

EK-TSZ05-OM-001

**TSZ05  
Tape Drive  
Owner's Manual**

Prepared by Educational Services  
of  
Digital Equipment Corporation

1st Edition, May 1990

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# About This Manual

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## OVERVIEW

This manual provides information necessary for installing, operating, and performing basic troubleshooting and maintenance on the TSZ05 Tape Drive.

The information in this manual is directed toward Digital customers and is intended to address the user's need for information on the TSZ05 Tape Drive.

## STRUCTURE OF THE MANUAL

**CHAPTER 1** provides general information and describes the physical characteristics of the TSZ05 Tape Drive. This chapter also contains the electrical, mechanical, and environmental specifications.

**CHAPTER 2** provides information on operating the TSZ05 Tape Drive.

**CHAPTER 3** provides information on basic operator troubleshooting and maintenance.

## NOTES, CAUTIONS, AND WARNINGS

The following conventions are observed in this manual.

<b>NOTE</b>	Used to highlight important information or explanations.
<b>CAUTION</b>	Used to highlight areas that could cause damage to the equipment or corrupt the data on the system.
<b>WARNING</b>	Used to call attention to areas that could injure personnel.

## RELATED DOCUMENTATION

The following publications also support the TSZ05 Tape Drive.

<b>Title</b>	<b>Part Number</b>
<i>TSZ05 Pocket Service Guide</i>	EK-TSZ05-PS
<i>TSZ05 Technical Manual</i>	EK-TSZ05-TM
<i>TSZ05 Installation Guide</i>	EK-TSZ05-IM

# INTRODUCTION

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## 1.1 INTRODUCTION

The TSZ05 Tape Drive is a 1600 bpi magnetic tape drive designed to provide for an interchange of data between systems and to provide backup for disk drives. The TSZ05 Tape Drive exchanges data with other components of a system and transfers that data to and from half-inch magnetic tape on 7 inch, 8.5 inch, and 10.5 inch reels.

The TSZ05 Tape Drive consists of three functional components: the interface, the drive electronics, and the drive mechanism. These three components interact to accomplish the various functions performed by the tape drive.

Data to be written on the magnetic tape is received from the Small Computer Systems Interface (SCSI) bus, and data read from the magnetic tape is transferred to the SCSI bus. A microprocessor is used to accomplish this transfer of data to and from the magnetic tape. The microprocessor interprets commands from the interface to:

- Accelerate and decelerate the tape
- Position the tape at the read/write head
- Detect tape position
- Control formatting
- Provide status outputs

The interface translates SCSI commands into drive executable commands, and translates tape drive data and status signals into the appropriate format for the SCSI bus.

The phase-encode method of recording is used to write data on the magnetic tape in accordance with ANSI Standard X3.39-1986. Nine tracks (eight tracks of data and a parity track) are written simultaneously across the width of the tape.

## 1-2 INTRODUCTION

The TSZ05 Tape Drive is self-loading. Tape is automatically threaded, positioned at beginning-of-tape (BOT), and properly tensioned.

## 1.2 SPECIFICATIONS

Refer to the following sections for the TSZ05 electrical, mechanical, environmental, and performance specifications.

### 1.2.1 Electrical Specifications

The TSZ05 Tape Drive complies with Underwriters' Laboratory (UL) for power cord grounded equipment, VDE/TUV (German standards and testing organizations), and Canadian Standards Association (CSA) requirements. Table 1-1 provides the electrical specifications for the TSZ05 Tape Drive.

**Table 1-1 Electrical Specifications**

<b>Voltage</b>	<b>Current</b>	<b>Frequency</b>	<b>Power</b>	<b>Heat Dissipation</b>
85 to 132 Vac	1.67 A at 120 V	49 to 63 Hz	220 W <b>maximum</b>	750 BTUs per hour <b>maximum</b>
187 to 264 Vac	.83 A at 220 V			

### 1.2.2 Mechanical Specifications

Table 1-2 provides the mechanical specifications for the TSZ05 Tape Drive.

**Table 1-2 Mechanical Specifications**

<b>Height</b>	<b>Width</b>	<b>Depth</b>	<b>Weight</b>
26.9 cm (10.59 in.)	50.5 cm (19.88 in.)	68.4 cm (26.94 in.)	45 kg (99 lbs)

### **1.2.3 Environmental Specifications**

#### **Acoustic Noise Emission**

55 dBa maximum measured from one meter

#### **Operating Temperature**

15°C to 32°C (59°F to 90°F) with tape

#### **Relative Humidity**

20% to 80% noncondensing (with tape)

#### **Operating Altitude**

3 kilometers (10,000 feet) maximum

### **1.2.4 Performance Specifications**

#### **Data Capacity**

46 megabytes (2400-foot tape)

#### **Head-to-Tape Data Transfer Rate**

160 kilobytes per second

#### **Interface Burst Rate**

1.5 megabytes per second maximum, asynchronous

## 1-4 INTRODUCTION

### Recording Speeds

25 and 100† inches per second at 1600 bits per inch

### Rewind Speed

175 inches per second average

### Operating Times

Operation	25 ips	100 ips†
Data Access	40 ms	260 ms
Reposition	120 ms	780 ms
Write Reinstruct	10.0 to 11.0 ms	2.0 to 3.5 ms
Read Forward Reinstruct	16.0 to 18.0 ms	3.0 to 4.0 ms

†Actual performance is dependent on system capability. The TSZ05 will stream up to 100 inches per second for data block sizes not exceeding 32 Kbytes.

## 1.3 SITE PREPARATION

Computer systems and peripherals in office areas are affected by static discharge, temperature changes, and humidity. These conditions may cause poor operation and may affect the dependability of the equipment. Good site planning can decrease these effects and make the installation process easier.

### 1.3.1 Preinstallation Considerations

#### Space

Allow enough space so that the TSZ05 cabinet can be moved forward for servicing and to ensure that air circulation provided to the cabinet is not obstructed. Place the tape drive where it can be accessed easily. Run the power cord and data cable in areas where no one will trip on them.

† Actual performance is dependent on system capability. The TSZ05 will stream up to 100 inches per second for data block sizes not exceeding 32 Kbytes.



## **Power**

Primary power is provided and installed by the customer. This circuit must meet all national and local codes that apply to it. If power disturbances cannot be prevented, more power conditioning equipment may be required and this is the customer's responsibility.

Since the TSZ05 requires 3.6 A maximum, it may be plugged into the same circuit as the workstation as long as the total current does not exceed the circuit capability. This circuit must be stable without any electrical noise, and provide a good system ground.

### **CAUTION**

**Do not connect any equipment such as air conditioners, office copiers, or coffee pots to this circuit.**

## **1.3.2 Environment**

The system that controls the environment should be capable of maintaining the recommended temperature and humidity ranges year-round (see Section 1.2.3). This system should filter the air to remove dust and other particles, as well as provide an even distribution of the air to prevent hot areas in the room where the TSZ05 Tape Drive is installed. Keep the tape drive away from heaters and out of direct sunlight.

## **1.3.3 Static Electricity**

Static discharge is a common problem for any electronic device and may cause lost data, equipment downtime, and other problems. The most common source of static electricity is the movement of people in contact with carpets and clothing. Low humidity allows a large amount of static charge to build up. To minimize problems with static electricity:

- Maintain more than 40% relative humidity
- Place the TSZ05 away from the heavy traffic areas
- Do not use carpets (if possible). If a carpet is necessary, choose a good antistatic carpet. If carpets are in place, antistatic mats placed around the equipment may help to decrease the problem

1974  
The following information was obtained from a review of the records of the Department of Health and Human Services, Office of the Assistant Secretary for Health Policy and Statistics, regarding the activities of the National Health Planning and Resources Administration (NHRA) during the period from January 1, 1973 to December 31, 1974.

The NHRA was established on January 1, 1973, as a result of the reorganization of the Department of Health and Human Services. The NHRA's primary responsibility is to coordinate and integrate health planning and resources activities within the Department and with other Federal, State, and local agencies.

