Educational Services

digital

Tx86 Series
Cartridge Tape Subsystem
Owner’s Manual
EK–OTX86–OM–001

Digital Equipment Corporation
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TF86 FCC NOTICE

The equipment described in this manual generates, uses, and may emit radio frequency energy. The equipment has been type tested and found to comply with the limits for a Class A computing device pursuant to Part 15 of FCC Rules, which are designed to provide reasonable protection against such radio frequency interference when operated in a commercial environment. Operation of this equipment in a residential area may cause interference, in which case the user at his own expense may be required to take measures to correct the interference.

TZ86 FCC NOTICE

The equipment described in this manual has been certified to comply with the limits for a Class B computing device, pursuant to Part 15 of FCC Rules. Only peripherals (computer input/output devices, terminals, printers, etcetera) certified to comply with the Class B limits may be attached to this computer. Operation with uncertified peripherals may result in interference to radio and television reception. 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. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Part 15 of FCC Rules, which are designed to provide reasonable protection against such 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, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

— Reorient the receiving antenna.
— 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 user may find the following booklet prepared by the Federal Communications Commission helpful: How to Identify and Resolve Radio-TV Interference Problems. This booklet is available from the US Government Printing Office, Washington, DC 20402, Stock No. 004–000–00398–5.

The tabletop unit must be used with a shielded data cable.
Für Bundesrepublik Deutschland
For Federal Republic of Germany
Pour la République fédérale d'Allemagne

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Digital Originalkabel entsprechen.
About This Manual

**Purpose**
This manual introduces the Tx86 series of cartridge tape subsystems and describes the operating procedures.

**Intended Audience**
This manual is intended for the TF86 or TZ86 subsystem owner.

**Chapter 1**
“About the Tx86 Cartridge Tape Subsystem” briefly describes the TF86 and TZ86 cartridge tape subsystems. This chapter describes the CompacTape III and CleaningTape III cartridges, and lists supplies and related documents.

**Chapter 2**
“Operating the Tx86 Subsystem” shows the indicators and controls on the Tx86 subsystem and explains their use. This chapter provides a step-by-step explanation of how to operate and clean a TK86 drive.

**Chapter 3**
“Solving Problems” explains how to identify and resolve problems with your subsystem. This chapter provides symptoms and lists the most likely causes of problems.

Continued on next page
About This Manual, Continued

Chapter 4
“Running Local Programs on the TF86 Subsystem” describes how to access and run the PARAMS, DIRECT, HISTRY, DRVEXR, and DRVTST local programs on the TF86 subsystem.

Appendix A
“Tx86 Subsystem Specifications” provides a specification listing for the TF86 and the TZ86.

Appendix B
“Standard VMS Commands” describes how to use standard VMS operating system commands with your Tx86 cartridge tape subsystem for optimum operating efficiency.

Appendix C
“Using the TZ86 Subsystem with the ULTRIX Operating System” describes how to add the TZ86 subsystem to your ULTRIX operating system, how to get maximum capacity and performance from the TZ86 subsystem, and using various ULTRIX commands to save information on the TZ86 subsystem.

Appendix D
“Digital Services” lists the services Digital Equipment Corporation provides its customers.

Convention
The term Tx86 refers to the TF86 and TZ86 series of cartridge tape subsystems.

Continued on next page
Chapter 1
About the Tx86 Cartridge Tape Subsystem

In This Chapter

Introduction
This chapter gives an overview of the Tx86 cartridge tape subsystem.

Contents
Chapter 1 includes the following topics:

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<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tx86 Cartridge Tape Subsystem</td>
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<td>Data Tape</td>
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<tr>
<td>Supplies</td>
<td>1–13</td>
</tr>
<tr>
<td>Related Documents</td>
<td>1–14</td>
</tr>
</tbody>
</table>
Tx86 Cartridge Tape Subsystem

Tx86 Description

The Tx86 series of cartridge tape subsystems are used primarily as backup storage devices and as devices for loading software onto Digital computer systems.

The Tx86 comes embedded in a system enclosure or in a tabletop enclosure with its own power supply. The Tx86 is available in these variations:

- TF86, for systems using the DSSI bus
- TZ86, for systems using the SCSI bus

Basic Components

The Tx86 subsystem consists of the following basic components:

<table>
<thead>
<tr>
<th>TF86 Subsystem</th>
<th>TZ86 Subsystem</th>
</tr>
</thead>
<tbody>
<tr>
<td>TK86 tape drive</td>
<td>TK86 tape drive</td>
</tr>
<tr>
<td>DSSI controller module</td>
<td>SCSI controller module</td>
</tr>
</tbody>
</table>

The TK86 drive is a streaming tape drive that can store up to 6.0 GB of data on a CompacTape III cartridge.

The Tx86 subsystem connects to the computer system through the controller module, which is responsible for initiating commands to the TK86 drive.

Continued on next page
Depending on your host system configuration, the SCSI controller module comes as one of the following two options:

<table>
<thead>
<tr>
<th>This controller option</th>
<th>For this SCSI cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-ended</td>
<td>6-meter (19-foot), maximum length, single-ended cable (ANSI SCSI standard)</td>
</tr>
<tr>
<td>Differential</td>
<td>Longer differential SCSI cables with better noise immunity</td>
</tr>
</tbody>
</table>

VMS Support

The TF86 is supported as a generic device (unknown device type) by version 5.4-2 or later of the VMS operating system.

The TZ86 is supported by various VMS versions with certain restrictions (Table 1–1):
### Table 1–1  TZ867 VMS Restrictions

<table>
<thead>
<tr>
<th>VMS Version</th>
<th>Restrictions¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;5.3</td>
<td>X</td>
</tr>
<tr>
<td>5.3</td>
<td>1,2,3</td>
</tr>
<tr>
<td>5.4</td>
<td>1,2,3</td>
</tr>
<tr>
<td>5.4-1</td>
<td>2,3</td>
</tr>
<tr>
<td>5.4-2</td>
<td>2,3</td>
</tr>
<tr>
<td>5.4-3</td>
<td>3</td>
</tr>
<tr>
<td>5.5</td>
<td>3</td>
</tr>
<tr>
<td>5.5-1</td>
<td>3</td>
</tr>
</tbody>
</table>

¹**KEY**

X = Not Supported

1 = VMS SHOW DEVICE command indicates "generic SCSI tape" and ERROR LOGGING indicates "GENERIC MK SUBSYSTEM". This has little impact on most applications.

2 = Standalone BACKUP not supported. You cannot create a standalone BACKUP tape.

3 = Writing COMPACTAPE III media with TK85 format is not supported, since VMS does not support density select on the TZ86.

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*Continued on next page*
The VMS backup performance rate of your Tx86 subsystem can depend on your system processor. For example:

- Connecting directly to an embedded bus adapter on such systems as the VAX 4000, VAX 6000, VAXstation 3100-30, -40, -80, or InfoServer 150 (TZ86 only) provides optimum performance.

- Connecting to a MicroVAX/VAXserver 3xxx (Q–bus) system with a KZQSA adapter can reduce the rate of performance but does not limit the high capacity of data storage that your Tx86 has.

The TF86, when connected to a KFQSA adapter installed in a MicroVAX II or MicroVAX/VAXserver 3xxx system, does not support booting of VMS or MicroVAX Diagnostic Monitor (MDM) software. An additional load device is needed to boot this software.

Continued on next page
Tx86 Cartridge Tape Subsystem, Continued

Decals

The Tx86 subsystem ships with decals including the appropriate language of the country to which the subsystem has been shipped. The decals adhere to the cartridge insert/release handle and the indicator panel (see Tx86 Front Panel). The tabletop TZ86 also has a decal for the switchpack on the rear panel.

Tx86 Front Panel

The following diagram shows the front panel of the Tx86 cartridge tape subsystem:
## Data Tape

### CompacTape III Description
The CompacTape III is a 4 1/8-inch square, dark gray, plastic cartridge containing 1200 feet of 1/2-inch magnetic, metal particle (MP) tape.

### Cartridge Packaging
Your CompacTape III is supplied with a:
- Set of slide-in labels for cartridges
- Cartridge handling information sheet

### Reading and Writing Data
The TK86 drive writes 56 pairs of tracks—112 tracks in all—on the CompacTape III. The drive reads and writes data in a two-track parallel, serpentine fashion, traveling the entire length of tape on two tracks (at about 100 inches per second). The drive then steps the head and reverses tape direction and continues to read/write on the next two tracks.

