

# **TZK10 Cartridge Tape Drive Owner's Guide**

**Order Number EK-TZK10-OG-002**

**First Edition, October 1990**  
**Second Edition, March 1991**

The information in this document is subject to change without notice and should not be construed as a commitment by Digital Equipment Corporation. Digital Equipment Corporation assumes no responsibility for any errors that may appear in this document.

The software described in this document is furnished under a license and may be used or copied only in accordance with the terms of such license.

No responsibility is assumed for the use or reliability of software on equipment that is not supplied by Digital Equipment Corporation or its affiliated companies.

Copyright © Digital Equipment Corporation 1990, 1991

All Rights Reserved.  
Printed in U.S.A.

The following are trademarks of Digital Equipment Corporation: DC6320, DC6525, DEC, DECdirect, DECservice, SERVICenter, TZK10, ULTRIX, VAX, VMS.

**digital™**

SCO is a trademark of Santa Cruz Operations, Incorporated.

UNIX is a registered trademark of UNIX System Laboratories, Inc.

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

This document was prepared and published by Educational Services Development and Publishing, Digital Equipment Corporation.

# Contents

---

## 1 Introduction

## 2 Operating Procedures

2.1	Controls and Indicators	2-1
2.1.1	LED	2-1
2.1.2	Eject Button	2-2
2.2	Tape Cartridge	2-2
2.3	Using the Tape Cartridge	2-4
2.3.1	Tape Cartridge Handling	2-4
2.3.2	Setting the Write-Protect Switch	2-5
2.3.3	Inserting the Tape Cartridge into the Drive	2-6
2.3.4	Removing the Tape Cartridge from the Drive	2-6
2.3.5	Retensioning	2-7
2.3.5.1	ULTRIX	2-7
2.3.5.2	VMS	2-7
2.3.5.3	SCO UNIX	2-8
2.4	SCSI ID Settings	2-8
2.4.1	Auto Density Select and Terminator Power	2-8

## 3 Operating Systems Support

3.1	TZK10 Operating Systems Support	3-1
3.1.1	VMS Support	3-1
3.1.2	Ultrix Support	3-1
3.1.3	512 Byte Blocks, 1 K Blocks, and Variable Records in 320/525 MByte Density	3-2
3.1.3.1	Effects on the ULTRIX Operating System	3-2
3.1.3.2	Effects on the SCO UNIX Operating System	3-2

3.1.4	Auto Density Select in the Read Case .....	3-3
3.1.4.1	Effects on the ULTRIX and SCO UNIX Operating Systems .....	3-3
3.1.5	Auto Density Select in the Write Case .....	3-3
3.1.5.1	Effects on the ULTRIX Operating System .....	3-3
3.1.5.2	Effects on the SCO UNIX and MS-DOS Operating Systems .....	3-4
3.1.5.3	Effects on the VMS Operating System .....	3-4

## **4 Preventive Maintenance and Problem Resolution**

4.1	Cleaning the Heads .....	4-1
4.2	System-Based Diagnostics .....	4-1
4.3	Tape Drive and Media Errors .....	4-2
4.4	Repair Services .....	4-2
4.4.1	On-Site Service .....	4-2
4.4.2	Basic Service .....	4-2
4.4.3	DECservice .....	4-3
4.4.4	Carry-In Service .....	4-3
4.4.5	Per Call Service .....	4-3

## **A Related Supplies**

## **B TZK10 Cartridge Tape Drive Specifications**

## **Index**

## **Figures**

2-1	TZK10 Tape Drive (Front View) .....	2-1
2-2	The Quarter-Inch Tape Cartridge .....	2-3
2-3	Setting the Write-Protect Switch .....	2-5
2-4	Inserting the Tape Cartridge .....	2-6
2-5	Layout of the Jumper/Strap Connector .....	2-10

**Tables**

2-1	LED Summary .....	2-2
2-2	Cartridge Compatibility .....	2-4
2-3	TZK10 SCSI ID Jumper Settings .....	2-9
A-1	Ordering cartridges .....	A-1
B-1	TZK10 Cartridge Tape Drive Specifications .....	B-1



# 1

## Introduction

---

The TZK10 cartridge tape drive is a half-height, 5-¼ inch, Quarter-Inch Cartridge (QIC) streaming tape drive for use with low end, desktop, and Digital Equipment workstation systems. The TZK10 tape drive provides archival storage/retrieval, and data collection activities. The TZK10 tape drive has small computer system interface (SCSI) ability.

