EK-OTK70-OM-001

TK70
Streaming Tape Drive

Owner's Manual

Prepared by Educational Services
of Digital Equipment Corporation

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NOTICE: This equipment generates and uses radio frequency energy. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against radio and television interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, the user is encouraged to try to correct the interference.

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Preface

HOW TO USE THIS MANUAL

This manual is intended as an aid for first-time users of the TK70 tape drive. We suggest you read this manual once completely before using the TK70. When you are ready to use the TK70, turn to Chapter 2, Operating Procedures.

Chapter 1 – Overview – briefly describes the TK70 tape drive, lists operating system considerations, describes the COMPACTape II tape cartridge, provides specifications, and lists related documents.

Chapter 2 – Operating Procedures – illustrates the controls and indicators on the front of the tape drive and explains their use. It provides a step-by-step explanation of how to plug in, use, and remove a TK70 tape cartridge.

Chapter 3 – Problem Resolution – explains how to identify and resolve TK70 problems. This chapter provides symptoms and lists the most likely cause of failure.

Chapter 4 – Services – lists the services that Digital Equipment Corporation provides its customers.

Appendix A – Standard VMS System Commands – lists some of the VMS commands used with the TK70. It includes a series of steps for backing up files on a TK70 using the VMS operating system.

Appendix B – Glossary – defines some of the terms commonly used in this book.

Chapter 1
Overview

1.1 TK70 Description

The TK70 is a streaming tape drive that stores up to 296 million bytes (or characters) on each of its associated tape cartridges. It is used with Digital microcomputer systems. Though the TK70 is physically small, it has much of the functionality of Digital's larger tape drives, like the TU81. The TK70 fits a standard peripheral slot in your microsystem.

The TK70 can read data from a tape that was written by its predecessor, the TK50. The TK50, however, cannot read data from a tape that has been written by the TK70.

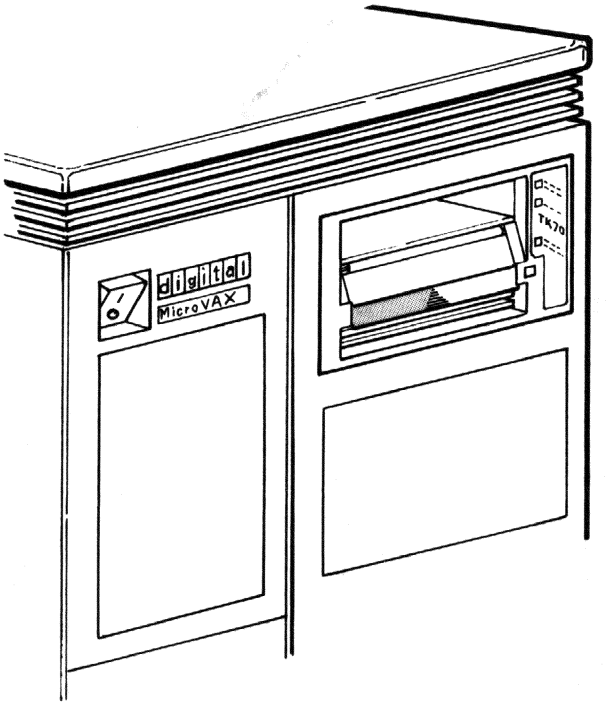
The TK70 is used primarily as a backup storage device, and to load software onto Digital computer systems. For example, the VMS operating system may be loaded from the TK70. The tape-distributed version of VMS is loaded from a TK50-formatted tape.

The TK70 uses a tape cartridge (labeled COMPACTape II) that contains the magnetic tape on a single reel. This single reel is an important feature to understand, because it affects the use of the TK70.

When you insert the tape cartridge into the drive, the tape is automatically threaded onto a take-up reel inside the drive. When the tape has been fully wound onto the take-up reel, it can take up to 90 seconds to rewind completely. *The tape must be fully rewound before you can remove the cartridge from the tape drive.* This procedure is different from a device that uses a cartridge with two reels, such as a video cassette recorder (VCR). A VCR tape can be ejected at any time—it doesn't have to be rewound first.

Two main components comprise the TK70 subsystem: the drive unit is one; a printed circuit board controller is the other. The controller is plugged into the backplane of a Digital microsystem. Figure 1–1 shows the TK70 in a MicroVAX II computer system. A cable internal to the system enclosure connects the controller to the drive.