The NHRA has been successful in carrying out its mandate and has made significant contributions to the development and implementation of health planning and resources programs. The NHRA has been instrumental in the development of the National Health Planning and Resources Act of 1973, which provides the legal framework for the NHRA's activities.

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# 2 OPERATION

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## 2.1 INTRODUCTION

This chapter discusses the operational considerations for the TSZ05 Tape Drive. The topics discussed are:

- Front panel
- Loading tape
- Unloading tape

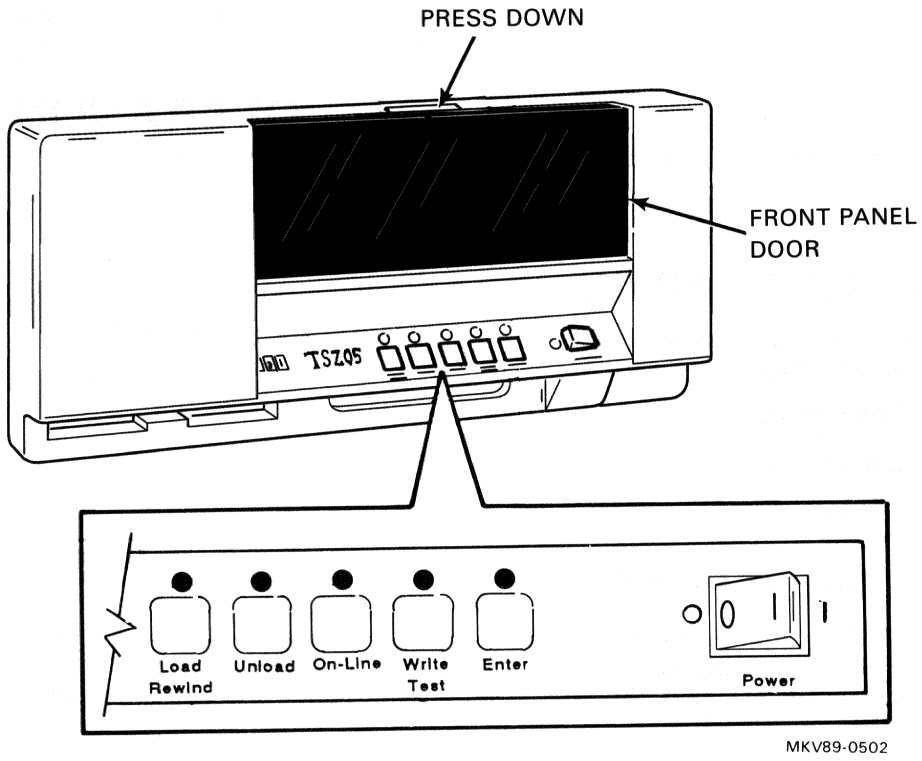
## 2.2 FRONT PANEL

The TSZ05 Tape Drive front panel (Figure 2-1) contains switches and indicators that allow the operator to perform various functions or to determine the status of the tape drive. The switches and indicators are described in Table 2-1.

### NOTE

**If a problem occurs, refer to Chapter 3 for error codes and corrective actions.**

2-2 OPERATION



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Figure 2-1 TSZ05 Front Panel

**Table 2-1 Switches and Indicators**

<b>Switch/Indicator</b>	<b>Function</b>
Load Rewind Switch	This switch, when pressed, causes the tape to load to beginning-of-tape (BOT) when the tape is inserted, or to rewind to BOT if the tape is already loaded.
Load Rewind Indicator	This indicator flashes while the tape is loading or rewinding. It then remains ON when either operation is complete to indicate that the tape is positioned with the BOT tab at the BOT photosensor.
Unload Switch	This switch, when pressed, causes the tape to unload. When the tape is unloaded, the access door unlocks allowing access to the tape reel.
Unload Indicator	This indicator flashes while the tape is unloading and then remains ON to indicate that tape is not loaded.
On-Line Switch	This switch places the tape drive either on-line or off-line. When the On-Line switch is pressed the first time, the tape drive is placed on-line. When pressed the second time, the tape drive is placed off-line.
On-Line Indicator	This indicator, when ON, indicates that the tape drive is on-line (capable of communicating with the host controller), and all front panel switches except the On-Line switch are disabled.
Write Test Switch	This switch causes the tape drive to enter or exit the diagnostic mode. The tape drive must be off-line for this switch to function. The first time this switch is pressed, the tape drive enters the diagnostic mode. If the switch is pressed while the tape drive is in the diagnostic mode, the tape drive exits the diagnostic mode.
Write Test Indicator	This indicator, when ON, shows that a write-enable ring is installed in the loaded tape reel.
Enter Switch	This switch in conjunction with the Load Rewind switch allows the operator to bypass the autothreading sequence for manual threading of tapes with damaged leaders.
Enter Indicator	This indicator in conjunction with the other indicators is used to indicate tape drive errors to the operator.

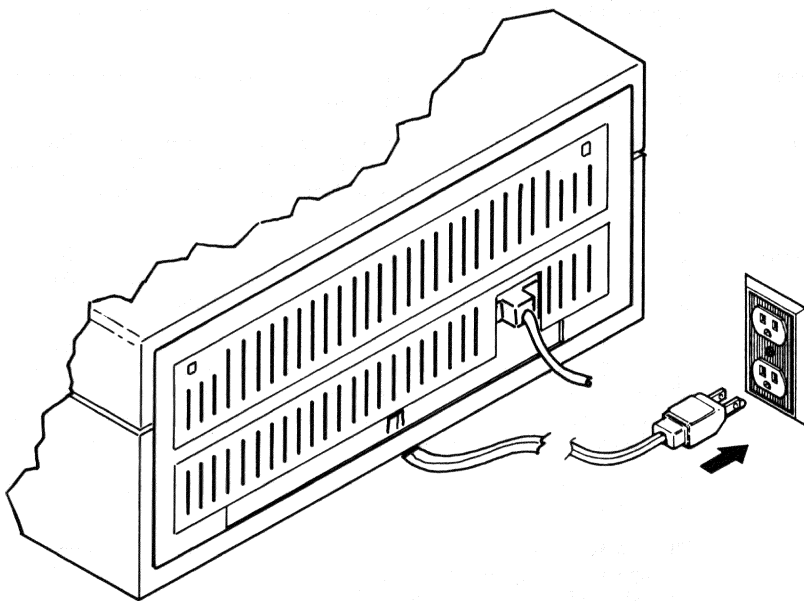
## 2.3 LOADING TAPE

Tape can be loaded in the TSZ05 Tape Drive either automatically or manually.

### 2.3.1 Automatic Tape Loading

To automatically load tape, perform the following steps.

1. Plug the power cord into the rear of the TSZ05 (Figure 2-2).

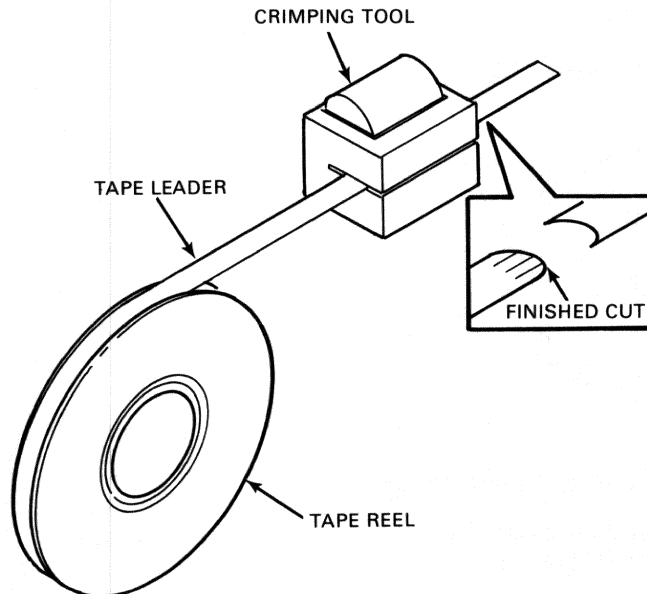


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**Figure 2-2 Power Cord Attachment**

2. Plug the power cord into an appropriate wall outlet.
3. Place the Power switch in the ON ( | ) position.
4. Observe that the Power switch lamp illuminates indicating that there is power to the drive.

