

# HEWLETT-PACKARD

CS/80  
EXTERNAL  
EXERCISER  
REFERENCE  
MANUAL



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Peripherals Group

CS/80 External Exerciser Reference Manual

5955-3462 JULY 1988

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# Conventions Used

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## COMMAND NAME

**SUPPORTED DEVICES:** Listed Here (CTD is Cartridge Tape Device)

### SHORT DEFINITION

Following the command name is an explanation of what the command does and when it should be used.

### INPUT FORMAT:

Input the TEST name?  
[**COMMAND NAME**]

### OUTPUT FORMAT:

NAME OF UTILITY OR TEST

This is what is printed when the command has been executed.

The following formats are used throughout this chapter:

nnnn - refers to a decimal number of any magnitude.

[**VVVV**] - refers to a decimal number of variable magnitude which must be input by the user. Bold numbers within brackets [**BOLD**] indicate all user inputs.

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

xxxx - refers to text printed out or displayed by the HP 85.

B - refers to a binary digit (bit) printed out or displayed by the HP 85.



# General Information

1

## Introduction

The purpose of this manual is to aid service-trained personnel in troubleshooting CS/80 devices to a replaceable assembly level. In this manual, the term "device" refers to any of the disc or disc/tape drives in the CS/80 family. The CS/80 External Exerciser links the vast set of internal diagnostics and utilities within a CS/80 device to a service-trained person. One of the significant features incorporated into all CS/80 devices is internal storage of all diagnostic and utility routines. The CS/80 External Exerciser initiates a specific test and displays the results when the test has completed; the test itself is performed completely within the device using its intelligent controller.

### CAUTION

Some of the CS/80 External Exerciser commands will destroy data on the selected unit. Check with the appropriate chapter before issuing any command.

## Scope of Manual

The CS/80 External Exerciser is comprised of programs which run on the HP 85 desktop computer. This manual divides the CS/80 External Exerciser into the following sections: Chapter 1 provides general information about the CS/80 External Exerciser. Chapter 2 contains the majority of the exerciser commands; these commands are located in the following programs: EXRSIZ, EXRSI2, D2D, and CRGTST. Chapter 3 contains unique tape drive commands for those devices which incorporate a cartridge tape drive. These commands are located in the TAPE program. Chapter 4 covers the operator designed programs. Operator designed steps can be entered individually to form an executable program which consists of specific CS/80 instructions. These commands are located in the OPER program. Chapter 5 covers the exerciser commands for use on HP 794X devices. These commands are in the program named EX794X. When testing an HP 794X device, EX794X should be used in place of EXRSIZ. Chapter 6 covers the exerciser commands for use on HP 7907 devices. These commands are in the program named EX7907. When testing an HP 7907 device, EX7907 should be used in place of EXRSIZ. Chapter 7 covers the exerciser commands for use on HP 7936 and HP 7937 devices. These commands are in the program named EX7937. When testing an HP 7936 and HP 7937 devices, EX7937 should be used in place of EXRSIZ. Chapter 8 covers the exerciser commands for use on HP 795X and HP 796X devices. These commands are in the program named EX795X. When testing an HP 795X and HP 796X devices, EX795X should be used in place of EXRSIZ.

Appendix A in this manual provides information on loading and running the CS/80 External Exerciser on the HP 85 desktop computer. The service manual for the particular device being diagnosed should be consulted for a list of CS/80 External Exerciser commands which are supported, and any special attributes those commands might have, since some commands are designed for certain devices.

Complete documentation for the CS/80 instruction set can be found in the *CS/80 Instruction Set Programming Manual*, part number 5955-3442.

## Diagnostics

Complete internal diagnostics are built into all CS/80 devices. Internal diagnostics consist of several routines which test individual PCAs, assemblies, and interfaces within the device. Microdiagnostics test specific hardware components; macrodiagnostics perform interactive tests among selected PCAs providing vital subsystem analysis. Operational tests concatenate or link several micro- and macrodiagnostic routines to achieve dynamic system verification.

A list of the diagnostics a particular device will execute can be found in the service manual for that device. If an error is found during a diagnostic, a status message is sent along with parameters indicating which unit failed and any associated errors. A diagnostic test terminates when an error occurs and the maximum possible isolation of that error has taken place.

Some of the tests performed by the exerciser relay device-specific error codes. On HP 7908, 791X, and 793X devices these can be either test errors or drive errors. A list of diagnostic Test Errors (TERRORS) and Drive Errors (DERRORS) can be found in the service manual for the particular device; each device has different error codes. TERRORS occur only as a result of a diagnostic or utility while DERRORS indicate a run-time failure. On HP 794X/5X/6X devices, the codes consist of Field Replaceable Assemblies (FRAs), failing subtest numbers, and fault codes; on HP 7907 devices, the codes consist of fault codes and status codes. All of this information is listed in the service manual for each particular device.

## Error Rate Tests

An error rate test is a powerful tool used to establish media integrity within a CS/80 device. There are two general types of error rate tests: 1) A Read-Only Error Rate Test (RO ERT) is nondestructive to user data, and 2) A Write Then Read Error Rate Test (WTR ERT) which destroys user data.

Both types of ERTs allow the user to input a loop count; the loop count is stored internally within the device and is the number of times the ERT is to be repeated.

A WTR ERT allows the user to specify the data pattern to be written. This pattern consists of eight hexadecimal digits; if the pattern entered is less than eight digits, the pattern will be right-justified in a 32-bit field and padded with zeros.

### Disc Error Rate Tests

On the disc unit, an ERT finds both correctable and uncorrectable read errors and accumulates information about each error, such as the address where the error occurs, the type of error and the number of times that particular address has had that error. The information obtained during an ERT may be logged on an area of the disc which is reserved for internal controller use. This area of the disc is the disc maintenance track. Disc maintenance tracks provide nonvolatile storage space for ERT information, spare track allocations, run-time faults, and special worst-case data patterns which can be written on the disc during a WTR ERT. When an ERT encounters a data error and logging has not been specified, the test will stop, report the error, and continue in this fashion until the loop count has been satisfied.

Both types of ERTs allow an offset to be entered. The offset parameter specifies a radial distance the heads are to be moved off track center during the read portion of the test (writes are always done with no offset). Any amount of offset will usually increase the error rate; if the offset is sufficiently large it may cause seek failures due to verify errors or hardware faults due to an off-track condition. The offset range allowed for each CS/80 device is specified in this manual with the appropriate commands (RO ERT and



WTR ERT). HP 794X, HP 795X, HP 796X, HP 7907, HP 7936, and HP 7937 devices do not perform offset reads.

An ERT catalogs errors by head number. Each error is accompanied by its logical address, the error type, the occurrence count, and an error byte. The error type is either uncorrectable, correctable, or CRC detected. The ERT information can be either logged on the disc maintenance tracks or printed out immediately as it is discovered. An explanation of the bits in the error byte can also be printed out during the test.

Read-Only Error Rate Tests (RO ERTs) can be either random or non-random (sequential). A random RO ERT reads 256 random addresses (sectors) of random length and finds all read errors. This method of testing allows a large physical area of the disc to be checked in a minimum amount of time. A non-random RO ERT sequentially reads data over a specified area of the disc and finds all read errors. Both types of RO ERTs will not destroy any user data.

WTR ERTs destroy some or all of the user data on the selected unit. There are three types of addressing allowed during a WTR ERT. A pattern WTR ERT sequentially writes data on a specified area of the disc, then reads all of the data which was written in an attempt to locate any sensitive bit pattern errors, read errors, or media defects. A random WTR ERT will write-then-read 256 randomly generated data patterns of varying length at random addresses. A short WTR ERT executes a combination of random ERTs over a small portion of the media; this test is intended for quick verification of the media.

### **Tape Error Rate Tests**

On the tape unit, an ERT finds read data errors in similar fashion as on the disc; however, errors are not reported until the completion of the test. Furthermore, the tape characterizes the types of read errors by retrying (re-reading) each address which has an error, including correctable errors. A tape with many errors, therefore, takes more time to complete an ERT than a tape with few errors. If the current address is tested using an ERT, the tape's sparing table will be obeyed; if a specified track or the entire tape is tested, the sparing table will be ignored, i.e., even the blocks which have been spared will be tested. The tape unit allows three types of ERTs to be performed: A RO ERT tests for read errors on a specified portion of the tape; a WTR ERT writes a specified pattern to each block over a specified portion of the tape, then reads the area which was written and locates any errors; Certification (CERT) is a special type of WTR ERT which tests every block address on the entire tape and automatically spares all those block addresses which have errors.

The tape's error correction circuit allows data to be reconstructed when its validity is questionable. When data is written to the tape, six frames are transmitted for each block. Frames one and three are combined in exclusive-or fashion to form frame five; correspondingly, frames two and four are combined in exclusive-or fashion to form frame six. Frames one through four are data; frames five and six are error correction information. If an error is detected (using CRC) in frame one, frame three, when exclusive-ored with frame five, will regenerate frame one. In this way, any of the four data frames may be reconstructed by combining the appropriate frames.

### **Error Logging**

An area in RAM within the device controller is responsible for recording up to five uncorrectable data errors during run-time operation. During an ERT, the same memory space is used to record any data errors, if detected. If this area in RAM becomes full, the device requests release from the host in order to log the error information. The Run-time Log (RUN LOG) contains information about data errors found only during run-time. Run-time is defined as any time in which a test, diagnostic, or utility is *not* being performed. During run-time, the error correction circuitry is enabled (on those devices which have this

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feature). If the ECC cannot correct an error, it will be logged during run-time. While executing an ERT, however, ECC is disabled so that all types of errors may be logged. The Error Rate Test Log (ERT LOG) contains information which is obtained only while doing an ERT and specifying the LOG option; the RUN LOG is identical except that it stores errors found only during run-time.

When an ERT begins, the data errors which are currently in RAM are cleared. This is done to prevent confusion between current and previous tests. To avoid erasing these errors, enter a PRESET command first; this will force all of the data error information in RAM to be immediately logged onto the disc maintenance tracks.

In addition to the ERT LOG and RUN LOG, some devices maintain an Error Summary (ERRSUM)—an accumulation of all TERRORS since the logs were last cleared using the CLEAR LOGS command. TERRORS point to both disc and tape unit faults. Each device has its own list of TERRORS provided in the service manual.

Error and fault information such as DERRORS, FRAs, subtest numbers and status are passed to the CS/80 External Exerciser when either an error occurs during run-time or an error is returned by the fault log. These can also appear in a status message (REQSTAT) as a result of a run-time fault. A list of all possible errors for each device can be found in the service manual for that device.

### Disc Error Logging

On the disc unit, error logging is done on the disc maintenance tracks. Logging to these tracks is handled automatically by the device's internal controller. Each disc surface contains its own set of maintenance tracks. Maintenance tracks store error information which has been obtained during ERTs, and also log any drive faults into the FAULT LOG.

### Tape Error Logging

On the tape unit, three logs are maintained: 1) the Run-time Log (RUN LOG) stores run-time data errors, 2) the Error Rate Test Log (ERT LOG) stores ERT data errors, and 3) the Use Log (USE LOG) keeps track of the amount of use the tape cartridge has undergone. While a tape cartridge is write-protected, none of the logs on that tape can be updated.

ERTs provide a good indication of the general health of the tape system. The results of an ERT are stored on the tape's ERT LOG. The ERT LOG shows how many blocks were accessed (read or written) during the test, and displays information about bad or suspect blocks. A block is the smallest addressable entity on the tape; it consists of 6 frames, each 256 bytes. Four of the frames (1024 bytes) contain user data and the remaining two frames provide error correction code.

The ERT LOG separates the number of corrected blocks into those that have permanent errors and those that have transient errors. Permanent errors are blocks which have one or more frame errors after three retries. Permanent errors are usually caused by a defect on the tape; up to 32 defects per 16,000 blocks on a short tape (16 Mbyte) is typical. If more than 128 permanent errors are logged, the tape or tape system could be malfunctioning. Transient errors are blocks which have a frame error that disappears on retries; tape system performance is not degraded if 250-300 transient errors are found per 16,000 blocks. If more than 512 transient errors occur per 16,000 blocks read, this indicates loose connectors or a dirty tape head.

The ERT LOG also shows uncorrectable and unlocatable blocks. If the tape's error correction capability cannot correct a block, that block is determined to be uncorrectable. Before sparing, a short tape may have 1-5 of these blocks; a significantly higher number of uncorrectable blocks indicates a defective tape or a

tape system problem. Unlocatable blocks are those blocks which have unreadable keys. Keys occur at the beginning of each block and contain the block address. Up to 16 unlocatable blocks per 16,000 blocks is normal; greater than this points to a tape or tape system problem.

Logical addresses are the only addresses logged during a tape ERT. The list of logical addresses includes only uncorrectable and unlocatable blocks which were found in the user's logical address space as determined by the current sparing technique. For this reason, the number of logical addresses listed during the test may not equal the sum of uncorrectable and unlocatable blocks since some of these may not be in the user's logical addressing space.

## Media Initialization

The controller within a CS/80 device must be able to recognize the addressing scheme used by each of its storage mediums or units. A unit is a separately addressable entity within a device such as a disc or a tape. The controller itself is also a separate unit. Parameters such as the disc sector format, sector interleaving, sparing technique, and tape block format are strictly governed by the internal controller. Media initialization involves setting up those parameters which establish the foundation of all communications to follow with a particular unit.

### Disc Initialization

On the disc unit, initializing the media destroys all data sectors and allows sector interleaving to be set. Sector interleaving allows the transfer rate of a CS/80 device to be matched most efficiently with that of the host computer connected to it. A host computer cannot always process data as fast as it is sent by the disc. Often, by the time the host computer is ready for another sector, the data head has already passed that particular sector on the disc, and a time delay or latency equal to as much time as one revolution of the disc is incurred. Sector interleaving allows the data to be staggered or interleaved by one or more sectors; access time is delayed only enough to match the speed of the host computer. Sector interleaving, therefore, reduces inherent latencies which are characteristic of all rotational memories.

The INIT MEDIA command permits three options for the disc: retain both primary (factory) and secondary (field) spares; retain only primary spares; and full initialization, which retains no spares. Media initialization is performed on the disc before leaving the factory. Any defective sectors or tracks are found and primary spares take their places. If a full initialization is ever performed outside of the factory, it is imperative that an extensive ERT be performed, and that any questionable sectors are spared using the SPARE command. A power-on diagnostic should be successfully completed before any sectors are spared; this ensures that the device is functioning properly and is capable of completing the spare operation. If a WTR ERT with a loop of 20 consistently finds a sector in error, that particular sector should be spared. If the host system has inadvertently created too many secondary spares (the only kind performed by a host), it is recommended that the disc be initialized to retain primary spares. Regardless of the type of media initialization, all user data is destroyed as part of the initialization process.

Each CS/80 device contains a number of spare tracks. Spare tracks are sequentially numbered starting at zero; this assigned number is defined as the *scalar* spare track number. When a track is spared, it is replaced by one of the available spare tracks. The difference between the spare's physical cylinder address and the defective track's cylinder address is an indication of how far the device had to seek in order to find an available spare. The service manual for each device provides information about the total number of available spare tracks and their corresponding physical addresses.

Two methods of sparing are used: data may be retained or it may be not retained. When data is retained during a sparing operation, only the data that is NOT part of the bad sector will be recovered; the data

## General Information CS/80 EXTERNAL EXERCISER

within the defective sector is lost. Each track has one extra sector set aside for a spare. The internal controller has the ability to map out one sector per track as defective and replace its logical address with that of the spare. All subsequent seeks to that address will go directly to the available spare.

If more than one spare sector is requested on a track, then the track sparing algorithm is invoked. The list of spared tracks is kept in controller RAM as well as on the maintenance tracks; therefore, a seek to a track which has been spared goes directly to the "new" track. The track sparing process is thus completely transparent to the user's logical addressing space.

### Tape Initialization

On the tape unit, initializing the media establishes the sparing technique. All sparing techniques involve altering the addressing scheme to eliminate defective blocks. A defective block is a block with either an uncorrectable data error or an unreadable key.

The INIT MEDIA command sets aside one out of every 512 blocks on the tape as an available spare. A defective block can either be skip-spared or jump-spared. Skip sparing changes the defective block's logical address to the next sequentially available spare block address. The defective block's physical address is then added to the spare table on the tape and can no longer be used. Each logical address between the defective block and the spare block which was used to replace it is then incremented. Since the existing data blocks within the affected area must be "shuffled" to new addresses, skip sparing envelops the data between the defective block and the nearest available spare block. Skip sparing, therefore, should only be used on new tapes or when loss of user data is not a concern. Jump sparing, however, replaces a defective block with the closest available spare block (according to seek time). Any future reference to a block which was jump-spared generates a seek directly to the spare. Since no other addresses are altered, jump sparing does not destroy any user data. Skip sparing is primarily used for optimization of a new tape; jump sparing is used once the tape contains data which is not to be destroyed.

A certification test is also permitted while initializing a tape. CERT locates all defective blocks and skip-sparses them if possible. When no available spare block exists beyond a defective block, then jump sparing is used.

## Operator Designed Programs

Operator designed programs can be created by using the OPER program on the HP 85. The various steps include the ability to locate and read, locate and write, and incremental seek. Also, the sequence of program steps may contain nested loops which allow multiple executions of the same routine. Up to 16 steps are entered individually and can be modified once the program has been created. The OPER commands are described in chapter 4.

# External Exerciser Commands

2

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## Introduction

This chapter documents the commands which are in the EXRSIZ, EXRSI2, CRGTST and D2D programs on the HP 85 External Exerciser tape. Many of the commands in this chapter apply to all CS/80 devices. The commands are in alphabetical order.

If you need information for commands for the HP 7907, 7936, 7937, 794X, 795X, or 796X disc drives, first look in the chapter that applies to that specific product. If a supported command is not found there, then the command will be found in this generic chapter since it applies to more than one device.

# AHA

**SUPPORTED DEVICES:** 7933/35

## **AUTOMATIC HEAD ALIGNMENT**

This command, unique to HP 7933 and HP 7935 disc drives, issues a PRESET command followed by a Read-Only Error Rate Test (RO ERT). The error rate test checks random addresses.

### **INPUT FORMAT:**

Input the TEST name?  
[AHA]

Input the loop count:  
1 <= COUNT <= 254, INF?  
[VVVV] or [INF]

### **OUTPUT FORMAT:**

AUTO HEAD ALIGNMENT UTILITY

AUTO HEAD ALIGNMENT  
UTILITY COMPLETED

# CACHEOFF

**SUPPORTED DEVICES:** 7933/35, 7936/37

## **TURN OFF DISC CACHE**

This command, unique to HP 793X disc drives, turns off the disc cache.

### **INPUT FORMAT:**

Input the TEST name?  
**[CACHEOFF]**

### **OUTPUT FORMAT:**

CACHE CONTROL UTILITY

Read Cache is disabled.  
Write Cache is disabled.

