

HEWLETT-PACKARD

HP 7979A/7980A/7980XC

Tape Drive User's Guide



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HEWLETT
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HP 7979A/7980A/7980XC Tape Drive User's Guide



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700 71st Avenue
Greeley, CO 80634

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About This Guide

This guide is written for operators trained in systems, and assumes a familiarity with computer terms and tape drive operation.

The guide is organized so that the information needed to get the drive up and running quickly is generally in the front. More detailed information about drive operation, troubleshooting, and installation is placed more towards the back of the guide.

The following chart is a brief overview of where information can be found.

If you would like to	Read	And then move to
Review drive features and characteristics	Chapter 1	Appendix B
Power-up quickly	Chapter 2, page 2-1	Chapter 3
Follow detailed operating steps	Chapter 2, page 2-4	Chapter 3
...and autoloading instructions	Chapter 2, page 2-5	
Understand the Control Panel	Chapter 2, page 2-14	
Troubleshoot the drive	Chapter 3	
Run a diagnostic	Chapter 3, page 3-5	
Study tape path guidelines	Chapter 4, page 4-2	
...or tape library management	Chapter 4, page 4-6	
Select an installation site	Appendix A, page A-1	Chapter 2
Configure the drive	Appendix A, page A-2	Chapter 2
Learn or review system commands	System manuals	

Safety Considerations

Please be familiar with the following safety markings and instructions before operating the tape drive.



WARNING calls attention to a procedure or practice which could result in personal injury if not correctly performed. Do not proceed beyond a **WARNING** sign until you fully understand and meet the indicated conditions.



CAUTION calls attention to an operating procedure or practice which could result in damage to the product or magnetic tape if not correctly performed. Do not proceed beyond a **CAUTION** sign until you fully understand and meet the indicated conditions.



This international caution symbol indicates that the operator should refer to the product instruction manual before beginning a procedure.



This symbol indicates hazardous voltages.



This symbol indicates an earth (ground) terminal.



This symbol warns the operator against using the extended unit as a resting place.



This symbol warns the operator against using the extended unit as storage shelf.



This symbol warns the operator against using the extended unit as a foothold.

WARNING



(Documents) Calls attention to a procedure or practice which could result in personal injury if not correctly performed. Do not proceed beyond this symbol until you fully understand and meet the indicated conditions.

CAUTION



(Documents) Calls attention to an operating procedure or practice which could result in damage to the product or magnetic tape if not correctly performed. Do not proceed beyond this symbol until you fully understand and meet the indicated conditions.

NOTE



(Documents) Calls attention to information which can be helpful in understanding the operation of the product.

Power and Grounding

This is a Safety Class I product and is provided with a protective earthing terminal. An uninterruptible safety earth ground must be provided from the main power source to the product input wiring terminals, power cord, or supplied power cord set. Whenever it is likely that this protection has been impaired, be certain that you do not operate the drive until the unit is repaired.

Verify that the product is configured to match the available main power source. If this product is to be operated with an autotransformer, make sure that the common terminal is connected to the earth terminal of the main power source.

Servicing

Any servicing, adjustment, maintenance, or repair of this product, other than that described within this document, must be performed only by service personnel trained by Hewlett-Packard.

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1

Introduction



Before You Begin

Inspect the new tape drive and its packaging. Does anything on the shipping container indicate rough handling? Is the drive or cabinet damaged in any way? If you see or suspect any damage, call the HP sales and support office that is serving you. Also, contact the carrier that delivered the drive.

If you don't see any damage, arrange to have the drive installed by an HP Customer Engineer.

Appendix A provides additional information about setting up and configuring the drive.

About The HP 7979A/7980A/7980XC

The HP 7979A, 7980A, and 7980XC are autoloading, horizontally-mounted, 1/2-inch reel-to-reel tape drives. These drives are designed for superior performance with simple operation. All feature the latest in storage technologies:

- compact, ergonomic design
- front autoloader
- simplified control panel
- versatile handling of all standard-sized reels (6 to 10 1/2-inch)
- 125 ips nominal tape speed for maximum streaming performance
- density configuration as needed: the 7979A supports 1600 cpi Phase-Encoded (PE) recording, the 7980A and 7980XC support both 1600 cpi and 6250 cpi Group-Coded Recording (GCR), and the 7980A's Option 800 supports 800 cpi Non-Return-to-Zero-Inverted (NRZI) recording.
- large cache buffer for fast transfers during start-stop applications; 512 KByte (7980A, 7980XC) 256 KByte (7979A).
- easy-to-use diagnostics
- custom operating features, selected by the operator from the control panel
- low power consumption

In addition, the HP 7980XC offers:

- 7980XC** ■ extra capacity data storage at 6250 cpi (6250 XC): data storage per tape increased by a factor of two to five times.
- 7980XC** ■ operator choice of drive operation; standard (7980A) or Extra Capacity (7980XC) mode.

Extra Capacity Data Storage With The 7980XC

The 7980XC, like the 7980A, writes and reads tapes in industry-standard 1600 PE and 6250 GCR densities. But the 7980XC also does more.

An advanced algorithm in the electronics of the 7980XC is capable of compressing data on tape by a factor of two to five times. THE COMPRESSED FORMAT IS AN OPTION IN 6250 CPI DENSITY ONLY and is known as 6250XC (6250 Extra Capacity). In all other features the 7980XC is the same as the 7980A tape drive.

How It's Done The 7980XC achieves a high level of data compression by:

- 1) a combination of a sophisticated compression algorithm implemented in VLSI (Very Large Scale Integration) circuits
- 2) an efficient utilization of the tape

Superior compression implemented in hardware –

The compression algorithm of the 7980XC, implemented in VLSI, recognizes repetitive data, whether this data is contiguous or appears intermittently throughout the total stream. The high-speed compression algorithm of the 7980XC is much more than a simple replacement of multiple zeros or blanks with special code. The 7980XC adapts to the data. The algorithm in the 7980XC is effective with any kind of data, as long as any pattern repeats – anywhere.

Instead of writing repetitive data to tape, a special code is assigned to each pattern of repeating data and this code is written to the tape instead. All writing to tape is done in industry-standard 6250 cpi GCR format.

Because the data compression algorithm of the 7980XC is implemented on the tape drive in VLSI circuitry, all compression and decompression of the data occurs separate from the host.

When the tape is read back and the special, Extra Capacity code is encountered, the tape drive automatically expands the data and returns it to the host just as it was originally written. The host computer sees only what appears to be an extra-long 6250 cpi tape.

Any tape drive capable of reading 6250 GCR can read a tape created by a 7980XC that used Extra Capacity (6250XC) storage. But because of the 6250XC codes embedded in the data, it is unlikely that the host would be able to interpret this data.

When a 7980XC creates an Extra Capacity tape, it places a special, uncompressed header in the first block written on the tape. This header identifies the tape as an Extra Capacity tape and may be read by any host.

Efficient use of the tape –

When writing in 6250XC format, the 7980XC combines several blocks of incoming data into one “superblock” containing approximately 60 Kbytes of compressed data. Writing these large “superblocks” reduces the number of gaps needed on a tape. Each length of tape saved by not turning it into a gap can now be filled with approximately 5 Kbytes of compressed data. Depending on file sizes and record sizes, the additional usable length of tape can be very significant.

The End Result The combination of compression and efficient utilization of the tape gives the 7980XC an extra tape capacity capability which is independent of the host's file size, and record size. Benchmarks on a wide variety of data indicate that HP 3000 tapes typically hold four to five times as much data as previously possible,

and HP 9000 HP-UX tapes hold approximately two to three times as much. The only variable which affects the ability to compress is the amount of repetition in the data. Text files, for example, can usually be compressed more than object code files because their data is generally more repetitive.

A standard (2400-ft) reel of tape at 6250 cpi density can hold approximately 140 megabytes of data. The 7980XC can increase this amount by about two to five times, depending on the data. If 3600-ft (1-mil) tapes are being used, the approximately 210 megabytes of available storage is increased to about 400 to 1000 megabytes (please see restrictions on using 1-mil tape in Appendix C).

Easy Selection From The Front Panel

Density selection for a 1600 cpi or 6250 cpi write is made by the host. When (and only when) a 6250 cpi write is selected by the host, the Extra Capacity feature of the HP 7980XC may be used in one of four ways, all configurable through the front panel:

– ALWAYS write COMPRESSED tapes

(the drive is almost always used for large system backups rather than for making interchange tapes)

– DO NOT write COMPRESSED tapes

(the drive will be used to write many uncompressed tapes)

– USUALLY write COMPRESSED tapes

(most tapes are compressed, but user may choose non-compressed as each tape is loaded)

– USUALLY write NON-COMPRESSED tapes

(most tapes are non-compressed, but user may choose to compress as each tape is loaded).

The first two modes of operation listed above are what might be called “hard” configurations – they become the default operation of the drive in 6250 cpi writes. No choice is given to the operator. These configurations may, however, be easily changed from the front panel.

The last two modes of operation might be called “interactive” configurations. They present the operator with what has been predetermined to be the most probable use of Extra Capacity, but the operator may choose the opposite by a couple of key presses on the front panel.

These last two modes use interactive displays to help the operator choose between Extra Capacity (6250XC) ON or OFF.

Any selections concerning Extra Capacity apply only when writing to tape; on reads, the HP 7980XC tape drive recognizes 6250XC tapes and expands their data automatically.

Data Integrity

The data integrity of the readback process in 6250 GCR is at least 100 Gigabytes of data per unrecoverable read error. Since the 7980XC tape drive writes data on less tape per backup, the chance of an error is much less. If an error were to occur however, it could involve more data because each block contains much

more data than is contained in standard 6250 format. These factors cancel each other, and the 6250XC format has the same effective error rate as the standard 6250 format.

Suggested Tape Library Management

The use of the extra capacity feature needs to be indicated on tape reels. The host does not recognize any difference between 6250 and 6250XC tapes. Tapes written in 6250XC must be read on a 7980XC tape drive; if they are mounted on a 7978A, for example, the drive will recognize them as 6250 tapes but the host will return an error message.

If a tape library is managed manually, the density should be marked as: "6250XC" or "XC" on the tape label. If an automated tape library manager system is used, the marking should be entered into the comment field of the tape label generation program.

Some Questions and Answers

- Q. Why, when doing Extra Capacity writes or reads, does the 7980XC start and stop more frequently than when doing non-compressed writes and reads?
- A. Compression/expansion occurs quickly and BEFORE the data reaches the 512-Kbyte buffer. When the tape stops streaming on a write, it shows that the host is unable to transfer bytes fast enough to keep the *effectively much larger* buffer filled and keep the tape streaming.
- When the tape stops while reading, this shows that the host is unable to accept data as fast as drive buffer fills with data expanded from code on the tape.
- Q. Why does each Extra Capacity tape take longer to read or write than a non-data-compressed tape?
- A. Each tape contains much more data than previously possible. The time required to transfer a given amount of data to or from the host is approximately the same for a 7980XC using Extra Capacity procedures as for a 7980A reading or writing non-compressed data. When Extra Capacity procedures are used, the amount of data written or read back is from two to five times greater, so the time required (determined by transfer rate) will be approximately two to five times greater.
- Time savings are a result of reduced rewinds, tape loads and operator time.
- Q. Are tapes written in 6250XC readable on tape drives that do not have Extra Capacity capability?
- A. Other drives will recognize 6250XC tapes as 6250 GCR and be able to read the data back. This data is returned to the host. But since this data is compressed, it can not be understood by the host software.
- Q. Why is Extra Capacity not available for 1600 PE?
- A. The extra capacity feature is not available for 1600 PE because this density is most commonly used for interchange.

Ordering Options on the HP 7979A/7980A/7980XC

HP 7979A – 1600 cpi
HP 7980A – 1600/6250 cpi (with Option 800 – 800/1600/6250 cpi)
HP 7980XC – 1600/6250 cpi (data compression on 6250 cpi)

Each drive has the following options:

Option 133 – Add-on Drive. Removed: cabinet, front panel shroud, standard lower front rack panel, back door, and anti-tip feet. Added: short lower panel. Includes installation.

Option 135 – Drive Only (installation in another 19-inch rack). Removed: cabinet, front panel shroud, standard lower front rack panel, back door, anti-tip feet, slides, and rails. Does not include installation.

Option 137 – Preparation for addition of disc drive. Removed: lower front door. Added: door with window, ventilation, and safety feet. Order when installing an HP 7936/37 disc drive in the bottom of the tape drive cabinet. Disc drive and HP 19512A Rackmount Kit required. Includes installation.

Option 1A4 - Preparation for installation in HP A1001A (1.6 metre) cabinet. Deletes cabinet and lower front door. Includes installation.

The HP 7980A has the following additional option:

Option 800 - Added capability to format tape in 800 cpi NRZI (Non-Return-to-Zero Inverted). Parts must be ordered separately. Contact your Hewlett-Packard Sales Representative for assistance in ordering and for installation arrangements.

UPGRADE PATHS HP 88703A – HP 7979A to HP 7980A. Includes on-site installation by HP. Not customer installable. *

HP 88705A – HP 7980A to HP 7980XC. Includes on-site installation by HP. Not customer installable. *

* An HP 7979A may be upgraded to an HP 7980XC by installing both the HP 88703A and the HP 88705A.

2

Operation

This chapter is divided into two sections: **Quick Start** and **Procedures**.

- **Quick Start** offers few details and explanations and is placed here as a reference for experienced operators.
- **Procedures** offers a detailed review of the drive's operation, providing complete instructions and explanations. Tasks you perform less frequently, such as enabling specific features, are described in Appendix A.

7980XC Only

The symbol to the left is used throughout this manual to mark information that applies only to the HP 7980XC, the only drive capable of Extra Capacity operation at 6250 cpi density (6250XC).

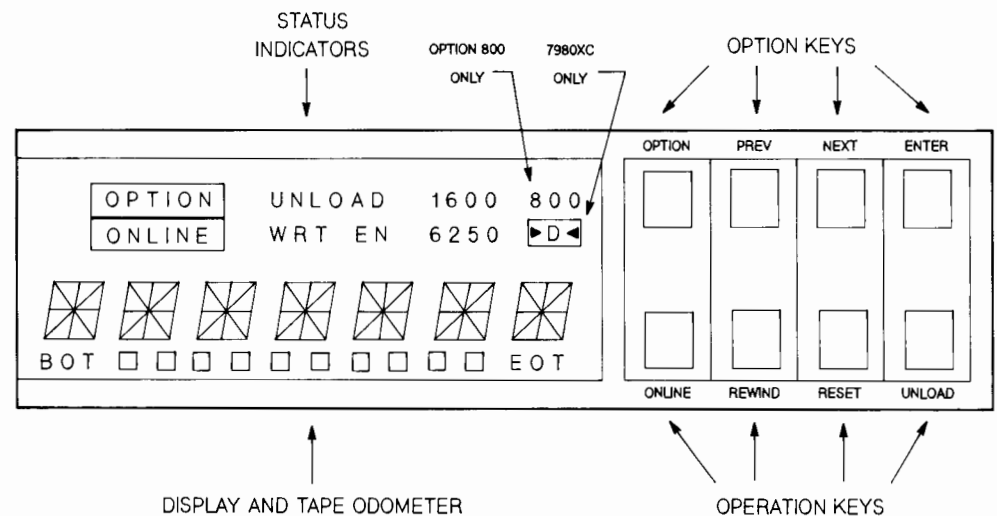
The Extra Capacity data storage capability provided by the HP 7980XC is explained in Chapter 1.