The TZK10 tape drive consists of one main component: the tape drive. The controller logic is located within the TZK10 tape drive itself.





# 2

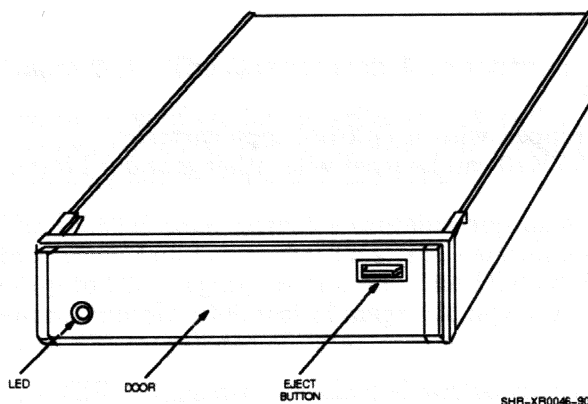
## Operating Procedures

---

This chapter provides operating instructions for the TZK10 cartridge tape drive.

### 2.1 Controls and Indicators

The TZK10 cartridge tape drive, Figure 2-1, has one dual color (green and amber) LED, and an eject button.



**Figure 2-1 TZK10 Tape Drive (Front View)**

#### 2.1.1 LED

Table 2-1 summarizes possible conditions of the LED.

**Table 2-1 LED Summary**

<b>LED</b>	<b>Condition</b>
Off	Tape is not present or tape is present but has been unloaded via software.
Solid Green <sup>1</sup>	Tape is loaded.
Blinking Green	Tape is in motion.
Solid Amber <sup>2</sup>	Fault.

<sup>1</sup>Cartridge is auto-loaded upon insertion.

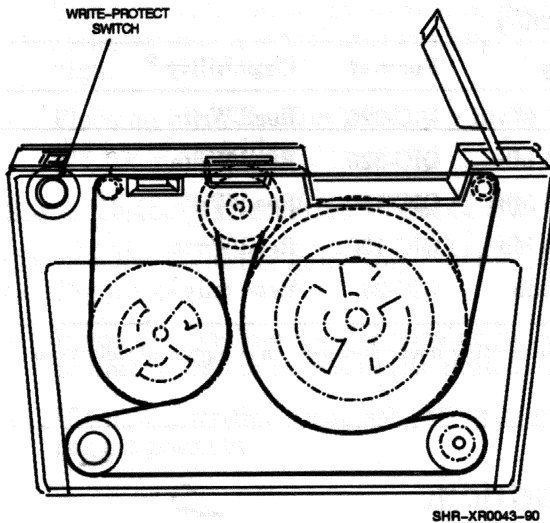
<sup>2</sup> See Section 4.3.

### **2.1.2 Eject Button**

The eject button unlocks the door and partially ejects the tape cartridge from the drive.

## **2.2 Tape Cartridge**

The TZK10 tape drive is shipped with a DC6320 tape cartridge (Figure 2-2), however, the TZK10 can be used with other standard format cartridges. See Table 2-2.



**Figure 2-2 The Quarter-Inch Tape Cartridge**

The tape cartridge has a write-protect switch to prevent accidental overwrite of data. When the switch is rotated to **SAFE**, (Figure 2-3), data may not be written to the tape.