#### **Other possible messages:**

Read Cache disabled because of RAM error.  
Write Cache disabled because of RAM error.  
Read Cache not installed.  
Write Cache not installed.  
Read Cache Status Unknown.  
Write Cache Status Unknown.

CACHE CONTROL UTILITY COMPLETED

# CACHEON

**SUPPORTED DEVICES:** 7933/35, 7936/37

## TURN ON DISC CACHE

This command, unique to HP 793X disc drives, turns on the disc cache.

## INPUT FORMAT:

Input the TEST name?  
**[CACHEON]**

## OUTPUT FORMAT:

### CACHE CONTROL UTILITY

Read Cache is enabled.  
Write Cache is enabled.

If no cache is installed, one or both of the following may be output:

Read Cache is not installed.  
Write Cache is not installed.

### Other possible messages:

Read Cache disabled because of RAM error.  
Write Cache disabled because of RAM error.  
Read Cache not installed.  
Write Cache not installed.  
Read Cache Status Unknown.  
Write Cache Status Unknown.

CACHE CONTROL UTILITY COMPLETED



## CACHE LOG

**SUPPORTED DEVICES:** 7933/35, 7936/37

### DISPLAY CACHE LOG

The cache log interrogates HP 793X disc drives about the status of the disc cache, if one is installed. It displays the number of correctable and uncorrectable errors since the log was last cleared.

### INPUT FORMAT:

Input the TEST name?  
[CACHE LOG]

### OUTPUT FORMAT:

READ CACHE ERROR LOG UTILITY

Cache Memory  
Correctable errors = nnnn  
Uncorrectable errors = nnnn

READ CACHE ERROR LOG  
UTILITY COMPLETED

# CACHE STATUS

**SUPPORTED DEVICES:** 7933/35, 7936/37

## DISPLAY CACHE STATUS

This command, unique to HP 793X disc drives, tells you the status of the disc cache.

### INPUT FORMAT:

Input the TEST name?  
**[CACHE STATUS]**

### OUTPUT FORMAT:

#### CACHE STATUS UTILITY

Read Cache enabled (or disabled)  
Write Cache enabled (or disabled)

#### Other possible messages:

Read Cache disabled because of RAM error.  
Write Cache disabled because of RAM error.  
Read Cache not installed.  
Write Cache not installed.  
Read Cache Status Unknown.  
Write Cache Status Unknown.

CACHE STATUS UTILITY COMPLETED

# CANCEL

**SUPPORTED DEVICES:** ALL

## **CANCEL TRANSACTION**

The CANCEL command causes graceful termination of most CS/80 transactions, leaving them in the reporting phase. CANCEL is useful when a device is not responding due to its internal state. The cancel command does not affect any of the logs. If a cancel command is sent during an error rate test, all data errors in RAM are logged on the disc maintenance tracks.

## **INPUT FORMAT:**

Input the TEST name?  
**[CANCEL]**

## **OUTPUT FORMAT:**

CANCEL UTILITY

CANCEL UTILITY COMPLETED

# CHANNEL

**SUPPORTED DEVICES:** ALL

## TEST HP-IB CHANNEL

The CHANNEL command initiates a read and write loopback test over the HP-IB channel. A loopback test checks the integrity of the HP-IB channel and its interface to the device. If the channel test fails, either the HP-IB channel is at fault or the Processor/HP-IB (PHI) circuitry on the device controller is not working properly.

### INPUT FORMAT:

Input the TEST name?

**[CHANNEL]**

Current HP-IB device

address = nnnn

Do you want to test another

device address?

**[YES]** or **[NO]**

Select one HP-IB address?

**[VVVV]**

### OUTPUT FORMAT:

HP-IB CHANNEL TEST

READ loopback test passed

WRITE loopback test passed

HP-IB CHANNEL UTILITY COMPLETED

If an error occurs, any of the following may be output:

ERROR in READ LOOP BACK data,

Byte was nnnn

Should have been nnnn

ERROR in WRITE LOOP BACK data,

Byte was nnnn

Should have been nnnn

READ loopback test

transfer length error

Received nnnn bytes

Expected 512 bytes

WRITE loopback test

transfer length error

Received nnnn bytes

Expected 512 bytes

# CICLEAR

**SUPPORTED DEVICES: ALL**

## **CHANNEL INDEPENDENT CLEAR**

This command will clear any device connected to the channel. If the controller unit is selected prior to issuing CICLEAR, all units within the device are cleared; otherwise, only the current selected unit will be cleared. CICLEAR does not alter the internal device RAM.

### **INPUT FORMAT:**

Input the TEST name?  
[CICLEAR]

### **OUTPUT FORMAT:**

CHANNEL INDEPENDENT CLEAR  
UTILITY

CHANNEL INDEPENDENT CLEAR  
UTILITY COMPLETED

## CLEAR LOGS

SUPPORTED DEVICES: ALL

ERASE LOGS

### CAUTION

CLEAR LOGS will erase information from one or more of the logs on the selected unit.

The CLEAR LOGS command clears the run-time data error log, the error rate test log, the fault log, and the cache log. The error summary is cleared if the disc unit is selected prior to issuing the CLEAR LOGS. The user has the option of clearing just the ERT LOG which allows each error rate test to accumulate its own errors in the error log.

#### INPUT FORMAT:

Input the TEST name?

[CLEAR LOGS]

0-clear all logs

1-ERT LOG

2-fault run log(HP 794X only)

3-cache log(7933XP)

Which log?

[VVVV]

#### OUTPUT FORMAT:

CLEAR LOGS UTILITY

ERT, CACHE, or ALL log(s) cleared

CLEAR LOGS UTILITY COMPLETED

# CRGTST

**SUPPORTED DEVICES: 7933/35**

## **TEST 7933/35 CARRIAGE**

This program tests the operation of the carriage assembly within HP 7933/35 disc drives. First a power-on spin-up diagnostic is performed, then a random read-only error rate test is initiated and finally, the head value table is read. The head values are stored and the previously described sequence is executed five times. At the end of the fifth loop the head values which were stored from each loop are evaluated and the change in slopes is derived. A change in slope greater than 45 microinches causes the test to fail; this means that the carriage bearings and rails must be cleaned thoroughly or possibly replaced.

In order for CRGTST to execute properly, the disc drive must be spun up prior to the test. This is done by pressing the LOAD/UNLOAD switch to the LOAD (in) position and waiting until the message "DRIVE <device number>" appears on the alphanumeric display.

### **INPUT FORMAT:**

Input the TEST name?  
Press the [PAUSE] key.

Type [LOAD "CRGTST"]

Press the [RUN] key.

### **OUTPUT FORMAT:**

CARRIAGE TEST UTILITY

PASSED!

If the test fails, the following is output:

FAILED!

CLEAN THE RAILS AND CARRIAGE  
BEARINGS THOROUGHLY.  
IF THE RAILS HAVE ALREADY BEEN  
CLEANED IT MAY BE NECESSARY TO  
REPLACE THE CARRIAGE ASSEMBLY.

## D2D

**SUPPORTED DEVICES: ALL**

### **DISC-TO-DISC BACK UP**

D2D is a program used to recover data. The utility establishes a full-volume transfer between two CS/80 devices. This utility is useful when a disc exhibits media problems that prevent a successful system reload. The data is copied from the source device to another disc called the destination device. D2D is not intended to be used for normal back up because it has been purposely designed to be fault-tolerant. If an unrecoverable data error is encountered on the source, the normal 800 millisecond retry algorithm will be performed; but, any data bits that are not read successfully will be passed to the destination as good data. If a Drive Error (DERROR) occurs during the transfer, the operation will be aborted.

#### **CAUTION**

Transferring data from a larger capacity disc to a smaller capacity disc is not recommended.

Some DERRORs can occur as a result of a write problem or a media defect. Any sector which produces a DERROR which is not hardware related must be spared with the SPARE utility (use the option which retains data). The only data which cannot be recovered by the spare operation is the bad data itself, which is unrecoverable anyway. Sparring the defective area allows the rest of the track to be recovered without causing the offending DERROR. To determine if reading any sectors will cause hard DERRORs, perform a Read-Only Error Rate Test (RO ERT) on the entire volume and inspect the fault log. Any sectors with solid DERRORs should be spared and then the RO ERT should be repeated until no sectors have DERRORs.

Be certain that any sector suspected of having a solid DERROR is proven to be solid by performing a RO ERT on the particular track on which the sector resides while checking for repeatable failure. Normally, the length of any uncorrected data will be about two bytes, with the remaining 254 bytes in that sector not exhibiting any error. This means that the chance of a particular data error actually corrupting the user's data base is small, but possible. Other defects on the source media such as an automatic head-alignment band which has been erased (7933/35 only) or servo defects are ignored during the transfer. For these types of defects, the integrity of the recovered data is very high since these are non-data errors. Since this utility is only to be used when a fault condition exists, it is mandatory that the transfer operation be verified after completion. To verify the data transfer, use the RF SECTOR utility (7933/35/36/37 and 791X with revision 5 firmware or later) or the Locate and Read (LCRD in OPER) command to match selected sectors on the media. Recommended locations to match are the first, last, and approximate middle sector of the volume size which was transferred.

Since this utility allows transferring between two different sized discs, always use the smaller capacity disc size to determine the last sector (block addressing is recommended).

#### **INPUT FORMAT:**

Input the TEST name?  
Press the [PAUSE] key.

Type [LOAD "D2D"]

Press the [RUN] key.



The following CS'80 devices responded:  
 nnnn nnnn nnnn etc.  
 Select source address <=7?  
**[VVVV]**  
 Select destination address <=7?  
**[VVVV]**  
 Input the unit number for the source?  
**[VVVV]**  
 Input the unit number for the destination?  
**[VVVV]**  
 Transfer from nnnn to nnnn  
 Press 'CONT' to continue  
**[CONT]**  
 Transfer in progress

**OUTPUT FORMAT:**

Disc to disc transfer program  
 Revision - nnnn

Initial status for source:  
 Status message follows:  
 nnnn nnnn nnnn nnnn nnnn nnnn nnnn nnnn nnnn nnnn  
 nnnn nnnn nnnn nnnn nnnn nnnn nnnn nnnn nnnn nnnn

Source dev type = DISC or TAPE  
 HPIB addr= nnnn  
 Destination dev type = DISC or TAPE  
 HPIB addr= nnnn

Final status for SOURCE:  
 Status message follows:  
 nnnn nnnn nnnn nnnn nnnn nnnn nnnn nnnn nnnn nnnn  
 nnnn nnnn nnnn nnnn nnnn nnnn nnnn nnnn nnnn nnnn

Final status for DESTINATION:  
 Status message follows:  
 nnnn nnnn nnnn nnnn nnnn nnnn nnnn nnnn nnnn nnnn  
 nnnn nnnn nnnn nnnn nnnn nnnn nnnn nnnn nnnn nnnn

End of transfer  
 PROGRAM WILL NOW STOP

# DESCRIBE

SUPPORTED DEVICES: ALL

## DESCRIBE SELECTED UNIT

The DESCRIBE command allows information within the currently addressed unit to be sent to the HP 85. The information consists of identification and addressing parameters about the unit which is currently addressed.

## INPUT FORMAT:

Input the TEST name?  
[DESCRIBE]

## OUTPUT FORMAT:

DESCRIBE UTILITY

Model: 79XX or CTD  
Unit: nnnn  
Type: DISC, TAPE, CONTROLLER, or UNKNOWN  
Max cyl addr: nnnn  
Max head addr: nnnn  
Max sect addr: nnnn  
Max block addr: nnnn  
Current interleave: nnnn

DESCRIBE UTILITY COMPLETED

# DIAG

**SUPPORTED DEVICES: ALL**

## **PERFORM INTERNAL DIAGNOSTICS**

This test will invoke diagnostic routines which reside in the internal device controller firmware. The specific diagnostics are unique to each device and are therefore described in the service manual for each device. Some diagnostic tests will clear the internal device RAM. Certain macrodiagnostics involve extensive device verification which re-establish default parameters such as selected unit and length.

### **INPUT FORMAT:**

Input the TEST name?

**[DIAG]**

Enter unit number (HP 794X devices only)

?

**[VVVV]**

Input diagnostic number (0 to Max diag #)

**[VVVV]**

Input the loop count <= 65535?

**[VVVV]**

### **OUTPUT FORMAT:**

INTERNAL DIAGNOSTIC TEST

Diag # = nnnn

Loop Count = nnnn

INTERNAL DIAGNOSTIC

TEST COMPLETED

If a fault occurs during a diagnostic test, a status message will be output. Refer to the REQSTAT command in this chapter for an explanation of the output.

# ERRSUM

**SUPPORTED DEVICES:** 7908/1X, CTD

## OUTPUT TEST ERROR SUMMARY

The Error Summary (ERRSUM) utility, unique to HP 7908 and HP 791X devices, prints 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 disc maintenance tracks. The CLEAR LOGS command clears the error summaries only if the disc unit is selected. The service manual for the particular device being diagnosed should be consulted for a list of TERRORS as the information is device dependent.

## INPUT FORMAT:

Input the TEST name?

**[ERRSUM]**

Do you want the previous (P) or current (C) results?

**[P]** or **[C]**

## OUTPUT FORMAT:

READ ERROR SUMMARY UTILITY

CURRENT or PREVIOUS ERROR SUMMARY

CURRENT error numbers:

HHH HHH HHH HHH HHH HHH HHH HHH  
HHH HHH HHH HHH HHH HHH HHH HHH  
Until all TERRORS are displayed.

or

No errors found.

If **[P]** was entered, the following additional information is output:

CURRENT - 1 error numbers:

HHH HHH HHH HHH HHH HHH HHH HHH  
Until all errors are displayed.

CURRENT - 2 error numbers:

HHH HHH HHH HHH HHH HHH HHH HHH  
Until all errors are displayed.

CURRENT - 3 error numbers:

HHH HHH HHH HHH HHH HHH HHH HHH  
Until all errors are displayed.

READ ERROR SUMMARY  
UTILITY COMPLETED

## ERT LOG

**SUPPORTED DEVICES:** 7908/1X, 7933/35, (for CTD, 794X, 7907, 7936/37, 795X/6X, refer to appropriate chapter)

### OUTPUT ERROR RATE TEST LOG

The error rate test log contains an accumulation of all read errors which were found during a read-only or a write-then-read error rate test. Since the Error Correction Circuitry (ECC) is disabled during an error rate test, the ERT LOG will accumulate both correctable and uncorrectable errors. Each data head has its own error rate test log for that surface. Error rate test errors are accumulated until the log is cleared using the CLEAR LOGS command.

### INPUT FORMAT:

Input the TEST name?

[ERT LOG]

Print error decoding info?

[YES] or [NO]

The following is the error decoding information:

TYPE:

UNC = ECC uncor. data error

COR = ECC correctable data error

CRC = Error detected only by CRC

CNT = Occurrence count  
(RUN/ERT logs only)

LPC = Loop count  
(RO/WTR ERTs only)

ERR BYTE:

00000000 ECC found cor. error  
(ERT LOG only)

00000001 ECC found uncor. error

00000010 ECC didn't detect error

00000100 Error is in sect header

00001000 CRC didn't detect error

00010000 First retry didn't  
recover data

00100000 Extra offset used

01000000 Formatter/Separator  
error

10000000 Unrecoverable error  
(RUN LOG only)

Input the head number or ALL?

[VVVV] or [ALL]

## ERT LOG

### OUTPUT FORMAT:

READ ERT DATA ERROR LOG UTILITY

The following is output for each head which was selected:

Head # = nnnn  
No. of sectors read = nnnn  
ECC correctable errors = nnnn  
ECC uncorrectable errors = nnnn  
Error addresses logged = nnnn

The following is output for each error:

CYL HEAD SECT TYPE CNT ERR BYTE  
nnnn nnnn nnnn xxxx nnnn BBBB BBBB  
Until all errors are displayed.

READ ERT DATA ERROR LOG  
UTILITY COMPLETED

# EXIT

**SUPPORTED DEVICES: ALL**

**EXIT PROGRAM OR COMMAND**

EXIT can be entered after any prompt. If EXIT is entered in response to "Input the TEST name?", the program will halt. Any other time EXIT is entered, the prompt "Input the TEST name" will be displayed.

**INPUT FORMAT:**

Input the TEST name?  
[EXIT]

**OUTPUT FORMAT:**

PROGRAM WILL NOW HALT.

## FAULT LOG

**SUPPORTED DEVICES:** 7908/1X, 7933/35 (for CTD, 794X, 7907, 7936/37, 795X/6X, refer to appropriate chapter)

### OUTPUT FAULT LOG

The fault log is an accumulation of the faults which have occurred on a device since the last time a CLEAR LOGS command was issued. The fault log resides on the disc maintenance tracks.

### INPUT FORMAT:

Input the TEST name?

**[FAULT LOG]**

### OUTPUT FORMAT:

READ DRIVE FAULT LOG UTILITY

Number of faults logged = nnnn

CURRENT Address:

Cyl = nnnn Head = nnnn Sect = nnnn\*

TARGET Address:

Cyl = nnnn Head = nnnn Sect = nnnn\*

TERROR = nnnn (if any)

DERROR = nnnn (if any)

Fault reg. = BBBB BBBB binary

\*Physical addresses print "N/A".

or

No drive faults to report

On the 7908/1X products the  
Fault reg. is valid only for  
DERRORs 64 and 203. (decimal)

READ DRIVE FAULT LOG

UTILITY COMPLETED



# HELP

**SUPPORTED DEVICES: ALL**

## **OUTPUT HELP INFORMATION**

HELP prints out all command names. An asterisk (\*) appears before commands that are not in the program currently running. Consult the service manual for the particular device being diagnosed.

## **INPUT FORMAT:**

Input the TEST name?