Figure 1–1: The TK70 in a MicroVAX II



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1.2 TK70 Backup Performance

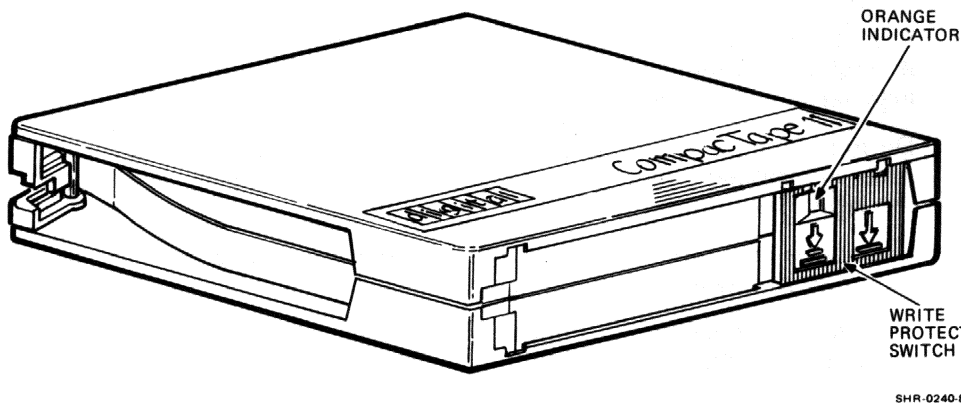
You can enhance TK70 backup operation performance through the use of various software "switches," or command qualifiers, on the operating system specific backup utilities. Each operating system has its own backup utility, which is documented in the operating system specific manual set. The value of these qualifiers to the performance of the TK70 is dependent upon the system in which the TK70 resides, and on the loading of that system. Refer to Appendix A, Standard VMS System Commands, and the software manuals for your operating system.

1.3 COMPACTape II Tape Cartridge

The COMPACTape II tape cartridge, Figure 1–2, is a 10 by 10 cm (4 by 4 in) plastic cartridge that can be used by the TK70 or TK50 tape drives. The COMPACTape II is the successor to the COMPACTape cartridge. The COMPACTape II is designed with tighter tolerances than the COMPACTape to support the higher recording densities of the TK70. The COMPACTape II is the new standard, and eventually will replace the COMPACTape cartridge.

The TK70 should use only the COMPACTape II tape cartridge to record data. The TK70 is able to read any COMPACTape or COMPACTape II cartridge originally written by the TK50. However, *the TK70 cannot overwrite a tape written by the TK50. The TK70 can only read data on that tape.* Before executing a command to the tape, the TK70 determines if the cartridge has been written by the TK50. If this is the case, the TK70 *automatically write protects the tape.* If the command you gave the TK70 was a write command (like BACKUP or COPY), the operating system sends a message that the tape cartridge is write protected and *does not* execute that command.

Figure 1–2: The COMPACTape II Tape Cartridge



The labels provided with the COMPACTape II tape cartridge have spaces for you to check whether the cartridge has been written by the TK50 or the TK70. If you write data to the cartridge with the TK50, check the block on the label that says 95 MB. If you write to the tape cartridge with a TK70, check the block that says 296 MB. If you use both TK50 and TK70 drives, remember that the TK50 is unable to read or write tapes that have originally been written by the TK70.

The tape cartridge has a write-protect switch to prevent accidental erasure of data. When the switch is moved to the left and the small orange rectangle is visible, data may not be written to the tape.

Inside the cartridge, a 600-foot single reel of magnetic tape stores data. A plastic cartridge leader is at the beginning of the tape. Some guidelines for COMPACTape cartridge use follow.

- Do not drop or bang the cartridge. This may cause the leader to be displaced, in which case the tape cartridge is unusable and may damage the drive. (See Paragraph 3.5.1, Inspecting the Cartridge.)
- Keep tape cartridges out of direct sunlight and away from heaters and other sources of heat.
- Store tape cartridges where the temperature is between 10 and 40°C (50 to 104°F).
- If the tape cartridge has been exposed to extremes of heat or cold, let it stabilize at room temperature for the same amount of time it was exposed—up to 24 hours.
- Do not place cartridges near sources of electomagnetic interference, such as terminals, motors, and video or X-ray equipment. Data on the tape may be erased.
- Store tape cartridges in a dust-free environment where the relative humidity is between 20 and 80 percent.
- Place an identification label only in the space provided for one on the front of the cartridge.

1.4 TK70 Specifications

Mode of Operation:	Streaming
Media:	12.77 mm (1/2 in) unformatted magnetic tape
Track Density:	96 tracks per inch
Bit Density:	10,000 bits per inch
Number of Tracks:	48
Transfer Rate (at host):	125 Kbytes per second
Tape Speed:	100 inches per second
Track Format:	Multiple track serpentine recording
Cartridge Capacity:	296 Mbytes, formatted (approx.)
Power Requirements:	12 V ± 5% @ 1.6 A (2.4 A surge), 75 mV ripple peak-to-peak
	+5 V ± 5% @ 1.1 A (1.5 A surge), 75 mV ripple peak-to-peak
Power Consumption	
Drive:	40 W, maximum
Host Adapter:	15 W, maximum

1.5 Related Supplies and Documentation

You should have a blank COMPACTape II tape cartridge, which you will need to run tests on your TK70 subsystem.

The TK70 requires VMS version 4.6 or later releases. Other operating systems will support the TK70 in the future.

Table 1–1 lists the TK70 documentation available from Digital Equipment Corporation.

