Educational Services

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

Digital Equipment Corporation

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Für Bundesrepublik Deutschland
For Federal Republic of Germany
Pour la République féderale d'Allemagne

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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.

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.

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:

Topic	Page
Tx86 Cartridge Tape Subsystem	1–2
Data Tape	1–7
Cartridge Compatibility	1–9
Cleaning Tape	1–11
Supplies	1–13
Related Documents	1–14

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:

TF86 Subsystem	TZ86 Subsystem
TK86 tape drive	TK86 tape drive
DSSI controller module	SCSI controller module

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.

Tx86 Cartridge Tape Subsystem, Continued

Basic Components (continued)

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

This controller option. . .	For this SCSI cable. . .
Single-ended	6-meter (19-foot), maximum length, single-ended cable (ANSI SCSI standard)
Differential	Longer differential SCSI cables with better noise immunity

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):

Tx86 Cartridge Tape Subsystem, Continued

Table 1–1   TZ867 VMS Restrictions

VMS Version	Restrictions[1]
<5.3	X
5.3	1,2,3
5.4	1,2,3
5.4-1	2,3
5.4-2	2,3
5.4-3	3
5.5	3
5.5-1	3

[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.

Tx86 Cartridge Tape Subsystem, Continued

Performance Consideration

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.

Required Load Device

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.

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:
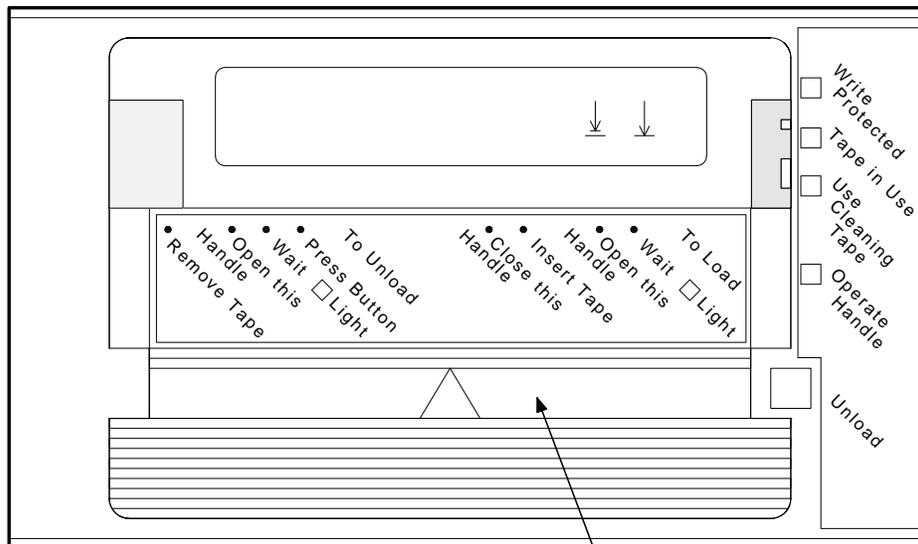
CARTRIDGE INSERT/RELEASE HANDLE

SHR-X0056G-91

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.

Data Tape, Continued

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:
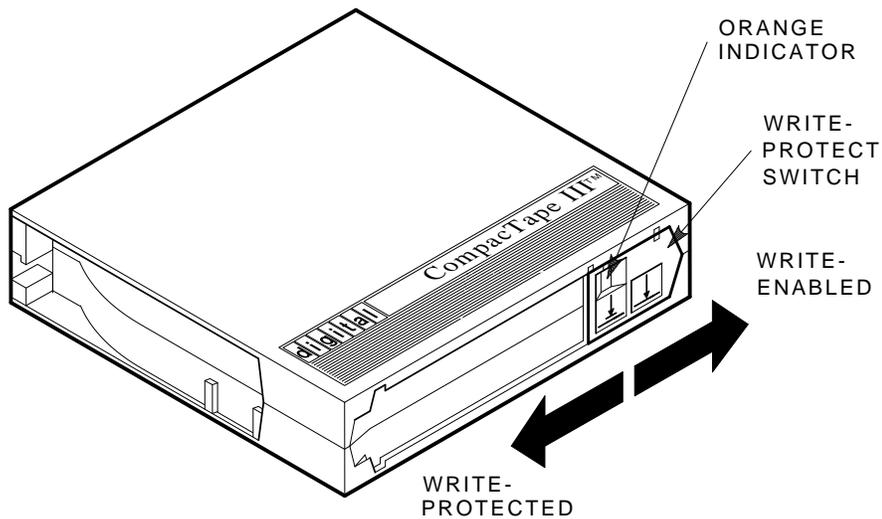
SHR_X1020C_89

