

1/2-inch Tape Drive User's Guide

HP 7979A/S and HP 7980 Series



HP Part No. 07980-90070
Printed in USA December 1991

Edition 1
E1191

Notice

This document contains information that is protected by copyright. All rights are reserved. No part of this document may be photocopied, reproduced, or translated to another language without the prior written consent of Hewlett-Packard Company. The information contained in this document is subject to change without notice.

Hewlett-Packard makes no warranty of any kind with regard to this printed material, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Hewlett-Packard shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this material.

FCC Radio Frequency Interference Statement (USA Only)

This equipment generates and uses radio frequency energy and, if not installed and used properly (that is, in strict accordance with the manufacturer's instructions) may cause interference to radio and television reception. The equipment has been type tested and found to comply within the limits for a Class A computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference in a commercial environment. Operation of this equipment in a residential area is likely to cause interference.

If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on (using the power switch located on the Disk Library System rear panel), the user is encouraged to try to correct the interference by one or more of the following measures:

- Re-orient the receiving antenna.
- Relocate the computer equipment with respect to the receiver.
- Move the computer away from the receiver.
- Plug the computer into a different outlet so that computer and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/ television technician for additional suggestions.

The Federal Communications Commission has prepared a booklet entitled *How to Identify and Resolve Radio - TV Interference Problems* which may be helpful to you. This booklet (stock #004-000-00345-4) may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

HP Computer Museum
www.hpmuseum.net

For research and education purposes only.

United Kingdom Telecommunications Act 1984

The HP 7979A/S and HP 7980 Series 1/2-inch Tape Drives are approved under Approval Number NS/G/1234/J/100003 for indirect connection to Public Telecommunication Systems within the United Kingdom.

German Electromagnetic Interference Regulations

Manufacturer's Declaration (English translation)

This certifies that the HP 7979A/S and HP 7980A/XC/S/SX 1/2-inch Tape Drives are in accordance with the Radio Interference Requirements of Directive FTZ 1046/1984. The German Bundespost has been notified that this equipment has been put into circulation, and the right to check the series for compliance with the requirements was granted.

If this equipment is to be operated with a system

- and if the General License is being claimed, the complete system has to comply with the General Licensing requirements.
- which has its own FTZ Serial License, and for which an operating license has been granted or requested, usually no further steps are necessary.

Funkentstörung Deutschland

Herstellerbescheinigung

Hiermit wird bescheinigt, daß die Geräte HP 7979A/S, HP 7980A/XC/S/SX in Übereinstimmung mit den Bestimmungen von Postverfügung 1046/84 funkentstört sind. Der Deutschen Bundespost wurde das Inverkehrbringen dieses Gerätes angezeigt und die Berechtigung zur Überprüfung der Serie auf Einhaltung der Bestimmungen eingeräumt.

Wird das Gerät innerhalb einer Anlage betrieben,

- so muß bei Inanspruchnahme der Allgemeinen Genehmigung FTZ 1046/84 die gesamte Anlage der oben genannten Genehmigung entsprechen.

- die mit einer FTZ-Serienprüfnummer gekennzeichnet ist, und für die eine Betriebsgenehmigung vorliegt oder beantragt wird, so sind in der Regel keine weiteren Schritte notwendig.

Japanese VCCI Statement

この装置は、第一種情報装置(商工業地域において使用されるべき情報装置)で商工業地域での電波障害防止を目的とした情報処理装置等電波障害自主規制協議会(VCCI)基準に適合しております。

従って、住宅地域またはその隣接した地域で使用すると、ラジオ、テレビジョン受信機等に受信障害を与えることがあります。

取扱説明書に従って正しい取り扱いをして下さい。

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, adjustments, maintenance, or repair of this product, other than that described within this document, must be performed by a Hewlett-Packard authorized service representative.

Printing History

New editions of this manual incorporate all material updated since the previous edition. The manual printing date and part number indicate its current edition. The printing date changes when a new edition is printed. (Minor corrections and updates incorporated at reprint do not cause this date to change.)

Edition 1 December, 1991

Contents

1. Introduction	
About This Guide	1-1
Typographical Conventions	1-2
About the HP 7979A/S and HP 7980 Series Tape Drives	1-3
2. Setting Up the Tape Drive	
Checking for Shipping Damage	2-1
Selecting a Site	2-2
Setting the Voltage	2-3
Connecting to the Host	2-5
HP-IB Host Connection	2-5
SCSI Host Connection (HP 7979S, HP 7980S/SX)	2-7
Connecting Power and Switching On	2-7
Setting the Address/ID Number	2-8
Configuring the Tape Drive to the Host	2-8
3. Operating the Tape Drive	
Using the Control Panel	3-1
Operation Keys	3-5
Option Keys	3-6
Status Indicators	3-7
Switching the Tape Drive On and Off	3-8
Loading a Tape	3-10
Write Density/Enable	3-12
Extra Capacity Feature (HP 7980XC/SX only)	3-13
Extra Capacity Storage Configuration Procedure	3-13
Monitoring Data Compression	3-14
Customizing Drive Operation	3-15
Changing the Time Used in Operator Timeout	3-15
Changing Rewind Speeds	3-16
High-Speed Rewinds (regular) or Archival Tape Conditioning	3-16
Regular/Archival Tape Conditioning (choice mode)	3-17
Unloading a Tape	3-17
Setting a Configuration	3-18
Running a Diagnostic Test	3-20
Reading an Information Log	3-22
Clearing an Information Log	3-22

4. Caring for the Tape Drive and Tapes	
Cleaning the Tape Path and Tapes	4-2
Cleaning Schedule	4-2
Cleaning Supplies	4-3
Cleaning Procedures	4-4
Before You Begin	4-5
Clean the Read/Write Head	4-5
Clean the Cleaner Block	4-6
Clean the Tape Path	4-7
Cleaning Tapes	4-8
New Tapes	4-8
Managing and Caring for Tapes	4-9
Storing Tapes	4-9
Transporting Tapes	4-9
Handling Tapes	4-10
Rewinding Tapes	4-11
Evaluating Tapes	4-11
Labeling Tapes	4-12
Resources	4-14
Selecting Tapes	4-15
Using 1-Mil Tape	4-15
5. Troubleshooting	
Interpreting Error Messages	5-1
Internal Diagnostics	5-3
Available Tests	5-3
Other Corrective Actions	5-5
Tape Does Not Autoload	5-5
If a change in environment is not the problem:	5-5
Manual Tape Threading	5-6
No Control Panel Lights	5-7
Power Failure Recovery Incomplete	5-10
Manual Tape Unloading	5-11
BOT/EOT Markers Must Be Replaced	5-12
Tape and Tape Path Not Clean	5-12
Clear Filming and Brown Staining	5-13
Cinching	5-13
Edge Damage	5-13
Pack Slip	5-13
Tape Stick and Blocking	5-13
A. Control Panel Messages	
Messages During Normal Operation	A-2
Warning and Error Messages	A-2
Idle Operation and Tape Position Messages	A-3
Option Selection Messages	A-3
Messages When Within Options	A-4
Messages When Within Test Option Mode	A-4
Messages During Diagnostics	A-5
Configuration Value Messages	A-5

B. Configurations	
HP-IB Configurations	B-2
UNLOCKED HP-IB Configurations	B-4
CONF 40 - ENABLE CHANGE TO THE NON-VOLATILE MEMORY	B-4
CONF 41 - AUTO ONLINE	B-4
CONF 43 - OPERATOR TIMEOUT 7980XC/SX Only	B-4
CONF 44 - ARCHIVAL TAPE CONDITIONING REWIND	B-4
CONF 45 - OPERATOR SELECT ARCHIVE	B-4
CONF 47 - COMPRESSION CONTROL 7980XC/SX Only	B-4
CONF 48 - LANGUAGE	B-5
CONF 77 - ACTIVITY INDICATOR	B-5
SCSI Configurations	B-6
UNLOCKED SCSI Interface Configurations	B-8
Conf 81 - Block Length	B-8
Conf 82 - Bus Inactivity Limit	B-9
Conf 83 - Disconnect Time Limit	B-10
Conf 84 - Disconnect Length	B-10
Conf 85 - Inquiry Field	B-10
Conf 86 - Interface Only Reset	B-11
Conf 87 - Read EOM Reported	B-11
Conf 88 - SCSI II Compatible	B-11
Conf 89 - EOT Reporting Modes	B-11
Conf 90 - SCSI Parity Checking	B-11
Conf 92 - Suppress Illegal Length	B-11
C. Data Compression	
Extra Capacity Data Storage (HP 7980XC/SX Only)	C-1
How It's Done	C-1
The Compression Algorithm	C-1
Efficient Use of the Tape	C-2
The End Result	C-2
Data Integrity	C-2
Suggested Tape Library Management	C-2
Some Questions and Answers About Using Data Compression	C-3
D. Information Logs	
Interpreting Information Log Displays	D-2
Detailed Information Log Descriptions	D-3
Info 0 - Error Log	D-3
Error Rate Logs	D-4
Info 1 - Error Rate Log	D-5
Info 2 - Current Error Rate	D-6
Info 3 and Info 4 - Cumulative Error Data	D-6
Info 5 - Cumulative Error Rate	D-7
Info 10 - Odometer	D-7
Info 12 - System Software Clock	D-8
Info 13 - Power Cycles	D-8
Info 15 - Battery Date	D-8
Info 20 - Drive Repositioning Statistics	D-9
Info 21 - Tape Autoload Statistics	D-9
Info 24 - Interface Option Identification	D-9

Info 25 - Firmware Rev Number	D-10
Info 30 - Tape Write Compression Rate (XC/SX Models)	D-10
E. Tape Drive Characteristics	
Drive Characteristics	E-1
Reliability	E-2
Functional Characteristics	E-2
Power Requirements	E-2
Physical Specifications	E-2
Tape Specifications	E-3
Environmental Specifications	E-3
F. Ordering: Options, Accessories, and Supplies	
Ordering HP 7979A/S and HP 7980 Series Options and Accessories	F-1
Product Options	F-1
HP-IB Interface Drives	F-1
SCSI (HP Common) Interface	F-1
Upgrade Paths	F-2
Tape Supplies	F-3
Glossary	
Index	

Figures

2-1. Fuse Module	2-4
3-1. Control Panel	3-2
3-2. Write-Enabled and Write-Protected Tapes	3-11
4-1. Cleaning Points	4-4
4-2. Cleaning the Read/Write Head	4-5
4-3. Cleaning the Cleaner Block	4-6
4-4. Cleaning the Tape Path	4-7
4-5. Preventing Tape Edge Damage	4-10
4-6. Example of a Tape Reliability Label	4-12
4-7. Suggested Extra Capacity Reel Label	4-13
5-1. Tape Threading	5-7
5-2. Fuse Module	5-9
5-3. BOT/EOT Marker Locations	5-12

Tables

1-1. Reader's Map	1-1
3-1. Control Panel Keys and Indicators OPERATION KEYS	3-2
3-2. Control Panel Keys and Indicators OPTION KEYS	3-3
3-3. Control Panel Keys and Indicators STATUS INDICATORS	3-4
3-4. Clearing an Information Log	3-22
4-1. Cleaning Schedule Guidelines	4-2
5-1. Error Messages and Actions	5-2
A-1. Messages During Normal Operation	A-2
A-2. Warning and Error Messages	A-2
A-3. Idle Operation and Tape Position Messages	A-3
A-4. Option Selection Messages	A-3
A-5. Messages When Within Options	A-4
A-6. Messages when within Test Option Mode	A-4
A-7. Messages During Diagnostics	A-5
A-8. Configuration Value Messages	A-5
B-1. Drives with HPIB Interface (Initial Configurations)	B-2
B-2. Drives with SCSI Interface - Kits HP 88754A or HP 88755A (Initial Configurations)	B-6
D-1. Information Logs	D-1
F-1. Ordering Options for the HP 7979A/S and HP 7980 Series	F-2
F-2. Upgrade Paths	F-2
F-3. Tape Supplies	F-3



Introduction

About This Guide

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

Table 1-1. Reader's Map

Chapter	Title	Description
1	Introduction	Introduces this manual and the HP Tape Drive products: HP 7979A/S, HP 7980 Series
2	Setting Up the Tape Drive	Describes Poweron, Host Connection, and Address/ID Setup
3	Operating the Tape Drive	Describes Control Panel use, tape load/unload, setting a configuration, running a diagnostic test, and reading and clearing an Information Log
4	Caring for the Tape Drive	Provides information for keeping your tape drive in top operating condition and for selecting tape brands and types.
5	Troubleshooting	Describes the Control Panel error messages (interpretation), the use of diagnostic tests to determine error cause, and problem situations you may encounter
Appendix A	Control Panel Messages	Provides a description of all Control Panel messages.
Appendix B	Configurations	Lists all available configurations and their default settings.
Appendix C	Data Compression	Describes the Extra Capacity data compression tape drive option.
Appendix D	Information Logs	Describes the Control Panel information log displays.
Appendix E	Specifications	Describes the HP Tape Drive (HP 7979A/S, HP 7980 Series) technical specifications.
Appendix F	Ordering Information	Provides ordering information—options, accessories and supplies.

Typographical Conventions

You should be familiar with the following typographical conventions and safety markings before operating the tape drive.

Warning



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



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.

Note



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



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.



Indicates a Control Panel button to be pressed.



Indicates a Control Panel status indicator.



Indicates a message in the Control Panel display.