Table 1–1: Related Documents

Order No.	Title
	TK70 Streaming Tape Drive Subsystem Technical Manual[1]
EK-OTK70-SM	TK70 Streaming Tape Drive Subsystem Service Manual (MicroVAX II)
AA-Z407B-TE	VAX/VMS Backup Utility Reference Manual
AI-Y506B-TE	Guide to VAX/VMS Disk and Magnetic Tape Operations
AA-Z424A-TE	VAX/VMS Mount Utility Reference Manual

[1]Restricted distribution

Chapter 2
Operating Procedures

This chapter provides operating instructions for the TK70 tape drive. The operation section is divided into two parts: inserting and using the tape cartridge, and removing the tape cartridge from the drive.

2.1 Controls and Indicators

The TK70 tape drive (Figure 2-1) has three lights, a beeper, an unload switch, and a handle (the cartridge insert/release handle).

The following paragraphs summarize the use of the switch and define the conditions of the lights. See Paragraph 2.2, Operation, for an explanation of how to insert, use, and remove tape cartridges.

2.1.1 Lights

Table 2-1 is a summary of the possible conditions of the lights.

Figure 2–1: The TK70 Tape Drive

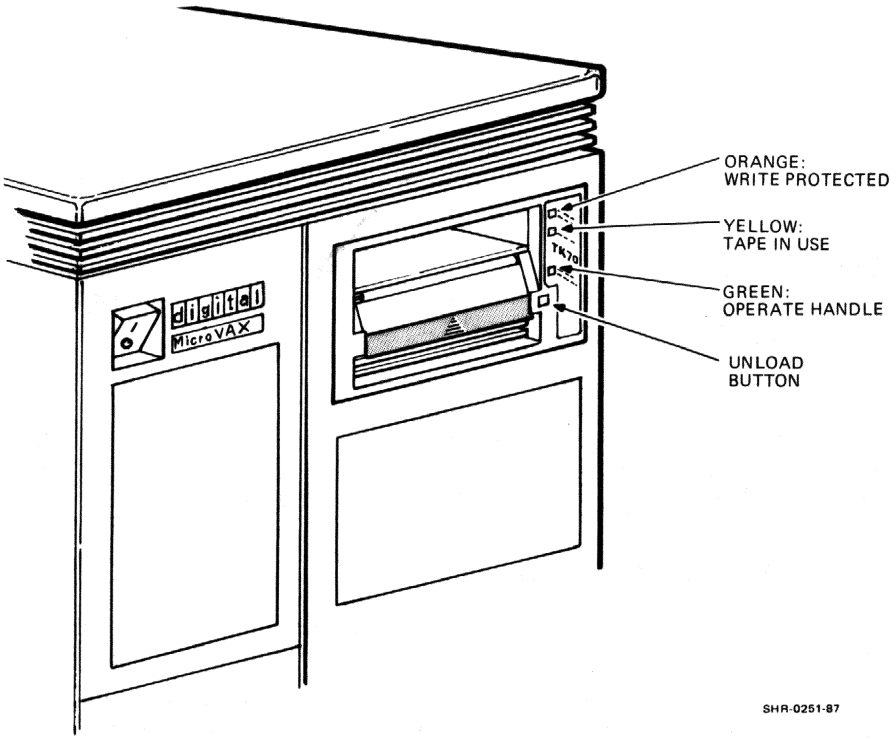


Table 2–1: Light Summary

Light	State[1]	Condition
Orange – Write Protected	On	Tape write protected
	Off	Tape write enabled
Yellow – Tape in Use	Blinking[2]	Tape being used
	Steady	Tape ready for use
Green – Operate Handle	On	OK to operate handle
	Off	Don't operate handle
	Blinking	Cartridge error detected

[1]All three lights blink to indicate a fault.

[2]Irregular blinking indicates that a read or write is in progress. Regular blinking indicates that the tape is loading or unloading.

2.1.2 Beeper

A beep sounds when you can operate the handle. When you hear the beep, the green light is on.

2.1.3 Unload Switch

The unload switch rewinds the tape. The tape must be completely rewound and unloaded back into the cartridge before the cartridge can be removed from the drive.

2.1.4 Cartridge Insert/Release Handle

To insert a tape cartridge, pull the cartridge insert/release handle to the open position. To lock the cartridge in place, push the cartridge insert/release handle to the closed position. To eject the cartridge after it has been rewound, pull the cartridge insert/release handle to the open position.

The handle may be pulled only when the green light is on, and after the momentary beep sounds. (When you hear the beep, the green light *is* on.)

2.2 Operation

2.2.1 Inserting and Using the Tape Cartridge

The numbered steps that follow correspond to Figure 2-2. Before you begin, make sure the power is on.

1. When the green light is on steadily, pull the handle to the open position.
2. Insert the cartridge.
3. Push the handle to the closed position. The green light turns off and the yellow light begins to blink, indicating that the tape is loading. When the tape is loaded (ready for use), the yellow light stays on steadily. Whenever the yellow light is on steadily and it is the only light on, the tape is ready to use.