[HELP]

## **OUTPUT FORMAT:**

AHA- Auto head alignment (7933/35)  
AMCLEAR- 794X/7907/TAPE device clear  
CACHEOFF- disable cache  
CACHEON- enable cache  
CACHE LOG- read cache error log  
CACHE STATUS- check cache status  
CANCEL- cancel transaction  
CERT- perform tape certification  
CHANNEL- test HP-IB channel  
CICLEAR- channel independent clear  
CLEAR LOGS- erase logs  
CRGTST- test 7933/35 carriage  
D2D- disc-to-disc back up program  
DESCRIBE- describe selected unit  
DIAG- perform internal diagnostics  
ERRSUM- output TERROR summary  
ERT LOG- output error rate test log  
EXIT- exit program or command  
FAULT LOG- output fault log  
HELP- output help information  
INIT MEDIA- initialize media  
OPER- create user programs  
PRESET- update device logs  
READCACHEOFF- disables read cache  
READCACHEON- enables read cache  
REQSTAT- request status  
RESET STATS- clear cache stats  
REV- output firmware revision  
RF SECTOR- read full sector  
RO ERT-.perform read-only  
    error rate test  
RUN LOG- output run log data  
SDCLEAR- clear selected device  
SENSE- output sensor data  
SERVO- perform 794X or 7907 servo test  
SPARE- spare block  
SPARE TABLE- output spare table  
TABLES- output device tables  
UNIT- set unit number

## HELP

UNLOAD- unload tape cartridge  
USE LOG- output tape use log  
WRITECACHEOFF- disables write cache  
WRITECACHEON- enables write cache  
WRITE FM- write file mark  
WTR ERT- perform write-then-read  
          error rate test

# INIT MEDIA

SUPPORTED DEVICES: ALL (for CTD refer to chapter 3)

## INITIALIZE MEDIA

### CAUTION

INIT MEDIA will erase all user data on the selected unit. If the device is power cycled or if certain diagnostics are performed, the unit is defaulted to unit 0. Depending on the amount of memory in the device, INIT MEDIA could take a long time to complete. This utility performs an initialization routine on the disc media. INIT MEDIA allows the user to: retain primary (factory) and secondary (field) spares; retain only primary spares; or, retain no spares (a full initialization). After a full initialization, it is imperative that an extensive error rate test be performed and that all questionable sectors be spared. INIT MEDIA erases all user data.

### INPUT FORMAT:

Input the TEST name?  
[INIT MEDIA]  
This utility will destroy all  
current data.  
Should this utility continue?  
[YES] or [NO]  
Do you want to:  
I = Initialize maintenance  
    tracks and retain no spares  
P = retain only primary spares  
    or  
B = retain primary and  
    secondary spares  
?  
[I] or [P] or [B]  
Input the interleave value <=32?  
[VVVV]

### OUTPUT FORMAT:

INITIALIZE MEDIA UTILITY  
  
This utility may take several  
minutes to complete.  
  
INITIALIZE MEDIA  
UTILITY COMPLETED

# **PRESET**

**SUPPORTED DEVICES: ALL**

**UPDATE DEVICE LOGS**

This command causes all recent information in controller RAM to be logged on the disc maintenance tracks, and an automatic head alignment takes place on devices which utilize this feature.

**INPUT FORMAT:**

Input the TEST name?  
**[PRESET]**

**OUTPUT FORMAT:**

PRESET DRIVE UTILITY

PRESET DRIVE UTILITY COMPLETED

## READCACHEOFF

**SUPPORTED DEVICES:** 7933/35, 7936/37

### TURN OFF DISC READ CACHE

This command, unique to HP 793X disc drives, turns off the disc read cache. The write cache must be disabled using either the WRITECACHEOFF command or the CACHEOFF command or the READCACHEOFF command will fail.

### INPUT FORMAT:

Input the TEST name?  
[READCACHEOFF]

### OUTPUT FORMAT:

READ CACHE CONTROL UTILITY

Read Cache is disabled.

Other possible messages:

Read Cache not installed.  
Read Cache disabled because of RAM error.  
Read Cache Status Unknown.

READ CACHE CONTROL  
UTILITY COMPLETED

# READCACHEON

**SUPPORTED DEVICES:** 7933/35, 7936/37

## TURN ON DISC READ CACHE

This command, unique to HP 793X disc drives, turns on the disc read cache.

### INPUT FORMAT:

Input the TEST name?  
**[READCACHEON]**

### OUTPUT FORMAT:

READ CACHE CONTROL UTILITY

Read Cache is enabled.

Other possible messages:

Read Cache not installed.  
Read Cache disabled because of RAM error.  
Read Cache Status Unknown.

READ CACHE CONTROL  
UTILITY COMPLETED

# REQSTAT

**SUPPORTED DEVICES: ALL**

## REQUEST STATUS

This utility sends a status message from the device to the exerciser. The status message consists of addressing information and any fault or error information which may be available. A status message can result during any transaction sequence while using the exerciser. REQSTAT or CICLEAR will clear the current status information.

### INPUT FORMAT:

Input the TEST name?  
[REQSTAT]

### OUTPUT FORMAT:

REQUEST STATUS UTILITY  
Current unit = nnnn (Fixed, Removable, or Controller)

Status bytes follow (hex):  
HH HH HH HH HH HH HH HH HH HH  
HH HH HH HH HH HH HH HH HH HH

Status message follows:

Unit = nnnn  
Unit type: Disc, Tape, Controller, or Unknown  
Unit nnnn (or No units) with pending status

New target address is:  
Cyl=nnnn Head=nnnn Sect=nnnn

REQUEST STATUS UTILITY COMPLETED

Any of the following messages may be output as part of the status message.

Status bits set are:

Channel parity error  
Illegal opcode  
Illegal volume or unit number  
Address bounds error  
Parameter bounds error  
Illegal parameter error  
Message sequence error  
Message length error

## REQSTAT

Cross units which failed are: nnnn  
Status bit set but no unit  
numbers in parameter field  
Controller fault  
Unit fault  
Hardware failed diagnostics  
Error codes are:  
Part number = nnnn failed  
TERROR = nnnn  
or  
FRA number nnnn failed  
Failing subtest num.(nnnn)= nnnn hex  
Non-responding host on PRI/SEC port  
Unknown (parameter field used)  
Release required for:  
OPERATOR request  
or  
DIAGNOSTIC result  
or  
INTERNAL maintenance  
Power on or media just loaded  
Retransmit error

Illegal parallel operation  
Uninitialized media  
No more spares available  
Selected drive is not ready  
Volume is write protected  
No data found  
Inconsistent lock or unlock  
Device, Unit, Sector range, Lock table or  
Resource unavailable  
(Resource unavailable if parameter field is used)  
Unrecoverable data overflow  
Unrecoverable data error  
Address of unrecoverable data:  
Cyl=nnnn Head=nnnn Sect=nnnn  
or  
Block address = nnnn  
or  
Unknown (parameter field used)  
End of File encountered  
End of Volume encountered



## REQSTAT

Release requested for:  
  Operator request  
  or  
  Diagnostic result  
  or  
  Internal maintenance  
Unit requesting release is:  
  Unit nnnn  
  or  
  Unknown (parameter field used)  
Media wearing out  
Data overrun  
Auto sparing invoked  
Device, Unit, Sector range or Resource available  
  (Resource available if parameter field is used)  
Recoverable data overflow  
Marginal data error  
  Address of marginal data:  
  Cyl=nnnn Head=nnnn Sect=nnnn  
  or  
  Block address = nnnn  
  or  
  Unknown (parameter field used)  
Recoverable data error, latency  
induced in order to  
recover the data  
  Address of recoverable block:  
  Cyl=nnnn Head=nnnn Sect=nnnn  
  or  
  Block address = nnnn  
  or  
  Unknown (parameter field used)  
Maintenance track overflow  
  Derrors follow:  
  DERROR = nnnn  
  Fault reg.=BBBBBBBB binary  
  or  
  Drive faults follow:  
  Fault code = nnnn hex  
  Status = nnnn hex  
New target address is:  
  Cyl=nnnn Head=nnnn Sect=nnnn  
  or  
  Block address = nnnn  
  or  
  Unknown (parameter field used)

# RESET STATS

**SUPPORTED DEVICES:** 7933/35, 7936/37

## RESET STATS

This command, unique to HP 793X disc drives, allows the cache table to be cleared.

### INPUT FORMAT:

Input the TEST name?  
[RESET STATS]

### OUTPUT FORMAT:

Clear cache Statistic Table?  
[YES] or [NO]

CLEAR CACHE STATISTICS  
UTILITY COMPLETED

**SUPPORTED DEVICES: ALL**

**OUTPUT FIRMWARE REVISION**

This utility reads the current revision numbers of the ROMs within the internal device controller.

**INPUT FORMAT:**

Input the TEST name?  
[REV]

**OUTPUT FORMAT:**

READ REVISION NUMBER UTILITY

Part number	Revision number
-----	-----
1	nnnn - r (nnnn=revision number)
2	nnnn - r (r=rework number)
3	nnnn - r
4	nnnn - r
5	nnnn - r
6	nnnn - r
7	nnnn - r (HP 7933/35 only)

READ REVISION NUMBER  
UTILITY COMPLETED

## RF SECTOR

**SUPPORTED DEVICES:** 791X, 7933/35, 7936/37

### READ FULL SECTOR

This utility (unique to HP 7933/35 and 791X with revision 5 firmware or later) reads and prints out a full sector from the specified logical address. A full sector includes the sector header, user data, CRC, and ECC information.

#### INPUT FORMAT:

Input the TEST name?

**[RF SECTOR]**

Number of times to loop reading  
the same sector<=32767?

**[VVVV]**

Do you want block 'B' or three  
vector 'V' addressing?

**[B] or [V]**

Enter address changes or just  
END LINE to keep the current  
the current values

If **[B]** is entered:

Current block address = nnnn?

**[VVVV] or [END LINE]**

If **[V]** is entered:

Current cylinder addr = nnnn?

**[VVVV] or [END LINE]**

Current head address = nnnn?

**[VVVV] or [END LINE]**

Current sector addr = nnnn?

**[VVVV] or [END LINE]**

## RF SECTOR

### OUTPUT FORMAT:

READ FULL SECTOR UTILITY

Cyl=nnnn Head=nnnn Sect=nnnn

Status = nnnn

Physical sector # = nnnn

Head # = nnnn

Physical cylinder # = nnnn

Spare sector = nnnn (or No sector sparing has occurred)

```
  1 HH HH HH HH HH HH HH HH
  9 HH HH HH HH HH HH HH HH
 17 HH HH HH HH HH HH HH HH
  .
  .
  .
249 HH HH HH HH HH HH HH HH
```

CRC = BBBB BBBB BBBB BBBB

ECC follows:

1 = BBBB BBBB

2 = BBBB BBBB

3 = BBBB BBBB

4 = BBBB BBBB

5 = BBBB BBBB

READ FULL SECTOR  
UTILITY COMPLETED

## RO ERT

**SUPPORTED DEVICES:** 7908/1X, 7933/35 (for CTD, 794X, 7907, 7936/37, 795X/6X, refer to appropriate chapter)

### PERFORM READ-ONLY ERROR RATE TEST

There are two types of RO ERTs: The standard type allows the user to specify a starting address for a sequential read; the random type reads 256 random addresses using random lengths. The results of the test can be logged or immediately displayed. RO ERT clears the internal device RAM.

The offset value range that each device allows is as follows:

Device	Maximum Offset Range
HP 7908	± 20
HP 7911	± 15
HP 7912	± 15
HP 7914	± 7
HP 7933	±127
HP 7935	±127

### INPUT FORMAT:

Input the TEST name?

[RO ERT]

Input the loop count:

1 <= count <=254 or INF?

[VVVV] or [INF]

Do you want a random RO ERT?

[YES] or [NO]

If [NO] is entered, the following addressing information is asked:

Enter address changes or just  
END LINE to keep the current  
values

Current cylinder addr = nnnn?  
[VVVV] or [END LINE]

Current head address = nnnn?  
[VVVV] or [END LINE]

Current sector addr = nnnn?  
[VVVV] or [END LINE]

Do you want to test the  
 V = volume, H = head, T = track  
 C = cylinder, or S = sector?  
 [V] or [H] or [T] or [C] or [S]

Do you want to enter an offset?  
 [YES] or [NO]  
 Input offset -127<=offset<=127?  
 [VVVV]

Output formats are:  
 PRT = print error information  
 LOG = log in error rate log  
 Enter the format?  
 [PRT] or [LOG]

If [PRT] is entered:

Print error decoding info?  
 [YES] or [NO]

The following is the error decoding information:

TYPE:  
 UNC = ECC uncor. data error  
 COR = ECC correctable data error  
 CRC = Error detected only by CRC

CNT = Occurrence count  
 (RUN/ERT logs only)

LPC = Loop count  
 (RO/WTR ERTs only)

ERR BYTE:  
 00000000 ECC found cor. error  
 (ERT LOG only)  
 00000001 ECC found uncor. error  
 00000010 ECC didn't detect error  
 00000100 Error is in sect header  
 00001000 CRC didn't detect error  
 00010000 First retry didn't  
 recover data  
 00100000 Extra offset used  
 01000000 Formatter/Separator  
 error  
 10000000 Unrecoverable error  
 (RUN LOG only)

## RO ERT

### OUTPUT FORMAT:

READ ONLY ERT TEST

If **[PRT]** was entered:

```
  CYL HEAD SECT TYPE LPC  ERR BYTE
nnnn nnnn nnnn xxxx nnnn BBBBBBBB
Error begins at byte nnnn (if TYPE=COR)
Until all errors are displayed.
```

If **[LOG]** was entered:

Do you want to see the ERT LOG?  
**[YES]** or **[NO]**

If **[YES]** is entered, refer to ERT LOG in this chapter.

READ ONLY ERT TEST COMPLETED



## RUN LOG

**SUPPORTED DEVICES:** 7908/1X, 7933/35 (for CTD, 794X, 7907, 7936/37, 795X/6X, refer to appropriate chapter)

### OUTPUT RUN LOG

The run log contains an accumulation of all read errors which were found during run time. Run-time data errors are accumulated and logged on the disc maintenance tracks automatically during normal device operation. Each data head has its own run log for that surface. Run-time data errors are accumulated until the log is cleared using the CLEAR LOGS command.

### INPUT FORMAT:

Input the TEST name?

[RUN LOG]

Print error decoding info?

[YES] or [NO]

The following is the error decoding information:

TYPE:

UNC = ECC uncor. data error

COR = ECC correctable data error

CRC = Error detected only by CRC

CNT = Occurrence count  
(RUN/ERT logs only)

LPC = Loop count  
(RO/WTR ERTs only)

ERR BYTE:

00000000 ECC found cor. error  
(ERT LOG only)

00000001 ECC found uncor. error

00000010 ECC didn't detect error

00000100 Error is in sect header

00001000 CRC didn't detect error

00010000 First retry didn't  
recover data

00100000 Extra offset used

01000000 Formatter/Separator  
error

10000000 Unrecoverable error  
(RUN LOG only)

Input the head number or ALL?

[VVVV] or [ALL]

## **RUN LOG**

### **OUTPUT FORMAT:**

READ RUN TIME DATA ERROR LOG  
UTILITY

The following is output for each head which was selected:

Head # = nnnn  
No. of sectors read = nnnn  
ECC correctable errors = nnnn  
ECC uncorrectable errors = nnnn  
Error addresses logged = nnnn

The following is output for each uncorrectable error:

CYL HEAD SECT TYPE CNT ERR BYTE  
nnnn nnnn nnnn xxxx nnnn BBBBBBBB  
Until all errors are displayed.

READ RUN TIME DATA ERROR LOG  
UTILITY COMPLETED

## **SDCLEAR**

**SUPPORTED DEVICES:** 7908/1X, 7933/35, 7936/37, 795X, 796X, CTD (for 794X and 7907, use AMCLEAR instead of SDCLEAR; refer to appropriate chapter)

### **CLEAR SELECTED DEVICE**

This command clears the device on the channel which is currently addressed. Any operation the device is performing when SDCLEAR is received is terminated as soon as possible such that no data corruption takes place. All complementary parameters such as unit and length are restored to their default values and any pending status is cleared. The internal device RAM is cleared also. To clear HP 794X or HP 7907 devices, use the AMCLEAR command (refer to Chapter 5 or 6); do not use SDCLEAR.

### **INPUT FORMAT:**

Input the TEST name?  
[SDCLEAR]

### **OUTPUT FORMAT:**

SELECTED DEVICE CLEAR UTILITY

SELECTED DEVICE CLEAR  
UTILITY COMPLETED

# SENSE

**SUPPORTED DEVICES:** 7933/35

## OUTPUT SENSOR DATA

This utility is unique to HP 7933/35 devices since they have temperature sensors. SENSE reads the value of the temperature within the device and also displays the hardware and read/write fault register contents. The bit pattern definitions are as follows:

Hardware (H/W) Fault Register Values	
SPINDLE SPEED DOWN	00000001
HEADS OFF TRACK	00000010
TRACK FOLLOWER PLL ERROR	00001000
TOP DOOR IS OPEN	00010000
EMERGENCY RETRACT IS SET	00100000
POWER FAILURE	01000000
READ/WRITE FAULT	10000000

Read/Write (R/W) Fault Register Values	
WRITE WITHOUT AC WRITE CURRENT	00000001
DC WRITE CURRENT WITHOUT WRITE	00000010
WRITE WITHOUT DC WRITE CURRENT	00000100
MULTIPLE HEADS ARE SELECTED	00001000

## INPUT FORMAT:

Input the TEST name?  
[SENSE]

## OUTPUT FORMAT:

READ SENSORS UTILITY

Blower pressure = GOOD or BAD  
Filter pressure = GOOD or BAD  
Exhaust air temperature  
= nnnn (+/-)3 degrees C  
Actuator coil temperature  
= nnnn (+/-)3 degrees C  
H/W fault reg = BBBB BBBB  
binary  
R/W fault reg = BBBB BBBB  
binary

READ SENSORS UTILITY COMPLETED

# SPARE

**SUPPORTED DEVICES:** 7908/1X, 7933/35 (for CTD, 794X, 7907, 7936/37, 795X/6X, refer to appropriate chapter)

## SPARE SECTOR

### CAUTION

A full power-on diagnostic should be successfully performed before sparing any sectors. This will prove that the device is capable of sparing.

This utility physically relocates a sector to an address which is reserved for sparing. The user has the option to retain the data on the affected track (except the sector which is determined to be bad). All sectors which are spared with the CS/80 External Exerciser are secondary (field) spares. The second sparing operation performed on a given track causes the entire track to be relocated since there is only one available spare sector per track.

A WTR ERT with a loop of 20 should be performed on a particular logical sector address after it has been spared. This ensures that the previously unused available spare sector is good. Since the entire track may have been spared, a RO ERT with a loop of 20 should be performed on the logical track also. This ensures that the previously unused available spare track is good. If either the logical sector or track which was addressed during the spare operation fails the error rate tests, the same logical sector should be spared again (relocated) until both error rate tests pass successfully.

### INPUT FORMAT:

Input the TEST name?  
[SPARE]  
Do you want to retain the data?  
[YES] or [NO]  
Do you wish block 'B' or three  
vector 'V' addressing?  
[B] or [V]

The spare command sequence restarts here for sparing multiple sectors.

If [B] is entered:

Current block address = nnnn?  
[VVVV] or [END LINE]

If [V] is entered:

Enter address changes or just  
END LINE to keep the current  
the current values

Current cylinder addr = nnnn?  
[VVVV] or [END LINE]

Current head address = nnnn?  
[VVVV] or [END LINE]

## **SPARE**

Current sector addr = nnnn?  
[VVVV] or [END LINE]

### **OUTPUT FORMAT:**

SPARE BLOCK UTILITY

Spared address was:

Cyl = nnnn Head = nnnn Sect = nnnn  
                  or

BLOCK nnnn

Spare another address?