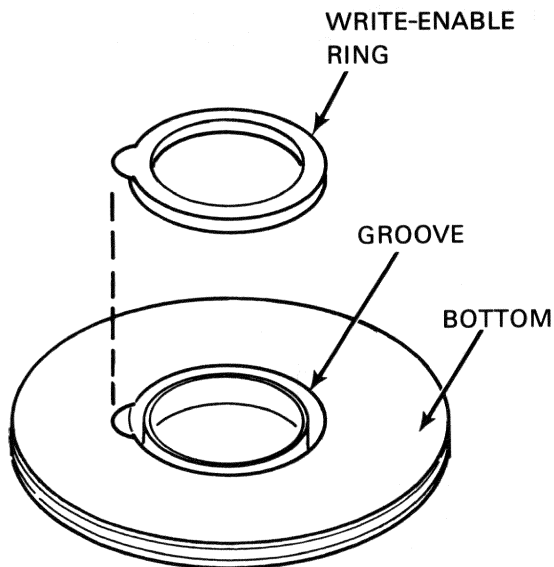
5. Ensure that the tape leader is not damaged and that the end is crimped. If the leader is damaged or the tape is new, use a cutting/crimping tool (P/N: 47-00038-00) to crimp the end of the tape (Figure 2-3).



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**Figure 2-3 Crimping Tool**

6. Ensure that the tape is completely wound onto the reel.
7. If the tape is going to be written on, locate the groove on the bottom of the reel (Figure 2-4).
8. Press the write-enable ring into the groove.

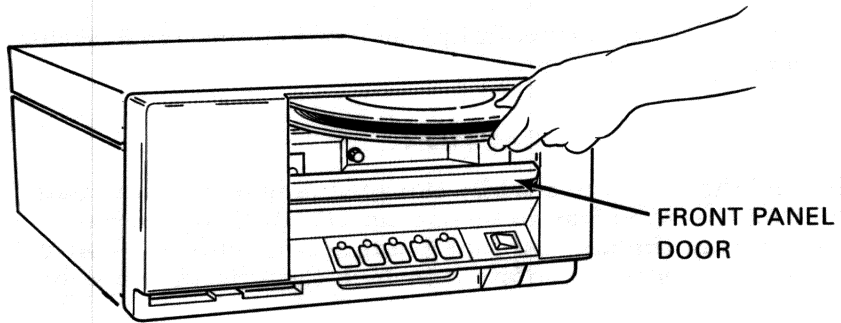


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**Figure 2-4 Installing a Write-Enable Ring**

9. Open the front panel door of the tape drive by pressing down gently on the top of the door (Figure 2-5).
10. Place the tape reel on the supply hub with the write-enable ring side of the reel down. The reel must lie evenly on the hub.
11. Close the front door.
12. Press the Load Rewind switch. The Load Rewind indicator lamp flashes during the load cycle (approximately 30 seconds).
13. When the tape is loaded, the Load Rewind indicator lamp remains ON (stops flashing) and the Write Test indicator lights if a write-enable ring is installed.
14. Press the On-Line switch to connect the tape drive to the controller.





**NOTE:**  
INSERT TAPE WITH WRITE-ENABLE RING.

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**Figure 2-5 Loading a Tape Reel**

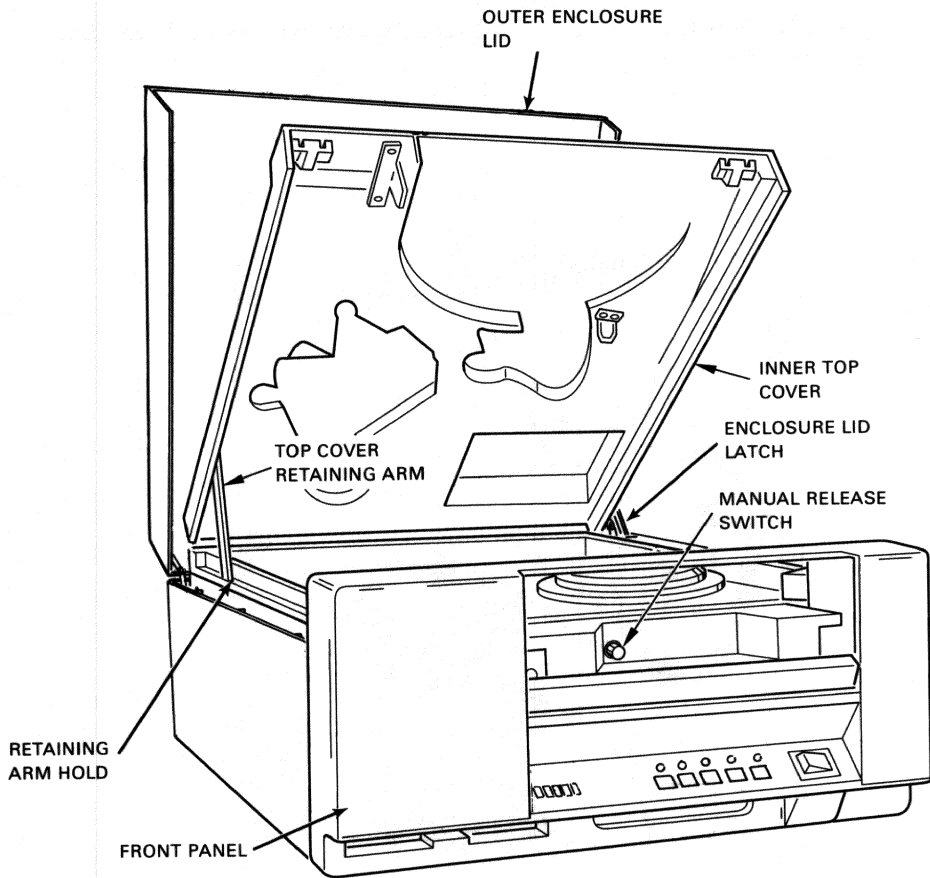
### 2.3.2 Manual Tape Loading

If the tape drive does not automatically load a reel of tape, the following manual load procedure can be used.

#### CAUTION

**Switching off the tape drive while the system is operating could cause data on the SCSI bus to be corrupted. Halt the system before performing the manual tape loading procedure. Raising the inner cover operates a safety interlock that disconnects the power.**

1. Ensure that none of the tape drive indicators are flashing.
2. Place the Power switch to the OFF (O) position.
3. Open the front panel door of the tape drive by pressing down gently on the top of the door.
4. Open the outer enclosure lid by pressing down on both front corners of the lid until the latch unlocks (a distinct click should be heard).
5. Raise the outer lid until the yellow safety latch on the right rear corner locks into place.
6. Grasp the inner cover on both sides, raise the inner cover, and place the cover retaining arm in its hole (Figure 2-6).
7. Place the tape reel on the supply hub with the write-enable ring side of the reel down. The reel must lie evenly on the hub.
8. Press and hold the manual release switch in (Figure 2-6) and rotate the supply hub clockwise until the tape reel locks in place. This is indicated by the three reel hub fingers raising against the reel hub and the reel stopping. Additional pressure is required to move the supply hub the last 1/8 turn. A distinct click is felt as it locks into place.
9. Release the manual release switch.