### Write-Protecting Data
The CompacTape III cartridge has a write-protect switch to prevent accidental erasure of data (see CompacTape III Diagram). When the switch is moved to the left and the small orange rectangle is visible, data cannot be written to the tape. Beneath the orange rectangle is an arrow over two lines on the write-protect switch. The arrow over the two lines symbolizes data cannot be written to the tape.

*Continued on next page*
Write-Protecting Data (continued)

On the right side of the write-protect switch is another symbol, an arrow over one line. The symbol indicates if the write-protect switch is moved to the right, data can be written to the tape.

CompacTape III Diagram

The following diagram shows the CompacTape III cartridge and its write-protect switch:
The following table shows cartridge compatibility with the TK86 drive:

<table>
<thead>
<tr>
<th>Cartridge Type</th>
<th>Read/Write Ability in the TK86</th>
</tr>
</thead>
<tbody>
<tr>
<td>CompacTape III (TK85)</td>
<td>Read/write in 85 Mode (48 tracks, 2.6 GBF)</td>
</tr>
<tr>
<td>CompacTape III (TK86)</td>
<td>Read/write in 86 Mode (112 tracks, 6.0 GBF)</td>
</tr>
<tr>
<td>CompacTape III (Blank)</td>
<td>Read/write in 86 Mode (112 tracks, 6.0 GBF)</td>
</tr>
</tbody>
</table>

Operating system support of density selection is not yet available. The TK86 tape drive defaults to using TK86 format (high density) for all writes from Beginning of Tape (BOT). When you append data to the tape cartridge, the current media density is used.

For information on selecting density using the TZ86 subsystem with the ULTRIX operating system, see Appendix C.

To write in TK85 format (low density) on a TF86 subsystem, you can use the PARAMS utility on VMS systems to modify a new DUP Parameter named FORCEDENSITY. An explanation of FORCEDENSITY is in the next section.

Continued on next page
Cartridge Compatibility, Continued

Using the FORCEDENSITY Parameter

For explanation on starting PARAMS to use the FORCEDENSITY parameter, see Chapter 4.

The DUP parameter FORCEDENSITY controls how a TF86 subsystem determines what density to use when writing from BOT.

FORCEDENSITY has the following possible values:

- 0 = automatic, as selected by the host
- 1 = low (TK85) density regardless of host selection
- 2 = high (TK86) density regardless of host selection

The factory setting is 2 for the FORCEDENSITY parameter. Under this setting, the TK86 tape drive will always reformat the tape to TK86 format on a WRITE-FROM-BOT.

Users wanting to write TK85 format must:

- Load a tape written in TK85 format and do APPEND operations
  
  or
  
- Change the value of FORCEDENSITY to 1 and then WRITE from BOT.

CAUTION
Be sure to change the value of FORCEDENSITY back to 2 after you have finished desired tape operations.
Cleaning Tape

**CleaningTape III Description**

The CleaningTape III is a 4 1/8-inch square, light yellow, plastic cartridge containing 1200 feet of 1/2-inch, cleaning tape. See Chapter 2 for information on using the CleaningTape III.

**Cartridge Packaging**

Your CleaningTape III is supplied with a:

- Slide-in label that has 20 boxes, each for marking a check after cartridge use (see Cartridge Expiration)
- Cartridge handling information sheet

**Cartridge Expiration**

You can use the CleaningTape III cartridge approximately 20 times before it expires. The word expire does not pertain to an expiration date. Expire means no cleaning area is left on the tape.

To record the number of uses, mark a check in one box on the cartridge label after each cleaning. After the final use, discard the cleaning tape cartridge.

*Continued on next page*
The following diagram shows the CleaningTape III:
Supplies

Cartridges Provided

One CompacTape III cartridge and one CleaningTape III cartridge ship with the Tx86 subsystem.

How To Order

You can order additional cartridges by contacting your Digital sales representative or by calling Digital’s DECdirect ordering service at 1-800-DIGITAL.

The following table lists cartridges with order numbers for the Tx86 subsystem:

<table>
<thead>
<tr>
<th>Order Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TK85–HC</td>
<td>CleaningTape III cleaning cartridge</td>
</tr>
<tr>
<td>TK85K–01</td>
<td>CompacTape III data cartridge</td>
</tr>
<tr>
<td>TK85K–07</td>
<td>CompacTape III data cartridge (quantity, 7)</td>
</tr>
<tr>
<td>TK85K–A0</td>
<td>CompacTape III data cartridge (quantity, 1008)</td>
</tr>
</tbody>
</table>
## Related Documents

The following documents provide more information on the Tx86 subsystem:

<table>
<thead>
<tr>
<th>Order Number</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AI–Y506B–TE</td>
<td>Guide to VAX/VMS Disk and Magnetic Tape Operations</td>
</tr>
<tr>
<td>EK–TX867–OM</td>
<td>Tx867 Series Magazine Tape Subsystem Owner’s Manual</td>
</tr>
<tr>
<td>EK–OTK86–RC</td>
<td>Tx86 Tape Drive Operator’s Reference Card</td>
</tr>
</tbody>
</table>
Chapter 2
Operating the Tx86 Subsystem

In This Chapter

Introduction
This chapter describes operating procedures for the Tx86 subsystem.

Contents
Chapter 2 includes the following topics:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicators and Controls</td>
<td>2-2</td>
</tr>
<tr>
<td>Cartridge Write-Protect Switch</td>
<td>2-7</td>
</tr>
<tr>
<td>Loading a Cartridge</td>
<td>2-9</td>
</tr>
<tr>
<td>Using a Cartridge</td>
<td>2-11</td>
</tr>
<tr>
<td>Using the CleaningTape III</td>
<td>2-12</td>
</tr>
<tr>
<td>Unloading a Cartridge</td>
<td>2-13</td>
</tr>
<tr>
<td>Preserving Cartridges</td>
<td>2-15</td>
</tr>
</tbody>
</table>
Indicators and Controls

The Tx86 subsystem has the following indicators and controls for operating the subsystem (see Diagram of Indicators and Controls):

Indicators

Write Protected indicator
Tape in Use indicator
Use Cleaning Tape indicator
Operate Handle indicator
Beeper

Controls

Unload button
Cartridge insert/release handle

Continued on next page
Indicators and Controls, Continued

Diagram of Indicators and Controls

The following diagram shows the Tx86 controls and indicators:

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Continued on next page
Indicators and Controls, Continued

**Power-on Self-test (POST)**

When you turn on system power, the drive performs the power-on self-test (POST). The sequence of events is:

1. The indicators turn on sequentially, from top to bottom.
2. All four indicators turn on simultaneously for approximately three seconds.
3. The green Operate Handle indicator and the two orange indicators turn off.
4. The yellow Tape in Use indicator blinks.
5. If no cartridge is loaded, the green Operate Handle indicator turns on and the beeper sounds.

Continued on next page
### Indicators and Controls, Continued

#### Interpreting the Indicators

Use this table to determine the subsystem's operating condition:

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Color</th>
<th>State</th>
<th>Operating Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Write Protected</td>
<td>Orange</td>
<td>On</td>
<td>Tape is write-protected.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
<td>Tape is write-enabled.</td>
</tr>
<tr>
<td>Tape in Use</td>
<td>Yellow</td>
<td>Blinking</td>
<td>Tape is moving.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On</td>
<td>Tape is loaded; ready for use.</td>
</tr>
<tr>
<td>Use Cleaning Tape</td>
<td>Orange</td>
<td>On</td>
<td>Drive head needs cleaning, or the tape is bad. See Using the CleaningTape III in this chapter.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Remains on after you unload the cleaning tape</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cleaning tape attempted to clean the drive head, but the tape expired, so cleaning was not done.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>After cleaning, turns on again when you reload the data cartridge</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Problem data cartridge. Try another cartridge.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
<td>Cleaning is complete, or cleaning is unnecessary.</td>
</tr>
<tr>
<td>Operate Handle</td>
<td>Green</td>
<td>On</td>
<td>Okay to operate the cartridge/insert release handle.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
<td>Do not operate the cartridge insert/release handle.</td>
</tr>
<tr>
<td>All four indicators</td>
<td>-</td>
<td>On</td>
<td>Power-on self-test is in progress.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blinking</td>
<td>An error has occurred. See Chapter 3, Solving Problems.</td>
</tr>
</tbody>
</table>

*Continued on next page*
Indicators and Controls, Continued

**Beeper**
A beeper sounds when you can operate the cartridge insert/release handle. When you hear the beep, the green light is on.

**Unload Button**
The Unload button rewinds the tape and unloads the tape from the drive back into the cartridge. The tape must be completely rewound and unloaded into the cartridge before you remove the cartridge from the drive. Depending on tape position, an unload operation may take from 10 seconds to 4 minutes.

