BE ERROWEOUS. CS8ODIAG MAY NOT FUNCTION PROPERLY (CS8OERR 207)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to successfully obtain describe data from the drive. Since the diagnostic needs this information to function correctly.
ACTION	Verify that the disk is in fact a CS/80 device and that the hardware path specified is valid.
<hr/>	
208	*** AN ERROR WAS ENCOUNTERED IN ATTEMPTING TO COMMUNICATE WITH THE DIAGNOSTIC SYSTEM (CS8OERR 208)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to successfully perform a function which requires communication with the diagnostic system.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
209	*** YOUR RESPONSE WAS INVALID (CS8OERR 209)
CAUSE	The data entered in response to a prompt was not valid.
ACTION	Refer to the prompt to determine the valid responses for the particular situation and enter one of the specified valid responses.
<hr/>	
210	*** AN ERROR WAS ENCOUNTERED WHILE ATTEMPTING TO OBTAIN DATA FROM AN I/O BUFFER (CS8OERR 210)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to get data from its i/o buffer and, therefore cannot obtain data from the device.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
211	*** AN ERROR WAS ENCOUNTERED WHILE ATTEMPTING TO PLACE DATA INTO AN I/O BUFFER (CS8OERR 211)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable place data into its i/o buffer and, therefore, cannot send data to the device.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
212	*** AN ERROR WAS ENCOUNTERED WHILE ATTEMPTING TO OBTAIN AN I/O BUFFER (CS8OERR 212)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable obtain an i/o buffer and therefore, cannot send/receive data to/from the device.
ACTION	Refer to action instructions for previously reported error.

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215 ***** HIGHER SECURITY IS NEEDED TO PERFORM THIS OPERATION (CS80ERR 215)**
CAUSE The user requested an operation which is restricted to users with higher security than
 the user possesses.
ACTION Contact system administrator if higher security level is desired.

216 ***** ! BYTES WERE EXPECTED TO HAVE BEEN SENT FROM THE DISC, BUT ONLY !**
 WERE RECEIVED (CS80ERR 216)
CAUSE Data returned from the device in response to a command consisted of a different
 number of bytes than were expected.
ACTION This is either a firmware problem or a diagnostic software problem.



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On-Line Optical Diagnostic

Introduction

The On-Line Optical Diagnostic (OPDIAG) is designed to provide a means of testing optical devices on any system that supports the online diagnostics subsystem. The devices that will be tested with this diagnostic are those that use the Command Set 80 (CS/80) message protocol for communication with the SPU. The types of tests that will be provided can:

- Perform an extensive fault isolating diagnostic trouble tree on the device and its system interface. Defects encountered will be reported to the user.
- Verify the integrity of the HP-IB data path to the selected device.
- Identify the product type of the selected device.
- Perform Write/Read Loopback tests.
- Initiate the device internal selftest.
- Locate, read and display a sector of data from the device in HEX and ASCII formats.
- Exercise the SERVO system with a butterfly type pattern.
- Test common transactions that are used in communication between the device and CPU.
- Allow the display of "ADDRESS" in either block or three-vector formats.
- Verify operation of the "DECRYPTion" circuits.
- Enable operation of the door "LOCK" feature.
- Enable operation of the door "UNLOCK" feature.

In addition, there is an external exerciser that provides an interactive environment which the user can access internal device diagnostics and utilities.

Defects and Enhancements

Submit defect reports and enhancement requests for this diagnostic through the STARS database referencing Product Number 30600-10034.

Auto-Diagnostics

If OPDIAG is run as an auto-diagnostic, the following default section will be run:

Section 10 Diagnostic Trouble Tree

Minimum Configuration

The hardware that is running beneath OPDIAG is of no concern to the diagnostic as long as the online diagnostics subsystem is supported and there is at least one optical device configured on the system.

In order to run this diagnostic, the online diagnostics subsystem must be supported.

Operating Instructions

OPDIAG can be run in two different modes as described below:

- Normal Mode** - indicates that the user can only run tests on the device that are non-destructive to data. An additional test that would not be allowed in this mode is the **READ** command because of security restrictions.
- Destructive Mode** - indicates that the user may run any test on the device. There are virtually no restrictions placed on the user in this mode and, therefore, extreme caution should be exercised by anyone running tests in Destructive Mode.

Default Tests

The following default section is run when no sections or steps are specified by the user:

Section 10 Diagnostic Trouble Tree

RUN Command

To bring up the online diagnostics subsystem, enter the following command at the system prompt:

```
sysdiag
```

The system responds with the following Diagnostic User Interface prompt:

```
DUI >
```

Typing **HELP** causes a summary of the DUI and its commands to be printed. Refer to the DUI section of this manual for details.

For example, to run the diagnostic, you might enter:

```
DUI >RUN OPDIAG pdev=4.1.0 <RUN Command Options>
      |
      | none required for
      | default test suite
      |
      |
      | insert physical location of
      | device to be tested here
```

FOR HP INTERNAL USE ONLY

Test Execution

When OPDIAG is run, the following header and welcome message will be displayed:

```
*****
*****
*****          OPTICAL DIAGNOSTIC          *****
*****
*****      (C) Copyright Hewlett Packard Co. 1990      *****
*****          All Rights Reserved          *****
*****          Version n.nn.nn              *****
*****
*****
```

Welcome, Today is FRI, Aug 31, 1990 7:39 AM

At this point, the diagnostic calls IO_Path_Test which is a diagnostic procedure that tests the I/O path to the device. If the status returned from this procedure call is "fail," the following message will be output:

```
*** WARNING -- THE I/O PATH TO THE DEVICE MAY NOT BE FUNCTIONING
    PROPERLY (OPDIAGERR 100)
```

Otherwise, the diagnostic issues a DESCRIBE command to the specified device to determine whether or not it is an optical device. If the device does not respond to the describe command, the following message will be output:

```
*** DEVICE FAILED TO RESPOND TO DESCRIBE COMMAND IN ALLOTTED
    TIME (OPDIAGERR 101)
```

```
*** OPDIAG DESCRIBE COMMAND FAILED.  DEVICE MAY NOT BE CS/80
    OR DESCRIBE INFORMATION RETURNED MAY BE ERRONEOUS.  OPDIAG
    MAY NOT FUNCTION PROPERLY (OPDIAGERR 207)
```

Do you wish to continue (Y/N)[N]?

If the user answers NO, the diagnostic will terminate immediately.

At this point, the sections specified by the user will be executed and the results output. If the user did not specify sections to be run, the default section will be executed.

If OPDIAG is run as an auto-diagnostic by the system, the default sections will be run.

If at any time, the number of errors generated reaches the limit specified by the user in the ERRCOUNT parameter of the run command, the following message will be output:

```
*** THE MAXIMUM NUMBER OF ERRORS HAS BEEN EXCEEDED (OPDIAGERR 110)
```

The diagnostic will then terminate execution. If the ERRPAUSE parameter of the RUN command was assigned a value of "on," then this diagnostic will stop after each error is generated and ask the user if the test should continue:

Do you wish to continue (Y/N)[Y]?

22-4 On-Line Optical Diagnostic

FOR HP INTERNAL USE ONLY

If the response is **Y**, then the test will be resumed (if possible), and if the response is **N**, this diagnostic will terminate. The [**Y**] indicates that **Y** will be the default response if the user simply hits <CR> in response to the prompt. If the sections and steps specified by the user were executed the number of times specified in the LOOP parameter of the run command, without the number of errors exceeding the ERRNUM value, the diagnostic will terminate normally and the following message output:

OPDIAG Diagnostic Exiting . . .

Upon termination of this diagnostic, control will return to the diagnostic system.

Detailed Test Descriptions

The remainder of this document is devoted to explaining each section of OPDIAG. For each section, the explanation will consist of a description of the section, including the actions performed therein, the expected output from that section, and error messages that are worth noting. Please note that in regard to the error messages, that not all the possible error messages are listed. The only error messages that are listed are those that are considered to be of special significance.

FOR HP INTERNAL USE ONLY

Section 10—DIAGNOSTIC TROUBLE TREE

Section 10 -- DIAGNOSTIC TROUBLE TREE

Write Loopback Completed

Read Loopback Completed

Device Selftest Completed

Read Sector Completed (NOTE -- IF MEDIA IS INSTALLED)

End of Section 10 -- DIAGNOSTIC TROUBLE TREE

FOR HP INTERNAL USE ONLY

Section 17—EXTERNAL EXERCISER

The OPDIAG External Exerciser is an interactive program which provides the user with access to the set of internal diagnostics, and utilities within an optical device. The purpose of the exerciser is to aid service-trained personnel in troubleshooting optical devices to a field-replaceable-unit level.

When the external exerciser is invoked, the following prompt will be displayed to the user:

OPDIAG>

When the prompt appears, the exerciser is waiting for a command from the user. The available commands are listed in this section in alphabetical order, accompanied by descriptions. Each command description is in the following format:

COMMAND NAME

SHORT DEFINITION

Explanation of what the command does and when it should be used.

INPUT FORMAT:

OPDIAG> [COMMAND NAME] Note that OPDIAG> is the prompt for this exerciser. The appearance of this prompt indicates that the exerciser is waiting for the user to input a command.

OUTPUT FORMAT:

Information is printed as a result of this command being executed

POSSIBLE ERROR MESSAGES:

Any error messages worth noting that may be generated as a result of this command. Note that not all possible error messages are listed here; only those that are especially worth mentioning in relation to the command.

FOR HP INTERNAL USE ONLY

There are several conventions used throughout this section in the command formats:

- nnnn** - refers to a decimal number of any magnitude that is output by the diagnostic.
- vvvv** - refers to a decimal number of variable magnitude that must be input by the user.
- H** - refers to a hexadecimal digit (0-F).
- O** - refers to an octal digit (0-7).
- B** - refers to a binary digit (0-1).

Any text enclosed in parenthesis indicates that the user is expected to input that text in response to a query from the diagnostic. Text enclosed in square brackets indicates the default response that will be assumed if the user simply hits <CR> in response to the query. For example, the user may be asked if the program should continue by the following question:

Do you wish to continue (Y/N) [N]?

The text enclosed in the parentheses (i.e., Y / N) indicates that the user is to type either a Y or an N in response to the question. A / separates each option. The default response in this case would be N, as indicated by the [N] prior to the question mark. If there is no default response listed (enclosed in square brackets), the user will not be allowed to "default" the input by only entering a <CR>.

Comments in the input and output sequences are enclosed in curly brackets and are not output by the program. For example, following the question in the previous example, the input sequence would probably look something like the following:

{if response was N this command will terminate}

Error messages will be preceded by three asterisks (***) and will be in all upper case letters. Other messages will not be all upper case and will not be preceded by the asterisks.

If the user enters a command in response to a prompt and that command is not recognized as an exerciser command, the following message will be displayed:

*** YOUR RESPONSE WAS INVALID

OPDIAG>

FOR HP INTERNAL USE ONLY

ADDRESS

Normal Mode Command

This command allows the user to convert block addresses to 3-vector addresses and vica versa. This conversion will be made using the maximum address for the device that is currently selected. This maximum address will be obtained via the OPDIAG DESCRIBE command.

INPUT FORMAT:

OPDIAG> address

ADDRESS UTILITY

Selected device is a HP C1707 optical device

Convert from block or 3-vector addresses (B/V)[V]?

{If response was B}

Enter block address (<cr> to keep current value)

Block address (0-nnnnnnnn) = [nnnn]?

{If response was V}

Enter 3-vector address (<cr> to keep current values)

Cylinder address (nnnn - nnnn) = [nnnn]?

Head address (nnnn - nnnn) = [nnnn]?

Sector address (nnnn - nnnn) = [nnnn]?

OUTPUT FORMAT:

{For block addresses to 3-vector addresses}

Block address nnnn (\$n) is equivalent to 3-vector address:

Cylinder = nnnn Head = nnnn Sector = nnnn

{For 3-vector addresses to block addresses}

3-vector address:

Cylinder = nnnn Head = nnnn Sector = nnnn

is equivalent to block address nnnn (\$n)

ADDRESS UTILITY COMPLETED

FOR HP INTERNAL USE ONLY

CLEAR

Destructive Mode Command

This section performs a **CLEAR** operation on the device that was specified in the **RUN** command. This command basically resets the device to its power-on state. The command that is sent to clear the device is a **CS/80 SELECTED DEVICE CLEAR**. The following actions are taken as a result of executing this section:

- Clear all clearable device or interface conditions currently asserted.
- Reset all complementary parameters to their power-on values.
- Reset the status reported from the device.

INPUT FORMAT:

```
OPDIAG> clear
```

OUTPUT FORMAT:

```
CLEAR COMMAND UTILITY  
Selected device is a HP C1707 optical device
```

```
CLEAR COMMAND UTILITY COMPLETED
```

FOR HP INTERNAL USE ONLY

DECRYPT

Normal Mode Command

The DECRYPT command will read a known data pattern from the test disk and compare it to the data pattern that is expected.

INPUT FORMAT:

OPDIAG> decrypt

OUTPUT FORMAT:

Selected device is a HP C1707 optical device

Insert Test Disk in drive. P/N 5010-4650/xxxx

Is the Test Disk installed (Y/N) [Y]?y

DECRYPT COMPLETED

FOR HP INTERNAL USE ONLY

DESCRIBE

Normal Mode Command

This section issues a DESCRIBE command to the selected device to determine whether it is responding to commands and whether it is an optical device.

INPUT FORMAT:

OPDIAG> describe

OUTPUT FORMAT:

DESCRIBE UTILITY

Selected device is a HP C1707 optical device

Describe Information:

The following unit(s) are installed:

0 15

Maximum transfer rate = 400 kbytes per second

Controller type = Integrated Single-Unit

Device is an HP C1707 Removable disk

Block size = 256 bytes

Buffer size = 48 blocks

Recommended burst size = 8 bytes

Block transfer time = 1667 microseconds

Average transfer rate = 153 kbytes per second

Optimal retry time = 90 10's of milliseconds

Maximum access time to data = 9000 10's of milliseconds

Maximum interleave = 0

There are no fixed volumes

Removeable volumes installed are:

0



Cyl	Head	Sect	Block	Sector Interleave
====	====	====	=====	=====
53	59	599	1934175	0

DESCRIBE UTILITY COMPLETED

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EXIT

Normal Mode Command

This command terminates execution of the External Exerciser. It may be entered any time the OPDIAG> prompt appears.

INPUT FORMAT:

OPDIAG> EXIT

OUTPUT FORMAT:

End of Section 17 - EXTERNAL EXERCISER

FOR HP INTERNAL USE ONLY

HELP

Normal Mode Command

The **HELP** command provides the user with information concerning any command in the External Exerciser. The user will be given the option to see a description of the command along with the syntax, or just the syntax alone.

INPUT FORMAT:

OPDIAG> help

OUTPUT FORMAT:

The following commands are available

ADDRESS	-- Converts block ADDRESSES to 3-vector and visa versa
CLEAR COMMAND	-- Perform a CLEAR operation on the device.
DECRYPT	-- Tests the DECRYPTion circuits.
DESCRIBE	-- Obtains DESCRIBE information from the device.
EXIT	-- Terminates execution of the External Exerciser.
HELP	-- Provides this list of commands as well as more detailed descriptions and syntax of each command.
LOOPBACK	-- Performs a write LOOPBACK to the channel followed by a read LOOPBACK to compare the data.
LOCK	-- LOCKs the media door to prevent removal of media.
READ	-- READs and displays a block of data from the device.
SELFTTEST	-- Initiates the power-on SELFTTEST on the device.
SERIAL	-- Obtains the SERIAL number of the unit programmed into the controller PCA.
SERVO	-- Initiates a butterfly type seek pattern to test the SERVO system.
STATUS	-- Obtains and decodes the current STATUS.
SUSPEND	-- SUSPENDs OPDIAG and returns control to the DUI.
UNIT	-- Sets the UNIT number on the device.
UNLOCK	-- UNLOCKs the media door to allow media removal.

FOR HP INTERNAL USE ONLY

LOCK

Normal Mode Command

The **LOCK** command locks the media door to prevent media removal.

INPUT FORMAT:

OPDIAG>LOCK

OUTPUT FORMAT:

DOOR LOCK COMPLETED

FOR HP INTERNAL USE ONLY

LOOPBACK

Normal Mode Command

This section performs a write loopback of 256 bytes of data on the channel using the pattern—255,0,1, . . . ,254. This operation is followed by a read loopback of 256 bytes which is compared with the expected pattern generated from Read-Only Memory (ROM) in the device and should be the same as the pattern specified above in the write loopback.

INPUT FORMAT:

OPDIAG>loopback

LOOPBACK UTILITY

Selected device is a HP C1707 optical device

Input the loop count (1 <= count <= 255)[1]?1

OUTPUT FORMAT:

Write Loopback Completed

Read Loopback Completed

LOOPBACK UTILITY COMPLETED

POSSIBLE ERROR MESSAGES :

*** ERROR IN TRANSMISSION DETECTED DURING READ

LOOPBACK TEST: (CS80ERR 115)

Byte #	Octal Value Transmitted	Octal Value Received	Bit Positions In Error
*****	*****	*****	*****
12	56	54	0000010
33	127	63	01100100
.			
.			
241	74	72	00000110

(Note: -- entries in the preceding table will be printed for as many errors as were detected, unless the ERRNUM value is exceeded)

FOR HP INTERNAL USE ONLY

READ

Destructive Mode Command

The READ command enables the user to look at any data block on the device. The data will be output in hex and ASCII format.

INPUT FORMAT:

OPDIAG> read

READ UTILITY

Selected device is a HP C1707 optical device

Do you want block or 3-vector addresses (B/V)[V]?b

{If response was B}

Enter block address (<cr> to keep current value)

Block address (nnnn - nnnn) = nnnn?

{If response was V}

Enter 3-V address (<cr> to keep current value)

Cylinder address (nnnn - nnnn) = nnnn?

Head address (nnnn - nnnn) = nnnn?

Sector address (nnnn - nnnn) = nnnn?

OUTPUT FORMAT:

The data follows(hex):

	0	1	2	3	4	5	6	7	8	9	
0:	HH	HH	HH	HH	HH	HH	HH	HH	HH	HH	.....
10:	HH	HH	HH	HH	HH	HH	HH	HH	HH	HH	.....
.											
.											
250:	HH	HH	HH	HH	HH	HH					.....

{Note: -- the dots in the preceding table represent non-alpha-numeric ASCII characters. Alpha-numeric characters will be printed}

READ UTILITY COMPLETED

FOR HP INTERNAL USE ONLY

SELFTEST

Normal Mode Command

The SELFTEST command enables the user to execute the device's internal power-on SELFTEST.

INPUT FORMAT:

```
OPDIAG> selftest
```

OUTPUT FORMAT:

```
SELFTEST
```

```
Selected device is a HP C1707 optical device
```

```
DEVICE SELFTEST COMPLETED
```

FOR HP INTERNAL USE ONLY

SERIAL

Normal Mode Command

The SERIAL command returns the serial number of the device.

INPUT FORMAT:

OPDIAG> serial

OUTPUT FORMAT:

READ SERIAL NUMBER

Selected device is a HP C1707 optical device

The Serial Number is xxxxAxxxxx

READ SERIAL NUMBER

FOR HP INTERNAL USE ONLY

SERVO

Normal Mode Command

The **SERVO** command enables the user to exercise the servo system with a butterfly type pattern.

INPUT FORMAT:

OPDIAG>servo

SERVO TEST

Selected device is an HP C1707 optical device

Input the loop count (1 <= count <= 255)[1]?1

Input the step size (1 <= max block size)[10000]?100000

OUTPUT FORMAT:

Loop_cnt = 0

SERVO TEST

FOR HP INTERNAL USE ONLY

STATUS

Normal Mode Command

The STATUS command enables the user to decode the current hardware status.

INPUT FORMAT:

OPDIAG> status

OUTPUT FORMAT:

Status =

Unit = 0 Volume = 0

No units with status pending

New target address is :

Block address = 0

FOR HP INTERNAL USE ONLY

SUSPEND

Normal Mode Command

The **SUSPEND** command enables the user to temporarily suspend execution of **OPDIAG** and return to the Diagnostic User Interface. The user may resume execution of **OPDIAG** from the **DUI** or have it aborted. Refer to the **DUI** for details on how these are accomplished.

INPUT FORMAT:

OPDIAG> suspend

OUTPUT FORMAT:

DUI>



FOR HP INTERNAL USE ONLY

UNIT

Normal Mode Command

This command allows the user to set the unit number within the device. This command is required for multi-unit drives so that the user can specify the unit to be tested.

INPUT FORMAT:

OPDIAG> unit

UNIT UTILITY

Selected device is an HP C1707 optical device

What unit do you wish to select (0-15)[0]?0

OUTPUT FORMAT:

Unit nnnn of the device has been successfully set

UNIT UTILITY COMPLETED

FOR HP INTERNAL USE ONLY

UNLOCK

Normal Mode Command

The **UNLOCK** command unlocks the media door to allow media removal.

INPUT FORMAT:

OPDIAG> unlock

OUTPUT FORMAT:

DOOR UNLOCK COMPLETED

FOR HP INTERNAL USE ONLY

Error Messages

This section gives a complete list of the error messages that may be generated by OPDIAG along with brief explanations of the meaning of the messages. The messages will be listed in numerical order and are exactly as they are displayed by the diagnostic.

100	*** WARNING -- THE I/O PATH MAY NOT BE FUNCTIONING PROPERLY (OPDIAGERR 100)
CAUSE	An error was detected by the Io_Path_Test service while testing the modules on the I/O path preceding the selected device.
ACTION	Execute the appropriate diagnostics on the modules preceding the selected device on the I/O path, especially on those that may have been reported as faulty in error messages immediately preceding this message. Note that the results of the execution of this instance of OPDIAG may be invalid.

101	*** DEVICE FAILED TO RESPOND TO ! COMMAND IN ALLOTTED TIME (OPDIAGERR 101)
CAUSE	No response to an I/O was received prior to the expiration of the allotted time.
ACTION	Verify that the selected device is actually connected to the system. Run SYSMAP, if available, to confirm the presence of the device.

102	*** OPDIAG IS UNABLE TO DIAGNOSE THE SELECTED DEVICE (OPDIAGERR 102)
CAUSE	The selected device identified itself as something other than an OPTICAL device.
ACTION	Determine type of selected device and run the appropriate diagnostic on it.

103	*** OPDIAG DIAGNOSTIC TERMINATING (OPDIAGERR 103)
CAUSE	A fatal error has been encountered.
ACTION	The specific error that was encountered should have been reported immediately prior to this message. Follow the action instructions for that error message.

105	*** EXCLUSIVE MODE REQUIRED TO EXECUTE THIS COMMAND (OPDIAGWARN 105)
-----	---

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106	*** DESTRUCTIVE MODE REQUIRED TO EXECUTE THIS COMMAND (OPDIAGERR 106)
CAUSE	The diagnostic does not have access to the device in the mode necessary to execute the selected command.
ACTION	The mode granted to a diagnostic for a selected device is system dependent. Use the HELP LDEV command at the DUI for more information.
<hr/>	
109	*** DEVICE ENCOUNTERED AN ERROR WHILE EXECUTING THE CS/BO ! COMMAND (OPDIAGERR 109)
CAUSE	The drive reported an error as a result of executing the selected operation.
ACTION	The hardware status that is displayed immediately following this message should indicate what sort of problem occurred, including a failing FRU if one is reported. If an FRU is reported, replace it and re-execute this diagnostic.
<hr/>	
110	*** THE MAXIMUM NUMBER OF ERRORS HAS BEEN EXCEEDED (OPDIAGERR 110)
CAUSE	The user-specified error limit has been reached.
ACTION	If more errors are desired, re-run the diagnostic assigning a larger value to the ERRCOUNT parameter of the run command.
<hr/>	
111	*** UNRECOGNIZED COMMAND -- TYPE "HELP" FOR A LIST OF VALID COMMANDS (OPDIAGERR 111)
CAUSE	The specified command is not a valid command.
ACTION	Use the help facility to obtain a list of the commands that are valid and enter the desired command.
<hr/>	
112	*** UNRECOGNIZED REPLY WAS FOUND (OPDIAGERR 112)
CAUSE	The reply that was entered in response to a prompt by the diagnostic is not valid.
ACTION	Refer to the prompt that was displayed and enter a response that is within the specified list of valid responses.
<hr/>	

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113	*** A NUMERICAL INPUT WAS EXPECTED BUT NOT RECEIVED (OPDIAGERR 113)																
CAUSE	The reply that was entered in response to a prompt by the diagnostic is not a valid number.																
ACTION	Re-enter number using only numeric characters and valid special characters (e.g. +, -, , etc.).																
<hr/>																	
114	*** AN UNEXPECTED ERROR OCCURRED IN THE IO_CS80 DAR (OPDIAGERR 114)																
CAUSE	A call to the CS/80 device access routine resulted in an unexpected status return.																
ACTION	The specific status generated by Io_Cs80 should have been displayed immediately prior to this error message. Report this set of error messages to support personnel.																
<hr/>																	
115	*** ERROR IN TRANSMISSION DETECTED DURING READ LOOPBACK TEST: (OPDIAGERR 115)																
	<table border="0"> <tr> <td></td> <td></td> <td></td> <td align="right">Bit Positions</td> </tr> <tr> <td></td> <td align="center">Octal Value</td> <td align="center">Octal Value</td> <td align="center">In Error</td> </tr> <tr> <td align="right">Byte #</td> <td align="center">Transmitted</td> <td align="center">Received</td> <td align="center">01234567</td> </tr> <tr> <td align="right">=====</td> <td align="center">=====</td> <td align="center">=====</td> <td align="center">=====</td> </tr> </table>				Bit Positions		Octal Value	Octal Value	In Error	Byte #	Transmitted	Received	01234567	=====	=====	=====	=====
			Bit Positions														
	Octal Value	Octal Value	In Error														
Byte #	Transmitted	Received	01234567														
=====	=====	=====	=====														
CAUSE	One or more bytes of data that were received from the device as a result of a loopback operation did not contain the expected value(s).																
ACTION	Data is most likely being corrupted along the data path between the host and the drive. Check all cable connections along the path and re-execute the diagnostic. If errors persist, execute appropriate diagnostics against the modules that lay in the path between the host and the device.																
<hr/>																	
117	*** ERROR IN STEP ! - ! (OPDIAGERR 117)																
<hr/>																	
118	*** ERROR -- EXPECTED ! BYTES FROM THE DEVICE AND RECEIVED ! BYTES (OPDIAGERR 118)																
CAUSE	The number of bytes in the reply from the device was not what was expected. This is most likely a result of executing the diagnostic on a device which is not supported by it.																
ACTION	Verify that the selected device is in the list of supported devices for the diagnostic (LIST ALL from the DU1). If it is, report the problem to support personnel.																
<hr/>																	

FOR HP INTERNAL USE ONLY

119 *THIS COMMAND IS NOT IMPLEMENTED ON THIS DRIVE/SYSTEM
(OPDIAGERR 119)**

CAUSE The selected operation is either not implemented on the selected device or the system does not provide access to it.

ACTION While other devices supported by the diagnostic may support the specified command, the selected device does not.

121 * IDENTICAL READS FROM DEVICE RETURNED NON-IDENTICAL
 DATA (OPDIAGERR 121)**

CAUSE A read operation was performed on the same sector twice and the data from both reads did not match exactly.

ACTION This is most likely a device hardware problem. If loopback executes correctly, the read/write board in the device is the probable cause of the error.

122 * DECRYPTED DATA READ FROM DEVICE DID NOT MATCH THE
 DATA EXPECTED (OPDIAGERR 122)**

CAUSE Two identical reads were made from the test disk at a predetermined sector. The reads were then compared with each other to verify that the data was good. The reads were then compared with the data expected at that location. This compare failed.

ACTION Since the two reads did not fail with a data compare error, either the wrong media was placed in the device, or The decryption circuits on the controller PCA must be suspect. Verify that the test disk 5010-4650/xxxx is installed for this test.

123 * SELECTED DEVICE IS NOT AN HP DEVICE (OPDIAGERR 123)**

124 * ERROR IN TRANSMISSION DETECTED DURING
 READ/WRITE MEDIA TEST: (OPDIAGERR 124)**

				Bit				
				Hex	Hex	Bit		
				Value	Value	In Error		
Cyl	Hd	Sect	Byte	Trns	Recd	01234567	Time	Error Occurred
=====				====	====	=====		=====
								!!!

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125	*** NO MEDIA IS PRESENT IN THE DEVICE. NO READ OPERATIONS WILL BE PERFORMED. (OPDIAGERR 125)
CAUSE	A DESCRIBE command was initiated prior to a READ command. This returned a zero length maximum block size.
ACTION	Insure that the proper medium is installed in the device.
<hr/>	
140	*** NO OPERATION WAS PERFORMED (OPDIAGERR 140)
CAUSE	Due to a previous error, which has already been reported, no operation was performed.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
142	*** THE UNIT HAS NOT BEEN PROGRAMMED. IT CANNOT BE USED FOR APPLICATIONS SOFTWARE UPGRADES OR INSTALLATIONS. (OPDIAGERR 142)
CAUSE	The controller PCA was changed but the serial number of the unit was not programmed in. This can be verified by running the "SERIAL" number command in section 17 of the diagnostic. It should indicate that the "The Serial Number is REPAIR BD." The front panel indicator should also be continuously flashing at a 10HZ rate.
ACTION	The CE must program the correct serial number into the unit using the HP PORTABLE PLUS computer and the "SERVUTIL" program.
<hr/>	
200	*** AN ERROR WAS ENCOUNTERED WHILE ATTEMPTING TO SEND/RECEIVE INFORMATION FROM THE USER (OPDIAGERR 200)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to communicate with the user interface process.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
201	*** AN ERROR WAS ENCOUNTERED IN ATTEMPTING TO RETRIEVE A MESSAGE FROM THE CATALOG (OPDIAGERR 201)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to extract a message from its message catalog.
ACTION	Refer to action instructions for previously reported error.
<hr/>	

FOR HP INTERNAL USE ONLY

202	*** AN ERROR WAS ENCOUNTERED IN ATTEMPTING TO CONVERT A NUMBER TO A STRING (OPDIAGERR 202)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to convert a number to a string.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
203	*** AN ERROR WAS ENCOUNTERED IN ATTEMPTING A BIT EXTRACTION OPERATION (OPDIAGERR 203)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to extract one or more bits from a number.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
204	*** THE SELECTED DEVICE COULD NOT BE OBTAINED FOR TESTING (OPDIAGERR 204)
CAUSE	The DUI was unable to obtain access to the device. The device may be held exclusively by another process.
ACTION	Determine the access status of the device and make the corrective requirements.
<hr/>	
205	*** DUE TO PROBLEMS WITH RETURN ADDRESSING MODE, ADDRESSES REPORTED WITH STATUS INFORMATION MAY BE INACCURATE (OPDIAGERR 205)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to set the return address mode on the drive.
ACTION	Refer to action instructions for previously reported error. Also, if hardware status is displayed later in the diagnostic run, the address portion of the status could be displayed in both block and 3-vector formats; the diagnostic cannot determine the current device mode.
<hr/>	
206	*** DUE TO PROBLEMS WITH SET BLOCK DISPLACEMENT, OPDIAG WILL TERMINATE TO AVOID POTENTIAL DESTRUCTION OF USER DATA (OPDIAGERR 206)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to successfully set the block displacement value on the drive. Since the diagnostic no longer knows what the displacement value is, it must terminate to avoid destroying data.
ACTION	Refer to action instructions for previously reported error.
<hr/>	

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207	*** OPDIAG DESCRIBE COMMAND FAILED. DEVICE MAY NOT BE CS/80 OR DESCRIBE INFORMATION RETURNED MAY BE ERRONEOUS. OPDIAG MAY NOT FUNCTION PROPERLY (OPDIAGERR 207)
CAUSE	The diagnostic was unable to successfully obtain describe data from the device. Since the diagnostic needs this information to function correctly, the user must make the determination to continue or terminate.
ACTION	Verify that the device is a CS/80 device and that the hardware path specified is valid.
<hr/>	
208	*** AN ERROR WAS ENCOUNTERED IN ATTEMPTING TO COMMUNICATE WITH THE DIAGNOSTIC SYSTEM (OPDIAGERR 208)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to successfully perform a function which requires communication with the diagnostic system.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
209	*** YOUR RESPONSE WAS INVALID (OPDIAGERR 209)
CAUSE	The data entered in response to a prompt was not valid.
ACTION	Refer to the prompt to determine the valid responses for the particular situation and enter one of the specified valid responses.
<hr/>	
210	*** AN ERROR WAS ENCOUNTERED WHILE ATTEMPTING TO OBTAIN DATA FROM AN I/O BUFFER (OPDIAGERR 210)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to get data from its I/O buffer and, therefore cannot obtain data from the device.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
211	*** AN ERROR WAS ENCOUNTERED WHILE ATTEMPTING TO PLACE DATA INTO AN I/O BUFFER (OPDIAGERR 211)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable place data into its I/O buffer and, therefore, cannot send data to the device.
ACTION	Refer to action instructions for previously reported error.
<hr/>	

FOR HP INTERNAL USE ONLY

212	*** AN ERROR WAS ENCOUNTERED WHILE ATTEMPTING TO OBTAIN AN I/O BUFFER (OPDIAGERR 212)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable obtain an I/O buffer and therefore, cannot send/receive data to/from the device.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
213	*** SECTION NUMBER ! IS NOT A VALID SECTION (OPDIAGERR 213)
<hr/>	
214	*** STEP NUMBER ! IS NOT A VALID STEP NUMBER OR THE CORRESPONDING SECTION WAS NOT SELECTED (OPDIAGERR 214)
<hr/>	
215	*** HIGHER SECURITY IS NEEDED TO PERFORM THIS OPERATION (OPDIAGERR 215)
CAUSE	The user requested an operation which is restricted to users with higher security than the user possesses.
ACTION	Contact system administrator if higher security level is desired.
<hr/>	
216	*** THE DATA RETURNED WAS NOT A VALID SERIAL NUMBER OR REPAIR BOARD STATUS. THE OPERATION OF THE UNIT MUST BE CONSIDERED SUSPECT. THE CONTROLLER PCA MAY BE DEFECTIVE. (OPDIAGERR 216)
CAUSE	Data returned from the device in response to the SERIAL number command was not a valid serial number range or REPAIR BD status. The operation of the unit is suspect.
ACTION	This is either a firmware problem or a diagnostic software problem. Try re-programming the correct serial number into the unit.
<hr/>	



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SS/80 Disk Diagnostic

Introduction

The SS/80 Disk Diagnostic (SS80DIAG) tests the HP9122D, HP9122S, and the HP9127A SS/80 disk drives.

This diagnostic does **not** test the following disk drives:

- HP7907A, 7908
- HP7911, 7912, 7914
- HP7933, 7935, 7936, 7937
- HP7957B, 7958B
- HP7961B, 7962B, 7963B

These drives are tested by the CS/80 Disk Diagnostic. Refer to CS80DIAG in this manual.

SS80DIAG runs on any HP Precision Architecture RISC computer system that supports Online Diagnostic Subsystem programs and is capable of detecting failures of one or more Field Replaceable Units (FRUs). The SS/80 Disk Diagnostic will:

- Verify the integrity of the HPIB data path to the selected disk
- Identify the product type of the selected disk
- Run the internal diagnostics on the disk (including selftest)
- Obtain and decode status messages from the disk
- Test common transactions that are used in communication between the disk and CPU to determine the integrity of these transactions
- Force certain errors to occur on the disk and verify that the disk reports them appropriately
- Provide a SS/80 Disk External Exerciser

Defects and Enhancements

Submit defect reports and enhancement requests for this diagnostic through the STARS database referencing product number 30600-10008.

Minimum Configuration

The hardware required to run the diagnostic consists of an HP Precision Architecture Computer with a SS/80 disk drive connected to it. The SS/80 disk under test must contain internal selftests that are capable of detecting failed FRU's in the disk drive. In addition, the disk must have a reserve area of at least 4 sectors set aside for use by diagnostics. The location of this area will be determined by the operating system and since it will be used by SS80DIAG, the data will be destroyed.

Operating Instructions

There is no special security level needed in order to run this diagnostic. However, any sections or steps of the diagnostic that have the potential to comprise system integrity will be restricted to certain security levels. Refer to the Security section on the DUI for information on the available security levels and test modes, and how each are determined.

Default Tests

If the user does not specify sections and steps to be run, the following default sections, including all steps, will be executed:

Section 2	Clear
Section 3	Identify
Section 4	Loopback
Section 5	Selftest
Section 8	Common System Operations
Section 9	Status Tests

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RUN Command

To bring up the Online Diagnostic subsystem, enter the following command to the system prompt:

%sysdiag

The system responds with the following prompt indicating that access has been gained to the Online Diagnostic User Interface (DUI).

DUI >

Typing **HELP** causes a summary of the DUI and its commands to be printed. Refer to the DUI Section of this manual for details.

Note



The device to be tested must be powered up and on line. Device physical locations (pdev) shown in the **RUN** commands are those of the devices on the "typical A1002A" system configuration described in the chapter on DUI. The pdev value entered must be correct for the system being tested.

For example, to run the diagnostic, you might enter:

```
DUI >RUN SS8ODIAG pdev=4.1.0 <RUN Command Options>
```

```
      |           |
      |   none required for
      |   default test suite
      |
```

*insert physical location of
device to be tested here;
alternatively, for MPE XL,
type the ldev number;
or for HP-UX, type the devfile name*

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Test Execution

When SS80DIAG is run, the following header and welcome message will be displayed:

```
*****
****
****          SS/80 DISC DIAGNOSTIC          ***
****
****   (C) Copyright Hewlett Packard Co. 1987   ***
****                All Rights Reserved.      ***
****                Version A.00.00           ***
****
*****
```

Welcome, Today is MON, May 22, 1987, 9:00 AM

During system initialization various messages can be output by SS80DIAG. Error messages are listed at the back of this document.

The diagnostic calls IO_Path_Test, which is a diagnostic procedure that tests the I/O path to the device. If the status returned from this procedure call is "fail", the following message will be output:

```
*** WARNING -- THE I/O PATH TO THE DISC MAY NOT BE FUNCTIONING
        PROPERLY (SS8OERR 100)
```

Otherwise, the diagnostic issues an identify to the specified device to determine whether or not it is a SS/80 disk. If the device does not respond to the identify command, the following message will be output:

```
DEVICE FAILED TO RESPOND TO IDENTIFY COMMAND (SS8OERR 101)
```

If a response was obtained, then the returned status is examined to determine if the device is a SS/80 disk. If not, the following message will be displayed:

```
THE SPECIFIED DEVICE IS NOT A SS/80 DISC --
RETURNED ID CODE WAS XXXX (SS8OERR 102)
```

If either of these two messages is generated, the diagnostic will terminate immediately after outputting them.