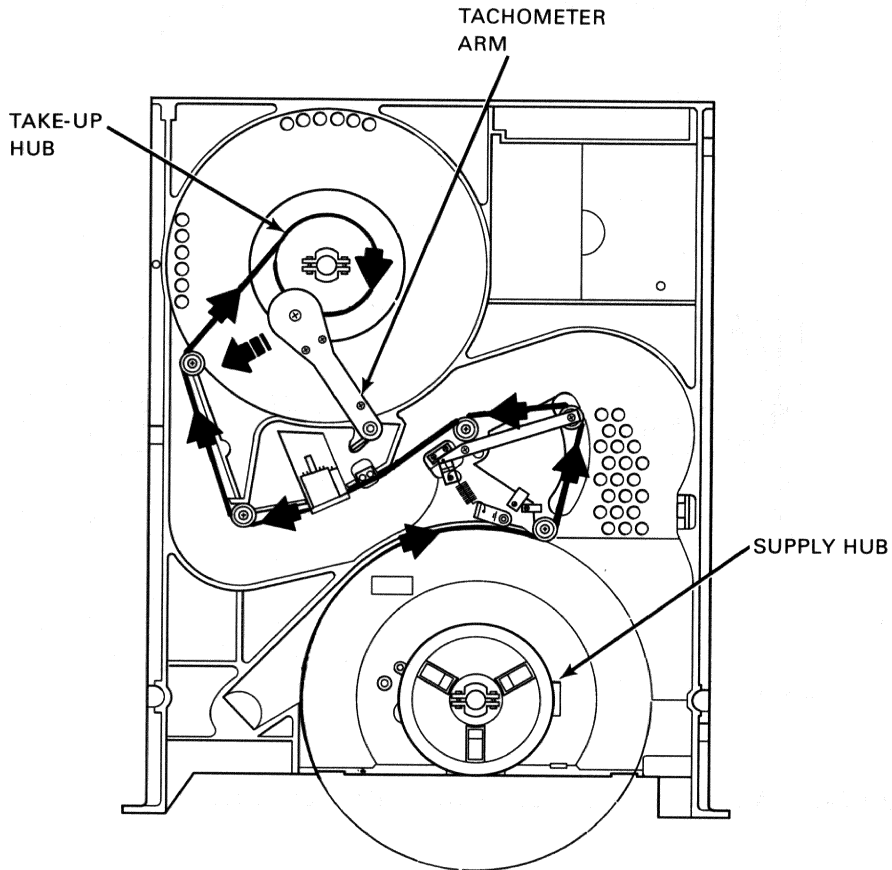


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**Figure 2-6 Accessing the Tape Drive for Manual Loading**

## 2-10 OPERATION

10. Thread the tape along the path shown in Figure 2-7.
11. Carefully hold the spring-loaded tachometer arm away from the take-up hub.



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**Figure 2-7 Tape Path**

12. Wrap the tape clockwise around the take-up hub until the end of the tape is held by the next tape layer.
13. Turn the take-up hub clockwise five revolutions and gently place the tachometer arm against the hub.

14. Check that the tape is seated correctly on the tape guides and the read/write head.
15. Lift the inner cover and move the cover retaining arm to the rear to close the cover.
16. Lower the inner cover and press down on the front corners to latch.
17. Lift the outer lid and lift the yellow safety latch on the right rear to close the lid.
18. Lower the outer lid and press down on the front corners to latch.
19. Close the front panel door by lifting it to the up position.
20. Place the power switch to the ON ( | ) position.
21. Press and hold the Enter switch.
22. While holding the Enter switch, press the Load Rewind switch.
23. Release both switches. This causes the tape to load to beginning-of-tape (BOT).
24. The Load Rewind indicator lamp flashes while the tape is loading (approximately 30 seconds) and then remains ON (stops flashing) to indicate that the tape is loaded.

## **2.4 UNLOADING TAPE**

Tape is usually unloaded automatically, but there may be cases where manual unloading is required. This section includes both procedures.

### **2.4.1 Automatic Tape Unloading**

To automatically unload tape, perform the following steps.

1. Ensure that the On-Line indicator is OFF and that the front panel door is closed. If the On-Line indicator is not OFF, press the On-Line switch to place the tape drive off-line.
2. Press the Unload switch. The Unload indicator flashes while the tape is unloading.
3. When the Unload indicator remains ON, and the front panel door is unlocked, open the front panel door and remove the tape reel.

#### **NOTE**

**If the tape reel cannot be removed, it may be necessary to use the manual tape unloading procedure.**

## 2.4.2 Manual Tape Unloading

If the tape drive does not automatically unload a tape reel, it may be necessary to perform the following steps.

### CAUTION

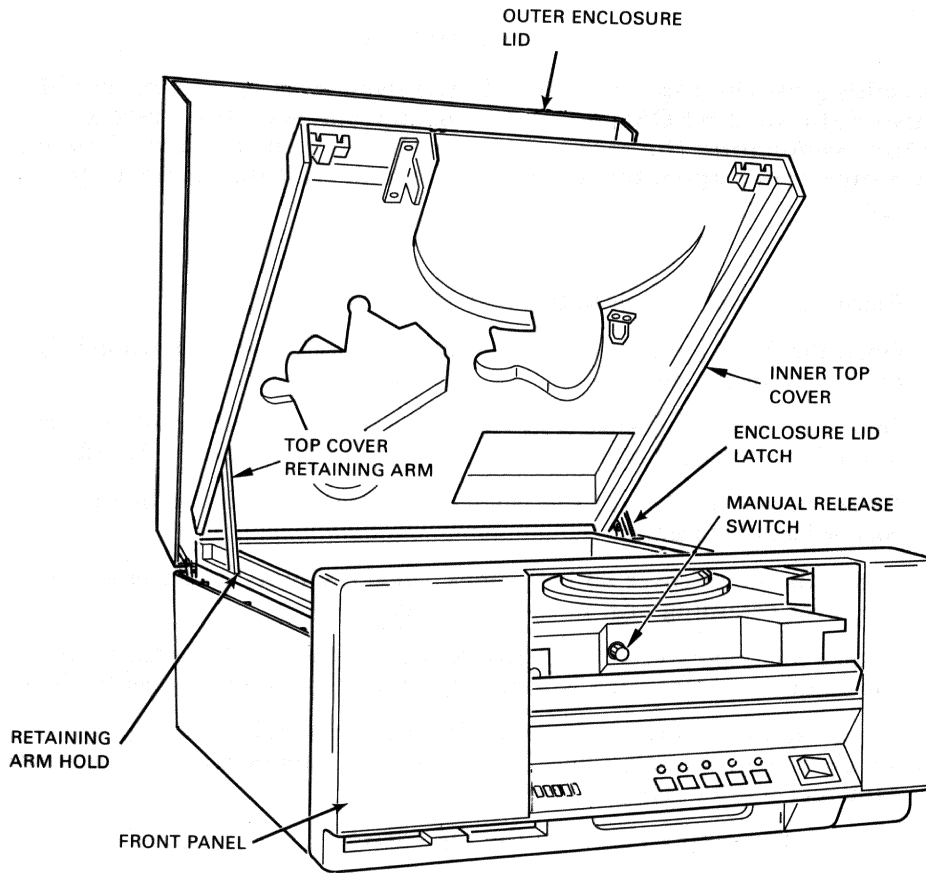
**Switching off the tape drive while the system is operating could cause data on the SCSI bus to be corrupted. Halt the system before performing the manual tape unloading procedure. Raising the inner cover operates a safety interlock that disconnects the power.**

1. Place the Power switch to the OFF (O) position.
2. Open the front panel door of the tape drive by pressing down gently on the top of the door.
3. Open the outer enclosure lid by pressing down on both front corners of the lid until the latch unlocks (a distinct click should be heard).
4. Raise the outer lid until the yellow safety latch on the right rear corner locks into place.
5. Grasp the inner cover on both sides, raise the inner cover, and place the cover retaining arm in its hole (Figure 2-8).
6. Rotate the supply reel counterclockwise to rewind all the tape onto the supply reel (the tape will be very taut due to take-up reel loading).
7. Press the manual release switch (Figure 2-8) while rotating the supply hub counterclockwise until the three fingers snap back and the tape reel rotates freely.
8. Remove the supply reel from the tape drive.
9. Lift the inner cover and move the cover retaining arm to the rear to close the cover.
10. Lower the inner cover and press down on the front corners to latch.
11. Lift the outer lid and lift the yellow safety latch on the right rear to close the lid.