**Cartridge Insert/Release Handle**
Operate the cartridge insert/release handle to load a cartridge or to eject a cartridge only when the Operate Handle indicator is on, and after the momentary beep sounds. The handle lifts to the open position and lowers to the closed position. See Loading a Cartridge and Unloading a Cartridge for the operating procedures.
Cartridge Write-Protect Switch

Positioning the Switch

Before loading the CompacTape III into the drive, position the write-protect switch on the front of the cartridge. The switch can move to the left so that the cartridge is write-protected, or to the right so that the cartridge is write-enabled (see Diagram of the Switch).

Diagram of the Switch

The following diagram shows the write-protect switch on the CompacTape III:

[Diagram of the Switch]

Continued on next page
Cartridge Write-Protect Switch, Continued

The following table describes what happens to data protection when you move the write-protect switch:

<table>
<thead>
<tr>
<th>If you move the write-protect switch before loading the cartridge. . .</th>
<th>Then. . .</th>
</tr>
</thead>
<tbody>
<tr>
<td>To the left on the cartridge, the tape is write-protected, with the orange indicator showing</td>
<td>You cannot write data to the tape.</td>
</tr>
<tr>
<td>To the right on the cartridge, the tape is write-enabled</td>
<td>You can write data to the tape (if it is not software write-protected).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>If you move the write-protect switch during operation. . .</th>
<th>Then. . .</th>
</tr>
</thead>
<tbody>
<tr>
<td>From the write-protected position to the write-enabled position</td>
<td>The tape becomes write-enabled after a variable amount of time (on order of seconds).</td>
</tr>
<tr>
<td>From the write-enabled position to the write-protected position</td>
<td>The tape becomes write-protected after a variable amount of time (on order of seconds).</td>
</tr>
</tbody>
</table>
Loading a Cartridge

Steps To Follow

The directions for loading a cartridge into and unloading a cartridge from the drive are printed on the front of the drive.

The following are more detailed steps for loading a cartridge (see Diagram of Cartridge Loading):

1. When the green light is on steadily, pull the cartridge insert/release handle open.
2. Insert the cartridge.
3. Push the cartridge into the drive.
4. Push the handle closed.

The green light turns off and the yellow light blinks to show the tape is loading. When the tape is at the beginning-of-tape (BOT) marker, the yellow light turns on steadily. The tape is now ready for use.

Continued on next page
Loading a Cartridge, Continued

Diagram of Cartridge Loading

The following diagram shows how to load a cartridge into the drive:
Using a Cartridge

**Tape in Use**
Whenever the yellow light is on steadily, the tape is ready to use. When the tape is being read, written, or rewound, the yellow light blinks.

**Things To Note During Cartridge Use**
Use the following table to determine what is happening during cartridge use:

<table>
<thead>
<tr>
<th>If. . .</th>
<th>Then. . .</th>
</tr>
</thead>
<tbody>
<tr>
<td>The yellow light is on steadily</td>
<td>A cartridge is loaded, but the tape is not moving. This condition can mean that no application is communicating with the controller, or that the application is communicating but is not delivering commands for tape motion.</td>
</tr>
<tr>
<td>The yellow light blinks irregularly</td>
<td>A read or write is in progress.</td>
</tr>
<tr>
<td>The yellow light blinks regularly</td>
<td>The tape is loading, unloading, or rewinding.</td>
</tr>
<tr>
<td>The green light turns on and the beeper sounds</td>
<td>The tape is unloaded.</td>
</tr>
<tr>
<td>All four lights blink</td>
<td>An error has occurred during operation. See Chapter 3, Solving Problems.</td>
</tr>
</tbody>
</table>
Using the CleaningTape III

When To Use
If the Use Cleaning Tape indicator turns on (see Diagram of Indicators and Controls), the drive head needs cleaning or the tape is bad (see Problem Data Cartridge). Use the CleaningTape III. Follow the instructions in this chapter for loading a cartridge into the drive. When cleaning is complete, the beeper sounds for you to remove the CleaningTape III.

If a particular cartridge causes the Use Cleaning Tape indicator to turn on frequently, it is suggested this cartridge be backed up on another, and then discarded. A damaged cartridge may cause unnecessary use of the CleaningTape III.

Problem Data Cartridge
If the Use Cleaning Tape indicator turns on after you clean the drive head and reload your data cartridge, your data cartridge may be causing the problem. Try another data cartridge, and if the Use Cleaning Tape indicator turns on again, call Digital Services.

Expired Cleaning Tape
If the Use Cleaning Tape indicator is on after you load the CleaningTape III, then cleaning has not been done and the cartridge is expired. Replace the cleaning cartridge.

The CleaningTape III expires after approximately 20 uses.
Unloading a Cartridge

Steps To Follow

Follow these steps to unload a cartridge from the drive (see Diagram of Cartridge Unloading):

1. Press the Unload button (or issue the appropriate system software command). The yellow Tape in Use indicator blinks as the tape rewinds.
2. When the green light turns on (the beeper also sounds), pull the cartridge insert/release handle open to eject the cartridge.
3. Remove the cartridge.
4. Push the handle closed.

CAUTIONS

Cartridges must be removed from the drive before host system power is turned off. Failure to remove a cartridge can result in cartridge and drive damage.

To prolong the life of your cartridge, return the cartridge to its plastic case when you remove the cartridge from the drive.
Unloading a Cartridge, Continued

Diagram of Cartridge Unloading

The following diagram shows how to unload a cartridge from the drive:

1

2

3

4
Preserving Cartridges

Guidelines

For longer life of recorded or unrecorded cartridges, store cartridges in a clean environment with the following conditions:

- Do not drop or bang the cartridge. Doing so can displace the tape leader, making the cartridge unusable and possibly damaging the drive.
- Keep tape cartridges out of direct sunlight and away from heaters and other heat sources.
- Store tape cartridges in temperatures between 10°C and 40°C (50°F to 104°F). For longer cartridge life, always store the cartridge in its plastic container and in room environment conditions of 72°F ± 7°F (22°C± 4°C).
- If the tape cartridge has been exposed to heat or cold extremes, stabilize the cartridge at room temperature for the same amount of time it was exposed—up to 24 hours.
- Do not place cartridges near electromagnetic interference sources, such as terminals, motors, and video or X-ray equipment. Data on the tape can be altered.
- Store tape cartridges in a dust-free environment where the relative humidity is between 20% and 80%. For longer cartridge life, store the cartridge at 40% ± 20% relative humidity.
- Place an identification label only in the slide-in slot on the front of the cartridge.
Chapter 3
Solving Problems

In This Chapter

Introduction
This chapter describes what to do if you have drive or tape problems.

Contents
Chapter 3 describes the following topics:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
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</thead>
<tbody>
<tr>
<td>Common Errors</td>
<td>3-2</td>
</tr>
<tr>
<td>Inspections</td>
<td>3-4</td>
</tr>
</tbody>
</table>
Common Errors

Avoiding Basic Problems

You can avoid some errors by following these guidelines:

- Use the correct cartridge type. See Cartridge Compatibility in Chapter 1.
- Care for your cartridges according to the guidelines in Preserving Cartridges, Chapter 2.
- Make sure the cartridge leader and the drive leader are in their correct positions. See Inspections in this chapter.
- Unload the cartridge before powering down the system.

Error Influences

If an error does occur during subsystem operation, you may be able to correct the error yourself. Factors influencing errors include:

- Defective media
- Dirty drive head
- Operator or user errors
- Incorrect backup commands

See Finding Solutions in this chapter for information on detecting and correcting these errors.

Continued on next page
### Common Errors, Continued

**Finding Solutions**

Use the following table to interpret error symptoms, determine their causes, and take corrective action:

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable Cause</th>
<th>Possible Correction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failure to mount or read/write with new or used cartridge</td>
<td>Bad cartridge</td>
<td>Retry with another cartridge.</td>
</tr>
<tr>
<td></td>
<td>Dirty drive head</td>
<td>Use CleaningTape III.</td>
</tr>
<tr>
<td>VMS INITIALIZE command fails with parity error</td>
<td>Tape calibration failed</td>
<td>Try another cartridge.</td>
</tr>
<tr>
<td>Green light is on and tape does not move (yellow light stays on, does not blink)</td>
<td>Cartridge load error</td>
<td>Inspect the cartridge for a mispositioned leader (see Diagram of Cartridge Leader in this chapter). Replace the cartridge if its leader is mispositioned.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inspect the drive for a damaged, misplaced, or unhooked leader (see Diagrams of Drive Leader in this chapter). Call Digital Services if the drive leader is not in the correct location.</td>
</tr>
<tr>
<td>All four lights blinking</td>
<td>Drive failed self-test or detected a hard error during operation</td>
<td>Try to clear the error by pressing the Unload button. If the error does not clear (the tape does not rewind and unload and the four lights blink), you have a hardware failure. Call Digital Services.</td>
</tr>
</tbody>
</table>
Inspections

Checking the Cartridge Leader

Before you use a tape cartridge, be sure the tape leader is in the same position as the one in Diagram of Cartridge Leader. Lift the door lock with your thumb and open the small door to expose the leader.