If access to the SS/80 disk is granted, the sections are executed and the results output. If the user has provided a value for the ERRCOUNT parameter of the RUN command, the following message will be output when the number of errors reaches or exceeds that value:

```
THE MAXIMUM NUMBER OF ERROR MESSAGES HAS BEEN EXCEEDED (SS8OERR 110)
```

The diagnostic will then terminate execution. If the ERRPAUSE parameter of the RUN command was assigned a value of "on", the diagnostic will stop after each error is generated and ask the user if the test should continue:

```
Do you wish to continue (Y/N)[Y]?
```

23-4 SS/80 Disk Diagnostic

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If the response is "Y" or **(Return)**, the test will be resumed (if possible), and if the response is "N", this diagnostic will terminate. If the sections and steps specified by the user were executed the number of times specified in the LOOP parameter of the RUN command without the number of errors exceeding the ERRNUM value, the diagnostic will terminate normally and the following message output:

SS/80 Disc Diagnostic Exiting . . .

Upon termination of this diagnostic, control will return to the Diagnostic system.

Test Section Descriptions

The following nine diagnostic program sections are available. The user can run individual steps within sections 4, 6, 8, and 9.

Section 2	Clear
Section 3	Identify
Section 4	Loopback
Step 6	Write Loopback
Step 7	Read Loopback
Section 5	Selftest
Section 6	Status
Step 10	Request Status
Step 11	Decode Status
Section 8	Common System Operations
Step 15	Locate and Verify Command
Step 16	Locate and Read Command
Step 17	Locate and Write
Step 18	Set Unit
Step 19	Set Address
Step 21	Set Length
Step 23	Set Status Mask
Section 9	Status Tests
Step 40	Illegal Opcode
Step 41	Module Addressing
Step 42	Address Bounds
Step 43	Parameter Bounds
Step 44	Illegal Parameter
Step 45	Message Sequence
Step 46	Message Length
Section 17	External Exerciser (Interactive Section)

A description of each section and step will be given along with the expected output from that section and step.

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Section 2—CLEAR

This section performs a clear operation on the disk that was specified in the **RUN** command. This command resets the disk to its power-on state. The command that will be sent to clear the disk will be a SS/80 selected device clear. The following actions are taken as a result of executing this section:

- Clear all clearable device or interface conditions currently asserted.
- Reset all complementary parameters to their power-on values.
- Reset the status reported from the device.

If no errors are encountered, the diagnostic will output the following message:

```
Section 2 -- CLEAR  
End of Section 2 -- Clear
```

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Section 3—IDENTIFY

This section issues an identify command to the selected disk to determine whether it is responding to commands and whether it is an SS/80 disk. If no errors are encountered, the diagnostic will output the following message:

Section 3 -- IDENTIFY

The selected device has been identified as an HPXXXX disc.

End of Section 3 -- Identify

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Section 4—LOOPBACK

This section will perform a write loopback of 256 bytes of data on the channel using the pattern—255,0,1, . . . ,254. This operation will be followed by a read loopback of 256 bytes which will be compared with to the expected pattern to verify correct transmission. The pattern sent in the read loopback is generated from Read-Only Memory (ROM) in the disk drive and should be the same as the pattern specified above in the write loopback. The user can select one or both of the following steps:

- Step 6 **Write data loopback**
- Step 7 **Read data loopback**

If no errors are encountered, the diagnostic will output the following message:

```
Section 4 -- LOOPBACK
  Step 6 - Write Loopback Completed
  Step 7 - Read Loopback Completed
End of Section 4 -- Loopback
```

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Section 5—SELFTEST

This section initiates the internal power-on selftest on the disk and reports the status of the test to the user. The test will be initiated by issuing an initiate diagnostic command specifying diagnostic 0 as the test to be performed, which is the power-on selftest used by the device. If no errors are encountered, the diagnostic will output the following message:

```
Section 5 -- SELFTEST  
End of Section 5 -- Selftest
```

Section 6—STATUS

This section requests status from the disk and outputs the status to the user. This is a two step process, one step to get the status and one step to decode it. This structure is used so that the system can supply a status to be decoded rather than always obtaining it from the disk. The user can select one of two steps:

- Step 10 **Request Status:** Issues a request status command to the disk and gets the hardware status that is returned.
- Step 11 **Decode Status:** Decodes the last status that was obtained from the disk, or the status provided by the system.

```
Section 6 -- STATUS
Step 10 - Request Status Completed
Status =
Unit = nnnn      Volume = nnnn
No units with pending status
```

or

```
Unit nnnn has status pending
```

{One or more of the following status messages may be printed}

```
>>>>>>>> REJECT ERRORS <<<<<<<<<
Received a command without odd parity
Received an unrecognized opcode
Received an illegal volume or unit address
Received an address which exceeds device bounds
Received an illegal parameter
Received a parameter of the wrong length
Received a message out of sequence
Received a message of the wrong length
```

```
>>>>>>>> FAULT ERRORS <<<<<<<<<
Error occurred during copy data transaction --
Units experiencing errors are :
    nnnn, nnnn, nnnn, nnnn
Controller hardware fault
Unit hardware fault
Hardware failed diagnostic --
    Failed part numbers are : nnnn, nnnn
    Test error numbers = nnnn, nnnn
Power failed or drive just powered on
Auto Release has been completed -- Retransmit last command
```



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>>>>>>> ACCESS ERRORS <<<<<<<<

Media has not been initialized or is unusable
Spare Block cannot be executed -- No spare media available
Drive is not ready for access
The selected volume is write protected
A block accessed during a read has not been written
Multiple unrecoverable data errors have occurred
Unrecoverable data has been detected --
Address of bad data is:
Block address = nnnn
or
Vector address =
Cylinder = nnnn Head = nnnn Sector = nnnn
End of file encountered
End of volume encountered

>>>>>>> INFORMATION ERRORS <<<<<<<<

Only one spare track remains on the disc
A latency was introduced during the transfer due to slow
transfer rate or seek retry
A defective block has been automatically spared
Multiple recoverable data errors have occurred
A latency was introduced to correct a data error --
Address of bad block is:
Block address = nnnn
or
Vector address =
cylinder = nnnn head = nnnn sector = nnnn

New Target address is:
Block address = nnnn
or
Vector address =
cylinder = nnnn head = nnnn sector = nnnn

Step 11 - Decode Status Completed
End of section 6 -- Status

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Section 8—COMMON SYSTEM OPERATIONS

This section will execute all SS/80 commands applicable to disks with the exception of initialize media and spare block, both of which are accessible in the External Exerciser section. The purpose of this section is to verify that these commands are functioning properly. The tests will be as thorough as possible while still allowing them to be automated. The user can select any of the following steps:

- Step 15 **Locate and Verify:** This step sends a SS/80 locate and verify command to the disk to verify 2k bytes of data at a random address.
- Step 16 **Locate and Read:** This step reads a sector of data twice and then compares the data received from both.
- Step 17 **Locate and Write:** This step writes a sector of random data to the reserve area on the disk, reads that data back and compares it to the data written.
- Step 18 **Set Unit:** This step sends a SS/80 set unit command to the disk to set unit 15 on it, requests a hardware status from the device, and verifies that the unit reported in status is 15.
- Step 19 **Set Address:** This step sends a SS/80 set address command to the disk to set the current address to some random value, requests a hardware status from the device, and verifies that the current address in the status is the same as the address that was just set.
- Step 21 **Set Length:** This step sends a SS/80 locate and read command to the disk to read 256 bytes of data at the current address.
- Step 23 **Set Status Mask:** This step sends a SS/80 set status mask command to mask out the address bounds error bit of the hardware status. An address bounds error will then be forced to occur by sending a SS/80 set address command to the disk to set an address that is greater than the maximum allowed.

If no errors are encountered, the diagnostic will output the following message:

```
Section 8 -- Common System Operations
End of Section 8 -- Common System Operations
```

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Section 9—STATUS TESTS

This section will force several errors to occur on the disk and then verify that the correct error bit was set in the hardware status returned from the drive.

- Step 40 **Invalid Opcode:** This step sends an invalid opcode bit to the disk, and then verifies that it was set in the status that was returned from the device.
- Step 41 **Module Addressing:** This step sets the unit to an invalid number using the set unit command, and then verifies that the module addressing error bit was set in the status that was returned from the device.
- Step 42 **Address Bounds:** This step sends a CS/80 set address command to the disk, sets the address to a value greater than the maximum allowed by the device, and then verifies that the address bounds bit was set in the status that was returned from the device.
- Step 43 **Parameter Bounds:** This step sends a CS/80 set status mask command to the disk, sets the status mask to all unmaskable bits, and then verifies that the parameter bounds error bit was set in the status that was returned from the device.
- Step 44 **Illegal Parameter:** This step sends a CS/80 set length command to the disk, giving it one byte for the length instead of the four bytes that the drive expects and then verifies that the illegal parameter bit was set in the status that was returned from the drive.
- Step 45 **Message Sequence:** This step sends a locate and write command while requesting that it return an execution message (instead of providing an execution message as was expected) and then verifies that the message sequence error bit was set in the status returned from the device.
- Step 46 **Message Length:** This step sends a CS/80 locate and write command to the disk, sets a length in the command phase and uses a different length in the execution phase. It then verifies that the message length bit was set in the status returned from the device.

Section 9 -- Status Tests
End of Section 9 -- Status Tests

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Section 17—EXTERNAL EXERCISER

The SS/80 External Exerciser is an interactive program which provides the user with access to the set of internal diagnostics and utilities within a SS/80 disk. This section explains what different kinds of data the exerciser can provide, how that information is generated and describes the commands available to the user. Refer to the SS/80 Reference Manual (P/N 5958-4129) for further information on the SS/80 instruction set. To run the External Exerciser select Section 17 of the SS80DIAG diagnostic. The SS80DIAG prompt appears indicating that the Exerciser is waiting for a command from the user. Refer to the Command Descriptions and the Exerciser Command Format explanations below for further details.

Command Descriptions

When the external exerciser is invoked, the following prompt will be displayed to the user:

SS80DIAG>

When the prompt appears, the exerciser is waiting for a command from the user. The available commands are listed in this section in alphabetical order accompanied by descriptions. Each command description is in the following format:

COMMAND NAME

Description:

Explanation of what the command does and when it should be used.

Input:

SS80DIAG>COMMAND NAME

The prompt for this exerciser is SS80DIAG>. The appearance of this prompt indicates that the exerciser is waiting for the user to input a command.

Output:

- Information printed as a result of this command being executed.
- Any error messages that may be worth noting are listed in this area.

There are several conventions used throughout this section in the command formats. They are as follows:

nnnn	refers to a decimal number of any magnitude that is output by the diagnostic.
vvvv	refers to a decimal number of variable magnitude that must be input by the user.
H	refers to a hexadecimal digit (0-F).
O	refers to an octal digit (0-8).
B	refers to a binary digit (0-1).

Any text enclosed in parentheses indicates that the user is expected to input that text in response to a query from the diagnostic. Text enclosed in square brackets indicates the default response that will be assumed if the user simply hits Return in response to the query. For example, the user may be asked if the program should continue by the following question:

Do you wish to continue (Y/N) [N]?

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The text enclosed in the parentheses (i.e., "Y/N") indicates that the user is to type either a "Y" or an "N" in response to the question. Each option is separated by a "/". The default response in this case would be "N", as indicated by the [N] prior to the question mark. If there is no default response listed (enclosed in square brackets), the user will not be allowed to "default" the input by only entering a Return.

Comments in the input and output sequences are enclosed in curly brackets and are not output by the program. For example, following the question in the previous example, the input sequence would probably look something like the following:

{if response was N this command will terminate}

Error messages will be preceded by three asterisks (***) and will be in all upper case letters. Other messages will not be all upper case and will not be preceded by the asterisks.

If the user enters a command in response to a prompt and that command is not recognized as an exerciser command, the following message will be displayed:

*****YOUR RESPONSE WAS INVALID**

SS80DIAG>

This message simply means that the command entered is not part of the command set for the external exerciser.

When the user enters a command that is recognized by the external exerciser, that command will then be processed as according to the corresponding command description given in one of the following sections of this document. If an error is encountered as a result of issuing a SS/80 command to the device, the status that is returned by the device will be displayed to the user. The status display will consist of some device identification information followed by several categorized error messages. The categories are reject errors, fault errors, access errors, and information errors. Reject errors indicate illegal interaction with the device such as an opcode error. These errors result when commands are sent to the device but not recognized by it. Fault errors indicate hardware failures. Access errors indicate media absence, formatting problems, or operator intervention. Information errors indicate potential problems or performance irregularities in the device. The format of the output status message follows:

Status =

Unit = nnnn Volume = nnnn

No units with pending status
 or
Unit nnnn has status pending

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{ One or more of the following status messages may be printed }

```
>>>>>>>> REJECT ERRORS <<<<<<<<<<
Received a command without odd parity
Received an unrecognized opcode
Received an illegal volume or unit address
Received an address which exceeds device bounds
Received an illegal parameter
Received a parameter of the wrong length
Received a message out of sequence
Received a message of the wrong length

>>>>>>>> FAULT ERRORS <<<<<<<<<<
Error occurred during copy data transaction --
  Units experiencing errors are :
    nnnn, nnnn, nnnn, nnnn
Controller hardware fault
Unit hardware fault
Hardware failed diagnostic --
  Failed part numbers are : nnnn, nnnn
  Test error numbers = nnnn, nnnn
Power failed or drive just powered on
Auto Release has been completed -- Retransmit last command

>>>>>>>> ACCESS ERRORS <<<<<<<<<<
Media has not been initialized or is unusable
Spare Block cannot be executed -- No spare media available
Drive is not ready for access
The selected volume is write protected
A block accessed during a read has not been written
Multiple unrecoverable data errors have occurred
Unrecoverable data has been detected --
  Address of bad data is:
    Block address = nnnn
    or
    Vector address =
      Cylinder = nnnn   Head = nnnn   Sector = nnnn
End of file encountered
End of volume encountered

>>>>>>>> INFORMATION ERRORS <<<<<<<<<<
Only one spare track remains on the disc
A latency was introduced during the transfer due to slow
  transfer rate or seek retry
A defective block has been automatically spared
Multiple recoverable data errors have occurred
A latency was introduced to correct a data error --
  Address of bad block is:
```

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```
Block address = nnnn  
or  
Vector address =  
cylinder = nnnn   head = nnnn   sector = nnnn
```

```
New Target address is:  
Block address = nnnn  
or  
Vector address =  
cylinder = nnnn   head = nnnn   sector = nnnn
```

Only the portions of the above status display that correspond to errors indicated by the hardware status variable will be output. This means, for example, that if no Access Errors were indicated by the status, none of the messages listed under that heading would be output.

In order to exit the exerciser, the EXIT command should be entered (see EXIT command description).

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ADDRESS

This command allows the user to convert block addresses to 3-vector addresses and visa versa. This conversion will be made using the maximum address for the device that is currently selected. This maximum address will be obtained via the SS/80 (extended) DESCRIBE command, which will be issued before the conversion is made if it has not been issued thus far.

Input:

SS80DIAG>ADDRESS

Do you want to convert from block or 3-vector
addresses (B/V)[B]?

{if response was B}

Enter block address (<cr> to keep current value) --
Block address(nnnn - nnnn) = nnnn?

{if response was V}

Enter 3-vector address (<cr> to keep current values) --
Cylinder address(nnnn - nnnn) = nnnn?
Head address(nnnn - nnnn) = nnnn?
Sector address(nnnn - nnnn) = nnnn?

Output:

{for block addresses to 3-vector addresses}

Block address nnnn is equivalent to 3-vector address:
Cylinder = nnnn Head = nnnn Sector = nnnn

{for 3-vector addresses to block addresses}

3-vector address:
Cylinder = nnnn Head = nnnn Sector = nnnn
is equivalent to block address nnnn

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CICLEAR

This command clears the selected device in a manner independent of the channel to which it is connected. Destructive Mode will be required to execute this command. This command causes the current disk operation to abort without any data corruption, all clearable devices or interface conditions to be cleared, all complementary parameters to be set to their power-on values, and the status reported from the device to be cleared.

Input:

SS80DIAG>CICLEAR

Output:

Device has been cleared successfully

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DESCRIBE

This command will obtain a SS/80 (extended) describe message from the device being tested and display the contents to the user in text form. The information in the describe message includes such things as device parameters that are used by system drivers.

Input:

SS80DIAG>DESCRIBE

Output:

```
Describe Information
-----
The following unit(s) are installed:
  nn nn . . . nn
Maximum transfer rate = nnnn Kbytes per second
Controller type =
    Integrated Single-Unit
    or Integrated Multi-Unit
    or Integrated Multi-Port
Port ID = nnnn
Number of host ports provided by controller = nnnn
Unit number = nnnn
Device is a nnnn fixed-disc
    or removable disc
    or tape
Block size = nnnn bytes
Buffer size = nnnn blocks
Burst mode is not recommended

    {or}
Recommended burst size = nnnn bytes
Block transfer time = nnnn microseconds
Average transfer rate = nnnn Kbytes per second
Optimal retry time = nnnn 10's of milliseconds
Maximum access time to data = nnnn 10's of milliseconds
Maximum interleave = nnnn
Maximum cylinder address = nnnn
Maximum head address = nnnn
Maximum sector address = nnnn
Maximum block address = nnnn
Current sector interleave = nnnn
Volume number = nnnn
```

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DIAG

This command will initiate internal diagnostic tests which reside in the disk drive. The tests which can be selected are device dependent and are fully described in the support documentation for each type of drive.

Input:

SS80DIAG>DIAG

Input the loop count to be used (1<=loop<=65535)[1]?

Output:

Internal diagnostic 0 has completed successfully

POSSIBLE ERROR MESSAGES:

*** DEVICE ENCOUNTERED AN ERROR WHILE EXECUTING THE
INITIATE DIAGNOSTIC COMMAND
{*status - including failing FRU if any*}

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EXIT

This command terminates execution of the External Exerciser. It may be entered any time the SS80DIAG> prompt appears.

Input:

SS80DIAG>EXIT

Output:

End of Section 17 - External Exerciser

FOR HP INTERNAL USE ONLY

HELP

This command provides the user with access to information concerning the commands that are available in the external exerciser. The user may request a list of the available commands accompanied by a brief description of each, or individual command descriptions. For individual commands, the user can request a description and syntax or just the syntax.

Input:

SS80DIAG>HELP [command name or <cr>]

Output:

{If no command name was given (i.e. [RETURN])}

The following commands are available:

ADDRESS - converts block addresses to 3-vector and visa versa

CICLEAR - issues a SS/80 Channel Independent Clear

.

.

UNIT - Sets the unit number on the device

{If a command was given}

Do you want a description or just syntax (D/S)[D]?

{If response was D}

COMMAND DESCRIPTION:

Description of the command

Syntax of the command

{If response was S}

COMMAND SYNTAX:

Syntax of the command



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INIT MEDIA

This command allows the user to format the disk's media. The user will be given the option to retain all spares that have been made on the disk, or retain only factory spares. All data on the disk may be destroyed by this command. It is essential that extensive error-rate testing be performed and all questionable sectors spared after executing this command.

Input:

SS80DIAG>INIT MEDIA

Do you want to:

- P = retain only primary spares
- A = retain all spares

Which option would you like[A]?

What interleave factor would you like (1<=interleave<=32)[1]?

{if other than 1}

***WARNING -- an interleave factor other than 1 may severely degrade system performance

Do you wish to continue(Y/N)[N]?

{if N}

What interleave factor would you like (1<=interleave<=32)[1]?

This test will destroy current data on the disc

Do you wish to continue (Y/N)[N]?

{responding N will terminate this command}

Output:

format - retain all spares

or

format - retain primary spares

Media is being initialized -- may take several minutes

Media has been successfully initialized

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READ

This command allows the user to access any data block on the selected device. Due to obvious potential security compromise, the user will need to possess Level 0 security to use this command.

Input:

SS80DIAG>READ

Do you want block or 3-vector addresses (B/V) [B]?

{if response was B}

Enter new address (<cr> to keep current value) --

Block address(nnnn - nnnn) = nnnn?

{if response was V}

Cylinder address(nnnn - nnnn) = nnnn?

Head address(nnnn - nnnn) = nnnn?

Sector address(nnnn - nnnn) = nnnn?

Output:

The data follows(hex):

	0	1	2	3	4	5	6	7	8	9	
0:	HH	HH	HH	HH	HH	HH	HH	HH	HH	HH	.....
10:	HH	HH	HH	HH	HH	HH	HH	HH	HH	HH	.....
.											
.											
250:	HH	HH	HH	HH	HH	HH					.....

Note

The dots in the preceding table represent non-alpha-numeric ASCII characters. Alpha-numeric characters will be printed.



FOR HP INTERNAL USE ONLY

SDCLEAR

This command clears the device to its power-on state using the SS/80 selected device clear command. In order to execute this command, the user must be in Destructive Mode. This command causes the current disk operation to abort without any data corruption, all complementary parameters to be set to their power-on values, and the status reported from the device to be cleared.

Input:

```
SS80DIAG>SDCLEAR
```

Output:

```
Device has been cleared successfully.
```

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UNIT

This command allows the user to set the unit number within the drive. This command is required for multi-unit drives so that the user can specify which unit is to be tested.

Input:

SS80DIAG>UNIT

What unit number do you wish to select (0-15)[0]?

Output:

Unit nnnn of the device has been successfully set

Error and Warning Messages

The following error and warning messages are generated by SS80DIAG. For other errors, consult the DUI section of this manual and the operating system manuals. The "!" indicates that a parameter of some sort replaces the exclamation point when the message is displayed. The following messages are listed in numerical order.

100	WARNING -- THE I/O PATH MAY NOT BE FUNCTIONING PROPERLY (SS80ERR 100)
CAUSE	An error was detected by the Io_Path_Test service while testing the modules on the I/O path preceding the selected device.
ACTION	Execute the appropriate diagnostics on the modules preceding the selected device on the I/O path, especially on those that may have been reported as faulty in error messages immediately preceding this message. The results of the execution of this instance of SS80DIAG may be invalid.
<hr/>	
101	DEVICE FAILED TO RESPOND TO ! COMMAND (SS80ERR 101)
CAUSE	No response to an I/O was received prior to the expiration of the allotted time.
ACTION	Verify that the selected disk drive is actually connected to the system. Run SYSMAP, if available, to confirm the presence of the device.
<hr/>	
102	SS80DIAG IS UNABLE TO DIAGNOSE THE SELECTED DEVICE (SS80ERR 102)
CAUSE	The selected device identified itself as something other than a SS/80 drive.
ACTION	Determine type of selected device and run the appropriate diagnostic on it.
<hr/>	
103	SS/80 DISC DIAGNOSTIC TERMINATING (SS80ERR 103)
CAUSE	A fatal error has been encountered.
ACTION	The specific error that was encountered should have been reported immediately prior to this message. Follow the action instructions for that error message.
<hr/>	
104	A RESERVE AREA IS NOT AVAILABLE ON THIS DRIVE -- NO OPERATION WAS PERFORMED. (CS80WARN 104)
CAUSE	There is no available area on the disk that can be written to without corrupting user data. This can happen if no such area is provided by the system, or if the diagnostic is running in destructive mode, in which the location of the reserve area is unknown to the system since the drive is locked for diagnostics.
ACTION	For systems which do not support a reserve area (e.g. HP-UX), reserve area operations are not supported. Otherwise, execute the diagnostic selecting only section 8.

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106	! MODE REQUIRED TO EXECUTE THIS COMMAND (SS80ERR 106)
CAUSE	The diagnostic does not have access to the drive in the mode necessary to execute the selected command.
ACTION	The mode granted to a diagnostic for a selected device is system dependent. For MPE XL, for example, the volume label must be scratched in order to access the disk destructively.
<hr/>	
108	! COMMAND IS NOT IMPLEMENTED ON THIS DRIVE/SYSTEM (SS80ERR 108)
CAUSE	The selected operation is either not implemented on the selected drive or the system does not provide access to it.
ACTION	This operation is unavailable.
<hr/>	
109	DEVICE ENCOUNTERED AN ERROR WHILE EXECUTING THE SS/80 ! COMMAND (SS80ERR 109)
CAUSE	The drive reported an error as a result of executing the selected operation.
ACTION	The hardware status that is displayed immediately following this message should indicate what sort of problem occurred, including a failing FRU if one is reported. If an FRU is reported, replace it and re-execute this diagnostic.
<hr/>	
110	THE MAXIMUM NUMBER OF ERRORS HAS BEEN EXCEEDED (SS80ERR 110)
CAUSE	The user specified error limit has been reached.
ACTION	If more errors are desired, re-run the diagnostic assigning a larger value to the ERRCOUNT parameter of the RUN command.
<hr/>	
111	UNRECOGNIZED COMMAND -- TYPE "HELP" FOR A LIST OF VALID COMMANDS (SS80ERR 111)
CAUSE	The specified command is not a valid command.
ACTION	Use the help facility to obtain a list of the commands that are valid and enter the desired command.
<hr/>	
112	UNRECOGNIZED REPLY WAS FOUND (SS80ERR 112)
CAUSE	The reply that was entered in response to a prompt by the diagnostic is not valid.
ACTION	Refer to the prompt that was displayed and enter a response that is within the specified list of valid responses.

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113 **A NUMERICAL INPUT WAS EXPECTED BUT NOT RECEIVED (SS80ERR 113)**
CAUSE The reply that was entered in response to a prompt by the diagnostic is not a valid number.
ACTION Re-enter number using only numeric characters and valid special characters (e.g. +, -, , etc.).

114 **AN UNEXPECTED ERROR OCCURRED IN THE IO_CS80 DAR (SS80ERR 114)**
CAUSE A call to the SS/80 device access routine resulted in an unexpected status return.
ACTION Please enter an SR. Within the text of the SR report all information returned by the Diagnostic User Interface. Also state operating system, version number, DUI version and diagnostic version.

115 **ERROR IN TRANSMISSION DETECTED DURING READ LOOPBACK TEST: (SS80ERR 115)**

	Octal Value	Octal Value	Bit Positions
Byte #	Transmitted	Received	In Error
=====	=====	=====	01234567
			=====

CAUSE One or more bytes of data that were received from the disk as a result of a loopback operation did not contain the expected value(s).
ACTION Data is most likely being corrupted along the data path between the host and the drive. Check all cable connections along the path and re-execute the diagnostic. If errors persist, execute appropriate diagnostics against the modules that lay in the path between the host and the device.

118 **ERROR -- EXPECTED ! BYTES FROM THE DEVICE AND RECEIVED ! BYTES (SS80ERR 118)**
CAUSE The number of bytes in the reply from the device was not what was expected. This is most likely a result of executing the diagnostic on a drive which is not supported by it.
ACTION Verify that the selected device is in the list of supported devices for the diagnostic (LIST ALL from the DUI). If it is, report the problem to support personnel.

119 **THIS COMMAND IS NOT SUPPORTED ON THIS DEVICE (SS80ERR 119)**
CAUSE The specified operation is not supported by the selected device.
ACTION While other devices supported by the diagnostic may support the specified command, the selected device does not.

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120	FILE SYSTEM ERROR ENCOUNTERED WHILE RETRIEVING A MESSAGE (SS80ERR 120)
CAUSE	An error was returned while attempting to obtain a message from the catalog. The actual error will have been displayed prior to this message.
ACTION	Please enter an SR. Within the text of the SR report all information returned by the Diagnostic User Interface. Also state operating system, version number, DUI version and diagnostic version.
<hr/>	
121	IDENTICAL READS FROM DISC RETURNED NON-IDENTICAL DATA (SS80ERR 121)
CAUSE	A read operation was performed on the same sector twice and the data from both reads did not match exactly.
ACTION	This is most likely a hardware problem with the drive. If loopback executes correctly, the read/write board in the drive is the probable cause of the error.
<hr/>	
122	DATA READ FROM DISC DID NOT MATCH DATA PREVIOUSLY WRITTEN (SS80ERR 122)
CAUSE	A sector was written to the disk and immediately read back. The data read did not match exactly the data written.
ACTION	This is most likely a hardware problem with the drive. If loopback executes correctly, the read/write board in the drive is the probable cause of the error.
<hr/>	
123	UNIT WAS SET TO 15 BUT STATUS DOES NOT INDICATE THE CURRENT UNIT AS 15 (SS80ERR 123)
CAUSE	A set unit command was sent to the disk specifying unit 15 and hardware status was immediately requested. The unit field of the status was not 15.
ACTION	This is definitely a drive problem—probably firmware.
<hr/>	
124	THE ADDRESS THAT WAS SET ON THE DISC IS NOT EQUIVALENT TO THE ADDRESS RETURNED IN STATUS (SS80ERR 124)
CAUSE	A set address command was sent to the disk immediately followed by a status request. The address reported in the hardware status did not match the address that was set.
ACTION	This is definitely a drive problem—probably firmware.
<hr/>	
125	BLOCK DISPLACEMENT WAS SET TO 1 BUT THE ADDRESS RETURNED IN STATUS DOES NOT INDICATE THAT THE DISPLACEMENT IS BEING USED (SS80ERR 125)
CAUSE	A set block displacement command was sent to the disk immediately followed by a status request. The current block displacement did not match that which was set.
ACTION	This is definitely a drive problem—probably firmware.

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126	DATA READ FROM THE DISC IN BURST MODE DID NOT MATCH DATA THAT WAS PREVIOUSLY WRITTEN IN BURST MODE (SS80ERR 126)
CAUSE	The drive was placed in burst mode and a write was done immediately followed by a read. The data read back did not match exactly the data that was written.
ACTION	This is definitely a drive problem—probably firmware.
<hr/>	
127	THE ADDRESS BOUNDS BIT IN STATUS WAS MASKED, BUT THE DEVICE SET IT WHEN AN ADDRESS BOUNDS ERROR WAS FORCED (SS80ERR 127)
CAUSE	The set status mask command was used to mask address bounds errors and then a set address command was issued with an address that exceeded the maximum. The drive reported the error even though the status was masked.
ACTION	This is definitely a drive problem—probably firmware.
<hr/>	
128	THE ADDRESS RETURNED IN STATUS INDICATES THAT THE DEVICE ERRONEOUSLY CONVERTED THE ADDRESS WHEN CHANGING ADDRESSING MODE (SS80ERR 128)
CAUSE	A set address command was issued to the drive followed by a set return address mode to the opposite of the current mode. Status was then requested and the current target address did not match the address that was set, implying that the address conversion performed by the drive was incorrect.
ACTION	This is definitely a drive problem—probably firmware.
<hr/>	
129	AN ERROR WAS ENCOUNTERED WHEN READING AFTER RETRY TIME WAS SET TO A RANDOM VALUE (SS80ERR 129)
CAUSE	A set retry time was issued to the drive with a random time value followed by a read command. The drive reported an error.
ACTION	This is definitely a drive problem—probably firmware.
<hr/>	
130	AN ERROR WAS ENCOUNTERED IN ATTEMPTING TO SEND A RELEASE COMMAND TO THE DEVICE (SS80ERR 130)
CAUSE	A release command was sent to the drive and the drive returned an error.
ACTION	This is definitely a drive problem—probably firmware.
<hr/>	
131	AN ERROR WAS ENCOUNTERED IN ATTEMPTING TO SEND A RELEASE DENIED COMMAND TO THE DEVICE (SS80ERR 131)
CAUSE	A release denied command was sent to the drive and the drive returned an error.
ACTION	This is definitely a drive problem—probably firmware.

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132	AN ERROR WAS ENCOUNTERED WHILE DOING A READ AFTER RPS WAS ENABLED (SS80ERR 132)
CAUSE	A set rps command was sent to the drive to enable rps followed by a read operation. The drive reported an error on the read.
ACTION	This is definitely a drive problem—probably firmware.
<hr/>	
133	AN INVALID OPCODE WAS SENT TO THE DEVICE, BUT THE ILLEGAL OPCODE BIT OF THE STATUS MESSAGE WAS NOT SET (SS80ERR 133)
CAUSE	A command was sent to the drive with an invalid op code and the drive did not report the expected error.
ACTION	This is definitely a drive problem—probably firmware.
<hr/>	
134	A SET UNIT COMMAND WAS ISSUED WITH A UNIT NUMBER OF 1, BUT THE MODULE ADDRESSING BIT OF THE STATUS MESSAGE WAS NOT SET (SS80ERR 134)
CAUSE	A set unit command was sent to the drive with a unit number of 1, which is an invalid unit number. The drive did not report the expected error.
ACTION	This is definitely a drive problem—probably firmware.
<hr/>	
135	A SET ADDRESS COMMAND WAS ISSUED TO AN ADDRESS GREATER THAN THE MAXIMUM FOR THE DEVICE, BUT THE ADDRESS BOUNDS BIT OF THE STATUS MESSAGE WAS NOT SET (SS80ERR 135)
CAUSE	A set address command was sent to the drive with an address greater than the maximum allowable. The drive did not report the expected error.
ACTION	This is definitely a drive problem—probably firmware.
<hr/>	
136	THE STATUS MASK WAS SET TO MASK ALL UNMASKABLE BITS, BUT THE PARAMETER BOUNDS BIT OF THE STATUS MESSAGE WAS NOT SET (SS80ERR 136)
CAUSE	A set status mask command was sent to the drive specifying that all bits be masked that are not allowable (unmaskable). The drive did not report the expected error.
ACTION	This is definitely a drive problem—probably firmware.
<hr/>	
137	A SET LENGTH COMMAND WAS ISSUED WITH ONLY 1 PARAMETER BYTE INSTEAD OF THE 4 EXPECTED BY THE DEVICE, BUT THE ILLEGAL PARAMETER BIT OF THE STATUS MESSAGE WAS NOT SET (SS80ERR 137)
CAUSE	A set length command was sent to the drive with fewer bytes than are expected by the drive for that command. The drive did not report the expected error.
ACTION	This is definitely a drive problem—probably firmware.

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138	A WRITE COMMAND WAS ISSUED TO THE DEVICE FOLLOWED BY A REQUEST FOR AN EXECUTION MESSAGE INSTEAD OF SENDING ONE, BUT THE MESSAGE SEQUENCE BIT OF THE STATUS MESSAGE WAS NOT SET (SS80ERR 138)
CAUSE	The SS/80 protocol was violated by sending a write command and specifying the wrong type of execution message. The drive did not report the expected error.
ACTION	This is definitely a drive problem—probably firmware.
<hr/>	
139	A WRITE COMMAND WAS ISSUED WITH THE LENGTH SET TO 10, FOLLOWED BY AN EXECUTION MESSAGE OF ONLY 6 BYTES, BUT THE MESSAGE LENGTH BIT OF THE STATUS MESSAGE WAS NOT SET (SS80ERR 139)
CAUSE	The SS/80 protocol was violated by sending a write command which specified that more bytes be written than were actually provided in the execution message. The drive did not report the expected error.
ACTION	This is definitely a drive problem—probably firmware.
<hr/>	
140	NO OPERATION WAS PERFORMED (SS80ERR 140)
CAUSE	Due to a previous error, which has already been reported, no operation was performed.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
200	AN ERROR WAS ENCOUNTERED WHILE ATTEMPTING TO SEND/RECEIVE INFORMATION FROM THE USER (SS80ERR 200)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to communicate with the user interface process.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
201	AN ERROR WAS ENCOUNTERED IN ATTEMPTING TO RETRIEVE A MESSAGE FROM THE CATALOG (SS80ERR 201)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to extract a message from its message catalog.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
202	AN ERROR WAS ENCOUNTERED IN ATTEMPTING TO CONVERT A NUMBER TO A STRING (SS80ERR 202)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to convert a number to a string.
ACTION	Refer to action instructions for previously reported error.

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203	AN ERROR WAS ENCOUNTERED IN ATTEMPTING A BIT EXTRACTION OPERATION (SS8OERR 203)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to extract one or more bits from a number.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
204	THE SELECTED DEVICE COULD NOT BE OBTAINED FOR TESTING (SS8OERR 204)
CAUSE	The DUI was unable to obtain access to the device. Device may be held exclusively by another process.
ACTION	Determine the access status of the device and make the corrective requirements.
<hr/>	
205	DUE TO PROBLEMS WITH RETURN ADDRESSING MODE, ADDRESSES REPORTED WITH STATUS INFORMATION MAY BE INACCURATE (SS8OERR 205)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to set the return address mode on the drive.
ACTION	Refer to action instructions for previously reported error. Also, if hardware status is displayed later in the diagnostic run, the address portion of the status could be displayed in both block and 3-vector formats since the diagnostic cannot determine the mode that the disk is currently in.
<hr/>	
206	DUE TO PROBLEMS WITH SET BLOCK DISPLACEMENT, SS8ODIAG WILL TERMINATE TO AVOID POTENTIAL DESTRUCTION OF USER DATA (SS8OERR 206)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to successfully set the block displacement value on the drive. Since the diagnostic no longer knows what the displacement value is, it must terminate to avoid destroying data.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
207	DUE TO PROBLEMS WITH DESCRIBE, SS8ODIAG CANNOT FUNCTION PROPERLY AND WILL THEREFORE TERMINATE (SS8OERR 207)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to successfully obtain describe data from the drive. Since the diagnostic needs this information to function correctly, it must terminate.
ACTION	Refer to action instructions for previously reported error.

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208	AN ERROR WAS ENCOUNTERED IN ATTEMPTING TO COMMUNICATE WITH THE DIAGNOSTIC SYSTEM (SS80ERR 208)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to successfully perform a function which requires communication with the diagnostic system.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
209	YOUR RESPONSE WAS INVALID (SS80ERR 209)
CAUSE	The data entered in response to a prompt was not valid.
ACTION	Refer to the prompt to determine the valid responses for the particular situation and enter one of the specified valid responses.
<hr/>	
210	AN ERROR WAS ENCOUNTERED WHILE ATTEMPTING TO OBTAIN DATA FROM AN I/O BUFFER (SS80ERR 210)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to get data from its I/O buffer and, therefore cannot obtain data from the device.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
211	AN ERROR WAS ENCOUNTERED WHILE ATTEMPTING TO PLACE DATA INTO AN I/O BUFFER (SS80ERR 211)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable place data into its I/O buffer and, therefore, cannot send data to the device.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
212	AN ERROR WAS ENCOUNTERED WHILE ATTEMPTING TO OBTAIN AN I/O BUFFER (SS80ERR 212)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable obtain an I/O buffer and therefore, cannot send/receive data to/from the device.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
215	HIGHER SECURITY IS NEEDED TO PERFORM THIS OPERATION (SS80ERR 215)
CAUSE	The user requested an operation which is restricted to users with higher security than the user possesses.
ACTION	Contact system administrator if higher security level is desired.
<hr/>	
216	! BYTES WERE EXPECTED TO HAVE BEEN SENT FROM THE DISC, BUT ONLY ! WERE RECEIVED (SS80ERR 216)
CAUSE	Data returned from the device in response to a command consisted of a different number of bytes than were expected.
ACTION	This is probably a firmware problem in the drive.



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FLEX Disk Diagnostic

Introduction

The FLEX Diagnostic (FLEXDIAG) is designed to provide a means of testing HP-FL disk drives. This diagnostic runs on any HP Precision Architecture computer system that supports Online Diagnostic Subsystem programs and is capable of detecting failures of one or more Field Replaceable Units (FRUs). The FLEX Diagnostic will:

- Perform an extensive fault isolating diagnostic trouble tree on the disk and its system interface. Defects encountered will be relayed to the user.
- Verify the integrity of the data path through the HP-FL subsystem.
- Identify the product type of the selected disk drive.
- Run the internal diagnostics on the disk (including self-test).
- Obtain and decode status from the disk.
- Obtain and decode information from the disk error logs.
- Test common transactions that are used in communication between the disk and CPU.
- Provide a FLEX Disk External Exerciser

Minimum Configuration

The hardware required to run the diagnostic consists of an HP Precision Architecture Computer system with an HP-FL interface card configured and installed, as well as at least one FLEX disk drive connected across the HP-FL interface.

Defects and Enhancements

Submit defect reports and enhancement requests concerning this diagnostic through the STARS database referencing product number 30600-10005.

Operating Instructions

There is no special security level needed in order to run this diagnostic. However, any portion of the diagnostic that has the potential to compromise system integrity will be restricted to certain security levels. Refer to the section on the DUI for information on the available security levels and test modes, and how each are determined.

Default Tests

If the user did not specify sections to be run, the following default section, will be executed:

Section 10 Diagnostic Trouble Tree

RUN Command

To bring up the Online Diagnostic subsystem, enter the following command to the system prompt:

sysdiag

The system responds with the following prompt indicating that access has been gained to the Online Diagnostic User Interface (DUI).

DUI >

Typing **HELP** causes a summary of the DUI and its commands to be printed. Refer to the DUI Section of this manual for details.

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Note



The device to be tested must be powered up and on line. Device physical locations (pdev) shown in the RUN commands are those of the devices on the "typical A1002A" system configuration described in the chapter on DUI. The pdev value entered must be correct for the system being tested.

For example, to run the diagnostic, you might enter:

```
DUI >RUN FLEXDIAG pdev=4.6.1 <RUN Command Options>
      |           |
      |   none required for
      |   default test suite
      |
```

*insert physical location of
device to be tested here;
alternatively, for MPE XL,
type the ldev number;
or for HP-UX, type the devfile name*

Test Execution

Enter the desired RUN parameters. The diagnostic responds with a header and welcome message:

```
*****
****                                     ****
****           FLEX DISC DIAGNOSTIC           ****
****                                     ****
**** C) Copyright Hewlett Packard Co. 1987,1988,1989 ****
****           All Rights Reserved.           ****
****           Version A.02.01                 ****
****                                     ****
*****
Welcome, Today is MON, August 10, 1987 at 12:30 PM
```

During system initialization various messages can be output by FLEXDIAG. Error messages can be distinguished from other messages by three ***'s preceding the text of the message (i.e., MESSAGE*** is an error message and "Message" is not). (Refer to the error message listing at the back of this document for cause and action information).

The diagnostic then verifies that the I/O path to the selected device is functioning properly. If any problems occur in the path, the following message will be displayed:

```
*** WARNING THE I/O PATH TO THE SELECTED DEVICE MAY NOT BE FUNCTIONING
    PROPERLY (FLEXERR 100).
```

Whether or not IO_PATH_TEST reported an error, the diagnostic will continue.

If at any time the number of errors generated reaches the limit specified by the user in the ERRRCOUNT parameter of the RUN command, the following message will be output:

```
THE MAXIMUM NUMBER OF ERROR MESSAGES HAS BEEN EXCEEDED (FLEXERR 110)
```


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The diagnostic will then terminate execution. If the ERRPAUSE parameter of the RUN command was assigned a value of "on", then this diagnostic will stop after each error is generated and ask the user if the test should continue:

Do you wish to continue (Y/N)[N]?

If the response is "Y" (or only a Return), the test will be resumed (if possible), and if the response is "N", the diagnostic will terminate. If the sections and steps specified by the user were executed the number of times specified in the LOOP parameter of the RUN command without the number of errors exceeding the ERRNUM value, the diagnostic will terminate normally and the following message output:

FLEX Disc Diagnostic Exiting . . .

Upon termination of this diagnostic, control will return to the diagnostic subsystem.

Test Section Descriptions

There are three diagnostic program sections available. The descriptions of each section provide the expected output from that section and step.

The following sections are available for use:

Section 10	Diagnostic Trouble Tree
Section 11	Flex Sparing Trouble Tree
Section 17	External Exerciser (Interactive Section)

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Section 10—DIAGNOSTIC TROUBLE TREE

This section will execute the fault isolating diagnostic trouble tree. The algorithm follows:

1. Perform a Write Loopback followed by a Read Loopback to test the channel.
2. Issue an internal power-on SELFTEST to the device.
3. Read sector twice and compare the data.
4. Read the device FAULT LOGS and decode any entries.
5. Read the device RUN LOGS; if entries exist, perform an RO ERT on the suspect block. If the RO ERT generates an error type, output the block address and the error type generated.

Output:

```
Section 10 -- Diagnostic Trouble Tree

Write Loopback Completed

Read Loopback Completed

Device Selftest Completed

Read Sector Completed

FAULT LOG

No Drive Faults To Report
{or}
There are nnnn entries in this log

Fault log values:

Current          Target
Cyl  Head  Sect  Cyl  Head  Sect  HFR      Fault Code  Act
====  ====  ====  ====  ====  ====  =====  =====  =====
* nnnn  nnnn  nnnn * nnnn  nnnn  nnnn  BBBBBBBB  DERR nnnn  nnnn
  {or}
                                           TERR nnnn

.
. Repeat for each entry in the log
.
* nnnn  nnnn  nnnn * nnnn  nnnn  nnnn  BBBBBBBB  DERR nnnn  nnnn
  {or}
                                           TERR nnnn

"*" Indicates a PHYSICAL address -- DO NOT attempt
to spare this address
```

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{If any entries were printed}

The HFR values are:

01234567

=====

XXXXXX1 Spin-up failed
XXXXXX1X Servo timing error
XXXXXX1XX Heads off track
XXXX1XXX AGC error
XXX1XXXX Sector timing error
XX1XXXXX Data overrun
X1XXXXXX Unused
1XXXXXXX Unused

Any (E) after the fault code indicates an event,
and an (F) indicates a fault.

Activity indicator values:

0 = no seeks	
1 = 1 seek	
2 = 2 seeks	
3 = 3 seeks	
4 = 4 seeks	
5 = 5 - 7 seeks	(1 sec)
6 = 8 - 200 seeks	(1 - 30 sec)
7 = 201 - 2000 seeks	(30 sec - 5 min)
8 = 2,001 - 12,000 seeks	(5 - 30 min)
9 = 12,001 - 25,000 seeks	(30 - 60 min)
10 = 25,001 - 150,000 seeks	(1 - 6 hours)
11 = 150,001 - 600,000 seeks	(6 - 24 hours)
12 = 600,001 - 4,000,000 seeks	(1 - 7 days)
13 = 4,000,001 - 16,000,000 seeks	(1 - 4 weeks)
14 = 16,000,001 - 100,000,000 seeks	(1 - 6 months)
15 = > 100,000,000 seeks	(> 6 months)

{Note: The above table is specific to HP7936/37 drives.
The values in this table will be changed
appropriately for other drive types.}

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RUN LOG

No Drive Run Log Entries

{or}

Performing RO ERT On Run Log Entries

{If error type found}

Logical			Error		
Cyl	Head	Sect	Type	Count	Error
====	====	====	=====	=====	=====
nnnn	nnnn	nnnn	XXX	nnnn	BBBBBBBB
nnnn	nnnn	nnnn	XXX	nnnn	BBBBBBBB

. Repeat for each entry generated

.
nnnn nnnn nnnn XXX nnnn BBBBBBBB

The error types are:

COR = ECC correctable error

UNC = ECC correctable error

UNR = unrecoverable error

*** = decode error manually

The Error values are:

XXXXXXX0 ECC found correctable error
XXXXXXX1 ECC found uncorrectable error
XXXXXXXI not used
XXXXXXXI Error found in sector header
XXXXXXXI Error found in sector body
XXXIXXXX CRC byte(s) in error
XXIXXXXX Parity error bit set
XIXXXXXX data underrun detected
IXXXXXXX ECC byte(s) in error

{Note: The above table is specific to HP7936/37 drives.
The values in this table will be changed
appropriately for other drive types.}

End of Section 10 -- Diagnostic Trouble Tree

FOR HP INTERNAL USE ONLY

Section 11—FLEX SPARING TROUBLE TREE

This section is designed to determine if the drive read/write PCA or a sensitive data pattern is the probable cause of excessive sparing or excessive entries in the run log.

Output:

Section 10 -- Flex Sparing Trouble Tree

{if ERRONLY is not on}

This section may take several minutes to complete and should be run only when drive sparing problems are suspected.

Do you wish to continue (Y/N) [N]?

{if continue}

No Problem Found

{or}

Suspect Read/Write PCA Defect

{or}

HP7936/37FL Read/Write PCA Sensitive To The Following Pattern:

```
0:  HH HH HH HH HH HH HH HH HH HH
10: HH HH HH HH HH HH HH HH HH HH
.
.
250: HH HH HH HH HH HH HH HH HH HH
```

Please Contact The HP7936/37 Support Engineer And Relay The Above Information.

{or}

Performing an extensive WTR ERT on suspect block

nnnn% completed

nnnn% completed

.

.

.

nnnn% completed

Media Defect Detected By Extensive WTR ERT. Media Defect Not Detected by HP7936/37FL Sparing Algorithm.

Please Contact The HP7936/37 Support Engineer And Relay The Above Information.

{if spare was performed}

Status -- including address affected by spare

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{or}

Performing an extensive WTR ERT on suspect block

nnnn% completed
nnnn% completed

.
.
.

nnnn% completed

HP7936/37FL media sensitive to the following pattern:

0: HH HH HH HH HH HH HH HH HH HH
10: HH HH HH HH HH HH HH HH HH HH

.
.

250: HH HH HH HH HH HH HH HH HH HH

Please Contact The HP7936/37 Support Engineer And
Relay The Above Information.

{if spare was performed}

Status -- including address affected by spare

End of Section 10 -- Flex Sparing Trouble Tree

Possible Error Messages:

Data was not recoverable and was lost. If data recovery
is needed, it should be performed.

Address:

Cylinder = nnnn

Head = nnnn

Sector = nnnn

Section 17—EXTERNAL EXERCISER

The Flex External Exerciser is an interactive program which provides the user with access to the set of internal diagnostics and utilities within a Flex disk. This section explains what different kinds of data the exerciser can provide, how that information is generated and describes the commands available to the user. To run the External Exerciser select Section 17 of the FLEXDIAG diagnostic. The FLEXDIAG prompt appears indicating that the Exerciser is waiting for a command from the user. Refer to the Command Descriptions and the Exerciser Command Format explanations below for further details.

Error-Rate Testing

Error-rate tests are powerful tools used to determine media integrity within a FLEX device. These tests can find correctable and uncorrectable read errors and provide information concerning each error, such as the address where the error occurred, the type of error, and the number of times it has occurred. This information can be displayed to the user and/or logged on the disk maintenance tracks, which are reserved for such use. These tracks provide nonvolatile storage, not only for error-rate test errors, but also for spare track addresses, drive faults, and special worst case data patterns which are written on the disk in certain error-rate tests.

All error rate tests allow the user to input a loop count when requesting the test. Each time an error is detected during the test, the test will stop, report the error, and then resume testing until the loop count has been satisfied. The loop count is not a count of the number of errors, but rather the number of passes the device will execute during the error-rate test. The following information will be reported for each error that occurs:

- An error information byte
- The loop count when the error occurred
- The current physical address
- The current logical address
- The byte number at which the error begins
- A bit map of the bits that were in error



There are two general types of error rate tests that can be performed. The first type, called a read only error rate test, is a nondestructive test which reads data from the disk and attempts to detect any read errors that occur. There are two error-rate tests available in this category:

Read Only Error-Rate Test

Sequentially reads the current data on the disk in a specified area of the media.

Random Read Only Error-Rate Test

Reads 256 random sectors of random length data. This test allows read errors to be detected on a large portion of the media in a minimum amount of time.

The second type of error-rate test, called a write-then-read error-rate test, is a destructive test which writes data onto the media and subsequently reads it back, attempting to detect such things as sensitive bit patterns, read errors, and media defects. When requesting an error-rate test in this category, the user is allowed to specify a pattern to be used in the test. This pattern can be defined and edited via the SET PATTERN command. If the user chooses not to enter a pattern, a choice will also be given to use worst case data patterns already residing on the disk maintenance tracks, or random data generated by the disk. There are two types of write-then-read error-rate tests available to the user:

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Pattern Write-Then-Read Error-Rate Test	Sequentially writes a specific data pattern over a specified area of the media and then reads back all of the data that was written.
Random Write-Then-Read Error-Rate Test	Writes-then-reads 256 randomly generated data patterns of random length at random locations on the media. This test locates errors that occur over a large area of the media in a minimum amount of time.

Error Logging

During run-time, the error correction circuitry of the drive is enabled. If an error is detected that cannot be corrected by this circuitry, it will be logged to an area of random access memory (RAM) on the drive that is used to record up to 5 uncorrectable data errors. If this area becomes full during run-time, which is defined to be any time in which a test, diagnostic, or utility is not being performed, the device requests release so that it can log the error information in the run-time drive error log on the maintenance tracks. All error logging is done automatically by the drive.

When error-rate tests are run, the error correction circuitry is disabled, thus allowing correctable and uncorrectable errors to be logged. These errors are logged in the same manner as run-time errors, assuming the user requested errors to be logged, except when the RAM is full, in which case the drive requests release and logs the errors to the error-rate test log, also on the maintenance tracks. When the error-rate test begins, a preset drive utility is issued, which forces any errors recorded in the RAM area to be logged to the maintenance tracks, and then the RAM area is cleared, thus avoiding confusion between old errors and ones detected during the error-rate test.

One additional log, the fault log, exists on the maintenance tracks. This log is used to store all drive and controller faults which have occurred since the last time the logs were cleared.

Sparing

All FLEX disk drives provide the means to replace defective sectors or tracks with good ones. This operation is referred to as "sparing". Each track on a FLEX drive contains one extra sector which does not appear in the user's data space. This sector is set aside as a spare sector to be used in the event that a bad sector is found somewhere on the track and needs to be removed. By using the SPARE command, the spare sector can be substituted for the bad sector. If more than one bad sector appears on the track, the entire track would be spared using one of several spare tracks on the disk set aside for this purpose.

The SPARE operation is very different for FLEX drives than with CS/80 drives. An option is provided with the SPARE command to either execute a spare retaining data with ERT or a spare retaining data without ERT. The following algorithm will explain these options.

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Spare retaining data with ERT.

1. The target sector is read into the data buffer saving the current ECC syndrome which indicates uncorrectable (read full sector).
2. Get a spare track.
3. Read the target track into the buffer.
4. Place the target track on the spare track keeping the uncorrectable sectors. The number of passes over the spare and target tracks depend on the number of uncorrectable errors.
5. Do a read and verify of the spare track matching the uncorrectable errors with those of the target track.
6. Perform a WTR ERT on the target sector.
7. If the ERT passes, the media is good. Restore the data, return good status, and free up the spare track.
8. If the ERT detected uncorrectable errors, continue sparing.
9. If the spare sector was available on the original target track then place the data back on the original target track using the spare sector, read and verify the original target track and mark the spare track available.
10. If the spare sector is not available on the original target track then mark the original target track as spared.
11. Return good status.

Spare retaining data without ERT is the same except no WTR ERT is performed on the target sector.

The data in the target sector will always be rewritten. If the data is ECC uncorrectable, it will be rewritten as unrecoverable. A write must now be performed to this sector to remove this error.

Command Descriptions

When the external exerciser is invoked, the following prompt will be displayed to the user:

FLEXDIAG>

When the prompt appears, the exerciser is waiting for a command from the user. The available commands are listed in this section in alphabetical order accompanied by descriptions. Each command description is in the following format:

COMMAND NAME

Description:

Explanation of what the command does and when it should be used.

Input :

FLEXDIAG>COMMAND NAME

The prompt for this exerciser is FLEXDIAG>. The appearance of this prompt indicates that the exerciser is waiting for the user to input a command.

Output :

Information printed as a result of this command being executed

There are several conventions used throughout this section in the command formats. They are as follows:

- nnnn* refers to a decimal number of any magnitude that is output by the diagnostic.
- vvv* refers to a decimal number of variable magnitude that must be input by the user.
- H* refers to a hexadecimal digit (0-F).
- O* refers to an octal digit (0-8).
- B* refers to a binary digit (0-1).

Any text enclosed in parenthesis indicates that the user is expected to input that text in response to a query from the diagnostic. Text enclosed in square brackets indicates the default response that will be assumed if the user simply hits (Return) in response to the query. For example, the user may be asked if the program should continue by the following question:

Do you wish to continue (Y/N) [N]?

The text enclosed in the parenthesis (i.e. "Y / N") indicates that the user is to type either a "Y" or an "N" in response to the question. Each option is separated by a "/". The default response in this case would be "N", as indicated by the [N] prior to the question mark. If there is no default response listed (enclosed in square brackets), the user will not be allowed to "default" the input by only entering a (Return).

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Comments in the input and output sequences are in *italics* and are not output by the program. For example, following the question in the previous example, the input sequence would probably look something like the following:

{if response was N this command will terminate}

Error messages will be preceded by three asterisks (***) and will be in all upper case letters. Other messages will not be all upper case and will not be preceded by the asterisks.

If the user enters a command in response to a prompt and that command is not recognized as an exerciser command, the following message will be displayed:

```
***YOUR RESPONSE WAS INVALID
FLEXDIAG>
```

This message simply means that the command entered is not part of the command set for the external exerciser.

When the user enters a command that is recognized by the external exerciser, that command will then be processed as according to the corresponding command description given in one of the following sections of this document. If an error is encountered as a result of issuing a FLEX command to the device, the status that is returned by the device will be displayed to the user. Status information is returned via two methods, a twelve byte Status Message or a four byte IMS message. Status messages are used to indicate a problem occurred in the transaction, but the transaction was able to continue to report phase. The IMS message is used to indicate a problem that did not allow a transaction to continue to the report phase. Both messages use the same basic format, and any common errors have the same values.

Status message categories:

- Hardware Error
- Access Error
- Information Error

IMS message categories

- Cancel Error
- Command Error
- Message Length
- Reset
- Resource Information
- Hardware Error
- Link Protocol
- Port Events

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{STATUS MESSAGE}

```
>>>>>>>>>>> Hardware Error <<<<<<<<<<<<<
Diagnostic failure
Unit hardware fault
Controller hardware fault

>>>>>>>>>>> Access Error <<<<<<<<<<<<<
Spare Block cannot be executed -- No spare media available
Defective spare has been detected
  Address of defective block is:
  Block address = nnnn
    or
  Vector address =
  Cylinder = nnnn   Head = nnnn   Sector = nnnn
Unrecoverable data overflow
Address of first defective block is:
  Block address = nnnn
    or
  Vector address =
  Cylinder = nnnn   Head = nnnn   Sector = nnnn
Unrecoverable data has been detected
Address of defective block is:
  Block address = nnnn
    or
  Vector address =
  Cylinder = nnnn   Head = nnnn   Sector = nnnn
End of volume encountered
Sparging Error -- To Many Auto Spares

>>>>>>>>>>> Information Error <<<<<<<<<<<<<
Only one spare track remains on the disc
Marginal data recovered with much difficulty
  Address of defective block is:
  Block address = nnnn
    or
  Vector address =
  Cylinder = nnnn   Head = nnnn   Sector = nnnn
Error and fault log areas (maintenance tracks) are full
A defective block has been spared
  Address of defective block is:
  Block address = nnnn
    or
  Vector address =
  Cylinder = nnnn   Head = nnnn   Sector = nnnn

>>>>>>>>>>>>> DERRORS <<<<<<<<<<<<<<<<
Drive error numbers = nnnn, nnnn, nnnn, nnnn
```

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ADDRESS

This **Normal Mode** command allows the user to convert block addresses to 3-vector addresses and vice versa. This conversion will be made using the maximum address for the device that is currently selected. This maximum address will be obtained via the FLEX (extended) describe command.

Input :

FLEXDIAG>ADDRESS

Do you want to convert from block or 3-vector
addresses (B/V) [V]?

{if response was B}

Enter block address (<cr> to keep current value) --
Block address(nnnn - nnnn) = nnnn?

{if response was V}

Enter 3-vector address (<cr> to keep current values) --
Cylinder address(nnnn - nnnn) = nnnn?
Head address(nnnn - nnnn) = nnnn?
Sector address(nnnn - nnnn) = nnnn?

Output :

ADDRESS UTILITY

Selected device is an HPXXXX disk drive

{for block addresses to 3-vector addresses}

Block address nnnn is equivalent to 3-vector address:
Cylinder = nnnn Head = nnnn Sector = nnnn

{for 3-vector addresses to block addresses}

3-vector address:
Cylinder = nnnn Head = nnnn Sector = nnnn
is equivalent to block address nnnn

ADDRESS UTILITY COMPLETED

FOR HP INTERNAL USE ONLY

CLEAR COMMAND

This **Destructive Mode** command provides the user with the means of performing several different types of clear operations on the selected drive. Prior to issuing the clear command, a **FLEX PRESET** command will be issued to force logging of all errors that are currently stored in RAM. This is necessary since the clear command will clear this RAM.

Input :

```
FLEXDIAG>CLEAR COMMAND
```

The clear options are:

- C - Configure Clear
- R - Reset Clear

Which clear do you want (C/R)[C]?

Output :

```
CLEAR COMMAND UTILITY  
Selected device is an HPXXXX disk drive
```

```
Preset completed successfully
```

```
{if reset clear}
```

```
Reset clear was successful
```

```
Configure clear was successful
```

```
CLEAR COMMAND UTILITY COMPLETED
```


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CLEAR LOGS

This **Normal Mode** command is used to clear the Run-Time Drive Error Log, the Error-Rate Test Drive Error Log, and the Drive Fault Log. The user will be given the option of clearing all of the logs or just the Error-Rate Test Drive Error Log, which would allow the logging of multiple executions of error-rate tests.

Input :

FLEXDIAG>CLEAR LOGS

```
*****  
*                               CAUTION                               *  
*   This command will destroy service related   *  
*   information.                               *  
*****
```

Do you wish to continue(Y/N)[N]?

{if yes}

Clear logs

0 - all logs

1 - ert logs

Which log[0]?

Output :

CLEAR LOGS UTILITY

Selected device is an HPXXXX disk drive

All log(s) cleared

{or}

ERT log(s) cleared

CLEAR LOGS UTILITY COMPLETED

FOR HP INTERNAL USE ONLY

DESCRIBE

This **Normal Mode** command will obtain a FLEX (extended) describe message from the device being tested and display the contents to the user in text form. The information in the describe message includes such things as device parameters that are used by system drivers.

Input :

FLEXDIAG>DESCRIBE

Output :

```
DESCRIBE UTILITY
Selected device is an HPXXXX disk drive

Describe Information:
The following unit(s) are installed:
  nnnn nnnn
Maximum transfer rate = nnnn Kbytes per second
Controller type =
  Integrated Single-Unit
  or Integrated Multi-Unit
  or Integrated Multi-Port
  or PBUS Only
Port ID = nnnn
Number of host ports provided by controller = nnnn
{If UNIT TEST LEVEL}
Unit number = nnnn
{If MECHANISM TEST LEVEL}
Device is a nnnn fixed-disk
  or removable disk
Block size = nnnn bytes
Buffer size = nnnn blocks
{If UNIT TEST LEVEL}
Burst mode is not recommended

  {or}
Recommended burst size = nnnn bytes
{If MECHANISM TEST LEVEL}
ESDI Interface
  {or}
SCSI Interface
Block transfer time = nnnn microseconds
Average transfer rate = nnnn Kbytes per second
```

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{If UNIT TEST LEVEL}
Optimal retry time = nnnn 10's of milliseconds
{If UNIT TEST LEVEL}
Maximum access time to data = nnnn 10's of milliseconds
Maximum interleave = nnnn
Volume number = nnnn

	Maximum Addresses				Sector
Cyl	Head	Sect	Block		Interleave
====	====	====	=====		=====
nnnn	nnnn	nnnn	nnnn		nnnn

DESCRIBE UTILITY COMPLETED

FOR HP INTERNAL USE ONLY

DIAG

This **Normal Mode** command will initiate internal diagnostic tests which reside in the disk drive. The tests which can be selected are device dependent and are fully described in the support documentation for each type of drive.

Input :

FLEXDIAG>DIAG

```
*****
*                CAUTION                *
*   This command MAY tie up the system for   *
*   long as it takes to fo finish the test.   *
*****
```

Do you wish to continue (Y/N) [N]?

Input the loop count (nnnn <= count <= nnnn) [nnnn]?

Output :

```
INITIATE DIAGNOSTIC UTILITY
Selected device is an HPXXXX disk drive

Loop = nnnn, Diag # = nnnn, Unit # = nnnn

INITIATE DIAGNOSTIC UTILITY COMPLETED
```



Possible Error Messages:

```
*** DEVICE ENCOUNTERED AN ERROR WHILE EXECUTING THE
FLEX INITIATE DIAGNOSTIC COMMAND
```

```
STATUS = { status }
```

FOR HP INTERNAL USE ONLY

ERT LOG

This **Normal Mode** command allows the user to access the Error-Rate Test Data Error Log which contains an accumulation of all read errors which were detected during error-rate tests. These errors accumulate until the CLEAR LOGS command is used to clear them. The errors in this log are organized according to head number.

Input :

FLEXDIAG>ERT LOG

Display the errors for all heads (Y/N)[Y]?

{if response was N}

Input the head number [nnnn] (nnnn - nnnn)?

Output :

ERT LOG UTILITY

Selected device is an HPXXXX disk drive

Error Rate Test Log Values

=====

Head number = nnnn
Number of sectors read = nnnn
Correctable errors = nnnn
Uncorrectable errors = nnnn

There are no log entries for this head
or

Logical			Error		
Cyl	Head	Sect	Type1	Count	Error
====	====	====	=====	=====	=====
nnnn	nnnn	nnnn	XXX	nnnn	BBBBBBBB
nnnn	nnnn	nnnn	XXX	nnnn	BBBBBBBB

. Repeat for each entry in the log

.
nnnn nnnn nnnn XXX nnnn BBBBBBBB

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{if any entries were printed}

Do you wish to see error byte decoding information(Y/N)[N]

{if yes}

The error types are:

CDR = ECC correctable
UNC = ECC uncorrectable
UNR = unrecoverable error
" = decode error manually

The Error values are :

00000000 ECC found correctable error
00000001 ECC found uncorrectable error
00000010 not used
00000100 Error found in sector header
00001000 Error found in sector body
00010000 CRC byte(s) in error
00100000 Parity error bit set
01000000 data underrun detected
10000000 ECC byte(s) in error

*{Note: The above table is specific to HP7936/37 drives.
The values in this table will be changed
appropriately for other drive types.}*

ERT LOG UTILITY COMPLETED

FOR HP INTERNAL USE ONLY

EXIT

This **Normal Mode** command terminates execution of the External Exerciser. It may be entered any time the FLEXDIAG> prompt appears.

Input :

FLEXDIAG>EXIT

Output :

End of Section 17 - External Exerciser

FOR HP INTERNAL USE ONLY

FAULT LOG

This **Normal Mode** command allows the user to access the Drive Fault Log which contains an accumulation of all faults that have occurred on the drive since the last CLEAR LOGS command was executed. If the cylinder address in any of the entries is followed by a *, this indicates that the address is physical. Thus, a spare **MUST NOT** be attempted using this address since the SPARE command uses only logical addresses. Fault Code values are displayed in decimal.

Inpnt :

FLEXDIAG>FAULT LOG

Output :

FAULT LOG UTILITY
Selected device is an HPXXXX disk drive

No drive faults to report
{or}
There are nnnn entries in this log

Fault log values:

Current			Target			HFR	Fault Code
Cyl	Head	Sect	Cyl	Head	Sect		
====	====	====	====	====	====	=====	=====
*	nnnn	nnnn	nnnn	* nnnn	nnnn	nnnn	BBBBBBBB DERR nnnn
.							or
.							TERR nnnn
.	Repeat for each entry in the log						
.							
	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	BBBBBBBB DERR nnnn
							or
							TERR nnnn

*** Indicates a PHYSICAL address -- DO NOT attempt to spare this address

{if any entries were printed}

Do you wish to see HFR decoding information(Y/N)[N]?

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{if Yes}

The HFR values are:

01234567

=====

00000001 spin-up failed
00000010 servo timing error
00000100 heads off track
00001000 AGC error
00010000 sector timing error
00100000 data overrun
01000000 unused
10000000 unused

Any (E) after the fault code indicates an event,
and an (F) indicates a fault.

Activity indicator values:

0 = no seeks
1 = 1 seek
2 = 2 seeks
3 = 3 seeks
4 = 4 seeks
5 = 5 - 7 seeks (1 sec)
6 = 8 - 200 seeks (1 - 30 sec)
7 = 201 - 2000 seeks (30 sec - 5 min)
8 = 2,001 - 12,000 seeks (5 - 30 min)
9 = 12,001 - 25,000 seeks (30 - 60 min)
10 = 25,001 - 150,000 seeks (1 - 6 hours)
11 = 150,001 - 600,000 seeks (6 - 24 hours)
12 = 600,001 - 4,000,000 seeks (1 - 7 days)
13 = 4,000,001 - 16,000,000 seeks (1 - 4 weeks)
14 = 16,000,001 - 100,000,000 seeks (1 - 6 months)
15 = > 100,000,000 seeks (> 6 months)

{Note: The above table is specific to HP7936/37 drives.
The values in this table will be changed
appropriately for other drive types.}

FAULT LOG UTILITY COMPLETED

FOR HP INTERNAL USE ONLY

HELP

This **Normal Mode** command provides the user with access to information concerning the commands that are available in the external exerciser. The user may request a list of the available commands accompanied by a brief description of each, or individual command descriptions. For individual commands, the user can request a description and syntax or just the syntax.

Input :

FLEXDIAG>HELP [command name or <cr>]

Output :

{If no command name was given (i.e.[RETURN])}

The following commands are available:

ADDRESS - converts block addresses to 3-vector and visa versa

CLEAR COMMANDS - provides access to Configure Clear or ...

.

.

WTR ERT - performs a write-then-read error rate test on
the device

{If a command was given}

Do you want a description or just syntax (D/S)[D]?

{If response was D}

COMMAND DESCRIPTION:

Description of the command

Syntax of the command

{If response was S}

COMMAND SYNTAX:

Syntax of the command

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INIT MEDIA

This command (**Normal Mode** for the *Initialize Maintenance Tracks* option; **Destructive Mode** for all other options) allows the user to format the disk's media. The user has the option of retaining all spares that have been made on the disk, or of retaining only factory spares. The user also has the option of initializing maintenance tracks. All data on the disk may be destroyed by this command. It is essential that extensive error-rate testing be performed and that all questionable sectors be spared after executing this command.

Input :

FLEXDIAG>INIT MEDIA

{If *NORMAL* mode access}
Initialize maintenance tracks (Y/N) [N]?
{or}
{If *DESTRUCTIVE* mode access}

* CAUTION *
* This command may destroy user data. *

Do you wish to continue (Y/N) [N]?

{if yes}

Do you want to:
M = initialize the maintenance tracks
P = retain only primary spares
A = retain all spares

Which option would you like [A] ?

Output :

INIT MEDIA UTILITY
Selected device is an HPXXXX disk drive

{if response was M}
format - initialize maintenance tracks

{if response was A}
format - retain all spares

{if response was P}
format - retain only primary spares

Media is being initialized -- may take several minutes

Media has been successfully initialized

INIT MEDIA UTILITY COMPLETED

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LOOPBACK

This **Normal Mode** command will perform a write loopback of 256 bytes of data on the channel using the pattern—255,0,1, . . . ,254. This operation will be followed by a read loopback of 256 bytes, which will be compared with the expected pattern to verify correct transmission. The pattern sent in the read loopback is generated from Read-Only Memory (ROM) in the disk drive, and should be the same as the pattern specified above in the write loopback.

Input:

FLEXDIAG> LOOPBACK

Output:

LOOPBACK UTILITY
Selected device is an HPXXXX disk drive

LOOPBACK UTILITY COMPLETED

Possible Error Messages:

*** ERROR IN TRANSMISSION DETECTED DURING READ
LOOPBACK TEST: (FLEXERR 115)

Bit Positions

Byte #	Octal Value Transmitted	Octal Value Received	In Error
12	56	54	00000010
33	127	63	01100100
.			
.			
241	74	72	00000110

{Note: -- entries in the preceding table will be printed for as many errors as were detected, unless the ERRNUM value is exceeded}

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MEDIA TEST

This **Destructive Mode** command enables the user to test the hardware/data path of the drive. This is done by performing variable length and variable location writes, followed by reads of the same length and location. The user is given the choice of testing a selected area or a random area. The option is also provided of selecting an internal pattern, or random pattern data, to be used in the test. This command will destroy data on the disk.

Input:

```
FLEXDIAG> MEDIA TEST

*****
*                               *
*           CAUTION             *
*   This command may destory user data.   *
*                               *
*****

Do you wish to continue (Y/N) [N]?

Clear the drive logs (Y/N) [N]?

Types of media tests:
  P = selected area media test
  R = random area media test
Enter the test type [P]?

{If not random area}
  Do you want block or 3-vector addresses (B/V)[V]?

{If response was B}
  Enter new address (<cr> to keep current value)
  Block address (nnnn - nnnn) = nnnn?

