hp StorageWorks SDLT Tape Drives

This guide is to be used as step-by-step instructions for installation and as a reference for operation, troubleshooting, and future upgrades.

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i n v e n t

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■ Install the operating system device drivers

■ Operate the SDLT drive

■ Troubleshoot the SDLT drive

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Conventions

Conventions consist of the following:

- Document Conventions
- Text Symbols
- Equipment Symbols

Document Conventions

The document conventions included in Table 1 apply in most cases.

Table 1: Document Conventions

Element	Convention
Cross-reference links	Figure 1
Key and field names, menu items, buttons, and dialog box titles	**Bold**
File names, application names, and text emphasis	Italics
User input, command and directory names, and system responses (output and messages)	Monospace font COMMAND NAMES are uppercase monospace font unless they are case sensitive
Variables	*\<monospace, italic font\>*
Website addresses	Underlined sans serif font text: http://www.hp.com

Text Symbols

The following symbols may be found in the text of this guide. They have the following meanings.

WARNING: Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or loss of life.

Caution: Text set off in this manner indicates that failure to follow directions could result in damage to equipment or data.

Note: Text set off in this manner presents commentary, sidelights, or interesting points of information.

Equipment Symbols

The following equipment symbols may be found on hardware for which this guide pertains. They have the following meanings.

Any enclosed surface or area of the equipment marked with these symbols indicates the presence of electrical shock hazards. Enclosed area contains no operator serviceable parts.

WARNING: To reduce the risk of injury from electrical shock hazards, do not open this enclosure.

Any RJ-45 receptacle marked with these symbols indicates a network interface connection.

WARNING: To reduce the risk of electrical shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.

Any surface or area of the equipment marked with these symbols indicates the presence of a hot surface or hot component. Contact with this surface could result in injury.

WARNING: To reduce the risk of injury from a hot component, allow the surface to cool before touching.

Power supplies or systems marked with these symbols indicate the presence of multiple sources of power.

WARNING: To reduce the risk of injury from electrical shock, remove all power cords to completely disconnect power from the power supplies and systems.

Any product or assembly marked with these symbols indicates that the component exceeds the recommended weight for one individual to handle safely.

WARNING: To reduce the risk of personal injury or damage to the equipment, observe local occupational health and safety requirements and guidelines for manually handling material.

Rack Stability

Rack stability protects personal and equipment.

⚠️ **WARNING:** To reduce the risk of personal injury or damage to the equipment, be sure that:
- The leveling jacks are extended to the floor.
- The full weight of the rack rests on the leveling jacks.
- In single rack installations, the stabilizing feet are attached to the rack.
- In multiple rack installations, the racks are coupled.
- Only one rack component is extended at any time. A rack may become unstable if more than one rack component is extended for any reason.

Getting Help

If you still have a question after reading this guide, contact an HP authorized service provider or access our website: http://www.hp.com.

HP Technical Support

In North America, call technical support at 1-800-652-6672, available 24 hours a day, 7 days a week.

Note: For continuous quality improvement, calls may be recorded or monitored.

Outside North America, call technical support at the nearest location. Telephone numbers for worldwide technical support are listed on the HP website under support: http://www.hp.com/country/us/eng/support.html.

Be sure to have the following information available before calling:

- Technical support registration number (if applicable)
- Product serial numbers
- Product model names and numbers
- Applicable error messages
- Operating system type and revision level
- Detailed, specific questions

HP Storage Website

The HP website has the latest information on this product, as well as the latest drivers. Access storage at: http://www.hp.com/country/us/eng/prodserv/storage.html. From this website, select the appropriate product or solution.

HP Authorized Reseller

For the name of your nearest HP authorized reseller:

■ In the United States, call 1-800-345-1518

■ In Canada, call 1-800-263-5868

■ Elsewhere, see the HP website for locations and telephone numbers: http://www.hp.com.

Introduction

1

This chapter covers the following topics:

- Overview
- HP Native Driver CD
- System requirements
- Data compression

Overview

The HP StorageWorks SDLT tape drive is a high-capacity, high-performance streaming tape drive designed for use with HP ProLiant servers, HP AlphaServers, and OpenSAN^{TM} storage systems. The tape drive uses Laser Guided Magnetic Recording (LGMR) technology to maximize the amount of data that can be stored on a tape.