To start the drive for the first time, use the "PROCEDURES" section of this Chapter. If your drive is a HP 7980XC, read "Extra Capacity Data Storage With the HP 7980XC" in Chapter 1 before operating the drive.

Quick Start

These instructions are a reminder of the basic loading procedure.

1. Press IN the **Standby Switch** on the lower left of the front panel. When the drive passes selftests, *READY* appears in the display.
2. Press the **UNLOAD** key to open the tape door.
3. Slide a tape through the tape path door, making sure the loose end of the tape is on the right and is not caught under the reel.
4. Close the tape path door.



7980XC Only **5a. If the drive is configured to be in Extra Capacity interactive mode, the display will flash either *XC ON* or *XC OFF*.**

If you want to write to tape, choose from the following:

DISPLAY FLASHING*	EXTRA CAPACITY WRITE DESIRED?	
	YES	NO
XC ON	Press ENTER. XC is write enabled.	Press NEXT/PREV to get XC OFF, then press ENTER.
XC OFF	Press NEXT/PREV to get XC ON, then press ENTER.	Press ENTER. XC is disabled.

* The flashing display stops at expiration of Operator Timeout (a configurable option). At timeout, the choice showing in the display is entered into the drive.

After your selection, or after expiration of the timeout, the drive begins the LOADING sequence.

7980XC Only **5b. If the drive is “hard” configured (interactive mode OFF), and a 6250 cpi write is to be done, the drive will either write a compressed or non-compressed tape according to the choice entered into Configuration 47.**



If writing will be done in a density other than 6250, ANY CHOICES MADE IN THE PREVIOUS STEP ARE IGNORED. Data-compressed tapes are written in 6250 cpi density only.

6. Press ONLINE.




An Extra Capacity tape (always written at 6250 cpi) will be recognized as a 6250 cpi tape by any tape drive capable of reading 6250 cpi tapes, but the drive will not be able to interpret the data.

O p e r a t i o n O p t i o n I n d i c a t o r s S t a t u s	Keys ONLINE REWIND RESET UNLOAD	Selects ONLINE or OFFLINE. Toggle key. Positions the tape at BOT. Aborts an operation. Unloads the tape and opens the tape door.
	Keys OPTION PREV NEXT ENTER	Enters or exits the OPTION select mode. Displays the previous OPTION choice. Displays the next OPTION choice. Selects the displayed OPTION and choices within the OPTION.
	Indicators ONLINE UNLOAD WRT EN 800 1600 6250 >D< TAPE ODOMETER	Lit when OPTION mode is selected. Lit when the drive is ONLINE. Flashes if the ONLINE command is queued. Lit when an UNLOAD operation is in progress. Flashes if the UNLOAD command is queued. Lit when a write-enabled tape is loaded into the drive. Remains on until tape is UNLOADed. Lit when a 800 cpi tape is loaded. Lit when a 1600 cpi tape is loaded. Lit when a 6250 cpi tape is loaded (7980A and 7980XC). Lit when a 6250XC tape is loaded (7980XC only). Lit when tape loaded is in 6250XC format (7980XC only). Segments show the relative position of the tape between the Beginning of Tape (BOT) and the End of Tape (EOT).


Control Panel Keys and Indicators
 (Quick Reference to Basic Functions)

Procedures

The following sections describe drive operations in more detail and are especially useful for first-time start-up. A full explanation of the Control Panel keys, status indicators, and display messages is at the end of this Chapter, after these procedures.

NOTE  If you have a drive capable of Extra Capacity storage (an HP 7980XC), please read “EXTRA CAPACITY DATA STORAGE WITH THE HP 7980XC” in Chapter 1, before reading these operational procedures.


Power on After the drive has been installed, follow these steps:

NOTE  When transferring the tape drive from a very cold environment to a warm environment, or vice versa, it is very important to let the drive adapt to the new conditions to obtain maximum autoloading performance.

Apply power to the drive for at least one hour before autoloading (**Main AC Power Switch** on the rear panel “1”, **Standby Switch** on the front panel IN – see next NOTE). If the new environment is extremely humid or cold, allow at least two hours.

Tapes should also be acclimatized. Remove storage rings or cases and let the tapes set for at least one hour. If extremely humid or cold, allow at least two hours. This procedure allows temperatures to equalize and allows the tapes to dry out sufficiently to insure optimum autoloading.

For optimum read/write performance, allow the tapes to acclimate for 24 hours. This provides enough time for the tape humidity to equalize with that of the environment.

NOTE  Two switches must be in the ON position to operate the drive; the **Main AC Power Switch**, located on the rear panel of the drive unit, and the **Standby Switch**, located on the lower left of the front panel.

The **Main AC Power Switch** controls input power to the drive and should remain ON continuously during normal operations. The **Standby Switch** allows input power to be passed to the electronics of the drive (and should also remain ON as much as possible to gain maximum life from the electronics).

After installation, all that is normally necessary is to start at Step 5 below. Steps 1 to 4 are here in case power is removed from the drive..

1. Make sure the **Standby Switch** on the lower left of the front panel is out (OFF). The is a toggle IN/OUT switch.
2. Access the rear of the drive unit by opening the rear door to the drive cabinet.
3. Press the top of the **Main AC Power Switch** ("1" on the rocker switch) to apply power.
4. Close the rear of the cabinet and move the cabinet back to its operating position.
5. Make sure the tape door is closed.

Startup: Initial and Normal Operation

NOTE



INITIAL STARTUP

These steps assume the drive is being started up for the first time. We will cycle the drive to a point where, if a tape had been loaded, normal interaction with the host could begin.

After this initial checkout, you will insert a tape and enter an explanation of normal operating procedures.

6. Press the **Standby Switch** on the lower left of the front panel IN (ON).


7980XC Only

If no display is obtained when both switches are in the correct position, refer to Chapter 3, No Control Panel Lights.

NOTE



If you have an HP 7980XC, please read "EXTRA CAPACITY DATA STORAGE WITH THE HP 7980XC" in Chapter 1, before reading these operational procedures.

When the drive is powered up,  and then *TESTING* appears in the Control Panel display. As the drive runs through the poweron sequence of tests, all lights on the panel are individually flashed.

When the drive passes selftest, *READY* appears (HP 7979A/7980A only). This message means that the drive is ready to load a tape or to accept commands from the Control Panel.

NOTE



The HP 7979A/7980A/7980XC can accept 1-mil tape (3600-foot reels). But before using this thickness of tape, we request you review *Using 1-mil Tape* in Appendix C.

NOTE

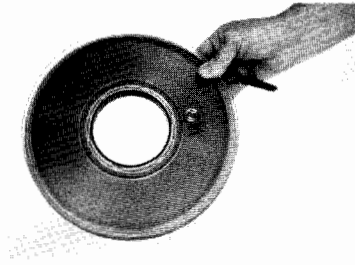


Prevent Edge Damage!

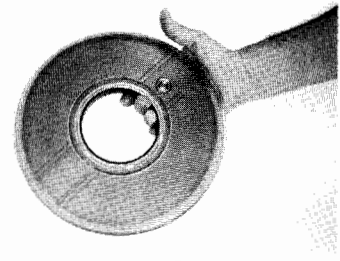
Use care when handling the tape reels. If reels are gripped in any way that presses the flanges together, there is a possibility of damaging the edge of the tape.

The hub is the strongest, least flexible portion of the reel. ALWAYS HOLD THE TAPE REEL BY THE HUB OR AS CLOSE TO THE HUB AS POSSIBLE.

There is a greater danger of mishandling tape reels when using a horizontal-mount tape drive. The figure on the right below shows how a reel could be held in a horizontal position with one hand without pressing the flanges together.



NO



YES



NOTE

- a) For consistent, optimum tape performance, the end of the tape should be rounded and crimped. (Most new tapes come from the manufacturer with the tape end prepared this way.)

Autoloading should not be affected by small folds or irregularities in the last couple of feet of the leader, but if the leader has folds that run lengthwise along the tape or if that portion is definitely “crumpled”, you should cut that part of the tape off. For best results, use a tool made for this purpose – like the tape cutter/crimper from Pericomp Corporation.

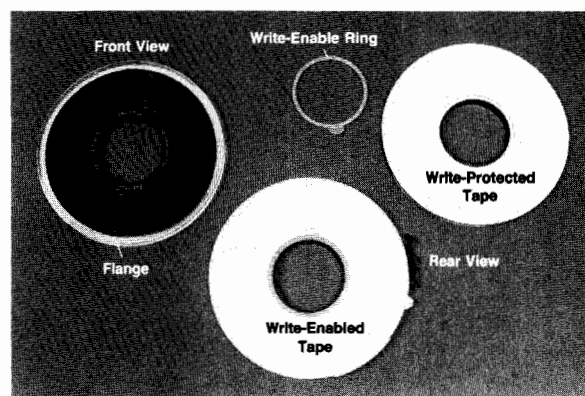
If the end of the tape is damaged, cut off only what is necessary to remove the damage.

To ensure that the tape can be loaded on any drive that conforms to ANSI standards, do not shorten the tape leader to less than 14 feet. (The tape leader is the portion of tape between the physical end of the tape and the BOT Marker.)

- b) Ensure that the tape end is free to move.

7. Check for tape write-enable capability, as desired.

Write-enable rings are installed on the back of a tape reel. When these rings are in place, you may record data on the tape. To protect data from being over-written, REMOVE THE RING. You may then read data from the tape but are prevented from writing to the tape.



Write-Enabled and Write-Protected Tapes



8. Press **UNLOAD** to open the tape path door.

CAUTION



Always press **UNLOAD** to open the door or to stop a **LOAD** operation. **Do not try to force the tape door open.**

NOTE



If the tapes you are going to use have recently been stored in a place that had a much different temperature and/or humidity level, the tapes should be acclimatized before use. Remove storage rings or cases and let the tapes set for at least one hour. If the difference in environments is “extreme”, allow at least two hours. This procedure allows temperatures to equalize and allows the tapes to dry out sufficiently to insure optimum autoloading.

For optimum read/write performance, allow the tapes to acclimate for 24 hours. This provides enough time for the tape humidity to equalize with that of the environment.

9. Slide a tape, free end to the right, into the center of the tape door opening. If inserting a small tape, it is best to insert the tape either to the center or a little to the right of center of the tape door.

Make sure the tape leader is free on the right side of the reel, not trapped under the reel or by the tape path door.

10. Close the tape path door. Closing the door initiates the next part of the sequence.

7980XC Only INITIAL STARTUP

The configuration placed in CONF 47, when shipped, is *IXC ON* (Interactive Extra Capacity ON). When the tape door is closed, the drive will flash *XC ON* in the display indicating that the drive expects the next 6250 cpi write to be done with 6250XC procedures – but also giving the operator the opportunity to choose not to compress and write standard, non-compressed 6250 cpi data.

If a 6250XC tape is **NOT** desired, the operator must press the **NEXT** or **PREV** Keys to obtain the *XC OFF* display, and then press **ENTER** to enter this selection into the drive.

ON LATER STARTUPS OF THE DRIVE –

After initial installation, drive default operation and/or operator interaction with choosing data compression may be set using CONF 47 (see “CUSTOMIZING DRIVE OPERATION” later in this Chapter).

If you change CONF 47 to a different setting than what was shipped with the unit (Interactive Extra Capacity ON), the display shows one of the following messages before proceeding to the next step in the poweron process. These messages reflect the configuration set by using CONF 47.

– *no display* – the drive is “hard” configured in one of two following ways.

- A) **WHEN THE HOST SELECTS A 6250 CPI WRITE**, the drive **ALWAYS** writes an industry-standard 6250 cpi tape (Extra Capacity feature OFF).

B) WHEN THE HOST SELECTS A 6250 CPI WRITE, the drive ALWAYS writes an Extra Capacity, 6250XC tape (Extra Capacity feature ON).

- flashing *XC ON* – WHEN THE HOST SELECTS A 6250 CPI WRITE, an Extra Capacity, 6250XC tape will be written unless the operator disables data compression before Operator Timeout (see following NOTE).
- flashing *XC OFF* – WHEN THE HOST SELECTS A 6250 CPI WRITE, an industry-standard 6250 cpi tape will be written unless the operator enables data compression before Operator Timeout (see following NOTE).

7980XC Only



When the display flashes *XC ON* or *XC OFF*, it will do so until the Operator Timeout time expires. At that time, whatever selection is in the display will be entered into the drive.

The time used for Operator Timeout is set by CONF 43. The drive is shipped with a setting of 10 seconds.

A description of CONF 43 is in “CUSTOMIZING DRIVE OPERATION” later in this Chapter and also in Appendix A.

7980XC Only

11. Use Extra Capacity data compression as desired.

A summary of possible actions at this point are:

DISPLAY FLASHING	EXTRA CAPACITY WRITE DESIRED?	
	YES	NO
- Interactive Extra Capacity Mode Selected.		
XC ON	Press ENTER. XC is write enabled.	Press NEXT/PREV to get XC OFF, then press ENTER.
XC OFF	Press NEXT/PREV to get XC ON, then press ENTER.	Press ENTER. XC disabled.
NO DISPLAY		
- “Hard” drive configuration.		
XC ON	No action. XC is write enabled.	Reconfigure drive using CONF 47.
XC OFF	Reconfigure drive using CONF 47.	No action. XC is disabled.

When your choice of how you will use Extra Capacity has been made (HP 7980XC only) or just after the tape door is closed (HP 7979A/7980A), the message *LOADING* appears in the display. The drive begins its automatic load sequence.

7980XC Only



Note that ALL SELECTIONS CONCERNING DATA COMPRESSION ARE MADE BEFORE THE TAPE IS LOADED. Extra Capacity reads and writes on the HP 7980XC are transparent to the host and in no way interfere with the host’s operation.



NOTE

When the drive senses a tape, the supply hub rotates to center the reel on the hub. Once the reel is correctly seated, the hub locks the reel. The autoloader blower then turns on and blows the tape end off the supply reel as the supply motor feeds the tape out into the path. While the blower is on, the drive searches for the free tape end.

When the tape end is found, the blower blows the tape through the tape path with the supply motor feeding out tape. The tape is sucked onto the rotating take-up reel until the sensor detects tape motion. The drive then properly tensions the tape and advances the tape to the BOT marker.