{If response was V}
  Enter new address (<cr> to keep current value)
  Cylinder address (nnnn - nnnn) = nnnn?
  Head address (nnnn - nnnn) = nnnn?
  Sector address (nnnn - nnnn) = nnnn?
```

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Test Area:

V = volume
H = head
C = cylinder
T = track
S = sector

Enter the test area [T]?

Do you want:

R = random transfer length
U = user input transfer length

Which option would you like (R/U) [U]?

{If response was U}

Input transfer length (nnnn <= sectors <= nnnn) [nnnn]?

The sources for the data pattern to be used are:

I - Internal pattern
R - Random pattern
U - User input pattern

Which pattern source would you like (I/R/U) [I]?

{If reply was U}

Input the pattern in hex:

Input the loop count (nnnn<= count <=nnnn) [nnnn]?

FOR HP INTERNAL USE ONLY

Output:

MEDIA TEST UTILITY
Selected device is an HPXXXX disk drive

Preset in progress...
Preset was successful

{If clear logs}
All log(s) cleared

Test Area = Volume starting at Cyl = nnnn, Head = nnnn, Sec = nnnn
{or}
Test Area = Head starting at Cyl = nnnn, Head = nnnn, Sec = nnnn
{or}
Test Area = Cyl starting at Cyl = nnnn, Head = nnnn, Sec = nnnn
{or}
Test Area = Track starting at Cyl = nnnn, Head = nnnn, Sec = nnnn
{or}
Test Area = Sec starting at Cyl = nnnn, Head = nnnn, Sec = nnnn

{If no errors detected}
No errors were detected in the media test

MEDIA TEST UTILITY COMPLETED

Possible Error Messages:

{If errors were detected}
*** ERROR IN TRANSMISSION DETECTED DURING WRITE/READ
MEDIA TEST: (FLEXERR 124)

Bit				Hex	Hex	Positions	
Cyl	Hd	Sect	Byte	Value	Value	In Error	Time Error Occurred
=====				====	====	=====	=====
nnnn	nnnn	nnnn	nnnn	HH	HH	BBBBBBBB	FRI, DEC 16, 1988 9:03 PM
nnnn	nnnn	nnnn	nnnn	HH	HH	BBBBBBBB	FRI, DEC 16, 1988 9:03 PM
.	Repeat for each occurrence						.
nnnn	nnnn	nnnn	nnnn	HH	HH	BBBBBBBB	FRI, DEC 16, 1988 9:03 PM

FOR HP INTERNAL USE ONLY

PRESET DRIVE

This **Normal Mode** command is used to force the errors in the drive's RAM to be logged. This type of operation is necessary before issuing a **RESET CLEAR** command which will result in these logs being cleared.

Input :

```
FLEXDIAG>PRESET DRIVE
```

Output :

```
PRESET DRIVE UTILITY  
Preset completed successfully  
  
PRESET DRIVE UTILITY COMPLETED
```


FOR HP INTERNAL USE ONLY

PRINT PHYSICAL

This **Normal Mode** command is used to enable the printing of **PHYSICAL** addresses in the **FAULT** logs.

Input:

```
FLEXDIAG> PRINT PHYSICAL
```

Output:

```
Print physical address enabled  
{or}  
Print physical address disabled
```

FOR HP INTERNAL USE ONLY

READ

This **Normal Mode** command allows the user to access any data block on the selected device. Due to obvious potential security compromise, the user will need to possess Level 0 security to use this command.

Input :

FLEXDIAG>READ

Do you want block or 3-vector addresses (B/V)[V]?

{if response was B}

Enter new address (<cr> to keep current value) --
Block address(nnnn - nnnn) = nnnn?

{if response was V}

Enter new address (<cr> to keep current value) --
Cylinder address(nnnn - nnnn) = nnnn?
Head address(nnnn - nnnn) = nnnn?
Sector address(nnnn - nnnn) = nnnn?

Output :

READ UTILITY

Selected device is an HPXXXX disk drive

The data in hex follows:

	0	1	2	3	4	5	6	7	8	9	
0:	HH	HH	HH	HH	HH	HH	HH	HH	HH	HH	.....
10:	HH	HH	HH	HH	HH	HH	HH	HH	HH	HH	.....
.											
.											
250:	HH	HH	HH	HH	HH	HH					.....

{Note: the dots in the preceding table represent non-alpha-numeric ASCII characters. Alpha-numeric characters will be printed.}

READ UTILITY COMPLETED

FOR HP INTERNAL USE ONLY

REV

This **Normal Mode** command allows the user to read the revision numbers of the ROM's that contain the firmware installed in the device.

Input :

FLEXDIAG>REV

Output :

REVISION UTILITY
Selected device is an HPXXXX disk drive

Firmware Revision Values:
Part Number Revision Number
===== =====
nnnn nnnn - nnnn
nnnn nnnn - nnnn
nnnn nnnn - nnnn
nnnn nnnn - nnnn
nnnn nnnn - nnnn
nnnn nnnn - nnnn
nnnn nnnn - nnnn

REVISION UTILITY COMPLETED

FOR HP INTERNAL USE ONLY

RFSECTOR

This **Normal Mode** command allows the user to read a full sector of data from the disk starting at any valid address. The sector header is displayed along with the data in the sector. Due to obvious potential security compromise, the user will need to possess Level 0 security to use this command.

Input :

FLEXDIAG>RFSECTOR

Do you want to access PHYSICAL addresses (Y/N) [N]?

{if response was Y}

Enter new address (<cr> to keep current value) --
PHYSICAL cylinder address (nnnn - nnnn) = nnnn?
PHYSICAL head address (nnnn - nnnn) = nnnn?
PHYSICAL sector address (nnnn - nnnn) = nnnn?

{if response was N}

Enter new address (<cr> to keep current value) --
Cylinder address (nnnn - nnnn) = nnnn?
Head address (nnnn - nnnn) = nnnn?
PHYSICAL Sector address (nnnn - nnnn) = nnnn?

Output :

READ FULL SECTOR UTILITY
Selected device is an HPXXXX disk drive

Physical spare = nnnn
Physical sector = nnnn
Head = nnnn
Logical Cylinder = nnnn
No sector sparing has occurred

{Note: Sector Status will be 1 for tracks that have not used spare sector. Otherwise it will be the physical spare sector.}

FOR HP INTERNAL USE ONLY

Header values (Hex):

0 1 2 3 4 5

0: HH HH HH HH HH HH

The data follows (Hex):

0 1 2 3 4 5 6 7 8 9

0: HH HH HH HH HH HH HH HH HH HH HH

10: HH HH HH HH HH HH HH HH HH HH HH

.

.

.

250: HH HH HH HH HH HH

{Note: the dots in the preceding table represent non-alpha-numeric ASCII characters.
Alpha-numeric characters will be printed.}

READ FULL SECTOR UTILITY COMPLETED

FOR HP INTERNAL USE ONLY

RO ERT

This **Normal Mode** command is used to initiate a read only error-rate test. Two types of tests are available through this command. The first is standard read only error-rate test which allows the user to specify the address at which the test is to start. This test will sequentially read data starting at this address in an attempt to detect any read errors. The second type of test is a random read only error-rate test which uses random addresses and lengths of reads in attempt to detect any read errors.

Input :

FLEXDIAG>RO ERT

```
*****
*                               *
*           CAUTION             *
*   This command MAY tie up the system for   *
*   long as it takes to fo finish the test.   *
*****
```

Do you wish to continue (Y/N) [Y]?

Clear the ERT logs (Y/N) [N]?

Types of RO ERTs:
S = selected area
R = random area

Enter the test type (S/R) [S]?

Do you want block or 3-vector addresses (B/V)[V]?
{if response was B}

Enter new address (<cr> to keep current value) --
Block address(nnnn - nnnn) = nnnn?

{if response was V}
Enter new address (<cr> to keep current value) --
Cylinder address(nnnn - nnnn) = nnnn?
Head address(nnnn - nnnn) = nnnn?
Sector address(nnnn - nnnn) = nnnn?

Test Area:
V = volume
H = head
T = track
C = cylinder
S = sector
Enter the test area [T]?

Input the loop count (nnnn<= count <= nnnn) [nnnn]?

Log or Print errors (L/P) [P]?



FOR HP INTERNAL USE ONLY

Output :

RO ERT UTILITY
Selected device is an HPXXXX disk drive

Preset in progress...
Preset was successful!

{If clear ERT logs}
ERT log(s) cleared

Test Area = Volume starting at Cyl = nnnn, Head = nnnn, Sec = nnnn
{or}
Test Area = Head starting at Cyl = nnnn, Head = nnnn, Sec = nnnn
{or}
Test Area = Cyl starting at Cyl = nnnn, Head = nnnn, Sec = nnnn
{or}
Test Area = Track starting at Cyl = nnnn, Head = nnnn, Sec = nnnn
{or}
Test Area = Sec starting at Cyl = nnnn, Head = nnnn, Sec = nnnn

{if no errors detected}
No errors were detected in the ERT

{if errors were detected}
RO ERT results:

Logical			Error		
Cyl	Head	Sect	Type	Count	Error
====	====	====	=====	=====	=====
nnnn	nnnn	nnnn	XXX	nnnn	BBBBBBBB
nnnn	nnnn	nnnn	XXX	nnnn	BBBBBBBB
.	Repeat for each entry in the log				
.					
nnnn	nnnn	nnnn	XXX	nnnn	BBBBBBBB

FOR HP INTERNAL USE ONLY

{if any errors were printed}

Do you wish to see error byte decoding information(Y/N)[N]

{if yes}

The error types are:

COR = ECC correctable error
UNC = ECC uncorrectable error
UNR = unrecoverable error
" = decode error manually

The Error values are :

00000000 ECC found correctable error
00000001 ECC found uncorrectable error
00000010 not used
00000100 Error found in sector header
00001000 Error found in sector body
00010000 CRC byte(s) in error
00100000 Parity error bit set
01000000 data underrun detected
10000000 ECC byte(s) in error

*{Note: The above table is specific to HP7936/37 drives.
The values in this table will be changed
appropriately for other drive types.}*

RO ERT UTILITY COMPLETED

FOR HP INTERNAL USE ONLY

RUN LOG

This **Normal Mode** command allows the user to access the Run-Time Data Error Log which contains an accumulation of all run-time data errors that have been logged since the last time the log was cleared.

Input :

FLEXDIAG>RUN LOG

Do you wish to see the errors for all heads (Y/N) [Y]?

{if response was N}

Input the head number (nnnn <= head <= nnnn) [nnnn]?

Output :

RUN LOG UTILITY

Selected device is an HPXXXX disk drive

Head number = nnnn

Number of sectors read = nnnn

Correctable errors = nnnn

Uncorrectable errors = nnnn

There are no log entries

or

Logical			Error		
Cyl	Head	Sect	Type	Count	Error
====	====	====	=====	=====	=====
nnnn	nnnn	nnnn	XXX	nnnn	BBBBBBBB
nnnn	nnnn	nnnn	XXX	nnnn	BBBBBBBB

. Repeat for each entry in the log

. nnnn nnnn nnnn XXX nnnn BBBBBBBB

{if any errors were printed}

Do you wish to see error byte decoding information(Y/N) [N]

{if yes}

The error types are:

COR = ECC correctable error

UNC = ECC uncorrectable error

UNR = unrecoverable error

" = decode error manually

FOR HP INTERNAL USE ONLY

The Error values are :

00000000	ECC found correctable error
00000001	ECC found uncorrectable error
00000010	not used
00000100	Error found in sector header
00001000	Error found in sector body
00010000	data not recovered on first retry
00100000	CRC byte(s) in error
01000000	ECC byte(s) in error
10000000	Unrecoverable error

*{Note: The above table is specific to HP7936/37 drives.
The values in this table will be changed
appropriately for other drive types.}*

RUN LOG UTILITY COMPLETED

FOR HP INTERNAL USE ONLY

SERVO TEST

This **Normal Mode** command allows the user to execute the drive's internal butterfly seek routine. It will allow the test to be performed on one or all of the drive heads. There is no data transferred with use of this command.

Input :

FLEXDIAG>SERVO TEST

```
*****
*                CAUTION                *
*   This command MAY tie up the system for   *
*   long as it takes to fo finish the test.   *
*****
```

Do you wish to continue (Y/N) [N]?

Input the loop count (1 <= count <= 254) [1] ?

Test all heads(Y/N) [N] ?

{If the response was N}

Input head (nnnn <= head <= nnnn) [nnnn]?

Output :

```
SERVO TEST UTILITY
Selected device is an HPXXXX disk drive

SERVO TEST UTILITY COMPLETED
```

FOR HP INTERNAL USE ONLY

SET PATTERN

This **Normal Mode** command will allow the user to define and edit a pattern to be used in write-then-read error-rate tests. The pattern must be input in hex and is restricted to 64 digits in length. If less than 64 digits are input, the pattern that was input will be duplicated as many times as necessary to produce 64 digits. If no pattern has yet been defined, the pattern that is input will be stored for use in a **WTR ERT**. If a pattern has been previously defined, via this command, that pattern will be displayed and the user can then edit that string. Valid edit characters are:

- R** for replace.
R will replace the characters in the pattern with the characters following the R, starting at the pattern character under which the R is typed.
- I** for insert.
I will insert the characters following the I into pattern following the character in the pattern under which the I is typed.
- D** for delete.
D will delete the pattern character under which the D is typed. Multiple D's may be typed to delete a succession of characters and other editing characters may follow a D (i.e., DIab" will delete one character and insert the string "ab" at that point in the pattern).

Following each edit string typed in, the resulting edited pattern will be re-displayed and the user will be given another opportunity to edit it. This process may be terminated by simply inputting a Return for the edit string.

Input :

FLEXDIAG>SET PATTERN

*{if no previous pattern has been defined}
Input the pattern in hex:*

*{if pattern contains all valid hex characters this
command will terminate}*

*{if a previous pattern has been defined or the initial pa
input contained invalid characters}*

*Input the changes (<cr> to stop):
{previous pattern is displayed here}
>*

*{if the input edit pattern is not valid then the
pattern will again be displayed and a new edit
string will be requested}*

*{this process will be repeated until user inputs a
[RETURN] only for the edit string}*

FOR HP INTERNAL USE ONLY

Output:

```
SET PATTERN UTILITY
Selected device is an HPXXXX disk drive

SET PATTERN UTILITY COMPLETED
```

FOR HP INTERNAL USE ONLY

SPARE

This command (**Normal Mode** for MPE/XL; **Destructive Mode** for HP-UX) will allow the user to spare a block or sector to an address which is reserved for sparing. The command will perform a Spare Retaining Data with an ERT. If the media of the target sector is determined to be good, the user will be given the option of performing a Spare Retaining Data without ERT. Refer to the section entitled "SPARING" in this document for the details on the sparing algorithm.

Input :

FLEXDIAG>SPARE

```
*****  
*                WARNING                *  
*      This command may destroy data.      *  
*****
```

Do you wish to continue (Y/N) [N]?

Do you want block or 3-vector addresses (B/V)[V]?

{if response was B}

Enter new address (<cr> to keep current value) --
Block address(nnnn - nnnn) = nnnn?

{if response was V}

Enter new address (<cr> to keep current values) --
Cylinder address(nnnn - nnnn) = nnnn?
Head address(nnnn - nnnn) = nnnn?
Sector address(nnnn - nnnn) = nnnn?

{If the ERT determined that the media is good}

The WTR ERT performed on the target block determined that the media is good -- MEDIA WAS NOT SPARED. If you wish to spare this media anyway, perform a spare (retain data) without ERT.

Do you wish to perform a spare (retain data) without ERT(Y/N) [N]?

FOR HP INTERNAL USE ONLY

Output :

```
SPARE UTILITY
Selected device is an HPC2204A disk drive

{If spare was performed}
{status -- including address of track affected by spare}

{If data could not be recovered}
*****
*                               WARNING                               *
* Data recovery was attempted on the target sector but the *
* data was not ECC correctable. When this data was *
* rewritten, the ECC field was modified to flag the sector *
* as unrecoverable. If data retention is needed, it *
* should be performed. To clean up the uncorrectable *
* error, a write must be performed to the target sector. *
*****

SPARE UTILITY COMPLETED
```

FOR HP INTERNAL USE ONLY

SUSPEND

This **Normal Mode** command allows the user to suspend FLEXDIAG and return to the DUI. The user enters RESUME at the DUI prompt to return to FLEXDIAG.

Input:

FLEXDIAG> SUSPEND

Output:

DUI>

FOR HP INTERNAL USE ONLY

TSTAT

This **Normal Mode** command allows the user to request a partial status of the drive. This command is useful for determining that the drive is still alive. If the drive is not alive, the status associated with the diagnostic failure is returned.

Input :

FLEXDIAG>TSTAT

Output :

TRANSPARENT STATUS UTILITY
Selected device is an HPXXXX disk drive

No status error messages to report.

{or}

STATUS = { status }

TRANSPARENT STATUS UTILITY COMPLETED

FOR HP INTERNAL USE ONLY

TABLES

This **Normal Mode** command provides access to the various information tables which reside in the drive. At present, the HP7937FL drive only supports the Spare Track table. The spare track table contains a list of all logical tracks which have been spared for each head.

Input :

FLEXDIAG>TABLES

Do you want to see the spare sectors (Y/N) [N]?

{If response is Y}

```
*****
*                CAUTION                *
*      This command MAY tie up the system for      *
*      long as it takes to fo finish the test.      *
*****
```

Do you wish to continue (Y/N) [N]?

Output :

TABLES UTILITY
Selected device is an HPXXXX disk drive

Spare Track Table:

{for each head}

Head Number = nnnn

Number of spare operations = nnnn
Number of spare tracks used = nnnn
Number of logical tracks spared = nnnn

{for each cylinder/scalar}

CYL	TYPE	SCALAR
====	=====	=====
nnnn	secondary	nnnn
nnnn	primary	nnnn

FOR HP INTERNAL USE ONLY

{If spare sectors option}

Locations of spared sectors

Logical			Spare	Type
Cyl	Head	Sect		
====	====	====		====
nnnn	nnnn	nnnn		secondary
nnnn	nnnn	nnnn		primary
.				
.	Repeat for each entry			
.				
nnnn	nnnn	nnnn		primary

TABLES UTILITY COMPLETED

TEST LEVEL

This **Normal Mode** command allows the user to select either the unit or mechanism test level. This command is required for multi-mech drives, so that the user can specify which mech is to be tested.

Input:

FLEXDIAG> TEST LEVEL

```
*****
*                               *
*                WARNING       *
* Address values set/reported from the UNIT          *
* LEVEL ARE NOT the same as those set/reported      *
* from the MECHANISM LEVEL.                          *
*                               *
* When testing from the mechanism level,            *
* address values set/reported are from the          *
* perspective of the mechanism. Do not               *
* confuse these values with those set and           *
* reported from the unit (host) level. Please       *
* consult your service manual for further          *
* details.                                           *
*****
```



Test from unit or mechanism level (U/M) [U]?

{If response was U}

What unit do you wish to select (nnnn - nnnn) [nnnn]?

{If response was M}

What mech do you wish to select (nnnn - nnnnn) [nnnn]?

Output:

TEST LEVEL UTILITY
Selected device is an HPXXXX disk drive

{If response was U}

Unit nnnn of the device has been successfully set
Address values are not set/reported from UNIT (HOST) LEVEL

{If response was M}

Mech nnnn of the device has been successfully set
Address values are not set/reported from the MECHANISM LEVEL

TEST LEVEL UTILITY COMPLETED

WTR ERT

This **Destructive Mode** command is used to initiate a write-then-read error-rate test. Two types of tests are available through this command.

Note Both of these tests will destroy data on the disk.



-
- Pattern ERT** Performs incremental writes followed by reads across a data area specified by the user. The pattern of data that is to be written and read is also specified by the user.
 - Random ERT** Does random length writes followed by reads at random locations on the disk.

Input :

FLEXDIAG>WTR ERT

```
*****  
*                WARNING                *  
*      This command may destroy data.      *  
*****
```

Do you wish to continue (Y/N) [N]?

Clear the ERT logs (Y/N) [N]?

Types of WTR ERTs:

P = selected area pattern WTR ERT

R = random area WTR ERT

Enter the test type [P]?

{If not random area}

Do you want block or 3-vector addresses (B/V) [V]?

{if response was B}

Enter new address (<cr> to keep current value) --

Block address(nnnn - nnnn) = nnnn?

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```
{if response was V}
Enter new address (<cr> to keep current values) --
  Cylinder address(nnnn - nnnn) = nnnn?
  Head address(nnnn - nnnn)    = nnnn?
  Sector address(nnnn - nnnn)  = nnnn?

Test Area:
V = volume
H = header
C = cylinder
T = track
S = sector
Enter the test area [T]?

The sources for the data pattern to be used are:
I - Internal pattern
R - Random pattern
U - User input pattern
Which pattern source would you like (I/R/P)[ I ]?
{If response was U}
Input the pattern in hex:

Input the loop count (nnnn <= count <= nnnn) [nnnn]?

Log or Print errors (L/P) [P]?

Output :

WTR ERT UTILITY
Selected device is an HPXXXX disk drive

Preset in progress...

Preset was successful!

{If clear ERT logs}
ERT logs cleared

Test Area = Volume starting at Cyl = nnnn, Head = nnnn, Sec = nnnn
{or}
Test Area = Head starting at Cyl = nnnn, Head = nnnn, Sec = nnnn
{or}
Test Area = Cyl starting at Cyl = nnnn, Head = nnnn, Sec = nnnn
{or}
Test Area = Track starting at Cyl = nnnn, Head = nnnn, Sec = nnnn
{or}
Test Area = Sec starting at Cyl = nnnn, Head = nnnn, Sec = nnnn
```

FOR HP INTERNAL USE ONLY

{if no errors detected}
No errors were detected in the ERT

{if errors were detected}
WTR ERT results:

Logical			Error		
Cyl	Head	Sect	Type	Count	Error
====	====	====	====	====	====
nnnn	nnnn	nnnn	XXX	nnnn	BBBBBBBB
nnnn	nnnn	nnnn	XXX	nnnn	BBBBBBBB
.	Repeat for each entry in the log				
.					
nnnn	nnnn	nnnn	XXX	nnnn	BBBBBBBB

{if any errors were printed}
Do you wish to see error byte decoding information(Y/N)[N]

{If yes}
The error types are:
COR = ECC correctable error
UNC = ECC uncorrectable error
UNR = unrecoverable error
" = decode error manually

The Error values are :

00000000	ECC found correctable error
00000001	ECC found uncorrectable error
00000010	not used
00000100	Error found in sector header
00001000	Error found in sector body
00010000	CRC byte(s) in error
00100000	Parity error bit set
01000000	data underrun detected
10000000	ECC byte(s) in error

{Note: The above table is specific to HP7936/37 drives.
The values in this table will be changed
appropriately for other drive types. }

WTR ERT UTILITY COMPLETED

Error and Warning Messages

The following error and warning messages are generated by FLEXDIAG. For other errors, consult the DUI section of this manual and the operating system manuals. The "!" indicates that a parameter of some sort will replace the exclamation point when the message is displayed.

100	*** WARNING -- THE I/O PATH MAY NOT BE FUNCTIONING PROPERLY (FLEXERR 100)
CAUSE	An error was detected by the Io_Path_Test service while testing the modules on the i/o path preceding the selected device.
ACTION	Execute the appropriate diagnostics on the modules preceding the selected device on the i/o path, especially on those that may have been reported as faulty in error messages immediately preceding this message. Note that the results of the execution of this instance of FLEXDIAG may be invalid.
101	*** DEVICE FAILED TO RESPOND TO ! COMMAND IN ALLOTTED TIME (FLEXERR 101)
CAUSE	No response to an i/o was received prior to the expiration of the allotted time.
ACTION	Verify that the selected disk drive is actually connected to the system. Run SYSMAP, if available, to confirm the presence of the device.
102	*** FLEXDIAG IS UNABLE TO DIAGNOSE THE SELECTED DEVICE (FLEXERR 102)
CAUSE	The selected device identified itself as something other than a FLEX CS/80 drive.
ACTION	Determine type of selected device and run the appropriate diagnostic on it.
103	*** FLEX DISC DIAGNOSTIC TERMINATING (FLEXERR 103)
CAUSE	A fatal error has been encountered.
ACTION	The specific error that was encountered should have been reported immediately prior to this message. Follow the action instructions for that error message.
104	*** A RESERVE AREA IS NOT AVAILABLE ON THIS DRIVE -- NO OPERATION WAS PERFORMED. (FLEXWARN 104)
CAUSE	There is no available area on the disk that can be written without corrupting user data. This can happen if no such area is provided by the system, or if the diagnostic is running in destructive mode, in which the location of the reserve area is unknown to the system, since the drive is locked for diagnostics.
ACTION	For systems which do not support a reserve area (e.g., HP-UX),
106	*** DESTRUCTIVE MODE REQUIRED TO EXECUTE THIS COMMAND (FLEXERR 106)
CAUSE	The diagnostic does not have access to the drive in the mode necessary to execute the selected command.
ACTION	The mode granted to a diagnostic for a selected device is system dependent. Use HELP LDEV command at the DUI for more information.

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108	*** ! COMMAND IS NOT IMPLEMENTED ON THIS DRIVE/SYSTEM (FLEXERR 108)
CAUSE	The selected operation is either not implemented on the selected drive or the system does not provide access to it.
ACTION	This operation is unavailable.
<hr/>	
109	*** DEVICE ENCOUNTERED AN ERROR WHILE EXECUTING THE FLEX ! COMMAND (FLEXERR 109)
CAUSE	The drive reported an error as a result of executing the selected operation.
ACTION	The hardware status that is displayed immediately following this message should indicate what sort of problem occurred, including a failing FRU if one is reported. If an FRU is reported, replace it and re-execute this diagnostic.
<hr/>	
110	*** THE MAXIMUM NUMBER OF ERRORS HAS BEEN EXCEEDED (FLEXERR 110)
CAUSE	The user specified error limit has been reached.
ACTION	If more errors are desired, rerun the diagnostic assigning a larger value to the ERRCOUNT parameter of the run command.
<hr/>	
111	*** UNRECOGNIZED COMMAND -- TYPE "HELP" FOR A LIST OF VALID COMMANDS (FLEXERR 111)
CAUSE	The specified command is not a valid command.
ACTION	Use the help facility to obtain a list of the commands that are valid and enter the desired command.
<hr/>	
112	*** UNRECOGNIZED REPLY WAS FOUND (FLEXERR 112)
CAUSE	The reply that was entered in response to a prompt by the diagnostic is not valid.
ACTION	Refer to the prompt that was displayed and enter a response that is within the specified list of valid responses.
<hr/>	
113	*** A NUMERICAL INPUT WAS EXPECTED BUT NOT RECEIVED (FLEXERR 113)
CAUSE	The reply that was entered in response to a prompt by the diagnostic is not a valid number.
ACTION	Reenter number using only numeric characters and valid special characters (e.g. +, -, , etc.).
<hr/>	
114	*** AN UNEXPECTED ERROR OCCURRED IN THE IO_FLEX DAR (FLEXERR 114)
CAUSE	A call to the FLEX device access routine resulted in an unexpected status return.
ACTION	Please enter an SR. Within the text of the SR report all information returned by the Diagnostic User Interface. Also state operating system, version number, DUI version and diagnostic version.
<hr/>	

FOR HP INTERNAL USE ONLY

115	*** ERROR IN TRANSMISSION DETECTED DURING READ LOOPBACK TEST: (FLEXERR 115)
CAUSE	One or more bytes of data that were received from the disk as a result of a loopback operation did not contain the expected value(s).
ACTION	Data is most likely being corrupted along the data path between the host and the drive. Check all cable connections along the path and re-execute the diagnostic. If errors persist, execute appropriate diagnostics against the modules that lay in the path between the host and the device.
<hr/>	
118	*** ERROR -- EXPECTED ! BYTES FROM THE DEVICE AND RECEIVED ! BYTES (FLEXERR 118)
CAUSE	The number of bytes in the reply from the device was not what was expected. This is most likely a result of executing the diagnostic on a drive which is not supported by it.
ACTION	Verify that the selected device is in the list of supported devices for the diagnostic (LIST ALL from the DUI). If it is, report the problem to support personnel.
<hr/>	
119	*** THIS COMMAND IS NOT SUPPORTED ON THIS DEVICE (FLEXERR 119)
CAUSE	The specified operation is not supported by the selected device.
ACTION	While other devices supported by the diagnostic may support the specified command, the selected device does not.
<hr/>	
120	*** FILE SYSTEM ERROR ENCOUNTERED WHILE RETRIEVING A MESSAGE (FLEXERR 120)
CAUSE	An error was returned while attempting to obtain a message from the catalog. The actual error will have been displayed prior to this message.
ACTION	Please enter an SR. Within the text of the SR report all information returned by the Diagnostic User Interface. Also state operating system, version number, DUI version and diagnostic version.
<hr/>	
121	*** IDENTICAL READS FROM DISC RETURNED NON-IDENTICAL DATA (FLEXERR 121)
CAUSE	A read operation was performed on the same sector twice and the data from both reads did not match exactly.
ACTION	This is most likely a hardware problem with the drive. If loopback executes correctly, the read/write board in the drive is the probable cause of the error.
<hr/>	
122	*** DATA READ FROM DISC DID NOT MATCH DATA PREVIOUSLY WRITTEN (FLEXERR 122)
CAUSE	A sector was written to the disk and immediately read back. The data read did not match exactly the data written.
ACTION	This is most likely a hardware problem with the drive. If loopback executes correctly, the read/write board in the drive is the probable cause of the error.
<hr/>	
123	*** SELECTED DEVICE IS NOT A RECOGNIZED HP DEVICE (FLEXERR 123)
CAUSE	The selected device does not identify itself with a recognized Hewlett-Packard product number or the version of diagnostic does not recognize or support the product.
ACTION	Verify visually the type of product being diagnosed. If the product is a valid Hewlett-Packard product, update the diagnostic to a version that supports the product.

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124 * ERROR IN TRANSMISSION DETECTED DURING READ/WRITE MEDIA
TEST: (FLEXERR 124)**

Cyl	Hd	Sect	Byte	Hex		Bit	Time Errors Occurred
				Value	Value	Positions	
				Trns	Recd	01234567	
=====				====	====	=====	=====

CAUSE Data written to the disk does not agree with the data read.
ACTION Verify the data path to the device using the LOOPBACK command and WTR ERT on the target sector.

140 * NO OPERATION WAS PERFORMED (FLEXERR 140)**
CAUSE Due to a previous error, which has already been reported, no operation was performed.
ACTION Refer to action instructions for previously reported error.

200 * AN ERROR WAS ENCOUNTERED WHILE ATTEMPTING TO SEND/RECEIVE
INFORMATION FROM THE USER (FLEXERR 200)**
CAUSE Due to a previous error, which has already been reported, the diagnostic was unable to communicate with the user interface process.
ACTION Refer to action instructions for previously reported error.

201 * AN ERROR WAS ENCOUNTERED IN ATTEMPTING TO RETRIEVE A MESSAGE FROM
THE CATALOG (FLEXERR 201)**
CAUSE Due to a previous error, which has already been reported, the diagnostic was unable to extract a message from its message catalog.
ACTION Refer to action instructions for previously reported error.

202 * AN ERROR WAS ENCOUNTERED IN ATTEMPTING TO CONVERT A NUMBER TO A
STRING (FLEXERR 202)**
CAUSE Due to a previous error, which has already been reported, the diagnostic was unable to convert a number to a string.
ACTION Refer to action instructions for previously reported error.

203 * AN ERROR WAS ENCOUNTERED IN ATTEMPTING A BIT EXTRACTION OPERATION
(FLEXERR 203)**
CAUSE Due to a previous error, which has already been reported, the diagnostic was unable to extract one or more bits from a number.
ACTION Refer to action instructions for previously reported error.

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204	*** THE SELECTED DEVICE COULD NOT BE OBTAINED FOR TESTING (FLEXERR 204)
CAUSE	The DUI was unable to access the device. Device may be held exclusively by another process.
ACTION	Determine the access status of the device and make the corrective requirements.
<hr/>	
205	*** DUE TO PROBLEMS WITH RETURN ADDRESSING MODE, ADDRESSES REPORTED WITH STATUS INFORMATION MAY BE INACCURATE (FLEXERR 205)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to set the return address mode on the drive.
ACTION	Refer to action instructions for previously reported error. Also, if hardware status is displayed later in the diagnostic run, the address portion of the status could be displayed in both block and 3-vector formats since the diagnostic cannot determine the mode that the disk is currently in.
<hr/>	
206	*** DUE TO PROBLEMS WITH SET BLOCK DISPLACEMENT, FLEXDIAG WILL TERMINATE TO AVOID POTENTIAL DESTRUCTION OF USER DATA (FLEXERR 206)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to successfully set the block displacement value on the drive. Since the diagnostic no longer knows what the displacement value is, it must terminate to avoid destroying data.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
207	*** DUE TO PROBLEMS WITH DESCRIBE, FLEXDIAG CANNOT FUNCTION PROPERLY AND WILL THEREFORE TERMINATE (FLEXERR 207)
CAUSE	The diagnostic was unable to successfully obtain describe data from the drive. Since the diagnostic needs this information to function correctly, the user must make the determination to continue or terminate.
ACTION	Verify that the disk is in fact a CS/80 device and that the hardware path specified is valid.
<hr/>	
208	*** AN ERROR WAS ENCOUNTERED IN ATTEMPTING TO COMMUNICATE WITH THE DIAGNOSTIC SYSTEM (FLEXERR 208)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to successfully perform a function which requires communication with the diagnostic system.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
209	*** YOUR RESPONSE WAS INVALID (FLEXERR 209)
CAUSE	The data entered in response to a prompt was not valid.
ACTION	Refer to the prompt to determine the valid responses for the particular situation and enter one of the specified valid responses.
<hr/>	

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210	*** AN ERROR WAS ENCOUNTERED WHILE ATTEMPTING TO OBTAIN DATA FROM AN I/O BUFFER (FLEXERR 210)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to get data from its i/o buffer and, therefore cannot obtain data from the device.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
211	*** AN ERROR WAS ENCOUNTERED WHILE ATTEMPTING TO PLACE DATA INTO AN I/O BUFFER (FLEXERR 211)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable place data into its i/o buffer and, therefore, cannot send data to the device.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
212	*** AN ERROR WAS ENCOUNTERED WHILE ATTEMPTING TO OBTAIN AN I/O BUFFER (FLEXERR 212)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable obtain an i/o buffer and therefore, cannot send/receive data to/from the device.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
215	*** HIGHER SECURITY IS NEEDED TO EXECUTE THIS SECTION (FLEXERR 215)
CAUSE	The user requested an operation which is restricted to users with higher security than the user possesses.
ACTION	Contact system administrator if higher security level is desired.
<hr/>	
216	*** ! BYTES WERE EXPECTED TO HAVE BEEN SENT FROM THE DISK, BUT ONLY ! WERE RECEIVED (FLEXERR 216)
CAUSE	Data returned from the device in response to a command consisted of a different number of bytes than were expected.
ACTION	This is either a firmware problem or a diagnostic software problem.
<hr/>	



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SCSI Disk Diagnostic 07/91

Introduction

The SCSI Disk Diagnostic (SCSIDISK) is designed to provide a means of testing SCSI disks on any system that supports the online diagnostics subsystem. The disks that will be tested using this diagnostic are those disks that utilize the Small Computer System Interface (SCSI) message protocol for communication with the SPU. Tests provided can:

- Perform an extensive fault isolating diagnostic trouble tree on the disk and its system interface. Defects encountered will be relayed to the user.
- Verify the integrity of the SCSI data path to the selected disk.
- Identify the product type of the selected disk.
- Perform the internal selftest on the disk.
- Obtain and decode status messages from the disk.
- Test common transactions that are used in communication between the disk and CPU to determine the integrity of these transactions.

In addition, an interactive external exerciser is provided. This exerciser provides access to internal disk diagnostics, logs, and utilities.

Defects and Enhancements

Submit defect reports and enhancement requests for this diagnostic through the STARS database referencing Product Number 30600-10043.

Auto-Diagnostics

If SCSIDISK is run as an auto-diagnostic, the following default section will be run:

Section 10 Diagnostic Trouble Tree

Minimum Configuration

The hardware running beneath SCSIDISK is of no concern to the diagnostic, as long as the online diagnostics subsystem is supported and there is at least one HP DSS SCSI disk configured on the system.

Operating Instructions

The SCSI Disk Diagnostic is part of the total online diagnostics subsystem package. It is designed to provide the user with both an on-line and off-line means of thoroughly testing any HP DSS SCSI disk on the system. With the on-line version, the functionality of system disks is limited to Non-Exclusive/Non-Destructive commands.

SCSIDISK can be run in two different modes as described below:

Non-Exclusive/Non-Destructive indicates that the user can only run tests on the device that are non-destructive to data on that device as well as other commands that may be executing. An example of a test that would not be allowed in this mode is the WTR Media Test.

Exclusive/Destructive - indicates that the user may run any test on the device. There are virtually no restrictions placed on the user in this mode and, therefore, extreme caution should be exercised by anyone running tests in Exclusive/Destructive Mode.

Default Tests

If no sections or steps are designated by the user in the RUN command the following default section will be run:

Section 10 Diagnostic Trouble Tree

RUN Command

The SCSI disk diagnostic can be accessed by the user via the Diagnostic User Interface. It is initiated using the run `scsidisk` command. Please refer to the DUI chapter for details concerning this command and its parameters. All parameters available in the run command are acceptable as parameters when running this diagnostic. Note that if the `ERRONLY` parameter is set "on", only error messages will be output by this diagnostic. Error messages can be distinguished from other messages by three "*"s preceding the text of the message (i.e., `*** MESSAGE` is an error message whereas `Message` is not). Also note that error messages are in all capital letters and other messages use some lower case. As noted in the previous section, certain modes are required in order to do certain tests. The mode needed to execute each command will be noted in the description of that command.

Test Execution

When `SCSIDISK` is run, the following header and welcome message will be displayed:

```
*****
*****                               *****
*****          SCSI DISK DIAGNOSTIC          *****
*****                               *****
*****          (C) Copyright Hewlett Packard Co. 1991          *****
*****          All Rights Reserved          *****
*****          Version n.nn.nn          *****
*****                               *****
*****
```

Welcome, Today is TUE, JUN 18, 1991 7:16 AM

At this point, the diagnostic calls `IO_Path_Test`, which is a diagnostic procedure that tests the I/O path to the device. If the status returned from this procedure call is "fail", the following message will be output:

```
*** WARNING -- THE I/O PATH TO THE DISK MAY NOT BE FUNCTIONING
    PROPERLY (SCSIERR 100)
```

Otherwise, the diagnostic issues an inquiry to the specified device to determine whether or not it is a SCSI disk. If the device does not respond to the inquiry command, the following message will be output:

```
*** DEVICE FAILED TO RESPOND TO INQUIRY COMMAND IN ALLOTTED TIME
(SCSIERR 101)
```

A second inquiry command is then issued. If this command fails, the following messages are displayed:

```
*** DEVICE FAILED TO RESPOND TO INQUIRY COMMAND IN ALLOTTED TIME
(SCSIERR 101)
```

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***** SCSI INQUIRY COMMAND FAILED. DEVICE MAY NOT BE SCSI OR INQUIRY
INFORMATION RETURNED MAY BE ERRONEOUS. SCSIIDISK MAY NOT FUNCTION
PROPERLY (SCSIERR 207)**

Do you wish to continue (Y/N)[N]:

If the user answers no the diagnostic will terminate immediately.

If a response was obtained, then the returned status is examined to determine if the device is a SCSI disk. If not, the following message will be displayed:

***** SCSIIDISK IS UNABLE TO DIAGNOSE THE SELECTED DEVICE (SCSIERR 102)**

If this message is generated, the diagnostic will terminate immediately after outputting it.

At this point, the sections specified by the user will be executed and the results output. If the user did not specify any sections the default section will be executed. If at any time, the number of errors generated reaches the limit specified by the user in the ERRCOUNT parameter of the run command, the following message will be output:

***** THE MAXIMUM NUMBER OF ERROR MESSAGES HAS BEEN EXCEEDED (SCSIERR 110)**

The diagnostic will then terminate execution. If the ERRPAUSE parameter of the RUN command was assigned a value of "on", then this diagnostic will stop after each error is generated and ask the user if the test should continue:

Do you wish to continue (Y/N)[Y]?

If the response is Y, then the test will be resumed (if possible); if the response is N, this diagnostic will terminate. the [Y] indicates that Y will be the default response if the user simply hits <CR> in response to the prompt. If the sections specified by the user were executed the number of times specified in the LOOP parameter of the run command without the number of errors exceeding the ERRNUM value, the diagnostic will terminate normally and the following message output:

SCSI Disk Diagnostic Exiting . . .

Upon termination of this diagnostic, control will return to the diagnostics subsystem.

Test Section Descriptions

This section is devoted to explaining each section in SCSIDISK. For each section, this explanation will consist of a description of the section, including the actions performed therein, the expected output from that section, and any error messages that may be generated that are worth noting. Please note that in regard to the error messages, all possible error messages that may be generated are not listed. The only error messages that are listed are those that are considered to be of special significance. For a complete list of error messages that may be generated while running SCSIDISK, please refer to the final section of this chapter.

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Section 10—DIAGNOSTIC TROUBLE TREE

This section will execute the fault isolating diagnostic trouble tree. The algorithm follows:

1. Issue an internal power-on SELFTEST to the device.
2. Read block twice and compare the data.

OUTPUT:

Section 10 -- Diagnostic Trouble Tree

Device Selftest Completed

Read Block Completed

End of Section 10 -- Diagnostic Trouble Tree

POSSIBLE ERROR MESSAGES

*** DEVICE ENCOUNTERED AN ERROR WHILE EXECUTING THE
SCSI INITIATE DIAGNOSTIC COMMAND (SCSIERR 109)

SENSE = { sense }

{Note: -- This sense printout will include the failing field
replaceable unit(s) as specified by the device}

Section 17—EXTERNAL EXERCISER

The SCSI External Exerciser is an interactive program which provides the user with access to the set of internal diagnostics, logs and utilities within a SCSI disk. The purpose of the exerciser is to aid service-trained personnel in troubleshooting SCSI disks to a field replaceable unit level.

The External Exerciser, as discussed earlier, is an interactive program that provides the user with access to the set of internal diagnostics, logs and utilities within a SCSI disk.

This section is divided into two sections. The first contains general information concerning the types of information the exerciser can provide and how that information is generated. The second section contains complete descriptions of the commands available in the exerciser.

Media Testing

Media tests are powerful tools used to determine media integrity within a SCSI device. These tests can find recoverable and unrecoverable read errors and provide information concerning each error, such as the address where the error occurred, the type of error, and the number of times it has occurred. This information can be logged on the disk maintenance tracks, which are reserved for such use. These tracks provide non-volatile storage, not only for media test errors, but also for spare track addresses, drive faults, and special worst case data patterns which are written on the disk in certain media tests.