CAUTIONS

Do not touch the exposed magnetic tape.

If the tape leader is not in the correct position, do not try to fix it. Use another cartridge instead.

Diagram of Cartridge Leader

The following diagram shows the correct position of the cartridge leader:

Continued on next page
**Inspections, Continued**

**Checking the Drive Leader**

Compare the leader inside your drive with those shown in Diagrams of Drive Leader. If the leader is unhooked, misplaced, or damaged, call Digital Services. Do not try to fix the leader.

**Diagrams of Drive Leader**

The following diagram shows the location of the leader inside the drive:

- **TAKEUP LEADER**
- **NOTCH IN LEADER**
- **BUCKLING LINK**
- **CARTRIDGE INSERT/RELEASE HANDLE (DOWN)**
Inspections, Continued

Diagrams of Drive Leader (continued)

The following diagram shows the correct and incorrect locations of the drive leader:

- **Correct Location of Leader**
- **Acceptable**

- **Leader Unhooked**
- **Unacceptable**

- **Leader Displaced Above Link**

---

SHR-0249-87
SHR_X1028F_91_CPG
Chapter 4
Running Local Programs on the TF86 Subsystem

In This Chapter

Introduction

This chapter shows you how to use the following local programs that reside in read-only memory (ROM) on the TF86 subsystem:

- **PARAMS** allows you to modify parameters for your TF86.
- **DIRECT** provides a directory of available local programs.
- **HISTORY** displays information about the TF86.
- **DRVEXR** exercises the tape drive and displays statistics after successful completion.
- **DRVTST** verifies the correct functioning of drive hardware.

Continued on next page
In This Chapter, Continued

Contents

Chapter 4 includes the following topics:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using the TF86 PARAMS Program</td>
<td>4–3</td>
</tr>
<tr>
<td>Using the TF86 DIRECT and HISTORY Utilities</td>
<td>4–11</td>
</tr>
<tr>
<td>Using the TF86 DRVEXR and DRVTST Programs</td>
<td>4–13</td>
</tr>
</tbody>
</table>

Intended Audience

This chapter is for TF86 users only.
Using the TF86 PARAMS Program

About PARAMS

PARAMS can be executed while the tape is controlled by another application. PARAMS is used only to access and change controller parameters.

When you execute PARAMS, communications between the host system and the TF86 subsystem are through the diagnostic utilities protocol (DUP). When you exit PARAMS, control is returned to the operating system.

Starting PARAMS

After defining a symbol node name to be the node name parameter for your drive, access PARAMS with the DCL command. The following example shows the sequence of commands to start PARAMS. These commands are for the VMS operating system, version 5.4-2 or later.

$ SHOW CLUSTER

View of Cluster from system ID 18582 node: DROVIM 7-SEP-1992 11:47:03

<table>
<thead>
<tr>
<th>SYSTEMS</th>
<th>MEMBERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NODE</td>
<td>SOFTWARE</td>
</tr>
<tr>
<td>--------</td>
<td>----------</td>
</tr>
<tr>
<td>DROVIM</td>
<td>VMS V5.3</td>
</tr>
<tr>
<td>GEAR</td>
<td>RFX V103</td>
</tr>
<tr>
<td>LIBRY</td>
<td>RFX V103</td>
</tr>
<tr>
<td>TF86</td>
<td>TFX V004</td>
</tr>
<tr>
<td>CANDY</td>
<td>VMS V5.3</td>
</tr>
<tr>
<td>BOLTS</td>
<td>VMS V5.3</td>
</tr>
</tbody>
</table>

$ SET HOST/DUP/SERVER=MSCP$DUP/TASK=PARAMS TF86

Continued on next page
Using the TF86 PARAMS Program, Continued

Starting PARAMS (continued)

Note that you can determine the node name by executing the SHOW CLUSTER command. Also note that, after TASK=, you append PARAMS to execute the PARAMS program.

**NOTE**
The node name is the name of the tape device. The node name is derived from the subsystem's serial number, unless you already reassigned the node name through PARAMS. A drive received from the factory has a unique drive serial number and, therefore, a unique node name.

Once you invoke PARAMS through the SET HOST/DUP command, the screen displays the following prompt:

PARAMS>

The PARAMS> prompt indicates that you have accessed the PARAMS program.

Unit Off-Line Message

If, when using the SET HOST/DUP command, you receive the error message:

Unit offline

you might have forgotten to load the FYDRIVER program. (Loading FYDRIVER a second time will not cause any problem.)

Load FYDRIVER as follows:

$ MCR SYSGEN (to access SYSGEN)
$ SYSGEN> LOAD FYDRIVER (to load FYDRIVER, prerequisite to using diagnostics)
$ SYSGEN> CON FYA0/NOADAP (to configure FYDRIVER)
$ SYSGEN> EXIT

Continued on next page
Using the TF86 PARAMS Program, Continued

Changing the Node Name

You may want to change the default node name to something you can recognize more easily than the node name the system created. If you decide to change the node name, you should be aware of the following:

- It is preferable to change the node name only once—when the device is first installed into your VMS system. Digital Services representatives know how to change the node name and avoid the error and additional system reboot described in this section.

- If you change the node name after the subsystem has been correctly recognized by VMS, VMS will not recognize the new subsystem node name when you exit PARAMS.

That is, if you execute the DCL command, SHOW CLUSTER, you will not see the subsystem's new node name in your table. If you try to use the subsystem, all applications will get errors indicating the subsystem is not present. To avoid problems, reboot VMS. Then, you can use the subsystem with its new node name.

PARAMS Functions

At the PARAMS> prompt, you can use the following commands:

<table>
<thead>
<tr>
<th>Use</th>
<th>To . .</th>
</tr>
</thead>
<tbody>
<tr>
<td>HELP</td>
<td>Display a list of available commands and usage format</td>
</tr>
<tr>
<td>SHOW /ALL</td>
<td>Display all subsystem parameters</td>
</tr>
<tr>
<td>SHOW parameter</td>
<td>Display a specific parameter</td>
</tr>
<tr>
<td>SET parameter</td>
<td>Set a parameter</td>
</tr>
<tr>
<td>WRITE</td>
<td>Save changes permanently in EEROM</td>
</tr>
<tr>
<td>EXIT</td>
<td>Exit from PARAMS</td>
</tr>
</tbody>
</table>

Continued on next page
Using the TF86 PARAMS Program, Continued

SHOW Command

Use the SHOW command to display the settings of the subsystem parameters. The SHOW command has two formats:

SHOW /ALL
SHOW parameter

To list all parameters, type:

PARAMS> SHOW /ALL

The list of parameters is long but includes five that you might want to change. In the following example, each row shows the parameter's name, the parameter's current value, the factory-set default value, the acceptable minimum and maximum values, and the format for representing the values:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Current</th>
<th>Default</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Radix</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNITNUM</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>255</td>
<td>Decimal</td>
</tr>
<tr>
<td>FORCEUNIT</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>Decimal</td>
</tr>
<tr>
<td>NODENAME</td>
<td>&quot;TF85&quot;</td>
<td>&quot;TF85&quot;</td>
<td></td>
<td></td>
<td>Ascii</td>
</tr>
<tr>
<td>FORCENAME</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>Decimal</td>
</tr>
<tr>
<td>SYSTEMID</td>
<td>420000F00002</td>
<td></td>
<td></td>
<td></td>
<td>Quad</td>
</tr>
</tbody>
</table>

To display a specific parameter, type:

PARAMS> SHOW systemid

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Current</th>
<th>Default</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Radix</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYSTEMID</td>
<td>420000F00002</td>
<td></td>
<td></td>
<td></td>
<td>Quad</td>
</tr>
</tbody>
</table>

Continued on next page
Using the TF86 PARAMS Program, Continued

SHOW Command (continued)

The following table defines the five parameters:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNITNUM</td>
<td>TMSCP unit number.</td>
</tr>
<tr>
<td>FORCEUNIT</td>
<td>Determines whether the UNITNUM value or DSSI node ID is used to identify the TMSCP unit. If you clear FORCEUNIT, then you should also assign UNITNUM to the desired value. UNITNUM means nothing when FORCEUNIT = 1.</td>
</tr>
<tr>
<td></td>
<td>1 — Uses the DSSI node ID.</td>
</tr>
<tr>
<td></td>
<td>0 — Uses the TMSCP unit number parameter value.</td>
</tr>
<tr>
<td>NODENAME</td>
<td>Node name for the TF86 subsystem. Enter a 6-character name. (The factory setting is a unique string derived from the subsystem serial number.)</td>
</tr>
<tr>
<td>FORCENAME</td>
<td>1 — Uses a &quot;canned&quot; node name: TF86x, where x = A through H, depending on the DSSI node number value (0 through 7, respectively).</td>
</tr>
<tr>
<td></td>
<td>0 — Uses the value set in NODENAME.</td>
</tr>
<tr>
<td>SYSTEMID</td>
<td>DSSI controller module's 48-bit (hex) system ID. It is recommended that you never change this value; it uniquely identifies your drive.</td>
</tr>
</tbody>
</table>

1If you intend to change either NODENAME or FORCENAME, the system will not recognize the drive as available until you reboot the VMS operation system.