If the autoloader operation fails (no error message given), try the above steps two or three times. If it continues to fail, refer to "AUTOLOAD PROBLEMS" in Chapter 3.

If the autoloader operation fails and you see *NO BOT* in the display, refer to "REPLACING BOT/EOT MARKERS" in Chapter 3.

12. You may press **ONLINE** anytime after closing the door. You may *queue* the command to go **ONLINE** immediately after closing the door or wait until the drive finds the BOT marker.

If you press **ONLINE** *before* loading has finished, the **ONLINE INDICATOR** flashes and the drive waits to go **ONLINE** until loading is finished.

If you press **ONLINE** *after* loading has finished, the drive goes **ONLINE**.

When the drive goes **ONLINE**:

- the **ONLINE INDICATOR** remains lit
- the **TAPE DENSITY INDICATOR** shows the density of the current tape (800, 1600, or 6250)
- (See Chapter 1, **ORDERING OPTIONS ON THE HP 7979A/7980A/7980XC**, for density indications possible on your drive.)
- the **EXTRA CAPACITY INDICATOR** (>D<) lights if the tape contains compressed data
- the **WRITE-ENABLE STATUS INDICATOR** shows the write enable/disable status of the tape
- the message in the display generally corresponds to the command the host is currently sending to the tape drive.

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- Unloading tape**
1. Take the drive offline by pressing **ONLINE**.
 2. Press **UNLOAD**. The drive **UNLOADS** the tape and opens the tape door.
 3. Remove the tape.

Monitoring the Data Compression Rate (HP 7980XC Only)

7480XC Only To display the data compression rate, follow these steps:

1. Take the drive OFFLINE (press the **ONLINE** key, if necessary).
2. Press **OPTION**.
3. Press **NEXT** until *INFO ** appears in the display.
4. Press **ENTER**. The display will show *INFO 0*.
5. Bring *INFO 30* into the display.**

** Pressing **NEXT** increments the number by 1, pressing **PREV** decrements the number by 1. Pressing the lower right key on the panel, the **UNLOAD** Key, increments the number by 10s, pressing the lower left key on the panel, the **ONLINE** Key, decrements the number by 10s.

6. Press **ENTER**.

The tape write compression rate for the LAST compressed (Extra Capacity format) tape written is displayed. The number displayed shows the amount of tape that would have been required for a normal GCR format tape COMPARED to the amount of tape actually used to write the Extra Capacity tape. For example, a value of 240 means 240% or a 2.4-to-1 tape compression ratio.

7. When through reading the compression rate, press **ENTER**. The display returns to *INFO **.
8. Press **OPTION** or **RESET** to leave Option mode.

Customizing Drive Operation



An expanded explanation of default configurations in these tape drives, and how these configurations are stored and changed, is in Appendix A.

The configurations described in this section are those that would probably be used most often.

7980XC Only CONFIGURING FOR EXTRA CAPACITY STORAGE —

1. Take the drive offline. (Press **ONLINE**, if necessary.)
2. Press **UNLOAD**. The drive UNLOADs the tape and opens the tape door.
3. Press **OPTION** to enter the Option Mode. *TEST ** appears in the display.
4. Press **NEXT** to bring *CONF ** into the display.
5. Press **ENTER** to select the configuration set mode. *CONF 0* comes into the display.
6. Bring the number *40* into the display.**

** Pressing **NEXT** increments the number by 1, pressing **PREV** decrements the number by 1. Pressing the lower right key on the panel, the **UNLOAD** Key, increments the number by 10s, pressing the lower left key on the panel, the **ONLINE** Key, decrements the number by 10s.

Configuration 40 must be set before any others; it is the *Enable Change to the Non-Volatile Memory*.

7. Press **ENTER**. The display shows the current setting for Configuration 40. This configuration should normally be OFF.
8. Using **NEXT** or **PREV** to bring *ON* into the display.
9. Press **ENTER**. Values currently in non-volatile memory may now be changed.
The display will show *SET 40* for about 1 second to confirm that it has placed the value for ON in Configuration 40. Then, *CONF ** re-appears in the display.
10. Press **ENTER** to select the configuration set mode again.
11. Bring *47* into the display. (Press the **NEXT** Key seven times.)
Configuration 47 sets how the drive uses the Extra Capacity feature.
12. Press **ENTER** to select the configuration.
13. The display will show your current setting for Configuration 47. Use **NEXT** or **PREV** to choose the type of compression control you want.
The types of compression control available and the displays they give the operator are:
XC ON – Write 6250 cpi tapes in compressed format only. No data compression display. *LOADING* appears in the display and tape loading begins automatically.
XC OFF – Do not write tapes in compressed format. No data compression display. *LOADING* appears in the display and tape loading begins automatically.
IXC ON – Operator choice with Extra Capacity ON as the default. *XC ON* is flashed until a choice is made between ON or OFF. If no choice is made in 10 seconds (default), Extra Capacity ON (default) becomes the selection in the drive.
IXC OFF – Operator choice with Extra Capacity OFF as the default. *XC OFF* is flashed until a choice is made between OFF or ON. If no choice is made in 10 seconds (default), Extra Capacity OFF (default) becomes the selection in the drive.
14. When your choice is showing in the display, press **ENTER**.
The display will show **SET 47** for about 1 second to confirm that it has placed your selection in Configuration 47. Then, *CONF ** re-appears in the display.
15. Press **OPTION** or **RESET** to leave the OPTION mode and return to *READY*.

CHANGING THE TIME USED IN OPERATOR TIMEOUT —

1. Take the drive offline. (Press **ONLINE**, if necessary.)
2. Press **OPTION** to enter the Option Mode. *TEST ** appears in the display.
3. Press **NEXT** to bring *CONF ** into the display.
4. Press **ENTER** to select the configuration set mode.
5. Bring the number *40* into the display.**

** Pressing **NEXT** increments the number by 1, pressing **PREV** decrements the number by 1. Pressing the lower right key on the panel, the **UNLOAD** Key, increments the number by 10s, pressing the lower left key on the panel, the **ONLINE** Key, decrements the number by 10s.

Configuration 40 must be set before any others; it is the *Enable Change to the Non-Volatile Memory*.

6. Press **ENTER**. The display shows the current setting for Configuration 40. This configuration is normally OFF.
7. Use **NEXT** or **PREV** to bring *ON* into the display.
8. Press **ENTER**. Values currently in non-volatile memory may now be changed. The display will show *SET 40* for about 1 second to confirm that it has placed the value for ON in Configuration 40. The, *CONF ** re-appears in the display.
9. Press **ENTER** to select the configuration set mode again.
10. Bring *CONF 43* into the display. Use keys as in Step 5. Configuration 43 is Operator Timeout.
11. Press **ENTER** to select the configuration.
12. The display will show your current setting for Configuration 43. Use **NEXT** or **PREV** to choose the length of time desired for Operator Timeout. The time settings available are:
 - OFF* – No timeout. Choice displayed on the front panel will continue indefinitely.
 - 1 to 99* – The timeout value in seconds.
13. When your choice is showing in the display, press **ENTER**. The display will show *SET 43* for about 1 second to confirm that it has placed your selection in Configuration 43. Then, *CONF ** re-appears in the display.
14. Press **OPTION** or **RESET** to leave the **OPTION** mode and return to *READY*.

CHANGING REWIND SPEEDS —

Two rewind speeds may be selected; high-speed (standard) or Archival Tape Conditioning speed.

When Archival Tape Conditioning is selected, rewind speed is slowed to approximately 50 inches per second so that air pockets, which can cause uneven tape stacking, are eliminated. For additional tape storage guidelines see **TAPE LIBRARY CARE** in Chapter 4.

Three methods of using the two rewind speeds are available:

1. Regular, high-speed rewind always
2. Archival tape conditioning rewind always
3. Regular/Archival Tape Conditioning choice always –

Prior to loading tape, the drive flashes the current rewind speed (REW or ATC). Press **NEXT** or **PREV** until desired speed is displayed, then press **ENTER**. If no selection is made in 10 seconds, the drive defaults to the current speed selection in Configuration 44.

(The Operator Timeout time of 10 seconds may be set to another value. See “CHANGING THE TIME USED IN OPERATOR TIMEOUT” in the section immediately preceding this one.)

To set any of the three rewind configurations, do the following nine steps and then continue under the heading of what you want to do; SELECT HIGH-SPEED (REGULAR) REWIND ALWAYS, SELECT ARCHIVAL TAPE CONDITIONING REWIND ALWAYS, or SELECT REWIND CHOICE MODE.

1. Take the drive offline. (Press **ONLINE**, if necessary.)
2. Press **OPTION** to enter the Option Mode. *TEST ** appears in the display.
3. Press **NEXT** to bring *CONF ** into the display.
4. Press **ENTER** to select the configuration set mode.
5. Bring the number *40* into the display.**

** Pressing **NEXT** increments the number by 1, pressing **PREV** decrements the number by 1. Pressing the lower right key on the panel, the **UNLOAD** Key, increments the number by 10s, pressing the lower left key on the panel, the **ONLINE** Key, decrements the number by 10s.

Configuration 40 must be set before any others; it is the *Enable Change to the Non-Volatile Memory*.

6. Press **ENTER**. The display shows the current setting for Configuration 40. This configuration should normally be OFF.
7. Use **NEXT** or **PREV** to bring *ON* into the display.
8. Press **ENTER**. Values currently in non-volatile memory may now be changed. The display will show *SET 40* for about 1 second to confirm that it has placed the value for ON in Configuration 40. Then, *CONF ** re-appears in the display.
9. Press **ENTER** to select the configuration set mode again.

TO SELECT HIGH-SPEED (REGULAR) REWIND ALWAYS:

10. Bring *CONF 44* into the display. (Press the **NEXT** Key four times.)
Configuration 44 is Archival Tape Conditioning Rewind.
11. Press **ENTER** to select the configuration.
12. The display will show your current setting for Configuration 44. Use **NEXT** or **PREV** to choose the type of rewinds you want.
When you press either **NEXT** or **PREV**, the choices alternate between the following:
*REW ** – Normal (high-speed) rewind
*ATC ** – Archival Tape Conditioning (slow-speed) rewind.
13. When *REW ** shows in the display, press **ENTER**.
The display will show *SET 44* for about 1 second to confirm that it has placed the selection in Configuration 44. Then, *CONF ** re-appears in the display.
14. Press **OPTION** or **RESET** to leave the OPTION mode and return to *READY*.

TO SELECT ARCHIVAL TAPE CONDITIONING REWIND ALWAYS:

10. Bring *CONF 44* into the display. Use keys as in Step 5.
Configuration 44 is Archival Tape Conditioning Rewind.
11. Press **ENTER** to select the configuration.
12. The display will show your current setting for Configuration 44. Use **NEXT** or **PREV** to choose the type of rewinds you want.
When you press either **NEXT** or **PREV**, the choices alternate between the following:
*REW ** – Normal (high-speed) rewind
*ATC ** – Archival Tape Conditioning (slow-speed) rewind.

13. When *ATC ** shows in the display, press **ENTER**.

The display will show *SET 44* for about 1 second to confirm that it has placed the selection in Configuration 44. Then, *CONF ** re-appears in the display.

14. Press **OPTION** or **RESET** to leave the **OPTION** mode and return to *READY*.

TO SELECT THE REWIND "CHOICE MODE" :

10. Bring *CONF 45* into the display. Use keys as in Step 5.

Configuration 45 is Operator Select Archive.

11. Press **ENTER** to select the configuration.

12. This display will show your current setting for Configuration 45. Use **NEXT** or **PREV** to display your choices.

When you press either **NEXT** or **PREV**, the choices alternate between the following:

ON – The operator will be given the opportunity to choose between normal and Archival Tape Conditioning rewinds after each tape is **LOAD**ed.

OFF – No choice will be presented to the operator. Rewind speed will be determined by the setting of Configuration 44, Operator Tape Conditioning Rewind (see previous procedure).

13. When *ON* shows in the display, press **ENTER**.

The display will show *SET 45* for about 1 second to confirm that it has placed the selection in Configuration 45. Then, *CONF ** re-appears in the display.

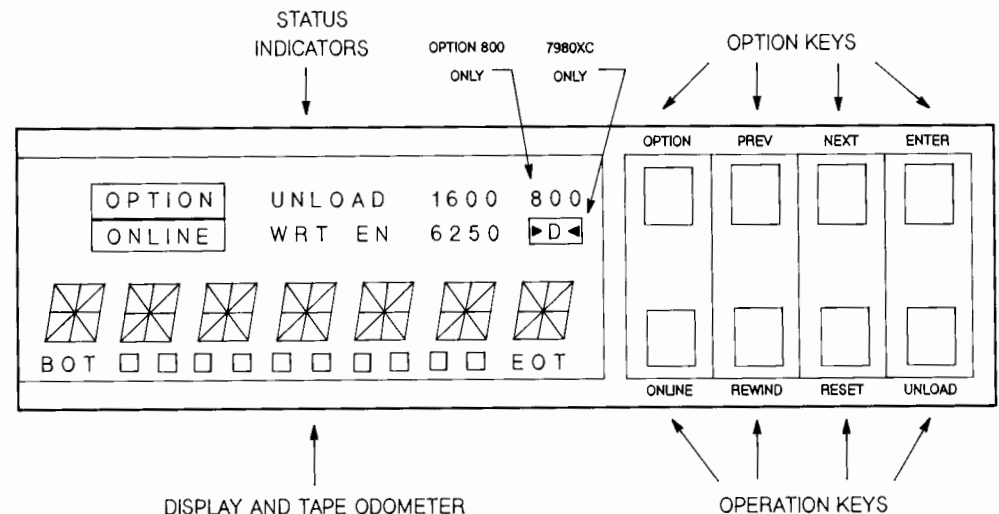
14. Press **OPTION** or **RESET** to leave the **OPTION** mode and return to *READY*.

The Control Panel

The Control Panel allows the operator to select operating, diagnostic, addressing, and configuring functions.

During normal operation, you will use the four **OPERATION KEYS** located on the bottom row of the Control Panel. You will select other functions using the **OPTION KEYS** on the top row. The **STATUS INDICATORS** do just that – indicate the status of the drive.

Operation, option, and error messages appear in the seven-character display under the **STATUS INDICATORS**. A tape odometer that shows the relative position of the tape during operation is located under this display.



The following list describes the purpose and response of each key and indicator:

OPERATION KEYS **ONLINE.** A toggle key that selects either ONLINE or OFFLINE operation of the drive. When the drive is ONLINE, it can accept and execute commands from the host. When the drive is OFFLINE, only local commands from the Control Panel can be executed.

The ONLINE STATUS INDICATOR lights when the drive goes ONLINE.

The ONLINE command may be *queued*; that is, you may press the key before the command can be performed, and the drive waits until the current operation is finished before going ONLINE. To indicate that the command is queued, the ONLINE STATUS INDICATOR flashes.

You may cancel a queued ONLINE command by pressing the ONLINE key a second time.