All media tests allow the user to input a loop count when requesting the test. Each time an error is detected during the test, the test will stop, log the error, and then resume testing until the loop count has been satisfied. Note that the loop count is not a count of the number of errors, but rather the number of passes the device will execute during the media test. The following information will be reported for each error that occurs:

- The current logical address.
- The error type.
- The loop count when the error occurred.
- An error information byte.

There are two general types of media tests that can be performed. The first type, called a read only media test, is a non-destructive test which reads data from the disk and attempts to detect any read errors that occur. There are two tests available in this category:

1. **Selected Area Read Only Media Test**—Sequentially reads the current data on the disk in a specified area of the media.
2. **Random Read Only Media Test**—Reads random sectors of random length data. This allows read errors to be detected on a large portion of the media in a minimum amount of time.

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The second type of media test, called a write-then-read media test, is a destructive test which writes data onto the media and subsequently reads it back, attempting to detect such things as sensitive bit patterns, read errors, and media defects. When requesting a media test of this type, the user is allowed to specify two types of tests. The first type of test will test the complete data channel to the device. The second type will only test the device media. Two options exist for each type of write-then-read media test:

1. **Selected Area Write-Then-Read Media Test**—Sequentially writes a specified data pattern over a specified area of the media and then reads back all of the data that was written.
2. **Random Write-Then-Read Media Test**—Writes then reads randomly generated data patterns of random length at random locations on the media. This test locates errors that occur over a large area of the media in a minimum amount of time.

Error Logging

The **ACCESS LOG** command allows the user to read the entries contained in the disk drive's maintenance log. This information is available for maintenance purposes. Log information is maintained in a RAM table which is initialized from the disk maintenance log on power-on or reset. It is only posted to the disk when an error entry is added. The **ACCESS LOG** command will always return the information from the RAM log; there is no disk access.

The addresses and block counts may return physical addresses as defined by the **PRINT PHYSICAL** command.

The **ACCESS LOG** command returns the contents of the Data Log, which includes the Usage Log and the Data Error Log, or the Hardware Error Log.

The maintenance log may be cleared by the **CLEAR LOGS** command. When this command is used, ALL logs are cleared.

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Sparing

All SCSI disk drives provide the means of replacing defective sectors or tracks with good ones. This operation is referred to as “sparing”. Each SCSI drive contains extra tracks which do not appear in the user’s data space. These tracks are set aside as spare tracks to be used in the event that a bad block is found somewhere on another track and needs to be removed. By using the SCSI REASSIGN BLOCK command, the spare track can be substituted for the bad track.

The SCSIDISK EXTERNAL EXERCISER REASSIGN BLOCK command attempts to perform pseudo-intelligent sparing. Following is the algorithm:

1. Attempt to recover the data from the target block.
2. If data was recovered, perform a reassign block retaining all other track data and rewrite target block data.
3. If data was not recovered from the target block, warn of data loss and prompt to continue.
4. If a single track contains multiple defective blocks the user must select the option of reassigning multiple blocks for the selected track.

Zoned Disks

The term “zone” as applied to disk drives refers to defined areas of the media in which disk parameters vary, typically number of sectors per track. Historically, disks are formatted with a constant number of sectors on each track. This simplifies design but compromises storage efficiency since the outside diameter (OD) of a disk has more available storage area (circumferential) than does the inside diameter (ID). It follows that to maximize storage space on the disk, there should be more data stored on the OD than on the ID, in the form of more sectors per track.

Newer HP disk drives now use zone techniques to more effectively use the additional storage space on the OD. The way this is currently being done is to divide the media into discrete regions, “zones”, which are bounded by cylinder ranges. In a three-zone disk, for example, approximately the first third of the disk, beginning at Cyl 0 (OD) would have the largest number of sectors per track. The next third (approximately) would have somewhat fewer sectors per track, and the remainder of the disk at the ID would have the smallest sector count on its tracks.

This roughly maximizes storage space on the disk by fully utilizing the larger available data space on the outer cylinders of the disk.

Throughout this manual and in the diagnostic, the term “zone” or “zoned” will be used to refer to disks which use this technique.

Exerciser Command Descriptions

When the external exerciser is invoked, the following prompt will be displayed to the user:

```
SCSIDISK>
```

When the prompt appears, the exerciser is waiting for a command from the user. The available commands are listed in this section in alphabetical order accompanied by descriptions. Each command description is in the following format:

COMMAND NAME

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SHORT DEFINITION

Explanation of what the command does and when it should be used.

INPUT FORMAT:

SCSIDISK> [COMMAND NAME]

Note that the prompt for this exerciser is "SCSIDISK>". The appearance of this prompt indicates that the exerciser is waiting for the user to input a command.

OUTPUT FORMAT:

Information printed as a result of this command being executed

POSSIBLE ERROR MESSAGES:

Any error messages worth noting that may be generated as a result of this command. Note that this does not imply that all possible error messages that may be generated are listed here, but rather, only those that are especially worth mentioning in relation to the command.

There are several conventions used throughout this section in the command formats. They are as follows:

- nnnn** - refers to a decimal number of any magnitude that is output by the diagnostic.
- vvvv** - refers to a decimal number of variable magnitude that must be input by the user.
- xxxx** - refers to text displayed or output by the program
- H** - refers to a hexadecimal digit (0-F).
- O** - refers to an octal digit (0-8).
- B** - refers to a binary digit (0-1).
- !** - when in a message, refers to a variable passed to that message

Any text enclosed in parenthesis indicates that the user is expected to input that text in response to a query from the diagnostic. Text enclosed in square brackets indicates the default response that will be assumed if the user simply hits <CR> in response to the query. For example, the user may be asked if the program should continue by the following question:

Do you wish to continue (Y/N) [N]?

The text enclosed in the parentheses (i.e., Y / N) indicates that the user is to type either a Y or an N in response to the question. Each option is separated by a /. The default response in this case would be N as indicated by the [N] prior to the question mark. If there is no default response listed (enclosed in square brackets), the user will not be allowed to "default" the input by only entering a <CR>.

Comments in the input and output sequences are enclosed in curly brackets and are not output by the program. For example, following the question in the previous example, the input sequence would probably look something like the following:

{if response was N this command will terminate}

Error messages will be preceded by three asterisks (***) and will be in all upper case letters. Other messages will not be all upper case and will not be preceded by the asterisks.

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If the user enters a command in response to a prompt and that command is not recognized as an exerciser command, the following message will be displayed:

***** INVALID RESPONSE (SCSIERR 209)**

SCSIDISK>

This message simply means that the command entered is not part of the command set for the external exerciser.

When the user enters a command that is recognized by the external exerciser, that command will then be processed according to the corresponding command description given in one of the following sections of this document. If an error is encountered as a result of issuing a SCSI command to the device, the hardware sense that is returned by the device will be displayed to the user. The status display will consist of the following format:

SENSE =

HH HH HH HH
HH HH HH HH
HH HH HH HH
HH HH HH HH
HH HH HH HH
HH HH

Sense Key = xxxx
Sense Code = xxxx

{One or more of the following sense fields may be printed}

Address of event:

Block address = nnnn

{or}

Vector address =

cylinder = nnnn head = nnnn sector = nnnn

Failed field replaceable unit: nnnn

Drive error numbers = HH, HH, HH, HH

Note that only the portions of the above status display that correspond to errors indicated by the hardware status variable will be output. This means, for example, that if no Drive Errors were indicated by the status, none would be output.

In order to exit the exerciser, the EXIT command should be entered (see EXIT command description).

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ACCESS LOG

Non-Exclusive/Non-Destructive Command

This command is used to retrieve information from the drive's maintenance log. The maintenance log is used by the drive to record the occurrence of various events, such as data errors and hardware faults. Detailed information concerning how the drive maintains the maintenance log is product specific. The ACCESS LOG command returns the contents of the Data log (which includes the Usage log and the Data Error log) or the Hardware Error log. A description of each follows:

Data Log Area indicates what portion of the drive's media is covered by the log data.
Contents: Access Count indicates the number of media positionings since the last hardware error.
Blocks Accessed indicates the number of blocks read over the entire disk drive.
First Retry Count indicates the number of times data recovery recovered data with one retry.
Multiple Retry Count indicates the number of times data was not recovered on the first retry.
Address field contains the address of the data block that encountered multiple read retries.
Error Type field indicates the type of data error the block encountered.
Count field indicates the number of times the specified block required multiple retries.
Error byte encodes specific data error information. Content is product specific.

Hardware Error Log Address field contains the address of the data block accessed when the error occurred.
Contents: Internal Device Status field contains an error code corresponding to the Additional Sense code returned by the REQUEST SENSE command.
Access Count field indicates the number of media accesses.

INPUT:

```
SCSIDISK> ACCESS LOG

Types of logs:
  D - Data Log
  H - Hardware Error Log
  B - Both Logs
Which log (D/H/B)[B]?
```

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OUTPUT:

ACCESS LOG UTILITY

PDEV XXXX is an HPXXXX disk drive

{If response was D}

{Print Physical is disabled}

Usage and Data Error Log

=====

Area = xxxx

Access Count = nnnn

Blocks Accessed = nnnn

First Retry Count = nnnn

Multiple Retry Count = nnnn

There are no data log entries

{or}

Logical Block Address	Error Type	Count	Error
nnnn	xxxx	nnnn	BBBBBBBB
.	{repeat for each entry}	.	.
nnnn	xxxx	nnnn	BBBBBBBB
nnnn	xxxx	nnnn	BBBBBBBB

Do you wish to see error byte decoding information (Y/N)[N]?

{If response was Y}

The error types are:

M-RET = recovered with retries

M-ECC = recovered with ECC

UNR = unrecoverable error

*** = decode error manually

The Error values are :

XXXXXX1 unused

XXXXXXIX unused

XXXXX1XX error recovered with retries

XXXX1XXX error recovered with ECC

XXX1XXXX unrecoverable error

XX1XXXXX sector error

X1XXXXXX header error

1XXXXXXX unused

{If response was H}

{Print Physical is disabled}

There are no hardware error log entries

{or}

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Hardware Error Log
=====

Logical Block Address	(HEX) Internal Device Status	Access Count
===== nnnn	===== nnnn	===== nnnn
.		
. {repeat for each entry}		
.		
nnnn	nnnn	nnnn
nnnn	nnnn	nnnn

Do you wish to see the access count decoding info(Y/N)[N]?
{If response was Y}

Access count values:

- 0 = no seeks
- 1 = 1 seek
- 2 = 2 seeks
- 3 = 3 seeks
- 4 = 4 seeks
- 5 = 5 - 7 seeks (1 sec)
- 6 = 8 - 200 seeks (1-30 sec)
- 7 = 201 - 2,000 seeks (30 sec - 5 min)
- 8 = 2,001 - 12,000 seeks (5-30 mins)
- 9 = 12,001 - 25,000 seeks (30-60 mins)
- 10 = 25,001 - 150,000 seeks (1-6 hours)
- 11 = 150,001 - 600,000 seeks (6-24 hours)
- 12 = 600,001 - 4,000,000 seeks (1-7 days)
- 13 = 4,000,001 - 16,000,000 seeks (1-4 weeks)
- 14 = 16,000,001 - 100,000,000 seeks (1-6 months)
- 15 = > 100,000,000 seeks (> 6 months)

{the values shown above will vary from disk to disk}

{If response was H}
{Print Physical is enabled}

There are no hardware error log entries
{or}

Hardware Error Log
=====

Physical Block Address	Internal Device Status	Access Count
===== nnnn	===== nnnn	===== nnnn
.		
. {repeat for each entry}		
.		
nnnn	nnnn	nnnn

FOR HP INTERNAL USE ONLY

nnnn

nnnn

nnnn

Do you wish to see the access count decoding info(Y/N)[N]?
{If response was N}

ACCESS LOG UTILITY COMPLETED



FOR HP INTERNAL USE ONLY

ADDRESS

Non-Exclusive/Non-Destructive Command

This command allows the user to convert block addresses to 3-vector addresses and visa versa. This conversion will be made using the maximum address for the device that is currently selected. This maximum address will be obtained via the SCSI READ CAPACITY command.

The ADDRESS command is also used to set a global program flag to either three-vector or block addressing mode.

INPUT:

```
SCSIDISK> ADDRESS

      Convert from block or 3-vector addresses (B/V)[V]?

{If response was B}
  Enter block address (<cr> to keep current value) --
    Block address(nnnn - nnnn) = nnnn?

{If response was V}
  Enter 3-vector address (<cr> to keep current values) --
    Cylinder address(nnnn - nnnn) = nnnn?
    Head address(nnnn - nnnn)   = nnnn?
    Sector address(nnnn - nnnn) = nnnn?
```

OUTPUT:

```
ADDRESS UTILITY
PDEV XXXX is an HPXXXX disk drive

{For block addresses to 3-vector addresses}
  Block address nnnn is equivalent to 3-vector address:
    Cylinder = nnnn  Head = nnnn  Sector = nnnn

{For 3-vector addresses to block addresses}
  3-vector address:
    Cylinder = nnnn  Head = nnnn  Sector = nnnn
  is equivalent to block address nnnn

ADDRESS UTILITY COMPLETED
```

FOR HP INTERNAL USE ONLY

CAPACITY

Non-Exclusive/Non-Destructive Command

This command allows the user to determine the maximum capacity, block address of the last addressable block and the current block size.

In addition, for zoned disks, it will display the number of zones and the cylinder ranges within each zone.

INPUT:

SCSIDISK> CAPACITY

OUTPUT:

{for single zone and non-zoned disks}

CAPACITY UTILITY

PDEV XXXX is an HPXXXX disk drive

Max Sector Address = nnnn
Max Head Address = nnnn
Max Cylinder Address = nnnn
Max Block Address = nnnn
Current Block Size = nnnn
Drive Capacity = nnnn bytes

CAPACITY UTILITY COMPLETED

{for multi-zoned disks}

CAPACITY UTILITY

PDEV XXXX is an HPXXXX disk drive

Disk Capacity Information:
=====

Number of Zones = n

Max Sect	Cyl Range
Zone	Addr (min..max)
n	nn n..nnn
.	
.	{repeated for each zone}
.	
n	nn nnn..nnnn

Max Head Address = nnnn
Max Block Address = nnnn
Current Block Size = nnnn
Drive Capacity = nnnn bytes

FOR HP INTERNAL USE ONLY

CAPACITY UTILITY COMPLETED

FOR HP INTERNAL USE ONLY

CLEAR LOGS

Non-Exclusive/Non-Destructive Command

This command is used to clear the drive's maintenance log. This consists of the Data log and Hardware Error log.

INPUT:

```
SCSIDISK> CLEAR LOGS
```

```
*****  
*                               *  
*          CAUTION              *  
*  This command will destroy service related  *  
*  information.                    *  
*                               *  
*  >> ALL logs will be cleared. <<        *  
*****
```

```
Do you wish to continue(Y/N)[N]?
```

OUTPUT:

```
CLEAR LOGS UTILITY  
PDEV XXXX is an HPXXXX disk drive  
  
Logs were cleared successfully  
  
CLEAR LOGS UTILITY COMPLETED
```

FOR HP INTERNAL USE ONLY

DEFECT LIST

Non-Exclusive/Non-Destructive Command

This command displays the drives primary defect list and/or the growing defect list. DEFECT LIST is similar to the CS/80 SPARE TABLE command.

The primary defect list contains the permanent flaws detected on the media by the original manufacturer. The growing defect list includes all defects identified after the drive leaves the manufacturer.

INPUT:

```
SCSIDISK> DEFECT LIST
```

```
Defect types:  
G - growing defect list  
P - primary defect list  
B - both lists  
Which list (G/P/B)[G]?
```

OUTPUT:

```
DEFECT LIST UTILITY  
PDEV XXXX is an HPXXXX disk drive  
  
{The following headers will be displayed depending}  
{on the list you selected to examine:           }  
  
{If response was G}  
Growing Defect List  
=====
```

```
{If response was P}  
Primary Defect List  
=====
```

```
{If response was B or default (CR)}  
Primary and Growing Defect List  
=====
```

FOR HP INTERNAL USE ONLY

{If product is HPC247x, the following list is displayed:}

Physical			Type
Cyl	Head	Sect	
=====			=====
nnnn	nnnn	nnnn	Spare Trk
nnnn	nnnn	nnnn	User Data

{For all other products, the following list is displayed:}

Physical				Logical		
Cyl	Head	Sect	Type	Cyl	Head	Sect
=====			=====	=====		
nnnn	nnnn	nnnn	User Data	nnnn	nnnn	nnnn
nnnn	nnnn	nnnn	Spare Trk	nnnn	nnnn	nnnn

DEFECT LIST UTILITY COMPLETED

FOR HP INTERNAL USE ONLY

DEVICE RESET

Exclusive/Non-Destructive Command

This command is used to reset the device. The following will be performed as a result of this command:

- Finish any logical block write in progress
- Abort any command in progress
- Controller initialization
- Initialize spare table
- Initialize saved pages information
- Initialize logs

INPUT:

```
SCSIDISK> DEVICE RESET
```

OUTPUT:

```
DEVICE RESET UTILITY  
PDEV XXXX is an HPXXXX disk drive  
  
DEVICE RESET UTILITY COMPLETED
```

FOR HP INTERNAL USE ONLY

DIAG

Non-Exclusive/Non-Destructive Command

This command will initiate the internal power-on self-test. A loop option allows the diagnostic to be repeated a specified number of times. Tests are device dependent, and are full described in the support documentation for each drive.

INPUT:

SCSIDISK> DIAG

```
*****
*                CAUTION                *
*  This command MAY impact system performance  *
*                (Enter 'E' at any prompt to exit)                *
*****
```

Do you wish to continue (Y/N)[Y]?

Input the loop count (nnnn <= count <= nnnn)[nnnn]?

OUTPUT:

INITIATE DIAGNOSTIC UTILITY
PDEV XXXX is an HPXXXX disk drive

Diagnostic loop = nnnn

INITIATE DIAGNOSTIC UTILITY COMPLETED

POSSIBLE ERROR MESSAGES:

*** DEVICE ENCOUNTERED AN ERROR WHILE EXECUTING THE
SCSI INITIATE DIAGNOSTIC COMMAND

SENSE = { sense }

FOR HP INTERNAL USE ONLY

EXIT

Non-Exclusive/Non-Destructive Command

This command terminates execution of the External Exerciser. It may be entered any time the SCSIDISK> prompt appears.

INPUT:

SCSIDISK> EXIT

OUTPUT:

End of Section 17 - External Exerciser

FOR HP INTERNAL USE ONLY

FORMAT UNIT

Exclusive/Destructive Command

This command allows the user to format the disk's media. The user will be given the option to retain all spares that have been made on the disk or retain only factory spares. All data on the disk will be destroyed by this command. It is essential that extensive media testing be performed and all questionable blocks reassigned after executing this command.

INPUT:

SCSIDISK> FORMAT UNIT

```
*****
*                          CAUTION                          *
*          This command may destroy user data                *
*****
```

Do you wish to continue (Y/N)[N]?

Do you want to:

A = retain all spares

P = retain only primary spares

Which option would you like (A/P)[A]?

OUTPUT:

FORMAT UNIT UTILITY

PDEV XXXX is an HPXXXX disk drive

{If response was A}

format - retain all spares

{or}

{If response was B}

format - retain primary spares

Media is being initialized -- may take several minutes

Media has been successfully initialized

FORMAT UNIT UTILITY COMPLETED

FOR HP INTERNAL USE ONLY

HELP

Non-Exclusive/Non-Destructive Command

This command provides the user with access to information concerning the commands that are available in the external exerciser. The user may request a list of the available commands accompanied by a brief description of each, or individual command descriptions. For individual commands, the user can request a description and syntax or just the syntax.

INPUT:

SCSIDISK> HELP [command name or <cr>]

OUTPUT:

{If no command name was given (i.e. <cr>)}
The following commands are available:

ACCESS LOG - Retrieve information from the maintenance log.

ADDRESS - Converts block addresses to 3-vector and
visa versa.

.

.

WTR MT - Performs a write-then-read media test on the disk.
The user is given the option of testing the complete
data path or disk media only.

{If a command was given}

Do you want a description or just syntax (D/S)[D]?

{If response was D}

COMMAND DESCRIPTION:
Description of the command
Syntax of the command

{If response was S}

COMMAND SYNTAX:
Syntax of the command

FOR HP INTERNAL USE ONLY

INQUIRY

Non-Exclusive/Non-Destructive Command

This command allows the user to obtain the drive type, media type and firmware revision.

INPUT:

SCSIDISK> INQUIRY

OUTPUT:

INQUIRY UTILITY
PDEV XXXX is an HPXXXX disk drive

Inquiry Information:
=====

Product revision number = nnnn
{If HPC221XB}
Product serial number = xxxx
{If HPC221XB}
Firmware ID number = nnnn
{If HPC221XB}
HDA serial number = nnnn
{If HPC221XB}
SCSI firmware revision = nnnn
{If HPC221XB}
ESDI firmware revision = nnnn
Physical addressing is enabled
 {or}
Physical addressing is disabled
Three-Vector address mode
 {or}
Block address mode

INQUIRY UTILITY COMPLETED



FOR HP INTERNAL USE ONLY

LDEV

Non-Exclusive/Non-Destructive Command

The LDEV command allows the user to select a new device to be tested. The user can select the new device by LDEV or PDEV.

INPUT:

```
CS80DIAG> LDEV
```

OUTPUT:

```
LDEV UTILITY
PDEV XXXX is an HPXXXX disk drive

Input LDEV or PDEV (L/P)[P]?

{If response was L}
New LDEV>

{If response was P}
New PDEV>

PDEV XXXX is an HPXXXX disk drive

LDEV UTILITY COMPLETED
```

FOR HP INTERNAL USE ONLY

PRINT PHYSICAL

Non-Exclusive/Non-Destructive Command

This command is used to enable the printing of PHYSICAL addresses in the DATA LOG and HARDWARE ERROR LOG.

INPUT:

SCSIDISK> PRINT PHYSICAL

OUTPUT:

Print physical address enabled
{or}
Print physical address disabled

FOR HP INTERNAL USE ONLY

READ

Non-Exclusive/Non-Destructive Command

This command allows the user to access any data block on the selected device. Due to potential security compromise, the user will need to possess Level 0 security to use this command.

INPUT:

SCSIDISK> READ

Do you want block or 3-vector addresses (B/V)[V]?

{If response was B}

Enter new address (<cr> to keep current value) --
Block address (nnnn - nnnn) = nnnn?

{If response was V}

Enter new address (<cr> to keep current value) --
Cylinder address (nnnn - nnnn) = nnnn?
Head address (nnnn - nnnn) = nnnn?
Sector address (nnnn - nnnn) = nnnn?

OUTPUT:

READ UTILITY

PDEV XXXX is an HPXXXX disk drive

The data in hex follows:

	0	1	2	3	4	5	6	7	8	9	
nnnn:	HH	HH	HH	HH	HH	HH	HH	HH	HH	HH	. . . . .
nnnn:	HH	HH	HH	HH	HH	HH	HH	HH	HH	HH	. . . . .
.											
.											
nnnn:	HH	HH	HH	HH	HH	HH					. . . . .

{Note: -- the dots in the preceding table represent non-alpha-numeric ASCII characters. Alpha-numeric characters will be printed}

READ UTILITY COMPLETED

FOR HP INTERNAL USE ONLY

RFBLOCK

Non-Exclusive/Non-Destructive Command

This command allows the user to request all available information fields for the specified logical or physical block. This information includes header, data, and ECC field contents. The drive returns a complete image of one physical block.

Due to potential security compromise, the user will need to possess Level 0 security to use this command.

INPUT:

SCSIDISK> RFBLOCK

Do you want to access PHYSICAL addresses (Y/N) [N]?

{If response was Y}

Enter new address (<cr> to keep current value) --
PHYSICAL cylinder address (nnnn - nnnn) = nnnn?
PHYSICAL head address (nnnn - nnnn) = nnnn?
PHYSICAL sector address (nnnn - nnnn) = nnnn?

{If response was N}

Enter new address (<cr> to keep current value) --
Cylinder address (nnnn - nnnn) = nnnn?
Head address (nnnn - nnnn) = nnnn?
Sector address (nnnn - nnnn) = nnnn?

OUTPUT:

READ FULL BLOCK UTILITY
PDEV XXXX is an HPXXXX disk drive

=====
Read full block of Cylinder = nnnn, Head = nnnn, Sector = nnnn
=====

Physical Cylinder = nnnn
Physical Head = nnnn
Logical Sector = nnnn
Spare Sector = nnnn

Header values (Hex):
0 1 2 3

0: HH HH HH HH

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The data follows (Hex):

	0	1	2	3	4	5	6	7	8	9	
nann:	HH	HH	HH	HH	HH	HH	HH	HH	HH	HH
nann:	HH	HH	HH	HH	HH	HH	HH	HH	HH	HH
.											
.											
.											
nann:	HH	HH	HH	HH	HH	HH					. . . . .

{Note: -- the dots in the preceding table represent non-alpha-numeric ASCII characters. Alpha-numeric characters will be printed}

READ FULL BLOCK UTILITY COMPLETED

FOR HP INTERNAL USE ONLY

REASSIGN BLOCK

Exclusive/Destructive Command

This command will allow the user to reassign a block to an address reserved for sparing. Refer to the subsection above entitled "SPARING" for details on the REASSIGN BLOCK operation. Note that this command should NOT be used unless the block being reassigned is known to be defective. This implies that media tests have been run on the suspected area and it consistently generates errors.

INPUT:

SCSIDISK> REASSIGN BLOCK

```
*****
*                               CAUTION                               *
*           This command may destroy user data                       *
*****
```

Do you wish to continue (Y/N)[N]?

```
*****
* The REASSIGN BLOCK command is intended to be *
* used to reassign a single block defect. The *
* provision to handle multiple defects in a *
* single command is made to allow recovery from *
* a situation where multiple defects occur on a *
* single track. *
*****
```

Defects to reassign on this track (nnnn <= defects <= nnnn)[nnnn]?

Do you want block or 3-vector addresses(B/V) [V]?

{If response was B}
Enter new address (<cr> to keep current value) --
Block address (nnnn - nnnn) = nnnn?

{If response was V}
Enter new address (<cr> to keep current values) --
Cylinder address (nnnn - nnnn) = nnnn?
Head address (nnnn - nnnn) = nnnn?
Block address (nnnn - nnnn) = nnnn?

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Number of read retries (0 <= retries <= 9)[0]?

```
{If target block data not recovered}
*****
*                               WARNING                               *
* Data from the above block(s) could not be recovered.             *
* If you continue this data will be lost and DATA                 *
* RECOVERY PROCEDURES MUST BE PERFORMED.                          *
*****

Do you wish to continue (Y/N)[N]?
```

```
{If reassign block failed}
REASSIGN BLOCK FAILED --
*****
* The REASSIGN BLOCK command failed. Perform a MEDIA               *
* TEST on the target track to verify that all defective           *
* blocks on the track were specified for reassignment.             *
*****
```

OUTPUT:

```
REASSIGN BLOCK UTILITY
PDEV XXXX is an HPXXXX disk drive

Attempting to read data of target block . . .
{If data was recovered}
Data was successfully recovered from target block

{If continue with target block data loss or target block data
was recovered}
Attempting to REASSIGN BLOCK(S)
{If successful}
Reassign Block(s) Succeeded

{If target block data recovered}
Attempting to re-write target block(s) data
All recovered data was successfully re-written to target block(s)

{If reassign block was performed}
Reassign block (retain track data option) was successful

{If no reassign block performed}
No reassign block was performed

REASSIGN BLOCK UTILITY COMPLETED
```

FOR HP INTERNAL USE ONLY

RO MT

Non-Exclusive/Non-Destructive Command

This command is used to initiate a read only media test. Two types of tests are available through this command. The first read only media test allows the user to specify the address at which the test is to start. This test will sequentially read data starting at this address in an attempt to detect any read errors. The second type of test is a random read only media test which uses random addresses and lengths of reads in attempt to detect any read errors.

INPUT:

SCSIDISK> RO MT

```
* * * * *
*           CAUTION           *
* This command MAY impact system performance *
*                                     *
*   (Enter 'E' at any prompt to exit)   *
* * * * *
```

Clear ALL logs (Y/N)[N]?

Types of RO MT's:

S = selected area

R = random area

Enter the test type (S/R)[S]?

Do you want block or 3-vector addresses (B/V)[V]?

{If response was B}

Enter new address (<cr> to keep current value) --

Block address (nnnn - nnnn) = nnnn?

{If response was V}

Enter new address (<cr> to keep current value) --

Cylinder address (nnnn - nnnn) = nnnn?

Head address (nnnn - nnnn) = nnnn?

Sector address (nnnn - nnnn) = nnnn?

Test Area:

V = volume

H = head

C = cylinder

T = track

S = sector

Enter the test area (V/H/C/T/S)[T]?

{If block address mode}

Enter new address (<cr> to keep current value) --

Block address (nnnn - nnnn) = nnnn?

{If 3-vector address mode}

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Enter new address (<cr> to keep current value) --
Cylinder address (nnnn - nnnn) = nnnn?
Head address (nnnn - nnnn) = nnnn?
Sector address (nnnn - nnnn) = nnnn?

Input the loop count (nnnn<= count <=nnnn)[nnnn]?

OUTPUT:

```
RO MT UTILITY
PDEV XXXX is an HPXXXX disk drive

Test Area = Volume, starting at Cyl = nnnn, Head = nn, Sec = nn
              {or}
Test Area = Head, starting at Cyl = nnnn, Head = nn, Sec = nn
              {or}
Test Area = Cyl, starting at Cyl = nnnn, Head = nn, Sec = nn
              {or}
Test Area = Track, starting at Cyl = nnnn, Head = nn, Sec = nn
              {or}
Test Area = Sec, starting at Cyl = nnnn, Head = nn, Sec = nn

{If area = Volume or Head or Random, the following status}
{updates will be displayed at one (1) minute intervals: }

Media Test Currently testing:
  Cyl= nnnn, Head= nn, Sect= nn; Block addr= nnnnnn

{If no errors detected}
No errors were detected by the media test
  {or}
*****
* MEDIA ERRORS DETECTED *
* Read the Access Log's Data Log *
*****

RO MT UTILITY COMPLETED
```

FOR HP INTERNAL USE ONLY

SEEK

Non-Exclusive/Non-Destructive Command

This command causes the drive to seek to a specified address or series of addresses. The command is useful for testing the servo circuitry. Three types of seeks may be performed: Random Seek seeks to a random address; Alternate Seek seeks between two specified addresses; and Butterfly Seek performs a series of seeks over the entire disk surface.

INPUT:

SCSIDISK> SEEK

```
*****
*                               *
*             CAUTION           *
*  This command MAY impact system performance  *
*                               *
*   (Enter 'E' at any prompt to exit)         *
*                               *
*****
```

Do you wish to continue (Y/N)[Y]?

Types of seeks:

- A = alternate seek
- B = butterfly seek
- R = random seek

Select the seek type (A/B/R)[R]?

{If response was Alternate}

Input Address #1:

Do you want block or 3-vector addresses (B/V)[V]?

{If response was B}

Enter new address (<cr> to keep current value) --
Block address (nnnn - nnnn) = nnnn?

{If response was V}

Enter new address (<cr> to keep current value) --
Cylinder address (nnnn - nnnn) = nnnn?
Head address (nnnn - nnnn) = nnnn?
Sector address (nnnn - nnnn) = nnnn?

Input Address #2:

Do you want block or 3-vector addresses (B/V)[V]?

{If response was B}

Enter new address (<cr> to keep current value) --
Block address (nnnn - nnnn) = nnnn?

{If response was V}

Enter new address (<cr> to keep current value) --
Cylinder address (nnnn - nnnn) = nnnn?
Head address (nnnn - nnnn) = nnnn?

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Sector address (nnnn - nnnn) = nnnn?

{If response was Butterfly}

Test all heads (Y/N)[N]?

{If response was N}

Input head number (nnnn <= head <= nnnn)[nnnn] ?

Input the loop count (nnnn <= count <= nnnn)[nnnn]?A

OUTPUT:

SERVO TEST UTILITY

PDEV XXXX is an HPXXXX disk drive

Pass nnnn started

Pass nnnn completed

SERVO TEST UTILITY COMPLETED

FOR HP INTERNAL USE ONLY

SUSPEND

Non-Exclusive/Non-Destructive Command

The **SUSPEND** command allows the user to suspend **SCSIDISK** and return to the **DUI**. The user enters **RESUME** at the **DUI** prompt to return to **SCSIDISK**.

INPUT:

SCSIDISK> SUSPEND

OUTPUT:

DUI>



FOR HP INTERNAL USE ONLY

VERIFY

Non-Exclusive/Non-Destructive Command

This command requests that data on the selected or random area of the drive's media be verified by ECC check only. A compare is not performed. The logs can be cleared before performing the verify.

INPUT:

SCSIDISK> VERIFY

```
*****
*                               *
*             CAUTION           *
*   This command MAY impact system performance   *
*                               *
*                               *
*   (Enter 'E' at any prompt to exit)           *
*                               *
*                               *
*****
```

Do you wish to continue (Y/N)[Y]?

Clear ALL logs (Y/N)[N]?

Types of VERIFY's:

S = selected area

R = random area

Enter the test type (S/R)[S]?

Do you want block or 3-vector addresses (B/V)[V]?

{If response was B}

Enter new address (<cr> to keep current value) --
Block address (nnnn - nnnn) = nnnn?

{If response was V}

Enter new address (<cr> to keep current value) --
Cylinder address (nnnn - nnnn) = nnnn?
Head address (nnnn - nnnn) = nnnn?
Sector address (nnnn - nnnn) = nnnn?

Test Area:

V = volume

H = head

C = cylinder

T = track

S = sector

Enter the test area (V/H/C/T/S)[T]?

{If response was U}

Enter ending address:

{If block address mode}

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Enter new address (<cr> to keep current value) --
Block address (nnnn - nnnn) = nnnn?

{If 3-vector address mode}

Enter new address (<cr> to keep current value) --
Cylinder address (nnnn - nnnn) = nnnn?
Head address (nnnn - nnnn) = nnnn?
Sector address (nnnn - nnnn) = nnnn?

Input the loop count (nnnn<= count <=nnnn)[nnnn]?

OUTPUT:

VERIFY UTILITY

PDEV XXXX is an HPXXXX disk drive

Test Area = Volume, starting at Cyl = nnnn, Head = nn, Sec = nn
{or}

Test Area = Head, starting at Cyl = nnnn, Head = nn, Sec = nn
{or}

Test Area = Cyl, starting at Cyl = nnnn, Head = nn, Sec = nn
{or}

Test Area = Track, starting at Cyl = nnnn, Head = nn, Sec = nn
{or}

Test Area = Sec, starting at Cyl = nnnn, Head = nn, Sec = nn

{If area = Volume or Head or Random, the following status}
{updates will be displayed at one (1) minute intervals: }

Media Test Currently testing:

Cyl= nnnn, Head= nn, Sect= nn; Block addr= nnnnnn

{If no errors detected}

No errors were detected by the verify
{or}

```
*****  
* MEDIA ERRORS DETECTED *  
* Read the Access Log's Data Log *  
*****
```

VERIFY UTILITY COMPLETED

FOR HP INTERNAL USE ONLY

WTR MT

Exclusive/Destructive Command

This command is used to initiate a write-then-read media test. Two types of tests are available through this command. The first write-then-read media test will test the data channel to the device. The second type will only test the device media. Two options exist for each of these types of tests, the first option performs incremental writes followed by reads across a data area specified by the user. The pattern of data that is to be written and read may be specified by the user or determined randomly. The second option is a random write-then-read media test which does random length writes followed by reads at random locations on the disk. These tests will destroy data on the disk.

INPUT:

```
SCSIDISK> WTR MT

*****
*                               CAUTION                               *
*           This command may destroy user data                       *
*****

Do you wish to continue (Y/N)[N]?

Clear All logs (Y/N)[N]?

Levels of media test:
  C = disk media and channel test
  D = disk media only
Enter the test method (C/D)[D]?

Types of WTR MT's:
  S = selected area
  R = random area
Enter the test type (S/R)[S]?

{If selected area}
  Do you want block or 3-vector addresses (B/V)[V]?

{If response was B}
  Enter new address (<cr> to keep current value) --
  Block address (nnnn - nnnn) = nnnn?

{If response was V}
  Enter new address (<cr> to keep current value) --
  Cylinder address (nnnn - nnnn) = nnnn?
  Head address (nnnn - nnnn) = nnnn?
  Block address (nnnn - nnnn) = nnnn?

{If selected area}
  Test Area:
  V = volume
  H = head
```

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C = cylinder
T = track
S = sector
Enter the test area (V/H/C/T/S)[T]?

Transfer length types:
R = random transfer length
U = user input transfer length
Enter the transfer length type (R/U)[U]?

{If response was U}
Input transfer length (nnnn <= sectors <= nnnn)[nnnn]?

The sources for the data pattern to be used are:
I - Internal pattern
U - User input pattern
R - Random pattern
Which pattern source would you like (I/U/R)[I]?

{If response was U}
Input the pattern in hex:

Input the loop count (nnnn<= count <=nnnn)[nnnn]?