NOTE

If the write protect switch on the cartridge is in the protected position, the orange write protect light is on and you will be unable to write data to the tape. If you move the write protect switch to the enabled position during operation, the system software does not recognize the fact that the tape is no longer write protected. You must software unload, and then reload the tape cartridge again before the software recognizes the cartridge as write enabled.

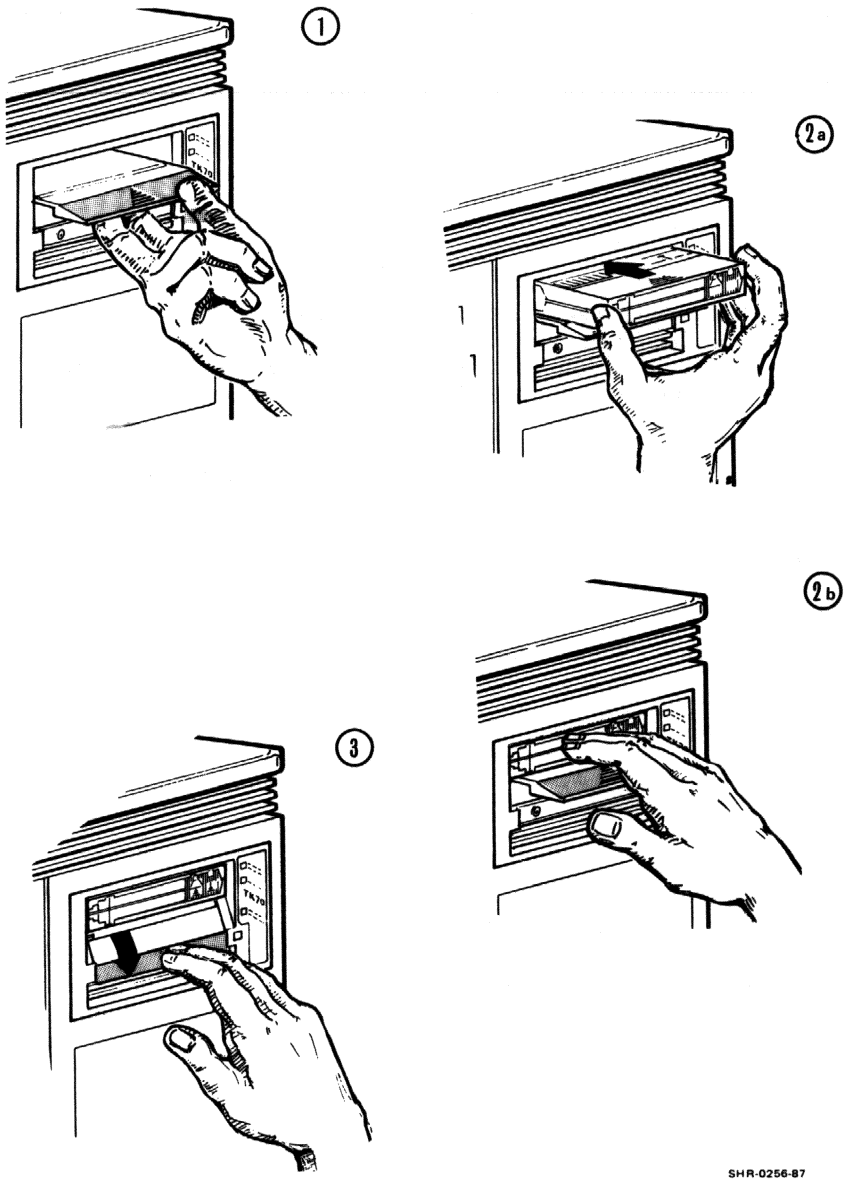
Similarly, if you move the write protect switch from the write enabled position to the write protected position during operation, the tape is not actually write protected until the current command is finished executing.

When the tape is being used (read, written, or rewound), the yellow light blinks. If an error occurs during operation (reading/writing), all three lights blink. If an error occurs when you are inserting the tape cartridge, the green light blinks and the tape does not move. If this happens, refer to Chapter 3, Problem Resolution.

When the yellow light is on steadily, you can proceed with your operation. This operation may be to boot your operating system, or possibly, back up files onto the TK70. Refer to your system documentation for instructions on booting your operating system.

When a read or write is in progress, the yellow light blinks *irregularly*.