Cartridge Compatibility

Comparison of Read/Write Ability

The following table shows cartridge compatibility with the TK86 drive:

Cartridge Type	Read/Write Ability in the TK86
CompacTape III (TK85)	Read/write in 85 Mode (48 tracks, 2.6 GBF)
CompacTape III (TK86)	Read/write in 86 Mode (112 tracks, 6.0 GBF)
CompacTape III (Blank)	Read/write in 86 Mode (112 tracks, 6.0 GBF)

Selecting Density with TF86

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.

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.

Cleaning Tape, Continued

CleaningTape III Diagram

The following diagram shows the CleaningTape III:
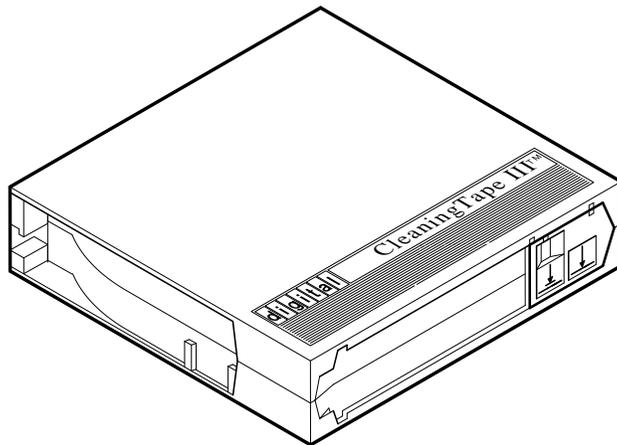
SHR_X1020E_89

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:

Order Number	Description
TK85–HC	CleaningTape III cleaning cartridge
TK85K–01	CompacTape III data cartridge
TK85K–07	CompacTape III data cartridge (quantity, 7)
TK85K–A0	CompacTape III data cartridge (quantity, 1008)

Related Documents

The following documents provide more information on the Tx86
subsystem:

Order Number	Title
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*
EK–TX867–OM	*Tx867 Series Magazine Tape Subsystem Owner's Manual*
EK–OTK86–RC	*Tx86 Tape Drive Operator's Reference Card*

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:

Indicators and Controls

Description of 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

Indicators and Controls, Continued

Diagram of Indicators and Controls

The following diagram shows the Tx86 controls and indicators:

ORANGE
YELLOW
ORANGE
GREEN

Write Protected
Tape in Use
Use Cleaning Tape
Operate Handle
Unload

Remove Tape
Open this Handle
Wait
Press this Light
Press Button
To Unload
Close this Handle
Insert Tape
Open this Handle
Wait
Press this Light
To Load

CARTRIDGE INSERT/RELEASE HANDLE
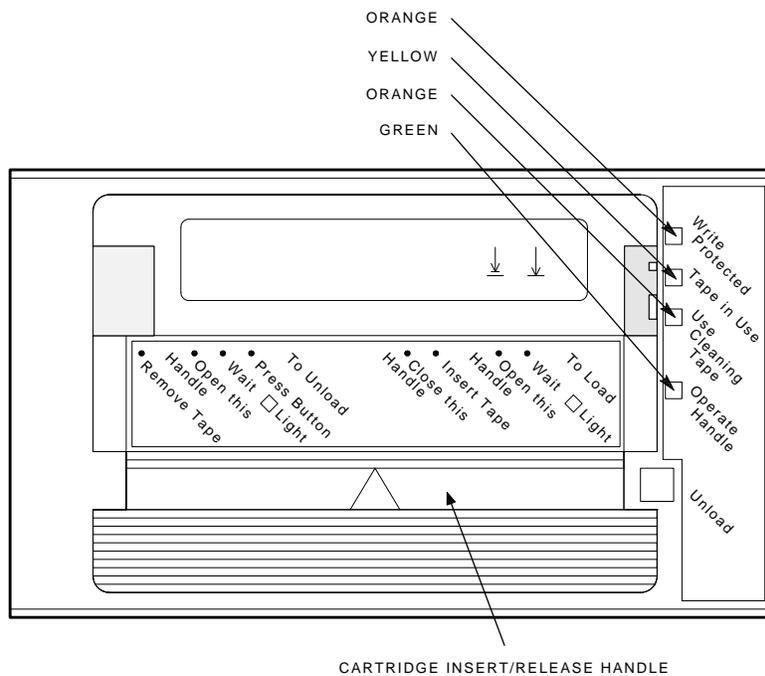
SHR-X0056H-91

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.