The SDLT uses a clustered magnetic-resistive (MR) head technology to improve data density, uses Partial Response Maximum Likelihood (PRML) technology to provide increased performance, and has a robust tape buckling system for reliability.
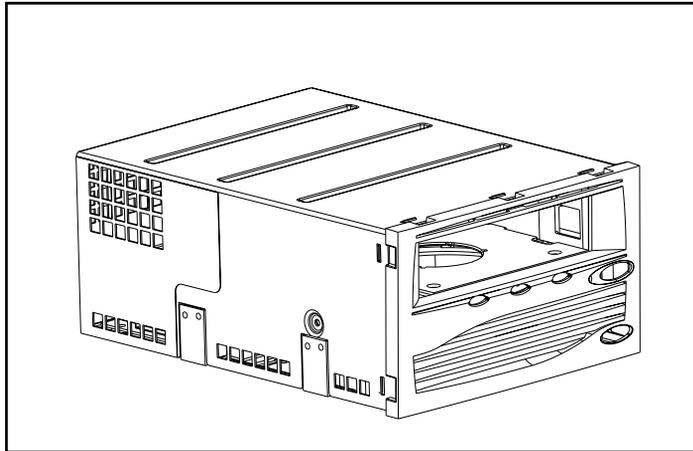
Figure 1: HP SDLT drive

HP StorageWorks Native Driver CD

The HP StorageWorks Native Driver CD, included in the SDLT drive kit, contains the latest drivers for HP tape drives.

System Requirements

See Table 2 for the recommended controller interfaces that can be used with the SDLT drive. Install and configure the controller before beginning the drive installation, using the documentation included with the controller.

Table 2 shows the categories of controllers that support the SDLT drive and which ones are recommended.

Table 2: Supported Controllers

Controller Categories	Recommended
Fast SCSI-2 (Narrow)	No
Fast SCSI-2 (Wide)	No
Wide-Ultra SCSI	Yes
Ultra-2 SCSI	Yes
Ultra-3 SCSI	Yes
Note: Equipping the server with at least a Wide-Ultra SCSI Controller is recommended.	

For a list of specific controllers and adapters that support the SDLT drive refer to: http://www.hp.com/country/us/eng/prodserv/storage.html

Data Compression

The SDLT drive reads and writes both uncompressed (native) and compressed data.

■ The SDLT 220 drive features a native formatted capacity of 110 GB and a sustained native data transfer rate of 11 MB/s.

■ The SDLT 320 drive features a native formatted capacity of 160 GB and a sustained native transfer rate of 16 MB/s.

When operating in compressed mode, data capacity is affected by how much the data can be compressed. Most data can be compressed at an approximate 2:1 ratio. This would provide the SDLT 220 drive with a compressed capacity of 220 GB and a compressed data transfer rate of 22 MB/s. The SDLT 320 has a compressed capacity of 320 GB and a compressed data transfer rate of 32 MB/s.

The SDLT drive ships from the factory with data compression enabled for writing. In this mode, data is always compressed when writing to the tape, but the drive is capable of reading both compressed and native tapes. For the drive to write native data, the data compression setting must be changed through the software. To change the setting, consult the backup application software documentation for the data compression enabling and disabling procedure.

Note: Capacity may vary based upon actual stored data. Data transfer rates can vary depending on actual data, media condition, and system and controller capabilities.

Operating System Device Drivers

2

The following operating systems support the HP SDLT drive:

- Microsoft Windows NT
- Microsoft Windows 2000
- Novell NetWare
- HP Tru64UNIX
- OpenVMS
- Red Hat Linux
- SuSe Linux
- Caldera UnixWare
- Caldera Open UNIX
- Caldera OpenServer
- Caldera Open Linux

For an updated list of supported operating systems, refer to:
www.compaq.com/support/files.

Click on Tape Storage under the heading Storage.

Device Drivers

Device drivers for Intel-based systems are located on the HP StorageWorks Native Driver CD.

Installing Drivers on Windows NT 4.0

These instructions apply to the Windows NT Backup Utility and other applications that don't provide their own drivers.

Note: Before starting the driver installation, verify that your tape drive is properly connected. Windows NT 4.0 only allows you to install tape device drivers sequentially. If you have other tape devices installed without drivers, install those drivers before attempting the following procedure, or click Cancel to bypass each tape device.

---

1. Click the Start button and then select Settings > Control Panel to open the Windows Control Panel.
2. Double-click the Tape Devices icon.
3. The Tape Devices dialog box is displayed and indicates that the driver for the new tape drive is not loaded. If the system does not automatically scan for new devices, select Detect. This scanning process creates a list of device drivers available for installation.
4. In the Install Driver dialog box, click Have Disk. The Install From Disk dialog box is displayed.
5. In the Copy manufacturer's files from field, type the driver path as shown below, and then select OK. Substitute the correct drive letter for your CD ROM drive.