Figure 2–2: Inserting the Tape Cartridge



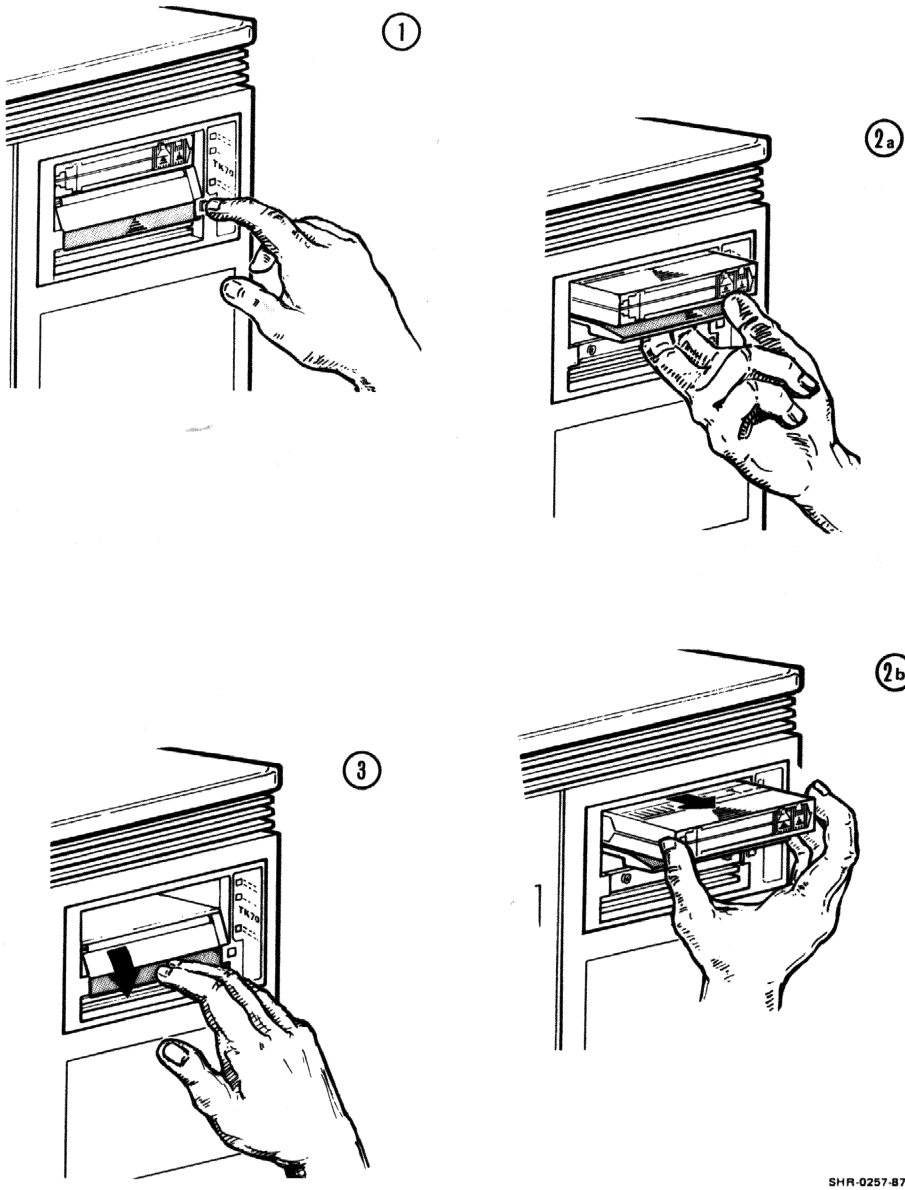
2.2.2 Removing the Tape Cartridge from the Drive

1. Press the unload switch (Figure 2–3). You can lift the handle when the green light comes on (the beep will also sound).
2. Pull the handle to the open position while the green light is on and remove the cartridge.
3. Push the handle to the closed position.

CAUTION

When you remove a tape cartridge from the drive, return it to its plastic case. Tape cartridges must be removed from the drive before drive power is turned off. Failure to remove the cartridge can result in damage to the cartridge and to the drive.

Figure 2–3: Removing the Tape Cartridge



Chapter 3
Problem Resolution

This chapter provides instructions to follow if your TK70 fails.

3.1 Correctable Failure During Tape Motion

If the TK70 fails during operation, you may be able to reset the fault and then rewind, unload, and remove the tape cartridge.

If all three lights are blinking (indicating a failure), press the unload switch. If the detected error is correctable, the tape will begin to rewind. While the tape is rewinding, the yellow light is blinking. When the tape has unloaded, the green light comes on and the beep sounds. You can then pull the handle to the open position to eject the tape cartridge.

3.2 Non-Correctable Failure During Tape Motion

If the tape does not rewind when you push the unload switch and the lights continue to blink, the error is not correctable. Call Digital Field Service.

3.3 Failure During Cartridge Insertion

When the tape cartridge is damaged, or if internal portions of the drive that handle the cartridge are not working, a cartridge fault occurs. If the green light blinks and the tape doesn't move (the yellow light does not blink), a cartridge fault has been detected. Remove the cartridge and try another. See also Paragraph 3.5.1, Inspecting the Cartridge, and Paragraph 3.5.2, Inspecting the Drive Leader.

3.4 Testing

If you purchased diagnostics from Digital, follow the instructions you received with your diagnostic tape or diskette to detect any problems with the TK70 or other device on your system.

3.5 Inspection

If you have trouble loading a tape cartridge, it is a good idea to perform a brief inspection of both the tape cartridge and the drive leader.

3.5.1 Inspecting the Cartridge

Figure 3–1 shows the correct position of the tape leader inside the cartridge. Before you attempt to use the tape cartridge, be sure the tape leader is in the same position as the one in Figure 3–1. Lift the catch with your thumb and open the small door to expose the leader.