2-14 OPERATION

12. Lower the outer lid and press down on the front corners to latch.

13. Close the front panel door by lifting it to the up position.



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**Figure 2-8 Accessing the Tape Drive for Manual Unloading**



# 3

## TROUBLESHOOTING AND MAINTENANCE

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### 3.1 INTRODUCTION

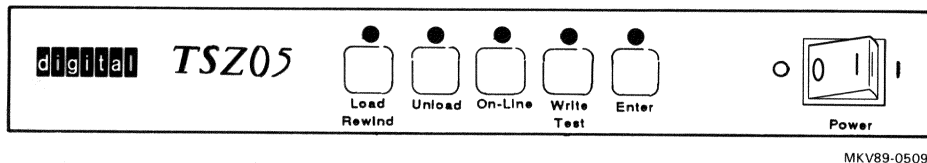
This chapter discusses basic troubleshooting and customer maintenance for the TSZ05 Tape Drive.

### 3.2 BASIC TROUBLESHOOTING

Basic troubleshooting consists of performing the corrective action indicated by error codes reported either by LEDs on the front panel of the tape drive or by messages on the host system.

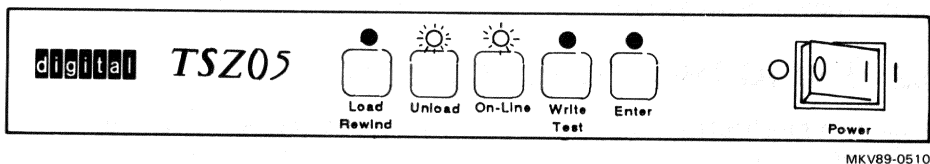
#### 3.2.1 Front Panel Error Reporting

The tape drive reports errors using the LED indicators on the front panel (Figure 3-1).



**Figure 3-1 Front Panel LEDs**

These five LEDs indicate errors by blinking after the load cycle is completed, displaying codes (LED patterns) that identify the type of error that occurred. Figure 3-2 shows how the first error code in Table 3-1 would appear on the front panel. Note that a 1 = lamp illuminated and a 0 = lamp off.



**Figure 3-2 Example of 01100 Error Code**

Table 3-1 shows error codes and the corresponding corrective action for errors that a user can correct. All other error codes require a Digital Customer Services technician to correct.

**Table 3-1 Error Codes/Corrective Action**

<b>LED Pattern</b>	<b>Corrective Action</b>
01100	Install a write-enable ring if you intend to write to this tape.
00110	Check that the tape reel is seated correctly on the supply hub.
11101	Place a reel of tape on the supply hub before pressing Load Rewind.
11011	Close the front panel door.
10111	Place a reel of tape (write-enable ring side down) on the supply hub.
01111	Check the beginning-of-tape (BOT) marker. The tape leader must be a minimum of 1.8 m (6 ft) and a maximum of 10.7 m (35 ft)
11111	Load failure: Recrimp the tape leader and try again. Load the tape manually if necessary.

If the error code is not listed in the above table, there are no user corrective actions that can be taken. Notify Digital Customer Services.

### 3.2.2 SCSI Error Reporting

The SCSI generates error data that can be accessed by a host system via the "request sense" command. The error data is presented as Sense keys and Additional Sense Codes. The Sense keys and their meanings are listed in Table 3-2 and the Additional Sense Codes are listed in Table 3-3.

**Table 3-2 Sense Keys**

<b>Hex Code</b>	<b>Sense Key</b>	<b>Meaning</b>
0	No Sense	No Sense key data to be reported.
1	Recovered Error	Command completed successfully with some recovery action.
2	Not Ready	The tape drive cannot be accessed.
3	Tape Error	Command terminated with an unrecovered error probably due to the tape.
4	Hardware Error	The tape drive detected a nonrecoverable hardware fault.
5	Illegal Request	Illegal parameter.
6	Unit Attention	The tape may have been changed or the tape drive has been reset.
7	Data Protect	A write was attempted on a tape without a write-enable ring installed.
8	Blank Check	A read past end-of-data (EOD) was attempted.
B	Aborted Command	The tape drive aborted a command.
D	Volume Overflow	The tape drive reached end-of-tape (EOT) and unwritten data remains in the buffer.

**Table 3-3 Additional Sense Codes**

<b>Hex Code</b>	<b>Additional Sense Code</b>
00	No Additional Sense information
20	Illegal command
43	Data buffer parity error
4B	Power-up failure
51	Functional timeout
52	Tape position error
53	Error occurred before command completion
54	Data buffer not empty
55	Fixed mode bit incorrectly set
56	Data transfer error: host to controller
57	Data transfer error: controller to host
58	Verify command with byte compare not supported
59	Space to end-of-data (EOD) not supported
5B	Command sequence error
5C	Unit select error
5D	Variable block length greater than 64K
5E	Unable to obtain buffer
5F	Command parameter error
60	Status error from target
62	Controller detected retries: buffer parity
63	Controller detected retries: SCSI parity
64	Controller detected tape retries

### 3.3 USER MAINTENANCE

The only user maintenance for the TSZ05 Tape Drive is the cleaning of the tape read/write head, tape path, sensors, and cleaning or replacement of the air filter.

The following are needed for maintenance on the TSZ05 Tape Drive:

- Tape Drive Cleaning Kit, P/N: TCU01 (for 20 hour, 40 hour, and 6 month service).
- Air Filter, P/N: 29-25065-00 (6 month service, if desired).

Maintenance parts may be ordered from Digital Equipment Corporation. Contact your local Digital representative for ordering information.

#### NOTE

**All components of the tape path should be cleaned after every 40 hours of operation or once per week, whichever occurs first. The read/write head should be cleaned after every 20 hours of operation. Only Freon TF™ should be used as a cleaning agent, and it should be applied with a lint-free swab or wipe.**

#### CAUTION

**Do not apply a cleaning agent directly to the item to be cleaned, even if the instructions on the cleaning agent state to do so. Always apply the cleaner to a lint-free swab or wipe first. Cleaning agents can dissolve the lubricants in precision bearings.**

**Table 3-4 Maintenance Matrix**

<b>Service Assembly</b>	<b>20 Hour</b>	<b>40 Hour</b>	<b>6 Month</b>
Read/Write Head	X	X	X
Tape Cleaner		X	X
Tachometer Roller		X	X
Take-up Hub		X	X
Roller Guides		X	X
Sensors		X	X
Air Filter			X

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### 3.3.1 20 Hour Maintenance

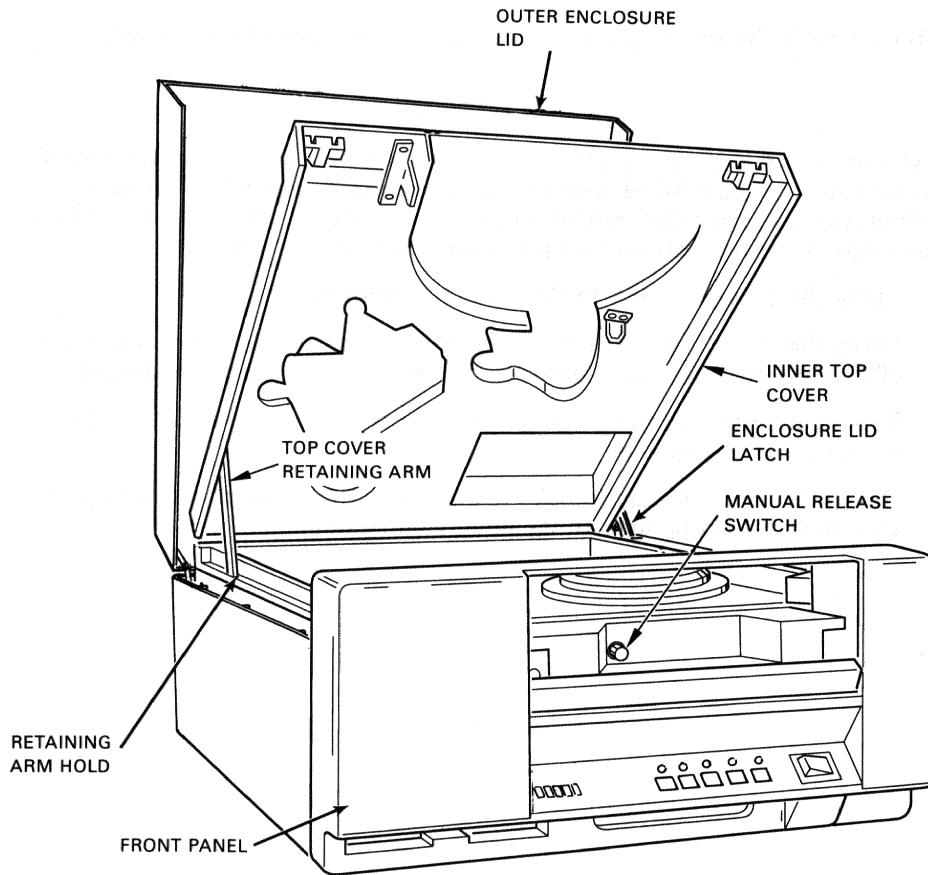
After every 20 hours of operation, clean the read/write head as follows.