About the HP 7979A/S and HP 7980 Series Tape Drives

The HP 7979A/S and HP 7980 Series Tape Drives 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:

Note



Throughout this document Hewlett-Packard 1/2 Inch Tape Drives will be referred to in the following ways:

- HP 7979A: HP-IB Interface
 - HP 7979S: SCSI Interface
 - HP 7980 Series Tape Drives:
 - HP 7980A: HP-IB Interface
 - HP 7980S: SCSI Interface
 - HP 7980XC: HP-IB Interface with Extra Capacity performance
 - HP 7980SX: SCSI Interface with Extra Capacity performance
-

- 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:
 - HP 7979A/S supports 1600 cpi Phase-Encoded (PE) recording
 - HP 7980A/S and 7980XC/SX support both 1600 cpi and 6250 cpi Group-Coded Recording (GCR)
 - Option 800 on the 7979A/S and 7980A/S supports 800 cpi Non-Return-to-Zero Inverted (NRZI) format
 - Large cache buffer for fast transfers during start-stop applications; 1 Megabyte on the 7979A/S and 7980A/S; 512 KByte on the 7980XC/SX
 - Easy-to-use diagnostics
 - Custom operating features, selected by the operator from the control panel
 - SCSI interface (HP 7979S, HP 7980S, HP 7980SX)
 - Low power consumption
- In addition, the Extra Capacity models (HP 7980XC/SX) offers:**
- Extra capacity data storage at 6250 cpi (called 6250XC): data storage per tape increased by a factor of 2 to 5 times.
 - Operator choice of drive operation; standard (7980A/S) or Extra Capacity (7980XC/SX) mode.

- 512-Kbyte cache buffer for fast transfers during start-stop applications

Setting Up the Tape Drive

The following setup steps are described in this chapter:

- Checking for shipping damage to the tape drive
- Selecting an appropriate site for the tape drive
- Setting the tape drive voltage
- Connecting the tape drive to the host system CPU
- Connecting the power cable and switching on the tape drive
- Setting the tape drive Address/ID number
- Configuring the tape drive to the host system

Checking for Shipping Damage

Inspect the new tape drive and its packaging.

- Does anything on the shipping container indicate rough handling?
- Is the drive damaged in any way?

If you see or suspect any damage, call your HP products distributor. Also, contact the carrier that delivered the drive.

Selecting a Site

The HP 7979A/S and HP 7980 Series 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 tape drive 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.
- Leave a minimum of 3 inches (70 to 80 mm) behind the rear of the drive to allow air to circulate.

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.

Warning



Do not operate the drive until your authorized service representative has installed it 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.

Setting the Voltage

Your service representative will set the voltage during installation. Use the following instructions should you ever need to change it.

1. Remove power from the tape drive by doing the following:
 - a. Toggle the front panel operation switch to the out (OFF) position.
 - b. Press the "0" side on the main AC power switch on the rear panel to remove power from the drive.
 - c. Disconnect the power cable.
2. Set the voltage configuration by doing the following:
 - a. 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 110-120 V operation, the fuse is 6 amperes normal blow. For 220-240 V operation, the fuse is 3 amperes normal blow (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.

- 6
- b. 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 above).
 - c. Replace the fuse module.

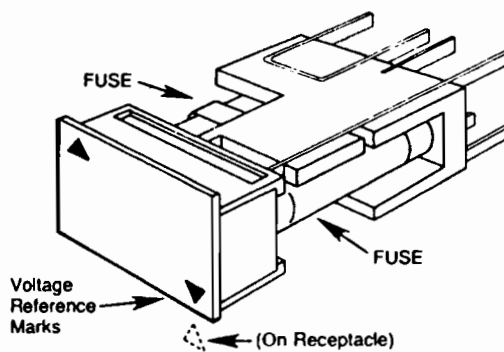


Figure 2-1. Fuse Module

Connecting to the Host

HP-IB Host Connection

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 length of the HP-IB cable that connects devices to a General I/O Channel (GIC) is seven meters plus one 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 five external meters supported plus one meter for each device.

The HP 7979A and HP 7980A/XC 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 one meter of external cable length.

What follows is a discussion of how to accurately determine the maximum cable length permitted in an HP-IB Host connection.

Example: In this example both the internal and external cable lengths (loads) of a simple system are used to calculate the maximum amount of cable allowed between the GIC and the tape drive. The example discusses an HP 3000 Series 64 computer using a GIC supporting seven meters of cable with two meters of internal cable (from the SPU to the outside of the computer cabinet).

<u>HP 7979A, HP 7980A/XC Specifications</u>	<u>Cable Length</u>
Tape Drive Cable Length Supported	+1 meter
GIC Cable Length Supported	+7 meters
Tape Drive Internal Cable (inside cabinet)	0 meter
GIC Internal Cable (inside cabinet)	-2 meters
<hr/>	<hr/>
Cable available	+6 meters

When all supported external cable lengths (additions) are tabulated with the existing internal lengths (subtractions), the *Cable Available* result should be always be that there is more cable available than is required for the connection. If you exceed the cable available limit, spurious and hard-to-find errors will most probably be introduced into the system.

Setting the Address/ID Number

Your service representative will set the address or ID number during installation. Use the following instructions should you ever need to change it.

1. Take the drive offline by pressing the **ONLINE** key.
The Online Status Indicator should be off.
2. Press **OPTION** to enter the Option Mode. **TEST *** appears in the display.
3. Press **NEXT** until **ADDR *** or **ID *** appears in the display.
 - **ADDR *** appears if you have an HP-IB interface.
 - **ID *** appears if you have a SCSI interface.
4. Press **ENTER**.
5. Using **NEXT** or **PREV**, bring the ADDRESS/ID number desired into the display.
6. Press **ENTER**.

The ADDRESS/ID you selected appears as **SET <#>**. The “#” is the address number (HP-IB) or the ID number (SCSI).

This display lasts for one second and then returns to the **ADDR *** or **ID *** display (depending on the interface installed).

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

Configuring the Tape Drive to the Host

Refer to your host system manuals to determine the steps for configuring a tape drive on the host operating system.

Operating the Tape Drive

This chapter explains the Control Panel and gives you the steps for the following tape drive operations:

- Using the Control Panel
- Switching the tape drive on and off
- Loading a tape
- Write density and data compression (extra capacity storage)
- Unloading a tape
- Customizing drive operation
- Setting a configuration
- Running a diagnostic test
- Reading an information log
- Clearing an information log



Using 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.

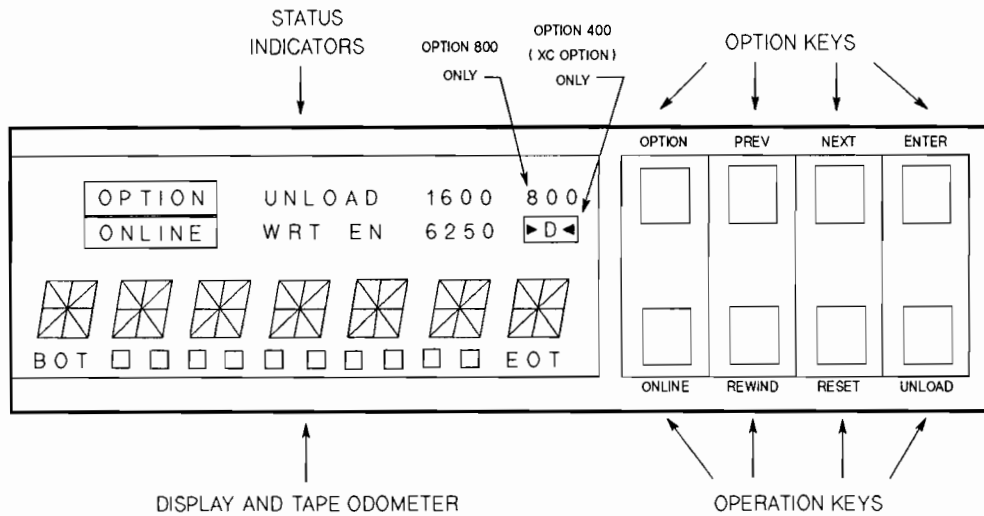



Figure 3-1. Control Panel

**Table 3-1.
Control Panel Keys and Indicators
OPERATION KEYS**

Control Panel Key	Function
Operation Keys	
ONLINE	<p>Selects ONLINE or OFFLINE. Toggle key. 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.</p> <p>The ONLINE STATUS INDICATOR displays when the drive goes ONLINE.</p> <p>The ONLINE command can 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, ONLINE flashes in the display.</p> <p>You may cancel a queued ONLINE command by pressing the ONLINE key a second time.</p>

**Table 3-1.
Control Panel Keys and Indicators
OPERATION KEYS (continued)**

Control Panel Key	Function
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 drive door is open.
UNLOAD	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.
RESET	Aborts operations; both those from the Control Panel and those under control of the host (if BUSY is displayed).

Caution Data Loss will occur if the **RESET** key is pressed two times in succession
 WHEN **BUSY** IS DISPLAYED.

**Table 3-2.
Control Panel Keys and Indicators
OPTION KEYS**

Control Panel Key	Function
Option Keys	
OPTION	Enters or exits the OPTION select mode.
PREV	Displays the previous OPTION choice.
NEXT	Displays the next OPTION choice.
ENTER	Selects the displayed OPTION and choices within the OPTION.

**Table 3-3.
Control Panel Keys and Indicators
STATUS INDICATORS**

Control Panel Key	Function
Status Indicators	
OPTION	Lit when OPTION mode is selected.
ONLINE	Lit when the drive is ONLINE. Flashes if the ONLINE command is queued.
UNLOAD	Lit when an UNLOAD operation is in progress. Flashes if the UNLOAD command is queued.
WRT EN	Lit when a write-enabled tape is loaded into the drive. Remains on until tape is UNLOADed.
800	Lit when a 800 cpi tape is used (Option 800 required).
1600	Lit when a 1600 cpi write density tape is used.
6250	Lit when a 6250 cpi write density tape is used.
>D<	Lit when a 6250 cpi write density tape with Extra Capacity is used (Options HP 88705A and/or HP 88703A required).
TAPE ODOMETER	Segments show the relative position of the tape between the Beginning of Tape (BOT) and the End of Tape (EOT).

Key Tips



Instead of using the **NEXT** or **PREV** key to get to your selection, use the **UNLOAD** key to increment by 10s or use the **ONLINE** key to decrement the number by 10s.

Operation Keys

Following is a detailed explanation of the Control Panel 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.

This key is inoperative if the drive is ONLINE or if the tape door is open.

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.

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

Caution Pressing the **RESET** key while **BUSY** is displayed 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.

Option Keys

Following is a detailed explanation of the Control Panel option keys.

OPTION **OPTION** activates the option mode, lights the **OPTION** status indicator, and disables the operation keys.

While in this mode, you may select options of TEST, CONFIguration, INFOrmation, or ADDRess (or ID).

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/ID).

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

The following is a detailed explanation of the Control Panel 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 switches 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 switches off when you place the drive **OFFLINE** by pressing the **ONLINE** key a 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 immediately after pressing the **REWIND** key).
- WRT EN** The **WRT EN** (Write-Enable) indicator lights, and remains on, when a tape with a write-enable ring is **LOAD**ed into the drive.
- The **WRT EN** indicator switches off when the write-enabled tape is **UNLOAD**ed.
- 800** (Option 800 required) Continually lit to show that a 800 cpi write density tape is being used.
- 1600** Continually lit to show that a 1600 cpi write density tape is being used.
- 6250** Continually lit to show that a 6250 cpi write density tape is being used.
- This indicator is used along with the **>D<** indicator to show 6250XC selection (See description of the **>D<** indicator below).
- >D<** Continually lit (HP 7980XC/SX only) to show that a 6250 cpi write density using Extra Capacity data storage procedure has been selected.
- TAPE ODOMETER** Located under the seven-character display, the odometer consists of the **BOT** reference, a row of fluorescent segments, and an **EOT** reference. This display shows the relative position of the tape during operation.

Switching the Tape Drive On and Off

Note



Severe changes in environment need attention when preparing to switch on the drive.

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



The two power 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 3 below. Steps 1 and 2 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). This is a toggle IN/OUT switch.
2. On the rear panel of the drive unit, press the top of the main AC power switch ("1" on the rocker switch) to apply power.
3. Make sure the tape door is closed.

(Continued on next page)

4. Press the standby switch on the lower left of the front panel IN (ON).

If no display is obtained when both switches are in the correct position, refer to "Control Panel Lights Do Not Come On" in Chapter 5.

When the drive is powered up, [X] [X] [X] [X] [X] [X] 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, the READY message (or whichever message Language Configuration 48 has been set to) appears in the display. This message means that the drive is ready to load a tape or to accept commands from the Control Panel.

Note

Depending on the selection made in the Language Configuration (48), the initial message will be READY, NO TAPE, or UNIT #. See Appendix B for more information on your display options.

Loading a Tape

Note

The HP 7979A/S and HP 7980 Series tape drives can accept 1-mil tape (3600-foot reels). But before using this thickness of tape, please review “Using 1-Mil Tape” in Chapter 4.

Caution

Handling and caring for tapes correctly is important. Improper tape handling and care can result in data loss and/or damage to the tape drive.

Read Chapter 4 for proper tape handling and care procedures.

Load the tape by completing the following steps:

1. Check that the tape you are loading has been acclimatized to room temperature and humidity.

Remove storage rings or cases and let the tapes set for a least one hour after they have been in a different temperature and/or humidity level. If the temperature or humidity was extremely different, let the tapes set for at least 2 hours and, optimally, 24 hours.

2. Check that the end of the tape has been rounded and crimped. Autoloading should not be affected by small folds or irregularities in the last couple of feet of the tape leader. (The tape leader is the portion of tape between the physical end of the tape and the BOT marker.) However, 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 leader off.