The DC6320 tape cartridge contains approximately 620 feet of magnetic tape wound on two reels. This tape cartridge has a formatted capacity of up to 320 megabytes of data. The DC6525 tape cartridge contains approximately 1000 feet of magnetic tape and has a formatted capacity of up to 525 megabytes of data.

The TZK10 tape drive reads and writes according to the following table, however the density selection and ability to write lower densities on higher density tape is operating system dependent (see Chapter 3).

**Table 2-2 Cartridge Compatibility**

<b>Cartridge</b>	<b>Capacity <sup>1</sup></b>	<b>Format</b>	<b>Capability <sup>2</sup></b>
DC6525	up to 525 Mb	QIC-320	Read/Write
DC6320	up to 320 Mb	QIC-320	Read/Write
DC6150/DC600XTD	up to 150 Mb	QIC-150	Read/Write
DC6150/DC600XTD	up to 120 Mb	QIC-120	Read/Write
DC600A	up to 60 Mb	QIC-24	Read only

<sup>1</sup>See Section 3.1.5 for information about writing lower densities on a higher density tape.

<sup>2</sup>Operating system dependent

## 2.3 Using the Tape Cartridge

This section explains how to insert a tape cartridge into, and remove a tape cartridge from, the TZK10 drive and how to write protect a tape. This section also explains proper tape cartridge handling.

### 2.3.1 Tape Cartridge Handling

To avoid damage to your tape cartridge, and to ensure continued tape drive reliability:

- Do not drop or bang cartridge.
- Keep cartridge out of direct sunlight, away from heaters and other sources of heat.
- Store cartridge where the temperature is between 10 and 40°C (50 to 104°F).
- If cartridge has been exposed to extremes of heat or cold, allow it stabilize at room temperature for the same amount of time it was exposed—up to 24 hours.
- Avoid placing cartridge near sources of electromagnetic interference, such as terminals, motors, and video or X-ray equipment. Any tape exposed to a magnetic field can lose information.
- Store cartridge in a dust-free environment where the relative humidity is between 20 to 80 percent.

- Store cartridge in its protective container, on edge or stacked. However, when stacking cartridges, do not stack more than five high.
- Place an identification label only in the space provided for the label on the top of cartridge.

### 2.3.2 Setting the Write-Protect Switch

Observe the following guidelines when setting the write-protect switch. See Figure 2-3.

- If you are reading data or copying data from a tape, set the write-protect switch to **SAFE** (write protected).
- If you are writing data, set the write-protect switch to the write-permit position.



Write-Permit Position



Write-Protect Position

SHR-XR0044-90

Figure 2-3 Setting the Write-Protect Switch

### 2.3.3 Inserting the Tape Cartridge into the Drive

Open the drive door by pressing the eject button. Insert the tape cartridge into the drive with the cartridge's write-protect switch in the upper right corner (see Figure 2-4.) Slide the cartridge straight into the cartridge area until you feel resistance. Then, close the cartridge door.

When the tape is properly inserted, the LED will be solid green and you can issue host operating system commands.

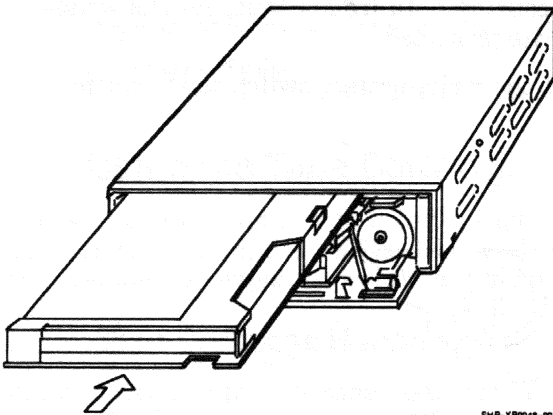


Figure 2-4 Inserting the Tape Cartridge

### 2.3.4 Removing the Tape Cartridge from the Drive

After the tape is dismantled via software, the LED changes from blinking green to either solid green or off, and you can remove the tape from the drive.