#### CAUTION

**Switching off the tape drive while the system is operating could cause data on the SCSI bus to be corrupted. Halt the system before performing the maintenance procedure. Raising the cover operates a safety interlock that disconnects the power.**

1. Place the Power switch to the OFF (O) position.
2. Open the outer enclosure lid by pressing down on both front corners of the lid until the latch unlocks (a distinct click should be heard).
3. Raise the outer lid until the yellow safety latch on the right rear corner locks into place.
4. Grasp the inner cover on both sides, raise the inner cover, and place the cover retaining arm in its hole (Figure 3-3).

### 3-8 TROUBLESHOOTING AND MAINTENANCE

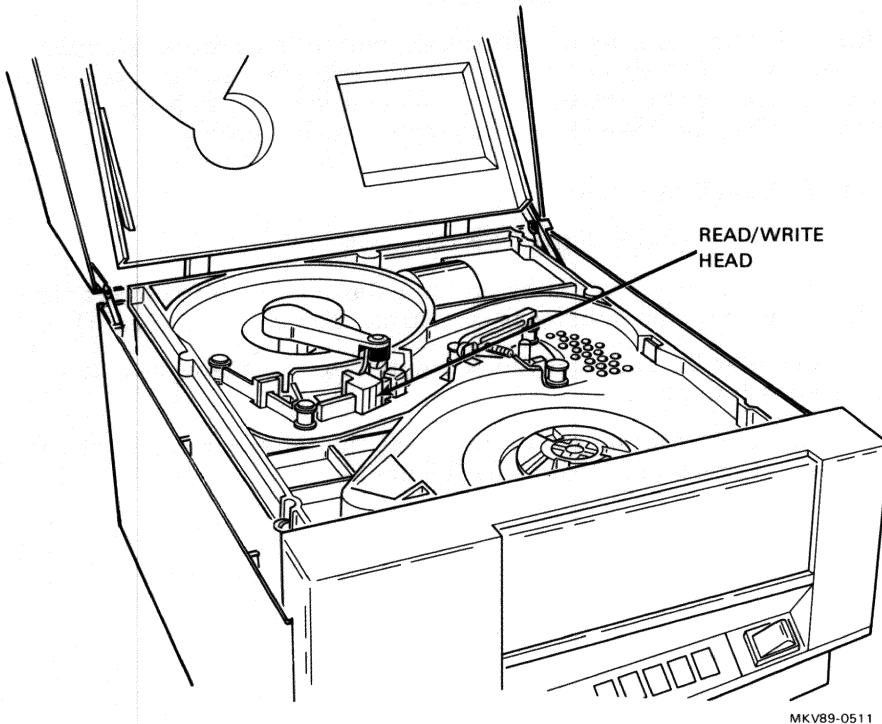


MKV89-0507

**Figure 3-3 Gaining Access to the Tape Path (20 Hour Maintenance)**



5. Apply Freon TF to a lint-free swab or wipe and clean the tape contact surface of the read/write head (Figure 3-4).
6. Wipe any residue from the head with the dry lint-free wipes provided in the kit.



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**Figure 3-4** Cleaning the Read/Write Head (20 Hour Maintenance)

7. Close the inner cover by releasing the cover retaining arm and lowering the cover.
8. Press down on the front corners until the inner cover snaps closed.
9. Release the latch and lower the outer lid of the enclosure.
10. Press gently on the front of the lid to latch it in place.

### **3.3.2 40 Hour Maintenance**

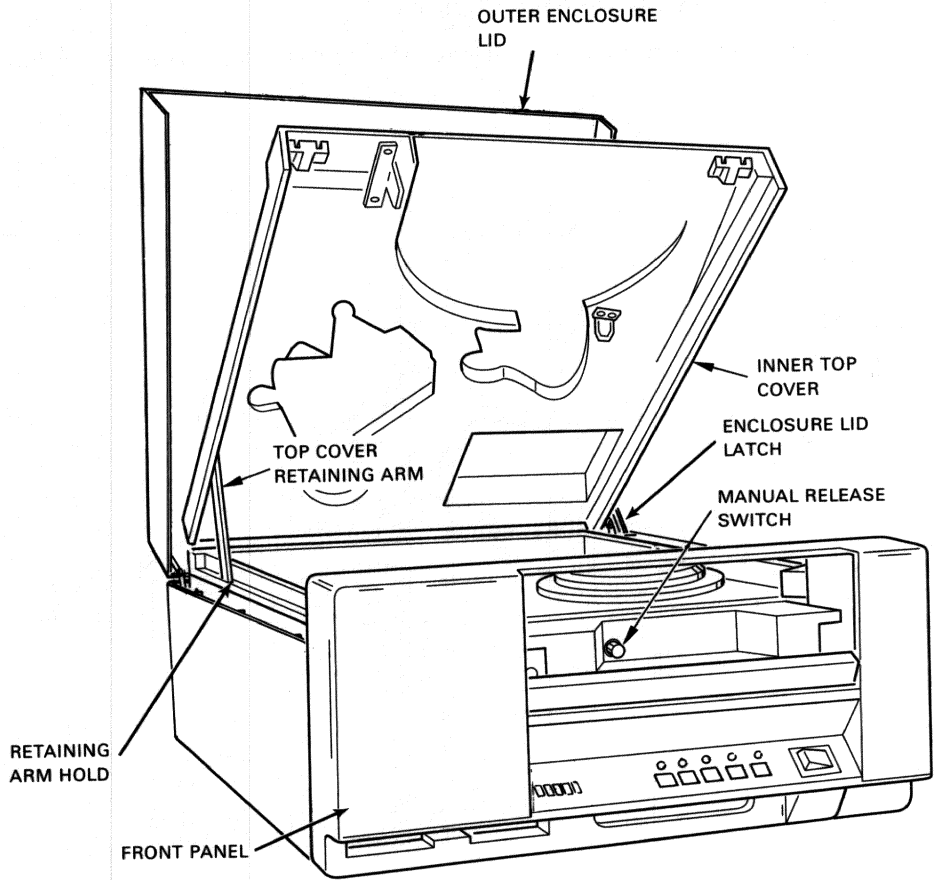
After every 40 hours of operation or once per week, whichever occurs first, clean the read/write head, tape path, and BOT/EOT sensors.

#### **CAUTION**

**Switching off the tape drive while the system is operating could cause data on the SCSI bus to be corrupted. Halt the system before performing the maintenance procedure. Raising the cover operates a safety interlock that disconnects the power.**

#### **Cleaning the Read/Write Head**

1. Place the Power switch to the OFF (O) position.
2. Open the outer enclosure lid by pressing down on both front corners of the lid until the latch unlocks (a distinct click should be heard).
3. Raise the outer lid until the yellow safety latch on the right rear corner locks into place.
4. Grasp the inner cover on both sides, raise the inner cover, and place the cover retaining arm in its hole (Figure 3-5).