For best results use a tool made for cutting tape—like the tape cutter/crimper from Pericomp Corporation.

Note

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.

3. Check that the tape end is free to move.

(Continued on next page)

4. 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.

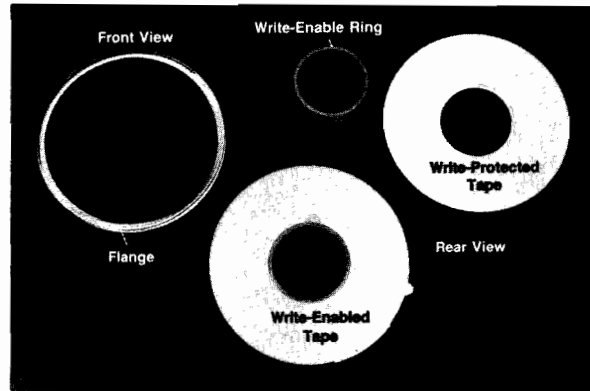


Figure 3-2. Write-Enabled and Write-Protected Tapes

5. Press the **UNLOAD** key to open the tape path door.

Caution



Always press the **UNLOAD** key to open the door or to stop a LOAD operation.
DO NOT TRY TO FORCE THE TAPE DOOR OPEN.

6. 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.

7. Close the tape path door.

The following will display:

- a. **LOADING** appears in the display.
- b. The write density of the tape displays (**800**, **1600**, **6250**, **BLANK**, or **UNKNOWN**). To detect and show the 800 cpi density, Option 800 must be installed.
- c. **BOT** displays.

Trouble?



If the autoload operation fails (no error message given), try the above steps two or three times. If it continues to fail, refer to “Tape Does Not Autoload” in Chapter 5.

If the autoload operation fails and you see **NO BOT** in the display, refer to “BOT/EOT Markers Must Be Replaced” in Chapter 5.

Write Density/Enable

Write density/enable is determined by the density of the tape that you are **LOADING** and if you are using a write enable ring with the tape.

The following display sequence occurs after the drive **LOADS** the tape.

- **DENSITY** appears in the display
- The **DENSITY INDICATOR LIGHT** is lit
- The tape density is lit (**800**, **1600**, **6250**, or **6250**)

The **>D<** indicator will also be lit if you are operating in the Extra Capacity mode (HP 7980XC/SX models).

- The **WRT EN** indicator remains lit (if a Write Enable Ring is being used) and shows the write enable/disable

Extra Capacity Feature (HP 7980XC/SX only)

Note



If you have a drive capable of Extra Capacity (HP 7980XC/SX), please read Appendix C, *Data Compression*, before using these operational procedures.

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 ¹	EXTRA CAPACITY	NO EXTRA CAPACITY
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.

¹ 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.

Extra Capacity Storage Configuration Procedure

1. Take the drive offline.
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)** until **CONF *** displays.
5. Press **(ENTER)** to select the configuration set mode.
6. Using **(NEXT)** or **(PREV)**, show **40** in the display. This configuration must be set before any others; it is the **enable change** to the non-volatile memory.

To step through the selections quicker, press the **(ONLINE)** key to increment the display by 10s or press the **(UNLOAD)** key to decrement the display by 10s.

7. Press **(ENTER)**. The display shows the current setting for Configuration 40. This configuration should normally be OFF.
8. Using the **(NEXT)** or **(PREV)** keys display **ON**.
9. Press **(ENTER)**. Values currently in non-volatile memory may now be changed.

The display will show **SET 40** for 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. Using **(NEXT)** or **(PREV)**, show **47** in the display. This is the number of the configuration that selects how the drive is to use the extra capacity feature.
12. Press **(ENTER)** to choose the type of compression control.
13. Pressing the **(NEXT/PREV)** keys will display the various choices for data compression.

The types of compression control available and the resulting displays are:

- **XC ON** - write 6250 cpi tapes in compressed format only. No data compression display. **Loading** is displayed and tape loading begins automatically.
- **XC OFF** - do not write tapes in compressed format. No data compression display. **Loading** is displayed 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.

Use **(NEXT)** or **(PREV)** to bring your choice of **XC ON**, **XC OFF**, **IXC ON**, or **IXC OFF** into the display.

14. Press enter. The display will show **SET <47>**.
15. Press **(RESET)** to return to the ready offline state.

Monitoring Data Compression. 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 *** is displayed.
4. Press **(ENTER)**. **INFO 0** is displayed.
5. Press the **(ONLINE)** key three times to display **INFO 30**.

Pressing the **(ONLINE)** key increments the display by 10s. Pressing the **(UNLOAD)** key decrements the display by 10s. You may also use the **(NEXT)** key to increment the display by 1s and the **(PREV)** key to decrement the display by 1s.

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 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

Note



An expanded explanation of default configurations in these tape drives is presented in Appendix B.

Changing the Time Used in Operator Timeout

1. Take the drive offline.
2. Press **(OPTION)** to enter the option mode. **TEST *** is displayed.
3. Press **(NEXT)** until **CONF *** is displayed.
4. Press **(ENTER)** to select the configuration set mode.
5. Using **(NEXT)** or **(PREV)**, show **40** in the display. This configuration must be set before any others; it is the enable change to the non-volatile memory.

To step through the selections quicker, press the **(ONLINE)** key to increment the display by 10s or press the **(UNLOAD)** key to decrement the display by 10s.

6. Press **(ENTER)**. The display shows the current setting for Configuration 40. This configuration should normally be OFF.
7. Using the **(NEXT)** or **(PREV)** keys display **ON**.
8. Press **(ENTER)**. Values currently in non-volatile memory may now be changed.
The display will show **SET 40** for 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. Press **(NEXT)** or **(PREV)** keys, show **43** in the display. This is the configuration that selects the Time Used in Operator Timeout.
11. Press **(ENTER)** to choose the setting.
12. Press **(NEXT)** or **(PREV)** keys to choose the time desired for operator timeout.

The time settings available are:

- OFF = No timeout. Choice will display on the Front Panel indefinitely
- 1 - 99 = the time-out value in seconds

13. Press **(ENTER)**. The display will show **SET <#>**. Where <#> is the value selected.
14. Press **(RESET)** to return to the READY offline state.

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:

- Regular, high-speed rewind always
- Archival tape conditioning rewind always
- 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 Conf 44 (see below).

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 previous to this one.)

High-Speed Rewinds (regular) or Archival Tape Conditioning

1. Take the drive offline, if necessary, by pressing **(ONLINE)**.
2. Press **(OPTION)** to enter the option mode. **TEST *** is displayed.
3. Press **(NEXT)** until **CONF *** is displayed.
4. Press **(ENTER)** to select the configuration set mode.
5. Using **(NEXT)** or **(PREV)**, show **40** in the display. This configuration must be set before any others; it is the enable change to the non-volatile memory.

To step through the selections quicker, press the **(ONLINE)** key to increment the display by 10s or press the **(UNLOAD)** key to decrement the display by 10s.

6. Press **(ENTER)**. The display shows the current setting for Configuration 40. This configuration should normally be OFF.
7. Using the **(NEXT)** or **(PREV)** keys display **ON**.
8. Press **(ENTER)**. Values currently in non-volatile memory may now be changed.
The display will show **SET 40** for 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 (**CONF *** displays).
10. Using **(NEXT)** or **(PREV)**, show **44** in the display. This configuration determines the Rewind Speed to be used.
11. Press **(ENTER)** to select the speed desired.

12. Use **(NEXT)** or **(PREV)** to display either **REW *** or **ATC ***, as desired. If **REW *** is left in the display when you go to step 10, all rewinds will be at the regular rate. If **ATC *** is left in the display, all rewinds will be at the archival tape conditioning rate.
13. Press **(ENTER)** to enter the mode displayed in step 9.
14. Press **(OPTION)** to leave option mode.
15. Press the **(ONLINE)** key to place the drive back online.

Regular/Archival Tape Conditioning (choice mode)

1. Do Steps 1 through 8 above.
2. Using **(NEXT)** or **(PREV)**, display **45** after **Conf ***.
3. Use **(NEXT)** or **(PREV)** to display either **DN** or **OFF**, as desired. If **DN** is left in the display, "choosing" will be enabled and the operator will be asked, prior to loading, whether the tape should be rewound at a regular or at an archival tape conditioning rate.

The **OFF** selection is used to return the drive to the whatever speed is called for by conf 44.
4. Press **(ENTER)** to enter the mode displayed in step 3.
5. Press **(OPTION)** to leave option mode.
6. Press the **(ONLINE)** key to place the drive back online.

Unloading a Tape

Follow these procedures to unload a tape. If you need to manually unload a tape, refer to Figure 5-1.

1. Tape the drive offline by pressing the **(ONLINE)** key.
2. Press the **(REWIND)**, then the **(UNLOAD)** keys. The drive unloads the tape and opens the tape door.
3. Remove the tape.

Setting a Configuration

Permanently setting a configuration requires three steps:

- Enable a change to the non-volatile memory by switching configuration 40 to **ON**.
- Select and change the configuration of choice.
- Disable changing the non-volatile memory by switching configuration 40 back to **OFF**.

Note



A complete list of configurations, their defaults, and permissions are available in Appendix B.

1. Enable a change to non-volatile memory by doing the following steps.
 - a. Take the drive offline. (Press **ONLINE** if necessary.)
 - b. Press **OPTION** to enter the option mode. **TEST *** appears in the display.
 - c. Press **NEXT** to bring **CONF *** into the display.
 - d. Press **ENTER** to select the configuration set mode.
 - e. Using **NEXT** or **PREV** bring **40** to the display.
 - f. Press **ENTER**. The display shows the current setting for Configuration 40. This configuration should normally be **OFF**.
 - g. Use **NEXT** or **PREV** to bring **ON** into the display.
 - h. 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.
2. Select and change the configuration of choice by doing the following steps:
 - a. Press **ENTER** to select the configuration set mode.
 - b. Use **NEXT** or **PREV** to bring the desired configuration number into the display.
 - c. Press **ENTER**. The display shows the current value for the selected configuration.
 - d. Use **NEXT** or **PREV** to bring your value choice into the display.
 - e. Press **ENTER**.

The display will show **SET xx** for about 1 second to confirm that the selected value was set. **CONF *** re-appears in the display.
3. Disable a change to non-volatile memory by doing the following steps.
 - a. Press **ENTER** to select the configuration set mode.
 - b. Bring **40** into the display.
 - c. Press **ENTER**.

d. Use **NEXT** or **PREV** to bring **OFF** into the display.

e. Press **ENTER**. Values currently in non-volatile memory may not be changed.

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

4. Exit configuration mode by pressing **RESET**.
5. Switch the drive online by pressing **ONLINE**.



Running a Diagnostic Test

Caution



Some tests will overwrite data on the tape. Be careful to select only test numbers described in “Available Tests” in Chapter 5.

If you see an error code not described in Table 5-1, contact your service representative.

Note



During testing, leave the tape drive cover on and the tape door closed. Touching any of the parts inside the tape drive while a test is running causes additional irrelevant errors.

To run a diagnostic test, follow these steps.

1. Switch on the drive and let the power on test complete.
2. Load a write-enabled “scratch” tape.
3. Close the tape door.
4. After the drive positions the tape at BOT, take the drive OFFLINE (press **ONLINE** if necessary).
5. Press **OPTION**. **TEST *** appears in the display.
6. Press **ENTER**.
7. Bring the test number you want into the display by pressing **NEXT** or **PREV**.
8. Press **ENTER**.
9. The display prompts **ONCE ***, asking you if you want the test to be run only once.

If you want 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 (run continuously until **RESET** is pressed).

10. 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.

Note



To abort a test, press **RESET** while the test is running. Press **RESET** one more time to return to the option select level (**TEST *** appears in the display).

11. If the test passes (**PASS xx** in the display), you can either exit testing by doing Step 13 or choose the same or another test by doing the following:

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.

If you want to select the same test, press **ENTER** and then repeat Steps 9 and 10.

If you want select another test, use the **NEXT** and **PREV** keys.

12. If the test fails, press **ENTER** to display the error that caused the failure. If you cannot find the error listed in Chapter 5, call your nearest authorized service representative.

Press **RESET** three times to completely exit through the test selection and option select levels.

13. Press **OPTION** or **RESET** to leave option mode.

Reading an Information Log

Information logs are primarily used by authorized service personnel. You may be asked to access the log(s) at some time to retrieve information (possibly prior to a service call).

A complete list of the information logs available to you is located in Appendix D.

To access an information log, do the following steps.

1. Take the drive OFFLINE (press **ONLINE** if necessary).
2. Press **OPTION**. **TEST *** appears in the display.
3. Press **NEXT** or **PREV** until **Info*** is displayed.
4. Press **ENTER**. **INFO 0** displays.
5. Bring the information log you want into the display by pressing **NEXT** or **PREV**.
6. Press **ENTER**.
7. Read the information in the log.

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.

8. When through reading the information log, press **ENTER**. The display returns to **INFO ***.
9. Press **OPTION** or **RESET** to leave the option mode.

Clearing an Information Log

The following information logs can be cleared by setting the corresponding configuration to CLEAR.

Table 3-4. Clearing an Information Log

Log Number	Description	Configuration to Clear	Password Required
Info 0	Error Log	Conf 0	No
Info 1	Error Rate Log	Conf 1	No
Info 3	Cumulative GCR Error Data	Conf 3	No
Info 4	Cumulative PE + NRZI Error Data	Conf 4	No
Info 10	Odometer	Conf 10	Yes ¹
Info 13	Power Cycles	Conf 13	Yes ¹
Info 15	Battery Date	Conf 15	No
Info 20	Drive Statistics	Conf 20	No
Info 21	Autoload Statistics	Conf 21	No

¹ Info 10 and 13 must be cleared by an authorized service representative.