CAUTION

Do not touch exposed portions of magnetic tape. If the tape leader is not in the correct position, do not attempt to fix it. Use a new cartridge instead.

3.5.2 Inspecting the Drive Leader

Compare the leader inside your drive with those shown in Figure 3–2. If the leader is unhooked, misplaced, or damaged, call Digital Field Service. Do not attempt to fix the leader.

Figure 3–1: Inspecting the Cartridge Leader

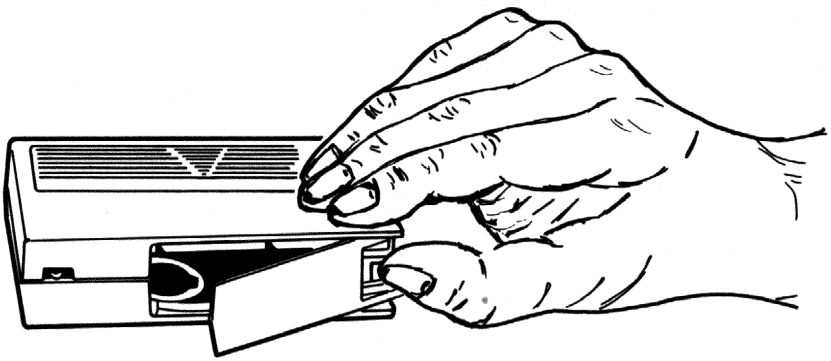
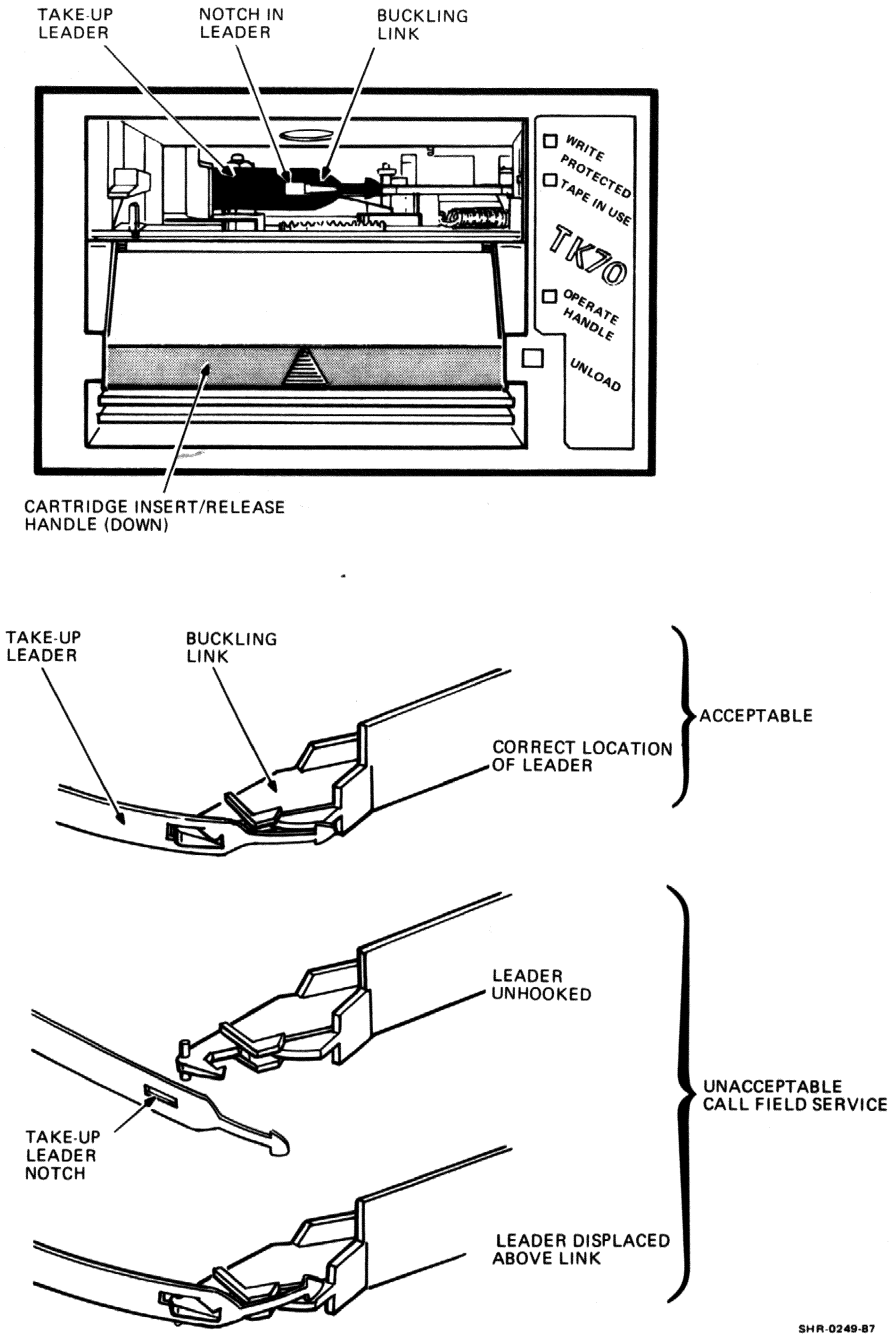


Figure 3–2: Inspecting the Drive Leader



Chapter 4
Digital Repair Service

Digital Field Service offers a range of flexible service plans.