[YES] or [NO]

SPARE BLOCK UTILITY COMPLETED

## SPARE TABLE

**SUPPORTED DEVICES:** 7907, 7908/1X, 7933/35, 7936/37 (for CTD, 794X, 795X/6X, refer to appropriate chapter)

### OUTPUT SPARE TABLE

This command accesses the information in the spare table. It provides identical information as that obtained when using the TABLES command and selecting table number 1. The spare table is a list of all logical tracks which have been spared for each head.

### INPUT FORMAT:

Input the TEST name?  
[SPARE TABLE]

### READ DRIVE SPARE TABLES UTILITY

Head number = nnnn  
# of secondary spare  
operations = nnnn  
# of tracks used = nnnn  
# of logical tracks spared = nnnn  
Until all heads are displayed.

The following is output for each logical track which is spared:

CYL	TYPE	SCALAR	
nnnn	xxxx	nnnn	(xxxx = PRIMARY or SECONDARY)

READ DRIVE SPARE TABLES  
UTILITY COMPLETED

# TABLES

**SUPPORTED DEVICES:** ALL (for CTD, refer to chapter 3)

## OUTPUT DEVICE TABLES

This utility accesses the tables stored internally within the device. The tables consist of: the spare track table, which is a list of all logical tracks that have been spared for each head; the head value table, which shows alignment values for each head; the configuration table, which is a list of the current configuration variables that allow custom device operation; and, the runout table, which shows the amount of eccentric runout (radial shift) for each head.

### INPUT FORMAT:

Input the TEST name?

[TABLES]

Drive table numbers are:

- 1 = Spare track table
- 2 = Head value table (HP 7933/35 only)
- 3 = Configuration table (HP 7933/35 only)
- 4 = Not used
- 5 = Not used
- 6 = Servo runout table (HP 7933/35 only)

Input drive table number?

[VVVV]

### OUTPUT FORMAT:

READ DRIVE SPARE TABLES UTILITY

Head number = nnnn  
# of secondary spare  
operations = nnnn  
# of tracks used = nnnn  
# of logical tracks spared = nnnn  
Until all heads are displayed.

The following is output for each logical track which is spared:

CYL	TYPE	SCALAR
nnnn	xxxx	nnnn (xxxx = PRIMARY or SECONDARY)

READ DRIVE SPARE TABLES  
UTILITY COMPLETED

READ DRIVE HEAD VALUE TABLES UTILITY

Alignment values for head # nnnn  
BAND 0 = nnnn (outside diameter)  
Δ0,1 = nnnn (change from middle to outside diameter)  
BAND 1 = nnnn (middle diameter)  
Δ1,2 = nnnn (change from inside to middle diameter)



## TABLES

BAND 2 = nnnn (inside diameter)  
Until all heads are displayed.

Skew values for head # nnnn  
BAND 0 = nnnn  
Δ0,1 = nnnn  
BAND 1 = nnnn  
Δ1,2 = nnnn  
BAND 2 = nnnn  
Until all heads are displayed.

Current Cylinder Offset Table  
Head 0 = nnnn  
Head 1 = nnnn  
Head 2 = nnnn  
Until all heads are displayed.

READ DRIVE TABLES  
UTILITY COMPLETED

READ DRIVE CONFIGURATION TABLES UTILITY

Transfer length = nnnn  
Burst length = nnnn  
Retry time = nnnn  
Status mask = BBBBBBBBBBBBBBBB  
RPS window = nnnn  
RPS advance = nnnn  
Set release Z bit = ON/OFF  
Set release T bit = ON/OFF  
Options flag = BBBBBBBB  
Burst with EOI = ON/OFF  
Return address = BLOCK/3 VECTOR

READ DRIVE TABLES  
UTILITY COMPLETED

READ DRIVE RUNOUT TABLES UTILITY

HEAD	RUNOUT
0	nnnn
1	nnnn
2	nnnn

Until all heads are displayed.

READ DRIVE TABLES  
UTILITY COMPLETED

# UNIT

**SUPPORTED DEVICES: ALL**

## SET UNIT NUMBER

This utility allows the user to select the unit number to be addressed within the device. The units within a CS/80 device include the disc unit, the controller, and possibly a cartridge tape unit. The disc is always unit "0". The tape unit in a standard disc/tape drive is always unit "1"; devices with dual controllers (Option 001) have both disc and tape units of "0" (each has its own channel).

### INPUT FORMAT:

Input the TEST name?  
[UNIT]

Input the unit number <= 15?  
[VVVV]

### OUTPUT FORMAT:

#### SET UNIT NUMBER UTILITY

If the device has just been powered on, or media has just been loaded or is not initialized, one or both of the following status messages will be output:

Power on or media just loaded  
status on unit nnnn  
Media uninitialized

Current unit selected = nnnn

SET UNIT NUMBER  
UTILITY COMPLETED

## **WRITECACHEOFF**

**SUPPORTED DEVICES:** 7933/35, 7936/37

### **TURN OFF DISC WRITE CACHE**

This command, unique to HP 793X disc drives, turns off the disc write cache.

### **INPUT FORMAT:**

Input the TEST name?  
**[WRITECACHEOFF]**

### **OUTPUT FORMAT:**

WRITE CACHE CONTROL UTILITY

Write Cache is disabled.

### **Other possible messages:**

Write Cache not installed.  
Write Cache disabled because of RAM error.  
Write Cache Status Unknown.

WRITE CACHE CONTROL  
UTILITY COMPLETED

# WRITECACHEON

**SUPPORTED DEVICES:** 7933/35, 7936/37

## TURN ON DISC WRITE CACHE

This command, unique to HP 793X disc drives, turns on the disc write cache. The read cache must be enabled using either the READCACHEON command or the CACHEON command or the WRITECACHEON command will fail.

### INPUT FORMAT:

Input the TEST name?  
[WRITECACHEON]

### OUTPUT FORMAT:

WRITE CACHE CONTROL UTILITY

Write Cache is enabled.

Other possible messages:

Write Cache not installed.  
Write Cache disabled because of RAM error.  
Write Cache Status Unknown.

WRITE CACHE CONTROL  
UTILITY COMPLETED

## WTR ERT

**SUPPORTED DEVICES:** 7908/1X, 7933/35 (for CTD, 794X, 7907, 7936/37, 795X/6X, refer to appropriate chapter)

### PERFORM WRITE-THEN-READ ERROR RATE TEST

<b>CAUTION</b>
----------------

WTR ERT will erase some or all of the user data on the selected unit.

There are three types of WTR ERTs. The pattern test (PT) allows the user to input a starting address; the test sequentially writes and then reads the entire volume from the specified starting address until the end-of-volume is reached. The random test (RN) writes and then reads 256 random addresses. The short test (SH) is a combination of the two other tests: random addresses near the outer edge of the disc are written and then read; this test is optimized for speed. A WTR ERT can LOG error information obtained during the test on the disc maintenance tracks or print (PRT) the information out immediately. WTR ERT clears the internal device RAM.

The offset value range that each device allows is as follows:

Device	Maximum Offset Range
HP 7908	± 20
HP 7911	± 15
HP 7912	± 15
HP 7914	± 7
HP 7933	±127
HP 7935	±127

### INPUT FORMAT:

Input the TEST name?

**[WTR ERT]**

This test will destroy current data.

Should it continue?

**[YES]** or **[NO]**

Input the loop count:

1 <= count <=254 or INF?

**[VVVV]** or **[INF]**

Types of Write Then Read ERTs:

PT = Pattern test ERT

RN = Random address ERT.

SH = Short ERT.

Enter the type of test?

**[PT]** or **[RN]** or **[SH]**

## WTR ERT

If [PT] is entered:

Enter address changes or just  
END LINE to keep the current  
values

Current cylinder addr = nnnn?  
[VVVV] or [END LINE]

Current head addr = nnnn?  
[VVVV] or [END LINE]

Current sector addr = nnnn?  
[VVVV] or [END LINE]

Do you want to test the  
V = volume, H = head, T = track  
C = cylinder, or S = sector?  
[V] or [H] or [T] or [C] or [S]  
Do you want to enter an offset?  
[YES] or [NO]  
Input offset -127<=offset<=127?  
[VVVV]

Sources of the bit pattern are:  
PT = ERT internal Pattern Table  
RN = ERT generates Random  
pattern table  
UP = User inputs pattern table

Enter the pattern source?  
[PT] or [RN] or [UP]

If [UP] is entered:

Input a hexadecimal pattern of  
up to 8 hex digits?  
[HHHHHHHH]  
Output formats are:  
PRT = print error information  
LOG = log in error rate log  
Enter the format?  
[PRT] or [LOG]

If [PRT] is entered:

Print error decoding info?  
[YES] or [NO]

## WTR ERT

The following is the error decoding information:

TYPE:

UNC = ECC uncor. data error  
COR = ECC correctable data error  
CRC = Error detected only by CRC

CNT = Occurrence count  
(RUN/ERT logs only)

LPC = Loop count  
(RO/WTR ERTs only)

ERR BYTE:

00000000 ECC found cor. error  
(ERT LOG only)  
00000001 ECC found uncor. error  
00000010 ECC didn't detect error  
00000100 Error is in sect header  
00001000 CRC didn't detect error  
00010000 First retry didn't  
recover data  
00100000 Extra offset used  
01000000 Formatter/Separator  
error  
10000000 Unrecoverable error  
(RUN LOG only)

### OUTPUT FORMAT:

WRITE THEN READ ERT TEST

If **[PRT]** was entered:

CYL HEAD SECT TYPE LPC ERR BYTE  
nnnn nnnn nnnn xxxx nnnn BBBBBBBB  
Error begins at byte nnnn (if TYPE=COR)  
Until all errors are displayed.

If **[LOG]** was entered:

Do you want to see the ERT LOG?  
**[YES]** or **[NO]**

If **[YES]** is entered, refer to ERT LOG in this chapter.

WRITE THEN READ ERT  
TEST COMPLETED

(

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(



# Tape Exerciser Commands

3

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## Introduction

This chapter documents the commands in the TAPE program on the HP 85 External Exerciser tape. All of the commands in this chapter apply specifically to Cartridge Tape Drives (CTDs), which are integrated into CS/80 devices. Some commands in the TAPE program have identical syntax and operation as documented in Chapter 2; these commands have not been repeated in this chapter, i.e., CANCEL, CICLEAR, CLEAR LOGS, DESCRIBE, EXIT, HELP, PRESET, REQSTAT, SDCLEAR, and UNIT.

Before any command in this chapter is used, the unit must be set to that of the tape drive. In all standard CS/80 devices, the CTD is unit "1"; in dual controller models (Option 001), the CTD is unit "0" (the CTD has its own channel). The commands are in alphabetical order.

# CERT

## PERFORM TAPE CERTIFICATION

<b>CAUTION</b>
----------------

CERT will erase all user data from the tape cartridge.

This command performs a write-then-read operation on the entire tape, and skip-spares any block which has two or more frame errors or has an unreadable key. The results of this test are obtained by issuing an ERT LOG command to the tape unit. During the certify test, the gain of the signal coming from the tape is purposely reduced by 14%; this permits more stringent testing to be done during the certify error rate test.

### INPUT FORMAT:

Input the TEST name?

[CERT]

This test will destroy current data.

Should it continue?

[YES] or [NO]

Input the loop count:

1 <= count <= 255?

[VVVV]

Sources of the bit pattern are:

PT = ERT internal Pattern Table

UP = User inputs pattern table

RN = ERT generates Random

pattern table

Enter the pattern source?

[PT] or [UP] or [RN]

If [UP] is entered:

Input a hexadecimal pattern of up to 8 hex digits?

[HHHHHHHH]

This may take a few minutes.

### OUTPUT FORMAT:

CERTIFICATION ERT TEST

Do you want to see the ERT log?

[YES] or [NO]

If [YES] is entered, refer to ERT LOG in this chapter.

CERTIFICATION UTILITY COMPLETED

## ERT LOG

### OUTPUT ERROR RATE TEST LOG

The error rate test log contains an accumulation of all read errors which were found during a read-only or a write-then-read error rate test. Since the Error Correction Circuitry (ECC) is disabled during an error rate test, the ERT LOG will accumulate both correctable and uncorrectable errors. The tape has one error rate test log area for the entire tape. Error rate test errors are accumulated until the log is cleared using the CLEAR LOGS command.

The HP 85 External Exerciser TAPE program has the additional capability of drawing a flag plot and printing an error listing during an ERT LOG. A flag plot is a visual image of the entire tape cartridge with blocks shown in the X direction and tracks shown in the Y direction. A "+" indicates a permanent error, a "U" indicates an uncorrectable error, and a "K" indicates an unlocatable key error. The error listing shows the logical addresses which were in error, the frames within the particular block which were at fault (1-6), and whether the error was an uncorrectable error or an unlocatable key error (U or K, respectively).

A flag plot prints out only logical addresses; spared addresses are not recorded. Permanent errors are to be expected during the life of a tape cartridge. Since spare addresses which have errors are placed into the ERT LOG, the number of permanent, uncorrectable, or unlocatable errors may differ from the number indicated in the error listing. These differences are due to the spared addresses.

The flag plot is particularly useful for detecting tape system and tape media problems. When permanent errors are grouped on odd tracks at BOT (0000) or on even tracks at EOT (1021 or 4087), usually with the number of errors per track increasing with track number, this indicates Instantaneous Speed Variation (ISV). Tapes which exhibit ISV should be replaced.

Permanent error clumping in the horizontal direction indicates either a dirty tape head, a faulty tape mechanism, or a media defect (especially errors clumped near the edge of the tape, tracks 0 and 1 or 14 and 15). Defective media should be replaced.

Permanent and/or unlocatable error clumping in the vertical direction indicates cartridge contamination. Look for evidence of white powder on tape friction pins and on the cartridge drive belt.

Excessive spares or vertical clumping on alternate tracks indicates poor formatting by the tape manufacturer. This is only a problem if all available spares are used.

### INPUT FORMAT:

Input the TEST name?  
[ERT LOG]

**ERT LOG**

**OUTPUT FORMAT:**

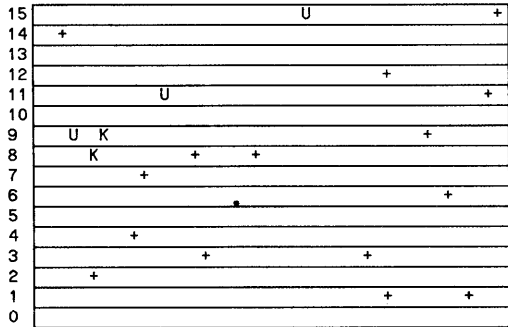
READ ERT DATA ERROR LOG UTILITY

ERT LOG HEADER

-----

# of BLOCKS accessed = nnnn  
# of CORRECTABLE errors = nnnn  
  due to: Permanents = nnnn  
          Transients = nnnn  
# of UNCORRECTABLE BLOCKS = nnnn  
# of UNLOCATABLE BLOCKS = nnnn

Do you want a flag plot?  
[YES] or [NO]



0000

1021  
or  
4087

+ - permanent error  
U - uncorrectable error  
K - unlocatable key

Do you want an error listing?  
[YES] or [NO]

LOG. ADDRESS      123456 U K

    nnnn          BBBBBB B B  
    nnnn          BBBBBB B B

Until the last error is displayed.

Binary bits set to "1" indicate frames  
which have errors.

## ERT LOG

The maximum number of the various types of errors allowed after one complete volume test (option "C" with length equal to "ALL" for either RO ERT or WTR ERT) is shown below. This *must* not be an accumulative error rate test; make sure the ERT LOG is cleared using the CLEAR LOGS command *before* running the ERT that is used to compare with the following table.

Tape ▶	88140L,LC long		88140S,SC short	
	WTR ERT	RO ERT	WTR ERT	RO ERT
#Blocks*	130,816	65,408	32,704	16,532
#Permanent	250	250	128	128
#Transient	N/A	N/A	N/A	N/A
#Unlocatable	15	N/A	10	N/A
#Uncorrectable	0	1	0	1

\*These may vary if tape is not certified.

READ ERT DATA ERROR LOG  
UTILITY COMPLETED

# INIT MEDIA

## INITIALIZE MEDIA

<b>CAUTION</b>
----------------

INIT MEDIA will erase all user data on the selected unit. If the device is power cycled or if certain diagnostics are performed, the unit is defaulted to unit 0. Make sure that the tape unit is selected *before* issuing this command.

This utility performs an initialization routine on the tape cartridge currently installed in the tape drive. Two options are allowed for tape initialization. The first option defaults the sparing table so that one spare block is set aside out of every 512 blocks. The second option accesses the run log to determine whether or not the tape is certified; if the tape is not certified, then the CERT error rate test utility is performed automatically. If the tape was previously certified, then all jump spares are converted to skip spares (for optimizing throughput).

### INPUT FORMAT:

Input the TEST name?

[INIT MEDIA]

This utility will destroy data,

Do you wish to continue?

[YES] or [NO]

INIT MEDIA options are:

1 = Reset spare table and label  
tape uncertified.

2 = Read certification status.

If tape is uncertified then  
certification utility is  
run.

If tape is certified then  
convert jump spares to skip  
spares. Tape is not recert-  
ified.

Input option number?

[1] or [2]

## INIT MEDIA

### OUTPUT FORMAT:

INITIALIZE MEDIA UTILITY

If [2] was entered:

Checking tape certification

Tape was ON-LINE, 3M, HP, 914X or NOT certified.

If the tape is certified and [2] was entered:

Converting jump spares to skip spares

If the tape is not certified and [2] was entered:

Tape will now be certified  
This may take a few minutes to  
execute

INITIALIZE MEDIA  
UTILITY COMPLETED

## RO ERT

### PERFORM READ-ONLY ERROR RATE TEST

There are three types of read-only error rate tests allowed on the tape. The current type checks the presently addressed block up to the specified length. The next type checks the specified track and next adjacent track (unless 15 is entered). The third type tests the entire tape. Results of each type of test are always logged on the tape's ERT LOG.

#### INPUT FORMAT:

Input the TEST name?

[RO ERT]

Input the loop count:

1 <= count <= 255?

[VVVV]

Do you want to test

L = logical addresses

S = specified track (physical)

E = entire tape (physical)

?

[L] or [S] or [E]

If [L] is entered:

Enter block address?

[VVVV]

Input length in blocks or ALL?

[VVVV] or [ALL]

If [S] is entered:

Input the track number <=15?

[VVVV]

This may take a few minutes.

#### OUTPUT FORMAT:

READ ONLY ERT TEST

Do you want to see the ERT log?

[YES] or [NO]

If [YES] is entered, refer to ERT LOG in this chapter.

READ ONLY ERT TEST COMPLETED



# RUN LOG

## OUTPUT RUN LOG

This log is an accumulation of errors which have occurred during run time (i.e. not during an error rate test). The run log is cleared with the CLEAR LOGS command.