Caring for the Tape Drive and Tapes

Data integrity, tape drive performance, and longevity of your tape library can be maximized if you do the following:

- Keep the tape path and tapes clean.

Taking preventative measures is in your best interest. 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.

- Care for the tapes properly.

Handling, storing and transporting tapes correctly prevents edge damage, reel failure, and tension loss.

- Select and use high-quality tapes.

HP strongly recommends the use of its “premium” quality tapes to maximize data integrity and reduce the frequency of replacement.

- Keep the environment of the tape drive and tape storage area clean.

A clean room environment with carefully-controlled temperature and humidity is the optimal environment for your tape drive and tapes.

Cleaning the Tape Path and Tapes

In this section you will learn the following:

- How often to clean the tape path
- What cleaning supplies to use
- How to clean the tape path and the tapes

Cleaning Schedule

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

Typically you will need to clean the tape path once every eight hours. However, if the error message **CHECK** occurs 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.

Table 4-1. Cleaning Schedule Guidelines

Cleaning Level	Cleaning Criteria
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 room 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 ANYTIME that you suspect abnormal dust in the computer center because of custodial activity, equipment moves, supply delivery, of if the drive has not been used for several days.

Cleaning Supplies

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

Use these materials to clean the tape path:

- Cleaning solvent

Hewlett-Packard supports only high-quality electronic-grade isopropyl alcohol of at least 90% concentration. The isopropyl mixture must consist of alcohol and distilled water only.

- Non-Abrasive, lint-free cloths and/or swabs

Caution



- Do not use cleaner solutions that contain lubricants. Lubricants deposit on the tape head and impair performance.
 - Do not use alcohol cleaning solutions on the rubber gripping fingers on the takeup reel.
 - Do not use aerosol cleaners. The spray is difficult to control and often contains metallic particles that can 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 Procedures

Figure 4-1 illustrates the points within the tape drive you should clean periodically.

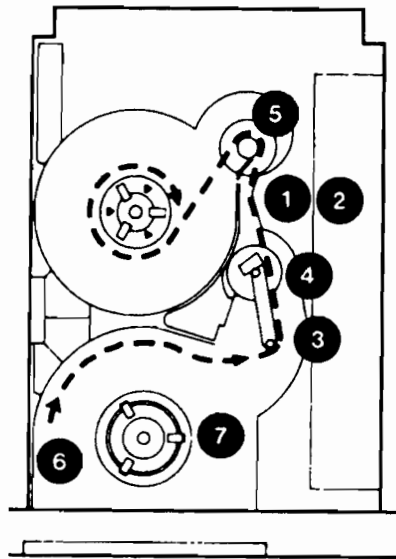


Figure 4-1. Cleaning Points

1	Read/Write Head
2	Cleaner Block
3 through 7	Tape Path

Before You Begin

Gather your cleaning supplies and note the following cautions.

Caution



- If you have to transfer the cleaning solvent to another container, use only a clean, unwaxed container.

Alcohol dissolves wax. If you use a waxed cup, the wax transfers to the tape path.

- DO NOT dip your cloths and swabs into the cleaning solvent container or touch the cloths or swabs to the lip of the open container during pouring. Doing so contaminates the solvent.

Clean the Read/Write Head

With a new swab or wipe moistened with cleaning solvent, do the following steps.

Note



If you are using a swab or a Teksleeve[®], keep the stick vertical so that you contact all of the head.

1. Wipe the head using at least 15 firm strokes up and down (perpendicular to the casting).
Be sure to clean all of the head; do not overlook the portion of the head nearest the casting.
2. Using a clean portion of the wiping material, use at least 15 firm strokes left/right (in the direction of tape motions).
Always finish with a left/right cleaning motion.
3. Change the swab or sleeve and repeat cleaning until you cannot see any trace of debris on the cleaning material.

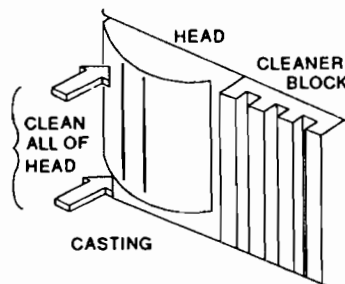


Figure 4-2. Cleaning the Read/Write Head

Clean the Cleaner Block

Note



Swabs or the edge of a Teksleeve fit in the grooves of the cleaner block very well.

1. With new cleaning material, moistened with cleaning solvent, clean each groove in the cleaner block using firm strokes.
2. Change your cleaning material and repeat cleaning until you cannot see any trace of debris on the swab.
3. Finish by wiping the cleaned surfaces of the cleaning block with a clean swab or wipe moistened with cleaning solvent.

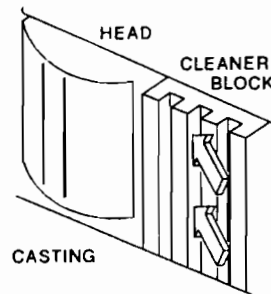


Figure 4-3. Cleaning the Cleaner Block

Clean the Tape Path

Each of the remaining tape path points need wiped clean.

1. Using a new swab or wipe moistened with WATER, clean point #7, the rubber gripping fingers.

Do not use cleaning solvent on rubber.

2. Using a new swab or wipe moistened with cleaning solvent, clean the remaining points #3 through #6.
3. Allow the tape path to dry for at least 30 seconds before loading a tape.

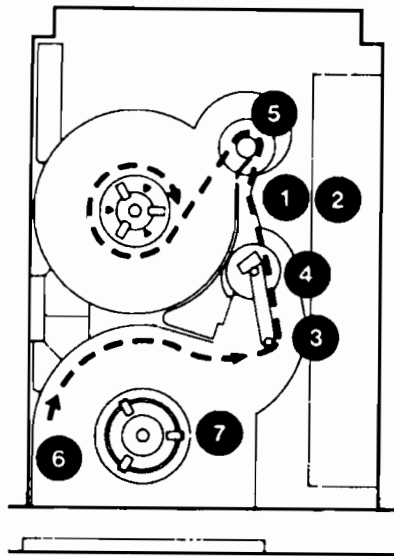


Figure 4-4. Cleaning the Tape Path

Cleaning Tapes

Ideally, you should clean your tapes with a cleaner/certifier machine. The cleaning process begins when adhered debris (wound into a reel of tape under extreme surface pressures) is loosened. Once debris is loosened, the debris is scraped from both sides of the tape.

Caution



If you choose to use a tape cleaner/certifier machine that uses tissues, do not use lubricated tissues. They may leave a film and may damage the tape and tape drive.

Also be sure the tissues are of high quality and are lint-free. Do not re-use portions of the tissue rolls. This leaves the tape dirtier than when you started.

Note



Tape cleaners should not be considered a substitute for the following:

- Using high-quality tapes
- Maintaining a clean tape path and heads
- Maintaining a clean environment for the tape drive

New Tapes

New tapes can contain debris from the manufacturing process, so Hewlett-Packard recommends that new tapes be conditioned before use. Either clean the new tape using the cleaner/certifier machine; or, load the tape into the tape drive and run it end-to-end.

If you use the tape drive cleaning method, you must be sure to clean your tape drive thoroughly after this process.

Managing and Caring for Tapes

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

The following topics are covered in this section:

- Storing tapes
- Transporting tapes
- Handling tapes
- Rewinding tapes
- Evaluating tapes
- Labeling tapes

Storing Tapes

- You may choose to use the Archival Tape Conditioning feature to improve tape stacking for storage.
- 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.**
- Always remove the tape from a tape drive destined for storage or extreme temperature/humidity. The tape can stick to the head if it is left in a non-operating environment tape drive.

Transporting Tapes

- 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 Tapes

- Hold the tape reel by the hub or as close to the hub as possible.

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 below shows how to hold a reel in a horizontal position with one hand without pressing the flanges together.

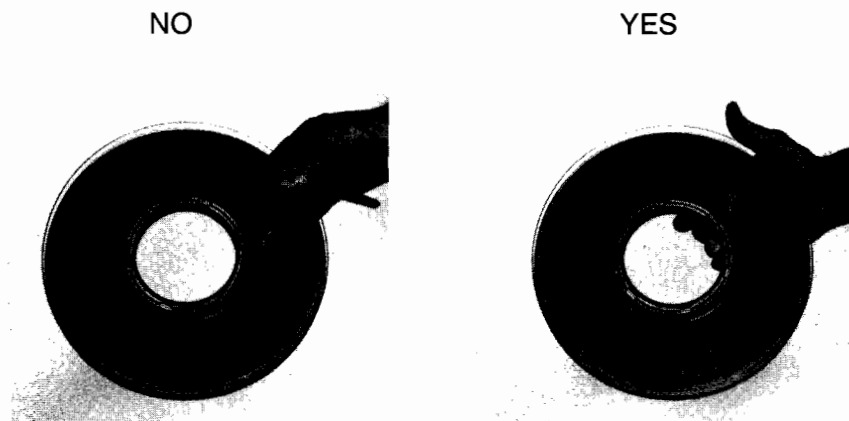


Figure 4-5. Preventing Tape Edge Damage

- 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.

Rewinding Tapes

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 rewind 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.

Evaluating Tapes

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:

- 150 single-track errors every 2400 feet
- 10 total (in any combination) two- and three-track errors every 2400 feet
- 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 Tapes

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 rows for 'SERIAL No.' and 'FILE No.', followed by a larger section for 'NOTES:'. On the right side, there are two rows for 'CREATED DATE OPERATOR' and 'PURGED'. At the bottom left, it says 'DENSITY = 800 1600 6250'. At the bottom right, it says 'RETENTION PERIOD'.

Figure 4-6. Example of a Tape Reliability Label

Special care must be taken with tapes written in 6250XC format (Option 400). This format is intended for large backups and is not generally used for interchange unless the interchange party has an HP 7980XC or SX (extra capacity storage capability installed). It is recommended 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 the HP 7980XC and HP 7980SX models recognize and are able to correctly expand the data automatically, other tape drives only recognize that the tape is a 6250 cpi tape. A host error will be returned when reading is begun.

Operators should be trained to mount 6250XC tapes only on Extra-Capacity-capable tape drives when data is to be read back. (Of course, ANY tape may be mounted on ANY tape drive for a write.)

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

Figure 4-7. Suggested Extra Capacity Reel Label

Resources

If tape and tape path problems persist after following all the suggested procedures and practices in this chapter, call your nearest Hewlett-Packard distributor. 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.

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

Selecting Tapes

Note



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.

You may purchase tapes directly from Hewlett-Packard. Refer to Appendix F.

Using 1-Mil Tape



Hewlett-Packard supports the use of 1-mil (3600-ft reel) tapes on the HP 7979A/S and HP 7980 Series 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/S and HP 7980 Series Tape 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/S and HP 7980 Series 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/S and HP 7980 Series Tape 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.



Troubleshooting

This chapter describes the following:

- Control panel display error messages and troubleshooting steps
- Diagnostic tests you may use as confidence tests
- Problem situations you may encounter during drive operation

Interpreting Error Messages

Error messages can occur in the following three situations:

- At poweron, when the drive runs a series of diagnostics
- After you run a diagnostic test from the control panel
- During normal operation

You can respond to many of the messages that 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.

Table 5-1. Error Messages and Actions

Messages	Action
Test Messages	
RUN <###>	Test <###> is running. No action is necessary.
PASS <###>	Test <###> has passed. No action is necessary.
FAIL <###>	Test <###> has failed. Press (ENTER) to display the error code. Write down the error code. If it is not one listed below in this table, call your service representative.
ERR 01	Test needs a tape to execute. Mount the tape.
ERR 04	Tape is write protected. Add the write-enable ring or use a new scratch tape.
ERR 06	Close top cover or front door.
ERR 12	Select valid test number.
ERR <###>	Call your service representative.
Operation Messages	
MISLOAD	Follow tape loading steps in "Loading a Tape" in Chapter 3. If the message persists, read "Tape Does Not Autoload" later in this chapter.
BUSY	Drive is completing online functions. No action is necessary. Pressing (RESET) aborts the host operations but may cause data loss. This indication stops when the host is finished.
INVALID	Select the (RESET) key. Chapter 2 explains the function of the keys.
NO BOT	UNLOAD the tape and manually check for the proper location and placement of the BOT marker. Refer to "BOT/EOT Markers Must Be Replaced" later in this chapter.
CHECK	Excessive soft error rate. Clean the tape path, the head and the cleaner block. Tape path cleaning procedures are in Chapter 4.

Caution



If you see an error code not described here, call your service representative. If you run a test not described in this guide, you risk losing data or changing the characteristics of the tape drive.

Internal 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 Table 5-1. If the error is not listed in the chart, notify your service representative.

Caution



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

Most diagnostic tests are intended to be used by authorized service personnel.

Available Tests

TEST 0 TEST 0 calls all poweron diagnostics. Runs automatically at poweron or can be run 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 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 TEST 70 lights all of the control panel indicators and displays.

TEST 71 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

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 (no light), GERMAN (one light), FRENCH (two lights), and SPANISH (three lights).

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.

Other Corrective Actions

Not all problems are diagnostic failures or result in control panel messages. Follow these guidelines when something out of the ordinary occurs. The following problems are described in this section.

- Tape does not autoload
- No control panel lights
- Power failure recovery is incomplete
- BOT/EOT markers must be replaced

Tape Does Not Autoload

If the drive is having difficulty LOADING a tape and you see a NO BOT message, read the “BOT/EOT Markers Must Be Replaced” section later in this chapter.