Continued on next page
Using the TF86 PARAMS Program, Continued

**SET Command**

Use the **SET** command to change parameters that you can list with the SHOW command.

Syntax for the SET command is:

`SET parameter value`

In this example, **parameter** is the name of the parameter to be set and **value** is the value you want assigned to the parameter.

**CAUTION**

The controller module does range validation checking on each parameter. However, it is not guaranteed all combinations of settings will result in correct controller module operation.

Parameters changed are not actually effective until you execute a WRITE command, described in the next section. If you forget to issue a WRITE command and try to EXIT, a warning message displays, telling you the parameter was modified but not written.

**NOTE**

If you request changing some parameters, the system will warn you that it must reset the controller to accept the changes. Details are in the EXIT Command section of this chapter.

Continued on next page
Using the TF86 PARAMS Program, Continued

WRITE Command

Use the WRITE command to save, in nonvolatile memory, the changes you made using the SET command. The WRITE command is similar to the VMS SYSGEN WRITE command. The syntax is WRITE at the PARAMS> prompt. The program's response depends on which parameters you changed. If the change is allowed without resetting the controller, the response is merely the PARAMS> prompt.

In the following example, the response requires user action:

PARAMS> SET NODENAME TAPE1
PARAMS> SET UNITNUM 18
PARAMS> WRITE

Changing NODENAME and UNITNUM each requires a reset (initialization) of the controller. PARAMS asks:

Changes require controller initialization, ok? [Y/(N)] Y

CAUTION

Answering YES aborts the controller’s current application, if any, and saves the parameters. Your changes take effect immediately and program control returns to the DCL command prompt.

To avoid aborting the current application, answer NO. If you answer NO, all parameters changed using SET since the previous successfully completed WRITE command are ignored. You are returned to the PARAMS> prompt. See the next section, EXIT Command.

The above example sets the TF86 subsystem’s node name to TAPE1, and the TMSCP unit number to 18. Executing WRITE and answering YES to the controller initialization question saves the node name and unit number in EEROM and resets the controller.

Continued on next page
Using the TF86 PARAMS Program, Continued

EXIT Command

Typing the **EXIT** command, at the PARAMS> prompt, ends the PARAMS program, and the word **Completed** appears on your screen.

**NOTE**
To exit from questions during the local program dialogue, type **Ctrl/C**, **Ctrl/Z**, or **Ctrl/Y**. In this case, your latest changes will be ignored.

The following table describes what happens when you use the EXIT command:

<table>
<thead>
<tr>
<th>If you . . .</th>
<th>Then the . . .</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did not SET a parameter</td>
<td>EXIT succeeds immediately.</td>
</tr>
<tr>
<td>SET parameters and forgot to execute WRITE</td>
<td>EXIT is ignored and you are advised:</td>
</tr>
<tr>
<td></td>
<td>Parameter modified but not written. Still exit? [Y/(N)]</td>
</tr>
<tr>
<td></td>
<td>If you answer YES, the system EXITS and returns to the DCL prompt. Your modifications are not saved.</td>
</tr>
<tr>
<td></td>
<td>If you answer NO, the system returns to the PARAMS&gt; prompt. To save your modifications, enter WRITE at the prompt, and then EXIT.</td>
</tr>
<tr>
<td>SET parameters and executed WRITE</td>
<td>System EXITS and returns to the DCL prompt.</td>
</tr>
</tbody>
</table>
Using the TF86 DIRECT and HISTRY Utilities

Starting DIRECT and HISTRY

To start DIRECT or HISTORY, use the same procedure for starting PARAMS, but alter the value of /TASK in the SET HOST/DUP command:

/TASK=DIRECT

or

/TASK=HISTORY

The following example shows the SET HOST/DUP command with DIRECT or HISTORY as the task:

$ SET HOST/DUP/SERVER=MSCP$DUP/TASK=DIRECT nodename

$ SET HOST/DUP/SERVER=MSCP$DUP/TASK=HISTORY nodename

Using DIRECT AND HISTORY requires no further user interaction.

About DIRECT

The DIRECT utility provides a directory of the diagnostic and utility programs resident in the TF86 subsystem. An example of a DIRECT display follows:

DIRECT V1.0 D
HISTORY V1.0 D
PARAMS V1.0 D
DRVEXR V1.0 SD
DRVST V1.0 SD
LDRTST V1.0 SD
Completed

Continued on next page
Using the TF86 DIRECT and HISTORY Utilities, Continued

About HISTRY

The HISTORY utility displays information about the history of the TF86 subsystem. An example of the HISTORY display follows:

```
TF86
  DSSI: TF86A5 /3 (DIPS)
Controller:
  S#: EN03000193
    HW: 000/PCB-rev:A000
    Bt: 120/42DA8D6A (23-JAN-1991 15:00:47)
    EE: 086.016 TD: 002
Drive:
  S#: EN04500420
    HW: 000/A000
    Cd: 064/935C
    EE: 001/E826
    Loader (S/H/M): 000/000/000
    Power on Hours: 1281
    Power Cycles: 31
Completed
```

Using the example above, the following list describes some of the information you see when you run HISTORY:

1. Reflects your device's node name. The DSSI node name is encoded from the controller serial number. The /3 (DIPS) indicates that the DSSI node ID for this device is 3.
2. The serial number for the controller board.
3. The revision number of the controller software.
4. The serial number for the tape drive.
Using the TF86 DRVEXR and DRVTST Programs

**DRVEXR Program**

The DRVEXR program exercises the tape drive. It is an intensive data transfer test and indicates the overall integrity of the drive. The following example shows the SET HOST/DUP command with DRVEXR as the task:

```
$ SET HOST/DUP/SERVER=MSCP$DUP/TASK=DRVEXR nodename
```

An example of a DRVEXR display follows:

Write/read anywhere on medium? [1=Yes/(0=No)] 1
User Data will be corrupted. Proceed? [1=Yes/(0=No)] 1
Test Time in Minutes [(10) - 100] 10
Minutes to Complete: 10

Data Compares enabled. DIAGNOSTIC TAG parameters used.

Stat Report

Test Name: DRVEXR, Pass 1
Random Seed: 1042247360
Byte Count: 0

Pattern Number: 9
Data Errors: Read Write
  Retries: 0 0
  ECC: 1
  Hard: 0 0
Data Compare Errors: 0
Mispositions: 0
Kbytes Written: 191478 Read: 94895

Test Passed

**NOTE**

The DRVEXR program prompts you for an execution time. The DRVTST program displays a specific execution time.
Using the TF86 DRVEXR and DRVTST Programs, Continued

**DRVTST Program**

The **DRVTST** program is a pass/fail test that invokes a comprehensive test of the drive hardware. A Test Complete message or a fatal error message appears when the test is complete.

The following example shows the SET HOST/DUP command with DRVTST as the task:

```
$ SET HOST/DUP/SERVER=MSCP$DUP/TASK=DRVTST nodename
```

An example of a DRVTST display follows:

Write/read anywhere on medium? [1=Yes/(0=No)] 1
User Data will be corrupted. Proceed? [1=Yes/(0=No)] 1
Minutes to Complete: 5

Data Compares enabled. DIAGNOSTIC TAG parameters used.
Tape Mark Enc.
At LEOT
Tape Mark Enc.
Long Gap Found
Test Passed
Appendix A
Tx86 Subsystem Specifications

Mode of Operation
The Tx86 subsystem operates in a streaming mode with a maximum transfer rate (at tape) of 800 kilobytes/s, formatted.