ON-SITE SERVICE offers the convenience of service at your site and insurance against unplanned repair bills. For a small monthly fee, you receive personal service from our Service Specialists. Within a few hours, the specialist is dispatched to your site with equipment and parts to give you fast and dependable maintenance.

BASIC SERVICE offers full coverage from 8 a.m. to 5 p.m., Monday through Friday. Options are available to extend your coverage to 12-, 16-, or 24-hour days, and to Saturdays, Sundays, and holidays.

DECservice offers a premium, on-site service providing committed response to remedial service requests made during contracted hours of coverage. Remedial maintenance will be performed continuously until the problem is resolved, which makes this service ideal for customers requiring maximum service performance.

Under Basic Service and DECservice, all parts, materials, and labor are covered in full.

CARRY-IN SERVICE offers fast, personalized response, and the ability to plan your maintenance costs for a smaller monthly fee than On-Site Service. When you bring your unit to one of 160 Digital Servicenters worldwide, factory-trained personnel repair your unit within two days. This service is available on selected terminals and systems. Contact your local Digital Field Service office to see if this service is available for your unit.

Digital Servicenters are open during normal business hours, Monday through Friday.

DECmailer offers expert repair at a per use charge. This service is designed for users who have the technical resources to troubleshoot, identify, and isolate the module causing the problem. Mail the faulty module to our Customer Returns Center where the module is repaired and mailed back to you within five days.

PER CALL SERVICE offers a maintenance program on a noncontractual, time-and-materials-cost basis. This service is available with either On-Site or Carry-In Service. It is appropriate for customers who have the expertise to perform first-line maintenance, but may occasionally need in-depth support from Field Service.

Per Call Service is also offered as a supplementary program for Basic Service customers who need maintenance beyond their contracted coverage hours. There is no materials charge in this case.

On-Site Per Call Service is provided on a best effort basis, with a normal response time of two to three days. It is available 24 hours a day, seven days a week.

Carry-In Per Call Service is available during normal business hours, with a two to three day turnaround.

For more information on these Digital service plans, prices, and special rates for volume customers, call the Digital Field Service office nearest you.

Appendix A
Standard VMS System Commands

A.1 VMS Commands Used with TK70

The TK70 uses all the standard magnetic tape commands that can be invoked by your operating system. This section outlines some of the major commands by which the VMS operating system accesses the TK70.

If you are using an operating system other than VMS, use the same commands for the TK70 that you normally use for any magnetic tape device. See the reference documentation supplied with your system.

The following command descriptions are written assuming the TK70 tape cartridge is already in the drive and the TK70 is called MUA0 by the system. These commands have several qualifiers and options. For more detailed information on these commands, refer to your operating system manuals.

A.1.1 ALLOCATE

ALLOCATE provides exclusive access to a device (such as the TK70) and optionally establishes a logical name for that device. Once you have allocated a device, other users cannot access that device until you explicitly DEALLOCATE it, or until you log out. Use the following format to allocate the TK70.

```
ALLOCATE MUA0: [logical name]
```

Example: To allocate the TK70 for your use and assign it the logical name TAPE1, type the following.

```
$ ALLOCATE MUA0: TAPE1:
```

A.1.2 INITIALIZE

CAUTION

Make sure that the tape is blank before initializing. Any data on the tape will be destroyed.

INITIALIZE writes directory information and file structure, specifies the device name (MUA0, or TAPE1), and writes a volume name to the magnetic tape volume on the TK70. The tape must be write enabled for the initialize operation. The command has the following format.

```
INITIALIZE logical name: [volume name]
```

Example: To initialize the device called TAPE1 and assign the volume name GMB001, type the following.

```
$ INITIALIZE TAPE1: GMB001
```

While the tape volume is being initialized, the yellow light blinks. When the initialize is complete, the tape rewinds and then the yellow light stays on steadily.

For detailed information regarding volume names and magnetic tape operations, refer to the *Guide to VAX/VMS Disk and Magnetic Tape Operations* (AI-Y506B-TE).

A.1.3 MOUNT

MOUNT lets you make a magnetic tape volume available for processing. With the TK70, MOUNT takes the following format.

```
MOUNT/FOREIGN/CACHE=TAPE logical name: volume name
```

Example: To make GMB001 on TAPE1 available for processing, type the following.

```
$ MOUNT/FOREIGN/CACHE=TAPE TAPE1: GMB001
```

When you MOUNT the tape volume, the yellow light blinks. The yellow light stays on steadily when the tape reaches BOT. The console displays a message such as GMB001 MOUNTED ON MUA0:.