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 and/or tapes from a very cold environment to a warm environment, or vice versa, it is very important that you let the drive and/or tapes adapt to the new conditions to obtain maximum autoload performance.

Apply power to the drive for at least one hour, optimally two hours, before autoloading a tape.

Remove storage rings or cases from the tapes and let them 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 is not the problem:

1. Press **UNLOAD** to release the tape and open the door. Remove the tape.
2. If the drive is mounted on rails in a cabinet—
 - a. Pull the release handle on the bottom middle of the front panel to release the drive.
 - b. 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. Refer to Chapter 4 for cleaning procedures.
5. Close the top cover.
6. If the drive is mounted on rails in a cabinet, slide the drive back inside the cabinet.
7. Cut off any wrinkled tape from the end of the tape leader. Use a tape crimper (like the one from Pericomp 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 “BOT/EOT Markers Must Be Replaced” at the end of this chapter.

8. 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.

9. 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 service representative.

Manual Tape Threading

Refer to Figure 5-1 for the following steps.

1. If the drive is mounted on rails in a cabinet—
 - a. Pull the release handle on the bottom middle of the front panel to release the drive.
 - b. Slide the drive out on its rails until the rail lock buttons snap into position.
2. Lift the top cover.
3. Place the tape reel, with the leader free and on the right side, onto the supply hub.
4. (Note the finger hole for the hub release lever to the right of the supply reel bed.) 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.
5. Thread the tape leader through the tape path. Follow the diagram at the end of these instructions or the diagram on the metal cover 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.
6. Close the top cover. A LOAD sequence begins automatically.
7. If the drive is mounted on rails in a cabinet, slide the drive back into the cabinet.

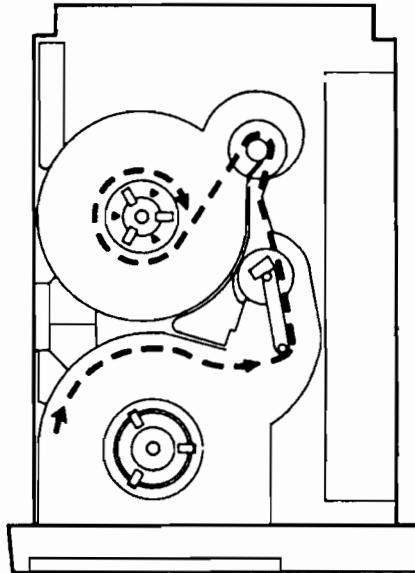


Figure 5-1. Tape Threading

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 (ON).
3. If both the main AC power switch and the standby switch were in their ON positions, try recycling power by switching them both OFF and then both ON again.

(Continued on next page)

4. Check/replace the fuses.

- a. Toggle the front panel standby switch to the out (OFF) position.
- b. Access the rear of the drive 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.

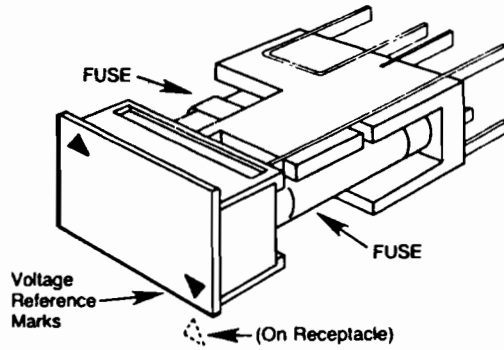


Figure 5-2. Fuse Module

- e. Replace the fuse if necessary.

Warning



Replace a blown fuse with one of the same type and rating. The fuse for 120 V operation is 6 Amperes normal blow, the fuse for 240 V operation is 3 Amperes normal blow (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. Press the standby switch on front panel in (ON).

Note



Control Panel lights still do not function properly?

Call your service representative.

Power Failure Recovery Incomplete

When power is restored after a power failure, the drive automatically runs 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 runs 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. If the drive is mounted on rails in a cabinet—
 - a. Pull the release handle on the bottom middle of the front panel to release the drive.
 - b. 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. Replace 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. If the drive is mounted on rails in a cabinet, slide the drive back into the cabinet.
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.
2. Slide the drive out on its rails until the rail lock buttons snap into position.
3. Lift the top cover.
4. Rotate the supply reel counterclockwise to rewind the tape.
5. (Note the finger hole for the hub release lever to the right of the supply reel bed.) Pull the hub release lever toward you and rotate the supply hub counterclockwise at the same time. This causes the tape reel clamps in the hub to lower, unlocking the reel from the hub.
6. Remove the tape reel.
7. Close the top cover.

BOT/EOT Markers Must Be Replaced

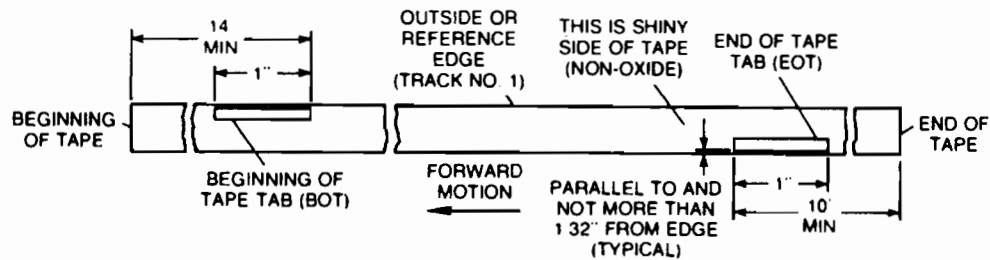


Figure 5-3. BOT/EOT Marker Locations

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.

Tape and Tape Path Not Clean

Guidelines for maintaining your tape and tape path are in Chapter 4.

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, these most common symptoms are described.

- Clear filming and brown staining
- Cinching
- Edge damage
- Pack slip
- Tape stick and blocking

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 cannot be removed by normal cleaning procedures. An additional problem is that these deposits cannot 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 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

Pressing the reel flanges together may damage the edge 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 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.



Control Panel Messages

Control panel display messages are divided into the following categories:

- Messages during normal operation (Table A-1)
- Warning and error messages (Table A-2)
- Idle operation and tape position messages (Table A-3)
- Option selection messages (Table A-4)
- Messages when within options (Table A-5)
- Messages when within test option mode (Table A-6)
- Messages during diagnostics (Table A-7)
- Configuration value messages (Table A-8)



Note



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

Table A-1. Messages During Normal Operation

Message	Description
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.
RETRY	The drive is retrying an operation.
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).
DENSITY	Displayed when the tape has been successfully loaded into the drive (tape density is also displayed: 1600, 6250, etc.)
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 tape LOADED into the drive is blank.
UNKNOWN	A tape of unknown density was LOADED.

Warning and Error Messages

Table A-2. Warning and Error Messages

Message	Description
BUSY	The drive is completing commands from the host. This display appears if the ONLINE or RESET key is pressed while the drive is completing host commands.
WAIT	The drive is waiting for the interface to complete a request from the host. This message is displayed briefly.
ONLINE	A keypress on the control panel 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.
DISABLE	The host has disabled capability to remove the tape from the drive (SCSI only).
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

Table A-3. Idle Operation and Tape Position Messages

Message	Description
READY	The drive is ready to accept commands or LOAD a tape. Whether this message or one of the next two messages (NO TAPE or UNIT #) appears in the display depends on the values stored in the Language Configuration (48). See NO TAPE and UNIT # described below.
NO TAPE	This message may be used instead of the READY message. See Appendix B, Language Configuration (48).
UNIT #	The “#” is the current bus address or ID. This message may be used instead of the READY message. See Appendix B, Language Configuration (48).
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.

Option Selection Messages

Table A-4. Option Selection Messages

Message	Description
TEST *	Selecting TEST Option?
CONF *	Selecting CONFIGURATION Option?
INFO *	Selecting INFORMATION Option?
ADDR *	Selecting Pertec-Compatible Interface ADDRESS number?
ID *	Selecting SCSI Interface Bus ID number?

Note



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 When Within Options

Table A-5. Messages When Within Options

Message	Description
TEST###	Selecting test number ("Available Tests" in Chapter 5)
CONF###	Selecting configuration number (Appendix B)
INFO###	Selecting information log number (Appendix D)
SET ###	Configuration has been set to specified number
SET OFF	Configuration has been set to OFF
ADR OFF	PERTEC-compatible interface is set to OFF
ID OFF	SCSI interface is set to OFF

Messages When Within Test Option Mode

Table A-6. Messages when within Test Option Mode

Message	Description
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 until an error or until stopped by the operator?
RUN ###	The drive is running test number ("Available Tests" in Chapter 5)
PASS###	Test number passed.
FAIL###	Test number failed. (Chapter 5)

Messages During Diagnostics

Table A-7. Messages During Diagnostics

Message	Description
OPTION	OPTION key name.
[]	ENTER key name.
NEXT	NEXT key name.
PREV	PREVIOUS key name.
BOT EOT	BOT EOT sensor test message.
*	Sensor seen.
KEY *	Key test.

Configuration Value Messages

Table A-8. Configuration Value Messages

Message	Description
**	Configuration value is unknown.
OFF	Select configuration value of "OFF"?
ON	Select configuration value of "ON"?
###	Select configuration number value of <###>?
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?



Configurations

Configurations are stored in the drive's non-volatile memory. The configurations described in Table B-2 and Table B-1 are either locked or unlocked.

Unlocked Configurations You may, at any time, change the setting for any configuration that is designated "Unlocked". See "Unlocked Configurations" at the end of this appendix for a description of unlocked configurations. See Chapter 3 for changing/setting configuration procedures.

Locked Configurations If you want to change any configuration that is designated "Locked", you will have to contact your service representative. Most of the "Locked" configurations determine basic parameters of the tape drive and, in almost every case, are not something you would want to change.

Note



You should keep a tape record of the configurations you are using in the drive. This enables you to restore your configurations after any service that requires power to be removed from the non-volatile memory. Saving configurations to tape should be done by the distributor at the time of installation, but you may also do it yourself at any time.

Configurations are saved to tape by running Test 128. Configurations are reloaded into the non-volatile memory by running Test 129. Use the "Running a Test" procedures outlined in Chapter 3.

HP-IB Configurations

Table B-1. Drives with HPIB Interface (Initial Configurations)

Configuration Name	Default Setting	Config. Number	Lock/ Unlock
Enable Change to the Non-Volatile Memory	OFF	40	Unlock
Auto Online	OFF	41	Unlock
Media Removal	ON	42	Lock
Operator Timeout	10	43	Unlock
Archival Tape Conditioning Rewind	OFF	44	Unlock
Operator Select Archive	OFF	45	Unlock
Density (7980x)	GCR	46	Lock
Later PE/GCR Density choices made via host			
Density (7979x)	PE	46	Lock
Compression Control (7980XC)	IXC ON	47	Unlock
Language	0	48	Unlock
Recovered Error Report	ON	49	Lock
Immediate Response	ON	50	Lock
Tape Marks to Disable Immediate Response	2	51	Lock
Write Retry Count	17	52	Lock
Low Density (PE) Gap Size	6	53	Lock
High Density (GCR) Gap Size	4	54	Lock
Stop At EOT	0	55	Lock
Write Holdoff Timeout In Seconds	5	56	Lock
Write Startup Point	OFF	57	Lock
Retry Before Skip	1	58	Lock
Write Auto-Hitch	1	59	Lock
Readaheads	ON	60	Lock
Tape Marks To Terminate Readahead	2	61	Lock
Read Retry Count	9	62	Lock
Gauge Usage	0	75	Lock
No Break On Failure	OFF	76	Lock
Activity Indicator	OFF	77	UnLock
Interface Non-volatile Change (not changeable from the Control Panel)	ON	80	Lock

Table B-1. Drives with HPIB Interface (Initial Configurations) (continued)

Configuration Name	Default Setting	Config. Number	Lock/ Unlock
Block Length	0	81	Lock
Bus Inactivity Limit	1	82	Lock
Disconnect Time Limit	0	83	Lock
Disconnect Length	0	84	Lock
Inquiry Field	0	85	Lock
Reset Method	ON	86	Lock
Read EOM Reported	OFF	87	Lock
Report EOT at Early EOT	OFF	89	Lock
Check Incoming Parity	ON	90	Lock
Vendor-Unique Density	ON	91	Lock
Suppress Illegal Length	OFF	92	Lock
Reserved		93-96	Lock

UNLOCKED HP-IB Configurations

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.

CONF 43 - OPERATOR TIMEOUT *7980XC/SX Only*

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.