   For Intel systems:

   E:drivers\StandAloneTapeDrive\nt4\I386\\dlt\dlt+sdlt

6. In the Install Driver dialog box, select the appropriate driver for your tape drive and click OK.
7. In the New SCSI Tape Device Found dialog box, click OK.
8. In the Tape Devices dialog box, click OK. This step completes the driver installation. Remove the CD and restart your system.

Installing Drivers on Windows 2000

These instructions apply to the Windows Backup Utility.

1. Right-click the My Computer icon and select Manage.

2. Select Device Manager on the left panel to display all the devices on the right panel on the Computer Management console. Make all subsequent selections from the devices shown in the right panel.

3. If the SDLT tape drive has not yet been installed, connect the device and select Scan for hardware changes to detect the device. At first, the device might be displayed in the "other device" category under the ? icon. After the correct driver is installed the device will be correctly displayed in the tape drives category.

To install the SDLT tape driver, select the tape drive under device manager and do the following:

1. Right click the drive and select Properties.

2. Select the Driver tab.

3. Click Update Driver to launch the Update Device Driver Wizard.

4. When prompted, select the option to display a list of known drivers.

5. Click Have Disk and select the CD ROM drive.

6. Navigate to the *Drivers \\StandAloneTapeDrives\\W2000\\dlt\\dlt+sdlt* directory.

7. Select the *.inf* file and click OK.

8. The wizard displays a list of the drives available in this directory.

9. Select the item that describes your drive and then click OK to install the driver.

Novell NetWare

The tape device driver is located with the operating system. Refer to the backup application installation guide for more information regarding additional software that might be needed.

Table 3 provides a list of supported controllers and where to get information about the software driver:

Table 3: Novell NetWare

Controller	Software Driver Information
Wide-Ultra SCSI Ultra-2 SCSI	Run the Readme.com file on any of the Novell Software Support Diskettes (NSSD) for driver installation instructions.

Be sure to load the appropriate drivers in accordance with the controller being used. There are additional driver considerations if you want to use applications requiring the Advanced SCSI Programming Interface (ASPI) support. For more information, see the "ASPI Support" section.

ASPI Support

The *Readme.com* file on the Novell Software Support Diskette (NSSD) outlines the specific drivers you need to support ASPI tape backup applications.

If you are using a tape backup application that uses ASPI, such as ARCserve provided by Computer Associates or Veritas BackupExec, refer to the information provided with the application NLM to determine whether it uses ASPI.

The ASPI drivers, *Cpqsaspi.nlm* Device Driver Functional Specification (DDFS) and *Nwaspi.nlm* NetWare Peripheral Architecture (NWPA), provide ASPI support for the SCSI architecture for applications that require this interface.

> **Note:** Some ISPs such as Veritas use their own ASPI drivers. Please read the ISV documentation before loading nwaspi.

All required drivers for ASPI tape support are provided on the NSSD. The NSSD ships with each server or can be downloaded from the HP website at: www.compaq.com/support/files.

Click on Tape Storage under the heading Storage. The *Scsi.rdm* file on the NSSD gives complete instructions on how to load these drivers and troubleshoot any problems.

HP Tru64 UNIX

The HP Tru64 UNIX operating system uses Dynamic Device Recognition (DDR) which allows the operating system to recognize the SDLT drive.

If the Tru64 UNIX system does not have a DDR entry to identify the SDLT drive, the system defaults to a generic SCSI device and to the default settings of the tape drive.

DDR Recognition

Note: Starting with UNIX 5.1, the syntax for tape related commands changed. The examples included below show the new syntax.

The SDLT drive provides compression so that the storage capability for tapes can be effectively doubled when the tape drive has been instructed to turn on compression. This is known as hardware compression. Hardware compression is controlled by the drive firmware and should be used instead of the software compression that is sometimes provided by software products. Check the software application manual to understand the interaction of the application with regard to hardware compression. The drive is instructed by the user to turn on hardware compression through use of switches in utilities such as tar. (Additional information is available online. See the man pages for tz, file, tar, dump and cpio. Additionally the man page for ddr.dbase can be useful. It is the derivation for the integers associated with compression below).

Turning Compression On

The following sections give 2 examples of turning on compression using the tar command.

Example 1

An example to turn on compression using a tar command is:

```
$tar cvf /dev/tape/tape5_d? filename.txt
```

Where:

- ■ tape5 = the tape device as known by the system (shown in the file command, in this case, tape unit 5).
- ■ ? = 0, 2, 4 or 6 will turn hardware compression off (see the SDLT drive description in the ddr.dbase file online).
- ■ ? = 1, 3, 5 or 7 will turn hardware compression on.