Indicators and Controls, Continued

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

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

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:
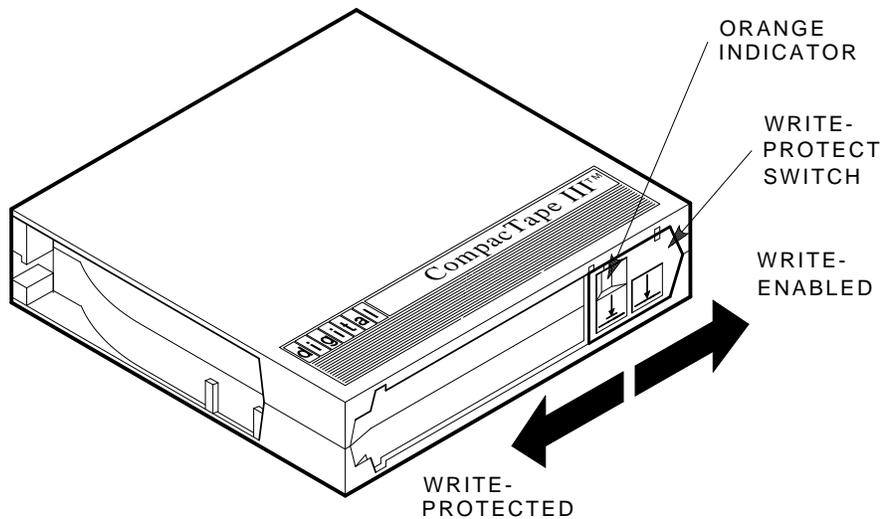
SHR_X1020C_89

Cartridge Write-Protect Switch, Continued

Data Protection

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

If you move the write-protect switch before loading the cartridge. . .	Then. . .
To the left on the cartridge, the tape is write-protected, with the orange indicator showing	You cannot write data to the tape.
To the right on the cartridge, the tape is write-enabled	You can write data to the tape (if it is not software write-protected).
If you move the write-protect switch during operation. . .	**Then. . .**
From the write-protected position to the write-enabled position	The tape becomes write-enabled after a variable amount of time (on order of seconds).
From the write-enabled position to the write-protected position	The tape becomes write-protected after a variable amount of time (on order of seconds).

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.

Loading a Cartridge, Continued

Diagram of Cartridge Loading

The following diagram shows how to load a cartridge into the drive:
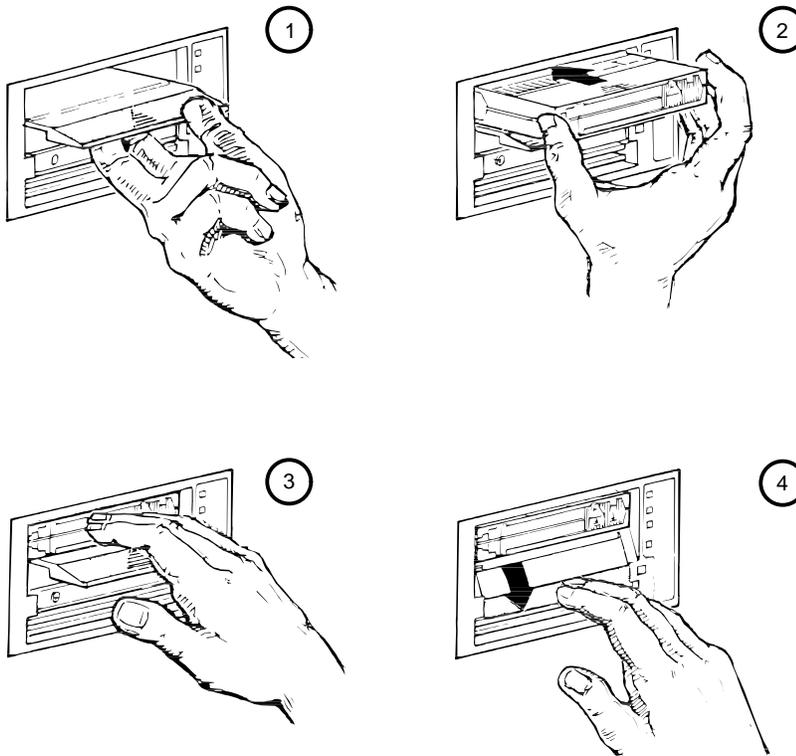
SHR-0256-87
SHR_X1093_89_CPG