### INPUT FORMAT:

Input the TEST name?  
[RUN LOG]

### OUTPUT FORMAT:

READ RUN TIME DATA ERROR LOG  
UTILITY

#### RUN LOG HEADER

-----  
# of UNCORRECTABLE BLOCKS = nnnn  
# of UNLOCATABLE BLOCKS = nnnn  
CERTIFICATION: ON-LINE, 3M, HP, 914X or NOT

If logical error addresses are found:

LOGICAL ADDR	ERRORS
-----	-----
nnnn	UNLOCATABLE
nnnn	UNCORRECTABLE

Until the last error is displayed.

READ RUN TIME DATA ERROR LOG  
UTILITY COMPLETED

# SPARE

## SPARE BLOCK

This utility replaces a known defective block with an available spare block and assigns it the logical address of the old defective block. Either jump or skip sparing may be used. Jump sparing takes more time but retains all user data except the defective block itself; skip sparing optimizes the spare for quick access but erases all user data between the defective block and the nearest available spare since all logical addresses must be shuffled.

### INPUT FORMAT:

Input the TEST name?

[SPARE]

Do you want S (Skip) or J (Jump) sparing?

[S] or [J]

The spare command sequence restarts here for sparing multiple blocks.

Enter new block address or just

END LINE to keep the current block address

Current block addr = nnnn?

[VVVV] or [END LINE]

### OUTPUT FORMAT:

SPARE BLOCK UTILITY

Spared address was:

Block nnnn

Spare another address?

[YES] or [NO]

SPARE BLOCK UTILITY COMPLETED

# SPARE TABLE

## OUTPUT SPARE TABLE

This command accesses the information in the spare table. It provides identical information as that obtained when using the TABLES command and selecting table option "S". The spare table is a list of all logical blocks which have been spared.

### INPUT FORMAT:

Input the TEST name?  
[SPARE TABLE]

### OUTPUT FORMAT:

READ TAPE SPARE TABLE UTILITY

ENTRY	TRACK #	PHYSICAL BLOCK #
nnnn	nnnn	nnnn
nnnn	nnnn	nnnn

Until all spares are displayed.  
Do you want a flag plot  
of spare locations?  
[YES] or [NO]

If [YES] is entered, the following flag plot is output:

15		S
14		
13		
12		
11		S
10		
9	S	
8		
7		
6		S
5		
4		S
3		
2		
1		
0		

0000 1021  
or  
4087

S - spared location

READ TAPE SPARE TABLE  
UTILITY COMPLETED

# TABLES

## OUTPUT DEVICE TABLES

This utility accesses the tables stored on the tape. The tape manufacturer's table identifies the type of cartridge and its date code. The tape spare table shows the physical addresses of the blocks which have been spared.

The copy data table is unique to the HP 7914. Two 67 Mb tapes are required to perform an image copy of the HP 7914; therefore, the copy data table is responsible for storing the starting disc address onto the tape during an image copy. The disc starting address points to the address on the disc where that particular tape's information should begin. The disc starting address on the first tape is zero; the disc starting address on the second tape is equal to one-half the total number of sectors on the disc (261,632 for the HP 7914).

## INPUT FORMAT:

Input the TEST name?

[TABLES]

Drive table numbers are:

M = Manufacturer's table

S = Tape spare table

C = Copy data address (HP 7914 only)

Input table type?

[M] or [S] or [C]

## OUTPUT FORMAT:

### MANUFACTURER'S BLOCK TABLE

Cartridge type = xxxx

# of user blocks/track = nnnn

Copyright notice

FORMAT (C) 19XX,  
MINN. MINING & MFG. CO.

Manufacturer's code = xxxx

Date code = nnnn

READ TABLES UTILITY COMPLETED

READ TAPE SPARE TABLE UTILITY

ENTRY	TRACK #	PHYSICAL BLOCK #
-------	---------	---------------------

nnnn	nnnn	nnnn
------	------	------

nnnn	nnnn	nnnn
------	------	------

Until all spares are displayed.

## TABLES

Do you want a flag plot  
of spare locations?  
[YES] or [NO]

15	S
14	
13	
12	
11	S
10	
9	S
8	
7	
6	S
5	
4	S
3	
2	
1	
0	

0000

1021

or  
4087

S - spared location

READ TAPE SPARE TABLE  
UTILITY COMPLETED

COPY DATA ADDRESS TABLE

Disc starting address = nnnn

READ TABLES UTILITY COMPLETED

# UNLOAD

## UNLOAD TAPE CARTRIDGE

This command unloads the tape cartridge in the same manner as the front panel UNLOAD button. The error rate log is updated if necessary, and the tape is rewound to End Of Tape (EOT). Then the use log is updated and the tape is unlocked from the mechanism. The eject lever can then be used to remove the tape cartridge from the tape drive.

### INPUT FORMAT:

Input the TEST name?  
[UNLOAD]

### OUTPUT FORMAT:

UNLOAD TAPE UTILITY

UNLOAD TAPE UTILITY COMPLETED

## USE LOG

### OUTPUT TAPE USE LOG

The use log stores the number of times that particular tape has been inserted for use and also the number of blocks which have been accessed on the tape to date. The use log can *not* be written to if the tape is "write-protected". The recommended maximum usage is 2,500 cycles from BOT to EOT and back to BOT. This is equivalent to approximately 277 full volume accesses; 20,480,000 blocks on a long tape or 5,120,000 blocks on a short tape.

### INPUT FORMAT:

Input the TEST name?  
[USE LOG]

### OUTPUT FORMAT:

READ TAPE USE LOG UTILITY

USE COUNT = nnnn  
# OF BLOCKS  
ACCESSED = nnnn

READ TAPE USE LOG  
UTILITY COMPLETED

# WRITE FM

## WRITE FILE MARK

This command writes an End Of File (EOF) mark at the current position on the tape. Whenever a file mark is encountered during a tape read operation, the process is immediately terminated.

### INPUT FORMAT:

Input the TEST name?

[WRITE FM]

Enter block address?

[VVVV]

This may take a few minutes

### OUTPUT FORMAT:

WRITE FILE MARK UTILITY

WRITE FILE MARK

UTILITY COMPLETED



## WTR ERT

### PERFORM WRITE-THEN-READ ERROR RATE TEST

#### CAUTION

WTR ERT will erase some or all of the user data on the selected unit.

There are three types of write-then-read error rate tests allowed on the tape. The current type checks the presently addressed block up to the specified length. The next type checks the specified track and next adjacent track (unless 15 is entered). The third type tests the entire tape. Results of each type of test are always logged on the tape's ERT LOG. A full-length WTR ERT takes twice as long as a full-length RO ERT.

#### INPUT FORMAT:

Input the TEST name?

[WTR ERT]

This test will destroy current data.

Should it continue?

[YES] or [NO]

Input the loop count:

1 <= count <= 255?

[VVVV]

Do you want to test

L = logical addresses

S = specified track (physical)

E = entire tape (physical)

?

[L] or [S] or [E]

If [L] is entered:

Enter block address?

[VVVV]

Input length in blocks or ALL?

[VVVV] or [ALL]

## **WTR ERT**

If **[S]** is entered:

Input the track number <=15?  
**[VVVV]**

Sources of the bit pattern are:  
PT = ERT internal Pattern Table  
UP = User inputs pattern table  
RN = ERT generates Random  
pattern table

Enter the pattern source?  
**[PT]** or **[UP]** or **[RN]**

If **[UP]** is entered:

Input a hexadecimal pattern of  
up to 8 hex digits.?  
**[HHHHHHHH]**  
This may take a few minutes.

### **OUTPUT FORMAT:**

WRITE THEN READ ERT TEST

Do you want to see the ERT log?  
**[YES]** or **[NO]**

If **[YES]** is entered, refer to ERT LOG in this chapter.

WRITE THEN READ ERT  
TEST COMPLETED

# Operator Designed Programs

---

4

## Introduction

This chapter documents the commands which are in the OPER program on the HP 85 External Exerciser tape. Most of the commands in this chapter apply to all CS/80 devices. This chapter describes the editing commands in the first part, and the executable commands in the second part.

# EDIT

## EDIT PROGRAM STEP

This command replaces one of the OPER commands with a new command. It does not allow existing OPER commands to be modified. At least two steps must exist in an OPER program when using EDIT.

### INPUT FORMAT:

Enter the command for step nnnn?

[EDIT]

Which step do you want to edit?

[VVVV]

Enter the new command for  
step nnnn?

[NULL] or [NEW COMMAND]

# EXEC

## EXECUTE PROGRAM

Once all the commands have been entered, this command begins execution of the program.

### INPUT FORMAT:

Enter the command for step nnnn?  
[EXEC]

### OUTPUT FORMAT:

START OF COMMAND EXECUTION

Step # = 1 Cmd = xxxx

Step # = 2 Cmd = xxxx

Until all commands have been executed.

# **EXIT**

## **EXIT PROGRAM**

This command terminates the OPER program. EXIT can be entered in response to any prompt during any input sequence. The current program will be lost.

## **INPUT FORMAT:**

Enter the command for step nnnn?  
[EXIT]

## **OUTPUT FORMAT:**

PROGRAM WILL NOW STOP

# HELP

## OUTPUT HELP INFORMATION

This command prints out all the valid OPER command names.

## INPUT FORMAT:

Enter the command for step nnnn?  
[HELP]

## OUTPUT FORMAT:

```
          COMMANDS
HELP - output help information
EXEC - execute program
EDIT - edit program step
LIST - list program
NEW  - start new program
NULL - delete program step
EXIT - exit program
-----
          PROGRAM STEPS
LCRD - locate and read
LCWR - locate and write
CMPR - write-then read and
      compare
COMP - complementary command
RQST - request status
CLR  - channel independent clear
LOOP - begin loop
ENDLP- end loop
INSK - incremental seek
```

# LIST

## LIST PROGRAM

This command lists the current program commands in order to verify what has been entered.

## INPUT FORMAT:

Enter the command for step nnnn?

[LIST]

## OUTPUT FORMAT:

Step 1 = xxxx

Step 2 = xxxx

Until all steps are listed.



## **NEW**

### **START NEW PROGRAM**

This command erases the current program and prompts for the first step in a new program.

### **INPUT FORMAT:**

Enter the command for step nnnn?  
[NEW]

### **OUTPUT FORMAT:**

Enter the command for step 1?

# NULL

## DELETE PROGRAM STEP

This command is only allowed in edit mode. The remaining steps are renumbered after a NULL. At least two commands must exist in an OPER program before using a NULL command.

### INPUT FORMAT:

Enter the command for step nnnn?

[EDIT]

Which step do you want to edit?

[VVVV]

Enter the new command for  
step nnnn?

[NULL]

## **Executable OPER Commands**

The rest of this chapter contains the executable OPER commands. Part or all of the program can be repeated using the LOOP and ENLDP commands. Since the OPER program actually sends and receives CS/80 instructions, it depicts an actual portrayal of device operation.

# **CLR**

## **CHANNEL INDEPENDENT CLEAR**

This command clears the selected device(s) on the HP-IB channel. All complementary values such as burst size, retry time, and current target address are returned to their default settings.

### **INPUT FORMAT:**

Enter the command for step nnnn?  
**[CLR]**

# CMPR

## WRITE-THEN-READ AND COMPARE

<b>CAUTION</b>
----------------

CMPR will erase user data on the selected unit.

This command performs a write-then-read check on the selected unit, and then compares the data read with the data previously written. If a length is not specified, then a length of zero is assumed and only a seek to the specified address occurs. The maximum length allowed is determined by the data buffer size of the HP 85 (1024 bytes). The retry time is in tens of milliseconds. Burst will remain set until changed.

### INPUT FORMAT:

Enter the command for step nnnn?

[CMPR]

1=Set Unit            4=Set Retry time  
2=Set Length        5=Set Burst  
3=Set Address

Enter the number(s) which represent the complementary command(s); Delimit the number(s) with a space?

[1] [2] [3] [4] or [5]

You entered the following

number(s): nnnn nnnn nnnn nnnn nnnn

UNIT NUMBER =?

[VVVV]

LENGTH =?

[VVVV]

Do you want BLOCK 'B' or

VECTOR 'V' addressing?

[B] or [V]

Input the block address?

[VVVV]

Cylinder?

[VVVV]

Head?

[VVVV]

Sector?

[VVVV]

Input the retry time?

[VVVV]

How many sectors per burst?

[VVVV]

Do you want to specify

a pattern?

[YES] or [NO]

Input a pattern <= 8 hex digits?

[HHHHHHHH]

# COMP

## COMPLEMENTARY COMMAND

This command allows the complementary values to be altered. To restore the default values, use the CLR command. The maximum length allowed is determined by the data buffer size of the HP 85 (1024 bytes). The retry time is in tens of milliseconds. Burst will remain set until changed.

### INPUT FORMAT:

Enter the command for step nnnn?

[COMP]

1=Set Unit            4=Set Retry time  
2=Set Length        5=Set Burst  
3=Set Address

Enter the number of the  
complementary command?

[1] [2] [3] [4] or [5]

UNIT NUMBER =?

[VVVV]

LENGTH =?

[VVVV]

Do you want BLOCK 'B' or  
VECTOR 'V' addressing?

[B] or [V]

Input the block address?

[VVVV]

Cylinder?

[VVVV]

Head?

[VVVV]

Sector?

[VVVV]

Input the retry time?

[VVVV]

How many sectors per burst?

[VVVV]

## **ENDLP**

### **END LOOP**

This command ends a loop within an OPER program (loops are set up with the LOOP command).

### **INPUT FORMAT:**

Enter the command for step nnnn?  
[ENDLP]

# **INSK**

## **INCREMENTAL SEEK**

This command performs incremental seeks on the disc unit.

### **INPUT FORMAT:**

Enter the command for step nnnn?  
**[INSK]**

What is the starting cylinder?  
**[VVVV]**

What is the ending cylinder?  
**[VVVV]**

What is the increment?  
**[VVVV]**



# LCRD

## LOCATE AND READ

This command performs a locate and read on the selected unit. If the set address parameter is not specified, then each successive LCRD will automatically increment the target address. If a length is not specified, then a length of zero is assumed and only a seek to the specified address occurs. The maximum length allowed is determined by the data buffer size of the HP 85 (1024 bytes). The retry time is in tens of milliseconds. Burst will remain set until changed.

### INPUT FORMAT:

Enter the command for step nnnn?

[LCRD]

1=Set Unit           4=Set Retry time

2=Set Length       5=Set Burst

3=Set Address

Enter the number(s) which represent the complementary command(s); Delimit the number(s) with a space?

[1] [2] [3] [4] or [5]

You entered the following

number(s): nnnn nnnn nnnn nnnn nnnn

UNIT NUMBER =?

[VVVV]

LENGTH =?

[VVVV]

Do you want BLOCK 'B' or

VECTOR 'V' addressing?

[B] or [V]

Input the block address?

[VVVV]

Cylinder?

[VVVV]

Head?

[VVVV]

Sector?

[VVVV]

Input the retry time?

[VVVV]

How many sectors per burst?

[VVVV]

Display read data?

[YES] or [NO]

OUTPUT FORMAT:

1 HH HH HH HH HH HH HH HH HH

10 HH HH HH HH HH HH HH HH HH

19 HH HH HH HH HH HH HH HH HH

28 etc.

Until all data is displayed.

# LCWR

## LOCATE AND WRITE

<b>CAUTION</b>
----------------

LCWR will erase user data on the selected unit.

This command performs a locate and write on the selected unit. If the set address parameter is not specified, then each successive LCRD will automatically increment the target address. If a length is not specified, then a length of zero is assumed and only a seek to the specified address occurs. The maximum length allowed is determined by the data buffer size of the HP 85 (1024 bytes). The retry time is in tens of milliseconds. Burst will remain set until changed.

### INPUT FORMAT:

Enter the command for step nnnn?

[LCWR]

1=Set Unit            4=Set Retry time  
2=Set Length        5=Set Burst  
3=Set Address

Enter the number(s) which represent the complementary command(s); Delimit the number(s) with a space?

[1] [2] [3] [4] or [5]

You entered the following number(s): nnnn nnnn nnnn nnnn nnnn

UNIT NUMBER =?

[VVVV]

LENGTH =?

[VVVV]

Do you want BLOCK 'B' or VECTOR 'V' addressing?

[B] or [V]

Input the block address?

[VVVV]

Cylinder?

[VVVV]

Head?

[VVVV]

Sector?

[VVVV]

Input the retry time?

[VVVV]

How many sectors per burst?

[VVVV]

Do you want to specify a pattern?

[YES] or [NO]

Input a pattern <= 8 hex digits?

[HHHHHHHH]

## LOOP

### BEGIN LOOP

This command allows a section of an OPER program to be executed a number of times. ENDLP or the end of the program is used to designate the loop boundary.

### INPUT FORMAT:

Enter the command for step nnnn?

[LOOP]

Input the loop count?

[VVVV]

## **RQST**

### **REQUEST STATUS**

This command reports the status of the last transaction. The output is identical to that of the REQSTAT command in Chapter 2 of this manual.

### **INPUT FORMAT:**

Enter the command for step nnnn?  
**[RQST]**

### **OUTPUT FORMAT:**

Refer to REQSTAT, Chapter 2, for request status output information.

## OPER Program Examples

The following program performs a variable length seek on the disc unit. Enter the program as shown.

Enter the command for step 1?

[LOOP]

Input the loop count?

[300]

Enter the command for step 2?

[INSK]

What is the starting cylinder?

[0]

What is the ending cylinder?

[300]

What is the increment?

[10]

Enter the command for step 3?

[INSK]

What is the starting cylinder?

[300]

What is the ending cylinder?

[0]

What is the increment?

[-10]

Enter the command for step 4?

[ENDLP]

Enter the command for step 5?