Example 2

Another example to turn on compression using a tar command is:

```
$tar cvf /dev/tape/tape5c filename.txt
```

Where:

- ■ tape5 = the tape device as known by the system (shown in the file command, in this case, tape unit 5).
- ■ c = compression on.

Turning Compression Off

The following command turns hardware compression off:

```
$tar cvf /dev/tape/tape5 filename.txt
```

For the latest UNIX patches refer to: www.support.compaq.com/patches/

Open VMS

The OpenVMS operating system uses native SCSI recognition for locally attached SCSI drives, which allows the operating system to recognize the SDLT drive. Recognition of the SDLT drive allows non-default settings, such as the density setting, to be used.

SCSI recognition for the SDLT drive is not supported for SCSI drives on any client node in an OpenVMS cluster that is running version 7.2-1 or earlier. If the SDLT drive is served to such a client that client system defaults to a generic SCSI device and the default settings are used.

The SDLT drive provides compression (called compaction in OpenVMS terminology) so that the storage capability for tapes can be effectively doubled when the SDLT drive has been instructed to turn on compaction. This is known as hardware compaction and should be used instead of the software compaction that is sometimes provided by software products. The SDLT drive is instructed by the user to turn on hardware compaction through use of the OpenVMS INITIALIZE and MOUNT commands. (See these two commands using Open VMS help from the $ prompt).

The format for the INITIALIZE command is:

```
INITIALIZE
    /MEDIA_FORMAT
    /MEDIA_FORMAT=[NO]COMPACTION
```

The INITIALIZE command controls whether data records are automatically compacted and blocked together on any device that supports data compaction. Data compaction and record blocking increase the amount of data that can be stored on a single tape cartridge.

Note: Once data compaction or non-compaction has been selected for a given cartridge, that same status applies to the entire cartridge.

The format for the MOUNT command is:

```
MOUNT
    /MEDIA_FORMAT
    COMPACTION
```

Example 1

```
$ MOUNT/FOREIGN/MEDIA_FORMAT=COMPACTION MKA400: BOOKS
```

This command performs a foreign mount of a tape with data compaction and record blocking enabled and assigns the logical name BOOKS to the tape.

Example 2

```
$ INIT/MEDIA_FORMAT=NOCOMPACTION MKA400: BOOKS
$ MOUNT/MEDIA_FORMAT=COMPACTION MKA400: BOOKS
```

This MOUNT command attempts a Files-11 mount of a tape labeled BOOKS with data compaction and record blocking enabled. Because the tape was initialized with compaction disabled, the MOUNT qualifier /MEDIA_FORMAT=COMPACTION has no effect.

Red Hat Linux

Red Hat Linux provides native drive recognition. Drive files are located in the /dev directory. Supplemental drivers are not required. The operating system defaults to a generic SCSI device and to the default settings of the tape drive.

Table 4: Typical Native OS Commands

Task	Command
Tar Write	`tar cvf /dev/st0 ./largefile`
Tar Read	`tar xvf /dev/st0`
DD Write	`dd if=./largefile of=//dev/st0 bs=51`
DD Read	`dd if=//dev/st0 of=./largefile bs=512`

SuSe Linux

SuSe Linux provides native drive recognition. Drive files are located in the /dev directory. Supplemental drivers are not required. The operating system defaults to a generic SCSI device and to the default settings of the tape drive.

Table 5: Typical Native OS Commands

Task	Command
Tar Write	`tar cvf /dev/st0 ./largefile`
Tar Read	`tar xvf /dev/st0`
DD Write	`dd if=./largefile of=/dev/st0 bs=512`
DD Read	`dd if=/dev/st0 of=./largefile bs=512`

Caldera UnixWare

Caldera UnixWare provides native drive recognition. Supplemental drivers are not required. The operating system defaults to a generic SCSI device and to the default settings of the tape drive.

The SDLT drive provides compression so that the storage capability for tapes can be effectively doubled when the SDLT drive has been instructed to turn on compaction. This is known as hardware compaction and should be used instead of the software compaction that is sometimes provided by software products.

Verify Compression

The following command returns the current compression setting of the drive:

```
tapecntl -C  /dev/rmt/ctape1
```

Example of returned data:

```
Tape Compression = 1
Tape Decompression =1
```

Note: Tape Decompression will always be set to 1.