Media
The specified media for the TF86 subsystem is 1/2 in (12.77 mm) unformatted magnetic tape with the following characteristics:

- Track density = 224 tracks/in (112 tracks)
- Bit density = 42,500 bits/in
- Number of tracks = 112
- Tape speed = 100 in/s
- Track format = Two-track parallel, serpentine recording
- Cartridge capacity = Up to 6.0 GB, formatted

Power Consumption
The TF86 subsystem consumes 56 W maximum.
The TZ86 subsystem consumes 40 W maximum.

Continued on next page
Power Requirements

The TF86 subsystem has the following power requirements:

- 12 V $\pm 5\%$ @ 1.6 A (2.6 A surge), 75 mV ripple peak-to-peak
- $+5$ V $\pm 5\%$ @ 4.5 A, 75 mV ripple peak-to-peak

The TZ86 subsystem has the following power requirements:

- 12 V $\pm 5\%$ @ 1.2 A (1.5 A surge), 75 mV ripple peak-to-peak
- $+5$ V $\pm 5\%$ @ 3.5 A, 75 mV ripple peak-to-peak
Appendix B
Standard VMS Commands

Using the Subsystem Efficiently

Introduction
This section identifies guidelines that you should follow to use the Tx86 subsystem effectively with your host application. To take best advantage of the subsystem’s efficient processing abilities, you must use certain qualifiers with the MOUNT and BACKUP commands. This appendix describes those qualifiers and their appropriate values.

Guidelines
For efficient operation of the TF86 or the TZ86 subsystem:

- Choose a large record size when mounting a tape. The value, 65534, is recommended.
- Do not use the COPY command to save more than 9,999 files onto the tape.

The TF86 subsystem has an additional consideration for operating efficiency:

- Be aware that the TF86 subsystem uses a default FORCECACHING parameter that enables the DSSI controller to cache write data to the drive. (See the discussion in TF86 FORCECACHING with the MOUNT Command.)
## Introduction

The Tx86 cartridge tape subsystem uses the standard magnetic tape commands that can be invoked under VMS operating system, version 5.4-2 or later.

This section discusses the following VMS commands used to operate the Tx86 subsystem:

<table>
<thead>
<tr>
<th>Command</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALLOCATE</td>
<td>B-3</td>
</tr>
<tr>
<td>INITIALIZE</td>
<td>B-3</td>
</tr>
<tr>
<td>MOUNT</td>
<td>B-4</td>
</tr>
<tr>
<td>BACKUP</td>
<td>B-5</td>
</tr>
<tr>
<td>COPY</td>
<td>B-6</td>
</tr>
<tr>
<td>DISMOUNT</td>
<td>B-6</td>
</tr>
<tr>
<td>DEALLOCATE</td>
<td>B-6</td>
</tr>
</tbody>
</table>

---

## For More Information

This appendix is a reference only; it does not include all the details that may be involved in using VMS commands.


*Continued on next page*
Tape Commands, Continued

Using the ALLOCATE Command

The ALLOCATE command provides exclusive access to a device 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 Tx86 subsystem:

```
$ ALLOCATE device_name: [logical name]
```

For example, to allocate the Tx86 subsystem for your use and assign it to the logical name TAPE1, do the following:

```
$ ALLOCATE MIA0: TAPE1
```

Using the INITIALIZE Command

**CAUTION**
Be sure to use a scratch tape before initializing; otherwise, any data on the tape will be destroyed.

Use the INITIALIZE command to specify the device name, and write a volume name to the magnetic tape volume loaded into the TK86 tape drive. The tape must be write-enabled for the initializing operation. Use the following format:

```
$ INITIALIZE device_name: [volume label]
```

As an example, to initialize the device TAPE1 and assign the volume name GMB001, type the following:

```
$ INITIALIZE MIA0: GMB001
```

For the initialization to succeed, the cartridge must not have been mounted (with the MOUNT command).

For detailed information regarding volume names and magnetic tape operations, see the Guide to VAX/VMS Disk and Magnetic Tape Operations (AA–M539A–TE).
Tape Commands, Continued

Using the MOUNT Command

The MOUNT command lets you make a magnetic tape volume available for processing. It loads the tape with the protection set according to the write-protect switch on the cartridge.

Use the following format to mount a tape with the Tx86 subsystem:

```
$ MOUNT/FOREIGN/CACHE=TAPE_DATA device_name: [volume label] [logical name]
```

As an example, to make TAPE1 available for processing, type the following:

```
$ MOUNT/FOREIGN/CACHE=TAPE_DATA MIA0: GMB001 TAPE1
```

The screen displays a message:

```
%MOUNT-I-MOUNTED, GMB001 mounted on MIA0:
```

You must use the /FOREIGN qualifier when you are performing BACKUP commands. Do not use it when you are performing COPY commands.
Tape Commands, Continued

TF86 FORCECACHING with the MOUNT Command

The TF86 DSSI controller has a parameter, accessible through the DUP PARAMS utility, that controls whether tape caching is done. This parameter is called FORCECACHING. Its default value is 1, which means that the controller always caches—even if you specify /NOCACHE with the MOUNT command, unless you also specify /READ_CHECK or /WRITE_CHECK.

You can modify FORCECACHING to value 0, which allows the subsystem to honor the various means the application program has to specify that commands not be cached.

CAUTION
Setting FORCECACHING to 0 and specifying /NOCACHE with the MOUNT command can result in significant subsystem performance degradation.

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

Using the BACKUP Command

The BACKUP command provides protection against file volume corruption by creating backup copies.

Use the following format to back up a file:

```
$ BACKUP/BLOCK=65534/ignore=(label) source=*.* tape:file.name
```

You can also back up lists of files and entire volumes.

See your system manuals before deciding on qualifiers for use with the BACKUP command. For detailed information about BACKUP and other VMS tape commands, see the VAX/VMS Backup Utility Reference Manual (AA–Z407B–TE).
### Tape Commands, Continued

#### Using the COPY Command

Use the **COPY** command, with the Tx86 subsystem, to copy files from tape.

In the following example, the MOUNT command requests that the volume labeled GMB001 be mounted on the drive at MIA0 and assigns the logical name TAPE1.

The COPY command uses the logical name TAPE1 for the input file specification. All files on MIA0 are copied to the current default disk and directory. The files keep their original file names and file types.

```
$ MOUNT MIA0: GMB001 TAPE1:
$ COPY TAPE1:*.* *.*
```

**NOTE**

Using the COPY command to move multiple files may not achieve optimum performance. Check with your system manager for more information.

#### Using the DISMOUNT Command

The **DISMOUNT** command cancels the previous MOUNT command, makes the unit unavailable for processing, and unloads the tape:

```
$ DISMOUNT logical_name OR device_name:
```

#### Using the DEALLOCATE Command

The **DEALLOCATE** command cancels the previous ALLOCATE command and makes the unit available for other users. The following is an example of the command:

```
$ DEALLOCATE MIA0: OR TAPE1
```
Appendix  C
Using the TZ86 Subsystem with
the ULTRIX Operating System

In this Appendix

Introduction
This appendix is intended for those using the TZ86 tape subsystem with the ULTRIX operating system.

This section includes:
- Adding the TZ86 subsystem to your ULTRIX system
- Tips on getting maximum capacity and performance
- Using various ULTRIX commands to save information on the TZ86 subsystem
Adding the TZ86 to your ULTRIX system

### Setting the SCSI ID

Before connecting the TZ86 subsystem to the SCSI bus:

1. Locate the SCSI ID switches at the rear of the TZ86 subsystem.
2. Ensure the SCSI ID (target ID) number for the TZ86 is unique. The recommended ID is 5. Use SCSI ID 5 only if no other device on the bus has SCSI ID 5.
3. Ensure all other devices on the SCSI bus have unique SCSI IDs.

### Connecting the TZ86 to ULTRIX

To connect the TZ86 subsystem to the ULTRIX system:

1. Physically connect the TZ86 cable(s) to the ULTRIX system.
2. Ensure an entry for the TZ86 subsystem is specified in the ULTRIX system configuration file. If you have to modify your configuration file by adding an entry, then you must build a new kernel and reboot the system. This is explained in this section.
3. Create logical device names for your TZ86 subsystem, explained in this section.

### Checking the ULTRIX Configuration File

Locate the ULTRIX system’s configuration file. It should be in the `/usr/sys/conf` directory under the mips or VAX system subdirectory.