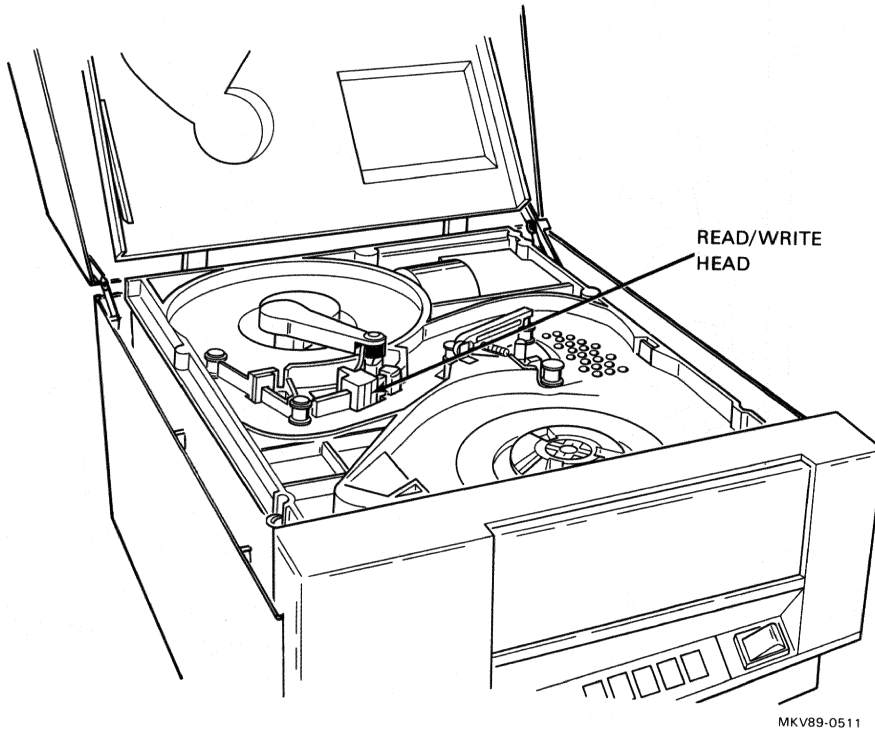


MKV89-0507

**Figure 3-5 Gaining Access to the Tape Path (40 Hour Maintenance)**

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5. Apply Freon TF to a lint-free swab or wipe and clean the tape contact surface of the read/write head (Figure 3-6).
6. Wipe any residue from the head with the dry lint-free wipes provided in the kit.

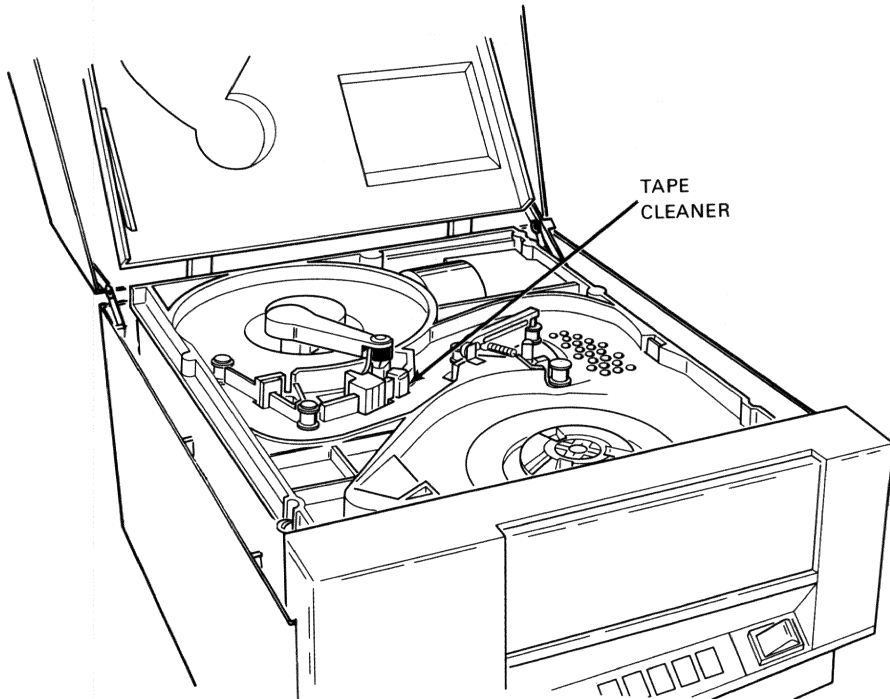


MKV89-0511

**Figure 3-6** Cleaning the Read/Write Head (40 Hour Maintenance)

### Cleaning the Tape Path

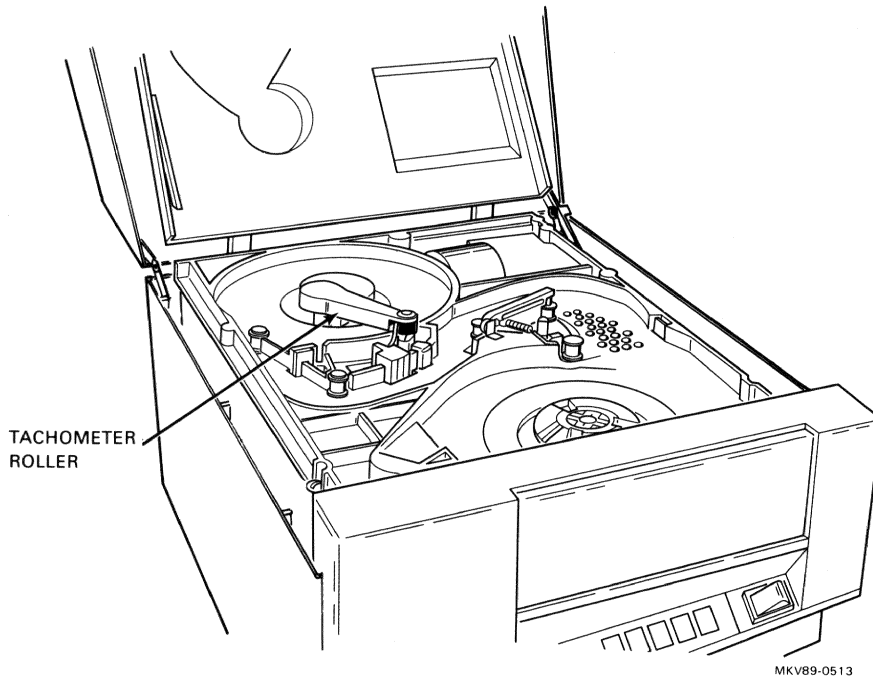
1. Apply Freon TF to a lint-free swab or wipe and clean the following components of the tape path:
  - a. Tape cleaner (Figure 3-7)
  - b. Tachometer roller (Figure 3-8)
  - c. Take-up hub (Figure 3-9)
  - d. Roller guides (Figure 3-10)
2. Wipe any residue from the components with the dry lint-free wipes provided in the kit.



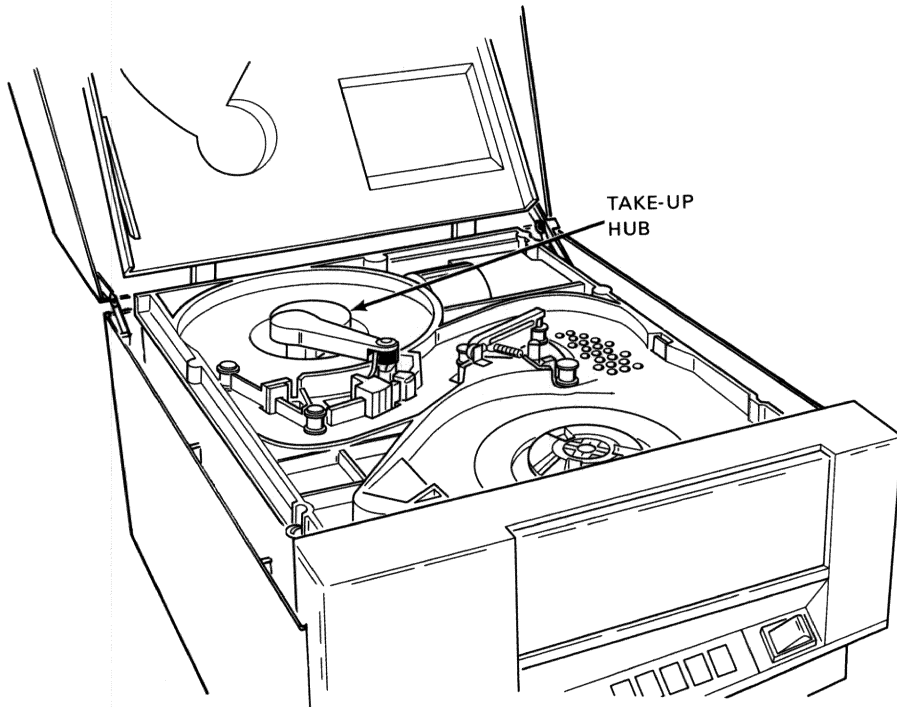
MKV89-0512

**Figure 3-7** Cleaning the Tape Cleaner

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**Figure 3-8** Cleaning the Tachometer Roller