CONF 47 - COMPRESSION CONTROL *7980XC/SX Only*

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 = *

SCSI Configurations

Table B-2.
Drives with SCSI Interface - Kits HP 88754A or HP 88755A
(Initial Configurations)

Configuration Name	Default Setting	Config. Number	Lock/ Unlock
Enable FP change	OFF	40	Lock
Auto Online	OFF	41	Lock
Media Removal	ON	42	Lock
Operator Timeout(XC drive only)	10	43	Lock
Archival Rewind	REW *	44	Lock
Operator Select Archive	OFF	45	Lock
Density	6250	46	Lock
FP Density Control (Non XC drive only)	OPEN	47	Lock
Compression Control (XC drive only)	OFF	47	Lock
Language	0	48	Lock
Recovered Error Report	ON	49	Lock
Immediate Response	ON	50	Lock
Tape Marks to disable Immediate Reporting	2	51	Lock
Write Retry Count	17	52	Lock
1600 PE, NRZI Gap Size	6	53	Lock
6250 GCR Gap Size	4	54	Lock
Stop at EOT	OFF	55	Lock
Write Holdoff Timeout (seconds) (FRU 4 Buffer Controller)	5	56	Lock
Write Holdoff Timeout (seconds) (FRU 14, 24, 34 Buffer Controller)	20	56	Lock
Write Startup Point (FRU 4 Buffer Controller)	2	57	Lock
Write Startup Point (FRU 14, 24, 34 Buffer Controller)	OFF	57	Lock
Retry Skip Start	3	58	Lock
Write Control	1	59	Lock
Readaheads	ON	60	Lock
Tape Marks to Terminate Readaheads	2	61	Lock
Read Retry Count	9	62	Lock
Trailing Buffer	0	63	Lock
Read Startup Point (eighths)	2	64	Lock
Max. Physical Record Size (XC drive only)	15	65	Lock

Table B-2.
Drives with SCSI Interface - Kits HP 88754A or HP 88755A
(Initial Configurations) (continued)

Configuration Name	Default Setting	Config. Number	Lock/ Unlock
Max. Files per Physical Record (XC drive only)	OFF	66	Lock
Max. Bytes per Physical Record (XC drive only)	OFF	67	Lock
Reserved	none	68	Lock
Reserved	none	69	Lock
Expansion Protection (XC drive only)	ON	70	Lock
Data Comp. Optimization Sample Period (XC drive only)	OFF	73	Lock
Data Comp. Optimization Threshold (XC drive only)	32	74	Lock
Gauge Usage	0	75	Lock
No Break on Failure	OFF	76	Lock
Activity Indicator	OFF	77	Unlock
Lock Host Density	OFF	78	Lock
Lock Interface Address	OFF	79	Lock
Enable Interface Non-Volatile RAM change	OFF	80	Lock
Block Length	0	81	Unlock
Bus Inactivity Limit	1	82	Unlock
Disconnect Time Limit	0	83	Unlock
Disconnect Length	0	84	Unlock
Inquiry Field	0	85	Unlock
Reset Method	ON	86	Unlock
Read EOM Reported	ON	87	Unlock
SCSI II Compatible	OFF	88	Unlock
Reporting Mode	0	89	Unlock
SCSI Parity Checking	ON	90	Unlock
Vendor-Unique Density	ON	91	Unlock
Suppress Illegal Length	OFF	92	Unlock

UNLOCKED SCSI Interface Configurations

Conf 81 - Block Length

Choices: 0 - 9

The block length is the size that records will be written to the tape.

Configuration Value	Block length (in bytes)
0	0 (variable length blocks)
1	8
2	256
3	512
4	1K
5	4K
6	16K
7	32K
8	128K
9	256K

Conf 82 - Bus Inactivity Limit

Choices: 0 - 9

The bus inactivity limit indicates the maximum time that the target is allowed to maintain the bus busy without handshakes until it must disconnect.

For firmware revisions up to (but not including) 3.78:

<u>Config Value</u>	<u>Bus Inactivity Limit (in 200 usec)</u>
0	0FFFFH (default value)
1	0100H
2	0200H
3	0400H
4	0800H
5	1000H
6	4000H
7	6000H
8	8000H
9	0H (always disconnect as soon as possible)

For firmware revisions 3.78/6.30 and beyond:

<u>Config Value</u>	<u>Limit Word (in 240 msec)</u>	<u>Bus Inactivity Limit (in msec)</u>
0	0FFFFH	15000
1	00008H	2
2	00020H	8
3	00080H	30
4	00200H	125
5	00400H	250
6	00800H	500
7	01000H	1000
8	04000H	4000
9	Auto disconnect	

Conf 83 - Disconnect Time Limit

Choices: 0 - 9

The disconnect time limit indicates the minimum time that the target should remain disconnected until it attempts to reselect.

<u>Config Value</u>	<u>Time Limit (in 100 usec)</u>
0	0 (reselect immediately)
1	1
2	8
3	256
4	512
5	1K
6	4K
7	16K
8	32K
9	64K - 1

Conf 84 - Disconnect Length

Choices: 0 - 9

The disconnect length indicates the amount of data that is to be transferred between SCSI bus disconnects.

<u>Config Value</u>	<u>Length (bytes)</u>
0	0 (no limit on data transferred)
1	512
2	1K
3	2K
4	4K
5	16K
6	32K
7	64K
8	128K
9	256K

Conf 85 - Inquiry Field

Choices: 0 - 127

The inquiry field allows the user to set a seven bit user specified code in the device-type qualifier field of the inquiry data.

Conf 86 - Interface Only Reset

Choices: OFF or ON

OFF - full poweron reset when bus reset is received

ON - interface only reset when bus reset is received

Conf 87 - Read EOM Reported

Choices: OFF or ON

OFF - no EOM reported

ON - EOM reported

End of media is relative to forward and reverse motion. EOM can be either the BOT or EOT.

Conf 88 - SCSI II Compatible

Choices: OFF or ON

OFF - not SCSI II compatible

ON - SCSI II compatible

“SCSI II” is an industry standard format that is more versatile than the original SCSI format.

Conf 89 - EOT Reporting Modes

Choices: 0 - 3

- 0 Report EOT at EOT marker
- 1 Report EOT at Early EOT point
- 2 Set only EOM bit in sense data at EOT
- 3 Set EOM and volume overflow sense key at EOT

Conf 90 - SCSI Parity Checking

Choices: OFF or ON

OFF - SCSI bus parity is not checked

ON - SCSI bus parity is checked

Conf 92 - Suppress Illegal Length

Choices: Off, 1 or 2

- Off Normal operation of SILI / ILI bits.
- 1 Auto suppress ILI on underlength (block size < request size) and SILI=0 (variable block mode only)
- 2 Do not suppress ILI on overlength (block size > request size) and SILI=1 (variable block mode only)



Data Compression

Extra Capacity Data Storage (HP 7980XC/SX Only)

With Extra Capacity Data Storage the HP 7980XC/HP 7980SX drives not only write and read industry-standard 1600 PE and 6250 GCR densities, they are also capable of increasing your data storage per tape by a factor of from two to five times.

The Extra Capacity format IS AN OPTION IN 6250 CPI DENSITY ONLY, and are known as

- 6250XC (HPIB 6250 Extra Capacity)
- 6250SX (SCSI 6250 Extra Capacity)



How It's Done

The large increase in data storage per tape is achieved by combining the following:

- A sophisticated compression algorithm implemented in VLSI (Very Large Scale Integration) circuits
- An efficient utilization of the tape

The Compression Algorithm

The compression algorithm of the Extra Capacity feature (HP 7980XC/SX Tape Drives), implemented in VLSI, recognizes repetitive data, whether this data is contiguous or appears intermittently throughout the total stream. The high-speed compression algorithm of Extra Capacity is much more than a simple replacement of multiple zeros or blanks with special code. The data compression operation adapts to the data. The algorithm of Extra Capacity, 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 Extra Capacity is implemented in VLSI circuitry of the tape drive, all compression and decompression of the data occurs separate from the host.

When the tape is read back and the special, Extra Capacity format 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 an HP 7980XC or HP 7980SX drive (Extra Capacity storage). But because of the 6250 extra capacity codes embedded in the data, the host cannot interpret this data.

When the drive creates an extra capacity tape, it places a special, uncompressed header in the first block written on the tape. Any host can read this header and determine that the tape is an extra capacity tape.

Efficient Use of the Tape

When writing in 6250XC or SX format, the drive 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 HP 7980XC/SX Tape Drives 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 (commercial system) tapes typically hold four to five times as much data as previously possible, and HP 9000 HP-UX (technical system) tapes hold approximately two to three times as much. The only variable that 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 text data is generally more repetitive.

A standard (2400-ft) reel of tape at 6250 cpi density can hold approximately 140 megabytes of data. Extra Capacity (SX, XC models) can increase this amount to about 280-400 megabytes, depending on the data. If 3600-ft (1-mil) tapes are being used, the approximately 210 megabytes of available storage is increased to about 400-1000 megabytes. (Please see restrictions on using 1-mil tape in “Using 1-Mil Tape” in Chapter 4.)

Data Integrity

The data integrity of the readback process in standard 6250 GCR is at least 100 gigabytes of data per unrecoverable read error. Because a drive equipped with the Extra Capacity (data compression) feature 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 HP 7980XC (HP-IB) or HP 7980SX (SCSI) drives; if they are mounted on any other 6250-cpi-capable tape drive, the drive will recognize them as 6250 tapes, but it is very unlikely that the host will be able to process the data and will return an error message.

If a tape library is managed manually, the density should be marked as “XC” (for HPIB) or “SX” (for SCSI) 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 About Using Data Compression

- Q. Why, when doing Extra Capacity writes or reads, does the drive 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 an HP 88780B/Option 400 using Extra Capacity procedures and an HP 88780B 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 the 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. But although this data is READABLE by the drive, it cannot be INTERPRETED by the host because the data remains in the compressed Extra Capacity format.
- 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.



Information Logs

Table D-1. Information Logs

Log Number	Name	Description
Info 0	Error Log	Displays the last 30 error log entries
Info 1	Error Rate Log	Displays the last 20 error rate entries
Info 2	Current Error Rate	Displays soft error rate of the current tape
Info 3	Cumulative Error Data	Displays cumulative GCR error data
Info 4	Cumulative Error Data	Displays cumulative PE + NRZI error data
Info 5	Cumulative Error Rate	Displays the cumulative soft error rate in bytes per error
Info 10	Odometer	Displays the amount of tape used
Info 12	System Software Clock	Displays the system clock
Info 13	Power Cycles	Displays the number of times the drive power has been cycled
Info 15	Battery Date	Displays the last two digits of the year the battery was installed
Info 20	Drive Repositioning Statistics	Displays reposition error statistics
Info 21	Tape Autoload Statistics	Displays attempted and successful autoload statistics
Info 24	Interface Option Identification	Displays the interface option
Info 25	Firmware Rev Number	Displays the code revision numbers of all processors
Info 30	Tape Write Compression Rate	Displays the current tape compression rate as a percentage

Interpreting Information Log Displays

An information log can have many entries with each consisting of one or more displays.

A sample entry and its displays are given for each of the information logs.

Display Number	Looks Like	Example	Means ...
1 ¹	"LABEL" DD HHH	E10 001	The display and its example is explained.

1 Display #1 of Entry 1

Where:

- "Quotes" Indicate display labels
- H Indicates a hexadecimal digit
- D Indicates a decimal digit
- DeDD Indicates exponential notation of 'D' times ten to the 'DD'

Detailed Information Log Descriptions

Info 0 - Error Log

Displays current log entries.

The error log maintains the last 30 errors that occurred within the drive . The initial error log display is for the most recent entry. The **PREV** and **NEXT** keys are used to view other entries in the log.

Display No.	Looks Like	Example	Means ...
1	"E" DD HHH	E10 001	Entry #10 in this log; 001 is the error code—a run-time error indicating "no tape loaded".
2	"FRU" DD	FRU 40	The detected Field Replaceable Unit (FRU) is the EOT/BOT sensor, FRU #40. Up to three FRUs may display—most probable to least probable. This display may be omitted if no FRU information applies. Only your service representative and remove/replace field replaceable units.
3	"T" DDD	T 41	The error occurred during the execution of the ROM Checksum Test #41. This display will appear only if the error occurred during the execution of a diagnostic test.
4	"*P" DDDDD	P 78978	A two-byte time stamp (in seconds) with "*" indicating that a poweron occurred since the last error was logged (i.e. no time correlation with previous entries) and "P" indicating that the error occurred during powerup. The "P" may be replaced by an additional digit in the time stamp. The error was logged 78978 seconds after the drive was powered on, and this is the first entry since the drive was powered on. (The clock rolls over approximately every 11.5 days.)

Error Rate Logs

Two error rate logs are maintained—a short-term and a long-term log. The short-term log, “Info 1 - Error Rate Log” contains multiple entries, one entry for each of the last 20 loads or density change of the tape. Each log entry indicates what the density for the entry was.

“Info 2 - Current Error Rate” is based on the data being accumulated for the tape that is currently loaded. When the next tape is loaded or the density is changed, the data accumulated is entered into the “Error Rate Log” log and then zeroed.

The “Error Rate Log” is intended for use during normal drive operation. During diagnostic sequences, density changes occur often enough to make the “Error Rate Log” roll through entries too fast. In order to keep from losing history in the log, entries are not made in the error rate log during diagnostic sequences. Only a single entry is made which makes no distinction between PE or GCR. In short, the “Error Rate Log” is not intended for use during diagnostics.

“Info 5 - Cumulative Error Rate Log” is a long-term history containing a separate PE and GCR log of data and errors. It does not, however, maintain how recent the information is or which load of tape it occurred on. The cumulative error is useful during normal runtime and is also used during certain diagnostic tests. Before error rate or wellness sequences are run, the cumulative log may be initialized, allowing the accumulated data to be related to the test at hand. The side effect of initializing the cumulative log is that all accumulated data up until that time is lost. The cumulative log is updated at least on every load or density change, but may be updated more often. It is not associated with the “Current Error Rate” information as is the “Error Rate Log”.

Info 1 - Error Rate Log

Displays current log entries.

An error rate log is maintained that contains a history of hard and soft errors for the past 20 loads of the tape. The results are displayed as two entries with the same log entry number. The initial error rate log display is the most recent entry in the log. The **PREV** and **NEXT** keys are used to move from the write to read displays and from one log entry to the next. Note that the entry number ("W"DD or "R"DD) of the initial display also indicates the number of entries in the log.