The configuration file name is the same as the system name and must contain an entry for the TZ86 subsystem.
Adding the TZ86 to your ULTRIX system, Continued

<table>
<thead>
<tr>
<th>If...</th>
<th>Then...</th>
</tr>
</thead>
<tbody>
<tr>
<td>An entry does not exist,</td>
<td>You need to create an entry in the configuration file.</td>
</tr>
<tr>
<td>An entry already exists,</td>
<td>You do not need to change the configuration file.</td>
</tr>
</tbody>
</table>

Creating an Entry

An entry has the following format:

tape name at controller device#

An example entry for Bus 0, SCSI ID 5:

tape tz5 at sii0 drive 5

To create an entry in the configuration file:

1. Refer to Table C–1 to determine the name according to your SCSI target ID and your bus number. Usually, users have one bus, Bus 0. Find the name, listed under the Bus 0 or Bus 1 column.

   For example: The name for SCSI Target ID 5, Bus 0 is tz5.

Table C–1  Determining the Tape Name

<table>
<thead>
<tr>
<th>SCSI Target ID</th>
<th>Bus 0</th>
<th>Bus 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>tz0</td>
<td>tz8</td>
</tr>
</tbody>
</table>

Continued on next page
Adding the TZ86 to your ULTRIX system, Continued

<table>
<thead>
<tr>
<th>Table C–1 (Continued) Determining the Tape Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCSI Target ID</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>7</td>
</tr>
</tbody>
</table>

2. Determine the name of the controller to which the TZ86 subsystem is connected.
3. Include the word tape, name, controller, and the device# in the entry.
Adding the TZ86 to your ULTRIX system, Continued

Building Kernel, Rebooting System

If you added an entry to your configuration file, you must rebuild the kernel and reboot the system. Be sure to save the original kernel before rebooting the system.

For example:

```
$ /etc/doconfig
$ mv /vmunix /vmunix.old
$ mv new_kernel_name /vmunix
$ /etc/shutdown -r now
```

(this creates a new kernel)
(save the old kernel)
(move the new kernel to the root directory)
(reboot the system)
Creating Logical Device Names

Use the MAKEDEV command located in the /dev directory to create logical device names.

For example:

$ cd /dev
$ MAKEDEV tz5

leads to some or all of the following logical device names:

/dev/nrmt0l
/dev/nrmt0h
/dev/rmt0l
/dev/rmt0h
/dev/rmt0m
/dev/nrmt0m
/dev/rmt0a
/dev/nrmt0a

- mt (in the middle of the logical name) means magnetic tape device.
- nr means no rewind when the utility completes. Use the no rewind option when more than one operation is being performed to the same tape.
- r means rewind when the utility completes.
- 0 is the logical unit number.

Continued on next page
Creating Logical Device Names (continued)

- l means low density.
- h means high density.
- m means medium density.
- a means auxiliary density.

**NOTE**
Since the TZ86 is a high density tape subsystem, be sure to use the logical device names including h. The only exception is if modifications are made to allow selection of TK85 density for writing via the low density device entry. See the Selecting Density section in this appendix.
Getting Maximum Capacity and Performance

Introduction

The TZ86 subsystem:

- Can store up to 6.0 GB of data per tape cartridge
- Run at peak streaming rates of 800 KB/s

This section explains how to maximize the functions of the TZ86 subsystem.

Getting Maximum Storage Capacity

To get maximum storage capacity:

Use block sizes that are integral multiples of 4,096 bytes, such as 4k, 8k, 12k, 16k, and so forth. It is recommended you use larger block sizes of 16k, 24k, or 32k, which:

- Allow more efficient data processing by the host and on the SCSI bus
- Maximize capacity

Some utilities and commands default to using block sizes that cause lower capacity and I/O rates. For example:

- If you use a 512 byte block size (this is the dd command's default), you will be able to fit only about 740 MB of data on the tape.
- If you use the recommended block sizes, this tape has a potential of 6.0 GB capacity.

Most utilities used for tape I/O let you select the block size through command line switches.

NOTE
If you are not using ULTRIX V4.2a or later, with the latest Common Access Method (CAM) software kit installed, you have a tape file length limit of 2.1 GB.
Getting Maximum Capacity and Performance, Continued

With striping or disk array techniques or when running the tar command to backup multiple file systems, you need to note the 2.1 GB limit. Plan backups so that a tar or dump set does not exceed the 2.1 GB limit. However, you can store multiple save sets on the same cartridge.

Maximizing Performance

To handle bursts of data, the TZ86 subsystem has 512 KB of cache memory. This minimizes repositioning and keeps I/O rates as high as the host can handle, up to 800 KB/s.

If a non-optimal block size is used, the possible average I/O rate is limited. The recommended block sizes are: 16k, 24k, or 32k. You can use larger block sizes of 36k, 40k, and so forth, but performance increase is unlikely.

Other factors that can limit performance:

- Data fragmentation on disks
- Overusing the I/O channel bandwidth
- Processing speed and host CPU loads
- Memory size

Continued on next page
Selecting Density

As explained in Chapter 1, density selection for write operations is not supported by ULTRIX at the time of this printing. However, if the CAM software is installed, you can:

- Modify the /sys/data/cam_data.c file to recognize the TZ86
- Assign the write densities selected by the host

The TK85 density is SEQ_42500_BPI (17h) and the TK86 density is 18h (no symbol is defined for this new media format). Changing the cam_data.c file should only be done by experienced users. You must rebuild the kernel to incorporate the changes. (See the configuration guidelines earlier in this appendix. Check the CAM software documentation for information about adding new devices.)

To allow density selection from the shell level:

1. Edit the /sys/data/cam_data.c file. Ensure a copy of the original is preserved and can be restored if necessary.
2. Make a copy of the TZ85’s density table (tz85_dens) found in /sys/data/cam_data.c. In this copy:
   - Change the TZ85 references to TZ86
   - Change the density code from SEQ_42500_BPI to 0x18 for all the subentries in the new density table, except for the minor 00 (rmtxl) subentry.

   This allows device rmtxl entries to select TK85 format and the others (rmtxm, rmtxh, rmtxa) to select TK86 format.
Getting Maximum Capacity and Performance, Continued

Selecting Density (continued)

3. Make a copy of the entry in the device descriptor information table for the TZ85 (search for DEV_TZ85) and change:
   - TZ85 to TZ86 in the comment and in the "DEC-----TZ85" string (underscores indicate five spaces)
   - DEV_TZ85 to the string: "TZ86"
   - &tz85_dens to &tz86_dens

4. Save the current kernel, build a new kernel, and reboot with the new kernel.
Using ULTRIX Tape Commands

Introduction
This section describes ULTRIX commands used to operate the TZ86 subsystem:

Table C–2 ULTRIX System Utilities

<table>
<thead>
<tr>
<th>For this command</th>
<th>See page</th>
</tr>
</thead>
<tbody>
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<td>C-11</td>
</tr>
<tr>
<td>dump</td>
<td>C-12</td>
</tr>
<tr>
<td>restore</td>
<td>C-13</td>
</tr>
<tr>
<td>dd</td>
<td>C-14</td>
</tr>
<tr>
<td>ltf</td>
<td>C-15</td>
</tr>
<tr>
<td>mt</td>
<td>C-16</td>
</tr>
<tr>
<td>cpio</td>
<td>C-17</td>
</tr>
</tbody>
</table>

The TZ86 subsystem uses standard magnetic tape commands to do backup and restore operations. The **tar** and **dump/restore** commands are used most often.

Using the tar Command
The **tar** command, which operates on files and directories, writes and reads tapes. The **tar** utility uses the specified block size or defaults to 10k byte block sizes. The default block size results in a 16% decrease of maximum capacity and I/O rates.

Table C-3 lists the options you can use with the **tar** command.
Table C–3  Common tar Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>b</td>
<td>Block size in bytes (n) Block size in kilobytes (nk) ( nb = n \times 512 ) bytes in a block</td>
</tr>
<tr>
<td>c</td>
<td>Create tape, writes from beginning</td>
</tr>
<tr>
<td>f</td>
<td>Tape device argument to follow</td>
</tr>
<tr>
<td>r</td>
<td>Append to the end of the tape</td>
</tr>
<tr>
<td>t</td>
<td>Table of contents of tape</td>
</tr>
<tr>
<td>u</td>
<td>Backup all new or modified files from last backup</td>
</tr>
<tr>
<td>v</td>
<td>Verbose</td>
</tr>
<tr>
<td>x</td>
<td>Extract from tape (read)</td>
</tr>
</tbody>
</table>

The following examples show command lines with the `tar` command to:

- Write a file to tape:
  
  `$ tar -cf /dev/rmt0h filename -b 64k`

- Read a file from tape to your current directory:
  
  `$ tar -fx /dev/rmt1h filename`

Using the `dump` Command

To use the `dump` command, you need system privileges. This command lets you write an entire file system to tape. Ensure that the current directory is not within the file system being backed up, except when backing up from the root directory.