[EXEC]

The next program will implement a write/read comparison on unit zero, vector address: cylinder 0, head 0, sectors 0 and 1. In this example, the number of bytes transferred is set to 36, and the hexadecimal pattern written is FFFFFFFF. For this example, only the commands and certain parameters are shown to save space; included after the program is an actual printout of the results.

```
Step 1 = COMP (Set Unit=0)
Step 2 = COMP (Set VECTOR Address=0,0,0)
Step 3 = LOOP (Set LOOP=2)
Step 4 = RQST
Step 5 = LCWR (Set Length=36; write FFFFFFFF)
Step 6 = ENDLP
Step 7 = COMP (Set VECTOR Address=0,0,0)
Step 8 = LOOP (Set LOOP=2)
Step 9 = RQST
Step 10 = LCRD (Set LENGTH=36; display YES)
Step 11 = ENDLP
Step 12 = EXEC
```

START OF COMMAND EXECUTION

```
Step # = 1 Cmd = COMP (Unit=0)
Step # = 2 Cmd = COMP (Address=0,0,0)
Step # = 3 Cmd = LOOP
Step # = 4 Cmd = RQST (First sector's address)
```

Status message follows:

```
Current unit is 0
Unit type: Disc
No units with pending status
```

```
New target address is:
VECTOR ADDRESS:
Cyl = 0 Head = 0 Sect = 0
```

```
Step # = 5 Cmd = LCWR (Write on target address)
Step # = 6 Cmd = ENDLP
Step # = 4 Cmd = RQST (Shows address of next sector)
```

Status message follows:

```
Current unit is 0
Unit type: Disc
No units with pending status
```

```
New target address is:
VECTOR ADDRESS:
Cyl = 0 Head = 0 Sect = 1
```

Step # = 5 Cmd = LCWR (Write on target address)  
Step # = 6 Cmd = ENDLP  
Step # = 7 Cmd = COMP (Set Address=0,0,0)  
Step # = 8 Cmd = LOOP  
Step # = 9 Cmd = RQST (Shows address of first sector)

Status message follows:

Current unit is 0  
Unit type: Disc  
No units with pending status

New target address is:  
VECTOR ADDRESS:  
Cyl = 0 Head = 0 Sect = 0

Step # = 10 Cmd = LCRD (Read the first sector)

1 FF FF FF FF FF FF FF FF  
10 FF FF FF FF FF FF FF FF  
19 FF FF FF FF FF FF FF FF  
28 FF FF FF FF FF FF FF FF

Step # = 11 Cmd = ENDLP  
Step # = 9 Cmd = RQST (Shows address of next sector)

Status message follows:

Current unit is 0  
Unit type: Disc  
No units with pending status

New target address is:  
VECTOR ADDRESS:  
Cyl = 0 Head = 0 Sect = 1

Step # = 10 Cmd = LCRD (Read the next sector)

1 FF FF FF FF FF FF FF FF  
10 FF FF FF FF FF FF FF FF  
19 FF FF FF FF FF FF FF FF  
28 FF FF FF FF FF FF FF FF

Step # = 11 Cmd = ENDLP (End of program)





## Introduction

This chapter documents the commands that are in the EX794X program on the HP 85 External Exerciser tape. All of the commands in this chapter apply specifically to HP 794X devices. Some commands in the EX794X program have identical syntax and operation as documented in chapter 2; these commands have not been repeated in this chapter, i.e. CANCEL, CICLEAR, CLEAR LOGS, DESCRIBE, DIAG, EXIT, HELP, INIT MEDIA, PRESET, REQSTAT, and UNIT behave as shown in Chapter 2. The commands are in alphabetical order.

# **AMCLEAR**

## **AMIGO CLEAR**

The HP 794X devices respond to an Amigo clear instead of a selected device clear (SDCLEAR).

### **INPUT FORMAT:**

Input the TEST name?  
**[AMCLEAR]**

AMIGO CLEAR UTILITY

AMIGO CLEAR UTILITY COMPLETED

# ERT LOG

## OUTPUT ERROR RATE TEST LOG

The error rate test log contains an accumulation of all read errors which were found during a read-only or a write-then-read error rate test. Since the Error Correction Circuitry (ECC) is disabled during an error rate test, the ERT LOG will accumulate both correctable and uncorrectable errors. Each data head has its own error rate test log for that surface. Error rate test errors are accumulated until the log is cleared using the CLEAR LOGS command.

### INPUT FORMAT:

Input the TEST name?

[ERT LOG]

Print error decoding info?

[YES] or [NO]

The following is the error decoding information:

#### TYPE:

REC = Recoverable data  
M-RE = Marginal data / retries  
M-EC = Marginal data / ECC cor.  
UNC = Uncorrectable data  
error

CNT = Occurrence count  
(RUN/ERT logs only)

LPC = Loop count  
(RO/WTR ERT's only)

#### ERR BYTE:

XXXXXX10 REC  
XXXXX1X0 M-RE  
XXX1XX0 M-EC  
XXX1XXX0 UNC  
XX1XXXX0 Sector error  
X1XXXXX0 Header error  
1XXXXXX0 Address mark error  
00000000 UNC error during write

Input the head number or ALL?

[VVVV] or [ALL]

## ERT LOG

### OUTPUT FORMAT:

READ ERT DATA ERROR LOG UTILITY

The following is output for each head which was selected above:

Head # = nnnn  
No. of sectors read = nnnn  
No. of errors = nnnn  
Error addresses logged = nnnn

  CYL HEAD SECT TYPE  CNT ERR BYTE  
nnnn nnnn nnnn xxxx nnnn BBBBBBBB  
Until all errors are displayed.

READ ERT DATA ERROR LOG  
UTILITY COMPLETED

# FAULT LOG

## OUTPUT FAULT LOG

The fault log is an accumulation of the faults which have occurred on a device since the last time a CLEAR LOGS command was issued. The fault log resides on the disc maintenance tracks. An explanation of the subtest and servo status bits is contained in the HP 794X service manual.

### INPUT FORMAT:

Input the TEST name?  
[FAULT LOG]

### OUTPUT FORMAT:

READ DRIVE FAULT LOG UTILITY

Number of faults logged = nnnn

Current address:

Cyl = nnnn Head = nnnn Sect = nnnn

TARGET Address:

Cyl = nnnn Head = nnnn Sect = nnnn

Fault code = HH hex

Subtest = HH hex

Status = HH hex

READ DRIVE FAULT LOG  
UTILITY COMPLETED

# RO ERT

## PERFORM READ-ONLY ERROR RATE TEST

A read-only error rate test performs a sequential read operation over a specified area of the media. The results of the test can be logged or immediately displayed.

### INPUT FORMAT:

Input the TEST name?

[RO ERT]

Input the loop count:

1 <= count <= 254 or INF?

[VVVV] or [INF]

Do you want a random RO ERT?

[YES] or [NO]

If [NO] is entered, the following addressing information is asked:

Enter address:

Cylinder (0 to Max Cylinder)?

[VVVV] or [END LINE]

Head (0 to Max Head)?

[VVVV] or [END LINE]

Sector (0 to Max Sector)?

[VVVV] or [END LINE]

Do you want to test the

V = volume, T = track,

S = sector?

[V] or [T] or [S]

Output formats are:

PRT = print error information

LOG = log in error rate log

Enter the format?

[PRT] or [LOG]

If [PRT] is entered:

Print error decoding info?

[YES] or [NO]

The following is the error decoding information:

TYPE:

REC = Recoverable data  
M-RE = Marginal data / retries  
M-EC = Marginal data / ECC cor.  
UNC = Uncorrectable data  
error

CNT = Occurrence count  
(RUN/ERT logs only)

LPC = Loop count  
(RO/WTR ERT's only)

ERR BYTE:

XXXXXX10 REC  
XXXXX1X0 M-RE  
XXXX1XX0 M-EC  
XXX1XXX0 UNC  
XX1XXXX0 Sector error  
X1XXXXX0 Header error  
1XXXXXX0 Address mark error  
00000000 UNC error during write

This may take a few minutes.

OUTPUT FORMAT:

READ ONLY ERT TEST

If [PRT] was entered:

CYL HEAD SECT TYPE LPC  
nnnn nnnn nnnn xxxx nnnn  
Until all errors are displayed.

If [LOG] was entered:

Do you want to see the ERT LOG?  
[YES] or [NO]

If [YES] is entered, refer to ERT LOG in this chapter.

READ ONLY ERT TEST COMPLETED

# RUN LOG

## OUTPUT RUN LOG

The run log contains an accumulation of all read errors which were found during run time. Run-time data errors are accumulated and logged on the disc maintenance tracks automatically during normal device operation. Each data head has its own error rate test log for that surface. Run-time data errors are accumulated until the log is cleared using the CLEAR LOGS command.

## INPUT FORMAT:

Input the TEST name?

[RUN LOG]

Print error decoding info?

[YES] or [NO]

The following is the error decoding information:

### TYPE:

REC = Recoverable data

M-RE = Marginal data / retries

M-EC = Marginal data / ECC cor.

UNC = Uncorrectable data  
error

CNT = Occurrence count  
(RUN/ERT logs only)

LPC = Loop count  
(RO/WTR ERT's only)

### ERR BYTE:

XXXXXX10 REC

XXXXX1X0 M-RE

XXXX1XX0 M-EC

XXX1XXX0 UNC

XX1XXXX0 Sector error

X1XXXXX0 Header error

1XXXXXX0 Address mark error

00000000 UNC error during write

Input the head number or ALL?

[VVVV] or [ALL]



## RUN LOG

### OUTPUT FORMAT:

READ RUN TIME LOG UTILITY

The following is output for each head which was selected above:

Head # = nnnn  
No. of sectors read = nnnn  
No. of errors = nnnn  
Error addresses logged = nnnn

CYL HEAD SECT TYPE CNT ERR BYTE  
nnnn nnnn nnnn xxxx nnnn BBBB BBBB  
Until all errors are displayed.

READ RUN TIME DATA ERROR LOG  
UTILITY COMPLETED

# SERVO

## PERFORM SERVO TEST

The servo test checks the operation of the servo system in HP 794X devices. An exhaustive sequence of seeks is executed, both verifying the subsequent location as well as monitoring the speed performance. Specifically, the test begins by positioning the heads over physical cylinder zero (at the OD). Now a series of seeks are performed: first one track, then two tracks, four, eight etc. until the ID is reached. Then two full stroke seeks are performed, from the ID to OD and back to the ID. Finally, a series of seeks (one track, two tracks, four, eight etc.) are done until the heads arrive at physical cylinder zero. This entire sequence of seeks is performed six times. At the end of each seek operation, the sector header is checked to make sure that its ID is correct. If any mismatches occur, the test fails.

### INPUT FORMAT:

Input the TEST name?  
[SERVO]

Input the loop count:  
1 <= count <=255?  
[VVVV] or [INF]

### OUTPUT FORMAT:

One of the following is output at the end of the test:

Test Passed  
or  
Seek failure  
or  
Position Failure  
or  
Timeout

Seeks completed = nnnn

SERVO TEST UTILITY COMPLETED

# SPARE

## SPARE SECTOR

### CAUTION

A full power-on diagnostic should be successfully performed before sparing any sectors. This will prove that the device is capable of sparing.

This utility physically relocates a sector to an address which is reserved for sparing. The user has the option to retain the data on the affected track (except the sector which is determined to be bad). All sectors which are spared with the CS/80 External Exerciser are secondary (field) spares. The second sparing operation performed on a given track causes the entire track to be relocated since there is only one available spare sector per track.

A WTR ERT with a loop of 20 should be performed on a particular logical sector address after it has been spared. This ensures that the previously unused available spare sector is good. Since the entire track may have been spared, a RO ERT with a loop of 20 should be performed on the logical track also. This ensures that the previously unused available spare track is good. If either the logical sector or track which was addressed during the spare operation fails the error rate tests, the same logical sector should be spared again (relocated) until both error rate tests pass successfully.

#### INPUT FORMAT:

Input the TEST name?

[SPARE]

Do you want to retain the data?

[YES] or [NO]

WARNING: A spare retaining data does not save the data on the target address.

Do you wish block 'B' or three vector 'V' addressing?

[B] or [V]

The spare command sequence restarts here for sparing multiple sectors.

If [B] is entered:

Enter block address (0 to Max Block)?

[VVVV]

If [V] is entered:

Enter address:

Cylinder (0 to Max Cylinder)?

[VVVV]

Head (0 to Max Head)?

[VVVV]

## **SPARE**

Sector (0 to Max Sector)?  
[VVVV]

### **OUTPUT FORMAT:**

SPARE BLOCK UTILITY

Spared address was:  
Cyl = nnnn Head = nnnn Sect = nnnn  
or  
BLOCK nnnn

Spare another address?  
[YES] or [NO]

SPARE BLOCK UTILITY COMPLETED

# SPARE TABLE

## OUTPUT SPARE TABLE

This command accesses the information in the spare table. It provides identical information as that obtained when using the TABLES command and selecting table number 1. The spare table is a list of all logical tracks which have been spared for each head.

### INPUT FORMAT:

Input the TEST name?  
[SPARE TABLE]

READ DRIVE SPARE TABLES UTILITY

Head number = nnnn  
# of field track  
spares = nnnn  
# of tracks used = nnnn  
# of logical tracks spared = nnnn  
Until all heads are displayed.

The following is output for each logical track which is spared:

CYL	TYPE	SCALAR	
nnnn	xxxx	nnnn	(xxxx = PRIMARY or SECONDARY)

READ DRIVE SPARE TABLES  
UTILITY COMPLETED

# WTR ERT

## PERFORM WRITE-THEN-READ ERROR RATE TEST

<b>CAUTION</b>
----------------

A write-then-read error rate test performs a sequential write operation over a specified area of the media, and then attempts to read the same area and locate any errors. The results of the test can be logged or immediately displayed.

### INPUT FORMAT:

Input the TEST name?

[WTR ERT]

This test will destroy current data.

Should it continue?

[YES] or [NO]

Input the loop count:

1 <= count <= 254 or INF?

[VVVV] or [INF]

Types of Write Then Read ERT'S:

PT = Pattern test ERT

RN = Random address ERT

Enter the type of test?

[PT] or [RN]

If [PT] is entered the following addressing information is asked:

Enter address:

Cylinder (0 to Max Cylinder)?

[VVVV]

Head (0 to Max Head)?

[VVVV]

Sector (0 to Max Sector)?

[VVVV]

Do you want to test the

V = volume, T = track,

S = sector?

[V] or [T] or [S]

Sources of the bit pattern are:  
PT = ERT internal Pattern Table  
SP = ERT uses Selected Pattern  
RN = ERT generates Random  
      pattern table

Enter the pattern source?  
[PT] or [SP] or [RN]

If [SP] is entered, the following is displayed:

Available patterns are:  
  (patterns in hex)  
1 = DB, 6D, B6  
2 = 92, 49, 24  
3 = DA  
4 = 17  
5 = AA  
6 = FF  
7 = 00

Enter number of desired  
pattern?  
[VVVV]

Output formats are:  
PRT = print error information  
LOG = log in error rate log  
Enter the format?  
[PRT] or [LOG]

If [PRT] is entered:

Print error decoding info?  
[YES] or [NO]

## WTR ERT

The following is the error decoding information:

### TYPE:

REC = Recoverable data  
M-RE = Marginal data / retries  
M-EC = Marginal data / ECC cor.  
UNC = Uncorrectable data  
error

CNT = Occurrence count  
(RUN/ERT logs only)

LPC = Loop count  
(RO/WTR ERT's only)

### ERR BYTE:

XXXXXX10 REC  
XXXXX1X0 M-RE  
XXXX1XX0 M-EC  
XXX1XXX0 UNC  
XX1XXXX0 Sector error  
X1XXXXX0 Header error  
1XXXXXX0 Address mark error  
00000000 UNC error during write

This may take a few minutes.

### OUTPUT FORMAT:

WRITE THEN READ ERROR RATE TEST

If **[PRT]** was entered:

CYL HEAD SECT TYPE LPC  
nnnn nnnn nnnn xxxx nnnn  
Until all errors are displayed.

If **[LOG]** was entered:

Do you want to see the ERT LOG?  
**[YES]** or **[NO]**

If **[YES]** is entered, refer to ERT LOG in this chapter.

WRITE THEN READ ERT  
TEST COMPLETED



---

## Introduction

This chapter documents the commands which are in the EX7907 program on the HP 85 External Exerciser tape. All of the commands in this chapter apply specifically to HP 7907 devices. Some commands in the EX7907 program have identical syntax and operation as documented in Chapter 2; these commands have not been repeated in this chapter, i.e. CANCEL, CHANNEL, CICLEAR, CLEAR LOGS, DESCRIBE, EXIT, HELP, INIT MEDIA, PRESET, REQSTAT, SPARE TABLE, TABLES, and UNIT behave as shown in Chapter 2. The commands are in alphabetical order.

# **AMCLEAR**

## **AMIGO CLEAR**

The HP 7907 devices respond to an Amigo clear instead of a selected device clear (SDCLEAR).

### **INPUT FORMAT:**

Input the TEST name?

[**AMCLEAR**]

### **OUTPUT FORMAT:**

AMIGO CLEAR UTILITY

Current unit = nnnn (Fixed, Removable, or Controller)

AMIGO CLEAR UTILITY COMPLETED

# ERT LOG

## OUTPUT ERROR RATE TEST LOG

The error rate test log contains an accumulation of all read errors which were found during a read-only or a write-then-read error rate test. Since the Error Correction Circuitry (ECC) is disabled during an error rate test, the ERT LOG will accumulate both correctable and uncorrectable errors. Each data head has its own error rate test log for that surface. Error rate test errors are accumulated until the log is cleared using the CLEAR LOGS command.

### INPUT FORMAT:

Input the TEST name?  
[ERT LOG]  
Print error decoding info?  
[YES] or [NO]

The following is the error decoding information:

TYPE:  
REC = Recoverable error  
M-RE = Marginal data / retries  
UNR = Unrecoverable data err

CNT = Occurrence count  
(RUN/ERT logs only)

LPC = Loop count  
(RO/WTR ERT's only)

ERR BYTE:  
XXXXXX1X REC  
XXXXX1XX M-RE  
XXX1XXXX UNR  
XX1XXXXX error in data  
X1XXXXXX error in header  
1XXXXXXX other error

Input the head number or ALL?  
[VVVV] or [ALL]

## ERT LOG

### OUTPUT FORMAT:

READ ERT DATA ERROR LOG UTILITY

Current unit = nnnn (Fixed, Removable, or Controller)

The following is output for each head which was selected above:

Head # = nnnn

No. of sectors read = nnnn

No. of errors = nnnn

Error addresses logged = nnnn

    CYL HEAD SECT TYPE CNT ERR BYTE  
nnnn nnnn nnnn xxxx nnnn BBBBBBBB  
Until all errors are displayed.

READ ERT DATA ERROR LOG  
UTILITY COMPLETED

# FAULT LOG

## OUTPUT FAULT LOG

The fault log is an accumulation of the faults which have occurred on a device since the last time a CLEAR LOGS command was issued. The fault log resides on the disc maintenance tracks. An explanation of the subtest and servo status bits is contained in the HP 7907 service manual.

### INPUT FORMAT:

Input the TEST name?  
**[FAULT LOG]**

### OUTPUT FORMAT:

READ DRIVE FAULT LOG UTILITY

Current unit = nnnn (Fixed, Removable, or Controller)

Number of faults logged = nnnn

Current address:

Cyl = nnnn Head = nnnn Sect = nnnn

TARGET Address:

Cyl = nnnn Head = nnnn Sect = nnnn

Fault code = HH hex

Status1 = BBBB Binary

Status2 = HH hex

or

No drive faults to report

READ DRIVE FAULT LOG

UTILITY COMPLETED

# RO ERT

## PERFORM READ-ONLY ERROR RATE TEST

A read-only error rate test performs a sequential read operation over a specified area of the media. The results of the test can be logged or immediately displayed.

### INPUT FORMAT:

Input the TEST name?

[RO ERT]

Input the loop count:

1 <= count <=254 or INF?

[VVVV] or [INF]

Do you want a random RO ERT?