Table 6: Additional tapecntl Commands

Task	Command
Retention Tape	`tapecntl -t /dev/rmt/ctape1`
Rewind Tape	`tapecntl -w /dev/rmt/ctape1`
Tar Write	`tar cvf /dev/rmt/ctape1 ./largefile`
Tar Read	`tar xvf /dev/rmt/ctape1`
DD Write	`dd if=./largefile of=/dev/rmt/ctape1 bs=512`
DD Read	`dd if=/dev/rmt/ctape1 of=./largefile bs=512`

Caldera Open UNIX

Caldera Open UNIX provides native drive recognition. Supplemental drivers are not required. The operating system defaults to a generic SCSI device and to the default settings of the tape drive.

The SDLT drive provides compression so that the storage capability for tapes can be effectively doubled when the SDLT drive has been instructed to turn on compaction. This is known as hardware compaction and should be used instead of the software compaction that is sometimes provided by software products.

Verify Compression

The following command returns the current compression setting of the drive:

```
tapecntl -C  /dev/rmt/ctape1
```

Example of returned data:

```
Tape Compression = 1
Tape Decompression =1
```

Note: Tape Decompression will always be set to 1.

Table 7: Additional tapecntl Command

Task	Command
Retention Tape	`tapecntl -t /dev/rmt/ctape1`
Rewind Tape	`tapecntl -w /dev/rmt/ctape1`
Tar Write	`tar cvf /dev/rmt/ctape1 ./largefile`
Tar Read	`tar xvf /dev/rmt/ctape1`
DD Write	`dd if=./largefile of=/dev/rmt/ctape1 bs=51`
DD Read	`dd if=/dev/rmt/ctape1 of=./largefile bs=512`

Caldera OpenServer

Caldera OpenServer provides native drive recognition. Supplemental drivers are not required. The operating system defaults to a generic SCSI device and to the default settings of the tape drive. The following tape commands are supported with the SDLT.

Table 8: Typical Native OS Commands

Task	Command
Tape Status	`tape status /dev/xStp0`
Tape xstatus	`tape xstatus /dev/xStp0`
Tape Retention	`tape reten /dev/xStp0`
Tape Erase	`tape erase /dev/xStp0`
Tape Reset	`tape reset /dev/xStp0`
Tape Rewind	`tape rewind /dev/xStp0`
Tape Block Size	`tape getblk /dev/xStp0`
Tape Write File Mark	`tape wfm /dev/xStp0`
Tape Get Compression	`tape getcomp /dev/xStp0`
Tar Write	`tar cvf /dev/rStp0 ./largefile`
Tar Read	`tar xvf /dev/rStp0`
Cpio Write	`cpio -ocBmud -O /dev/rStp0)`
Cpio Read	`cpio -vicu -I /dev/rStp0`
DD Write	`dd if=./largefile of=/dev/rStp0 bs=512`
DD Read	`dd if=/dev/rStp0 of=./largefile`
Tape Load	`tape load /dev/xStp0`
Tape Unload	`tape unload /dev/xStp0`

Caldera Open Linux

Caldera Open Linux provides native drive recognition. Supplemental drivers are not required. The operating system defaults to a generic SCSI device and to the default settings of the tape drive.

The following commands, including Magnetic Tape (mt) commands, are supported with the SDLT.

Table 9: Magnetic Tape (mt) Commands

Task	Command
Check Tape Status	`mt -f /dev/st0 status`
Retention Tape	`mt -f /dev/st0 retension`
Rewind Tape	`mt -f /dev/st0 rewind`
Set Tape to End Of Data	`mt -f /dev/nst0 eod`
Set Tape Block Size	`mt -f /dev/st0 setblk 1024`
Set Compression to disabled	`mt -f /dev/st0 compression 0`
Verify Compression	`mt -f /dev/st0 datcompression`
Set Compression to Enabled	`mt -f /dev/st0 compression 1`
Get Compression	`mt -f /dev/st0 datcompression`
Tape Load	`mt -f /dev/st0 load`
Tape Unload	`mt -f /dev/st0 offline`

Table 10: Additional Commands

Task	Command
Tar Write	`tar cvf /dev/st0 ./largefile`
Tar Read	`tar xvf /dev/st0`
Cpio Write	`cpio -o -O /dev/st0 --block-size=1024)`
Cpio Read	`cpio -vi -I /dev/st0`
DD Write	`dd if=./largefile of=/dev/st0 bs=1024`
DD Read Test	`dd if=/dev/st0 of=./largefile bs=1024`

Operating the SDLT Drive

3

This chapter covers the following topics:

- Power On-Self-Test
- HP-approved cartridges
- Operating the SDLT drive
- Front panel indicators and buttons
- Write-protecting a cartridge
- Cartridge handling and storage
- DRTape Solution

Power On Self-Test

When power is initially applied, the SDLT drive performs a Power On Self-Test (POST). After the user powers up the drive, the green indicator flashes while POST is performing. When the green indicator is illuminated, the drive is ready for operation.