The `dump` command uses 10k byte block sizes. A 16% reduction in capacity and I/O rates can result from using these block sizes.
Using ULTRIX Tape Commands, Continued

Table C–4 lists the options you can use with the dump command.

<table>
<thead>
<tr>
<th>Option</th>
<th>Meaning</th>
<th>Recommended Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>d</td>
<td>Tape density in bits per inch</td>
<td>42500</td>
</tr>
<tr>
<td>f</td>
<td>Tape device</td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>Notify all privileged accounts, the status of dump</td>
<td></td>
</tr>
<tr>
<td>s</td>
<td>Size of tape in feet</td>
<td>57600</td>
</tr>
<tr>
<td>u</td>
<td>Update the /etc/dumpdates file with the date</td>
<td></td>
</tr>
<tr>
<td>0-9</td>
<td>Dump level</td>
<td></td>
</tr>
</tbody>
</table>

The following examples show command lines with the dump command:

```
$ dump 0dsf 42500 57600 /dev/rmt0h /dev/rrz1a
$ dump unsf 42500 57600 /dev/rmt0h /usr/users
```

Dump level 0 is the highest and dumps the whole file system. Dump level 9 is the lowest. All files, modified since the last dump of the same or lower dump level, are dumped.

Using the restore Command

The restore command reads a tape that is backed up with the dump command. The restore command can read a file, a directory, or the entire tape.

The restore command uses 10k byte block sizes. A 16% reduction in capacity and I/O rates can result from using these block sizes.
Table C–5 lists the options you can use with the `restore` command.

<table>
<thead>
<tr>
<th>Option</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>f</td>
<td>Tape device</td>
</tr>
<tr>
<td>r</td>
<td>Read everything from tape</td>
</tr>
<tr>
<td>i</td>
<td>Interactive</td>
</tr>
<tr>
<td>v</td>
<td>Verbose</td>
</tr>
<tr>
<td>x</td>
<td>Extract</td>
</tr>
</tbody>
</table>

The following example shows a command line with the `restore` command:

```
$ restore -xvf filename
```

**Using the `dd` Command**

Use the `dd` command to perform a device-to-device copy. The copy is done by file or by image, depending on the specification of the input or output device files.

Disks have two types of device files, image and block:

- If the disk image file (/dev/rrxxx) is used, performance is faster.
- If the disk block file (/dev/rxxx) is used, it is easier to retrieve a single file later.

The `dd` command uses the specified block size, or if none is given, a default of 512 bytes. An 87% reduction in capacity and performance can result from using the default block size. It is important to specify a more optimal block size.

Continued on next page
Using ULTRIX Tape Commands, Continued

Table C-6 lists the options you can use with the `dd` command.

<table>
<thead>
<tr>
<th>Option</th>
<th>Meaning</th>
<th>Recommended Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>if</td>
<td>Input file</td>
<td></td>
</tr>
<tr>
<td>of</td>
<td>Output file</td>
<td></td>
</tr>
<tr>
<td>bs</td>
<td>Input and output block size (bytes)</td>
<td>32768</td>
</tr>
<tr>
<td>ibs</td>
<td>Input block size (bytes)</td>
<td>32768 for tape</td>
</tr>
<tr>
<td>obs</td>
<td>Output block size (bytes)</td>
<td>32768 for tape</td>
</tr>
</tbody>
</table>

The following examples show command lines with the `dd` command to:

- Write to tape with the block device file:
  
  $ dd if=/dev/rz1a of=/dev/rmt1h bs=32768

- Write to tape with the image device file:
  
  $ dd if=/dev/rrz1a of=/dev/rmt1h bs=32768

- Read a tape:
  
  $ dd if=/dev/rmt1h of=/dev/rz1a ibs=32768

Using the ltf Command

Use the `ltf` command to write and read ANSI tapes. This command operates on files and directories and uses the specified block size. Otherwise, the command defaults to 2,048 byte blocks, resulting in a 50% decrease of capacity and I/O rates.

Continued on next page
Using ULTRIX Tape Commands, Continued

Table C–7 lists the options you can use with the `ltf` command.

**Table C–7  Common ltf Options**

<table>
<thead>
<tr>
<th>Option</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Specify a block size to use</td>
</tr>
<tr>
<td>c</td>
<td>Create tape, writes from beginning</td>
</tr>
<tr>
<td>f</td>
<td>Tape device argument to follow</td>
</tr>
<tr>
<td>u</td>
<td>Backup all new or modified files from last backup</td>
</tr>
<tr>
<td>t</td>
<td>Table of contents of tape</td>
</tr>
<tr>
<td>v</td>
<td>Verbose</td>
</tr>
<tr>
<td>x</td>
<td>Extract from tape (read)</td>
</tr>
</tbody>
</table>

The following examples show command lines with the `ltf` command to:

- Write a file to tape:
  
  ```bash
  $ ltf -cf /dev/rmt0h filename -B 16k
  ```

- Read a file from tape to your current directory:
  
  ```bash
  $ ltf -fx /dev/rmt1h filename
  ```

**Using the mt Command**

The `mt` (magnetic tape) command allows you to give certain commands to the tape drive.

Table C–8 lists the options you can use with the `mt` command.

---

*Continued on next page*
Using ULTRIX Tape Commands, Continued

Table C–8 Common mt Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>eof</td>
<td>Write file mark(s)</td>
</tr>
<tr>
<td>bsf</td>
<td>Backward space file(s)</td>
</tr>
<tr>
<td>bsr</td>
<td>Backward space record(s)</td>
</tr>
<tr>
<td>fsf</td>
<td>Forward space file(s)</td>
</tr>
<tr>
<td>fsr</td>
<td>Forward space record(s)</td>
</tr>
<tr>
<td>offline</td>
<td>Unload the tape</td>
</tr>
<tr>
<td>rewind</td>
<td>Rewind to the beginning of medium</td>
</tr>
<tr>
<td>status</td>
<td>Obtain information from the drive</td>
</tr>
</tbody>
</table>

The following examples show command lines with the mt command to:

- Get the status of a drive:
  
  $ mt -f /dev/rmt0h status

- Rewind the default drive:
  
  $ mt rewind

- Write two file marks to the default drive:
  
  $ mt eof 2

Using the cpio Command

The cpio command allows you to save files and directories on tape and other media and retrieve these files.

Table C–9 lists the options you can use with the cpio command.
Using ULTRIX Tape Commands, Continued

<table>
<thead>
<tr>
<th>Option</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>c</td>
<td>Write or read header information in ASCII character form</td>
</tr>
<tr>
<td>d</td>
<td>Create directories as needed</td>
</tr>
<tr>
<td>i</td>
<td>Copy in</td>
</tr>
<tr>
<td>o</td>
<td>Copy out</td>
</tr>
<tr>
<td>t</td>
<td>Table of contents of tape</td>
</tr>
<tr>
<td>v</td>
<td>Verbose</td>
</tr>
</tbody>
</table>

The following examples show command lines with the `cpio` command to:

- Write to tape all files and subdirectories from your current directory:
  
  
  $ find . -print | cpio -ocv > /dev/rmt0h
  
- List all files and subdirectories that are on the tape:
  
  $ cpio -ictv < /dev/rmt0h
  
- Retrieve all files and subdirectories from the tape:
  
  $ cpio -icdv < /dev/rmt0h
  
- Retrieve selective files from the tape:
  
  $ cpio -icv < 'filename' < /dev/rmt0h
Appendix D
Digital Services

Service Plans

Introduction
Digital Equipment Corporation offers a range of flexible service plans.

On-Site Service
On-site service offers the convenience of service at your site and insurance against unplanned repair bills. For a 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
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 periods, and to include Saturdays, Sundays, and holidays. Under the basic service plan, all parts, materials, and labor are covered in full.

Continued on next page
### DECservice Plan
The DECservice plan offers a premium, on-site service for producing 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 the DECservice plan, all parts, materials, and labor are covered in full.

### Carry-In Service
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 2 days. This service is available on selected terminals and systems. Digital SERVICenters are open during normal business hours, Monday through Friday.

### DECmailer Service
DECmailer service 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 5 days.

### Per Call Service
Per call service offers a maintenance program on a noncontractual, time-and-materials-cost basis. It is appropriate for customers who have to perform first-line maintenance, but may occasionally need in-depth support from Digital Services.
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