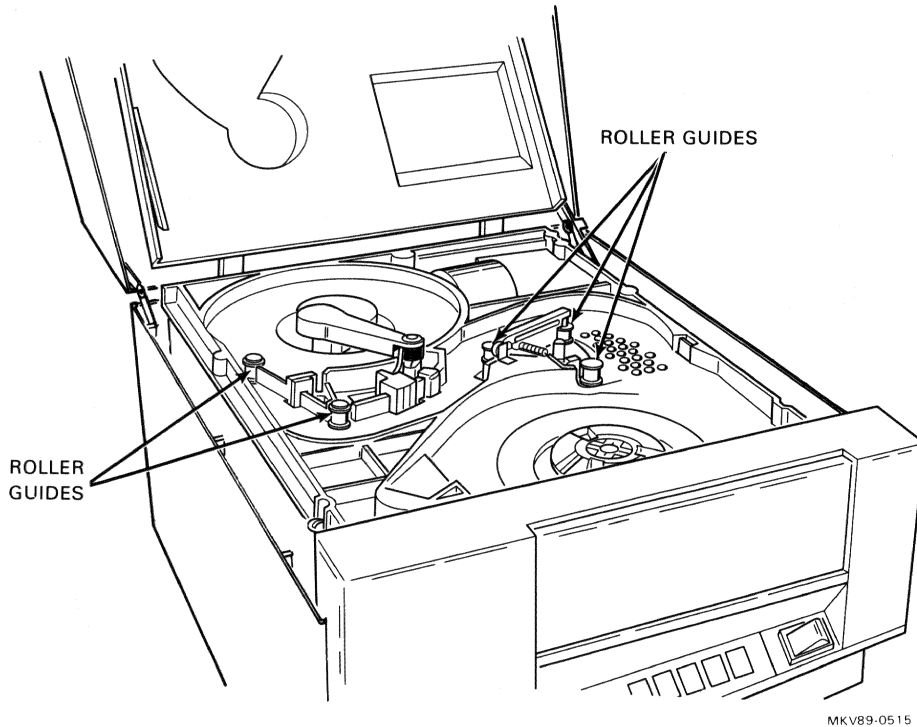


MKV89-0514

**Figure 3-9 Cleaning the Take-up Hub**

Note that it will be necessary to hold the tachometer arm away from the hub during cleaning.

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**Figure 3-10** Cleaning the Roller Guides

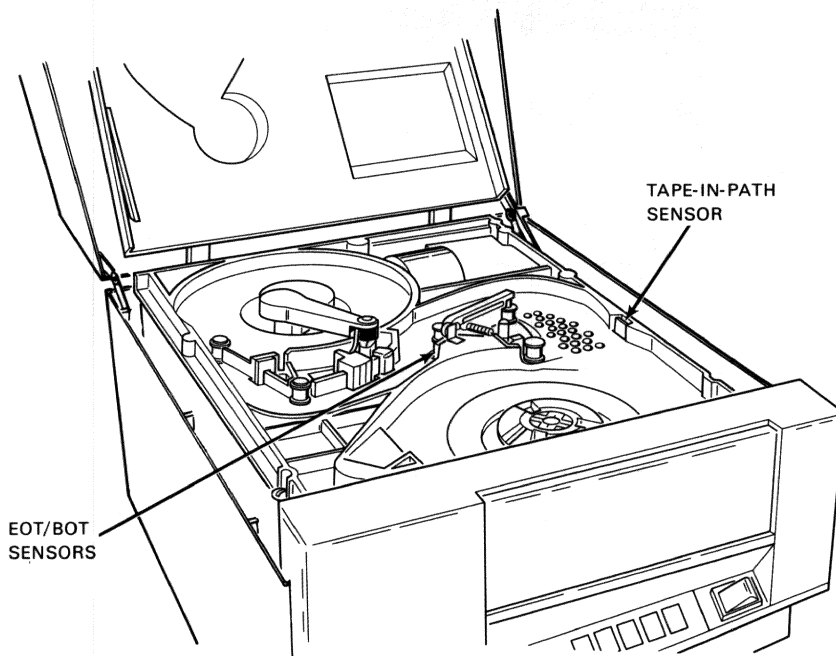


## Cleaning the Sensors

### CAUTION

When cleaning the sensors, be as gentle as possible. The alignment of the LEDs is critical.

1. Using a dry cotton swab, gently wipe any dust off each sensor transmitter and receiver lens (Figure 3-11).



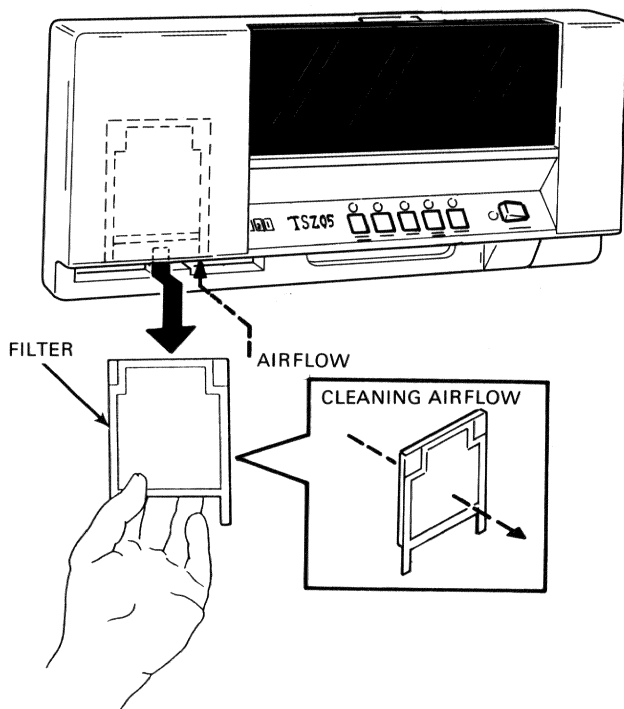
MKV89-0516

**Figure 3-11** Cleaning the Sensors

2. Close the inner cover by releasing the cover retaining arm and lowering the cover.
3. Press down on the front corners until the inner cover snaps closed.
4. Release the latch and lower the outer lid of the enclosure.
5. Press gently on the front of the lid to latch it in place.

### 3.3.3 6 Month Maintenance

Every six months, in addition to the 40 hour maintenance, clean or replace the air filter as follows. The filter is located in the lower left front of the enclosure (Figure 3-12).



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**Figure 3-12 Removing the Air Filter**

1. Remove the filter by pulling the bottom of the filter forward to free the two fingers at the bottom (Figure 3-12).
2. Pull the filter down and out.
3. Note that the direction of airflow is from the outside to the inside of the cabinet.
4. Vacuum or blow compressed air through the filter in the opposite direction of the airflow.

5. Reinstall the filter or replace it with a new unit (P/N: 29-25065-00) by sliding it up and under the top hold-down fingers (the plastic frame to the outside). See Figure 3-12 for position.
6. Snap the two bottom fingers under the opening.