REWIND. Pressing REWIND positions the tape at BOT.

When the BOT Marker is reached, "BOT" appears in the display.

The REWIND Key is inoperative while the drive is ONLINE or the tape door is open.

RESET. RESET aborts operations; both those from the Control Panel and those under control of the host (if *BUSY* is being displayed).

CAUTION



Pressing the RESET Key a second time causes the data in the drive buffer to be lost.

If the RESET key is pressed during a tape LOAD, the LOAD will be aborted – the tape door remains closed.

While in OPTION mode, pressing RESET backs up the selection process (and display) to the previous level.

UNLOAD. Pressing the UNLOAD key UNLOADs the tape and opens the tape door. The UNLOAD STATUS INDICATOR lights. The key is active only when the drive is OFFLINE.

If no tape is present in the drive, the tape door opens immediately.

The UNLOAD command may be *queued*. You may press the key immediately after pressing REWIND and the drive will wait until REWIND is finished and then execute an UNLOAD.

OPTION KEYS **OPTION.** OPTION activates the Option mode, lights the OPTION INDICATOR, and disables the Operation Keys.

While in this mode, you may select options of TEST, CONFiguration, INFOrmation, or ADDRess.

Pressing the **OPTION** key while in any state except running a test or within the **INFO** display, returns the drive to normal, **OFFLINE** operation.

PREV. Pressing **PREV** decrements the number in the display or returns to the previous option.

NEXT. Pressing **NEXT** increments the number in the display or advances to the next option.

ENTER. Selects the **OPTION** currently shown in the display (**TEST**, **CONFIguration**, **INFOrmation**, **ADDRess**).

Once an **OPTION** is selected, the **NEXT** and **PREV** keys are used to step through possible values for that **OPTION** and the **ENTER** key is used to select the value.

STATUS INDICATORS

OPTION. The **OPTION INDICATOR** is lit when the drive is in **OPTION** mode and remains lit while you are accessing a particular option.

The **OPTION INDICATOR** turns off if you press the **OPTION** Key a second time.

ONLINE. The **ONLINE INDICATOR** remains on while the drive is **ONLINE**. This indicator flashes if the **ONLINE** command is in a queued state; caused by pressing the **ONLINE** Key immediately after starting a **LOAD** sequence. When the **LOAD** sequence is finished, the drive will automatically go **ONLINE** and the **ONLINE INDICATOR** will remain on continuously.

The **ONLINE INDICATOR** turns off when you place the drive **OFFLINE** by pressing the **ONLINE** Key second time.

UNLOAD. Lights when an **UNLOAD** operation is in progress. Goes out after the tape door opens in the **UNLOAD** sequence; **UNLOAD** appears in the display.

This indicator flashes if the **UNLOAD** command is queued (the **UNLOAD** Key was pressed before the previous command finished executing).

WRTE N. The **WRTE N (Write-Enable) INDICATOR** lights, and remains on, when a tape with a write-enable ring is **LOADed** into the drive.

The **WRTE N INDICATOR** turns off when the write-enabled tape is **UNLOADed**.

800. (Option 800 required) The **800 INDICATOR** lights when a 800 cpi density tape is **LOADed**. It remains on until the recording density changes or the tape is **UNLOADed**.

All density indicators stay off if a blank tape is **LOADed**.

1600. The **1600 INDICATOR** lights when a 1600 cpi density tape is **LOADed**. It remains on until the recording density changes or the tape is **UNLOADed**.

If a tape of unknown density is **LOADed**, both this indicator and the **6250 INDICATOR** light.

All density indicators stay off if a blank tape is **LOADed**.

6250. (HP 7980A/HP 7980XC) The 6250 INDICATOR lights when a 6250 cpi density tape is LOADED. It remains on until the recording density changes or the tape is UNLOADED.

(HP 7980XC) This indicator lights, along with the >D< indicator, when a tape is loaded that was written using Extra Capacity procedures.

If a tape of unknown density is LOADED, both this indicator and the 1600 INDICATOR light.

All density indicators stay off if a blank tape is LOADED.

7980XC Only >D<. Lights when a tape is loaded that was written using Extra Capacity data storage procedures.

TAPE ODOMETER. Located under the seven-character display, the odometer consists of the BOT INDICATOR, a row of fluorescent segments, and an EOT INDICATOR. Shows relative position of the tape during operation.

The following list describes the messages and prompts which you may see in the display.

MESSAGES



A question mark at the end of the message description means that the message is a prompt; what is shown in the display will be selected if the **ENTER** key is pressed.

MESSAGES DURING NORMAL OPERATION

⊠⊠⊠⊠⊠⊠⊠ The drive is powering up. All segments of all digits light.

TESTING Displayed during poweron selftest sequence.

LOADING The drive is LOADING a tape.

UNLOAD⊠ The drive is UNLOADing a tape.

READING ⊠ The host is reading data from the tape.

WRITING ⊠ The host is writing data to the tape.

REWIND⊠ The drive is REWINDing tape.

⊠ *RESET* ⊠ The drive is RESETting (commanded from either the Control Panel or the host).

⊠ *6250* ⊠ The tape LOADED into the drive has a density of 6250 cpi.

⊠ *1600* ⊠ The tape LOADED into the drive has a density of 1600 cpi.

⊠ *800* ⊠ The tape LOADED into the drive has a density of 800 cpi.

□ *BLANK* □ The blank tape was LOADED.

□ *UNKNOWN* □ A tape of unknown density was LOADED.

7980XC Only *XC* □ *ON* □ □ FLASHING – A density of 6250 cpi has been selected by the host and the drive is requesting a confirmation that the next write will be 6250XC. The operator may choose to select the alternative, industry-standard 6250 cpi, at this time by use of the **NEXT** or **PREV** Key to display *XC OFF* and then pressing the **ENTER** Key.

7980XC Only *XC* □ *OFF* □ FLASHING – A density of 6250 cpi has been selected by the host and the drive is requesting a confirmation that the next write will be industry-standard 6250 cpi. The operator may choose to select the alternative, 6250XC, at this time by use of **NEXT** or **PREV** key to display *XC ON* and then pressing the **ENTER** key.

WARNING AND ERROR MESSAGES

□ *BUSY* □ □ The drive is completing commands from the host. This display appears if the OFFLINE key is pressed while the drive is completing host commands.

□ *WAIT* □ □ The drive is waiting for the interface to complete a request.

ONLINE □ A keypress on the ONLINE key was received but cannot be accepted because the drive is ONLINE.

INVALID The keypress received from the Control Panel cannot be executed in the present mode.

MISLOAD An attempt to LOAD a tape failed.

NO □ *BOT* □ The drive could not find a Beginning-of-Tape (BOT) Marker.

INVERT □ The tape was inserted upside down.

□ *DOOR* □ □ The tape door or the top cover has been opened. This message is displayed if a front panel operation is attempted.

IDLE OPERATION AND TAPE POSITION MESSAGES

□ *READY* □ The drive is ready to accept commands or LOAD a tape.

□ *NO TAPE* □ Phrase used instead of *READY* in drives configured to use languages 4 through 7 (see Configurations, Appendix A).

□ □ *BOT* □ □ The tape is at the Beginning-of-Tape (BOT) Marker and is ready to accept commands.

□ □ *EOT* □ □ The tape is beyond the End-of-Tape (EOT) Marker.

□ □ □ □ □ □ The drive is waiting for a command. The tape is between BOT and EOT (but not at either one). If a command is not received in five seconds, the display changes to “IDLE” (see the next message description). This is not an error message.

IDLE The drive is waiting for a command. The tape is between BOT and EOT (but not at either one) and a command has not been received in the last five seconds. This is not an error message.

CHECK An excessive “soft” error rate has been detected by the drive. A “soft” error is anything that causes the drive to retry reading or writing a record. This message usually indicates that the tape path and head should be cleaned.

MESSAGES WHEN ENTERING OPTION SELECTION

TEST* Selecting TEST Option?

CONF* Selecting CONFIGURATION Option?

INFO* Selecting INFORMATION Option?

ADDR* Selecting ADDRESS Option?

MESSAGES WHEN WITHIN OPTIONS

TEST### Selecting Test <###>? (### = test number)

CONF### Selecting Configuration <###>? (### = configuration number)

INFO### Selecting Information <###>? (### = information number)

ADR OFF Selecting an HP-IB address of OFF?

ADDR # Selecting Address <#>? (# = address number)

SET ### Set Configuration <###> or Address <###>? (### = number)

SET OFF The drive HP-IB address has been set to OFF.

MESSAGES WHEN WITHIN TEST OPTION MODE

ONCE* Run the selected test once?

10* Run the selected test 10 times?

100* Run the selected test 100 times?

1000* Run the selected test 1000 times?

LOOP* Run the selected test forever?

RUN ### The drive is executing Test <###>. (### = test number)

PASS### Test <###> passed. (### = test number)

FAIL### Test <###> failed. (### = test number)



NOTE

YOU SHOULD NOT SEE THE NEXT FOUR MESSAGES DURING NORMAL OPERATIONAL USE. These prompts appear during selection of diagnostic tests that should only be executed by trained service personnel. See Chapter 3, *Troubleshooting* for descriptions of the tests available to all operators.

Press **RESET** at least two times to return to the *TEST <###>* display. If you were not attempting to run a test, press **RESET** one more time to return to the *TEST** display (which is the Option Select level). Then use the **NEXT** or **PREV** keys to select the desired Option.

A##### Selecting parameter A <#####>? (##### = selected value)

B##### Selecting parameter B <#####>? (##### = selected value)

C##### Selecting parameter C <#####>? (##### = selected value)

SEQ##### User-defined sequence of tests is being defined.

MESSAGES DURING DIAGNOSTICS

OPTION##### OPTION Key name (used in diagnostics).

ENTER##### ENTER Key name (used in diagnostics).

NEXT##### NEXT Key name (used in diagnostics).

PREV##### PREVIOUS Key name (used in diagnostics).

BOT#####*EOT* BOT/EOT sensor test message (used in diagnostics).

*#####**##### Sensor seen (used in diagnostics).

KEY#####*##### Key test (used in diagnostics).

CONFIGURATION VALUE MESSAGES

*#####*** Configuration value is unknown.

#####OFF Select Configuration value of “OFF”?

#####ON Select Configuration value of “ON”?

#####CLEAR Select Configuration value of “CLEAR”?

#####SAVE Select Configuration value of “SAVE”?

#####HOST Select Configuration value of “HOST”?

#####REW#####*##### Select normal, high-speed rewind?

#####ATC#####*##### Select Archival Tape Conditioning rewind?

3

Troubleshooting and Diagnostics

Overview

This chapter describes some problems you may encounter during operation and also offers steps to solve those problems.

This chapter also describes diagnostics you may use as confidence tests. Most of the drive's diagnostics, however, are useful only to service personnel. **You should not run any tests other than those described here.**

CAUTION



If you see an error code not described here, call the nearest Hewlett-Packard Service Center. If you run a test not described in this Guide, you risk losing data or changing the characteristics of the tape drive.

Error Messages

Error messages can occur in three situations:

- at poweron, when the drive runs a series of diagnostics,
- after you run a diagnostic from the Control Panel, and
- during normal operation.

You can respond to many of the messages which occur from the poweron and other diagnostic tests. You cannot respond to some runtime errors however, because the tape drive only notifies the host of these errors and may continue running. Anytime an error occurs, the error is entered into an error log maintained by the drive. If the error is caused by a hardware failure, the error is reported to the host.

The following chart lists error messages you may see on the Control Panel display and the steps to take when you see them.

		MESSAGES	ACTION
T E S T		RUN <###>	Test <###> is running. No action necessary.
		PASS <###>	Test <###> has passed. No action necessary.
		FAIL <###>	Test <###> has failed. Press ENTER to display error code.
		ERR 01	Test needs a tape to execute. Mount tape.
		ERR 04	Tape is write protected. Remove write-enable ring or use a new scratch tape.
		ERR 06	Close top cover.
		ERR 20	Select valid test number.
O P E R A T I O N		ERR 31	Wait until system is available.
		ERR <###>	Call Hewlett-Packard.
		MISLOAD	Follow tape loading steps in Chapter 2. If message persists, read "AUTOLOAD PROBLEMS" in Chapter 3.
		BUSY	Drive completing online functions. No action necessary. Pressing RESET aborts host operations but may cause data loss. This indication stops when host is finished.
		INVALID	Select valid key. Chapter 2 explains the functions of the keys.
		NO BOT	UNLOAD tape and manually check for proper location and placement of the BOT marker. Refer to "REPLACING BOT/EOT MARKERS" at the end of Chapter 3.
		CHECK	Excessive soft error rate. Clean the tape path. Tape path cleaning procedures are in Chapter 4.

Error Messages and Actions

Displaying the Error Logs

A number of logs are maintained by the drive. These logs contain errors detected during operation, drive performance information, drive usage information, and various other statistics.

THESE LOGS ARE PRIMARILY FOR THE USE OF TRAINED SERVICE PERSONNEL, but you may be asked to access the log(s) at some time to retrieve information (possibly prior to a service call).

To display the error log(s), follow these steps:

1. Take the drive OFFLINE (press the **ONLINE** Key, if necessary).
2. Press **OPTION**.
3. Press **NEXT** twice to bring *INFO ** into the display.
4. Press **ENTER**. The display will show *INFO 0*.

This log contains the last 30 errors that occurred during operation of the drive.

5. If this is *not* the log you want, go to Step 7. If this *is* the log you want, press **ENTER** again to begin showing the information.
6. Step through the entries as necessary.**

** Pressing **NEXT** increments the log entry by 1, pressing **PREV** decrements the log entry by 1.

The first digit of the error code in the log entry indicates the order in which the errors occurred (e.g. *E01*, *E02*, etc.). The *greater* the number in the log, the *more recent* the error.

GO TO STEP 9.

7. If you are requested to read a different log than Log 0 (*INFO 0* is in the display), bring that *INFO* number into the display.**

** Pressing **NEXT** increments the number by 1, pressing **PREV** decrements the number by 1. Pressing the lower right key on the panel, the **UNLOAD** Key, increments the number by 10s, pressing the lower left key on the panel, the **ONLINE** Key, decrements the number by 10s.

8. Press **ENTER** to begin showing the information.**

** Pressing **NEXT** increments the log entry by 1, pressing **PREV** decrements the log entry by 1.

The first digit of the error code in the log entry indicates the order in which the errors occurred (e.g. *E01*, *E02*, etc.) The *greater* the number in the log, the *more recent* the error.

9. When finished reading the log(s), press **ENTER**. The display returns to *INFO **.

10. Press **OPTION** or **RESET** to leave Option mode.

Diagnostics

Two sets of diagnostic tests are available to the operator; a series of poweron selftests and a series of confidence tests.

If a test fails, check the chart in the front of this chapter. If the error is not listed in the chart notify your nearest Hewlett-Packard Service Center.