OUTPUT:

WTR MT UTILITY
PDEV XXXX is an HPXXXX disk drive

{If clear all logs}
All logs cleared

Test Area = Volume, starting at Cyl = nnnn, Head = nn, Sec = nn
{or}
Test Area = Head, starting at Cyl = nnnn, Head = nn, Sec = nn
{or}
Test Area = Cyl, starting at Cyl = nnnn, Head = nn, Sec = nn
{or}
Test Area = Track, starting at Cyl = nnnn, Head = nn, Sec = nn
{or}
Test Area = Sec, starting at Cyl = nnnn, Head = nn, Sec = nn

{If area = Volume or Head or Random, the following status}
{updates will be displayed at one (1) minute intervals: }

Media Test Currently testing:
Cyl= nnnn, Head= nn, Sect= nn; Block addr= nnnnnn

{If no errors detected}
No errors were detected by the media test
{or}

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```
*****  
* MEDIA ERRORS DETECTED *  
* Read the Access Log's Data Log *  
*****  
WTR MT UTILITY COMPLETED
```

Error Messages

This section gives a complete list of the error messages that may be generated by SCSIDISK along with brief explanations of the meaning of the messages. The messages will be listed in numerical order and are exactly as they appear in the message catalog. Thus, an "!" indicates that a parameter of some sort will be placed in the location marked by the exclamation point.

100	*** WARNING -- THE I/O PATH MAY NOT BE FUNCTIONING PROPERLY (SCSIERR 100)
CAUSE	An error was detected by the Io.Path.Test service while testing the modules on the i/o path preceding the selected device.
ACTION	Execute the appropriate diagnostics on the modules preceding the selected device on the i/o path, especially on those that may have been reported as faulty in error messages immediately preceding this message. Note that the results of the execution of this instance of SCSIDISK may be invalid.
<hr/>	
101	*** DEVICE FAILED TO RESPOND TO ! COMMAND IN ALLOTTED TIME (SCSIERR 101)
CAUSE	No response to an i/o was received prior to the expiration of the allotted time.
ACTION	Verify that the selected disk drive is actually connected to the system. Run SYMAP, if available, to confirm the presence of the device.
<hr/>	
102	*** SCSIDISK IS UNABLE TO DIAGNOSE THE SELECTED DEVICE (SCSIERR 102)
CAUSE	The selected device identified itself as something other than a SCSI drive.
ACTION	Determine type of selected device and run the appropriate diagnostic on it.
<hr/>	
103	*** SCSI DISK DIAGNOSTIC TERMINATING (SCSIERR 103)
CAUSE	A fatal error has been encountered.
ACTION	The specific error that was encountered should have been reported immediately prior to this message. Follow the action instructions for that error message.
<hr/>	
104	*** A RESERVE AREA IS NOT AVAILABLE ON THIS DRIVE -- NO OPERATION WAS PERFORMED. (SCSIWARN 104)
CAUSE	There is no available area on the disk that can be written to without corrupting user data. This can happen if no such area is provided by the system, or if the diagnostic is running in destructive mode, in which the location of the reserve area is unknown to the system since the drive is locked for diagnostics.
ACTION	For systems which do not support a reserve area (e.g. HP-UX), reserve area operations are not supported.

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105	*** EXCLUSIVE MODE REQUIRED TO EXECUTE THIS COMMAND (SCSIERR 105)
CAUSE	The diagnostic does not have access to the drive in the mode necessary to execute the selected command.
ACTION	The mode granted to a diagnostic for a selected device is system dependent. Use the HELP LDEV command at the DUI for more information.
<hr/>	
106	*** DESTRUCTIVE MODE REQUIRED TO EXECUTE THIS COMMAND (SCSIERR 106)
CAUSE	The diagnostic does not have access to the drive in the mode necessary to execute the selected command.
ACTION	The mode granted to a diagnostic for a selected device is system dependent. Use the HELP LDEV command at the DUI for more information.
<hr/>	
107	*** INVALID DEVICE WAS SELECTED (SCSIWARN 107)
CAUSE	The device selected with the LDEV command is not a valid device.
ACTION	Verify the PDEV or LDEV input and retry the command.
<hr/>	
109	*** DEVICE ENCOUNTERED AN ERROR WHILE EXECUTING THE SCSI ! COMMAND (SCSIERR 109)
CAUSE	The drive reported an error as a result of executing the selected operation.
ACTION	The hardware status that is displayed immediately following this message should indicate what sort of problem occurred, including a failing FRU if one is reported. If an FRU is reported, replace it and re-execute this diagnostic.
<hr/>	
110	*** THE MAXIMUM NUMBER OF ERRORS HAS BEEN EXCEEDED (SCSIERR 110)
CAUSE	The user specified error limit has been reached.
ACTION	If more errors are desired, re-run the diagnostic assigning a larger value to the ERRCOUNT parameter of the run command.
<hr/>	

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111 * UNRECOGNIZED COMMAND --**
 TYPE "HELP" FOR A LIST OF VALID COMMANDS (SCSIERR 111)
CAUSE . The specified command is not a valid command.
ACTION Use the help facility to obtain a list of the commands that are valid and enter the
 desired command.

112 * UNRECOGNIZED REPLY WAS FOUND (SCSIERR 112)**
CAUSE The reply that was entered in response to a prompt by the diagnostic is not valid.
ACTION Refer to the prompt that was displayed and enter a response that is within the
 specified list of valid responses.

113 * A NUMERICAL INPUT WAS EXPECTED BUT NOT RECEIVED (SCSIERR 113)**
CAUSE The reply that was entered in response to a prompt by the diagnostic is not a valid
 number.
ACTION Re-enter number using only numeric characters and valid special characters (e.g. +, -,
 , etc.).

114 * AN UNEXPECTED ERROR OCCURRED IN THE IO SCSI DAR (SCSIERR 114)**
CAUSE A call to the SCSI device access routine resulted in an unexpected status return.
ACTION The specific status generated by Io_Cs80 should have been displayed immediately
 prior to this error message. Report this set of error messages to support personnel.

115 * ERROR IN TRANSMISSION DETECTED DURING READ LOOPBACK**
 TEST: (SCSIERR 115)

	Octal Value	Octal Value	Bit Positions
Byte #	Transmitted	Received	In Error
=====	=====	=====	01234567 =====

CAUSE One or more bytes of data that were received from the disk as a result of a loopback
 operation did not contain the expected value(s).
ACTION Data is most likely being corrupted along the data path between the host and the
 drive. Check all cable connections along the path and re-execute the diagnostic. If
 errors persist, execute appropriate diagnostics against the modules that lay in the path
 between the host and the device.

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118	*** ERROR -- EXPECTED ! BYTES FROM THE DEVICE AND RECEIVED ! BYTES (SCSIERR 118)
CAUSE	The number of bytes in the reply from the device was not what was expected. This is most likely a result of executing the diagnostic on a drive which is not supported by it.
ACTION	Verify that the selected device is in the list of supported devices for the diagnostic (LIST ALL from the DUI). If it is, report the problem to support personnel.
<hr/>	
119	*** THIS COMMAND IS NOT SUPPORTED ON THIS DEVICE (SCSIERR 119)
CAUSE	The specified operation is not supported by the selected device.
ACTION	While other devices supported by the diagnostic may support the specified command, the selected device does not.
<hr/>	
120	*** FILE SYSTEM ERROR ENCOUNTERED WHILE RETRIEVING A MESSAGE (SCSIERR 120)
CAUSE	An error was returned while attempting to obtain a message from the catalog. The actual error will have been displayed prior to this message.
ACTION	This is a software error. Report to support personnel.
<hr/>	
121	*** IDENTICAL READS FROM DISK RETURNED NON-IDENTICAL DATA (SCSIERR 121)
CAUSE	A read operation was performed on the same sector twice and the data from both reads did not match exactly.
ACTION	This is most likely a hardware problem with the drive. If loopback executes correctly, the read/write board in the drive is the probable cause of the error.
<hr/>	
122	*** DATA READ FROM DISK DID NOT MATCH DATA PREVIOUSLY WRITTEN (SCSIERR 122)
CAUSE	A sector was written to the disk and immediately read back. The data read did not match exactly the data written.
ACTION	This is most likely a hardware problem with the drive. If loopback executes correctly, the read/write board in the drive is the probable cause of the error.
<hr/>	



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123 ***** SELECTED DEVICE IS NOT A RECOGNIZED HP DEVICE (SCSIERR 123)**
CAUSE The selected device does not identify itself with a recognized Hewlett-Packard product number or the version of diagnostic does not recognize or support the product.
ACTION Verify visually the type of product being diagnosed. If the product is a valid Hewlett-Packard product, update the diagnostic to a version that supports that product.

124 ***** ERROR IN TRANSMISSION DETECTED DURING READ/WRITE CHANNEL**
TEST: (SCSIERR 124)

				Hex	Hex	Bit	
				Value	Value	Positions	
	Cyl	Hd	Sect	Byte	Trns	Recd	01234567
	=====	=====	=====	=====	=====	=====	=====
CAUSE	Data written to the disk does not agree with the data read.						
ACTION	Verify the data path to the device using the LOOPBACK command and WTR ERT on the target sector.						

130 ***** INTERNAL ERROR IN SCSIDISK: INVALID CYLINDER (CYL #!)**
PASSED TO GET_MAX_NUM_SECTORS (SCSIERR 130)

CAUSE This error should only occur for multi-zoned disks. It indicates that an internal routine to calculate the number of sectors on a track was passed a cylinder range it did not expect. Possible problem with address conversion in the disk.
ACTION Use the ADDRESS command to convert BLOCK address 0 to a three-vector address. This will reset program internal variables. If this fails, examine the DEFECT LIST using the DEFECT command to see if the DEFECT LIST is valid.

134 ***** THE ADDRESS ENTERED (C!, S!, H!) APPEARS TO RESIDE IN A RESERVED AREA OF THE DISK, HOWEVER A CHECK OF THE DRIVE SUGGESTS A PROBLEM MAY EXIST WITH THE DRIVE FORMAT, PARTICULARLY THE DEFECT LIST. IT IS SUGGESTED THAT YOU EXAMINE THE DEFECT LIST FOR PROBLEMS ("DEFECT" CMD). THE ADDRESS ENTERED CAN NOT BE CONVERTED. PLEASE RE-ENTER. (SCSIERR 134)**

CAUSE When entering a 3-vector address, the conversion showed that the address was a physical or reserved area of the drive. However, further checks by the diagnostic revealed that the drive continually returns a "RESERVED" status for areas which are not likely to be reserved. The drive is probably experiencing a problems with its DEFECT LIST.
ACTION Exit ("E") from the 3-vector input and examine the DEFECT LIST with the DEFECT command. If problems persist, use BLOCK addressing only.

135 ***** THE ADDRESS ENTERED (C!, S!, H!) IS A RESERVED (PHYSICAL) AREA OF THE DISK. PLEASE RE-ENTER. (SCSIERR 135)**

CAUSE This should only occur on multi-zoned drives. While entering a 3-vector address, the conversion routine in the disk returned a status indicating that the address entered was a Physical/ Reserved area of the drive (defective track, spare track, log track, etc).
ACTION Enter a different track address, or 'E'xit the entry.

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136	*** UNABLE TO PROPERLY CONVERT ADDRESS. SEND/RECEIVE DIAG FAILED. (SCSIERR 136)
CAUSE	This should only occur on multi-zoned drives. The drive was asked to convert an address between Block and 3-vector and failed the convert routine. The disk controller may be failing to execute the convert diagnostic properly.
ACTION	Examine the drive logs for error. Reset the drive, or power cycle it and try again. If problems persist, other devices on the SCSI bus may be interfering with the routine.
137	*** THE ADDRESS WAS NOT PROPERLY CONVERTED; AS A RESULT, SCSI DISK OPERATION MAY NOT BE PREDICTABLE (SCSIWARN 136)
CAUSE	Same as SCSIERR 136 above.
ACTION	This is a warning that the values used by the diagnostic are compromised. Take the same actions as in SCSIERR 136. If problems persist, exit diagnostic and restart. If this too fails, the disk and/or controller should be replaced.
138	*** CALL TO GET SYSTEM TIME RETURNED UNEXPECTED FORMAT; "!", (Code= !). UNABLE TO CALCULATE TIME DELAY (SCSIERR 138)
CAUSE	Diagnostic subsystem returned a time in an unexpected format "!". Expected format is: mm/dd/yy. This will affect timed updates during long media tests. Internal error.
ACTION	Note format displayed and "Code =" value. Submit SR against diagnostic.
140	*** NO OPERATION WAS PERFORMED (SCSIERR 140)
CAUSE	Due to a previous error, which has already been reported, no operation was performed.
ACTION	Refer to action instructions for previously reported error.
200	*** AN ERROR WAS ENCOUNTERED WHILE ATTEMPTING TO SEND/RECEIVE INFORMATION FROM THE USER (SCSIERR 200)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to communicate with the user interface process.
ACTION	Refer to action instructions for previously reported error.

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201	*** AN ERROR WAS ENCOUNTERED IN ATTEMPTING TO RETRIEVE A MESSAGE FROM THE CATALOG (SCSIERR 201)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to extract a message from its message catalog.
ACTION	Refer to action instructions for previously reported error.

202	*** AN ERROR WAS ENCOUNTERED IN ATTEMPTING TO CONVERT A NUMBER TO A STRING (SCSIERR 202)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to convert a number to a string.
ACTION	Refer to action instructions for previously reported error.

203	*** AN ERROR WAS ENCOUNTERED IN ATTEMPTING A BIT EXTRACTION OPERATION (SCSIERR 203)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to extract one or more bits from a number.
ACTION	Refer to action instructions for previously reported error.

204	*** THE SELECTED DEVICE COULD NOT BE OBTAINED FOR TESTING (SCSIERR 204)
CAUSE	The DUI was unable to obtain access to the device. Device may be held exclusively by another process.
ACTION	Determine the access status of the device and make the corrective requirements.

207	*** SCSI DISK INITIALIZATION FAILED. DEVICE MAY NOT BE SCSI OR INFORMATION RETURNED MAY BE ERRONEOUS. SCSI DISK MAY NOT FUNCTION PROPERLY (SCSIERR 207)
CAUSE	The diagnostic was unable to successfully obtain data from the drive. Since the diagnostic needs this information to function correctly, the user must make the determination to continue or terminate.
ACTION	Verify that the disk is in fact a SCSI device and that the hardware path specified is valid.

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208	*** AN ERROR WAS ENCOUNTERED IN ATTEMPTING TO COMMUNICATE WITH THE DIAGNOSTIC SYSTEM (SCSIERR 208)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to successfully perform a function which requires communication with the diagnostic system.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
209	*** INVALID RESPONSE (SCSIERR 209)
CAUSE	The data entered in response to a prompt was not valid.
ACTION	Refer to the prompt to determine the valid responses for the particular situation and enter one of the specified valid responses.
<hr/>	
210	*** AN ERROR WAS ENCOUNTERED WHILE ATTEMPTING TO OBTAIN DATA FROM AN I/O BUFFER (SCSIERR 210)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to get data from its i/o buffer and, therefore cannot obtain data from the device.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
211	*** AN ERROR WAS ENCOUNTERED WHILE ATTEMPTING TO PLACE DATA INTO AN I/O BUFFER (SCSIERR 211)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable place data into its i/o buffer and, therefore, cannot send data to the device.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
212	*** AN ERROR WAS ENCOUNTERED WHILE ATTEMPTING TO OBTAIN AN I/O BUFFER (SCSIERR 212)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable obtain an i/o buffer and therefore, cannot send/receive data to/from the device.
ACTION	Refer to action instructions for previously reported error.
<hr/>	

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213	*** SECTION NUMBER ! IS NOT A VALID SECTION (SCSIERR 213)
CAUSE	The section number input was not a valid section.
ACTION	Verify the valid sections and input your selection.
<hr/>	
214	*** AN ERROR WAS ENCOUNTERED WHILE ATTEMPTING TO INITIALIZE THE PROGRAM (SCSIERR 214)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to start.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
215	*** HIGHER SECURITY IS NEEDED TO PERFORM THIS OPERATION (SCSIERR 215)
CAUSE	The user requested an operation which is restricted to users with higher security than the user possesses.
ACTION	Contact system administrator if higher security level is desired.
<hr/>	
216	*** AN ERROR WAS ENCOUNTERED WHILE ATTEMPTING TO RELINQUISH ACCESS TO THE CURRENT DEVICE. PROGRAM TERMINATING. (SCSIERR 216)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to relinquish access to the current device.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
217	*** AN ERROR WAS ENCOUNTERED WHILE ATTEMPTING TO OBTAIN ACCESS TO THE NEW DEVICE. ACCESS WAS NOT OBTAINED. (SCSIERR 217)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to obtain access to the current device.
ACTION	Refer to action instructions for previously reported error.
<hr/>	

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218	*** AN ERROR WAS ENCOUNTERED WHILE ATTEMPTING TO OBTAIN ACCESS TO THE OLD DEVICE. PROGRAM TERMINATING. (SCSIWARN 218)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to regain access to the previous device under test. Access to this device was attempted after access to the new device was not obtained.
ACTION	The device is currently being accessed exclusively by another process.
<hr/>	
219	*** THE OPTION TO OBTAIN DISK SPACE IS NOT IMPLEMENTED FOR THIS OPERATING SYSTEM. (SCSIWARN 219)
CAUSE	The operating system does not currently provide the functionality necessary to execute this command.
ACTION	Communicate the need for this functionality to the appropriate division.
<hr/>	
220	*** AN ERROR OCCURRED WHILE ATTEMPTING TO OBTAIN DISK SPACE. (SCSIERR 220)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to obtain disk space.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
221	*** AN ERROR WAS ENCOUNTERED WHILE ATTEMPTING TO OBTAIN DISK SPACE. DISK SPACE RETURNED IS NOT ADEQUATE TO PERFORM TESTS. (SCSIERR 221)
CAUSE	The area obtained from the disk device for test was not adequate to perform any substantial test. (SCSIWARN 221)
ACTION	Contiguous free space on the disk device is fragmented or there does not exist any free space large enough to test.
<hr/>	
222	*** AN ERROR WAS ENCOUNTERED WHILE ATTEMPTING TO RELINQUISH DISK SPACE. (SCSIERR 222)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to relinquish disk space.
ACTION	Refer to action instructions for previously reported error.
<hr/>	

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223	*** LOGICAL BLOCK SIZE MUST EQUAL PHYSICAL BLOCK SIZE TO INITIATE THIS COMMAND. (SCSIERR 223)
CAUSE	The SCSI MODE SELECT parameter set the device block size to a value which differs from the physical block size.
ACTION	Command cannot be executed until the physical block size is the same as the logical block size.
<hr/>	
225	*** UNABLE TO DETERMINE DISK PARAMETERS. DEVICE IS NOT RESPONDING TO MODE_SENSE I/O REQUEST. (SCSIWARN 225)
CAUSE	Mode Sense request to drive to determine parameters failed. Drive is not responding to standard mode sense request.
ACTION	Reset drive or power cycle. If problems persist, trouble- shoot disk.
<hr/>	
226	*** MODE SENSE DID NOT RETURN EXPECTED PAGE (n). UNABLE TO DETERMINE DISK MECHANISM PARAMETERS. (SCSIWARN 226)
CAUSE	Mode sense was successful, however expected page "n" was not retrieved.
ACTION	Reset drive or power cycle. If problems persist, trouble- shoot disk.
<hr/>	
300	*** CATALOG OR PROGRAM REVISIONS FOUND IN CATALOG ARE NOT VALID OR CURRENT. CATALOG IS PROBABLY INCORRECT FOR THIS PROGRAM RELEASE. SCSIDISK TERMINATING. (SCSIERR 300)
CAUSE	The program verifies its own catalog revision along with the message catalog revision. They were not as expected. Message catalog (CSCSIDSK) is not correct for this program release.
ACTION	Install correct catalog and program release.
<hr/>	
302	*** PROGRAM HAS EXPIRED. INSTALL CURRENT VERSION OF SCSIDISK. SCSIDISK TERMINATING. (SCSIERR 302)
CAUSE	This is a beta/test-release error only. Program was designed to operate until a specific date. Afterwards, it will display this message and expire.
ACTION	Install current program release.
<hr/>	



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SCSI CD Diagnostic

Introduction

The SCSI Compact Disk Diagnostic (SCSICD) is designed to provide a means of testing SCSI compact disks on any system that supports the online diagnostics subsystem. The disks that will be tested using this diagnostic are those that utilize the Small Computer System Interface (SCSI) message protocol for communication with the SPU. Tests provided can:

- Perform an extensive fault isolating diagnostic trouble tree on the disk and it's system interface. Defects encountered will be relayed to the user.
- Verify the integrity of the SCSI data path to the selected disk.
- Identify the product type of the selected disk.
- Perform the internal selftest on the disk.
- Obtain and decode status messages from the disk.
- Test common transactions that are used in communication between the disk and CPU to determine the integrity of these transactions.

In addition, an interactive external exerciser will be provided. This exerciser provides access to internal disk diagnostics and utilities.

Defects and Enhancements

Submit defect reports and enhancement requests for this diagnostic through the STARS database referencing Product Number 30600-10044.

Minimum Configuration

The hardware running beneath SCSICD is of no concern to the diagnostic, as long as the online diagnostics subsystem is supported and there is at least one SCSI compact disk configured on the system.

In order to run this diagnostic, the online diagnostics subsystem must be supported.

Autodiagnostics

If SCSICD is run as an autodiagnostic by the system, the default section will be run.

Operating Instructions

The SCSI Compact Disk Diagnostic is part of the total online diagnostics subsystem. It is designed to provide the user with both an on-line and off-line means of thoroughly testing any SCSI compact disk on the system. With the on-line version, the functionality of system disks is limited to Non-Exclusive/Non-Destructive commands.

SCSICD can be run in two different modes as described below:

- Non-Exclusive/Non-Destructive - indicates that the user can only run tests on the device that are non-destructive to data on that device as well as other commands that may be executing. An example of a test that would not be allowed in this mode is the Device Reset.
- Exclusive/Destructive - indicates that the user may run any test on the device. There are virtually no restrictions placed on the user in this mode and, therefore, extreme caution should be exercised by anyone running tests in Exclusive/Destructive Mode.

Default Tests

If the user does not specify any sections the following default section will be executed:

Section 10 Fault isolating diagnostic trouble tree

RUN Command

The SCSI compact disk diagnostic can be accessed by the user via the Diagnostic User Interface. It is initiated using the run `scsicc` command. All parameters available in the run command are acceptable as parameters when running this diagnostic. Note that if the `ERRONLY` parameter is set "on", only error messages will be output by this diagnostic. Error messages can be distinguished from other messages by three "*"s preceding the text of the message (i.e., '*** MESSAGE' is an error message whereas 'Message' is not). Also note that error messages are in all capital letters and other messages use some lower case. This diagnostic can also be run as an auto-diagnostic by the diagnostic system. As noted in the previous section, certain modes are required in order to do certain tests. The mode needed to execute each command will be noted in the description of that command.

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Test Execution

When SCSICD is run, the following header and welcome message will be displayed:

```
*****
*****
*****          SCSI CD DIAGNOSTIC          *****
*****
*****      (C) Copyright Hewlett Packard Co. 1990      *****
*****          All Rights Reserved          *****
*****          Version n.nn.nn              *****
*****
*****
```

Welcome, Today is FRI, Aug 5, 1982 7:39 AM

At this point, the diagnostic calls IO_Path_Test which is a diagnostic procedure that tests the I/O path to the device. If the status returned from this procedure call is "fail", the following message will be output:

```
*** WARNING -- THE I/O PATH TO THE DISK MAY NOT BE FUNCTIONING
PROPERLY (SCSIERR 100)
```

Otherwise, the diagnostic issues an inquiry to the specified device to determine whether or not it is a SCSI compact disk. If the device does not respond to the inquiry command, the following message will be output:

```
*** DEVICE FAILED TO RESPOND TO INQUIRY COMMAND IN ALLOTTED TIME
(SCSIERR 101)
```

A second inquiry command is then issued. If this command fails, the following messages are displayed:

```
*** DEVICE FAILED TO RESPOND TO INQUIRY COMMAND IN ALLOTTED TIME
(SCSIERR 101)
```

```
*** SCSI INQUIRY COMMAND FAILED.  DEVICE MAY NOT BE SCSI OR INQUIRY
INFORMATION RETURNED MAY BE ERRONEOUS.  SCSICD MAY NOT FUNCTION
PROPERLY (SCSIERR 207)
```

Do you wish to continue (Y/N) [N]:

If the user answers no the diagnostic will terminate immediately.

If a response was obtained, then the returned status is examined to determine if the device is a SCSI disk. If not, the following message will be displayed:

```
*** SCSICD IS UNABLE TO DIAGNOSE THE SELECTED DEVICE (SCSIERR 102)
```

If this message is generated, the diagnostic will terminate immediately after outputting it.

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At this point, the sections specified by the user will be executed and the results output. If the user did not specify any sections the default section will be executed. If at any time, the number of errors generated reaches the limit specified by the user in the ERRCOUNT parameter of the run command, the following message will be output:

***** THE MAXIMUM NUMBER OF ERROR MESSAGES HAS BEEN EXCEEDED (SCSIERR 110)**

The diagnostic will then terminate execution. If the ERRPAUSE parameter of the RUN command was assigned a value of "on", then this diagnostic will stop after each error is generated and ask the user if the test should continue:

Do you wish to continue (Y/N) [Y]?

If the response is Y then the test will be resumed (if possible), and if the response is N this diagnostic will terminate. the Y] indicates that Y will be the default response if the user simply hits <CR> in response to the prompt. If the sections specified by the user were executed the number of times specified in the LOOP parameter of the run command without the number of errors exceeding the ERRNUM value, the diagnostic will terminate normally and the following message output:

SCSI CD Diagnostic Exiting . . .

Upon termination of this diagnostic, control will return to the diagnostic subsystem.

Test Section Descriptions

The remainder of this document is devoted to explaining each section in *SCSICD*. For each section, this explanation will consist of a description of the section, including the actions performed therein, the expected output from that section, and any error messages that may be generated that are worth noting. Please note that in regard to the error messages, all possible error messages that may be generated are not listed. The only error messages that are listed are those that are considered to be of special significance.

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Section 10—DIAGNOSTIC TROUBLE TREE

This section will execute the fault isolating diagnostic trouble tree. The algorithm follows:

1.) Issue an internal power-on SELFTEST to the device.
2.) Read block twice and compare the data.

OUTPUT :

Section 10 -- Diagnostic Trouble Tree

Device Selftest Completed

Read Block Completed

End of Section 10 -- Diagnostic Trouble Tree

POSSIBLE ERROR MESSAGES :

*** DEVICE ENCOUNTERED AN ERROR WHILE EXECUTING THE
SCSI INITIATE DIAGNOSTIC COMMAND (SCSIERR 109)

SENSE = { sense }

{Note: -- This sense printout will include the failing field
replaceable unit(s) as specified by the device}

Section 17—EXTERNAL EXERCISER

The SCSI External Exerciser is an interactive program which provides the user with access to the set of internal diagnostics and utilities within a SCSI compact disk. The purpose of the exerciser is to aid service-trained personnel in troubleshooting SCSI compact disks to a field replaceable unit level.

The External Exerciser, as discussed earlier, is an interactive program that provides the user with access to the set of internal diagnostics and utilities within a SCSI compact disk.

Media Testing

Media tests are powerful tools used to determine media integrity within a SCSI device. These tests can find recoverable and unrecoverable read errors and provide information concerning each error, such as the address where the error occurred and the type of error.

All media tests allow the user to input a loop count when requesting the test. Each time an error is detected during the test, the test will stop, report the error, and then resume testing until the loop count has been satisfied. Note that the loop count is not a count of the number of errors, but rather the number of passes the device will execute during the media test. The following information will be reported for each error that occurs:

- The current logical address.
- The error type.
- The loop count when the error occurred.

There is only one type of media test that can be performed on compact disk devices, the read only media test. The type of test, is a non-destructive test which reads data from the disk and attempts to detect any read errors that occur. There are two tests available in this category:

1.) Selected Area Read Only Media Test—Sequentially reads the current data on the disk in a specified area of the media.
2.) Random Read Only Media Test—Reads random sectors of random length data. This allows read errors to be detected on a large portion of the media in a minimum amount of time.

FOR HP INTERNAL USE ONLY

Exerciser Command Descriptions

When the external exerciser is invoked, the following prompt will be displayed to the user:

SCSICD>

When the prompt appears, the exerciser is waiting for a command from the user. The available commands are listed in this section in alphabetical order accompanied by descriptions. Each command description is in the following format:

COMMAND NAME

SHORT DEFINITION

Explanation of what the command does and when it should be used.

INPUT FORMAT:

SCSICD> [COMMAND NAME]

Note that the prompt for this exerciser is SCSICD>. The appearance of this prompt indicates that the exerciser is waiting for the user to input a command.

OUTPUT FORMAT:

Information printed as a result of this command being executed

POSSIBLE ERROR MESSAGES:

Any error messages worth noting that may be generated as a result of this command. Note that this does not imply that all possible error messages that may be generated are listed here, but rather, only those that are especially worth mentioning in relation to the command.

There are several conventions used throughout this section in the command formats. They are as follows:

- nnnn* - refers to a decimal number of any magnitude that is output by the diagnostic.
- vvv* - refers to a decimal number of variable magnitude that must be input by the user.
- zzzz* - refers to text displayed or output by the program
- H* - refers to a hexadecimal digit (0-F).
- O* - refers to an octal digit (0-8).
- B* - refers to a binary digit (0-1).

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Any text enclosed in parenthesis indicates that the user is expected to input that text in response to a query from the diagnostic. Text enclosed in square brackets indicates the default response that will be assumed if the user simply hits <CR> in response to the query. For example, the user may be asked if the program should continue by the following question:

Do you wish to continue (Y/N) [N]?

The text enclosed in the parenthesis (i.e., Y / N) indicates that the user is to type either a Y or an N in response to the question. Each option is separated by a /. The default response in this case would be N, as indicated by the [N] prior to the question mark. If there is no default response listed (enclosed in square brackets), the user will not be allowed to "default" the input by only entering a <CR>.

Comments in the input and output sequences are enclosed in curly brackets and are not output by the program. For example, following the question in the previous example, the input sequence would probably look something like the following:

{if response was N this command will terminate}

Error messages will be preceded by three asterisks ("***") and will be in all upper case letters. Other messages will not be all upper case and will not be preceded by the asterisks.

If the user enters a command in response to a prompt and that command is not recognized as an exerciser command, the following message will be displayed:

*** YOUR RESPONSE WAS INVALID

SCSICD>

This message simply means that the command entered is not part of the command set for the external exerciser.

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When the user enters a command that is recognized by the external exerciser, that command will then be processed according to the corresponding command description given in one of the following sections of this document. If an error is encountered as a result of issuing a SCSI command to the device, the hardware sense that is returned by the device will be displayed to the user. The status display will consist of the following format:

SENSE =

```
HH HH HH HH
HH HH HH HH
HH HH HH HH
HH HH HH HH
HH HH
```

```
Sense Key = HH
Sense Code = HH
```

{One or more of the following sense fields may be printed}

```
Address of event:
  Block address = nnnn
```

```
Failed field replaceable unit: nnnn
```

Note that only the portions of the above status display that correspond to errors indicated by the hardware status variable will be output. This means, for example, that if no Drive Errors were indicated by the status, none would be output.

In order to exit the exerciser, the EXIT command should be entered (see EXIT command description).

FOR HP INTERNAL USE ONLY

CAPACITY

Non-Exclusive/Non-Destructive Command

This command allows the user to determine the maximum capacity, block address of the last addressable block and the current block size.

INPUT FORMAT:

SCSICD> CAPACITY

OUTPUT FORMAT:

CAPACITY UTILITY
PDEV XXXX is an HPXXXX disk drive

Capacity Information
=====
Max Block Address = nnnn
Current Block Size = nnnn
Drive Capacity = nnnn bytes

CAPACITY UTILITY COMPLETED

FOR HP INTERNAL USE ONLY

DEVICE RESET

Exclusive/Non-Destructive Command

This command is used to reset the device. The following will be performed as a result of this command:

- Finish any logical block write in progress
- Abort any command in progress
- Controller initialization
- Initialize spare table
- Initialize saved pages information
- Initialize logs

INPUT FORMAT:

SCSICD> DEVICE RESET

OUTPUT FORMAT:

DEVICE RESET UTILITY
PDEV XXXX is an HPXXXX disk drive

DEVICE RESET UTILITY COMPLETED



FOR HP INTERNAL USE ONLY

DIAG

Non-Exclusive/Non-Destructive Command

This command will initiate the internal power-on self-test. A loop option allows the diagnostic to be repeated a specified number of times. Tests are device dependent, and are full described in the support documentation for each drive.

INPUT FORMAT:

SCSICD> DIAG

```
*****
*                CAUTION                *
* This command MAY tie up the system for *
* as long as it takes to finish the test. *
*****
```

Do you wish to continue (Y/N)[Y]?

Input the loop count (nnnn <= count <= nnnn)[nnnn]?

OUTPUT FORMAT:

```
INITIATE DIAGNOSTIC UTILITY
PDEV XXXX is an HPXXXX disk drive
```

```
INITIATE DIAGNOSTIC UTILITY COMPLETED
```

POSSIBLE ERROR MESSAGES:

```
*** DEVICE ENCOUNTERED AN ERROR WHILE EXECUTING THE
SCSI INITIATE DIAGNOSTIC COMMAND
```

```
SENSE = { sense }
```

FOR HP INTERNAL USE ONLY

EXIT

Non-Exclusive/Non-Destructive Command

This command terminates execution of the External Exerciser. It may be entered any time the SCSICD> prompt appears.

INPUT FORMAT:

SCSICD> EXIT

OUTPUT FORMAT:

End of Section 17 - External Exerciser

FOR HP INTERNAL USE ONLY

HELP

Non-Exclusive/Non-Destructive Command

This command provides the user with access to information concerning the commands that are available in the external exerciser. The user may request a list of the available commands accompanied by a brief description of each, or individual command descriptions. For individual commands, the user can request a description and syntax or just the syntax.

INPUT FORMAT:

SCSICD> HELP [command name or <cr>]

OUTPUT FORMAT:

{If no command name was given (i.e. <cr>)}
The following commands are available:

CAPACITY - Displays the maximum capacity and block size.
DEVICE RESET - Issue a Bus Device Reset
.
.
SUSPEND - Suspends SCSICD and returns to the DUI

{If a command was given}
Do you want a description or just syntax (D/S)[D]?

{If response was D}
COMMAND DESCRIPTION:
Description of the command
Syntax of the command

{If response was S}
COMMAND SYNTAX:
Syntax of the command

FOR HP INTERNAL USE ONLY

INQUIRY

Non-Exclusive/Non-Destructive Command

This command allows the user to obtain the drive type, media type and firmware revision.

INPUT FORMAT:

SCSICD> INQUIRY

OUTPUT FORMAT:

INQUIRY UTILITY
PDEV XXXX is an HPXXXX disk drive

Inquiry Information
=====

Product Revision = xxxx
Firmware Revision = xxxx

INQUIRY UTILITY COMPLETED

FOR HP INTERNAL USE ONLY

LDEV

Non-Exclusive/Non-Destructive Command

The LDEV command allows the user to select a new device to be tested. The user can select the new device by LDEV or PDEV.

INPUT FORMAT:

```
CS80DIAG> LDEV
```

OUTPUT FORMAT:

```
LDEV UTILITY  
PDEV XXXX is an HPXXXX disk drive
```

```
Input LDEV or PDEV (L/P)[P]?
```

```
{If response was L}  
New LDEV>
```

```
{If response was P}  
New PDEV>
```

```
PDEV XXXX is an HPXXXX disk drive
```

```
LDEV UTILITY COMPLETED
```

FOR HP INTERNAL USE ONLY

READ

Non-Exclusive/Non-Destructive Command

This command allows the user to access any data block on the selected device. Due to potential security compromise, the user will need to possess Level 0 security to use this command.

INPUT FORMAT:

SCSICD> READ

Enter new address (<cr> to keep current value) --
Block address (nnnn - nnnn) = nnnn?

OUTPUT FORMAT:

READ UTILITY
PDEV XXXX is an HPXXXX disk drive

The data in hex follows:

	0	1	2	3	4	5	6	7	8	9	
0:	HH	HH	HH	HH	HH	HH	HH	HH	HH	HH	. . . . .
10:	HH	HH	HH	HH	HH	HH	HH	HH	HH	HH	. . . . .
.											.
.											.
2040:	HH	HH	HH	HH	HH	HH	HH	HH			. . . . .

{Note: -- the dots in the preceding table represent non-alpha-numeric ASCII characters. Alpha-numeric characters will be printed}

READ UTILITY COMPLETED

FOR HP INTERNAL USE ONLY

RO MT

Non-Exclusive/Non-Destructive Command

This command is used to initiate a read only media test. Two types of tests are available through this command. The first read only media test allows the user to specify the address at which the test is to start. This test will sequentially read data starting at this address in an attempt to detect any read errors. The second type of test is a random read only media test which uses random addresses and lengths of reads in attempt to detect any read errors.

INPUT FORMAT:

SCSICD> RO MT

```
* * * * *
*           CAUTION           *
*   This command MAY tie up the system for   *
*   as long as it takes to finish the test.   *
* * * * *
```

Do you wish to continue (Y/N)[Y]?

Clear ALL logs (Y/N)[N]?

Types of RO MT's:

S = selected area

R = random area

Enter the test type (S/R)[S]?

Enter new address (<cr> to keep current value) --

Block address (nnnn - nnnn) = nnnn?

Test Area:

V = volume

S = sector

Enter the test area (V/S)[S]?

Input the loop count (nnnn<= count <=nnnn)[nnnn]?

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OUTPUT FORMAT:

RO MT UTILITY
PDEV XXXX is an HPXXXX disk drive

Test Area = Volume starting at Cyl = nnnn, Head = nnnn, Sec = nnnn
{or}
Test Area = Sec starting at Cyl = nnnn, Head = nnnn, Sec = nnnn

{If no errors detected}
No errors were detected by the media test
{or}

{If errors were detected}
*** ERROR IN TRANSMISSION DETECTED DURING READ
MEDIA TEST: (SCSIERR 124)



Cyl	Hd	Sect	Byte	Trns	Recd	Hex Value	Hex Value	Bit Positions In Error	Time Error Occurred
nnnn	nnnn	nnnn	nnnn	HH	HH	BBBBBBBB	BBBBBBBB	01234567	FRI, DEC 16, 1988 9:03 PM
nnnn	nnnn	nnnn	nnnn	HH	HH	BBBBBBBB	BBBBBBBB		FRI, DEC 16, 1988 9:03 PM
. Repeat for each occurrence									
nnnn	nnnn	nnnn	nnnn	HH	HH	BBBBBBBB	BBBBBBBB		FRI, DEC 16, 1988 9:03 PM

RO MT UTILITY COMPLETED

FOR HP INTERNAL USE ONLY

SEEK

Non-Exclusive/Non-Destructive Command

This command causes the drive to seek to a specified address or series of addresses. The command is useful for testing the servo circuitry. Three types of seeks may be performed: Random Seek seeks to a random address; Alternate Seek seeks between two specified addresses; and Butterfly Seek performs a series of seeks over the entire disk surface.

INPUT FORMAT:

SCSICD> SEEK