[YES] or [NO]

If [NO] is entered, the following addressing information is asked:

Enter address:

Cylinder (0-626)?

[VVVV]

Head (0-1)?

[VVVV]

Sector (0-63)?

[VVVV]

Do you want to test the

V = volume, T = Track,

or S = sector?

[V] or [T] or [S]

Output formats are:

PRT = print error information

LOG = log in error rate log

Enter the format?

[PRT] or [LOG]

Print error decoding info?  
[YES] or [NO]

The following is the error decoding information:

TYPE:

REC = Recoverable error  
M-RE = Marginal data / retries  
UNR = Unrecoverable data err

CNT = Occurrence count  
(RUN/ERT logs only)

LPC = Loop count  
(RO/WTR ERT's only)

ERR BYTE:

XXXXXX1X REC  
XXXXX1XX M-RE  
XXX1XXXX UNR  
XX1XXXXX error in data  
X1XXXXXX error in header  
1XXXXXXX other error

**OUTPUT FORMAT:**

READ ONLY ERT TEST

Current unit = nnnn (Fixed, Removable, or Controller)

If [PRT] was entered:

CYL HEAD SECT TYPE LPC  
nnnn nnnn nnnn xxxx nnnn  
Until all errors are displayed.

If [LOG] was entered:

Do you want to see the ERT LOG?  
[YES] or [NO]

If [YES] is entered, refer to ERT LOG in this chapter.

READ ONLY ERT TEST COMPLETED

# RUN LOG

## OUTPUT RUN LOG

The run log contains an accumulation of all read errors which were found during run time. Run-time data errors are accumulated and logged on the disc maintenance tracks automatically during normal device operation. Each data head has its own error rate test log for that surface. Run-time data errors are accumulated until the log is cleared using the CLEAR LOGS command.

## INPUT FORMAT:

Input the TEST name?

[RUN LOG]

Print error decoding info?

[YES] or [NO]

The following is the error decoding information:

### TYPE:

REC = Recoverable error

M-RE = Marginal data / retries

UNR = Unrecoverable data err

CNT = Occurrence count

(RUN/ERT logs only)

LPC = Loop count

(RO/WTR ERT's only,

### ERR BYTE:

XXXXXX1X REC

XXXXX1XX M-RE

XXX1XXXX UNR

XX1XXXXX error in data

X1XXXXXX error in header

1XXXXXXX other error

Input the head number or ALL?

[VVVV] or [ALL]



## RUN LOG

### OUTPUT FORMAT:

READ RUN TIME LOG UTILITY

Current unit = nnnn (Fixed, Removable, or Controller)

The following is output for each head which was selected above:

Head # = nnnn

No. of sectors read = nnnn

No. of errors = nnnn

Error addresses logged = nnnn

CYL HEAD SECT TYPE CNT ERR BYTE

nnnn nnnn nnnn xxxx nnnn BBBBBBBB

Until all errors are displayed.

READ RUN TIME DATA ERROR LOG

UTILITY COMPLETED

# SERVO

## PERFORM SERVO TEST

The servo test checks the operation of the servo system in HP 7907 devices. An exhaustive sequence of seeks is executed; refer to the service manual for detailed information about the servo test.

### INPUT FORMAT:

Input the TEST name?  
[SERVO]

Input the loop count:  
1 <= count <= 255?  
[VVVV]

### OUTPUT FORMAT:

SERVO TEST UTILITY

Current unit = nnnn (Fixed, Removable, or Controller)

One of the following is output at the end of the test:

Test Passed  
or  
Seek failure  
or  
Position Failure  
or  
Timeout

Seeks completed = nnnn

SERVO TEST UTILITY COMPLETED

# SPARE

## SPARE BLOCK

### CAUTION

A full power-on diagnostic should be successfully performed before sparing any sectors. This will prove that the device is capable of sparing.

This utility physically relocates a sector to an address which is reserved for sparing. The user has the option to retain the data on the affected track (except the sector which is determined to be bad). All sectors which are spared with the CS/80 External Exerciser are secondary (field) spares. The second sparing operation performed on a given track causes the entire track to be relocated since there is only one available spare sector per track.

A WTR ERT with a loop of 20 should be performed on a particular logical sector address after it has been spared. This ensures that the previously unused available spare sector is good. Since the entire track may have been spared, a RO ERT with a loop of 20 should be performed on the logical track also. This ensures that the previously unused available spare track is good. If either the logical sector or track which was addressed during the spare operation fails the error rate tests, the same logical sector should be spared again (relocated) until both error rate tests pass successfully.

### INPUT FORMAT:

Input the TEST name?  
[SPARE]

The spare command sequence restarts here for sparing multiple sectors.

Spare Maintenance track?  
[YES] or [NO]

If [YES] is entered, the following is asked:

Logging or Scratch(LOG,SCR)?  
[LOG] or [SCR]

If [NO] was entered, the following is asked:

Do you want to retain the data?  
[YES] or [NO]  
Do you wish block 'B' or three  
vector 'V' addressing  
?  
[B] or [V]

If [B] is entered:

Enter block addr(0-80255)?  
[VVVV]

## **SPARE**

If [V] is entered:

Enter address:

Cylinder (0-626)?

[VVV]

Head (0-1)?

[VVV]

### **OUTPUT FORMAT:**

SPARE BLOCK UTILITY

Current unit = nnnn (Fixed, Removable, or Controller)

Spared address was:

Cyl = nnnn Head = nnnn

or

BLOCK nnnn

Spare another address?

[YES] or [NO]

SPARE BLOCK UTILITY COMPLETED

## WTR ERT

### PERFORM WRITE-THEN-READ ERROR RATE TEST

#### CAUTION

WTR ERT will erase some or all of the user data on the selected unit. If the selected unit is write-protected, WTR ERT will not occur.

A write-then-read error rate test performs a sequential write operation over a specified area of the media, and then attempts to read the same area and locate any errors. The results of the test can be logged or immediately displayed.

#### INPUT FORMAT:

Input the TEST name?  
[WTR ERT]

This test will destroy current data.  
Should it continue?  
[YES] or [NO]

Input the loop count:  
1 <= count <= 254 or INF?  
[VVVV] or [INF]  
Types of Write Then Read ERT'S:  
PT = Pattern test ERT  
RN = Random address ERT

Enter the type of test?  
[PT] or [RN]

If [PT] is entered the following addressing information is asked:

Enter address:  
  
Cylinder (0-626)?  
[VVVV]  
Head (0-1)?  
[VVVV]  
Sector (0-63)?  
[VVVV]  
Do you want to test the  
V = volume, T = Track,  
or S = sector?  
[V] or [T] or [S]

## WTR ERT

Sources of the bit pattern are:

PT = ERT internal Pattern Table

SP = ERT uses Selected Pattern

RN = ERT generates Random  
pattern table

Enter the pattern source?

[PT] or [SP] or [RN]

If [SP] is entered, the following is displayed:

Available patterns are:

(patterns in hex)

1 = CD

2 = E7, 39

3 = 33

4 = DB, 6D, B6

5 = 49, 33

6 = FF

7 = 00

Enter number of desired

pattern?

[VVVV]

Output formats are:

PRT = print error information

LOG = log in error rate log .

Enter the format?

[PRT] or [LOG]

Print error decoding info?

[YES] or [NO]

## WTR ERT

The following is the error decoding information:

TYPE:

REC = Recoverable error  
M-RE = Marginal data / retries  
UNR = Unrecoverable data err

CNT = Occurrence count  
(RUN/ERT logs only)

LPC = Loop count  
(RO/WTR ERT's only)

ERR BYTE:

XXXXXX1X REC  
XXXXX1XX M-RE  
XXX1XXXX UNR  
XX1XXXXX error in data  
X1XXXXXX error in header  
1XXXXXXX other error

OUTPUT FORMAT:

WRITE THEN READ ERROR RATE TEST

Current unit = nnnn (Fixed, Removable, or Controller)

If [PRT] was entered:

CYL HEAD SECT TYPE LPC  
nnnn nnnn nnnn xxxx nnnn  
Until all errors are displayed.

If [LOG] was entered:

Do you want to see the ERT LOG?  
[YES] or [NO]

If [YES] is entered, refer to ERT LOG in this chapter.

WRITE THEN READ ERT  
TEST COMPLETED





## Introduction

This chapter documents the commands which are in the EX7937 program on the HP 85 External Exerciser tape. All of the commands in this chapter apply specifically to HP 7936 and HP 7937 devices. Some commands in the EX7937 program have identical syntax and operation as documented in Chapter 2; these commands have not been repeated in this chapter, i.e. CANCEL, CICLEAR, CLEAR LOGS, DESCRIBE, DIAG, EXIT, HELP, INIT MEDIA, PRESET, REQSTAT, REV, SDCLEAR, SPARE TABLE, and UNIT behave as shown in Chapter 2. The commands are in alphabetical order.

# ERT LOG

## OUTPUT ERROR RATE TEST LOG

The error rate test log contains an accumulation of all read errors which were found during a read-only or a write-then-read error rate test. Since the Error Correction Circuitry (ECC) is disabled during an error rate test, the ERT LOG will accumulate both correctable and uncorrectable errors. Each data head has its own error rate test log for that surface. Error rate test errors are accumulated until the log is cleared using the CLEAR LOGS command.

### INPUT FORMAT:

Input the TEST name?

**[ERT LOG]**

Print error decoding info?

**[YES]** or **[NO]**

The following is the error decoding information:

#### TYPE:

COR = ECC correctable error  
UNC = ECC uncorrectable error

#### ERR BYTE:

00000000 ECC correctable error  
00000001 ECC uncorrectable err  
00000010 No error detected  
00000100 Error in sector header  
00001000 Error in sector body  
00010000 CRC byte(s) in error  
00100000 Parity bit enabled  
01000000 Data underrun fault  
10000000 Error in parity byte

Input the head number or ALL?

**[VVVV]** or **[ALL]**

**OUTPUT FORMAT:**

READ ERT DATA ERROR LOG UTILITY

Current unit = nnnn (Fixed, Removable, or Controller)

The following is output for each head which was selected above:

Head # = nnnn  
No. of sectors read = nnnn  
ECC correctable errors = nnnn  
ECC uncorrectable errors = nnnn  
Error addresses logged = nnnn

CYL	HEAD	SECT	TYPE	CNT	ERR	BYTE
=====	=====	=====	=====	=====	=====	=====
nnnn	nnnn	nnnn	xxxx	nnnn	BBBBBBBB	

Until all errors are displayed.

READ ERT DATA ERROR LOG  
UTILITY COMPLETED

# FAULT LOG

## OUTPUT FAULT LOG

The fault log is an accumulation of the faults which have occurred on a device since the last time a CLEAR LOGS command was issued. The fault log resides on the disc maintenance tracks. An explanation of the subtest and servo status bits is contained in the HP 7936/37 service manual.

## INPUT FORMAT:

Input the TEST name?

**[FAULT LOG]**

## OUTPUT FORMAT:

READ DRIVE FAULT LOG UTILITY

Current unit = nnnn (Fixed, Removable, or Controller)

Number of faults logged = nnnn

	Current			Target		
	Cyl	Hd	Sec	Cyl	Hd	Sec
1) Physical addr	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn

	HFR	Fault Code	ACT
1) BBBB BBBB	DERR	nnnn	(nnnn)

HFR values:

XXXXXX1 Spindle speed error  
XXXXX1X Servo timing error  
XXXXX1XX Heads off track  
XXXX1XXX AGC error  
XXX1XXXX Data overrun

(E) is an event, (F) is a fault.

## FAULT LOG

### Activity 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 (.5-5 min)
- 8 = 2001-12E3 seeks (5-30 min)
- 9 = 12E3-25E3 seeks (30-60 min)
- 10 = 25E3-150E3 seeks (1-6 hrs)
- 11 = 150E3-6E5 seeks (6-24 hrs)
- 12 = 6E5-4E6 seeks (1-7 days)
- 13 = 4E6-16E6 seeks (1-4 weeks)
- 14 = 16E6-100E6 seeks (1-6 mons)
- 15 = >100,000,000 seeks (6 mons)

or

No drive faults to report

READ DRIVE FAULT LOG  
UTILITY COMPLETED

# RO ERT

## PERFORM READ-ONLY ERROR RATE TEST

A read-only error rate test performs a sequential read operation over a specified area of the media. The results of the test can be logged or immediately displayed.

### INPUT FORMAT:

Input the TEST name?

[RO ERT]

Input the loop count:

1 <= count <=254 or INF?

[VVVV] or [INF]

Do you want a random RO ERT?

[YES] or [NO]

If [NO] is entered, the following addressing information is asked:

Enter address:

Cylinder (0-1395)?

[VVVV]

Head (0-6) or (0-12)?

[VVVV]

Sector (0-122)?

[VVVV]

Input test area:

V = volume

H = head

C = cylinder

T = track

S = sector

?

[V] or [H] or [C] or [T] or [S]

Output formats are:

PRT = print error information

LOG = log in error rate log

Enter the format?

[PRT] or [LOG]

If **[PRT]** was entered:

Print error decoding info?  
**[YES]** or **[NO]**

The following is the error decoding information:

TYPE:

COR = ECC correctable error  
UNC = ECC uncorrectable error

ERR BYTE:

00000000 ECC correctable error  
00000001 ECC uncorrectable err  
00000010 No error detected  
00000100 Error in sector header  
00001000 Error in sector body  
00010000 CRC byte(s) in error  
00100000 Parity bit enabled  
01000000 Data underrun fault  
10000000 Error in parity byte

This may take a few minutes.

**OUTPUT FORMAT:**

READ ONLY ERT TEST

Current unit = nnnn (Fixed, Removable, or Controller)

RO ERT Loop = nnnn  
Test area starting at  
Cyl=nnnn Head=nnnn Sect=nnnn

If any errors are detected:

CYL HEAD SECT TYPE LPC  
nnnn nnnn nnnn xxxx nnnn  
Until all errors are displayed.

If **[LOG]** was entered:

Do you want to see the ERT LOG?  
**[YES]** or **[NO]**

If **[YES]** is entered, refer to ERT LOG in this chapter.

READ ONLY ERT TEST COMPLETED

# RUN LOG

## OUTPUT RUN LOG

The run log contains an accumulation of all read errors which were found during run time. Run-time data errors are accumulated and logged on the disc maintenance tracks automatically during normal device operation. Each data head has its own error rate test log for that surface. Run-time data errors are accumulated until the log is cleared using the CLEAR LOGS command.

## INPUT FORMAT:

Input the TEST name?

**[RUN LOG]**

Print error decoding info?

**[YES]** or **[NO]**

The following is the error decoding information:

### TYPE:

COR = ECC correctable error

UNC = ECC uncorrectable error

### ERR BYTE:

00000000 ECC correctable error

00000001 ECC uncorrectable err

00000010 Data underrun

00000100 Error in sector header

00001000 Error 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

Input the head number or ALL?

**[VVVV]** or **[ALL]**



## RUN LOG

### OUTPUT FORMAT:

READ RUN TIME LOG UTILITY

Current unit = nnnn (Fixed, Removable, or Controller)

The following is output for each head which was selected above:

Head # = nnnn

No. of sectors read = nnnn

ECC correctable errors = nnnn

ECC uncorrectable errors = nnnn

Error addresses logged = nnnn

CYL HEAD SECT TYPE CNT ERR BYTE

nnnn nnnn nnnn xxxx nnnn BBBB BBBB

Until all errors are displayed.

READ RUN TIME DATA ERROR LOG

UTILITY COMPLETED

# SERVO

## PERFORM SERVO TEST

The servo test checks the operation of the servo system in HP 7936 or HP 7937 devices. An exhaustive sequence of seeks is executed; refer to the service manual for detailed information about the servo test.

### INPUT FORMAT:

Input the TEST name?  
[SERVO]

Input the loop count:  
1 <= count <= 255 ?  
[VVVV]

Input head # or ALL?  
[VVVV]

This may take a few minutes.

### OUTPUT FORMAT:

#### SERVO UTILITY

Current unit = nnnn (Fixed, Removable, or Controller)

One of the following is output at the end of the test:

Test Passed  
or  
Seek failure  
or  
Position Failure  
or  
Timeout

Seeks completed = nnnn

SERVO UTILITY COMPLETED

# SPARE

## SPARE BLOCK

### CAUTION

A full power-on diagnostic should be successfully performed before sparing any sectors. This will prove that the device is capable of sparing.

This utility physically relocates a sector to an address which is reserved for sparing. The user has the option to retain the data on the affected track (except the sector which is determined to be bad). All sectors which are spared with the CS/80 External Exerciser are secondary (field) spares. The second sparing operation performed on a given track causes the entire track to be relocated since there is only one available spare sector per track.

A WTR ERT with a loop of 20 should be performed on a particular logical sector address after it has been spared. This ensures that the previously unused available spare sector is good. Since the entire track may have been spared, a RO ERT with a loop of 20 should be performed on the logical track also. This ensures that the previously unused available spare track is good. If either the logical sector or track which was addressed during the spare operation fails the error rate tests, the same logical sector should be spared again (relocated) until both error rate tests pass successfully.

#### INPUT FORMAT:

Input the TEST name?  
[SPARE]

The spare command sequence restarts here for sparing multiple sectors.

WARNING: a spare retaining data does not save the data of the target address.

Do you want to retain the data?  
[YES] or [NO]  
Do you wish block 'B' or three vector 'V' addressing?  
[B] or [V]

If [B] is entered:

Enter block addr(0-1202816) or (0-2232203)?  
[VVVV]

## **SPARE**

If [V] is entered:

Enter address:

Cylinder (0-1395)?

[VVV]

Head (0-6) or (0-12)?

[VVV]

Sector (0-122)?

[VVV]

### **OUTPUT FORMAT:**

SPARE BLOCK UTILITY

Current unit = nnnn (Fixed, Removable, or Controller)

Spared address was:

Cyl = nnnn Head = nnnn Sector = nnnn

or

BLOCK nnnn

Spare another address?

[YES] or [NO]

SPARE BLOCK UTILITY COMPLETED

## WTR ERT

### PERFORM WRITE-THEN-READ ERROR RATE TEST

#### CAUTION

WTR ERT will erase some or all of the user data on the selected unit. If the selected unit is write-protected, WTR ERT will not occur.

A write-then-read error rate test performs a sequential write operation over a specified area of the media, and then attempts to read the same area and locate any errors. The results of the test can be logged or immediately displayed.

#### INPUT FORMAT:

Input the TEST name?

[WTR ERT]

This test will destroy data.

Should it continue?

[YES] or [NO]

Input the loop count:

1 <= count <=254 or INF?

[VVVV] or [INF]

Types of Write Then Read ERT'S:

PT = Pattern test ERT

RN = Random address ERT

Enter the type of test?

[PT] or [RN]

If [PT] is entered the following addressing information is asked:

Enter address:

Cylinder (0-1395)?