CAUTION



Run ONLY the tests described in this Guide. Take care when you are selecting test numbers. Some tests will overwrite data on the tape.

Available Tests

TEST 0 calls all poweron diagnostics. Run automatically at poweron or manually by the operator, **TEST 0** calls a sequence of tests that checks all data paths and normal machine operation. **TEST 0** also sequences through all the Control Panel lights and indicators. This test should take no more than 45 seconds.

CAUTION



You must use a write-enabled "scratch" tape for the next test, **TEST 1**. The test overwrites any data on the tape.

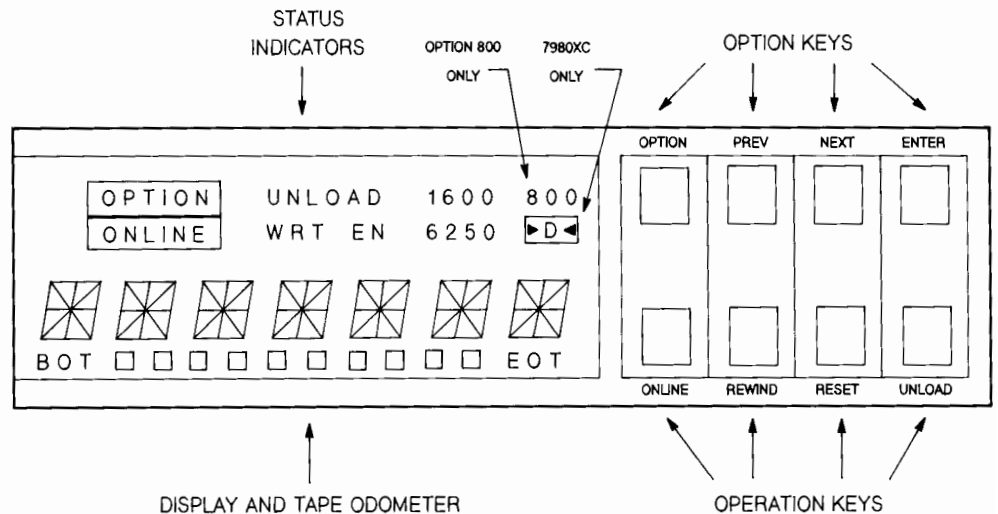
TEST 1 completely checks out the drive. The test first runs all poweron tests, then loads a tape and checks out all sensors. The test causes a write to EOT, a rewind, and then a read from the tape at each of the densities your drive is capable of writing. On a 2400-ft tape, with 800, 1600, and 6250 cpi densities, this test takes about 35 minutes.

TEST 70 lights all of the Control Panel indicators and displays.

TEST 71 tests the keys on the Control Panel. The name of each key is displayed for one second after that key is pressed. The test is terminated by pressing **RESET** twice.

TEST 72 is an interactive test that checks control panel functions. After selecting this diagnostic, press the keys in the following order:

1. **OPTION** This function is tested by selecting the next language in Configuration 48. The Tape Odometer shows the languages as positions on the left end of the row of indicators. Repeatedly pressing the **OPTION** Key cycles the selection through **ENGLISH**, **GERMAN**, **FRENCH**, and **SPANISH**. The three indicators on the left end of the odometer scale light, in turn, from left to right (none lit = English, first indicator lit = German, second indicator lit = French, and third indicator lit = Spanish).
2. **PREV** This function is tested by selecting the display message stored in memory that “precedes” the message currently in the display. Repeatedly pressing this key steps “backwards” through the available list of messages in the current language.
3. **NEXT** This function is tested by selecting the display message stored in memory that “follow” the message currently in the display. Repeatedly pressing this key steps “forward” through the available list of messages in the current language.
4. **ONLINE** Resets the message pointer back to the first message shown when this test was started.
5. **ENTER** or **RESET** Stops **TEST 72**.



Running Tests To run a diagnostic test, follow these steps. **TEST 1**, “General Checkout” is used as an example:

1. Insert a write-enabled “scratch” tape.
2. Close the tape door.
3. After the drive positions the tape at **BOT**, take the drive **OFFLINE** (press **ONLINE**, if necessary).
4. Press **OPTION**. **TEST *** appears in the display.
5. Press **ENTER**.

6. Bring the test number you want into the display.

For this example, *TEST 1*, press the **NEXT** Key once to bring “1” into the display. If you go past the number “1”, press **PREV** to decrement the number.

When selecting tests with much higher numbers (for example, Test 72), you may want to use the **UNLOAD** Key to increment the display by 10s or the **ONLINE** Key to decrement the display by 10s until you get close to the number and then use the **NEXT** or **PREV** Key to increment or decrement the display to the proper units digit.

7. Press **ENTER**.

8. The display prompts *ONCE **, asking you if you want the test to be run only once.

If you would like to run the test more than once (perhaps checking for intermittent problems), use **NEXT** and **PREV** to display your other choices. Your other choices are: 10 times, 100 times, 1000 times, or **LOOP** (runs continuously until **RESET** is pressed).

9. Press **ENTER** to run the test.

The drive displays *RUN <test number>*, indicating which individual test in the sequence is running. (These individual tests are not described in this Guide because they have meaning only for those trained to service this product. You will want to know only if the sequence completes successfully or not.)

10. When the test is over, either *PASS <test number>* or *FAIL <test number>* is displayed.

If the test passed and you want to repeat the test or to select another test, press **ENTER** or **RESET**. The display will return to the level that displays the test number (in this case it will display *TEST 1*).

If you want to select the same test, press **ENTER** and then repeat Steps 8 and 9.

If you want another test, use the **NEXT** and **PREV** keys (and/or **UNLOAD** and **ONLINE** keys to move by 10s) to select the number of the test you want and then do Steps 8 and 9.

11. If the test fails, press **ENTER** to display the error that caused the failure. If you cannot find the error listed in the chart in the front of this chapter, call the nearest Hewlett-Packard Service Center. Press **RESET** three times to completely exit through the test selection and Option Select levels.
12. To abort a test (*TEST 1* in this case), press **RESET**. Press **RESET** one more time to come back to the Option Select level (*TEST ** appears in the display).
13. Press **OPTION** or **RESET** to leave Option Mode.

Other Problems

Not all problems are diagnostic failures or result in Control Panel messages. Follow these guidelines when something out of the ordinary occurs.

Autoload Problems

If the drive is having difficulty **LOADing** a tape and you are seeing a *NO BOT* message, go to the end of this Chapter to “REPLACING BOT/EOT MARKERS”.

If you do not see *NO BOT* in the display, begin by reading the following **NOTE** and then, if necessary, do the steps that follow the **NOTE**.

NOTE

When transferring the tape drive from a very cold environment to a warm environment, or vice versa, it is very important to let the drive adapt to the new conditions to obtain maximum autoloading performance.

Apply power to the drive for at least one hour before autoloading (**Main AC Power Switch** on the rear panel to "1", **Standby Switch** on the front panel IN). If the new environment is extremely humid or cold, allow at least two hours.

Tapes should also be acclimatized. Remove storage rings or cases and let the tapes set for at least one hour. If extremely humid or cold, allow at least two hours. This procedure allows temperatures to equalize and allows the tapes to dry out sufficiently to insure optimum autoloading.

IF A CHANGE IN ENVIRONMENT DOES NOT SEEM TO BE THE PROBLEM:

1. Press **UNLOAD** to release the tape and open the door. Remove the tape.
2. Pull the release handle on the bottom middle of the front panel to release the drive, then slide the drive out on its rails until the rail lock buttons snap into position.
3. Lift the top cover.
4. Clear any debris off the tape path. If the tape progressed to the takeup reel hub during the LOAD sequence but did not attach to the hub, check to see that the small air inlet holes on the hub are not blocked by debris.
5. Close the top cover.
6. Cut off any wrinkled tape from the end of the tape leader. Use a tape crimper (like the one from Pericom Corporation) to ensure that the end of the tape is cut, crimped and rounded properly. Ensure that the tape that is cut off does not contain the BOT Marker. If the BOT Marker must be cut off, go to *Replacing BOT/EOT Markers* at the end of this chapter.
7. Slide the tape reel in – place the reel in the center or to the right of the tape path opening. (If you insert the reel in to the left, the supply hub cannot always find the reel.)

Make sure the tape leader is free on the right side of the reel; not trapped or pinched by the reel or by the tape path door.

8. Close the tape door. A LOAD sequence begins automatically.
If the tape does not autoloading, try removing and re-inserting the tape a couple of times. If the drive still does not autoloading, you may manually LOAD the tape using the following steps. Also, contact your nearest Hewlett-Packard Service Center.

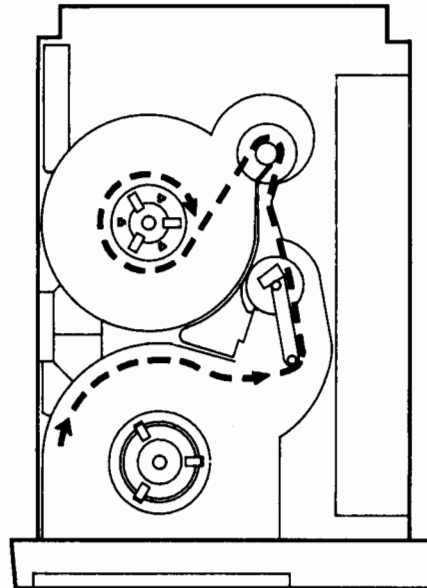
MANUAL TAPE THREADING (see following figure):

9. Lift the top cover.
10. Place the tape reel, with the leader free and on the right side, onto the supply hub.

11. Pull the Hub Release Lever toward you and rotate the supply hub clockwise at the same time. This causes the tape reel clamps in the hub to raise, locking the reel onto the hub. (The finger hole for the Hub Release Lever is to the right of the supply reel bed.)
12. Thread the tape leader through the tape path. Follow the diagram at the end of these instructions or the diagram on the metal plate to the right of the tape path.
Hold the tape onto the takeup reel hub with a finger and wrap the leader around the hub three or four times. Take any slack out of the tape.
13. Close the top cover. A LOAD sequence begins automatically.
14. Slide the drive back into the cabinet.

Place both hands on either side of the front panel and give the drive a short, abrupt push toward the cabinet. This causes the rails to ride up over the rail lock buttons and allows the drive to slide freely.

Slide the drive back into the cabinet until you hear the locks snap.



Tape Threading

No Control Panel Lights

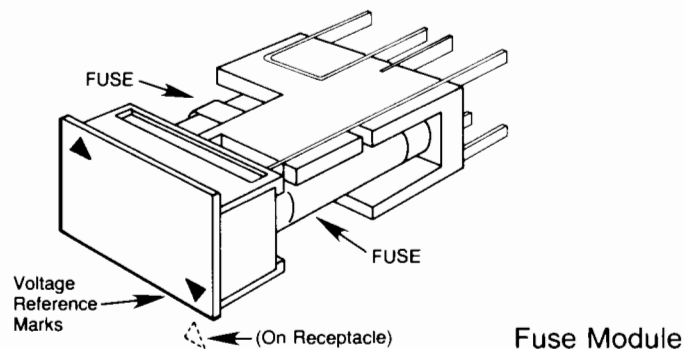
If your power outlets are functioning and the lights are still not operating, follow these steps:

1. Check that all power connections are secure.
2. Check that the Main AC Power Switch on the rear of the drive assembly is in the "1" (ON) position and the Standby Switch on the lower left of the front panel is in (ON).
3. If both the **Main AC Power** and the **Standby Switch** were in their ON positions, try recycling power by switching them both OFF and then both ON again.

4. Check/replace the fuses.

- a) Toggle the front panel **Standby Switch** to the out (OFF) position.
- b) Open the rear access door and press the “0” side on the **Main AC Power Switch** to remove power from the drive.
- c) Disconnect the power cable.
- d) Slide the fuse module out. The fuse module is located directly under the power cable receptacle. When the power cable is removed, a small slot on the top edge of the module can be accessed. Insert your fingernail or a small screwdriver into this slot to break the module free from its flush-mounted position.

Slide the module all the way out and inspect the fuse. Check for correct rating. The fuse in use is on the lower side of the module; the side where the module and receptacle arrows face each other.



- e) Replace the fuse if necessary.

WARNING



Replace a blown fuse with one of the same type and rating. The fuse for 120V operation is 6 Amperes, the fuse for 240V operation is 3 Amperes (3.15 Amperes in Europe).

- f) Slide the fuse module back in, *making sure that the arrow on the edge of the fuse module case points to the correct voltage number on the fuse module (120V or 240V).*
- g) Reconnect the power cable.
- h) Apply power by pressing the “1” on the **Main AC Power Switch** in.
- i) Close the rear door and reposition the drive unit, if necessary.
- j) Press the **Standby Switch** on front panel in (ON).

If the Control Panel lights still do not function properly, call the nearest Hewlett-Packard Service Center.

Power Failure Recovery

When power is restored after a power failure, the drive automatically executes its poweron selftests and re-tensions the tape.

The most probable reason the drive may not recover from a loss of power is that the tape has spooled completely off the supply reel onto the takeup reel. When power is re-applied, the drive executes selftests and then searches forward about 25 feet looking for the BOT Marker. If power was lost when the tape was beyond EOT, the drive will pull the tape completely off the supply reel in its search for the BOT Marker. If the automatic reLOAD fails after a power failure – and the selftest has passed (does *NOT* display *FAIL 0*), follow these steps:

1. Pull the release handle on the bottom middle of the front panel to release the drive, then slide the drive out on its rails until the rail lock buttons snap into position.
2. Lift the top cover. Check to see if the tape has spooled completely off the supply reel onto the takeup reel. If it has, go to Step 3. If not, go to Step 5.
3. Manually thread the tape back through the tape path and wind it around the hub of the supply reel approximately 25 times, or until the EOT Marker passes through the tape path. (It helps to lightly moisten the last inch of the tape to help it initially cling to the supply reel hub.)

To ensure that the drive sees the EOT Marker, wind the Marker all the way back to the supply reel. This gives the drive room to re-tension and ramp up before the EOT Marker passes the BOT/EOT Sensor, located at the base of the Tension Arm.

4. Close the top cover. A LOAD sequence begins automatically.
5. If the tape door opened during the failure, close the tape door to re-initiate the LOAD sequence and then go to Step 8. If the tape door remained closed, go to the next step.
6. Lift the top cover.
7. Wind the takeup reel clockwise until the slack in the tape is removed.
8. Close the top cover. A LOAD sequence begins automatically.
9. Slide the drive back into the cabinet.

Place both hands on either side of the front panel and give the drive a short, abrupt push toward the cabinet. This causes the rails to ride up over the rail lock buttons and allows the drive to slide freely.

Slide the drive back into the cabinet until you hear the locks snap.