Press the eject button. The door will open and the cartridge will eject part way. Pull down on the cartridge door, grasp the cartridge and slide it out of the drive.

## 2.3.5 Retensioning

For satisfactory performance we recommend that the cartridge be retensioned (running the tape one complete end-to-end pass) in any of the following cases:

1. Each time it is inserted in the drive.
2. After prolonged operation over a limited area.
3. After exposure to a temperature change greater than 30°F (16°C).
4. After one hour of start-stop or shuffle operation.

The retension function is supported for the TZK10 tape only. The retension command may be different for other operating systems or tape utilities. Please refer to the appropriate system documentation.

### 2.3.5.1 ULTRIX

Retension the tape by performing the following ULTRIX command:

```
mt -f /dev/rmt $n$ h ret
```

where  $n$  equals the drive unit number.

### 2.3.5.2 VMS

Retension the tape by performing the following VMS commands:

1. Mount the drive /FOREIGN
2. Issue one of the following commands:
  - SET MAGTAPE/REWIND/RETENSION  
Rewinds tape to BOT after a retension is performed.
  - SET MAGTAPE/UNLOAD/RETENSION  
The tape will be left "unloaded", not dismounted.
3. Example:

```
$ MOUNT/FOREIGN MKA500
```

```
$ SET MAGTAPE/REWIND/RETENSION MKA500
```

### 2.3.5.3 SCO UNIX

Retention the tape by performing the following SCO UNIX command:

```
TAPE RETEN
```

## 2.4 SCSI ID Settings

This section shows how each Small Computer Systems Interface (SCSI) device's ID is determined and set. TZK10 tape drives are preset to the appropriate SCSI ID for the system during manufacturing and, in most cases, the SCSI ID should not need to be changed. The only time these SCSI IDs may have to be changed is when a TZK10 tape drive is installed as an add-on to a system.

### NOTE

**You cannot have two or more SCSI devices with the same SCSI ID. Each SCSI device must have its own SCSI ID.**

The SCSI ID is set or changed by adding jumpers to, or removing jumpers from, a connector at the rear of the tape drive. This connector is illustrated in Figure 2-5.

Table 2-3 lists the jumper settings necessary to configure the TZK10 tape drive for a particular SCSI ID.

### 2.4.1 Auto Density Select and Terminator Power

Auto density select and terminator power are set or changed by adding jumpers to, or removing jumpers from, a connector at the rear of the tape drive. This connector is illustrated in Figure 2-5.

The disable auto density select (DADS) and terminator power (TERMPWR) jumpers are set to the appropriate system configuration during manufacturing.

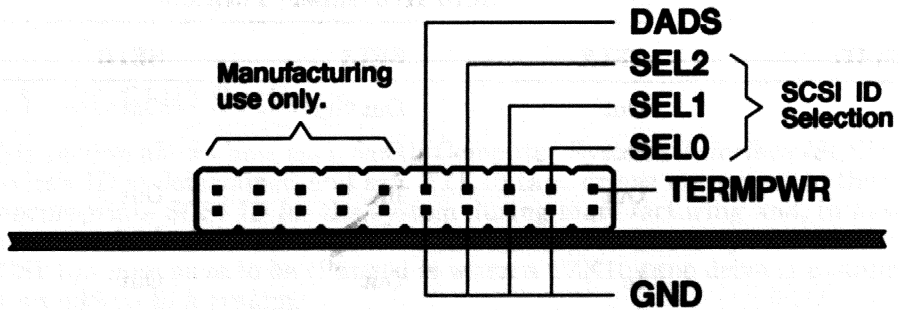


**Table 2-3 TZK10 SCSI ID Jumper Settings**

SCSI ID	SCSI ID Jumper† Positions		
	SEL2	SEL1	SEL0
0	Out	Out	Out
1	Out	Out	In
2	Out	In	Out
3	Out	In	In
4	In	Out	Out
5§	In	Out	In
6	In	In	Out
7	In	In	In

§Default ID for the TZK10 tape drive in most Digital systems.