Display No.	Looks Like	Example	Means ...
Write Displays			
1	"W" DD "Density"	W17 PE	Indicates the beginning of write displays for entry 17. PE format was used for the operation. Available density formats are NRZ, PE, and GCR.
2	"WH" HH	WH 01	Hard write errors in hexadecimal (unrecovered errors). One hard write error occurred.
3	"WS" HHHH	WS 0003	Soft write errors in hexadecimal (recovered errors). Three soft write errors occurred.
4	"WD" DeDD	WD 3e06	Amount of data written in bytes. 3×10^6 bytes of data were written.
Read Displays			
1	"R" DD "Density"	R17 PE	Indicates the beginning of the read displays for entry 17. PE format was used for the operation. Available density formats are NRZ, PE, and GCR.
2	"RH" HH	RH 01	Hard read errors in hexadecimal (unrecovered errors). One hard read error occurred.
3	"RS" HHHH	RS 0003	Soft read errors in hexadecimal (recovered errors). Three soft read errors occurred.
4	"RD" DeDD	RD 3e06	Amount of data read in bytes. 3×10^6 bytes of data were read.

Info 2 - Current Error Rate

Displays soft error rate of the current tape.

Display No.	Looks Like	Example	Means ...
1	"W" DeDD	W 2e07	Displays the write soft error rate in bytes-per-write soft error. Current write soft error rate is approximately 20 Mbytes of data per error.
2	"R" DeDD	R 3e06	Displays the read soft error rate in bytes-per-read soft error.

Info 3 and Info 4 - Cumulative Error Data

- INFO 3 - Displays cumulative GCR error data.
- INFO 4 - Displays cumulative PE + NRZI error data.

Cumulative error data logs are maintained containing all past occurrences of hard and soft errors as well as the total amount of data written and read. The **PREV** and **NEXT** keys are used to move from the write to the read displays.

Display No.	Looks Like	Example	Means ...
Write Displays			
1	"WH" HH	WH 01	Hard write errors in hexadecimal (uncorrected errors). One hard write error occurred.
2	"WS" HHHH	WS 0003	Soft write errors in hexadecimal (corrected errors). Three soft write errors occurred.
3	"WD" DeDD	WD 3e06	Amount of data written in bytes. 3×10^6 bytes of data were written.
Read Displays			
1	"RH" HH	RH 01	Hard read errors in hexadecimal (uncorrected errors). One hard read error occurred.
2	"RS" HHHH	RS 0003	Soft read errors in hexadecimal (corrected errors). Three soft read errors occurred.
3	"RD" DeDD	RD 3e06	Amount of data read in bytes. 3×10^6 bytes of data were read.

Info 5 - Cumulative Error Rate

Displays the cumulative soft error rate in bytes per error.

Display No.	Looks Like	Example	Means ...
1	"GCR/PE"	GCR	Indicates the following two displays are the cumulative Write and Read soft error rates for operations using GCR density. If PE is indicated, the following two displays are the cumulative Write and Read soft error rates for operations using PE + NRZI density.
2	"W" DeDD	W 3e03	Write soft error rate in bytes-per-write soft error. 3×10^3 bytes of data per write soft error.
3	"R" DeDD	R 3e03	Read soft error rate in bytes-per-read soft error. 3×10^3 bytes of data per read soft error.

Info 10 - Odometer

Displays the Odometer.

The odometer is a 6-byte value containing the amount of tape covered in 0.1-foot increments. It requires three displays.

Display No.	Looks Like	Example	Means ...
1	"1" DDDDD	1	No numbers after the display number indicates all zeros.
2	"2" DDDDD	2	No numbers after the display number indicates all zeros.
3	"3" DDDDD	3 1449	The total amount of tape is 144.9 feet.

The odometer must be initialized at some point from a configuration tape or from the front panel. Until it is initialized, it will display ***** indicating that it is inoperative.

Info 12 - System Software Clock

Displays the system clock.

The system clock is four bytes long with a least count of approximately 1/20 seconds. The system clock is initialized to zero when the drive is powered up. It is maintained by the drive controller within the drive controller dual port RAM (DPR).

All time stamps used within machine logs use the system software clock. Time is displayed in hours, minutes, and seconds of operation.

Display No.	Looks Like	Example	Means ...
1	DDDDD	0	0 Hours
2	DD	11	11 Minutes (maximum is 59 minutes)
3	DD		56 Seconds (maximum is 59 seconds)

Info 13 - Power Cycles

Displays the number of times the drive power has been cycled

Display No.	Looks Like	Example	Means ...
1	DDDDD	2	Number of times the drive power has been cycled is 2.

The power cycle log must be initialized at some point from a configuration tape or from the front panel. Until it is initialized, it will display ***** indicating that it is inoperative.

Info 15 - Battery Date

Displays last two digits of the year the battery was installed.

Display No.	Looks Like	Example	Means ...
1	DD	89	Last two digits of the year the battery was installed. This battery was installed in 1989.

Info 20 - Drive Repositioning Statistics

Displays drive repositioning statistics.

Display No.	Looks Like	Example	Means ...
1	"FM" DD	FM -7	Forward reposition error mean in mils
2	"FV" DD	FV 13	Forward reposition error variance in mils squared
3	"RM" DD	RM 0	Reverse reposition error mean in mils
4	"RV" DD	RV 0	Reverse reposition error variance in mils squared

Info 21 - Tape Autoload Statistics

Displays tape autoload statistics.

Display No.	Looks Like	Example	Means ...
1	"LS" DDD	LS 80	The percentage of successful loads
2	"LR" DDD	LR 0	The percentage of successful loads requiring retries
3	"LA" DDDDD	LA 5	The total number of loads attempted

Info 24 - Interface Option Identification

Displays the interface option identification message.

Display No.	Looks Like	Example	Means ...
1	"Option"	HP SCSI	Displays the installed interface—SCSI, HP-IB, or Pertec

Info 25 - Firmware Rev Number

Displays code revision numbers of all processors.

The revision number of code within each of the processors is displayed. Four displays are sequenced with each display having the following format.

Display No.	Looks Like	Example	Means ...
1	DD DDD	8 640	Processor #1 ID number (DD=8), version number (D=6), revision number (DD=40)
2	DD DDD	3 388	Processor #2 ID number (DD=3), version number (D=3), revision number (DD=88)
3	DD DDD	4 388	Processor #3 ID number (DD=4), version number (D=3), revision number (DD=88)
4	DD DDD	16 391	Processor #4 ID number (DD=16), version number (D=3), revision number (DD=91)

Info 30 - Tape Write Compression Rate (XC/SX Models)

Displays the current tape compression rate as a percentage.

The tape write compression rate for the last compressed (XC format) tape written is displayed. The number displayed shows the amount of tape required for a normal GCR tape compared to the XC format tape generated. A value of 240 would indicate a 2.4 to 1 tape compression.

Display No.	Looks Like	Example	Means ...
1	DDDDD	240	Shows the amount of tape required for a normal GCR tape compared to the XC/SX format tape generated. For example, 240 indicates 2.4 to 1 tape compression.

Tape Drive Characteristics

Drive Characteristics

Transfer Rate to Tape (max.)	
6250 GCR	769 Kbytes/s
1600 PE	208 Kbytes/s
800 NRZI	104 Kbytes/s
Transfer Rate to Tape (avg.)	
6250 GCR	747 Kbytes/s (64K blocks - 0.3-inch gap)
1600 PE	198 Kbytes/s (16K blocks - 0.5-inch gap)
800 NRZI	99 Kbytes/s (8K blocks - 0.5-inch gap)
Burst Transfer Rate to Buffer (max.)	
SCSI	1.5 Mbytes/s
Pertec-compatible	0.33-1.6 Kbytes/s
Speed (nominal)	
Read/Write	
GCR	123 ips
PE/NRZI	130 ips
Rewind	320 ips average, 450 ips maximum (90 seconds to rewind a 2400-ft tape)
Density/Format	
Density	
	6250 cpi GCR
	6250 cpi Extra Capacity (Opt.400)
	1600 cpi PE
	800 cpi NRZI (Opt.800)
Formatted Data Capacity (2400-ft reel)	
	140 Mbytes (typ. 6250 cpi)
	200-700 Mbytes (typ. 6250 cpi Extra Capacity--Opt.400)
	40 Mbytes (typ. 1600 cpi)
	20 Mbytes (typ. 800 cpi--Opt.800)

Maximum Physical Block Size On Tape*	
6250 GCR	256 Kbytes
1600 PE	64 Kbytes
800 NRZI	64 Kbytes
*block size may be limited by host operating system	

Reliability

Hard Error Rate* (will not exceed)	
GCR Read	1 in 10 ¹¹ *
Write	1 in 10 ¹⁰
PE Read	1 in 10 ¹⁰ *
Write	1 in 10 ⁹
NRZI Read	1 in 10 ¹⁰ *
Write	1 in 10 ⁹
*at 90% statistical confidence	

Functional Characteristics

Internal Buffer Size	512 Kbytes or 1 Mbyte
Operating Mode	Streaming
Interface	SCSI, PERTEC-compatible

Power Requirements

Line Voltage (+/-10%)	90-125 VAC
	198-250 VAC
Line Frequency (+10% -4%)	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	31 kg (68 lbs)
Shipping Weight	47 kg (93 lbs)

Tape Specifications

Width	12.7 mm (0.5 in.)
Thickness*	0.038 mm (1.5 mils)
	Tape should meet or exceed ANSI X3.40-1983)

*See Chapter 4.

Tension	283 g (10 oz +/-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

Temperature	
Operating	15-32° C (limited by media)
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 <20°C maximum wetbulb temperature
Storage/Shipment	90% at 40°C maximum wetbulb temperature
Altitude	
Operating	3000 m (10,000 ft)
Non-Operating	15,300 m (50,000 ft)
Shock	
Transportation	Trapezoidal pulse, 188 ips, 30 G
End-Use	Half-sine pulse, 57 ips, <3 ms duration approx. 150 G
Vibration	
Operating Random	5-500 Hz, 0.21 g RMS
Non-Operating Random	5-500 Hz, 2.0 g RMS
Non-Operating Swept Sine	5-500 Hz, 0.5 g (0-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 Überwachungs-Verein Bayern Inc. (TUV certified)

DIN IEC 380/VDE 0806/08.81

IEC 435/VDE 0805/11.84

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

Ordering: Options, Accessories, and Supplies

Ordering HP 7979A/S and HP 7980 Series Options and Accessories

Product Options

HP-IB Interface Drives

- 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)

SCSI (HP Common) Interface

- HP 7979S - 1600 cpi, (with Option 800 - 800/1600/6250 cpi), HP Common SCSI interface
- HP 7980S - 1600/6250 cpi (with Option 800 - 800/1600/6250 cpi), HP Common SCSI interface
- HP 7980SX - 1600/6250 cpi (data compression on 6250 cpi), HP Common interface

Note



Each drive has the following option: 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.

Table F-1. Ordering Options for the HP 7979A/S and HP 7980 Series

Product/ Option Number	Product Description	Notes
Option 135	Drive Only	Install 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 1A4	Installation in HP A1001A (1.6 meter) cabinet	Deletes cabinet and lower front door. Includes installation.
The 7979A/S and 7980A/S have the following additional option:		
Option 800	800 cpi NRZI Tape Format	Added capability for 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

Table F-2. Upgrade Paths

Part Number	Upgrade to:	Details
HP 88703A	HP 7979A/S to HP 7980S	Includes on-site installation by HP. Not customer installable. ¹
HP 88705A	HP 7980A/S to HP 7980XC/SX	Includes on-site installation by HP. Not customer installable. ¹
HP 88707S	HP-IB to SCSI	HP-IB Interface 1/2 inch Tape Drive (HP 7979A/7980A/7980X) converted to a Single-Ended SCSI interface. Includes on-site installation by HP.

¹ An HP 7979S may be upgraded to an HP 7980SX by installing both the HP 88703A and the HP 88705A.

Tape Supplies

A full range of computer supplies may be order through Hewlett-Packard. Contact *HP Direct* at 800-538-8787 (in the U.S.) or your local HP Sales Office.

Table F-3. Tape Supplies

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
Isopropyl Alcohol, 8 oz (91%)	92281B
Texsleeves (box of 144)	9300-0767
Lint-Free Wipes (bag of 100)	92193W
Magnetic Tape Sense Markers (card of 250 BOT/EOT Markers)	92150M



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 that 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.

beginning of tape

See BOT.

bits per inch

See BPI.

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 cache.

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.

bytes per inch

See CPI.

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.

characters per inch

See CPI.

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 bpi 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 characters or bits that can be recorded in a given length of tape, expressed in characters-per-inch (CPI) or bits-per-inch (BPI).

directory

The table of contents for the files stored on a tape or disk.

end of tape

See EOT.

EOT

A 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 an HP 7980XC or HP 7980SX 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." See also "data compression."

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.

Group-Coded Recording

See GCR.

head

The assembly that writes electromagnetic bits onto tape and/or reads previously written bits from tape.

host

See CPU.

image backup

(Usually applied to backing up of a random-access device, i.e. disk.) 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.

inches per second

See IPS.

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.

Mean Time Between Failures

See MTBF.

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).

MTBF

Mean Time Between Failures, the mean of the number of power-on hours between hardware failures that necessitate repair.

Non-Return to Zero Inverted

See NRZI.

NRZI

Non-Return To Zero Inverted format. Enables a drive to store 800 CPI 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.

Phase-Encoded

See PE.

protocol

The set of commands that 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 head.