10. Press **ONLINE** to resume ONLINE operations (if desired).

MANUAL TAPE UNLOADING

If you cannot wait for power to be restored before removing a tape from the drive, use the following steps:

1. Pull the release handle on the bottom middle of the front panel to release the drive, then slide the drive out on its rails until the rail lock buttons snap into position.
2. Lift the top cover.

3. Rotate the supply reel counterclockwise to rewind the tape.
4. Pull the Hub Release Lever towards you and rotate the supply reel counterclockwise at the same time to retract the reel locking clamps. (The finger hole for the Hub Release Lever is to the right of the supply reel bed.)
5. Remove the tape reel.
6. Close the top cover.
7. Slide the drive back into the cabinet.

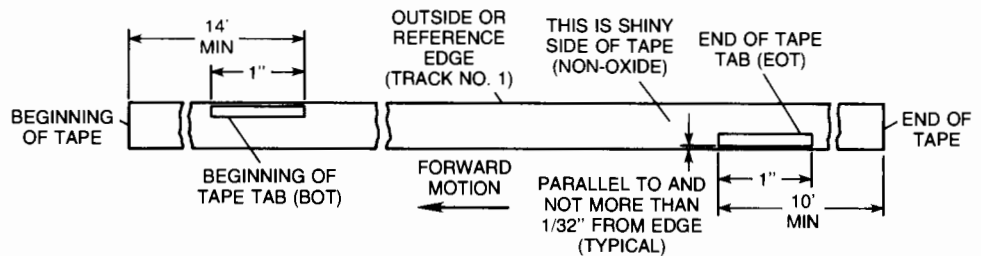
Place both hands on either side of the front panel and give the drive a short, abrupt push toward the cabinet. This causes the rails to ride up over the rail lock buttons and allows the drive to slide freely.

Slide the drive back into the cabinet until you hear the locks snap.

Tape and Tape Path Problems

Tape and tape path troubles are best handled by using the preventive guidelines presented in the next chapter.

Replacing BOT/EOT Markers



BOT/EOT Marker Locations

If a BOT Marker comes off, or the section on which it is mounted is cut off, replace the Marker using the diagram above for a guide. Place the BOT Marker a maximum of 16 feet from the physical beginning of the tape. Do not place the BOT Marker less than 14 feet from the beginning of the tape.

You may order adhesive-backed Magnetic Tape Sense Markers (BOT/EOT tabs) and other supplies from Hewlett-Packard. See Appendix B.

4

Tape Management



Overview

This chapter is divided into three sections: *Tape and Tape Path Problems*, *Tape Path Care* and *Tape Library Care*. Understanding and preventing the symptoms and problems presented here will significantly enhance the performance of your tape drive.

Taking preventative measures is in your best interest, since a clean tape path and clean tapes reduce read/write errors, shorten read/write times, lengthen tape life, and translate into less work for you.

Tape and Tape Path Problems

There are several sources of tape and tape path problems: contamination, tapes that leave oxide and binder on the tape path, high temperatures and humidity, and improper operating practices. To help you identify problems, here's a list of the most common symptoms:

Clear Filming and Brown Staining

A tape sheds binder and oxide during normal tape operations. Usually, debris from the tape can be removed by periodic cleaning. However, some combinations of humidity, temperature, tape tension, tape speed, and chemical composition of the binder in certain brands of tape may cause a deposit to be formed on the head that can not be removed by normal cleaning procedures. An additional problem is that these deposits can not even be seen. If allowed to accumulate, the head will have to be replaced.

If cleaning the head does not correct a high read error rate, contact your Hewlett-Packard service representative. "Clear filming" and "brown staining" can be verified by a drop in read signal levels across all tracks. If this is the problem, further actions can then be worked out with regard to your particular site environment, procedures, and requirements.

Cinching

When you suddenly stop a spinning reel, the outer layers of tape continue to spin. This will cause loose windings within the tape pack to bunch.

Edge Damage

If you hold a reel by the rims or apply pressure or weight on the edge of the reel, you may damage the outer tracks of the tape. Edge damage may also occur if the tape is caught by the reel flange or tape path guide edges.

Pack slip

Slip appears as "steps" in an otherwise smooth winding. If you forget to place a vinyl strip or foam pad on a tape, sections of the tape may shift if you handle the tape roughly or subject it to impact, vibration, or thermal stress. Pack slip also causes uneven winding and rewinding.

Tape Path Care

Tape Stick and Blocking

High temperatures and humidity cause tape binder to soften and stick to the drive head or may cause tape layers to stick together. Either of these may remove the oxide coating.

For optimal performance, follow these suggestions for cleaning schedules, materials, and procedures.

Cleaning Schedule

How often you clean the tape path depends on usage, operating environment, and tape quality.

Most users find that they need to clean the tape path once every eight hours. However, if the error message *CHECK* begins to occur regularly, you should clean the tape path more frequently. If frequent cleaning does not improve reliability, check your tapes. Are the tapes old, worn, or kept in a dirty area? All old and worn tapes should be copied immediately and then discarded. You should evaluate tapes regularly.

The definitions in the following chart should help you develop an appropriate cleaning schedule.

MINIMUM	Clean the tape path thoroughly EVERY EIGHT HOURS if:
	<ul style="list-style-type: none"> ■ less than ten reels are used in eight hours ■ you see no particles on the tape head after each reel of tape ■ you do not suspect abnormal dust in the computer center from increased traffic or vacuuming.
NORMAL	Clean the tape path thoroughly EVERY ONE TO TWO HOURS of continuous running if:
	<ul style="list-style-type: none"> ■ more than ten reels are used in eight hours ■ you see no particles on the tape head after each reel of tape ■ you do not suspect abnormal dust in the computer center.
HEAVY	Clean the tape thoroughly AFTER EACH REEL of tape if:
	<ul style="list-style-type: none"> ■ particles appear on the tape head after each reel of tape ■ you are reading interchange tapes from outside your computer center ■ you are using new or little-used tapes (new tapes usually contain debris from the slitting process during their manufacture).
SPECIAL	Clean the tape path IF:
	<ul style="list-style-type: none"> ■ you suspect abnormal dust in the computer center because of custodial activity, equipment moves, supply delivery, or if the drive has not been used for several days.

Cleaning Schedule Guidelines

Read *Tape Library Care* in this chapter for general guidelines on tape use and storage and to determine whether environmental problems exist in your computer center.

Cleaning Supplies

Cleaning supplies are available from Hewlett-Packard. See Appendix B for ordering information.

Use these materials to clean the tape path:

■ CLEANING SOLVENT

Hewlett-Packard supports **ONLY** the use of LIQUID Freon TF or trichlorotrifluoroethane as a tape path cleaning solvent. Freon TF cuts oil and grease, evaporates quickly, leaves no residue, and will not damage the tape path. If using another solvent, make sure that the cleaning fluid is a high quality solution of trichlorotrifluoroethane and a maximum of 20% isopropyl alcohol.

■ NON-ABRASIVE, LINT-FREE CLOTHS AND/OR SWABS

Please follow these precautions:

CAUTION



Do not use cleaner solutions which contain lubricants. Lubricants deposit on the tape head and impair performance.

Do not use standard hub cleaners or strong alcohol solutions >20%. These solutions will damage the guides and rollers in the tape path and may leave a film on, or otherwise damage the head.

Do not use aerosol cleaners, even if they are Freon TF. The spray is difficult to control and often contains metallic particles that damage the tape head.

Do not use soap and water on the tape path. Soap leaves a thick film, and water may damage electronic parts.

Discard the cloths and swabs after use. Even if they appear clean, they are contaminated.

Do not use facial tissues. Although they may seem effective, they leave highly abrasive lint in the tape path.

Cleaning Procedure

1. Pour a small amount of solvent into a clean container, such as a small UNWAXED paper cup.
-

CAUTION

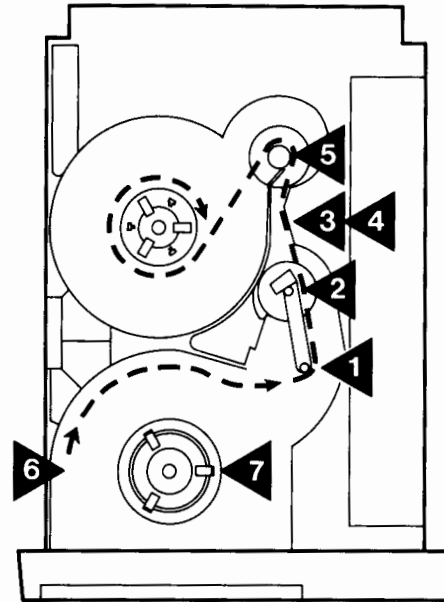


Freon TF dissolves wax. If you use a waxed cup, the wax will transfer to the tape path.

DO NOT dip your cloths and swabs into the solvent can, since this contaminates the solvent.

2. Dab all cloths and swabs into the container as needed.

3. Applying gentle pressure in one direction, use a lint-free swab or cloth to clean the following surfaces (refer to the following figure for locations):
 - 1 – Buffer Arm movable roller
 - 2 – Buffer Arm fixed guide
 - 3 – Tape Cleaner Block (scraping surfaces and inside debris traps)
 - 4 – Read/Write/Erase Head (use a clean swab)
 - 5 – Speed Encoder roller and washer
 - 6 – Use a lint-free wipe to brush out debris in the supply reel bed (depression) in the casting
 - 7 – Periodically check and wipe off rubber gripping fingers on the supply reel hub.



Cleaning Points

Tape Library Care

Using high quality tapes and following these guidelines prevents errors and lengthens the life of your tapes. Poor tape practices cause many failures.



The selection and use of media, supplies, and consumables are the customer's responsibility. Hewlett-Packard reserves the right to exclude from the warranty or service agreement any repairs for damage to HP products which HP reasonably determines or believes was caused by use of non-HP media or cleaning supplies. Hewlett-Packard will, upon request, repair such damage on a time and material basis.

- Storage**
- You may choose to use the Archival Tape Conditioning feature to improve tape stacking for storage. Refer to Chapter 2, "CHANGING REWIND SPEEDS" for the sequence of keystrokes.
 - Keep tapes in a clean environment at all times. Exposure to dust and other particles such as food and cigarette smoke impairs tape performance. Choose storage areas away from office activity to reduce contamination.

-
- Maintain a constant temperature around 70°F (21°C) and a relative humidity around 40%. Tapes subjected to extremes in temperature or humidity may become sticky or brittle.
 - Do not stack tapes horizontally unless they are in metal canisters.
 - Secure the end of the tape by a vinyl strip or a foam pad to prevent tension loss. DO NOT use adhesive tape because it can leave a sticky residue.
 - During long-term storage, reduce contamination by sealing canisters in plastic bags. BE SURE TO REMOVE DUST ON THE OUTSIDE OF THE BAGS BEFORE REMOVING THE CANISTERS.

Transportation

- Avoid physical shock and extreme temperature changes.
- Pack tapes in water-resistant containers when you are moving tapes from one location to another.
- Secure the ends of the tape to maintain proper tension.
- Avoid metal detection equipment (such as the kind in airports), because electromagnetic fields can be strong enough to cause data loss.

Handling

- Hold the reel in the center to prevent edge damage.
- Do not pick up the reel by the flanges; they are easily bent. If the flanges are bent, the tape may unwind unevenly, which can eventually cause edge damage.
- Do not shake the tape. Shaking causes pack slip.
- Prevent sharp blows to the reels. The reel could fracture and damage the tape.

Winding

Proper tension is necessary to ensure smooth movement of the tape and accurate data transfer. Excessive tension permanently distorts the backing, while loose tension causes cinching. A properly maintained tape drive will wind tapes at the correct tension.

- To prevent the pack from losing its tension, secure the end of the tape with either a vinyl strip or a foam pad when you remove it from the drive.
- Tapes can be contaminated if they are wound onto dirty reels. Clean empty reels before using them.
- Adopt a program of regular inspection, winding, and rewinding of stored tapes every six to nine months to ensure wind quality.

Evaluation

You can stop your system from wasting valuable time retrying and skipping bad sections of tape by evaluating your tapes regularly. Reels of tape should be discarded once they reach one or more of the following levels:

1. 150 single-track errors every 2400 feet.
2. 10 total (in any combination) two- and three-track errors every 2400 feet.
3. 1 permanent write error every 2400 feet.

These are maximum error rates. Please evaluate your tapes using whatever system or program is available to you, but set your levels low to prevent data loss and retries.

Labeling To run a well-managed tape library, you must keep accurate records of each tape's condition and adopt a regular schedule of evaluation. This will help you ensure reliability, lengthen tape life, and spot problems quickly.

Use reliability labels, similar to the one in the following figure, to reduce paperwork and increase your efficiency. The labels eliminate files, since they allow you to record a tape's history on the reel itself. You need only glance at the label to identify the condition of the tape and determine when maintenance is required.

The diagram shows a curved rectangular label divided into several sections. On the left side, there are two horizontal lines for 'SERIAL No.' and 'FILE No.'. Below these is a larger section labeled 'NOTES:'. At the bottom left, it says 'DENSITY = 800 1600 6250'. On the right side, there are two horizontal lines for 'CREATED DATE OPERATOR' and 'PURGED'. At the bottom right, it says 'RETENTION PERIOD'.

Example of a Tape Reliability Label

7980XC Only Special care must be taken with tapes written in 6250XC format. This format is intended for large backups and is not generally used for interchange unless the interchange party has a HP 7980XC tape drive. We recommend that you mark tape labels with "6250XC" if the Extra Capacity feature is used.

This labeling can be done manually on the tape label or placed in the "Comments" field of an automated tape library manager.

Labeling tapes is especially important in an installation that uses several different types of tape drives. Although HP 7980XC tape drives recognize and are able to correctly expand the data automatically, other tape drives, such as the HP 7980A, only recognize the tape as a 6250 cpi tape; a host error will be returned when reading is begun.

Mount 6250XC tapes only on HP 7980XC tape drives when data is to be read back. (Any tape may be mounted on any tape drive for a write.)

SERIAL No.	DATE	OPERATOR
FILE No.	CREATED	
NOTES:	PURGED	
DENSITY = 800 1600 6250 6250 XC	RETENTION PERIOD	

Suggested Extra Capacity Tape Label

Resources If tape and tape path problems persist after following all the suggested procedures and practices in this chapter, call the nearest sales office. The tape drive may need to be repaired by a service engineer.

The following publications are available for those who wish to learn more about tape care and library management:

- *Care and Handling of Computer Magnetic Storage Media*, Sidney Geller, National Bureau of Standards Special Publication #500-101, 1983.

Contact:

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

- *The Handling and Storage of Computer Tape*, 3M Company.

Contact:

Technical Service
Data Recording Products Division
3M Company
3M Center
St. Paul, Minnesota 55101

- *Success With Magnetic Tape*, Hewlett-Packard Company, HP P/N 5953-7131, 1986.