†Jumper Part Number - 12-14314-00



**DADS (Disable Auto Density) - When jumper is installed, automatic density selection is disabled.**

**TERMPWR (Terminator Power) - When jumper is installed, power for the terminator is provided by drive.**

SHR-XR0107-90

**Figure 2-5 Layout of the Jumper/Strap Connector**

# 3

## Operating Systems Support

---

### 3.1 TZK10 Operating Systems Support

The material in this chapter is for your reference. Because operating system commands are a complex tool, this chapter is not intended to teach you all the details involved in using such commands.

The TZK10 cartridge tape drive reads and writes tapes in many different densities and formats that are specified by the International Quarter Inch (QIC) Cartridge Standards Committee. The drive also supports an auto density selection feature that is used differently by different operating systems. This chapter describes the way different operating systems use the following features:

- The 512 byte block size vs. 1K blocks in 320MB/525MB density.
- Auto density selection in the read case.
- Auto density selection in the write case.

#### 3.1.1 VMS Support

The TZK10 cartridge tape drive is supported by VMS version 5.4-2 or higher.

#### 3.1.2 Ultrix Support

The TZK10 cartridge tape drive is supported by Ultrix version 4.1 or higher.

### 3.1.3 512 Byte Blocks, 1 K Blocks, and Variable Records in 320/525 MByte Density

The QIC standards specify three formats for the 320/525 MB density. In all three cases the on-tape data format is 1K fixed blocks.

#### **512 byte fixed block**

The 512 byte fixed block format takes two 512 byte user data blocks and writes one 1K block on tape. This format has the advantage that all other density QIC tapes are written in 512 byte blocks. Replacing older QIC tape drives with new density drives takes little or no operating system changes.

#### **1K fixed block**

This format is the native format for this density. User data is written directly as 1K data blocks.

#### **Variable record tapes**

This format takes user data and creates one or more fixed length blocks. The byte count is recorded in the first block and the last block is zero filled. In this way, the drive appears to read and write variable length records.

The following sections discuss the effects that the three formats have on the ULTRIX and SCO UNIX operating systems.

#### **3.1.3.1 Effects on the ULTRIX Operating System**

The ULTRIX operating system will operate the TZK10 tape drive in fixed block 512 byte mode. This mode allows for data interchange with the largest number of other UNIX systems.

ULTRIX/UWS Version 4.1 was shipped with the block size set to 1K data blocks. Instructions explaining how to change the block size to 512 bytes were shipped with the TZK10 tape drive. These instructions also explain how to return to reading and writing 1K records if the user so desires. The block size will not affect capacity or performance of the tape drive.

#### **3.1.3.2 Effects on the SCO UNIX Operating System**

Systems running SCO UNIX only support 512 byte fixed block. In this mode of operation data can be interchanged with Ultrix systems and most other UNIX and MS-DOS systems.

### 3.1.3.2.1 VMS

VMS systems will only support the drive in high density ( 320/525 MB ) variable block mode. This mode allows the drive to be used like any other VMS tape drive.

## 3.1.4 Auto Density Select in the Read Case

The TZK10 tape drive performs automatic density selection when the tape drive is positioned at Beginning of Tape (BOT) and receives a read command. Because there are two formats of fixed block operations, the drive can be set up in the factory to default to either format. The TZK10 is set to 512 byte block format.

The following sections discuss the effects that auto density select in the read case has on the ULTRIX and SCO UNIX operating systems.

### 3.1.4.1 Effects on the ULTRIX and SCO UNIX Operating Systems

In fixed block mode operation, auto density select in the read case allows the user to select any tape density and the drive will still read the data. Note that if the data is written in variable block mode or 1K fixed block mode, the data is not readable.