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:

If. . .	Then. . .
The yellow light is on steadily	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.
The yellow light blinks irregularly	A read or write is in progress.
The yellow light blinks regularly	The tape is loading, unloading, or rewinding.
The green light turns on and the beeper sounds	The tape is unloaded.
All four lights blink	An error has occurred during operation. See Chapter 3, Solving Problems.

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:
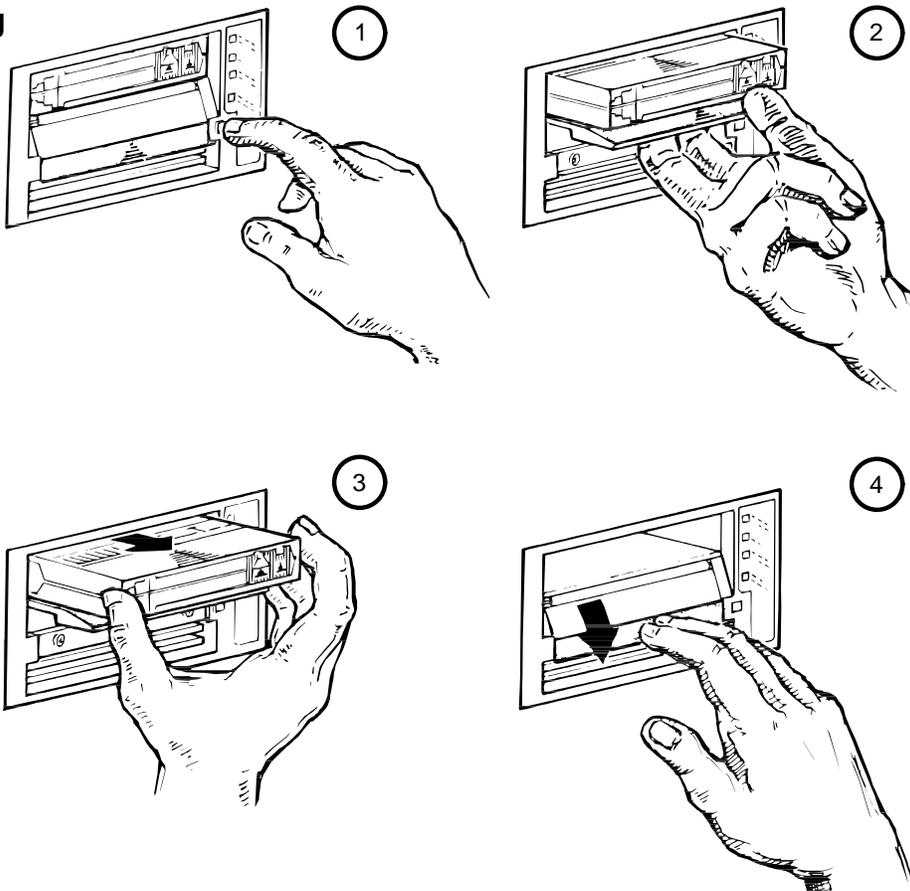
Preserving Cartridges

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:

Topic	Page
Common Errors	3–2
Inspections	3–4

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.

Common Errors, Continued

Finding Solutions

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

Symptom	Probable Cause	Possible Correction
Failure to mount or read/write with new or used cartridge	Bad cartridge	Retry with another cartridge.
	Dirty drive head	Use CleaningTape III.
VMS INITIALIZE command fails with parity error	Tape calibration failed	Try another cartridge.
Green light is on and tape does not move (yellow light stays on, does not blink)	Cartridge load error	Inspect the cartridge for a mispositioned leader (see Diagram of Cartridge Leader in this chapter). Replace the cartridge if its leader is mispositioned. 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.
All four lights blinking	Drive failed self-test or detected a hard error during operation	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.