[VVVV]

Head (0-6) or (0-12)?

[VVVV]

Sector (0-122)?

[VVVV]

## WTR ERT

Input test area:

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

[V] or [H] or [C] or [T] or [S]

Sources of the bit pattern are:

PT = ERT internal Pattern Table  
UP = ERT uses Selected Pattern  
RN = ERT generates Random  
pattern table

Enter the pattern source?

[PT] or [UP] or [RN]

If [UP] is entered, the following is displayed:

HEX pattern (8 digits max)?

[BBBBBBBB]

Output formats are:

PRT = print error information  
LOG = log in error rate log

Enter the format?

[PRT] or [LOG]

Print error decoding info?

[YES] or [NO]

The following is the error decoding information:

**TYPE:**

COR = ECC correctable error  
UNC = ECC uncorrectable error

**ERR BYTE:**

00000000 ECC correctable error  
00000001 ECC uncorrectable err  
00000010 No error detected  
00000100 Error in sector header  
00001000 Error in sector body  
00010000 CRC byte(s) in error  
00100000 Parity bit enabled  
01000000 Data underrun fault  
10000000 Error in parity byte

This may take a few minutes.

**OUTPUT FORMAT:**

WRITE THEN READ ERROR RATE TEST

Current unit = nnnn (Fixed, Removable, or Controller)

If **[PRT]** was entered:

CYL HEAD SECT TYPE LPC  
nnnn nnnn nnnn xxxx nnnn  
Until all errors are displayed.

If **[LOG]** was entered:

Do you want to see the ERT LOG?  
**[YES]** or **[NO]**

If **[YES]** is entered, refer to ERT LOG in this chapter.

WRITE THEN READ ERT  
TEST COMPLETED





## Introduction

This chapter documents the commands that are in the EX795X program on the HP 85 External Exerciser tape. All of the commands in this chapter apply specifically to HP 795X/796X devices. Some commands in the EX795X program have identical syntax and operation as documented in chapter 2; these commands have not been repeated in this chapter, i.e. CANCEL, CICLEAR, CLEAR LOGS, DESCRIBE, DIAG, EXIT, HELP, INIT MEDIA, PRESET, REQSTAT, REV, SDCLEAR, and UNIT behave as shown in Chapter 2. The commands are in alphabetical order.

# ERT LOG

## OUTPUT ERROR RATE TEST LOG

The error rate test log contains an accumulation of all read errors which were found during a read-only or a write-then-read error rate test. Since the Error Correction Circuitry (ECC) is disabled during an error rate test, the ERT LOG will accumulate both correctable and uncorrectable errors. Each data head has its own error rate test log for that surface. Error rate test errors are accumulated until the log is cleared using the CLEAR LOGS command.

### INPUT FORMAT:

Input the TEST name?

[ERT LOG]

Print error decoding info?

[YES] or [NO]

The following is the error decoding information:

#### TYPE:

FIFO = FIFO data lost during  
write (or a Track Offset on 795XB/6XB)  
REC = Recoverable data  
M-RE = Marginal data/retries  
M-EC = Marginal data/ECC  
corrected  
UNR = Unrecoverable data  
error

#### ERROR BYTE:

XXXXXX1 FIFO (or Track Offset on 795XB/6XB)  
XXXXXX1X REC  
XXXXX1XX M-RE  
XXXX1XXX M-EC  
XXX1XXX0 UNR  
XX1XXXXX Error in data  
X1XXXXXX Error in header  
1XXXXXXX No data sync

Input the head number or ALL?

[VVVV] or [ALL]

## ERT LOG

### OUTPUT FORMAT:

READ ERT DATA ERROR LOG UTILITY

The following is output for each head which was selected above:

Head # = nnnn  
No. of sectors read = nnnn  
No. of errors = nnnn  
Error addresses logged = nnnn

CYL HEAD SECT TYPE CNT ERR BYTE  
nnnn nnnn nnnn xxxx nnnn BBBB BBBB  
Until all errors are displayed.

READ ERT DATA ERROR LOG  
UTILITY COMPLETED

# FAULT LOG

## OUTPUT FAULT LOG

The fault log is an accumulation of the faults which have occurred on a device since the last time a CLEAR LOGS command was issued. The fault log resides on the disc maintenance tracks. An explanation of the subtest and servo status bits is contained in the HP 795X/796X service manual.

## INPUT FORMAT:

Input the TEST name?  
[FAULT LOG]

## OUTPUT FORMAT:

READ DRIVE FAULT LOG UTILITY

Number of faults logged = nnnn

Current address:

Cyl = nnnn Head = nnnn Sect = nnnn

TARGET Address:

Cyl = nnnn Head = nnnn Sect = nnnn

Fault code = HH hex

Subtest = HH hex

Status = HH hex

READ DRIVE FAULT LOG  
UTILITY COMPLETED

## RO ERT

### PERFORM READ-ONLY ERROR RATE TEST

A read-only error rate test performs a sequential read operation over a specified area of the media. The results of the test can be logged or immediately displayed.

#### INPUT FORMAT:

Input the TEST name?

[RO ERT]

Input the loop count:

1 <= count <= 254 or INF?

[VVVV] or [INF]

Do you want a random RO ERT?

[YES] or [NO]

If [NO] is entered, the following addressing information is asked:

Enter the address:

Cylinder (0 to Max Cylinder)?

[VVVV]

Head (0 to Max Head)?

[VVVV]

Sector (0 to Max Sector)?

[VVVV]

Test area:

0 = Sector

1 = Track

2 = Cylinder

3 = Surface

4 = Volume

Input area:

[VVVV]

Output formats are:

PRT = print error information

LOG = log in error rate log

Enter the format?

[PRT] or [LOG]

If [PRT] is entered:

Print error decoding info?

[YES] or [NO]

## RO ERT

The following is the error decoding information:

TYPE:  
FIFO = FIFO data lost during  
write (or a Track Offset on 795XB/6XB)  
REC = Recoverable data  
M-RE = Marginal data/retries  
M-EC = Marginal data/ECC  
corrected  
UNR = Unrecoverable data  
error

ERROR BYTE:  
XXXXXX1 FIFO (or Track Offset on 795XB/6XB)  
XXXXX1X REC  
XXXXX1XX M-RE  
XXXX1XXX M-EC  
XXX1XXX0 UNR  
XX1XXXXX Error in data  
X1XXXXXX Error in header  
1XXXXXXX No data sync

This may take a few minutes.

### OUTPUT FORMAT:

READ ONLY ERT TEST

If **[PRT]** was entered:

CYL HEAD SECT TYPE LPC  
nnnn nnnn nnnn xxxx nnnn  
Until all errors are displayed.

If **[LOG]** was entered:

Do you want to see the ERT LOG?  
**[YES]** or **[NO]**

If **[YES]** is entered, refer to ERT LOG in this chapter.

READ ONLY ERT TEST COMPLETED

# RUN LOG

## OUTPUT RUN LOG

The run log contains an accumulation of all read errors which were found during run time. Run-time data errors are accumulated and logged on the disc maintenance tracks automatically during normal device operation. Each data head has its own error rate test log for that surface. Run-time data errors are accumulated until the log is cleared using the CLEAR LOGS command.

## INPUT FORMAT:

Input the TEST name?

[RUN LOG]

Print error decoding info?

[YES] or [NO]

The following is the error decoding information:

### TYPE:

FIFO = FIFO data lost during  
write (or a Track Offset on 795XB/6XB)  
REC = Recoverable data  
M-RE = Marginal data/retries  
M-EC = Marginal data/ECC  
corrected  
UNR = Unrecoverable data  
error

### ERROR BYTE:

XXXXXXXX1 FIFO (or Track Offset on 795XB/6XB)  
XXXXXXXX1X REC  
XXXXX1XX M-RE  
XXXX1XXX M-EC  
XXX1XXXX UNR  
XX1XXXXX Error in data  
X1XXXXXX Error in header  
1XXXXXXX No data sync

Input the head number or ALL?

[VVVV] or [ALL]

## RUN LOG

### OUTPUT FORMAT:

READ RUN TIME LOG UTILITY

The following is output for each head which was selected above:

Head # = nnnn  
No. of sectors read = nnnn  
No. of errors = nnnn  
Error addresses logged = .nnnn

CYL HEAD SECT TYPE CNT ERR BYTE  
nnnn nnnn nnnn xxxx nnnn BBBBBBBB  
Until all errors are displayed.

READ RUN TIME DATA ERROR LOG  
UTILITY COMPLETED



# SERVO

## PERFORM SERVO TEST

The servo test checks the operation of the servo system in HP 795X/796X devices. An exhaustive sequence of seeks is executed, both verifying the subsequent location as well as monitoring the speed performance. Specifically, the test begins by positioning the heads over physical cylinder zero (at the OD). Now a series of seeks are performed: first one track, then two tracks, four, eight etc. until the ID is reached. Then two full stroke seeks are performed, from the ID to OD and back to the ID. Finally, a series of seeks (one track, two tracks, four, eight etc.) are done until the heads arrive at physical cylinder zero. This entire sequence of seeks is performed six times. At the end of each seek operation, the sector header is checked to make sure that its ID is correct. If any mismatches occur, the test fails.

### INPUT FORMAT:

Input the TEST name?

[SERVO]

Input the loop count:

1 <= count <=255?

[VVVV] or [INF]

### OUTPUT FORMAT:

One of the following is output at the end of the test:

Test Passed

or

Seek failure

or

Position Failure

or

Timeout

Seeks completed = nnnn

SERVO TEST UTILITY COMPLETED

# SPARE

## SPARE SECTOR

### CAUTION

A full power-on diagnostic should be successfully performed before sparing any sectors. This will prove that the device is capable of sparing.

This utility physically relocates a sector to an address which is reserved for sparing. On HP 795XB and HP 796XB disc drives, the user has the option to retain the data on the affected track (these disc drives will attempt to save the data from the bad sector itself). All sectors which are spared with the CS/80 External Exerciser are secondary (field) spares. The second sparing operation performed on a given track causes the entire track to be relocated since there is only one available spare sector per track.

A WTR ERT with a loop of 20 should be performed on a particular logical sector address after it has been spared. This ensures that the previously unused available spare sector is good. Since the entire track may have been spared, a RO ERT with a loop of 20 should be performed on the logical track also. This ensures that the previously unused available spare track is good. If either the logical sector or track which was addressed during the spare operation fails the error rate tests, the same logical sector should be spared again (relocated) until both error rate tests pass successfully.

### INPUT FORMAT:

Input the TEST name?

[SPARE]

For most disc drives, the following message will appear:

WARNING: A spare sector retaining data does not save the data on the target sector.

Do you want to retain the data on the rest of the track? (Y or N)

[YES] or [NO]

For HP 795XB/796XB disc drives, the following message will appear:

795XB disc drives attempt to save the data of the target sector when retaining data.

Do you want to retain the data on the target track? (Y or N)

[YES] or [NO]

Do you wish block 'B' or three vector 'V' addressing?

[B] or [V]

The spare command sequence restarts here for sparing multiple sectors.

If [B] is entered:

Enter block address (0-1188431)?

[VVVV]

## SPARE

If [V] is entered:

Enter address:

Cylinder (0-1571)?

[VVVV]

Head (0-11)?

[VVVV]

Sector (0-62)?

[VVVV]

### OUTPUT FORMAT:

SPARE BLOCK UTILITY

The following responses may appear:

Data at target sector was saved.

or

Data at target track was not  
retained.

Data on the rest of the track was  
retained.

On HP 795XB/796XB disc drives, error rate tests will be performed on the bad sector. If the tests pass, the following message will appear:

The drive has determined that  
the sector does not need to be  
spared.

Do you want to force sparing? (Y or N)

[YES] or [NO]

If [YES] is entered, the force bit is set and the SPARE command is re-issued. Then the following appears:

Forced sparing has been invoked.

Spared address was:

Cyl = nnnn Head = nnnn Sect = nnnn

or

BLOCK nnnn

Sector sparing has completed.

or

Track sparing has completed.

Spare another address?

[YES] or [NO]

## **SPARE**

If **[YES]** is entered, the sparing routine is repeated. If any errors occur during the sparing routine, the appropriate error message(s) will be displayed at that time.

SPARE BLOCK UTILITY COMPLETED

# SPARE TABLE

## OUTPUT SPARE TABLE

This command accesses the information in the spare table. It provides identical information as that obtained when using the TABLES command and selecting table number 1. The spare table is a list of all logical tracks which have been spared for each head.

## INPUT FORMAT:

Input the TEST name?  
[SPARE TABLE]

READ DRIVE SPARE TABLES UTILITY

Head number = nnnn  
# of field track spares  
= nnnn  
# of tracks used = nnnn  
# of logical tracks spared = nnnn  
Until all heads are displayed.

The following is output for each logical track which is spared:

CYL	TYPE	SCALAR	
nnnn	xxxx	nnnn	(xxxx = PRIMARY or SECONDARY)

READ DRIVE SPARE TABLES  
UTILITY COMPLETED

# WTR ERT

## PERFORM WRITE-THEN-READ ERROR RATE TEST

**CAUTION**

A write-then-read error rate test performs a sequential write operation over a specified area of the media, and then attempts to read the same area and locate any errors. The results of the test can be logged or immediately displayed.

### INPUT FORMAT:

Input the TEST name?  
[WTR ERT]

This test will destroy current data.  
Should it continue?  
[YES] or [NO]

Input the loop count:  
1 <= count <= 254 or INF?  
[VVVV] or [INF]

Types of Write Then Read ERT'S:  
PT = Pattern test ERT  
RN = Random address ERT

Enter the type of test?  
[PT] or [RN]

If [PT] is entered the following addressing information is asked:

Enter the address:

Cylinder (0 to Max Cylinder)?  
[VVVV]

Head (0 to Max Head)?  
[VVVV]

Sector (0 to Max Sector)?  
[VVVV]

Test area:  
0 = Sector  
1 = Track  
2 = Cylinder  
3 = Surface  
4 = Volume  
Input area:  
[VVVV]

Sources of the bit pattern are:  
PT = ERT internal Pattern Table  
SP = ERT uses Selected Pattern  
RN = ERT generates Random  
pattern table

Enter the pattern source?  
[PT] or [SP] or [RN]

If [SP] is entered, the following is displayed:

Available patterns are:  
(patterns in hex)  
1 = 39CE7  
2 = C30  
3 = 30E61CC3987  
4 = B8F32E3CC  
5 = CC  
6 = DB6  
7 = 33F94CFE5

Enter number of desired  
pattern?  
[VVVV]

Output formats are:  
PRT = print error information  
LOG = log in error rate log  
Enter the format?  
[PRT] or [LOG]

If [PRT] is entered:

Print error decoding info?  
[YES] or [NO]

## WTR ERT

The following is the error decoding information:

### TYPE:

FIFO = FIFO data lost during  
write (or a Track Offset on 795XB/6XB)  
REC = Recoverable data  
M-RE = Marginal data/retries  
M-EC = Marginal data/ECC  
corrected  
UNR = Unrecoverable data  
error

### ERROR BYTE:

XXXXXXXX1 FIFO (or Track Offset on 795XB/6XB)  
XXXXXXXX1X REC  
XXXXX1XX M-RE  
XXXX1XXX M-EC  
XXX1XXX0 UNR  
XX1XXXXX Error in data  
X1XXXXXX Error in header  
1XXXXXXX No data sync

This may take a few minutes.

### OUTPUT FORMAT:

WRITE THEN READ ERROR RATE TEST

If [PRT] was entered:

CYL HEAD SECT TYPE LPC  
nnnn nnnn nnnn xxxx nnnn  
Until all errors are displayed.

If [LOG] was entered:

Do you want to see the ERT LOG?  
[YES] or [NO]

If [YES] is entered, refer to ERT LOG in this chapter.

WRITE THEN READ ERT  
TEST COMPLETED



# HP 85

# A

Note: The following items are required for implementing the CS/80 External Exerciser using the HP 85:

Description	HP Order Number
ROM DRAWER	HP 82936A
I/O ROM	00085-15003
16K MEMORY MODULE	HP 82903A
HP-IB INTERFACE	HP 82937A
EXERCISER PROGRAM	5010-0566
EXERCISER PROGRAM	5010-0567

Due to HP 85 memory size limitations, the CS/80 External Exerciser has been stored as many separate programs on two tapes. Some of the commands are repeated in two or more programs where necessary. Since loading another program is time consuming, it is suggested that the user become familiar with the commands and the program(s) in which they reside using the HELP command.

To load the exerciser into an HP 85, proceed as follows:

- a. Connect the HP-IB cable from the HP 85 to the CS/80 device.
- b. Power-on the CS/80 device.
- c. Insert the CS/80 External Exerciser tape into the HP 85.
- d. Power-on the HP 85.

The HP 85 goes through an automatic loading sequence, and lists the programs along with their HELP routines. The program desired is selected by pressing the appropriate "k" key on the HP 85.

If the CS/80 External Exerciser tape has been inserted into the HP 85 before power-on, then once power is turned on the tape will automatically enter autoloading. During autoloading, a help listing is displayed and the "k" keys on the HP 85 are set up with the program names and their associated HELP listings. To load a program, press the appropriate "k" key; for the HELP listing of a program, hold down the shift key and press the appropriate "k" key.

If the tape is inserted after the HP 85 has been powered on, or if another program is desired, loading can be done as follows:

- a. Press the [PAUSE] key (if a program is already running).
- b. Type [LOAD "NAME"], where NAME is the desired program.
- c. Press the [END LINE] key.

The autoloading feature within the HP 85 allows the program to start running immediately once it has loaded. If the program was loaded otherwise (such as by typing LOAD "NAME") then the RUN key must be

HP 85  
CS/80 EXTERNAL EXERCISER

pressed to run the program. RUN always restarts the program from the beginning. To stop and start a program, press PAUSE and CONT respectively. CONT re-enters the program at exactly the same point at which PAUSE caused it to stop.

If a command in another program is entered, the question "Another program will now be loaded from the tape, Do you want the program loaded?" will be asked. If YES is entered, the program in which the command resides will be loaded; if NO is entered, the current program module is re-entered and "Input the TEST name?" is displayed again. After typing in a command, press the END LINE key to enter the command.

If any problems are encountered while running a specific program, or if the CS/80 device has been power cycled or has run diagnostics, the program should be restarted by pressing the PAUSE key and then the RUN key. If the program does not restart, then the power to the HP 85 should be cycled. This will cause the tape to autoload. If a read error is displayed while loading the tape, then the tape head should be cleaned.

The CS/80 External Exerciser sets up three "k" keys while each test is running. If k1 is pressed (ABORT), the program will ask "Do you wish to ABORT?". If YES is entered, then a CANCEL is issued. Certain tests such as INIT MEDIA or CERT cannot be aborted due to the nature of the test. If k2 is pressed (DISPLA), then all printer output is forced to go to the display screen; conversely, if k3 is pressed (PRINTR), then the output is redirected to the thermal printer.

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