Contact:

Hewlett-Packard Direct Marketing Division
1320 Kifer Road
Sunnyvale, CA 94084
(800) 538-8787 in U.S.
(406) 738-4133 in Alaska, California, or Hawaii

Appendix A Set Up and Configuration

Overview

This appendix contains the information you need before and during installation of the tape drive. In addition to offering installation guidelines, it provides instructions to set the address and unit number of your drive, as well as explaining the features available to you in the configuration option.

Site Selection

The HP 7979A/7980A/7980XC tape drives are designed to function within a wide range of temperature and humidity conditions. You should, however, maintain a clean, climate-controlled operating area to maximize the drive's performance.

Actual operating range is limited by the magnetic tape. Because the tape path and the tape are susceptible to contamination and are sensitive to changes in temperature and humidity, tape handling procedures should include the suggestions outlined in Chapter 4.

For optimal performance, follow these guidelines when selecting a site:

- The area does not have to be air conditioned, but the temperature should fall between 65°F and 75°F, non-condensing (18°C to 24°C).
- Position the drive away from frequently-used doors and walkways, stacks of supplies that collect dust, and smoke-filled rooms.
- Consider ventilation and door clearance requirements when choosing an appropriate site. The following figures should help you determine the space needed for the drive.
 - Leave a minimum of 3 inches (70 to 80 mm) behind the rear of the drive to allow air to circulate.
 - Maintain a clearance of at least 39 inches (1 meter) in front of the unit for pulling the cabinet out during servicing.



NOTE Follow the most stringent environmental specifications for any device within your system. Adhere to any restrictions listed for that device to maximize system performance.

Inspection and Installation

Before installation, inspect the cabinet and drive carefully. If you see any damage, immediately contact the Hewlett-Packard Sales Office that arranged for your delivery and also file a claim with the carrier. If possible, save the shipping container. Be sure to include the model and serial number of the drive in any correspondence with the Sales Office and with the carrier.

The following is a list of the accessories shipped with the drive. Reorder numbers are listed in Appendix B. Contact your Hewlett-Packard Sales Office if any item is missing.

“User’s Guide”	1
“Success With Magnetic Tape”	1
Magnetic Tape (2400-ft)	1 reel
Magnetic Tape Head Cleaner	1 can
Foam Swabs	1 package of 50
Tape Seal Holder	2
HP-IB Cable (2-metre)	1
Power Cable (voltage depends on destination)	1

Accessories Shipped with the HP 7979A/7980A/7980XC Tape Drives

Move the drive to the operating site using the following precautions. Use these precautions any time the drive is relocated.

- Two people should move the drive; one to push and the other to guide it safely.
- Ensure that the levelers are not touching the floor.

CAUTION



If the levelers contact the floor while the drive is being moved, they may bend or break and the drive may tip over. After moving the drive to its operating site, lower the leveler feet to stabilize the unit.

Contact your Hewlett-Packard Sales Representative and arrange for an HP Customer Engineer to complete the installation.

Refer to Chapter 2 for operating instructions, or to the last section of this appendix if you need configuring information.

WARNING

Do not operate the drive until a Hewlett-Packard Customer Engineer has installed and thoroughly checked its operation. If the system is configured incorrectly or there are signs of damage, you could injure yourself or the drive when the drive is powered up. Repairs necessitated by the misuse or improper operation of the drive are not covered under warranty.

Cabling

HP-IB cabling requires that the total cable lengths in a configuration, both internal and external, must not exceed the total cable lengths supported by the devices in that configuration. (Cable lengths are given here in meters.)

The maximum allowed length of the HP-IB cable which connects devices to a General I/O Channel (GIC) is 7 meters plus 1 meter for each device. Two meters are used internally in the System Processor Unit (SPU) and must be subtracted from the total cable allowed. The result is that there are 5 external meters supported plus 1 meter for each device.

The HP 7979A/7980A/7980XC tape drives accept the HP-IB cable directly into their HP-IB transceivers and therefore have an internal cable length of 0 meters. These tape drives support 1 meter of external cable length.

The following example shows how both the internal and external cable length ("loads") of a simple system are used to calculate the maximum amount of cable allowed between the GIC and the tape drive. The example assumes a HP3000 Series 64 computer using a GIC supporting 7 meters of cable with 2 meters of cable internally (from the SPU to the outside of the cabinet).

HP 7979A/7980A/7980XC	
Cable length Supported	+ 1 m
GIC	
Cable length Supported	+ 7 m
HP 7979A/7980A/7980XC	
Internal Cable (inside cabinet)	0 m
GIC	
Internal Cable (inside cabinet)	- 2 m
<hr/>	
Cable available	+ 6 m

When all supported external cable lengths (pluses in this case) are added to all existing internal cable lengths (minuses in this case), the optimum result should be zero. If there is a difference, it must be on the side of having more cable supported than actually used. If the amount of supported cable length

(total of internal and external) is exceeded, spurious and hard-to-find errors will most probably be introduced into the system.

A GIC supports from 1 to 8 HP-IB peripherals. Depending on the type of peripheral and its time of use, connecting other peripherals to the GIC that supports this drive might degrade the performance of the drive to an unacceptable level.

To add some flexibility in installation, the cable length supported by the HP 7979A/7980A/7980XC may be increased by using the resistor packs on the HP-IB board.



NOTE

Short HP-IB cables should not be linked together to make a longer cable. Use a single cable of the correct length.

The following is a list of the different lengths of HP-IB cables available from Hewlett-Packard.

LENGTH	PART NO.
1.6 ft (0.5 m)	10833D
3.3 ft (1.0 m)	10833A
6.6 ft (2.0 m)	10833B
13.2 ft (4.0 m)	10833C

Setting the HP-IB Address

The Customer Engineer will set the HP-IB address during installation. Follow the following instructions should you ever need to change it.

1. Take the drive offline.
2. Press **OPTION** to enter the Option Mode. *TEST ** appears in the display.
3. Press **NEXT** until *ADDR ** appears.
4. Press **ENTER** to select the ADDRESSing Option.
5. Using **NEXT** or **PREV**, display the address desired (OFF, or 0 to 7)
6. Press **ENTER**.

The address you selected appears as *SET <#>*. The # will be the HP-IB address (or *OFF*). This display will last for 1 second and then return to the *ADDR ** display.

NOTE The drive is shipped with the Address set to *OFF*. The setting should only be used to remove the drive from the HP-IB.

-
7. Leave the Option Mode by pressing **OPTION** or **RESET**.

Configurations

The following are the factory-set configurations for the HP 7979A/7980A/7980XC tape drives. These settings are held in non-volatile memory; the settings are retained, even when power is removed from the drive.

Some of these configurations may be changed by the operator. These configurations are marked by a ● on the left side of the list. The definitions and possible settings for these operator-changable configurations follow the list of "INITIAL CONFIGURATION SETTINGS."

The procedure for changing a configuration is at the end of this Appendix, under "SETTING A CONFIGURATION OPTION."

During installation, your Hewlett-Packard Customer Engineer should make a tape containing these configuration settings and give it to you. This will provide a record from which you may restore configurations in the event the battery that maintains the non-volatile memory is removed (during service) or fails.

NOTE If your use of the tape drive requires special configurations, contact your nearest Hewlett-Packard Sales and Service Office.

INITIAL CONFIGURATION SETTINGS

(● = operator changeable)		
Option	Setting	Conf. Number
● Enable Change to the Non-Volatile Memory	OFF	40

OPERATOR INTERACTION CONFIGURATIONS

● Auto Online	OFF	41
● Archival Tape Conditioning Rewind	OFF	44
● Operator Select Archive	OFF	45
● Language	0	48
● Density (default for 7980A/7980XC ... later selections of PE or GCR densities are made through the host system) (default for 7979A ...)	GCR	46
<i>7980XC Only</i> ● Compression Control	IXCON	47

PERFORMANCE AND HOST INTERACTION CONFIGURATIONS

WRITE

Immediate Response	ON	50
Tape Marks to Disable Immediate Response	2	51
Write Retry Count	17	52
Low Density (PE) Gap Size	6	53
High Density (GCR) Gap Size	4	54
Stop At EOT	0	55
Write Holdoff Timeout In Seconds	5	56

READ

Readaheads	ON	60
Tape Marks To Terminate Readahead	2	61
Read Retry Count	9	62

DIAGNOSTICS

OPERATOR FEEDBACK

Gauge Usage	0	75
No Break On Failure	OFF	76
● Activity Indicator	OFF	77
Interface Non-volatile Change (not changeable from the Control Panel)	ON	80
● Enable Automatic Unload	OFF	81

(CONF 40) – ENABLE CHANGE TO THE NON-VOLATILE MEMORY

Choices: ON or OFF.

Allows changes to the non-volatile configuration options to be made from the Control Panel. **THIS CONFIGURATION MUST BE SET TO “ON” BEFORE ANY OTHER CONFIGURATION CHANGES CAN BE MADE.** After setting this to ON and then proceeding to change the chosen configuration, it is recommended that you reset this configuration to OFF.

(CONF 41) – AUTO ONLINE

Choices: ON or OFF.

Causes the drive to automatically place itself ONLINE when the tape LOAD sequence completes.

7980XC Only **(CONF 43) – OPERATOR TIMEOUT**

Choices: OFF, 1-99

Controls the timeout used with interactive operator selections. Numbers set value in seconds. When OFF is set, there is no timeout.

(CONF 44) – ARCHIVAL TAPE CONDITIONING REWIND

Choices: ON or OFF.

When ON, the drive performs all rewinds at the slower Archive Tape Conditioning speed of approximately 50 ips.

(CONF 45) – OPERATOR SELECT ARCHIVE

Choices: ON or OFF.

When ON, the drive prompts the operator to select either the Archive Tape Conditioning speed or the normal speed for rewind. The drive prompts the operator before each loading operation.

7980XC Only (CONF 47) – COMPRESSION CONTROL

Choices: XC ON, XC OFF, IXC ON, IXC OFF.

XC ON – Write 6250 cpi tapes in compressed format only.

XC OFF – Do not write tapes in compressed format.

IXC ON – Operator choice with Extra Capacity ON as the default. *XC ON* is flashed until a choice is made between ON or OFF. If no choice is made in 10 seconds (default), Extra Capacity ON (default) becomes the selection in the drive.

IXC OFF – Operator choice with Extra Capacity OFF as the default. *XC OFF* is flashed until a choice is made between OFF or ON. If no choice is made in 10 seconds (default), Extra Capacity OFF (default) becomes the selection in the drive.

(CONF 48) – LANGUAGE

Choices: 0,1,2,3,4,5,6,7

Sets the language used in the Control Panel display to one of the following:

0 – English

1 – German

2 – French

3 – Spanish

4 – English with NO TAPE message instead of READY

5 – German with NO TAPE message instead of BEREIT

6 – French with NO TAPE message instead of PRET

7 – Spanish with NO TAPE message instead of LISTA

(CONF 77) – ACTIVITY INDICATOR

Choices: OFF, 1,2,3

Displays an indicator in the right-most digit of the front panel when host commands are being processed.

1 – indicator = -

2 – indicator = --

3 – indicator = *

CONF 81 – ENABLE AUTOMATIC UNLOAD

Choices: ON or OFF.

When ON, the tape is automatically UNLOADED when the host places the drive OFFLINE.

Setting a Configuration Option

1. Take the drive offline. (Press **ONLINE**, if necessary.)
2. Press **OPTION** to enter the Option Mode. *TEST ** appears in the display.
3. Press **NEXT** until *CONF ** appears.
4. Press **ENTER** to select the configuration set mode.
5. Bring the number *40* into the display.**

** Pressing **NEXT** increments the number by 1, pressing **PREV** decrements the number by 1. Pressing the lower right key on the panel, the **UNLOAD** Key, increments the number by 10s, pressing the lower left key on the panel, the **ONLINE** Key, decrements the number by 10s.

Configuration 40 must be set before any others; it is the *Enable Change to the Non-Volatile Memory*.

6. Press **ENTER**. The display shows the current setting for Configuration 40. This configuration is normally OFF.
7. Use **NEXT** or **PREV** to bring *ON* the display.

-
8. Press **ENTER**. Changing the values currently in non-volatile memory is now enabled.

The display will show *SET 40* for about 1 second to confirm that it has placed the value for ON in Configuration 40. Then, *CONF ** re-appears in the display.

9. Press **ENTER** to select the configuration set mode again.
10. Bring the number of the desired configuration into the display. Use keys as in Step 5.
11. Press **ENTER** to select the configuration.
12. The display will show your current setting for the Configuration that you have chosen. Use **NEXT** or **PREV** to display the "VALUE" desired (used when selecting a LANGUAGE; i.e. 0 [English], 1 [German], 2 [French], or 3 [Spanish]).
13. When your choice is showing in the display, press **ENTER**.
The display will show *SET <value>* for about 1 second to confirm your configuration selection. Then *CONF ** re-appears in the display.
14. Press **OPTION** or **RESET** to return to *READY*.

Configuring densities must be done through the host system.



NOTE

If your use of the tape drive requires special configurations, contact your nearest Hewlett-Packard Sales and Service Office.

Changing the Voltage Configuration

REMOVE POWER FROM THE DRIVE UNIT

1. Toggle the front panel **Standby Switch** to the out (OFF) position.
2. Press the "0" side on the **Main AC Power Switch** on the rear panel to remove power from the drive.
3. Disconnect the power cable.

CHANGE THE VOLTAGE CONFIGURATION

4. Slide the fuse module out.

The fuse module is located directly under the power cable receptacle on the rear of the drive unit. When the power cable is removed, a small slot on the top of the module can be accessed. Insert your fingernail or a small screwdriver into this slot to help slide the module out from its flush-mounted position. Pull the fuse module all the way out.

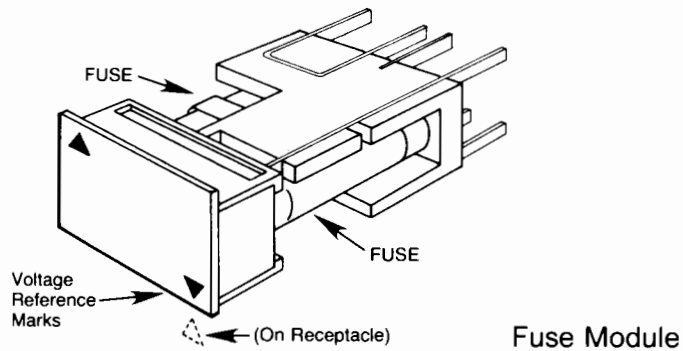


WARNING

The correct fuse for the selected voltage must be in the proper receptacle in the holder.

For 110-120V operation, the fuse is 6 Amperes. For 220-240 V operation, the fuse is 3 Amperes (3.15 Amperes in Europe). Viewed from the end of the fuse holder as the holder is being inserted, the 'active' fuse will be on the right side of the holder – the same side as the Voltage Reference Mark.

5. Rotate the fuse module so that the desired voltage rating arrow (“110-120 V” or “220-240 V”) aligns with the arrow on the lower edge of the receptacle. Ensure that the correct fuse is in on the right side (see WARNING).