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:

CARTRIDGE
LEADER

DOOR LOCK
(RELEASE BY LIFTING
DOOR LOCK WITH THUMB)
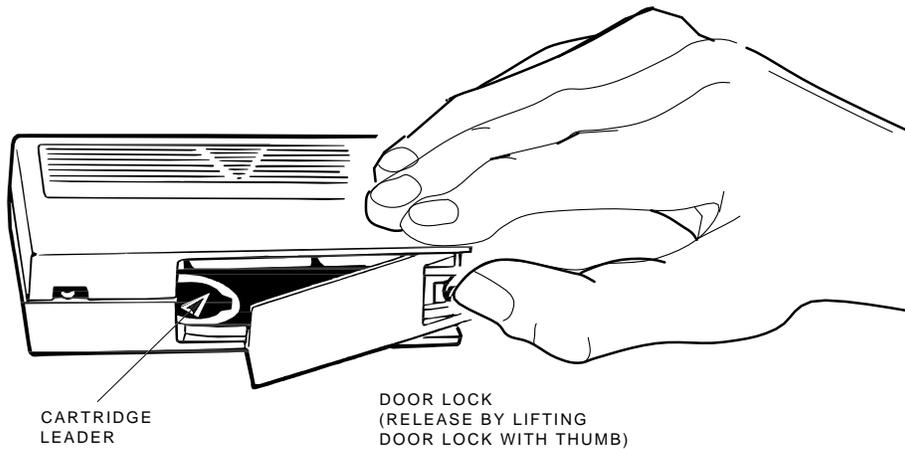
SHR-0002-86
SHR_X1027_89_CPG

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

Write Protected
Tape in Use
Use Cleaning Tape
Operate Handle
Unload

CARTRIDGE INSERT/RELEASE HANDLE (DOWN)
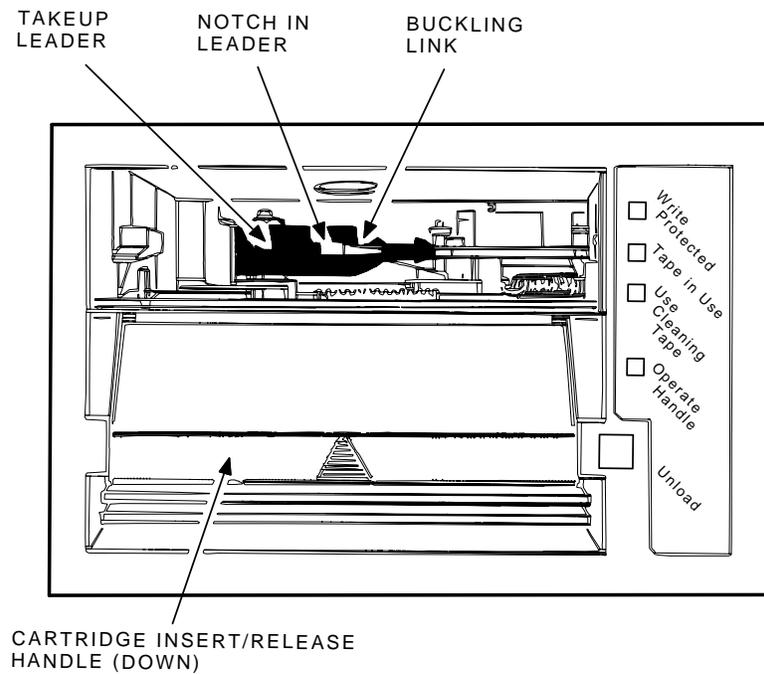
SHR-0249-87
SHR_X1028G_91_CPG

Continued on next page

Inspections, Continued

Diagrams of Drive Leader (continued)