Generally, the MOUNT command allows you to perform either write or read operations. However, you have an option to write protect the tape volume by using the /NOWRITE qualifier. Here is the command format.

```
MOUNT/FOREIGN/CACHE=TAPE/NOWRITE logical name: volume name
```

When you MOUNT the tape volume with the /NOWRITE qualifier, the orange light comes on and the yellow light blinks.

The /FOREIGN qualifier *must* be used when you perform BACKUP commands. It *must not* be used when you perform COPY commands.

For more information, see the *VAX/VMS Mount Utility Reference Manual* (AA-Z424A-TE).

A.1.4 DISMOUNT

DISMOUNT cancels the previous MOUNT command (makes the unit unavailable for processing) and rewinds the TK70 tape. To rewind and unload the TK70 tape (to ready it for ejection from the drive), use the following command format.

```
DISMOUNT logical name:
```

When the DISMOUNT command is invoked, the tape rewinds. As the tape is rewinding, the yellow light blinks. When the rewind is complete and the tape is ready for ejection, the green light comes on and the beep sounds.

To rewind to BOT without unloading the tape, use this format.

```
DISMOUNT/NOUNLOAD logical name:
```

While the tape is rewinding, the yellow light blinks. When the operation is complete, the yellow light stays on steadily, indicating that the tape is again ready for use.

A.1.5 BACKUP

BACKUP provides a means of protection against file volume corruption by creating functionally equivalent backup copies.

To back up a file on the TK70, use this command format.

```
BACKUP/NOCRC/BUFF=5/BLOCK=16384 filename.ext device-
name[logical name]:filename.bck
```

In addition to backing up single files, you can back up lists of files and entire volumes. The yellow light blinks as the data is being written to the tape.

By selecting the /NOCRC, /BUFF=5, and /BLOCK=16384 qualifiers, you can achieve optimum performance from your TK70. The command line above excludes the use of the host-available CRC error detection/correction capability, and depends on the embedded error checking and correction capabilities of the TK70. Keep in mind that TK70 error correction capabilities relate specifically to the TK70—not to the entire system.

Use of the /NOCRC qualifier requires a systems management decision relative to data integrity vs. performance. In most instances, TK70 internal error detection and correction capabilities are sufficient to ensure data integrity and recovery. The host-level CRC provides another level of error detection and correction, which may be important under some conditions.

Refer to your system manuals before deciding on qualifiers for use with the BACKUP command. For detailed information about BACKUP, see the *VAX/VMS Backup Utility Reference Manual* (AA-Z407B-TE).

You can also COPY files onto the COMPACTape II tape cartridge. See your operating system reference manuals for more information on the COPY command.

A.2 Backing Up on the TK70 with VMS

This section provides a general series of steps for backing up files on a TK70 when you are using the VMS operating system. The steps are written assuming the TK70 is device MUA0, and that a tape has been inserted.

1. $ ALLOCATE MUA0: TAPE1:
2. $ MOUNT/FOREIGN/CACHE=TAPE TAPE 1:GMB001
3. $ BACKUP/NOCRC/BUFF=5/BLOCK=16384 filename.ext TAPE1:filename.bck
4. $ DISMOUNT TAPE1:
5. $ DEALLOCATE TAPE1:

After step 5, you can remove the tape cartridge from the drive. Refer to Paragraph 2.2.2.

Appendix B
Glossary of Terms

BOT

Beginning of Tape. This is the first position on the tape where data can be written. BOT is set automatically. You need perform no operations in regard to BOT.

Cartridge Insert/Release Handle

This handle sets the internal mechanisms of the TK70 to accept or eject the tape cartridge. The handle is pulled open to insert a tape cartridge, pushed closed so the tape can be used, and pulled open again to eject the cartridge after the tape has been completely rewound.

Cartridge Leader

A plastic leader at the beginning of the magnetic tape. The mating of the cartridge leader with the drive leader is like the threading of a needle. The leader inside the cartridge serves as the "eye" of the needle. This plastic leader may be either black or white.

Drive Leader

A plastic leader inside the TK70. After the drive leader mates with the cartridge leader, it draws the magnetic tape out of the tape cartridge and onto the take-up reel inside the drive. As the tape is wound onto the take-up reel, it passes the magnetic read and write heads.

Insertion

Placing the tape cartridge in the TK70. The cartridge leader mates with the drive leader during insertion.

Load

When the tape cartridge has been inserted correctly and the leaders have mated, the drive automatically winds the tape to BOT.

Unload Switch

A switch on the front of the tape drive that rewinds and unloads the tape. When this operation is complete, the cartridge may be ejected. The green light comes on and the beep sounds to indicate that you may pull the handle to the open position and remove the cartridge.

Write Protect Switch

A switch on the COMPACTape II tape cartridge that prevents data from being written to the tape. In its protected position, a small orange indicator is visible on the front of the tape cartridge. In its write enabled position, no orange rectangle is visible and data may be written to the tape.