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 streaming operation.

streaming operation

Continuous data flow to or from the tape drive, as opposed to start/stop operation.

superblock

A block size of approximately 60 kilobytes used 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 write-protected.

write enable ring

A ring installed on the back of tape reels. When the ring is in place, you may record data on the tape. When the ring is removed, data cannot 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

See Extra Capacity.



Index

1

1600 indicator, 3-7
1-Mil Tapes, 4-15

6

6250 indicator, 3-7

8

800 indicator, 3-7

A

accessing information logs, 3-22
address
 setting, 2-8
air conditioning, 2-2
autoload
 problems, 5-5
 procedures, 3-10
 trouble, 3-12

B

binder, 5-13
BOT/EOT markers
 locations, 5-12
 replacing, 5-12
brown staining, 5-13

C

cabinet options, F-1
caring for tapes and tape drives, 4-1
cautions
 cleaning, 4-3
 switching on and off, 3-8
caution symbol, 1-2
changing non-volatile memory, B-4
characteristics
 environmental, E-3
 functional, E-2
 physical, E-2
 power requirements, E-2
 reliability, E-2
 tape drive, E-1
 tapes, E-3
checking
 Address/ID number, 2-8

power connections, 2-7
shipping damage, 2-1
voltage, 2-3

cinching

preventing, 4-11

cleaning

apes, 4-8
cautions, 4-3
cleaner block, 4-6
frequency, 4-2
new tapes, 4-8
read/write head, 4-5
schedules, 4-2
supplies, 4-3
tape path, 4-2, 4-7
tapes, 4-2

cleaning supplies, F-3

clearance

tape drive, 2-2

clear filming, 5-13

clearing information logs, 3-22

compression

data, C-1

configurations

enable change to non-volatile memory, B-4
HPIB, B-2
locked, B-1
SCSI, B-6
storing, B-1
unlocked, B-1

Configurations

Setting, 3-18

configuration value messages, A-5

connecting the tape drive, 2-5

control panel

configuration value messages, A-5
description, 3-1
diagnostic messages, A-5
error messages, 5-1
idle operation messages, A-3
key tips, 3-4
lights do not switch on, 5-7
normal operation messages, A-2
option messages, A-4
option selection messages, A-3
picture, 3-2

- quick reference, 3-2
- tape position messages, A-3
- test option mode messages, A-4
- warning and error messages, A-2
- conventions
 - typographical, 1-2
- corrective actions, 5-5
- crimping
 - tapes, 3-10
- cutting
 - tapes, 3-10

D

- damage
 - from shipping, 2-1
- data compression, 3-13, 3-14, C-1
 - option, F-1
- data integrity, 4-1
- data storage
 - compression, C-1
- description
 - chapters, 1-1
 - control panel, 3-1
 - HP 7979A/S, 1-3
 - operation keys, 3-2
 - option keys, 3-2
 - options, F-1
 - status indicators, 3-2
 - unlocked configurations, B-4
- description
 - HP 7980 Series, 1-3
- diagnostic messages, A-5
- diagnostics
 - running, 3-20
 - using to troubleshoot, 5-3
- dimensions
 - tape drive, E-2
- >D< indicator, 3-7
- discarding bad tapes, 4-11

E

- edge damage, 5-13
- emission compliance, ii
- enabling changes to non-volatile memory, B-4
- ENTER** key, 3-6
- environment
 - locating the tape drive, 2-2
- environmental specifications, E-3
- error messages, A-2
 - interpreting, 5-1
- evaluating tapes, 4-11
- extra capacity data storage, C-1
- extra capacity storage, 3-13

F

- features
 - product, 1-3
- functional characteristics, E-2
- fuse module
 - picture, 2-4

G

- ground terminal symbol, 1-2
- guide
 - information, 1-1
 - symbols used, 1-2

H

- handling tapes, 4-10
- holding tapes, 4-10
- host connection, 2-5
- HPIB configurations, B-2
- humidity, 2-2
- humidity specifications, E-3

I

- ID
 - setting, 2-8
- idle operation messages, A-3
- indicators
 - 1600, 3-7
 - 6250, 3-7
 - 800, 3-7
 - >D< , 3-7
 - ONLINE, 3-7
 - OPTION, 3-7
 - Tape Odometer, 3-7
 - UNLOAD, 3-7
 - WRT EN, 3-7
- indicators, status, 3-2
- information
 - guide, 1-1
- information logs, D-1
 - clearing, 3-22
 - reading, 3-22
- internal diagnostics, 5-3

K

- keys
 - description, 3-2
 - ENTER**, 3-6
 - NEXT**, 3-6
 - ONLINE**, 3-5
 - OPTION**, 3-6
 - PREV**, 3-6
 - RESET**, 3-5
 - REWIND**, 3-5
 - tips, 3-4

UNLOAD, 3-5

L

labeling tapes, 4-12
leaders, tape, 3-10
libraries
 managing tapes, 4-1
library management
 resources, 4-14
loading
 trouble, 3-12
loading tapes, 3-10
 holding the tape, 4-10
 manually, 5-6
location
 placement of drive, 2-2
locked configurations, B-1
logs
 information, D-1
 reading, 3-22

M

maintenance
 preventative, 4-1
managing and caring for tapes, 4-9
manual
 information, 1-1
 symbols used, 1-2
manual tape threading, 5-6
map
 reader, 1-1
measurements
 tape drive, E-2
messages
 configuration value, A-5
 diagnostics, A-5
 error, 5-1
 idle operation, A-3
 normal operation, A-2
 option selection, A-3
 tape position, A-3
 test option mode, A-4
 warning and error, A-2
 within options, A-4
mounting
 see loading, 3-10

N

NEXT key, 3-6
note symbol, 1-2
numbers
 setting Address/ID, 2-8

O

ONLINE indicator, 3-7
ONLINE key, 3-5
operation
 caring for tape drives, 4-1
 caring for tapes, 4-1
 Changing Rewind Speeds, 3-15
 changing time used in operator timeout, 3-15
 configuration value messages, A-5
 customizing the drive, 3-15
 diagnostic messages, A-5
 high-speed rewinds/archival tape conditioning,
 3-16
 HP 7980XC/SX Tape Drive, 3-13
 idle operation messages, A-3
 messages, A-2
 option messages, A-4
 option selection messages, A-3
 overview, 3-1
 regular/archival tape conditioning, 3-17
 running tests, 3-20
 switching on and off, 3-8
 tape position messages, A-3
 test option mode messages, A-4
 warning and error messages, A-2
OPTION indicator, 3-7
OPTION key, 3-6
option messages, A-4
options
 cabinets, F-1
 data compression, F-1
 HPIB, F-1
 ordering, F-1
 rack slides, F-1
 SCSI, F-1
option selection messages, A-3
ordering options, F-1
ordering supplies, F-3
overview
 data compression, C-1
 operation, 3-1
 product, 1-3
 setup steps, 2-1
 troubleshooting, 5-1
oxide, 5-13

P

packaging
 damage, 2-1
pack slip, 5-13
performance
 caring for tape drives, 4-1
 caring for tapes, 4-1
Pertec

- options, F-1
- physical specifications, E-2
- pictures
 - control panel, 3-2
 - fuse module, 2-4
 - write-enabled/protected tapes, 3-11
- power
 - on and off, 3-8
- power failure
 - unloading tapes manually, 5-11
- power failure recovery, 5-10
- powering on the tape drive, 2-7
- power requirements, E-2
- preparing new tapes, 4-8
- preventative measures, 4-1
- preventing tape edge damage, 4-10
- PREV** key, 3-6
- problems
 - tape and tape drive, 5-1
- procedures
 - caring for tape drives, 4-1
 - caring for tapes, 4-1
 - Changing Rewind Speeds, 3-15
 - changing time used in operator timeout, 3-15
 - checking for shipping damage, 2-1
 - cleaning new tapes, 4-8
 - cleaning tapes, 4-2, 4-8
 - cleaning the cleaner block, 4-6
 - cleaning the read/write head, 4-5
 - cleaning the tape path, 4-2, 4-7
 - connecting power, 2-7
 - customizing the drive, 3-15
 - data compression, 3-12
 - evaluating tapes, 4-11
 - extra capacity storage, 3-12
 - handling tapes, 4-10
 - high-speed rewinds/archival tape conditioning, 3-16
 - host configuration, 2-8
 - host connection, 2-5
 - labeling tapes, 4-12
 - loading a tape, 3-10
 - loading tapes manually, 5-6
 - managing and caring for tapes, 4-9
 - monitor data compression, 3-14
 - preventing cinching, 4-11
 - preventing retries, 4-11
 - preventing tape edge damage, 4-10
 - preventing tension, 4-11
 - reading information logs, 3-22
 - regular/archival tape conditioning, 3-17
 - replacing the fuse, 5-7
 - restoring configurations, B-1
 - rewinding tapes, 4-11
 - running diagnostics to troubleshoot, 5-3

- running tests, 3-20
- selecting a site, 2-2
- selecting tapes, 4-15
- setting Address/ID, 2-8
- setting the voltage, 2-3
- setup, 2-1
- storing configurations, B-1
- storing tapes, 4-9
- switching on and off, 3-8
- switching on the tape drive, 2-7
- transporting tapes, 4-9
- unloading tapes manually, 5-11
- write density, 3-12

Procedures

- setting configurations, 3-18
- Unloading a tape, 3-17

product description, 1-3

publications

- library management, 4-14
- tape care, 4-14

Q

- quick reference
 - control panel, 3-2

R

- rack slides, F-1
- reader
 - map, 1-1
- records
 - tape, 4-12
- recovery
 - power failures, 5-10
- reliability labels, 4-12
- reliability specifications, E-2
- replacement tapes, F-3
- replacing
 - BOT/EOT markers, 5-12
- RESET** key, 3-5
- resources
 - library management, 4-14
 - tape care, 4-14
- restoring configurations, B-1
- retries
 - preventing, 4-11
- rewinding tapes, 4-11
- REWIND** key, 3-5

S

- schedules
 - cleaning, 4-2
- SCSI
 - configurations, B-6
 - options, F-1

- selecting tapes, 4-15
- Setting Configurations, 3-18
- setting up the tape drive, 2-1
- shipping damage, 2-1
- site
 - environment, 2-2
- specifications
 - environmental, E-3
 - reliability, E-2
 - tape drive, E-1
 - tapes, E-3
- status indicators
 - description, 3-2
- storing configurations, B-1
- storing tapes, 4-9
- supplies, F-3
 - cleaning, 4-3
- switching on the tape drive, 2-7
- symbols
 - caution, 1-2
 - ground terminal, 1-2
 - note, 1-2
 - used in guide, 1-2
 - voltage, 1-2
 - warning, 1-2

T

- tape blocking, 5-13
- tape care, 4-1
 - resources, 4-14
- tape cinching, 5-13
- tape drive
 - characteristics, E-1
 - clearance requirements, 2-2
 - environmental specifications, E-3
 - functional characteristics, E-2
 - host configuration, 2-8
 - location, 2-2
 - operation, 3-1
 - physical specifications, E-2
 - power requirements, E-2
 - reading information logs, 3-22
 - reliability, E-2
 - running tests, 3-20
 - setup, 2-1
 - specifications, E-1
 - switch on and off, 3-8
- Tape drive
 - setting configurations, 3-18
- tape drive care, 4-1
- tape edge damage, 5-13
- Tape Odometer
 - indicator, 3-7
- tape pack slip, 5-13
- tape path
 - cleaning, 4-2
 - troubleshooting, 5-12
- tape position messages, A-3
- tapes
 - autoload problems, 5-5
 - brown staining, 5-13
 - cleaning, 4-2, 4-8
 - clear filming, 5-13
 - crimping, 3-10
 - cutting, 3-10
 - evaluating, 4-11
 - handling, 4-10
 - labeling, 4-12
 - leader length, 3-10
 - loading, 3-10
 - loading manually, 5-6
 - maintaining tension, 4-11
 - managing and caring for, 4-9
 - preparing new tapes, 4-8
 - preventing cinching, 4-11
 - preventing edge damage, 4-10
 - rewinding, 4-11
 - selecting, 4-15
 - specifications, E-3
 - storing, 4-9
 - supplies, F-3
 - transporting, 4-9
 - Unloading, 3-17
 - unloading manually, 5-11
 - using 1-Mil, 4-15
 - write-enabled/protected, 3-11
- tape stick, 5-13
- temperature, 2-2
- temperature specifications, E-3
- tension
 - proper tape, 4-11
- test option mode messages, A-4
- tests
 - running, 3-20
 - using to troubleshoot, 5-3
- threading tapes manually, 5-6
- tips
 - control panel keys, 3-4
- transporting tapes, 4-9
- trouble
 - autoload, 3-12
- troubleshooting, 5-1
 - BOT/EOT markers, 5-12
 - brown staining, 5-13
 - clean tape path, 5-12
 - clean tapes, 5-12
 - clear filming, 5-13
 - control panel lights, 5-7
 - error messages, 5-1
 - pack slip, 5-13

- power failure recovery, 5-10
- replacing the fuse, 5-7
- tape cinching, 5-13
- tape does not autoloading, 5-5
- tape edge damage, 5-13
- tape stick and blocking, 5-13
- unloading tapes manually, 5-11

typographical conventions, 1-2

U

- UNLOAD indicator, 3-7
- unloading tapes
 - manually, 5-11
- Unloading tapes, 3-17
- UNLOAD** key, 3-5

- unlocked configurations, B-1
- Unmounting
 - See unloading, 3-17

V

- voltage
 - setting, 2-3
- voltage symbol, 1-2

W

- warning messages, A-2
- warning symbol, 1-2
- write density, 3-12
- write-enable/protected tapes, 3-11
- WRT EN indicator, 3-7