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

TAKEUP LEADER

BUCKLING LINK

CORRECT LOCATION OF LEADER

ACCEPTABLE

LEADER UNHOOKED

UNACCEPTABLE

TAKEUP LEADER NOTCH

LEADER DISPLACED ABOVE LINK
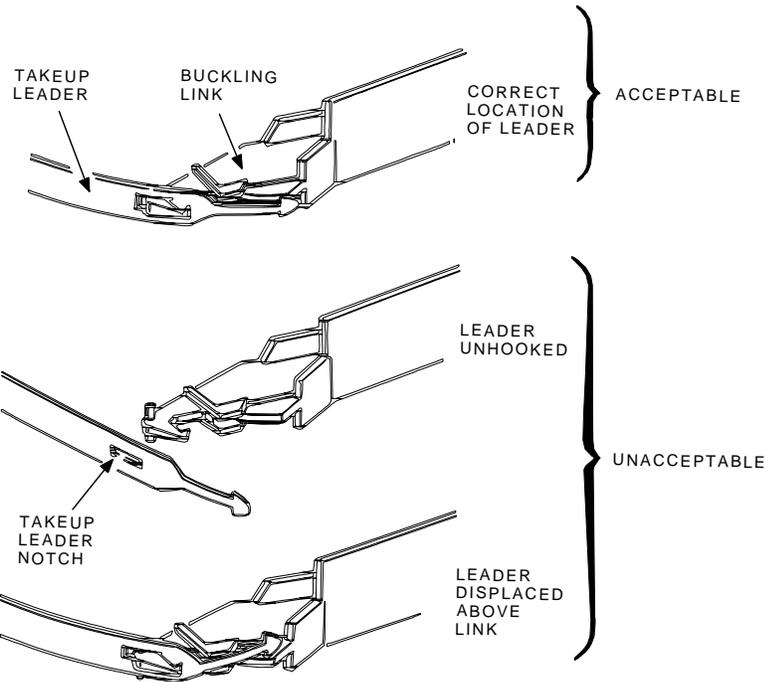
SHR-0249-87
SHR_X1028F_91_CPG

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.
- **HISTRY** displays information about the TF86.
- **DRVEXR** exercises the tape drive and displays statistics after successful completion.
- **DRVTST** verifies the correct functioning of drive hardware.

In This Chapter, Continued

Contents

Chapter 4 includes the following topics:

Topic	Page
Using the TF86 PARAMS Program	4–3
Using the TF86 DIRECT and HISTRY Utilities	4–11
Using the TF86 DRVEXR and DRVTST Programs	4–13

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

```
-------------------------------
|   SYSTEMS          |MEMBERS |
|---------------------------- |
|NODE   | SOFTWARE  | STATUS  |
|-------|-----------|-------- |
|DROVIM | VMS V5.3  | MEMBER  |
|GEAR   | RFX V103  |         |
|LIBRY  | RFX V103  |         |
|TF86   | TFX V004  |         |
|CANDY  | VMS V5.3  | MEMBER  |
|BOLTS  | VMS V5.3  | MEMBER  |
-------------------------------
```

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

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
```

**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:

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

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:

```
Parameter          Current     Default     Minimum     Maximum     Radix

UNITNUM                  0           0           0         255     Decimal
FORCEUNIT                1           1           0           1     Decimal
NODENAME         "T8DBBB  "    "TF85    "                          Ascii
FORCENAME                0           0           0           1     Decimal
SYSTEMID   420000F00002                                            Quad
```

To display a specific parameter, type:

```
PARAMS> SHOW systemid

Parameter          Current     Default     Minimum     Maximum     Radix

SYSTEMID   420000F00002                                            Quad
```

Continued on next page

4–6

Using the TF86 PARAMS Program, Continued

SHOW Command (continued)	The following table defines the five parameters:

Parameter	Definition
UNITNUM	TMSCP unit number.
FORCEUNIT	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. 1 — Uses the DSSI node ID. 0 — Uses the TMSCP unit number parameter value.
NODENAME	Node name for the TF86 subsystem.[1] Enter a 6-character name. (The factory setting is a unique string derived from the subsystem serial number.)
FORCENAME	1 — Uses a "canned" node name: TF86x, where x = A through H, depending on the DSSI node number value (0 through 7, respectively).[1] 0 — Uses the value set in NODENAME.
SYSTEMID	DSSI controller module's 48-bit (hex) system ID. It is recommended that you never change this value; it uniquely identifies your drive.

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

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.**

**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.

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:

If you. . .	Then the. . .
Did not SET a parameter	EXIT succeeds immediately.
SET parameters and forgot to execute WRITE	EXIT is ignored and you are advised: `Parameter modified but not written. Still exit? [Y/(N)]` If you answer YES, the system EXITS and returns to the DCL prompt. Your modifications are not saved. If you answer NO, the system returns to the PARAMS> prompt. To save your modifications, enter WRITE at the prompt, and then EXIT.
SET parameters and executed WRITE	System EXITS and returns to the DCL prompt.

Using the TF86 DIRECT and HISTRY Utilities

Starting DIRECT and HISTRY

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