Note: If the amber indicator is illuminated, a problem has been detected. See Chapter 4, "Troubleshooting the SDLT Drive."

HP-approved Cartridges

Table 11 lists HP-approved cartridges:

Table 11: Cartridge Types and Formats

	SDLT 220	SDLT 320
Media Compatibility	SDLT Tape 1 DLT Tape IV (Read only) DLT Tape I: TRS13 Model (Read Only)	SDLT Tape 1 DLT Tape IV (Read only) DLT Tape I (Read Only)

Table 12 lists media kit part numbers:

Table 12: Media Kit Part Numbers

Media Kit	Part Number
SDLT 20-Pack	188527-B26
SDLT 10-Pack	188527-B22
SDLT 5-Pack	188527-B21

Operating the SDLT Drive

Loading a Cartridge

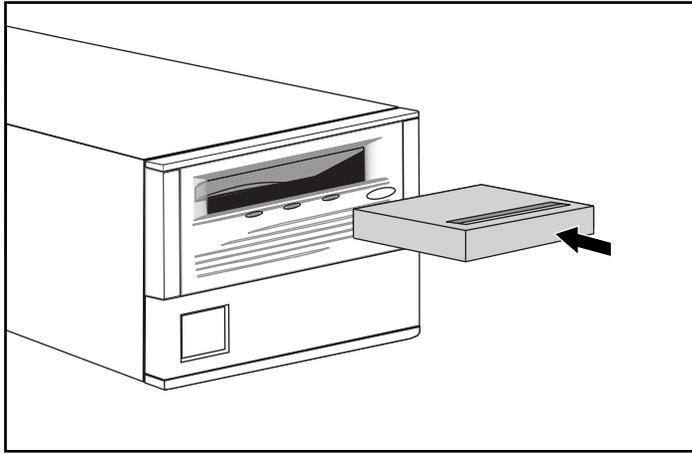Push the cartridge completely into the drive, as shown in Figure 2.

Figure 2: Loading a cartridge

After a cartridge is inserted, the cartridge initialization process begins and the green indicator flashes. When the cartridge is at the beginning of tape (BOT) marker, the green indicator is illuminated. The cartridge is now ready for use.

> **Caution:** If reusing a prerecorded cartridge and writing from BOT, all prerecorded data is lost.

Unloading a Cartridge

To unload a cartridge, press the **Eject** button or issue an eject command in the software application.
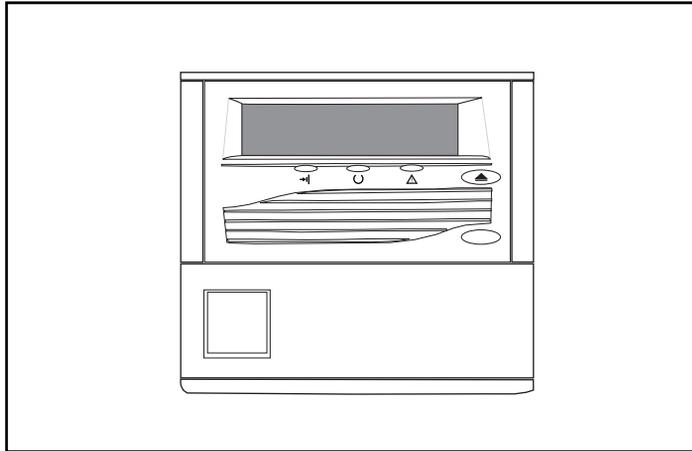
Front Panel Indicators and Buttons

Figure 3: Identifying the SDLT 220 front panel indicators
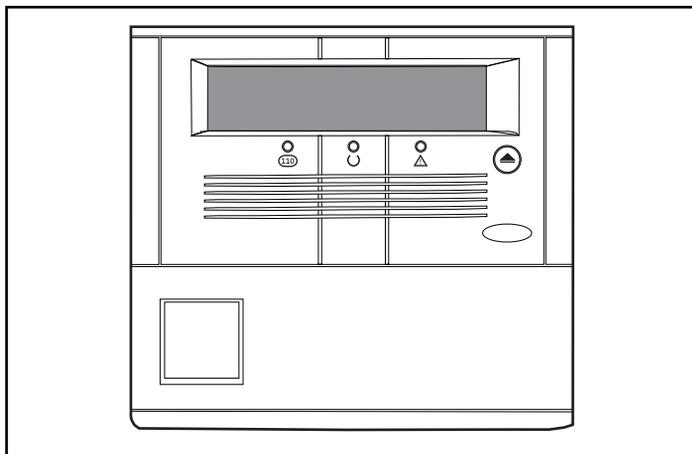
Figure 4: Identifying the SDLT 320 front panel indicators

Table 13 lists the front panel indicators.