## 3.1.5 Auto Density Select in the Write Case

This feature allows the TZK10 tape drive to select the density the tape is written. When this feature is enabled the TZK10 writes the tape in the highest density supported by the current cartridge. When the feature is disabled the host system sets the density. If the user selects a density higher than supported by the media an error is returned.

This feature is controlled by a jumper on the back of the drive. When the Disable Auto Density Select (DADS) jumper is inserted, the feature is disabled.

### 3.1.5.1 Effects on the ULTRIX Operating System

For ULTRIX operating systems, auto density select is disabled when writing to the TZK10. The ULTRIX operating system provides the following four pairs of devices to select the density, allowing the user to write lower densities on high density tapes for interchange:

- rmt0h/nrmt0h - High density (320/525 MByte)
- rmt0m/nrmt0m - Medium density (150 MByte)
- rmt0l/nrmt0l - Low density (120 MByte)
- rmt0a/nrmt0a - alternate density (QIC-24), read only

**3.1.5.2 Effects on the SCO UNIX and MS-DOS Operating Systems**

In the SCO UNIX and MS-DOS operating systems, there is no user control of density select. The tape drive always determines the correct density.

**3.1.5.3 Effects on the VMS Operating System**

VMS supports only high density (320MB/525MB) variable block mode.

# 4

## Preventive Maintenance and Problem Resolution

---

This chapter describes preventive maintenance and problem solving for the TZK10 cartridge tape drive. Preventive maintenance involves periodic head cleaning. Problem solving is described in Section 4.3.

Digital Equipment Corporation strongly recommends that you follow the instructions for handling cartridge tapes, retensioning the cartridge tapes, and cleaning the heads of the drive.

### 4.1 Cleaning the Heads

The heads are the components in a drive that physically read and write data to and from the media (in this case, a cartridge tape).

Recommended equipment for head cleaning is **Digital Cleaning Cartridge, part number TZK1X-HA**. Refer to the tape head cleaning instructions included with the cleaning cartridge.

The cleaning interval depends on three main factors:

1. How often the drive is used
2. The quality of the tape
3. The quality of the environment

However, the following can be used as a recommended guideline: Clean the head after every 8 hours of use.

### 4.2 System-Based Diagnostics

Your system has system-based diagnostics that can be used to test the TZK10 tape drive.

System-based diagnostics are usually referred to in your system owner's manual as *console-based diagnostics*, *self-tests*, or *system exercisers*. Refer to your system documentation for information about these diagnostics.

Prior to calling Customer Services, you can execute system diagnostics to test the TZK10 drive. Always try cleaning the head and using a different cartridge before calling Customer Services.

**NOTE**

**Some system-based diagnostics are subject to software licensing. Consult your Digital Equipment Corporation sales representative.**

### **4.3 Tape Drive and Media Errors**

If a drive error occurs during an operation, you may be able to clear the fault, rewind, unload, and remove the tape cartridge.

If the amber LED goes out when you remove the cartridge, the error is likely media related or due to a dirty head. Clean the head and try another cartridge.

If the amber LED stays on when you remove the cartridge, call your authorized Digital Equipment Corporation Customer Services representative.

### **4.4 Repair Services**

Digital Equipment Customer Services offer a range of flexible service plans.

#### **4.4.1 On-Site Service**

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

#### **4.4.2 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 days, and to Saturdays, Sundays, and holidays. Under the basic service plan, all parts, materials, and labor are covered in full.



### **4.4.3 DECservice**

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

### **4.4.4 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. Contact your local Digital Equipment Customer Services office to see if this service is available for your unit. Digital SERVICenters are open during normal business hours, Monday through Friday.

### **4.4.5 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 Equipment Customer Services.



# A

## Related Supplies

---

To order additional blank cartridges and head cleaning cartridges, contact either your Digital Equipment sales representative or DECdirect™. Refer to the following part numbers.