```
*****
*                CAUTION                *
*  This command MAY tie up the system for  *
*  as long as it takes to finish the test.  *
*****
```

Do you wish to continue (Y/N)[Y]?

Types of seeks:

- A = alternate seek
- B = butterfly seek
- R = random seek

Select the seek type (A/B/R)[R]?

{If response was Alternate}

Input Address #1:

Enter new address (<cr> to keep current value) --
Block address (nnnn - nnnn) = nnnn?

Input Address #2:

Enter new address (<cr> to keep current value) --
Block address (nnnn - nnnn) = nnnn?

{If response was Butterfly}

Test all heads (Y/N)[N]?

{If response was N}

Input head number (nnnn <= head <= nnnn)[nnnn] ?

Input the loop count (nnnn <= count <= nnnn)[nnnn]?A

OUTPUT FORMAT:

SERVO TEST UTILITY
PDEV XXXX is an HPXXXX disk drive

Pass nnnn started
Pass nnnn completed

FOR HP INTERNAL USE ONLY

SERVO TEST UTILITY COMPLETED

FOR HP INTERNAL USE ONLY

SUSPEND

Non-Exclusive/Non-Destructive Command

The **SUSPEND** command allows the user to suspend SCSICD and return to the DUI. The user enters **RESUME** at the DUI prompt to return to SCSICD.

INPUT FORMAT:

SCSICD> SUSPEND

OUTPUT FORMAT:

DUI>

Error Messages

This section gives a complete list of the error messages that may be generated by SCSICD along with brief explanations of the meaning of the messages. The messages will be listed in numerical order and are exactly as they appear in the message catalog. Thus, a “!” indicates that a parameter of some sort will be placed in the location marked by the exclamation point. A “&” indicates that the line below will be concatenated onto the end of the line with the ampersand. Finally, a “%” means that the line below is a continuation of the message, but not to be concatenated as with the ampersand.

100	*** WARNING -- THE I/O PATH MAY NOT BE FUNCTIONING PROPERLY (SCSIERR 100)
CAUSE	An error was detected by the Io_Path_Test service while testing the modules on the i/o path preceding the selected device.
ACTION	Execute the appropriate diagnostics on the modules preceding the selected device on the i/o path, especially on those that may have been reported as faulty in error messages immediately preceding this message. Note that the results of the execution of this instance of SCSICD may be invalid.
101	*** DEVICE FAILED TO RESPOND TO ! COMMAND IN ALLOTTED TIME (SCSIERR 101)
CAUSE	No response to an i/o was received prior to the expiration of the allotted time.
ACTION	Verify that the selected disk drive is actually connected to the system. Run SYSMAP, if available, to confirm the presence of the device.
102	*** SCSICD IS UNABLE TO DIAGNOSE THE SELECTED DEVICE (SCSIERR 102)
CAUSE	The selected device identified itself as something other than a SCSI drive.
ACTION	Determine type of selected device and run the appropriate diagnostic on it.
103	*** SCSI CD DIAGNOSTIC TERMINATING (SCSIERR 103)
CAUSE	A fatal error has been encountered.
ACTION	The specific error that was encountered should have been reported immediately prior to this message. Follow the action instructions for that error message.
104	*** A RESERVE AREA IS NOT AVAILABLE ON THIS DRIVE -- NO OPERATION WAS PERFORMED. (SCSIWARN 104)
CAUSE	There is no available area on the disk that can be written to without corrupting user data. This can happen if no such area is provided by the system, or if the diagnostic is running in destructive mode, in which the location of the reserve area is unknown to the system since the drive is locked for diagnostics.
ACTION	For systems which do not support a reserve area (e.g. HP-UX), reserve area operations are not supported.

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105	*** EXCLUSIVE MODE REQUIRED TO EXECUTE THIS COMMAND (SCSIERR 105)
CAUSE	The diagnostic does not have access to the drive in the mode necessary to execute the selected command.
ACTION	The mode granted to a diagnostic for a selected device is system dependent. Use the HELP LDEV command at the DUI for more information.
<hr/>	
106	*** DESTRUCTIVE MODE REQUIRED TO EXECUTE THIS COMMAND (SCSIERR 106)
CAUSE	The diagnostic does not have access to the drive in the mode necessary to execute the selected command.
ACTION	The mode granted to a diagnostic for a selected device is system dependent. Use the HELP LDEV command at the DUI for more information.
<hr/>	
107	*** INVALID DEVICE WAS SELECTED (SCSIWARN 107)
CAUSE	The device selected with the LDEV command is not a valid device.
ACTION	Verify the PDEV or LDEV input and retry the command.
<hr/>	
108	*** ! COMMAND IS NOT IMPLEMENTED ON THIS DRIVE/SYSTEM (SCSIERR 108)
CAUSE	The selected operation is either not implemented on the selected drive or the system does not provide access to it.
ACTION	This operation is unavailable.
<hr/>	
109	*** DEVICE ENCOUNTERED AN ERROR WHILE EXECUTING THE SCSI ! COMMAND (SCSIERR 109)
CAUSE	The drive reported an error as a result of executing the selected operation.
ACTION	The hardware status that is displayed immediately following this message should indicate what sort of problem occurred, including a failing FRU if one is reported. If an FRU is reported, replace it and re-execute this diagnostic.

FOR HP INTERNAL USE ONLY

110	*** THE MAXIMUM NUMBER OF ERRORS HAS BEEN EXCEEDED (SCSIERR 110)
CAUSE	The user specified error limit has been reached.
ACTION	If more errors are desired, re-run the diagnostic assigning a larger value to the ERRCOUNT parameter of the run command.
<hr/>	
111	*** UNRECOGNIZED COMMAND -- TYPE "HELP" FOR A LIST OF VALID COMMANDS (SCSIERR 111)
CAUSE	The specified command is not a valid command.
ACTION	Use the help facility to obtain a list of the commands that are valid and enter the desired command.
<hr/>	
112	*** UNRECOGNIZED REPLY WAS FOUND (SCSIERR 112)
CAUSE	The reply that was entered in response to a prompt by the diagnostic is not valid.
ACTION	Refer to the prompt that was displayed and enter a response that is within the specified list of valid responses.
<hr/>	
113	*** A NUMERICAL INPUT WAS EXPECTED BUT NOT RECEIVED (SCSIERR 113)
CAUSE	The reply that was entered in response to a prompt by the diagnostic is not a valid number.
ACTION	Re-enter number using only numeric characters and valid special characters (e.g. +, -, , etc.).
<hr/>	
114	*** AN UNEXPECTED ERROR OCCURRED IN THE IO_SCSI DAR (SCSIERR 114)
CAUSE	A call to the SCSI device access routine resulted in an unexpected status return.
ACTION	The specific status generated by Io_Cs80 should have been displayed immediately prior to this error message. Report this set of error messages to support personnel.
<hr/>	

FOR HP INTERNAL USE ONLY

115 ***** ERROR IN TRANSMISSION DETECTED DURING READ LOOPBACK**
 TEST: (SCSIERR 115)

	Octal Value	Octal Value	Bit Positions
Byte #	Transmitted	Received	In Error
=====	=====	=====	01234567
			=====

CAUSE One or more bytes of data that were received from the disk as a result of a loopback operation did not contain the expected value(s).

ACTION Data is most likely being corrupted along the data path between the host and the drive. Check all cable connections along the path and re-execute the diagnostic. If errors persist, execute appropriate diagnostics against the modules that lay in the path between the host and the device.

118 ***** ERROR -- EXPECTED ! BYTES FROM THE DEVICE AND RECEIVED**
 ! BYTES (SCSIERR 118)

CAUSE The number of bytes in the reply from the device was not what was expected. This is most likely a result of executing the diagnostic on a drive which is not supported by it.

ACTION Verify that the selected device is in the list of supported devices for the diagnostic (LIST ALL from the DUI). If it is, report the problem to support personnel.

119 ***** THIS COMMAND IS NOT SUPPORTED ON THIS DEVICE (SCSIERR 119)**

CAUSE The specified operation is not supported by the selected device.

ACTION While other devices supported by the diagnostic may support the specified command, the selected device does not.

120 ***** FILE SYSTEM ERROR ENCOUNTERED WHILE RETRIEVING A**
 MESSAGE (SCSIERR 120)

CAUSE An error was returned while attempting to obtain a message from the catalog. The actual error will have been displayed prior to this message.

ACTION This is a software error. Report to support personnel.

121 ***** IDENTICAL READS FROM DISK RETURNED NON-IDENTICAL**
 DATA (SCSIERR 121)

CAUSE A read operation was performed on the same sector twice and the data from both reads did not match exactly.

ACTION This is most likely a hardware problem with the drive. If loopback executes correctly, the read/write board in the drive is the probable cause of the error.

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123 ***** SELECTED DEVICE IS NOT A RECOGNIZED HP DEVICE (SCSIERR 123)**
CAUSE The selected device does not identify itself with a recognized Hewlett-Packard product number or the version of diagnostic does not recognize or support the product.
ACTION Verify visually the type of product being diagnosed. If the product is a valid Hewlett-Packard product, update the diagnostic to a version that supports that product.

124 ***** ERROR IN TRANSMISSION DETECTED DURING READ/WRITE CHANNEL**
 TEST: (SCSIERR 124)

				Hex	Hex	Bit		
				Value	Value	Positions		
Cyl	Hd	Sect	Byte	Trns	Recd	In Error	Time	Error Occurred
-----				----	----	01234567	-----	-----

CAUSE Data written to the disk does not agree with the data read.
ACTION Verify the data path to the device using the LOOPBACK command and WTR ERT on the target sector.

140 ***** NO OPERATION WAS PERFORMED (SCSIERR 140)**
CAUSE Due to a previous error, which has already been reported, no operation was performed.
ACTION Refer to action instructions for previously reported error.

200 ***** AN ERROR WAS ENCOUNTERED WHILE ATTEMPTING TO SEND/RECEIVE**
 INFORMATION FROM THE USER (SCSIERR 200)
CAUSE Due to a previous error, which has already been reported, the diagnostic was unable to communicate with the user interface process.
ACTION Refer to action instructions for previously reported error.

201 ***** AN ERROR WAS ENCOUNTERED IN ATTEMPTING TO RETRIEVE A**
 MESSAGE FROM THE CATALOG (SCSIERR 201)
CAUSE Due to a previous error, which has already been reported, the diagnostic was unable to extract a message from its message catalog.
ACTION Refer to action instructions for previously reported error.

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202	*** AN ERROR WAS ENCOUNTERED IN ATTEMPTING TO CONVERT A NUMBER TO A STRING (SCSIERR 202)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to convert a number to a string.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
203	*** AN ERROR WAS ENCOUNTERED IN ATTEMPTING A BIT EXTRACTION OPERATION (SCSIERR 203)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to extract one or more bits from a number.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
204	*** THE SELECTED DEVICE COULD NOT BE OBTAINED FOR TESTING (SCSIERR 204)
CAUSE	The DUI was unable to obtain access to the device. Device may be held exclusively by another process.
ACTION	Determine the access status of the device and make the corrective requirements.
<hr/>	
207	*** SCSI CD INITIALIZATION FAILED. DEVICE MAY NOT BE SCSI OR DESCRIBE INFORMATION RETURNED MAY BE ERRONEOUS. SCSI CD MAY NOT FUNCTION PROPERLY (SCSIERR 207)
CAUSE	The diagnostic was unable to successfully obtain describe data from the drive. Since the diagnostic needs this information to function correctly, the user must make the determination to continue or terminate.
ACTION	Verify that the disk is in fact a SCSI device and that the hardware path specified is valid.
<hr/>	
208	*** AN ERROR WAS ENCOUNTERED IN ATTEMPTING TO COMMUNICATE WITH THE DIAGNOSTIC SYSTEM (SCSIERR 208)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to successfully perform a function which requires communication with the diagnostic system.
ACTION	Refer to action instructions for previously reported error.
<hr/>	

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209	*** YOUR RESPONSE WAS INVALID (SCSIERR 209)
CAUSE	The data entered in response to a prompt was not valid.
ACTION	Refer to the prompt to determine the valid responses for the particular situation and enter one of the specified valid responses.
<hr/>	
210	*** AN ERROR WAS ENCOUNTERED WHILE ATTEMPTING TO OBTAIN DATA FROM AN I/O BUFFER (SCSIERR 210)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to get data from its i/o buffer and, therefore cannot obtain data from the device.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
211	*** AN ERROR WAS ENCOUNTERED WHILE ATTEMPTING TO PLACE DATA INTO AN I/O BUFFER (SCSIERR 211)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable place data into its i/o buffer and, therefore, cannot send data to the device.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
212	*** AN ERROR WAS ENCOUNTERED WHILE ATTEMPTING TO OBTAIN AN I/O BUFFER (SCSIERR 212)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable obtain an i/o buffer and therefore, cannot send/receive data to/from the device.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
213	*** SECTION NUMBER ! IS NOT A VALID SECTION (SCSIERR 213)
CAUSE	The section number input was not a valid section.
ACTION	Verify the valid sections and input your selection.
<hr/>	

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214	*** AN ERROR WAS ENCOUNTERED WHILE ATTEMPTING TO INITIALIZE THE PROGRAM (SCSIERR 214)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to start.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
215	*** HIGHER SECURITY IS NEEDED TO PERFORM THIS OPERATION (SCSIERR 215)
CAUSE	The user requested an operation which is restricted to users with higher security than the user possesses.
ACTION	Contact system administrator if higher security level is desired.
<hr/>	
216	*** AN ERROR WAS ENCOUNTERED WHILE ATTEMPTING TO RELINQUISH ACCESS TO THE CURRENT DEVICE. PROGRAM TERMINATING. (SCSIERR 216)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to relinquish access to the current device.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
217	*** AN ERROR WAS ENCOUNTERED WHILE ATTEMPTING TO OBTAIN ACCESS TO THE NEW DEVICE. ACCESS WAS NOT OBTAINED. (SCSIERR 217)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to obtain access to the current device.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
218	*** AN ERROR WAS ENCOUNTERED WHILE ATTEMPTING TO OBTAIN ACCESS TO THE OLD DEVICE. PROGRAM TERMINATING. (SCSIWARN 218)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to regain access to the previous device under test. Access to this device was attempted after access to the new device was not obtained.
ACTION	The device is currently being accessed exclusively by another process.
<hr/>	

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219	*** THE OPTION TO OBTAIN DISK SPACE IS NOT IMPLEMENTED FOR THIS OPERATING SYSTEM. (SCSIWARN 219)
CAUSE	The operating system does not currently provide the functionality necessary to execute this command.
ACTION	Communicate the need for this functionality to the appropriate division.
<hr/>	
220	*** AN ERROR OCCURRED WHILE ATTEMPTING TO OBTAIN DISK SPACE. (SCSIERR 220)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to obtain disk space.
ACTION	Refer to action instructions for previously reported error.
<hr/>	
221	*** AN ERROR WAS ENCOUNTERED WHILE ATTEMPTING TO OBTAIN DISK SPACE. DISK SPACE RETURNED IS NOT ADEQUATE TO PERFORM TESTS. (SCSIERR 221)
CAUSE	The area obtained from the disk device for test was not adequate to perform any substantial test. (SCSIWARN 221)
ACTION	Contiguous free space on the disk device is fragmented or there does not exist any free space large enough to test.
<hr/>	
222	*** AN ERROR WAS ENCOUNTERED WHILE ATTEMPTING TO RELINQUISH DISK SPACE. (SCSIERR 222)
CAUSE	Due to a previous error, which has already been reported, the diagnostic was unable to relinquish disk space.
ACTION	Refer to action instructions for previously reported error.
<hr/>	



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Ciper Line Printer Diagnostic

Introduction

The CIPER Diagnostic will test an HP 2563A/64B/65A/66A,66B or HP2567B Line Printer to detect failures of a Field Replaceable Unit. The diagnostic will run on any HP Precision Architecture Computer system which supports the Online Diagnostic subsystem. CIPER (which stands for Control messages for Intelligent PERipherals) was developed to control intelligent peripherals. The user can:

- specify which sections and steps are to be run
- set test parameters to control the handling of error messages
- select the number of test executions and the particular CIPER Line Printer unit to be tested. Only MPE XL-based systems have auto-diagnostic capability.

Defects and Enhancements

Submit defect reports and enhancement requests for this diagnostic through the STARS database referencing product number 30600-10002.

Minimum Configuration

The hardware required to run the diagnostic consists of an HP Precision Architecture RISC computer system with a supported (see above) Ciper Line Printer connected and configured to it. The Ciper Device under test must contain internal selftests that are capable of detecting failed Field Replaceable Units (FRU's).

Auto-Diagnostics

The Ciper Line Printer diagnostic program can be invoked by the I/O system for auto-diagnostic purposes when a nonrecoverable printer error has been detected. In auto-diagnostics mode, this diagnostic program will execute the following sections and steps:

Section 2	Reset
Section 3	Clear/Identify
Section 5	Selftest
Section 6	Request Device Status (all steps)

Operating Instructions

The diagnostic is accessible by all users who have obtained diagnostic security 1 or 0. Refer to the Security Section on DUI for a detailed description of user capabilities. The diagnostic program will execute only after all current printer activity has completed. During testing, the printer will be unable to output system user data but will resume spooling upon completion of the current diagnostic section and step. Before attempting to run the diagnostic, ensure that the line printer to be tested is powered up and put online.

Default Tests

If the user does not specify the sections and steps to be run, the following default sections and steps will be executed:

Section 2	Reset
Section 3	Clear/Identify
Section 5	Selftest
Section 6	Request Device Status (all steps)

RUN Command

To bring up the Online Diagnostic subsystem, enter the following command to the system prompt:

```
sysdiag
```

The system responds with the following prompt indicating that access has been gained to the Online Diagnostic User Interface (DUI).

```
DUI >
```

Typing HELP causes a summary of the DUI and its commands to be printed. Refer to the DUI chapter of this manual for details.

Note



The device to be tested must be powered up and on line. Device physical locations (pdev) shown in the RUN commands are those of the devices on the "typical A1002A" system configuration described in the chapter on DUI. The pdev value entered must be correct for the system being tested.

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device status messages are received, they are immediately displayed to the user. If the device clear is unsuccessful, the CIPER line printer diagnostic will terminate immediately.

Upon completion of synchronization, the section and steps specified by the user are executed, and the results output. The test sections and steps are described in the "Detailed Test Descriptions Section". If the user did not specify sections or steps to be run, the default sections and steps will be run by CIPERLPD. The default sections are 2, 3, 5, and 6 (Reset Clear/Identify, Selftest and Request Device Status).

If at any time, the number of errors generated reaches the limit specified by the user in the ERRCOUNT parameter of the RUN command, the following message will be displayed:

***** SPECIFIED ERROR COUNT HAS BEEN EXCEEDED (CPRERR 16)**

The diagnostic will then terminate execution. If the ERRPAUSE parameter of the RUN command was assigned a value of "on", then the diagnostic will stop after each error is generated and ask the user whether the test should continue:

Continue (Y/N) [Y]?

If the response is "Y" then the test will be resumed, and if the response is "N", the diagnostic will terminate. If the user enters a carriage return, the diagnostic defaults to a "Y". Upon completion of all sections and steps selected by the user or CIPERLPD default, the following message will signal the termination of CIPERLPD. The diagnostic will terminate normally and the following message will be output:

CIPERLPD Exiting...

If the diagnostic terminated prematurely due to ERRPAUSE or exceeding ERRCOUNT, the above message will not be displayed. Control will return to the DUI:

DUI >

To exit CIPERLPD, the user simply types EXIT. Control will return to the DUI upon completion of the current section and step.

Test Section Descriptions

The seven diagnostic program sections listed below are available for user selection. The user may also select individual steps to be run for Section 6. A description of each section and step will be given, along with the expected output from that section and step.

Section 2	Reset
Section 3	Clear/Identify
Section 5	Selftest
Section 6	Request Device Status
Step 10	Obtain Device Status
Step 11	Decode Device Status
Section 10	Ripple Print
Section 12	Request and Decode Environmental Status
Section 14	Request and Decode Job Status

Section 2—RESET

This section issues a (ESC E) programmatic reset to the CIPER line printer. This will cause the device to be placed into one of the following known states:

- Primary and secondary symbol sets as configured from the Operator Control Panel
- Vertical line spacing (6/8 LPI) as selected from the Operator Control Panel
- Paper moves to the next top of form position (if not currently at top of form)
- Print buffer cleared
- Standard VFC Channel assignments selected
- Left margin set at first column
- Form length remains at the save value as before power loss

If no errors are generated the diagnostic will output the following message:

```
Section 2 - RESET
End of Section 2 - RESET
```

Section 3—CLEAR/IDENTIFY

This section issues a device clear to the printer and will display the information contained in the Device Clear Response to the user. This includes the record size in bytes, the maximum environmental status size in bytes, and the HP product code. If no errors are generated the diagnostic will output the following message:

```
Section 3 - CLEAR/IDENTIFY

The selected device has been identified as an nnnn printer.
Record Buffer size (bytes): nnn
Max Env Status Block size (Bytes): nnn

End of Section 3 - CLEAR/IDENTIFY
```

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Section 5—SELFTEST

This section issues an (ESC Z) to the CIPER line printer, which will execute the printer selftest. The selftest will print one or more pages of test patterns onto the paper. If the selftest failed, the hardware status information will be displayed to the user. Refer to Section 6, Step 11 of this section for decoding format. Some printers will go offline if the selftest fails. This section may execute up to 90 seconds. If no errors are generated the diagnostic will output the following message:

```
Section 5 - SELFTEST
End of Section 5 - SELFTEST
```

Section 6—DEVICE STATUS

This section obtains and decodes the device status from the printer. The following steps are available:

- Step 10 **Request Hardware Status:** This step will obtain the device hardware status. Only the status of the I/O request will be displayed if the request failed.
- Step 11 **Decode Hardware Status:** This step displays the device hardware status in text format to the user. The SELFTEST FAIL CODE BYTE fields of the device status will identify the failing Field Replaceable Unit (FRU). If Step 10 was selected and did not complete successfully, then

If no errors are generated the diagnostic will output the following message:

```
Section 6 -- DEVICE STATUS
```

```
Step 10 - Request Hardware Status Completed
```

```
-----
Peripheral Status:
  [any of: On Line
           Off Line
           Paper Out
           Paper Jam
           Platen/Gate Open
           Ribbon Malfunction
           Self Test Fail]
```

```
Error Conditions:
  [any of: Data Loss
           Power Fail]
```

```
Selftest Fail Code Byte 1 : nn
Selftest Fail Code Byte 2 : nn
```

```
< Description of selftest fail code >
```

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Note



The possible error descriptions are specific to each CIPER printer, so listing the possible message is not possible. If this program does not recognize the printer model as returned in the Clear/Identify section, or does not have a language localized message for the particular failure, the user must refer to the printer manual to decode the selftest fail code themselves.

CIPER Protocol Errors:

[any of: Illegal Record Header Length
Incorrect Host-to-peripheral record number
Illegal Host/Peripheral field
Undefined Record Code
Undefined Data Type
Illegal Device-Dependent Format Number
Illegal Block Label
Transport Service Error
Data Overrun]

Step 11 - Decode Hardware Status Completed

End of Section 6 -- DEVICE STATUS

Section 10—RIPPLE PRINT

This section causes the line printer to perform a ripple print for the number of lines specified by the user. Upon entering this section, the user will be asked to enter the number of lines to be printed. If a carriage return is entered, one page of output will be printed. Any input except a line number count is illegal, and this section will ask for input again. When printing has completed the job status will be displayed to the user. If no errors are generated the diagnostic will output the following message:

Section 10 - RIPPLE PRINT

Enter number of lines to be printed (page = 60) >>

Silent Run Mode: <ON/OFF>

Job Sheet Count: nnn

End of Section 10 - RIPPLE PRINT

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Section 12—ENVIRONMENTAL STATUS

This section will obtain the information for the last environmental status generated, and will display that information to the user. Because the format of the device dependent portion of the environmental status may change during the lifetime of the printer, this portion of the environmental status will be displayed in HEX. If no errors are generated the diagnostic will output the following message:

Section 12 -- ENVIRONMENTAL STATUS

```
-----  
Block Number:                nnn  
Byte Offset:                 nnn  
Checkpoint Number:          nnn  
Device Dependent Format Number: nnn
```

Remaining environmental status data is given in HEX:

```
ENV_BYTE (16): nn nn nn nn nn nn nn nn nn nn nn nn  
  ( Continue for remaining data bytes )  
-----
```

End of section 12 -- ENVIRONMENTAL STATUS

Section 14—JOB STATUS

This section obtains the information for the last job status generated and will display that information to the user. If no errors are generated the diagnostic will output the following message:

Section 14 - JOB STATUS

```
Silent Run Mode: <ON/OFF>  
Job Sheet Count: nnn
```

End of Section 14 - JOB STATUS



Error Messages

The following is a list of error messages which may appear when using CIPERLPD. Other diagnostic error messages may appear at any time. Error messages without the (CPLERR #) trailer are generated by the Online Diagnostic subsystem or the Operating system. Listed below each error message, are a probable cause and recommended action statement. The actual cause and action may differ from this list depending upon the particular circumstances of a given situation. The "!" indicates that a parameter of some sort replaces the exclamation point when the message is displayed.

10	*** SECTION ! DOES NOT EXIST. (CPRERR 10)
CAUSE	The user has specified a section which does not exist in this diagnostic.
ACTION	Please use the diagnostic user interface HELP command to determine the correct section number.
11	*** STEP ! DOES NOT EXIST. (CPRERR 11)
CAUSE	The user has specified a step which does not exist in this diagnostic.
ACTION	Please use the diagnostic user interface HELP command to determine the correct step number.
12	*** WARNING -- THE I/O PATH TO THE LINE PRINTER MAY NOT BE FUNCTIONING PROPERLY. (CPRERR 12)
CAUSE	This diagnostic program issued a request to have the diagnostic system test the I/O path to the line printer. The results of those tests indicate that a problem may exist in the path to the line printer.
ACTION	A message indicating the hardware problem encountered will be displayed before this message. It may be advisable to run the appropriate diagnostic program for the suspected I/O hardware indicated by that message.
13	*** RECEIVED UNKNOWN RESPONSE MESSAGE FROM THE PRINTER. (CPRERR 13)
CAUSE	This diagnostic received an unknown reply message from the line printer during an I/O transaction.
ACTION	Verify that the printer being tested is supported by this diagnostic. The diagnostic user interface LIST command will give a list of printers which are appropriate for this diagnostic. Otherwise, report the set of error messages and product number of printer to support personnel.
15	*** COULD NOT ESTABLISH COMMUNICATION LINK TO THE PRINTER. (CPRERR 15)
CAUSE	This diagnostic was not able to open communications with the line printer.
ACTION	Verify that the printer is properly cabled to the system. Also, the printer must be on line.

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16	*** SPECIFIED ERROR COUNT HAS BEEN EXCEEDED. (CPRERR 16)
CAUSE	The number of errors specified by the user has been reached. As requested the diagnostic will terminate after this message is displayed.
ACTION	Please execute this diagnostic with a higher error count in the ERRCOUNT option if you wish to see more error message. If the ERRCOUNT option is not given, all the error messages will be displayed.
<hr/>	
17	*** STEP WAS SELECTED WITHOUT SECTION. (CPRERR 17)
CAUSE	The user selected a step but did not specify the corresponding section in the RUN parameters.
ACTION	Please consult the diagnostic user interface HELP command to determine the appropriate section to select with the desired step.
<hr/>	
18	*** ENVIRONMENTAL STATUS BLOCK TOO LARGE FOR I/O BUFFER ALLOCATED. (CPRERR 18)
CAUSE	The environmental status block returned by the line printer is too large for the I/O buffer specified by the diagnostic program.
ACTION	Please submit a service request indicating the following: a) Identify the printer being tested by product number. Also include any special printer options installs if applicable. b) Any other error messages displayed with this error message. c) The CIPERLPD sections and steps executed to produce this error.
<hr/>	
19	*** EXPECTED RECEIVE READY RESPONSE NOT OBTAINED. (CPRERR 19)
CAUSE	This diagnostic is expecting a receive ready message from the printer and did not receive it. This diagnostic cannot issue any requests to the printer until a receive read message is obtained.
ACTION	Verify that the printer is on line. If the printer is not on line, the fault encountered will be displayed on the LED's. Otherwise we have a communication protocol error. Re-execute the diagnostic, and if problem persists report error to support personnel.
<hr/>	
20	*** COULD NOT CLOSE COMMUNICATION LINK TO THE PRINTER. (CPRERR 20)
CAUSE	This diagnostic was not able to terminate communications with the line printer.
ACTION	Enable error tracing by rerunning the program with the TRACE=ERROR parameter at the DUI command line, and a file service request with the trace information generated by executing CIPERLPD again with the same sections and steps.
<hr/>	
21	*** DEVICE COULD NOT BE OBTAINED FROM DIAGNOSTIC SYSTEM. (CPRERR 21)
CAUSE	The diagnostic program did not obtain permission to access the line printer. Detailed information will be displayed with this message.
ACTION	The reason for being denied access to the printer will be displayed before this message. Please refer to the action clause for that error message.
<hr/>	
22	*** RECORD RECEIVED OUT OF SEQUENCE. (CPRERR 22)
CAUSE	The reply message received from the line printer did not have the correct sequence number.
ACTION	This may be a communication protocol error. Re-execute the diagnostic, and if problem persists report error to support personnel.
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23	*** UNABLE TO ISSUE REQUEST: RECEIVE READY COUNT IS ZERO. (CPRERR23)
CAUSE	The diagnostic is unable to issue a request to the line printer because the receive ready count is zero.
ACTION	This may be a communication protocol error. Re-execute the diagnostic, and if problem persists report error to support personnel.
<hr/>	
24	*** INVALID LINE COUNT WAS GIVEN. (CPRERR 24)
CAUSE	User gave a zero or negative number of lines to be printed.
ACTION	User must give a positive number of lines to be printed. If the user enters <cr>, default of 80 lines will be printed.
<hr/>	
25	*** INITIALIZATION FAILURE: DEVICE CLEAR REQUEST FAILED (CPRERR 25)
CAUSE	During initialization of this diagnostic, it issues a write request to initiate a device clear. In this case, that write request failed.
ACTION	Error messages indicating the cause of the write error will be displayed before this message. Please refer to action clause for those error messages. Also, verify that the printer is properly cabled to the system, and is on line.
<hr/>	
26	*** INITIALIZATION FAILURE: READ CLEAR RESPONSE FAILED (CPRERR 26)
CAUSE	During initialization of this diagnostic, it issues a read request to obtain the device clear response message. In this case, that read request was not successful.
ACTION	Error messages indicating the cause of the read error will be displayed before this message. Please refer to action clause for those error messages. Also, verify that the printer is properly cabled to the system, and is on line.
<hr/>	
27	*** WRITE REQUEST FOR JOB STATUS FAILED (CPRERR 27)
CAUSE	This diagnostic tried to issue a write request to initiate a READ JOB STATUS command. That write request was not successful.
ACTION	Error messages containing more detailed information will be displayed before this message. Please refer to the action clause for those error messages. Also, verify that the printer is on line. If the printer is not on line, the fault encountered should be displayed on the LED's.
<hr/>	
28	*** READ REQUEST FOR JOB STATUS FAILED (CPRERR 28)
CAUSE	This diagnostic tried to issue a read request to obtain job status from the printer. That read request was not successful.
ACTION	Error messages containing more detailed information will be displayed before this message. Please refer to the action clause for those error messages. Also, verify that the printer is on line. If the printer is not on line, the fault encountered should be displayed on the LED's.

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29	*** WRITE REQUEST FOR ENVIRONMENTAL STATUS FAILED (CPRERR 29)
CAUSE	This diagnostic tried to issue a write request to initiate a READ ENVIRONMENTAL STATUS command. That write request was not successful.
ACTION	Error messages containing more detailed information will be displayed before this message. Please refer to the action clause for those error messages. Also, verify that the printer is on line. If the printer is not on line, the fault encountered should be displayed on the LED's.
<hr/>	
30	*** READ REQUEST FOR ENVIRONMENTAL STATUS FAILED (CPRERR 30)
CAUSE	This diagnostic tried to issue a read request to obtain environmental status information. That read request was not successful.
ACTION	Error messages containing more detailed information will be displayed before this message. Please refer to the action clause for those error messages. Also, verify that the printer is on line. If the printer is not on line, the fault encountered should be displayed on the LED's.
<hr/>	
31	*** WRITE REQUEST FOR JOB START FAILED (CPRERR 31)
CAUSE	This diagnostic tried to issue a write request to initiate a JOB START command. That write request was not successful.
ACTION	Error messages containing more detailed information will be displayed before this message. Please refer to the action clause for those error messages. Also, verify that the printer is on line. If the printer is not on line, the fault encountered should be displayed on the LED's.
<hr/>	
32	*** WRITE REQUEST FOR ONE LINE OF RIPPLE PRINT FAILED (CPRERR 32)
CAUSE	This diagnostic tried to issue a write request to write a data pattern to the printer. That write request was not successful.
ACTION	Error messages containing more detailed information will be displayed before this message. Please refer to the action clause for those error messages. Also, verify that the printer is on line. If the printer is not on line, the fault encountered should be displayed on the LED's.
<hr/>	
33	*** WRITE REQUEST FOR JOB END FAILED (CPRERR 33)
CAUSE	This diagnostic tried to issue a write request to initiate a JOB END command. That write request was not successful.
ACTION	Error messages containing more detailed information will be displayed before this message. Please refer to the action clause for those error messages. Also, verify that the printer is on line. If the printer is not on line, the fault encountered should be displayed on the LED's.
<hr/>	

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34	*** WRITE REQUEST FOR DEVICE STATUS FAILED (CPRERR 34)
CAUSE	This diagnostic tried to issue a write request to initiate a device status. That write request was not successful.
ACTION	Error messages containing more detailed information will be displayed before this message. Please refer to the action clause for those error messages. Also, verify that the printer is on line. If the printer is not on line, the fault encountered should be displayed on the LED's.
<hr/>	
35	*** READ REQUEST FOR DEVICE STATUS FAILED (CPRERR 35)
CAUSE	This diagnostic tried to issue a read request to obtain a reply from a DEVICE STATUS command. That read request was not successful.
ACTION	Error messages containing more detailed information will be displayed before this message. Please refer to the action clause for those error messages. Also, verify that the printer is on line. If the printer is not on line, the fault encountered should be displayed on the LED's.
<hr/>	
36	*** WRITE REQUEST FOR SELFTTEST FAILED (CPRERR 36)
CAUSE	This diagnostic tried to issue a write request to initiate a selftest. That write request was not successful.
ACTION	Error messages containing more detailed information will be displayed before this message. Please refer to the action clause for those error messages. Also, verify that the printer is on line. If the printer is not on line, the fault encountered should be displayed on the LED's.
<hr/>	
37	*** READ REQUEST FOR SELFTTEST FAILED (CPRERR 37)
CAUSE	This diagnostic tried to issue a read request to obtain a reply from a SELFTTEST command. That read request was not successful.
ACTION	Error messages containing more detailed information will be displayed before this message. Please refer to the action clause for those error messages. Also, verify that the printer is on line. If the printer is not on line, the fault encountered should be displayed on the LED's.
<hr/>	
38	*** WRITE REQUEST FOR DEVICE CLEAR FAILED (CPRERR 38)
CAUSE	This diagnostic tried to issue a write request to initiate a device clear. That write request was not successful.
ACTION	Error messages containing more detailed information will be displayed before this message. Please refer to the action clause for those error messages. Also, verify that the printer is on line. If the printer is not on line, the fault encountered should be displayed on the LED's.
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39	*** READ REQUEST FOR DEVICE CLEAR FAILED (CPRERR 39)
CAUSE	This diagnostic tried to issue a read request to obtain reply from a DEVICE CLEAR command. That read request was not successful.
ACTION	Error messages containing more detailed information will be displayed before this message. Please refer to the action clause for those error messages. Also, verify that the printer is on line. If the printer is not on line, the fault encountered should be displayed on the LED's.
<hr/>	
40	*** WRITE REQUEST FOR RESET FAILED (CPRERR 40)
CAUSE	This diagnostic tried to issue a write request to initiate a reset. That write request was not successful.
ACTION	Error messages containing more detailed information will be displayed before this message. Please refer to the action clause for those error messages. Also, verify that the printer is on line. If the printer is not on line, the fault encountered should be displayed on the LED's.
<hr/>	
41	*** UNABLE TO RELEASE READ I/O BUFFER TO HOST (CPRERR 41)
CAUSE	This diagnostic was not able to return data space to the host system.
ACTION	Error messages containing more detailed information will be displayed before this message. Please refer to the action clause for those error messages.
<hr/>	
42	*** UNABLE TO RELEASE WRITE I/O BUFFER TO HOST (CPRERR 42)
CAUSE	This diagnostic was not able to return data space to the host system.
ACTION	Error messages containing more detailed information will be displayed before this message. Please refer to the action clause for those error messages.
<hr/>	
43	*** UNABLE TO OBTAIN READ I/O BUFFER FROM HOST (CPRERR 43)
CAUSE	This diagnostic program was not able to obtain data space to use as an I/O buffer for READ transactions.
ACTION	Error messages containing more detailed information will be displayed before this message. Please refer to the action clause for those error messages.
<hr/>	
44	*** UNABLE TO OBTAIN WRITE I/O BUFFER FROM HOST (CPRERR 44)
CAUSE	This diagnostic program was not able to obtain data space to use as an I/O buffer for WRITE transactions.
ACTION	Error messages containing more detailed information will be displayed before this message. Please refer to the action clause for those error messages.
<hr/>	

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45	*** UNABLE TO INITIALIZE READ I/O BUFFER TO ZERO (CPERR 45)
CAUSE	This diagnostic was not able to initialize the contents of the read I/O buffer to zero.
ACTION	Enable error tracing by rerunning the program with the TRACE=ERROR parameter at the DUI command line, and a file service request with the trace information generated by executing CIPERLPD again with the same sections and steps.
<hr/>	
46	*** UNABLE TO INITIALIZE WRITE I/O BUFFER TO ZERO (CPERR 46)
CAUSE	This diagnostic was not able to initialize the contents of the write I/O buffer to zero.
ACTION	Enable error tracing by rerunning the program with the TRACE=ERROR parameter at the DUI command line, and a file service request with the trace information generated by executing CIPERLPD again with the same sections and steps.
<hr/>	
47	*** INTERNAL ERROR: CASE OVERFLOW --- FILL RECORD (CPERR 47)
CAUSE	This diagnostic has hit the default clause of a CASE statement. This is a software error.
ACTION	Please submit a service request indicating the following: a) The sections and steps being requested of the diagnostic. b) The section and step that produced this error message. c) Any other error messages displayed with this message. d) Identify the printer being tested by product number.
<hr/>	
48	*** EXCEEDED MAXIMUM READ RE-TRY COUNT OF 5. (CPERR 48)
CAUSE	This diagnostic has received 5 reply messages from the printer, but the expected message was not obtained.
ACTION	Verify that the printer is on line. If the printer is not on line, the fault encountered will be displayed on the LED's. Otherwise, re-execute the diagnostic and if problem persists report error to support personnel.
<hr/>	
49	*** UNABLE TO CONVERT BUFFER INDEX TO BE DISPLAYED (CPERR 49)
CAUSE	This diagnostic was not able to convert an integer value, which is the buffer index, into a string representation.
ACTION	Enable error tracing by rerunning the program with the TRACE=ERROR parameter at the DUI command line, and a file service request with the trace information generated by executing CIPERLPD again with the same sections and steps.
<hr/>	
50	*** UNABLE TO OBTAIN BUFFER TEXT FROM CATALOG (CPERR 50)
CAUSE	This diagnostic was not able to obtain the environmental status label from the message catalog. Detailed error information will be displayed with this error message.
ACTION	Enable error tracing by rerunning the program with the TRACE=ERROR parameter at the DUI command line, and a file service request with the trace information generated by executing CIPERLPD again with the same sections and steps.
<hr/>	
51	*** UNABLE TO CONVERT DATA TO BE DISPLAYED (CPERR 51)
CAUSE	This diagnostic was not able to convert an integer value into a string representation.
ACTION	Enable error tracing by rerunning the program with the TRACE=ERROR parameter at the DUI command line, and a file service request with the trace information generated by executing CIPERLPD again with the same sections and steps.

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52	*** UNABLE TO MARK PRINTER AS DEFECTIVE (CPRERR 52)
CAUSE	This diagnostic encountered an error while trying to inform the diagnostic system that the printer is defective.
ACTION	Error messages containing more detailed information will be displayed before this message. Please refer to the action clause for those error messages.
<hr/>	
53	*** INITIALIZATION FAILURE: DEVICE STATUS WRITE REQUEST FAILED (CPRERR 53)
CAUSE	During initialization of this diagnostic, it issues a write command to request hardware status. In this case, that write request failed.
ACTION	Error messages indicating the cause of the write error will be displayed before this message. Please refer to action clause for those error messages. Also, verify that the printer is properly cabled to the system, and is on line.
<hr/>	
54	*** INITIALIZATION FAILURE: DEVICE STATUS READ REQUEST FAILED (CPRERR 54)
CAUSE	During initialization of this diagnostic, it issues a read request to obtain hardware status. In this case, that read request was not successful.
ACTION	Error messages indicating the cause of the read error will be displayed before this message. Please refer to action clause for those error messages. Also, verify that the printer is properly cabled to the system, and is on line.
<hr/>	



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Page Printer Diagnostic

Introduction

The Page Printer Diagnostic will test an HP 2680A or 2688A Page Printer to detect failures of Field Replaceable Units (FRU's). This function may be supplemented and enhanced by display of other status information. The diagnostic will run on any HP Precision Architecture Computer system which supports the Online Diagnostic Subsystem. The user can specify which sections and steps are to be run, set test parameters to control the handling of error messages, and select the number of test executions and the particular Page Printer unit to be tested.

Defects and Enhancements

Submit defect reports and enhancement requests for this diagnostic through the STARS database referencing product number 30600-10004.

Minimum Configuration

The hardware required to run the diagnostic consists of an HP Precision Architecture RISC computer system with a supported (see above) Page Printer connected and configured to it. The Device under test must contain internal selftests that are capable of detecting failed Field Replaceable Units (FRU's).

Auto-Diagnostics

The Page Printer diagnostic program can be invoked by the I/O system for auto-diagnostic purposes when a nonrecoverable printer error has been detected. Only MPE XL-based systems have auto-diagnostic capability.

In auto-diagnostics mode, this diagnostic program will execute the following sections and steps:

Section 2	Clear
Step 6	Hard Clear
Section 3	Identify
Section 4	Loopback
Section 5	Selftest

Operating Instructions

The diagnostic is accessible by all users who have obtained diagnostic security 1 or 0. Refer to the Online Diagnostics Overview section for a detailed description of system security. The diagnostic program will execute only after all current printer activity has completed. During testing, the printer will be unable to output system user data but will resume spooling upon completion of the diagnostic.

Before attempting to run the diagnostic, ensure that the page printer to be tested is powered up and put online.

Default Tests

If the user does not specify the sections and steps to be run, the following default sections and steps will be executed:

Section 2	Clear
Step 6	Hard Clear
Section 3	Identify
Section 4	Loopback
Section 5	Selftest
Section 20	Pattern Print

RUN Command

To bring up the Online Diagnostic subsystem, enter the following command to the system prompt:

```
sysdiag
```

The system responds with the following prompt indicating that access has been gained to the Online Diagnostic User Interface (DUI).