Table 13: Front Panel Inicators

Indicator Icon	Color	Action	Explanation
→▌ (SDLT 220)	Red	ON	Cartridge is write-protected
⬭110 (SDLT 320)	Red	ON	SDLT 110 format data tape
	Red	Blinking	Density change is pending
⟲	Green	Blinking	Drive is becoming ready
	Green	ON	Drive is ready
⚠	Amber	ON	Drive needs attention

Table 14 shows the front panel button.

Table 14: Front Panel Button

Control Button	Description
⏏	Eject button

Write-Protecting a Cartridge

The cartridge has a write-protect switch to prevent accidental erasure of data. Before loading the cartridge into the drive, position the write-protect switch on the front of the cartridge. Figure 3-4 illustrates using the write-protect switch. By moving the switch to the left ❶, the cartridge is write-protected, and by moving the switch to the right ❷, the cartridge is write-enabled.

Moving the cartridge write-protect switch to the left while the cartridge is in the SDLT drive, illuminates the red indicator immediately. If the drive is writing to the cartridge, write-protect does not begin until the current write command completes.
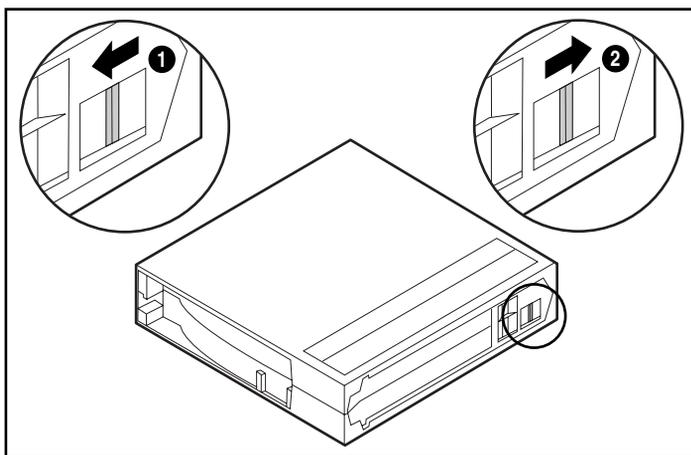

Figure 5: Cartridge with right-protect switch

Cartridge Handling and Storage

For longer life of recorded or unrecorded cartridges,

- Store cartridges in a clean environment.

- Use cartridges in temperatures between 10°C and 40°C (50°F to 104°F).

- If a cartridge has been exposed to extreme heat or cold, stabilize the cartridge at room temperature for the same amount of time it was exposed for up to 24 hours.

- Do not place cartridges near electromagnetic interference sources, such as terminals, motors, and video or X-ray equipment. Doing so may cause data on the cartridge to be altered.

- Store cartridges in a dust-free environment where the relative humidity is between 20 percent and 80 percent. For longer cartridge life, store the cartridge at
  40 percent to 60 percent relative humidity.

- If a cartridge is dropped or damage is suspected, gently shake the cartridge:

  — If it rattles, it is damaged. Restore the data on the cartridge by some means other than by using the SDLT drive, and discard the damaged cartridge.

  — If it doesn't rattle, check the tape leader ❷ inside the cartridge. To do this, open the door on the rear of the cartridge by releasing the door lock ❶. The tape leader should be in the position shown in Figure 6.

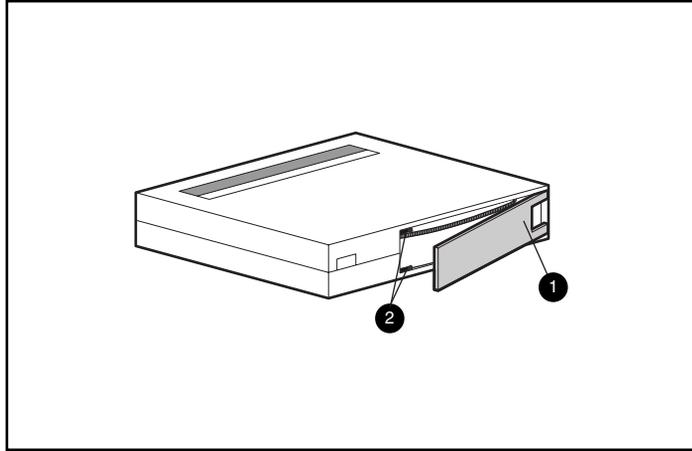**Figure 6: Checking the tape leader**

■ Cartridges should always be stored in their polypropylene case and positioned on their edge so that the axis of the tape supply reel is parallel to the surface upon which the cartridge rests.