6. Connect the appropriate power cable to the power receptacle (110-120 V or 220-240 V cable).
7. Apply power by pressing the “1” on the **Main AC Power Switch**.
8. Press the **Standby Switch** on the front panel in (ON).

Appendix **B** Supplies and Sales Offices

Accessories

A full range of computer supplies may be ordered through Hewlett-Packard. You may obtain the "Computer Users Catalog" by phoning 800-538-8787 or write to:

HP Direct
Hewlett-Packard
P.O. Box 3640
Sunnyvale, California 94088-3640



The following is a list of basic supplies given here for your convenience.

Item	HP Part Number
Magnetic Tape, 600 ft (box of 10)	92150D
Magnetic Tape, 1200 ft (box of 10)	92150E
Magnetic Tape, 2400 ft (box of 10)	92150F
Tape Head Cleaner (Freon TF)	92193F
Foam Swabs (package of 50)	9300-0767
Lint-free Wipes (bag of 100)	92193W
Magnetic Tape Sense Markers (card of 250) (BOT/EOT Markers)	92150M

Sales and Support Offices

United States:

Hewlett-Packard
4 Choke Cherry Road
Rockville, MD 20850
(301) 948-6370

Hewlett-Packard
5161 Lankershim Blvd.
North Hollywood, CA 91601
(818) 505-5600

Hewlett-Packard
5201 Tollview Drive
Rolling Meadows, IL 60008
(312) 255-9800

Hewlett-Packard
2000 South Park Place
Atlanta, GA 30339
(404) 955-1500

Canada:

Hewlett-Packard (Canada) Ltd.
6877 Goreway Drive
Mississauga, Ontario
Canada, L4V 1M8
(416) 678-9430

Europe:

Hewlett-Packard S.A.
World Trade Center
110 Avenue Louis Casai
1215 Cointrin, Geneva, Switzerland
(022) 98 96 51

Australia/New Zealand:

Hewlett-Packard Australia Ltd.
31-41 Joseph Street
Blackburn, Victoria 3130, Australia
895-2895

Japan:

Yokogawa-Hewlett-Packard Ltd.
29-21 Takaido-Higashi 3 Chome
Suginami-Ku, Tokyo 168
(03) 331-6111

Far East Area:

Hewlett-Packard Asia Ltd.
47/F, 26 Harbour Road
Wanchai, Hong Kong
G.P.O. Box 863, Hong Kong
5-8330833

Latin America:

Hewlett-Packard Company
Intercontinental Headquarters
3495 Deer Creek Road
Palo Alto, CA 94304 USA
(415) 857-1501

Appendix C Technical Specifications

Drive Specifications

	HP 7979A	HP 7980A	HP 7980XC
Burst transfer rate (1)			
6250 GCR	N/A	781 Kbytes/s max.	1000 Kbytes/s max.
1600 PE	200 Kbytes/s max.	200 Kbytes/s max.	200 Kbytes/s max.
800 NRZI	N/A	100 Kbytes/s max.	N/A
Speed			
Read/Write	125 ips	125 ips	125 ips
Rewind		320 ips average, 400 ips maximum (90 seconds to rewind a 2400-ft tape)	
Density/Format			
Density	1600 cpi	6250 cpi 1600 cpi 800 cpi (Opt. 800)	6250 cpi 6250XC 1600 cpi
Formatted Data Capacity (2400-ft reel)	40 Mbytes (typ. 1600)	140 Mbytes (typ. 6250) 40 Mbytes (typ. 1600) 20 Mbytes (typ. 800 cpi)	200-700 Mbytes
Maximum Physical Block Size On Tape*			
6250 GCR	N/A	256 Kbytes	256 Kbytes
1600 PE	64 Kbytes	64 Kbytes	64 Kbytes
800 NRZI	N/A	64 Kbytes	N/A
*block size may be limited by host operating system			
Reliability			
Error Rate			
GCR Hard	N/A	1 in 10 ¹¹ *	1 in 10 ¹¹ *(2)
PE Hard	1 in 10 ¹⁰ *	1 in 10 ¹¹ *	1 in 10 ¹¹ *
NRZI		1 in 10E10*	
*at 90% statistical confidence			

¹ These rates are the maximum tape drive potential and do not reflect actual transfer rates, which depend on the host used.

² Specified in tens of number of bytes per unrecoverable read error. Because less tape is written per amount of data, the number of bytes stored per error is less than 1 in 10¹¹. However, if a record is unreadable it would represent more data than with industry-standard 6250 cpi density.

HP 7979A/7980A/7980XC

FUNCTIONAL CHARACTERISTICS

Internal Buffer Size	256 Kbytes
Operating Mode	Streaming
Interface	HP-IB (IEEE 488)

POWER REQUIREMENTS

Line Voltage ($\pm 10\%$)	100-120 VAC 200-240 VAC
Line Frequency	50-60 Hz
Power Consumption	
Maximum	250 Watts
Standby	20 Watts
Idle	170 Watts

PHYSICAL SPECIFICATIONS

Mechanism	
Height	222 mm (8.75 in.)
Width	483 mm (19.0 in.)
Depth	673 mm (26.5 in.)
Weight	38.5 kg (85 lbs)
Mechanism In The Rack	
Height	1000 mm (39.37 in.)
Width	600 mm (23.62 in.)
Depth	800 mm (31.5 in.)
Weight	136.5 kg (300 lbs)
Shipping Weight	177.25 kg (390 lbs)

Tape Specifications

Width	12.7 mm (0.5 in.)
Thickness*	0.038 mm (1.5 mils)
	Tape should meet or exceed ANSI X3.40-1976)

*see *Using 1-Mil Tape* at the end of these specifications

Tension	283 g (10 oz \pm 1 oz)
Reel Sizes	267 mm (10.5 in.) 216 mm (8.5 in.) 178 mm (7.0 in.) 152 mm (6.0 in.)

Environmental Specifications

HP 7979A/7980A/7980XC

Temperature	
Operating	15-32 C
Non-Operating	0-55 C
Storage	-40 to 70 C
Rate of Change	20 C per hour
Relative Humidity	
Operating	Tape medium limited to 20%-80% at <25 C maximum wetbulb temperature
Storage/Shipment	90% at 40 C
Altitude	
Operating	3000 m (10,000 ft)
Non-Operating	15,300 m (50,000 ft)
Shock	
Transportation	Trapezoidal pulse, 168 ips, 30 G min.
End-Use	Half-sine pulse, 57 ips, <3 ms duration approx. 150 G
Vibration	
Operating Random (0.21 GRMS)	5-500 Hz, 0.21 G rms
Non-Operating Random (2 GRMS)	5-500 Hz, 2.0 G rms
Non-Operating Swept Sine (0.5 G peak)	5-500 Hz, 0.5 G peak
Audible Noise (weighted sound power)	
Read Write Operation	6.6 Bels (A)
Tape Loading Operation	7.2 Bels (A)
Heat Dissipation	1280 BTU/hr maximum, 850 BTU/hr (typical)
Safety	
Underwriters Laboratories UL 478, 5th Edition (UL listed)	
Canadian Standards Association C22.2 No. 154-M1983 (CSA certified)	
International Electrotechnical Commission IEC 380, 435 (complies)	
Technischer Uberwachungs-Verein Bayern Inc. (TUV) DIN IEC 380/VDE 0806/08.81	
Emissions	
Federal Communications Commission FCC-A	
Fernmeldetechnisches Zentralamt (Telecommunications Central Office, West Germany) FTZ 1046/84 (with level B Controller) VDE-B	
Voluntary Control Council for Interference by Data Processing Equipment and Electronic Office Machines (VCCI) Class 1 0dB	

Using 1-Mil Tape

Hewlett-Packard supports the use of 1-mil (3600-ft reel) tapes on the HP 7979A/7980A/7980XC tape drives **only under certain conditions**. These conditions are stated at the end of the following background information.

Electrically and magnetically, 1-mil tapes are equivalent to ANSI-standard 1.5-mil tapes, but do not meet ANSI thickness specifications due to their thinner Mylar substrate. Thin tape was designed for low-speed datalogging operations.

Two characteristics of 1-mil tape must be taken into account before this tape is used; 1-mil tapes are more susceptible to deformation and breaking, and thin tapes conform to the read/write heads differently and therefore wear the heads differently than 1.5-mil tapes.

With regard to tape deformation, the HP 7979A/7980A/7980XC drives will physically handle 1-mil tapes without deforming or breaking them. All tape operations are supported, including autoloader.

With regard to different head wear patterns, the HP 7979A/7980A/7980XC heads are affected by use of 1-mil tape in the same way as heads on any other tape drive; the critical read/write area of the head wears at an increased rate and forms a different profile from that made by 1.5-mil tape.

When a 1.5-mil tape is mounted on a drive in which the read/write area of the head has been worn by frequent use of 1-mil tape, the thicker 1.5-mil tape cannot conform to the wear profile caused by the 1-mil tape and will pass over the read/write area of the head at a greater distance. This increased tape-to-head distance causes signal loss. The effect of signal loss can be an increase in read and write errors. This effect is true for all industry-standard half-inch tape drives.

Because of the incompatibility of the head wear profiles, Hewlett-Packard can support the use of 1-mil tapes on the HP 7979A, HP 7980A, and HP 7980XC drives only if the following guidelines are used:

- if a significant portion (more than 1 tape in 10) of the tapes used on the drive are 1-mil tapes, we recommend that a drive be dedicated to the use of the thinner tapes
- if less than 1 tape in 10 used on the drive is a 1-mil tape, AND at least 10 1.5-mil tapes are mounted between the mountings of the 1-mil tapes, the two tape types can be used on the same drive.

Glossary

Address	A number that identifies the location to which the CPU (or “host”) can send data or from which the CPU receives data.
Archival Tape Conditioning	An optional method of rewinding a tape which is going into long-term storage. The tape is rewound back onto the original (supply) reel at a reduced speed which prevents air from being trapped between tape layers; resulting in a smooth, even tape stack on the reel.
Autoload	Capability of a tape drive to perform a LOAD operation automatically (see LOAD).
Backup	The process of copying data from one mass storage device to another.
Block	A group of data handled as a single unit.
BOT	Reflective marker that indicates the beginning of the space available for data storage on the tape.
BPI	Bits-Per-Inch (when considering one track). Is also known as Bytes-Per-Inch or Characters-Per-Inch (CPI) if one inch of the full width of the tape is considered. (Bits are recorded in parallel.)
Buffer	A block of memory that temporarily stores data being transferred from one device to another; the buffer compensates for the different processing rates of the devices. This drive has a 512 kbyte buffer. A high-speed buffer is also called a <i>cache</i> .
BUS	A bundle of wires over which computer devices can communicate. The bus allows connection of multiple devices which can communicate with the host simultaneously.
Cache	A high-speed buffer used to store sequences of instructions from the main memory. When the CPU needs an instruction, it first searches cache memory instead of the slower main memory.
Confidence Test	A diagnostic or series of diagnostics that assures the operator or service personnel that the drive is functioning correctly. A confidence test, for example, may test all of the control panel indicators by lighting them in sequence.
CPI	Characters-Per-Inch; a measurement of tape density. Density is expressed using this term when all tracks in one inch of tape are looked at in cross-section (eight data tracks plus one track containing parity). When only one track is considered, the term <i>bpi</i> is used. (See BPI.)
CPU	Central Processing Unit; also called “host.” The CPU is where instructions or programs are decoded and executed.
Crimper	A small instrument that cuts and rounds the tip of the tape.
Data Compression	The process of maintaining the same information in fewer bits.
Diagnostics	Tests that “diagnose” or detect hardware problems or errors.
Density	The number of bits or characters that can be recorded in a given length of tape; expressed in <i>bpi</i> or <i>cpi</i> .
Directory	The table of contents for the files stored on a tape or disc.

EOT	Reflective marker that indicates the end of the space allowed for data recording. This marker is usually placed about 10 feet from the physical end of the tape.
Error Log	A block of memory in the drive that logs recent errors.
Extra Capacity	The term used when referring to data compression on a HP 7980XC tape drive. Standard-length tapes are able to store more information when written to in "Extra Capacity" format and can, therefore, be viewed as having an "extra" capacity for information. Extra Capacity is also known as "6250XC".
GCR	Group-Coded Recording format. Enables a drive to store 6250 characters per inch and includes the ability to detect and correct simultaneous errors in up to two tracks.
Head	The assembly that writes electromagnetic bits onto tape and/or reads previously written bits from tape.
Image Backup	(Usually applied to backing up of a random-access device; i.e. disc). All sectors and cylinders of a disc are copied, serially, to the backup device without any attempt to assemble complete files. Fragmented files remain fragmented files.
IPS	Inches Per Second; a measurement of tape speed.
KByte	A unit of measurement for memory storage, also called "k" or "kilobyte." One kilobyte is equal to 1,024 bytes.
Load	To move tape from the supply reel, through the tape path to the takeup reel, establish tension, and position the Beginning of Tape point (BOT) at the "start" point with respect to the head.
MByte	A unit of measurement for memory storage, also called "Mb" or "megabyte." One megabyte is equal to 1,024,000 bytes (approximately one million).
NRZI	Non-Return-to-Zero Inverted format. Enables a drive to store 800 characters per inch and includes the ability to detect (but not correct) errors.
Offline	Tape drive mode in which the drive will not execute read and write commands for the CPU.
Online	Tape drive mode in which the drive is able to communicate with the CPU.
PE	Phase-Encoded recording format; allows 1600 cpi and single-track error detection and correction.
Protocol	The set of commands which manages the transfer of data from one device to another.
Queue	A lineup of operations or commands waiting to be executed.
Read/Write Head	See <i>HEAD</i> .
Selftest	A sequence of small test programs the drive executes when you turn it on. These programs check that the drive is functioning correctly.
Start/Stop Operation	Intermittent data flow, as opposed to <i>streaming</i> operation.
Streaming Operation	Continuous data flow to or from the tape drive, as opposed to <i>start/stop</i> operation.
Superblock	A block size of approximately 60 kilobytes used by the HP 7980XC when writing in "Extra Capacity" format. The normal block size is 16 kilobytes.
Tape Collar	A protective, plastic circle that fastens around the tape and holds the tape in place.
Transfer Rate	The rate at which data is transferred from one device to another.
Unload	A rewind sequence where all the tape is wound back onto the supply reel.
Write Enable	To enable writing to tape; the tape is not <i>write-protected</i> .

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- Write** A ring installed on the back of tape reels. When the ring is ENABLE RING in place, you may record data on the tape; when the ring is removed, data may not be written to the tape (tape is write-protected).
- Write-Protect** To protect data on the tape from being erased or overwritten; the tape is write-protected if the write-enable ring is removed from the back of the tape reel.
- 6250XC** Another term used for EXTRA CAPACITY. See EXTRA CAPACITY.

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