```
DUI >
```

Typing HELP causes a summary of the DUI and its commands to be printed. Refer to the DUI Section of this manual for details.

Note



The device to be tested must be powered up and on line. Device physical locations (pdev) shown in the RUN commands are those of the devices on the "typical A1002A" system configuration described in the chapter on DUI. The pdev value entered must be correct for the system being tested.

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For example, to run the diagnostic in an MPE XL environment, you might enter:

```
DUI >RUN PPDIAG pdev=4.6.2 <RUN Command Options>
      |                               |
      |   none required for         |
      |   default test suite        |
      |                               |
      |                               |
      |   insert physical location of |
      |   device to be tested here;   |
      |   alternatively, for MPE XL,  |
      |   type the ldev number;       |
      |   for HP-UX, type the devfile |
      |   name                         |
```

All parameters associated with the DUI's RUN command are accepted by the Page Printer diagnostic. More detailed information can be obtained by referring to the section on DUI.

Test Execution

When PPDIAG is executed, the following welcome message will be displayed:

```
*****
****                                     ***
****           PAGE PRINTER DIAGNOSTIC   ***
****                                     ***
****   (C) Copyright Hewlett Packard Co. 1987 ***
****           All Rights Reserved.     ***
****           Version A.00.00          ***
****                                     ***
*****
```

Welcome, Today is MON, May 22, 1987, 9:00 AM

Following the header, PPDIAG will try to obtain access to the requested device from the Online Diagnostic subsystem. If access to the printer is not obtained, the following PPDIAG error message appears and the program terminates. Other messages from either the operating system or the diagnostic subsystem may also appear:

*** UNABLE TO CONTINUE EXECUTION OF REQUESTED DIAGNOSTICS. (PPERR 05010)

If access to the device was obtained, the diagnostic will automatically invoke a diagnostic subsystem routine to test the I/O path to the printer. This is necessary since PPDIAG has no knowledge of intermediate hardware connecting the host to the printer. If the status returned from this routine is "fail", a warning message will be displayed but the diagnostic will continue:

*** The I/O path to the printer may be faulty. Any results
(good or bad) shown below might not originate in the printer.
(PPWARN 07005)

If the I/O path tests out okay, the diagnostic will automatically ask the device to identify itself. If the device fails to respond to the request the program will terminate displaying an appropriate error message(s). If an unexpected identification code is received, the following warning message will be displayed and PPDIAG will continue to treat the selected device as though it were a page printer:

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*** Device not recognized as a page printer. HP-IB code
returned = !. (PPWARN 07006)

If the device correctly identifies itself, the sections and steps specified by the user in the DUI RUN command will be executed. If the user did not specify sections and steps to be run, the default sections and steps will be executed (See Mini Operating Instructions).

If at any time, the number of errors generated reaches the limit specified by the user in the ERRCOUNT parameter of the RUN command, the following error message will be displayed and the diagnostic will terminate:

*** SPECIFIED ERROR COUNT LIMIT HAS BEEN EXCEEDED. (PPERR 05015)

If the ERRPAUSE parameter of the RUN command was assigned a value of "on", then PPDIAG will stop after each error is generated and ask the user whether the test should continue. If the response is "Yes" (default) then the test will be resumed and if the response is "No", the program will terminate.

Continue Execution ? (YES/NO) [YES] >

To exit PPDIAG, the user simply types EXIT. Control will return to the DUI upon completion of the current section and step. A description of PPDIAG and all the sections contained within are available through the DUI Help facility.

Test Section Descriptions

There are eight diagnostic program sections which are available for user selection. The user may also select individual steps to be run for Section 2. A description of each section and step is given, along with the expected output from that section and step along with any error messages of note.

Section 2	Clear
Step 5	Soft Clear (flush buffers)
Step 6	Hard Clear (complete reset)
Section 3	Identify
Section 4	Loopback
Section 5	Selftest
Section 6	Display I/O Status
Section 8	Display Environmental Status
Section 20	Pattern Print
Section 50	Simulate Panel (2680 only)

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Section 2—CLEAR

This section performs a Hard and/or Soft Clear on the page printer specified when the diagnostic was invoked. This causes the device to be placed into a known state as follows:

- Step 5 **Soft Clear** (Close Job)
 Print buffer emptied by printing
 All character sets, forms & VFCs remain unchanged
- Step 6 **Hard Clear** (Clear to power on state)
 Print buffer cleared (data lost)
 Default character set loaded, all other sets cleared
 Default vertical format control loaded, all other VFCs cleared
 All forms cleared
 Default logical page table (LPT) loaded
 Paper moves to the next blank physical page

If no errors are generated the diagnostic will output the following:

```
Section 2 -- CLEAR
  Step 5 - Soft Clear (Close job - print buffers)
  Step 6 - Hard Clear (Reset to power on state)
End of Section 2 -- CLEAR
```

Section 3—IDENTIFY

This section requests the specified page printer to identify itself in order to determine whether it is responding. If not, an error message is displayed and the program aborted. Otherwise, the user will be informed of the device identity or, if not a page printer, will be issued a warning and execution will continue. If no errors are generated the diagnostic will output the following:

```
Section 3 -- IDENTIFY

===== DEVICE IDENTIFICATION =====

HPIB code   = 2004 Device is recognized as a page printer.
Product     = HP2680A (EPOC)
             {or HP2680A (EPOC -- Graphics option)}
             {or HP2688A (BONSAI)}
             {or HP2688A (BONSAI -- Graphics option)}
MCS date code = -info not available-
DCS date code = 4121

End of Section 3 -- IDENTIFY
```

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Section 4—LOOPBACK

This section tests the accuracy of transmission over the data channel between the host and the selected device by sending a bit pattern (as a 256-byte string) to the printer, reading the pattern back out of the printer, and comparing the resulting pattern with the original. Because the printer does not generate a predictable sequence of its own, some types of transmission errors may not be detected. PPDIAG will output one of the following messages:

Section 4 -- LOOPBACK

Page Printer data channel checks out OK.

or:

The following transmission errors were detected during the loopback test:

Byte #	Hex Value Transmitted	Hex Value Received	Erroneous bits
12	56	54	00000010
33	7F	3D	01000010

. . . .
. . . .
. . . .

End of Section 4 -- LOOPBACK

Entries in the preceding table will be printed for as many errors as were detected, unless the ERRCOUNT parameter of the RUN command has been exceeded.

Section 5—SELFTTEST

This section causes execution of the internal power-up selftest of the page printer circuitry. The name and/or number of any field replaceable unit (FRU) which this test identifies as being faulty is displayed. Both environmental and I/O status are cleared and reset to the power-up state. Unlike a selftest resulting from an actual power-up, the printer is immediately available to receive data at the end of a remote selftest. In addition, the remote selftest does not cause any printout. The user should be aware that selftest identifies problems in the DCS (Data Control System) only. Limited information on the MCS (Machine Control System) can be found by requesting a display of I/O status. PPDIAG will output one of the following messages:

Section 5 -- SELFTTEST

No faulty Field Replaceable Units (FRUs) were detected.

or

Selftest detected failures in the following FRUs:

- o Data Processor
- o External Register
- o Main Memory
- o Character Block Processor

End of Section 5 -- SELFTTEST

Section 6—DISPLAY I/O STATUS

This section will obtain and decode the device status as contained in the I/O Status Block of the printer. Status will be displayed in readable text format.

Page Printer protocol is such that a request for the I/O status block is considered erroneous when the status block is clean. When this happens the I/O status returned indicates a transmission error. If this condition occurs, PPDIAG issues the following message after the status display:

NOTE: The above status can also result from an unexpected request to read clean (no problems) I/O status; i.e., a transmission error in this situation is probably not indicative of a problem.

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If no errors are generated the diagnostic will output the following:

Section 6 -- DISPLAY I/O STATUS

```
=====
                          I/O STATUS
=====

-----MACHINE STATUS-----

o The printer is ON-line
o The printer is OFF-line
o Power fail/Power on detected since last I/O status read
  The printer was in the process of printing sheet # x.
  Last successfully transferred page was on sheet # x.
o A message is being displayed on the printer panel
o The Machine Control System (MCS) has detected the
  following error:

200 A/D modulator failure
201 Beam detect failure
    First order power (FOP) < 50, may be result of
      low RF target.
202 Laser failure
203 RF driver failure
    ON/OFF RF output differential too low.
204 Scanner failure
    Scanner frequency <> 75Hz +- 1%
205 Phtr area 0
    No pad warm-up in area 0.
    Check fuses, AC power, other power path.
206 Preheat fail
207 Relay failure
    Either current detected with all relays open
      or current < 32 in one or more relays.
208 Triac/fuse
    Current < 32 in one of the pads and it will
      not warm up.
209 Fuser circuit open
    current < 32
210 ADC hung up
    time-out on request for A/D converter.
211 Purge pump, fan fail
    Current < 21
212 No response from DCS
    Data Control System failed to reply to a
      status or loopback request.
213 MCS/DCS loopback
    Data Control System replied to loopback request,
      but test failed.
```

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- 214 Dev supply fail
Developer voltage < 100 or 2"setting-287
AND/OR door bias voltage < 20.
- 215 Scanner start fail
- 220 ES loop fail 1
Primary Corona limited,
· Simultaneous Corona locked.
Probable failure - Primary Corona.
- 221 ES loop fail 2
Simultaneous Corona limited,
Primary Corona locked.
Probable failure - Simultaneous Corona.
- 222 ES loop fail 3
Both Primary and Simultaneous Coronae limited.
Probable failure - both Coronae.
- 223 Low sim corona fail
Simultaneous Corona current < (expected - 32)
- 224 Low primary V fail
Primary Corona voltage < 128
- 225 Low primary I fail
Primary corona current < 40
OR < (desired screen voltage - 32)
- 226 Low screen V fail
Screen voltage < (expected - 32)
- 227 High transfer I fail
Transfer current > (expected + 32)
- 228 Low transfer I failure
Transfer current < (expected - 32)
- 229 ESM shut door test F
Electrostatic monitor voltage
<> (door bias voltage +/- 15)
- 230 ESM supply failure
Electrostatic monitor not receiving power.
- 231 ESM open door test F
Electrostatic monitor voltage < 50
- 232 Noisy signal ground
Signal ground > 10
- 233 DCS power on
Data Control System has performed a power on
sequence but there was not corresponding
power on sequence done in the MCS.
- 234 High sim corona fail
- 235 Drum top switch err
Drum top switch is giving false top of drum
indication.
- 240 A/D data invalid
A/D converter +5V ref. > 138 or < 118
- 241 Cardcage overtemp (failure)
A/D count > 205
- 242 Densitometer failure 1
Clean drum reflectance < 600.

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243 Developer short cct
Short circuit indicated by developer voltage
< 2"setting-287
OR < 100 AND door bias >= 20

244 Drum not in sync
Top of drum not being indicated every 2.64 sec.

245 Low reflectance
Average reflectance < (target - 100)

247 +28V supply failure
28V power supply < 149 (26V)

249 Illegal MCS command
Data Control System received illegal
command from Machine Control System.

250 Fuser/PAMM fan fail
Current < 81.

251 No top of drum
Either drum not up to speed or faulty
drum top switch.

252 High reflectance
Average reflectance > (target + 60)
AND toner hopper empty bit not set.

253 Densitometer failure 2
LED current <128 OR > 230.

254 Developer overfull
Average developer volume >= 210

255 Illegal DCS command
Machine Control System received illegal
command from Data Control System.

260 Prim cor supply 2
Primary Corona current > 32.

261 Trfr cor supply 2
Transfer current > 32

262 Phtr temp sensor
Preheater temperature sensor registers < 10
while at least one pad registers > 25.

263 Simul cor supply 2
Simultaneous corona current > 32

264 Fuser switch short
current > 32

265 Phtr overtemp
Hardware overtemp bit set (190 C)
OR one or more pads too hot (>250 (185 C))

266 RF driver stuck on
RF power >= 16 when RF driver should be off.

267 AC triac short
Current > 20

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268 No drum
Drum has been removed from printer.

270 Encoder edge error
Encoder level did not change as stepper advanced.
Look for faulty encoder disc or faulty level
detection circuit.

271 Encoder res error
Encoder disc resolution $\langle \rangle 20 \pm 1$

272 Step phase error
Step phase does not advance along with stepper.
Due either to stepper motor not operation
properly or faulty drive circuit.

273 Stepper init error
Stepper initialization value found in non-
volatile memory is out of bounds.

274 High ZOP, laser off

275 Stack safety switch
Stack safety switches have been set for 1050ms.
(AC contactor is now open.)

276 NVR failure
Nonvolatile RAM selftest has failed.

277 Invalid stepper position
Desired stepper position is too close to an
encoder edge.
Select another stepper position or adjust
encode disc position.

278 Illegal NVR #xx
One or more of the parameters in the Machine
Control System's RAM is not within limits.

280 High screen V fail
Screen voltage $>$ (expected + 32)

281 Low transfer V fail
Transfer voltage $<$ 100.

282 DCS mem parity err
DCS memory controller has issued a parity
interrupt.
Printer should be taken off-line and Data
Control System error log should be displayed.

283 Wiper blade is up

300 A/D modulator warning

301 Beam detect warning
First order power (FOP) $<$ 50, may be result of
low RF target. Electrostatic loop is limited
or running in Service Command Mode.

302 Laser warning

303 RF driver warning
ON/OFF RF output differential too low.
Electrostatic loop is limited or running in
Service Command Mode.

305 Cardcage Overtemp (warning)
196 $<$ A/D count $<$ 205

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- 306 ESM shut door test W
Electrostatic monitor voltage <> bias voltage
+6.
- 307 Pad area fail
Current < 32 in one or more areas in one or
more pads.
- 308 Phtr I Sensor
Current < 32 in one of the pads, however
pad warms up.
- 309 Erase lamp warn
Current to erase lamp < 33.
- 310 Overall illum warn
Current < 33.
- 311 Hopper motor warn
Current < 21
- 312 Paper width sensor
Faulty paper width sensor (45 < voltage < 245).
- 313 Invalid phtr target
Target temperature form A/D converter < 50.
- 314 Relay warning
Current detected with all relays open. This is
similar to relay failure except that wide paper
is being used. Inability to open a relay is
not harmful to the printer.
- 315 Developer full
189 > average developer volume count < 210.
- 320 ES loop warn 1
Electrostatic loop limited (within range).
Primary Corona limited,
Simultaneous Corona locked.
Probable failure - Primary Corona.
- 321 ES loop warn 2
Electrostatic loop limited (within range).
Simultaneous Corona limited,
Primary Corona locked.
Probable failure - Simultaneous Corona.
- 322 ES loop warn 3
Electrostatic loop limited (within range).
Both Primary and Simultaneous Coronae limited.
Probable failure - both Coronae.
- 323 ES loop warn 4
Process potentials did not reach acceptable
levels during printer warm-up.
- 324 Low primary V warn
Electrostatic loop limited (within range).
Primary Corona voltage < 128

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- 325 Low primary I warn
Electrostatic loop limited (within range).
Primary corona current < 40
OR < (desired screen voltage - 32)
- 326 DCS ROM read err
Data Control System detected a read error
as it was trying to load default Logical
Page Table (LPT), Vertical Format Control,
and/or character set from ROMs on the
DCS PCA.
- 327 Spur DCS ack intrpt
Machine Control Processor received an
unexpected acknowledgment (no message
was sent which required acknowledgment)
from the Data Control System.
- 328 Can't turn off +28V
28 volt power supply was detected as being
on when it shouldn't be.
- 329 Vacuum bag full
Vacuum bag sensor switch detected full bag.
- 330 Low screen V warn
Electrostatic loop limited (within range).
Screen voltage < (expected - 32)
- 331 High screen V warn
Electrostatic loop limited (within range).
Screen voltage > (expected + 32)
- 332 Low sim corona fail
Electrostatic loop limited (within range).
Simultaneous Corona current < (expected - 32)
- 333 Volume sensor warn
Instantaneous developer volume < 40.
- 335 Densitometer warn 1
Clean drum reflectance = 765.
A/D converter is held latched at max count.
- 340 Mem controller fail
Selftest on Data Control System's
memory controller indicates failure.
- 341 Char processor fail
Selftest on Data Control System's
character processor indicates failure.
- 342 DMA failure
Selftest on Data Control System's
direct memory access indicates failure.
- 343 DCS main memory fail
Selftest on Data Control System's
main memory arrays indicates failure.
- 344 External reg fail
Selftest on Data Control System's
external register indicates failure.

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- 345 Data processor fail
Selftest on Data Control System's
data processor indicates failure.
- 346 High sim corona warn
Electrostatic loop limited (within range).
Simultaneous Corona current > (expected + 32)
- 347 ESM door reference
100 < door bias voltage < 40

NOTE: Detailed information on this status can be found
in the "HP2680 Service Manual".

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----- DATA STREAM STATUS -----

- o OK
- o The following errors were encountered while processing Sheet ! Record !
- o The following errors were encountered while processing the environment file for this job.
- o Data was lost
- o No data loss was detected
- o Parity error detected during HPIB activity
- o Transmission error detected by printer,
Possible causes:
 - erroneous channel command
 - undefined channel command
 - erroneous data length
- o other problems:
 - o No memory is available to load the character set currently being sent.
 - o No memory is available to load the form set currently being sent.
 - o No memory is available to load the Vertical Format Control currently being sent.
 - o An attempt was made to print data and no character set was selected.
 - o An attempt was made to select an undefined form.
 - o An attempt was made to print data and no Vertical Format Control is currently selected.
 - o An attempt was made to print data and no Logical Page Table is currently selected.
 - o An attempt was made to move the logical pen beyond the limits of the currently defined logical page.
 - o The printer could not process all the data before it was due to be transferred to the drum/photoconductor/paper.
WARNING: Data was lost.
 - o The spooler block contains a format error. The error could be an invalid function code, an incorrect record, or an incorrect block size.
 - o Missing Multi-Copy Form table. An attempt was made to use the Multi-Copy Forms table, but the table was not loaded.
 - o The maximum number of copies per physical page, as defined by the spooler with function code 132, has been exceeded. The printer has reset the requested number of copies to equal that maximum.

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- o A command or function was received when no job was in progress.
- o No memory. Printer's dynamic memory (User & Bucket) is so occupied with character sets, VFCs, and forms that an inadequate amount of memory remains to process the current input data.
WARNING - Data was lost.
- o The VFC selected, word 10 of the Logical Page Table (line spacing on page), is ≤ 0 .
- o Attempt made to skip to a nonexistent VFC channel.
- o The logical page was truncated to fit on the physical page.
- o The page size requested by the programmer did not match the paper length set on the printer. The length indicated on the printer prevails.
- o No character set was selected when processing print record. The record will be skipped.
- o Not enough memory is available for picture download
- o An attempt was made to print more than 64 pictures on physical page.
- o An attempt was made to print a picture which is not present.

End of Section 6 -- DISPLAY I/O STATUS

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Section 8—DISPLAY ENVIRONMENT STATUS

This section obtains and then display in text form, the information contained in the ENVIRONMENTAL STATUS BLOCK of the printer. If no errors are generated the diagnostic will output the following:

Section 8 -- DISPLAY ENVIRONMENTAL STATUS

```
=====
ENVIRONMENTAL STATUS
=====

----- MEMORY UTILIZATION -----

Capacity
Printer:                !k words
DCS:                    !k words
Incoming data buffer:   ! blocks

Available
DCS Main Memory:       ! buckets (20 words/bucket)

Utilization
Max used this job:     ! buckets
Incoming data buffer:  ! blocks (512 words/block)
User area              ! words/16

Character sets
Descriptor blocks:     ! words
Images:                ! words/16

Vertical Format Control: ! words

Forms
Descriptor blocks:     ! words
Images & triplet words: ! words/16

Pictures
Images & triplet words: ! words/16

----- JOB STATUS -----

# of VFCs loaded:      !
# of character sets loaded: !
# of forms loaded:     !
# of pictures loaded:  !
```


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```
# active logical pages:      !
# blanks not printed (clipped)
  this job:                  !
currently processing page #  !
Page length                 ! in.
Page width                  ! in.
```

Print error explanations:

- o Picture(s) not printed because of start before the 1/4 inch margin at top of page. Either programming error or operator inadvertently positioned the picture off the page via the ADJUST PRINT POSITION keys.
- o End of Job encountered while printer was silent running.
- o Form(s) not printed because of start before the 1/4 inch margin at top of page. Either programming error or operator inadvertently positioned the picture off the page via the ADJUST PRINT POSITION keys.
- o Data truncated from either the top or bottom of page. Either programming error or operator inadvertently positioned the picture off the page via the ADJUST PRINT POSITION keys.

End of Section 8 -- DISPLAY ENVIRONMENTAL STATUS

Section 20—PATTERN PRINT

This section causes the device to print a test pattern to verify the overall operation of the page printer. This section also causes the printer to set up the environment to the default state and then to print the following 131 character line 119 times. Default spacing and page ejection should cause 60 lines to be printed on the first page and 59 on the second.

The following will be printed all on one line:

```
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNPOQRSTUVWXYZ[ \ ]^_`
abcdefghijklmnopqrstuvwxyz{|}~ABCDEFGHIJKLMNPOQRSTUVWXYZ0123456789
```

If no errors are generated the diagnostic will output the following:

Section 20 -- PATTERN PRINT

End of Section 20 -- PATTERN PRINT

FOR HP INTERNAL USE ONLY

Section 50—SIMULATE PANEL (2680 only)

This section is included for Customer Engineers (CEs) who want to run the remote diagnostic as they would the printer by entering printer commands at a simulated printer panel. This panel will accept numbers, and the word EXIT. RUN and HALT are not executable remotely. Any resulting messages and/or "printouts" are displayed on the screen.

The current hardware and firmware configuration of 2680s severely limits the practical functionality of this section. Rather, it is included as a framework to accommodate any future firmware changes and to provide a model for diagnostic writers of new printers. If the user enters a valid panel code which is not accessible remotely, a list of available commands is displayed. If no errors are generated the diagnostic will output the following:

Section 50 -- SIMULATE PANEL

```
Current panel msg:      |-----|
                        |             |
Explanation :
                        |-----|
Next command ("EXIT" to stop) > |-----|
```

The above is repeated until EXIT is entered.

End of Section 50 -- SIMULATE PANEL

Error and Warning Messages

The following are general error/warning messages which may be encountered during the execution of PPDIAG. Note, however, that system dependent error messages may be displayed by the subsystem along with any error message generated by this diagnostic. All error message without the (PPERR #) trailer are generated by the subsystem. Errors which have explanatory notes (preceded by "—") will normally display only one of the notes listed here.

05001	*** PRINTER FAILURE (PPERR 05001)
	RESULTING HARDWARE STATUS:
CAUSE	The printer has acknowledged a request but refuses to comply. The reason for the refusal is contained in the I/O status block which is returned and displayed following this message.
ACTION	Dependent on device and status returned.
05002	*** UNEXPECTED ERROR INTERNAL TO DIAGNOSTIC SYSTEM.
CAUSE	An unexpected condition arose which is indicative of a problem outside this program.
ACTION	Submit an SR against ppdia. Report any immediately preceding errors in the SR.
05003	*** UNEXPECTED ERROR ENCOUNTERED - LIKELY PPDIAG PROGRAM ERROR.
CAUSE	An unexpected condition arose which is indicative of a programming problem in this program.
ACTION	Submit an SR against ppdia. Report any immediately preceding errors in the SR.
05004	*** RECEIVED INVALID RESPONSE FROM PRINTER. DATA PATH OR PRINTER ERROR INDICATED. (PPERR 05004)
CAUSE	A response was received from the printer that could not be decoded according to current specifications.
ACTION	Further diagnosis of printer necessary. If the device being tested is new and uses previously unused codes, modification of this program may be necessary.
05005	*** UNABLE TO SATISFY REQUEST TO !. (PPERR 05005)
CAUSE	Some printer request (substituted for !) could not be executed. Other explanatory messages should precede this. If the root cause was printer failure (PPERR 05001), this message will be preceded by a listing of the current I/O status for the printer (if available).
	NOTE: Some sections make several different requests to the printer so that seemingly unrelated requests may fail. For example, section 3 (Identify) involves both an "identification" request and a "read env status" request. In these cases, an additional error message will specify the actual user request that failed.
ACTION	See actions associated with explanatory messages.

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05006 *** CURRENT PAGE SIZE COULD NOT BE OBTAINED. (PPERR 05006)
CAUSE Some failure to read environmental status occurred.
ACTION Further diagnosis of printer based on I/O status returned is necessary.

05007 *** IMPRACTICAL OR IMPOSSIBLE TO COMPLETE REMAINDER OF SECTION.
(PPERR 05007)
CAUSE Previous fatal error in execution of requested section.
ACTION Fix cause of previous error(s).

05008 *** IMPRACTICAL OR IMPOSSIBLE TO COMPLETE REMAINDER OF STEP.
(PPERR 05008)
CAUSE Previous fatal error in execution of requested step.
ACTION Fix cause of previous error(s).

05009 *** UNABLE TO OBTAIN DATA BUFFERS FOR TALKING WITH PRINTER.
(PPERR 05009)
CAUSE Memory space for data transfers could not be set aside.
ACTION Action based on previous explanatory errors.

05010 *** UNABLE TO CONTINUE EXECUTION OF REQUESTED DIAGNOSTICS.
(PPERR 05010)
CAUSE Either access to the device could not be obtained, or an error internal to the system occurred.
ACTION Correct any immediately preceding error conditions.

05012 *** ONLY THE FOLLOWING PANEL COMMANDS ARE AVAILABLE REMOTELY:
0 - Reset
1 - Selftest (NOTE: Same as 610, i.e. this remote version does not cause any printout)
101 - Display DCS date code
610 - DCS selftest (Tests for individual components (612-618) cannot be activated remotely)
(PPERR 05012)
CAUSE The state of page printer firmware currently restricts use of the panel to the above commands.
ACTION Select only from the above list of commands.

05013 *** UNABLE TO RETRIEVE ONE OR MORE COMMANDS FROM THE MESSAGE CATALOG.
EXECUTION WILL PROCEED USING NUMBER CODED INPUT ONLY:

EXIT : 20001
NO : 20002
YES : 20003

Numbered panel commands are entered as usual.
(PPERR 13)
CAUSE Either the message catalog is incorrect/corrupted or one or more commands are missing from the catalog.
ACTION You will be given the choice to continue on a number code basis or not (you must answer in the numeric codes for yes/no). In any case, your support engineer should ensure that all commands and keywords are properly listed in the system catalog.

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05014	*** FAILED TO RECEIVE REPLY FROM THE DEVICE AFTER ! SECONDS. (PPERR 05014)
CAUSE	A reply from the selected device was not received within the specified time-out interval. The device or some intermediate hardware/software is probably not functioning properly.
ACTION	If you selected the "errpause" parameter in the run command, you will be given the opportunity to retry the function by answering "YES" to the continuation prompt. More than one retry is probably fruitless.
<hr/>	
05015	*** SPECIFIED ERROR COUNT LIMIT HAS BEEN EXCEEDED. (PPERR 05015)
CAUSE	The error limit specified in the "ERRCOUNT" parameter of "RUN" command has been exceeded.
ACTION	If this is not desired, either omit the ERRCOUNT parameter or set a higher limit.
<hr/>	
05016	*** FUNCTION IS NOT CURRENTLY AVAILABLE ON THE SELECTED PRINTER. (PPERR 05016)
CAUSE	The requested function is not currently implemented by the diagnostic system for the device being tested.
ACTION	If this is unexpected, submit an SR against ppdia.
<hr/>	
05017	*** INDIVIDUAL TESTS ARE NOT AVAILABLE REMOTELY. USE COMPLETE SELFTEST(610) INSTEAD. (PPERR 05017)
CAUSE	A request for a selftest of 612-618 (selftest of a single, particular field replaceable unit). Only the complete selftest (covers all FRUs within the DCS) is available remotely.
ACTION	Select 610 if that selftest will suffice.
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05018	*** THE ! BYTE BUFFER PROVIDED IS TOO SMALL FOR REQUESTED DATA. (PPERR 05018)
CAUSE	The device and/or diagnostic subsystem attempted to return more data than could be placed into the transfer buffer provided by this program.
ACTION	If this is unexpected, submit an SR against ppdia.
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05019	*** INVALID USER RESPONSE. (PPERR 05019)
CAUSE	A response was entered by the user which was in some way inappropriate for the prompt given. One of the following listed submessages will be provided as a detailed explanation:—expected numeric response—unrecognized command, type help for assistance—numeric response must fall between ! and !.
ACTION	Re-enter requested data or type "HELP" for prompt specific information.
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05020	*** UNRECOGNIZED MCS ERROR. MCS ERROR CODE = ! (PPERR 05020)
CAUSE	An unexpected Machine Control System printer error code was received. It is probably a new code and not yet included in this program's message set.
ACTION	The code will have to be looked up in the latest version of the service manual. Notify the maintenance engineer for this diagnostic program.
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05021	*** PPDIA ABORTING DUE TO FATAL ERROR. (PPERR 05021)
CAUSE	The reason for abort is always listed in one or more preceding errors.
ACTION	Fix preceding error(s), if desired.

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05023	*** UNABLE TO OBTAIN COMPLETE IDENTIFICATION. (PPERR 05023)
CAUSE	PPDIAG was unable to obtain environmental status from the printer. Therefore, the product name/number and DCS date code could not be determined. However, the device did respond to an identify command (supplied HPIB code).
ACTION	Take action based on I/O status returned.
<hr/>	
05024	*** HARDWARE I/O STATUS COULD NOT BE OBTAINED. (PPERR 05024)
CAUSE	Unable to copy I/O status block from data transfer buffer.
ACTION	Action dependent on preceding error message.
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05025	*** THE REQUESTED COMMAND REQUIRES ! MODE. (PPERR 05025)
CAUSE	The command function involved in your current request requires a more restrictive mode (disruptive or destructive) than you have been granted based on your security clearance.
ACTION	Acquire additional security clearance from the system manager. Consult the Diagnostic Program Development Guide for an explanation of modes.
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05026	*** CHARACTER STRING CONTAINED SOMETHING OTHER THAN A VALID INTEGER NUMBER. (PPERR 05026)
CAUSE	The response to a request for an integer number contained a non numeric character and/or an invalid base indicator.
ACTION	Enter numeric digits only.
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05028	*** PPDIAG IS UNABLE TO PROPERLY COMMUNICATE WITH THE USER. (PPERR 05028)
CAUSE	Either the message catalog is incorrect/corrupted or one or more commands are missing from the catalog. Normally this message cannot be printed intact since it indicates failure of the message display services of the diagnostic system. However, since its number will be displayed, this message is provided for lookup reference.
ACTION	Submit an SR against ppdiaq.
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05029	*** A PRINT JOB AND/OR ENVIRONMENT LOAD COULD NOT BE COMPLETED. (PPERR 05029)
CAUSE	Could not close a print job on the printer. Some printout may be lost.
ACTION	Action dependent on I/O status displayed.
<hr/>	
05030	*** PRINT DATA AND/OR ENVIRONMENT INFO COULD NOT BE TRANSFERRED TO THE PRINTER. (PPERR 05030)
CAUSE	Could not complete a write request to the printer.
ACTION	Action dependent on I/O status displayed.

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05031	*** ENVIRONMENTAL STATUS COULD NOT BE RESET FOR PRINT JOB. (PPERR 05031)
CAUSE	Could not clear previous environmental state and/or load new environment for next job.
ACTION	Action dependent on I/O status displayed.
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05032	*** UNABLE TO PREPARE FOR PRINT JOB AND/OR ENVIRONMENT LOAD. (PPERR 05032)
CAUSE	Could not open a new job on the printer.
ACTION	Action dependent on I/O status displayed.
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05033	*** UNABLE TO RETRIEVE REQUESTED INFORMATION FROM DATA BUFFER. (PPERR 05033)
CAUSE	Unable to remove information returned in response to your request from the data transfer buffer.
ACTION	Action dependent on preceding error message.
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07001	*WARNING - Unable to mark printer as defective. (PPWARN 07001)
CAUSE	The diagnostic has attempted to block further use of the tested device by the system. This attempt failed.
ACTION	The device should be electronically or physically removed from the system until it is repaired or deemed operational again by this diagnostic.
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07002	*WARNING - Unable to convert number to readable form. (PPWARN 07002)
CAUSE	The most likely cause is that the number could not fit into the designated space. In any case, asterisks will be substituted.
ACTION	This problem is not fatal to execution of the program, but may make interpretation of results difficult. This is normally unexpected and an SR should be submitted against PPDIAG.
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07003	*WARNING - Data buffers received by the program were not as large as requested. One or more diagnostic functions may fail at a later time. (PPWARN 07003)
CAUSE	PPDIAG did not receive as much data transfer memory as was requested. This may result in the failure of some or all diagnostic functions.
ACTION	This is normally a system restriction which you may not be able to overcome. Some diagnostic functions may work just fine with a less than maximum needed area.
<hr/>	
07004	*WARNING - Expected ! bytes of response from the printer. Received ! bytes instead. (PPWARN 07004)
CAUSE	This might be expected on a new development device. However, it can also result from an internal problem with the printer or any intervening hardware/software. Error message 05018 is normally issued if the expected response is too small.
ACTION	Submit an SR against ppdiaq.

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07005	*WARNING - The I/O path to the printer may be faulty. Any results (good or bad) shown below might not originate at at the printer. (PPWARN 07005)
CAUSE	The I/O path between memory and the printer was not verified. This can result from a system internal error, an unimplemented test program, or an actual failure of the test, in which case a faulty field replaceable unit (FRU) should be displayed.
ACTION	If test failure, further testing of the I/O path should be done. In any case, communication with the printer should be considered unreliable from this point on.
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07006	*WARNING - Device not recognized as a page printer. HPIB code returned = !. (PPWARN 07006)
CAUSE	An unexpected HPIB code was received in response to an identification request. This diagnostic is intended to diagnose page printer devices (HPIB code 2004) only.
ACTION	The diagnostic will treat the selected device as though it were a page printer.
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07007	*WARNING - Number of data bytes specified in variable record header does not agree with the actual data length. (PPWARN 07007)
CAUSE	Invalid assembly of spool block variable record. PPDIAG automatically truncates data to the length specified in the record header or the maximum length of a spool block, whichever is smaller.
ACTION	Advisory only. Submit an SR against ppdiaq.
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07008	*WARNING - Number of data bytes specified in variable record header exceeds size of spool block. (PPWARN 07008)
CAUSE	Invalid assembly of spool block variable record. Data length is automatically truncated to size of spool block.
ACTION	Advisory only. Submit an SR against ppdiaq.
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07009	*WARNING - Only the first ! bytes returned by the printer will be processed. (PPWARN 07009)
CAUSE	Issued when printer returns more data than expected. In this case the expected number of bytes will be processed. This will yield incomplete and/or erroneous information, but is given as a partial aid to the user.
ACTION	Advisory only.



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