**Table A-1 Ordering cartridges**

---

<b>Part No.</b>	<b>Cartridge</b>
TZK1X-CB	Five blank 320 megabyte data cartridges
TZK1X-CD	Five blank 525 megabyte date cartridges
TZK1X-HA	One head cleaning cartridge

---



# B

## TZK10 Cartridge Tape Drive Specifications

The following table describes the TZK10 cartridge tape drive specifications.

**Table B-1 TZK10 Cartridge Tape Drive Specifications**

Mode of operation:	Streaming
Drive interface:	SCSI-2
Dimensions:	44 mm (1.732 in)H x 146.05 mm (5.75 in)W x 208.28 mm (8.20 in)D
Weight (without cartridge):	1.1 kg (2.4 lbs)
Media:	DC6320/DC6525 or Digital approved equivalent see Table 2-2
Track width, write:	0.1778 mm +0.0000/-0.0127 mm (0.0070" +).0000"/-0.0005"
Track width, read:	0.1270 mm +0.0127/-0.0000 mm (0.0050" +).0005"/-0.0000"
Data density:	16,000 (bpi)
Number of tracks:	26
Transfer rate:	200 Kbytes/s at average streaming mode 1.5 Mbytes/s at SCSI (maximum)
Tape speed:	3.05 cm/s (120 ips)
Track format:	Multiple track serpentine recording
Cartridge capacity:	320 Mbytes, formatted (approx.) - DC6320

B-2 TZK10 Cartridge Tape Drive Specifications

**Table B-1 (Cont.) TZK10 Cartridge Tape Drive Specifications**

---

	525 Mbytes, formatted (approx.) - DC6525
Power requirements:	+12 V $\pm$ 5% @ 1.0 A (2.0 A surge), 150 mV ripple peak-to-peak  +5 V $\pm$ 5% @ 1.2 A (1.8 A surge), 150 mV ripple peak-to-peak
Power consumption	
Nominal:	20 W
Peak:	33 W
Environmental	
Operating temperature:	5°C (50°F) to 40°C (104°F)
Non-operating temperature:	-30°C (-22°F) to +60°C (151°F)
Operating humidity:	20% to 80% RH maximum
Non-operating humidity:	10% to 90% RH maximum
Operating altitude:	2.4 km (13,000 ft)
Non-operating altitude:	4.9 km (40,000 ft)

---

# Index

---

## A

- Auto density
  - selection, 3-1
- Auto density select
  - DADS jumper, 3-3
  - read, 3-3
  - write, 3-3

## C

- Cleaning the heads
  - cleaning cartridge, 4-1
  - frequency, 4-1
- Controls and indicators, 2-1
  - eject button, 2-2
  - LED, 2-1

## D

- Digital Equipment Repair Services,  
4-2

## E

- Eject button, 2-2
- Errors
  - drive, 4-2
  - media, 4-2

## H

- Heads
  - cleaning, 4-1
  - cleaning cartridge, 4-1

## L

- LED summary, 2-1

## O

- Operating systems
  - MS-DOS, 3-4
  - SCO UNIX, 3-2, 3-4
  - ULTRIX, 3-2, 3-3
  - VMS, 3-3, 3-4
- Ordering cartridges, A-1

## R

- Retensioning
  - SCO UNIX command, 2-8
  - ULTRIX command, 2-7
  - VMS command, 2-7

## S

- SCSI ID
  - default, 2-8
  - jumpers, 2-8
  - setting, 2-8
  - settings, 2-8

## 2 Index

### SCSI ID (Cont.)

table, 2-8

TZK10 default, 2-8

Specifications, B-1

## T

### Tape cartridge

capacity, 2-3

density selection, 2-3

description, 2-2

handling, 2-4

insertion, 2-6

removal, 2-6

retensioning, 2-7

use, 2-6

Tape cartridges

ordering, A-1

Tape density

formats, 3-1, 3-2

## W

### Write-protect

setting, 2-5

switch, 2-5

use, 2-5