```
/TASK=DIRECT
```

or

```
/TASK=HISTRY
```

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

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

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

Using DIRECT AND HISTRY 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
HISTRY V1.0  D
PARAMS V1.0  D
DRVEXR V1.0 SD
DRVTST V1.0 SD
LDRTST V1.0 SD
Completed
```

Using the TF86 DIRECT and HISTRY Utilities, Continued

About HISTRY

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

```
TF86
❶ DSSI:  TF86A5  /3 (DIPs)
Controller:
❷ S#: EN03000193
   HW: 000/PCB-rev:A000
   Bt: 120/42DA8D6A (23-JAN-1991 15:00:47)
❸ Cd: V004/8DC18611 (1-SEP-1992 3:47:36)
   EE: 086.016  TD: 002
Drive:
❹ 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 HISTRY:

❶ 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.

❷ The serial number for the controller board.

❸ The revision number of the controller software.

❹ 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.**

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.

Power Requirements

The TF86 subsystem has the following power requirements:

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

The TZ86 subsystem has the following power requirements:

- 12 V ±5% @ 1.2 A (1.5 A surge), 75 mV ripple peak-to-peak
- +5 V ±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.)

Tape Commands

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:

For this command. . .	See page. . .
ALLOCATE	B–3
INITIALIZE	B–3
MOUNT	B–4
BACKUP	B–5
COPY	B–6
DISMOUNT	B–6
DEALLOCATE	B–6

For More Information

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

For more information about VMS commands and command files, see the *VAX/VMS Guide to Using Command Procedures* (AA–H782B–TE), *VAX/VMS Command Language User's Guide* (AA–DO23C–TE), or the *VMS System Manager's Guide*.

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.

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 degredation.

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

If...	Then...
An entry does not exist,	You need to create an entry in the configuration file.
An entry already exists,	You do not need to change the configuration file.

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

SCSI Target ID	Bus 0	Bus 1
0	tz0	tz8

.

Table C–1   (Continued)   Determining the Tape Name

SCSI Target ID	Bus 0	Bus 1
1	tz1	tz9
2	tz2	tz10
3	tz3	tz11
4	tz4	tz12
5	tz5	tz13
6	tz6	tz14
7	tz7	tz15

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            (this creates a new kernel)
$ mv /vmunix /vmunix.old   (save the old kernel)
$ mv new_kernel_name /vmunix   (move the new kernel to the root directory)
$ /etc/shutdown -r now     (reboot the system)
```

Adding the TZ86 to your ULTRIX system, Continued

**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

C–6

Adding the TZ86 to your ULTRIX system, Continued

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

Getting Maximum Capacity and Performance, Continued

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.

Continued on next page

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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

For this command. . .	See page. . .
tar	C-11
dump	C-12
restore	C-13
dd	C-14
ltf	C-15
mt	C-16
cpio	C-17

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

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

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.

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

Table C–4   Common dump Options

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

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.

Using ULTRIX Tape Commands, Continued

Table C–5 lists the options you can use with the **restore** command.

Table C–5   Common restore Options

Option	Meaning
f	Tape device
r	Read everything from tape
i	Interactive
v	Verbose
x	Extract

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.

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

Table C–6   Common dd Options

Option	Meaning	Recommended Value
if	Input file	
of	Output file	
bs	Input and output block size (bytes)	32768
ibs	Input block size (bytes)	32768 for tape
obs	Output block size (bytes)	32768 for tape

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.

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

Table C–7   Common ltf Options

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

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

- Write a file to tape:

  ```
  $ ltf -cf /dev/rmt0h  filename  -B 16k
  ```

- Read a file from tape to your current directory:

  ```
  $ 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.

Table C–8   Common mt Options

Option	Meaning
eof	Write file mark(s)
bsf	Backward space file(s)
bsr	Backward space record(s)
fsf	Forward space file(s)
fsr	Forward space record(s)
offline	Unload the tape
rewind	Rewind to the beginning of medium
status	Obtain information from the drive

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.

Table C–9   Common cpio Options

Option	Meaning
c	Write or read header information in ASCII character form
d	Create directories as needed
i	Copy in
o	Copy out
t	Table of contents of tape
v	Verbose

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.

Service Plans, Continued

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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