DRTape Solution

Your new tape drive supports Disaster Recovery provided by various HP approved tape backup software vendors. A disaster can occur at any time. When it hits, the server may crash, fail to restart, or recover with functionality problems. If you don't have a Disaster Recovery strategy in place, all of the data can be lost. Even if you perform a full backup, the restore process takes precious time to get the server running again.

The DRTape Solution simplifies the Disaster Recovery process. If a full backup with DRTape has been completed before a failure occurs, a system can be up and running in a short amount of time. The DRTape Solution provides the following benefits:

■ Reduces the number of steps that need to be performed during a disaster recovery process.

■ Reduces the time needed for the backup and restore windows.

■ Simplifies the disaster recovery process by reducing the number of items (diskettes, CDs, and tapes) to a single tape. This also helps to ensure a successful recovery by eliminating problems associated with damaged or unavailable media.

The DRTape Solution includes the following features:

■ HP-specific firmware that allows the tape device to emulate a bootable SCSI CD-ROM in a disaster recovery mode.

■ Vendor-specific software that creates disaster recovery media that will load a minimal operating system to allow the user to restore the failed system.

Note: Refer to the user documentation that shipped with the vendor-specific software for more information on how to use the software.

■ Completely self-contained design that does not require CDs to restore the system during the disaster recovery process.

System Requirements

There are specific operating system, drive firmware, controller BIOS and system drivers that are required for the DRTape Solution. A supported server and operating system compatibility matrix is available at:

http://www.compaq.com/products/storageworks/drtape/index.html

---

Note: A "DR Ready" sticker on your tape drive indicates that you have the proper firmware. If you do not have the minimum version or later version, you can download a SoftPaq ™ of the most recent firmware version from the supported drive website.

⚠ **Caution:** If you are using a Compaq 66 MHz/64 bit Wide Ultra3 SCSI controller, you must reload this driver after the operating system has been loaded onto the system using the Compaq SmartStart and Support Software CD (ProLiant Essentials).

Perform the following steps to reload the driver:

1. Insert the SmartStart or Server Support Setup Utility CD into the CD ROM drive.
2. Select "Install Compaq Server Support."
3. Use your down arrow key to select "Compaq 66 MHz/64 bit Wide Ultra3 SCSI driver (ADPU160M.SYS)." Then click Install.

Using the Disaster Recovery Solution

This section describes how to use the DRTape Solution to create and restore a system. First, a disaster recovery tape must be created and stored for future use. After a disaster has happened, the disaster recovery tape is retrieved to restore and configure a system with a tape drive or an autoloader.

Creating a Disaster Recovery Tape

The DRTape Solution consists of a tape that contains a backup of your operating system, application software, and data.

Perform the following steps to create a Disaster Recovery tape backup using an SDLT tape drive and supported software:

1. Install the DRTape enabled software.

Note: Refer to the vendor-specific documentation to install the software.

---

2. The tape drive or autoloader will be identified as a bootable tape device and the user will be prompted to create a bootable image that will be copied onto the media.

3. Complete the backup process. Write-protect the tape after the backup process completes, and store the tape for future use.

Restoring a System

To restore a system using the backup DRTape:

1. Insert the SmartStart CD into the CD-ROM drive. Allow it to run until you are prompted to insert the operating system CD.

2. Remove the SmartStart CD.

3. Retrieve the most recent DRTape.

4. Make sure that the DRTape is write-protected and load the DRTape in the tape drive.

5. When all three LED indicator lights on the front of the tape drive are blinking, power on the computer or the tape drive within 15 seconds. This will place the tape drive into disaster recovery mode.

6. Your system is now in disaseter recovery mode. When the system restarts, the tape drive is identified as a bootable device. After the operating system loads, the vendor specific software screen displays giving information on how to proceed. Refer to the vendor specific software documentation to complete the restore process.

After the vendor-specific software restores the system, the system is now ready for normal operation.

Troubleshooting the SDLT Drive

4

The chapter covers the following topics:

■ What to do if there is a problem

■ Upgrading firmware

What to do if there is a Problem

If the SDLT drive fails during POST or operation, use Table 15 to determine the problem and the action to take. Power down the SDLT drive before performing a corrective action.

Table 15: Troubleshooting Chart

If	Then	Action
The system does not recognize the SDLT drive.	The system might not be configured to see the SCSI ID.	Configure the system to see the ID.
	The SCSI ID might not be unique.	Change the SCSI ID and reconfigure the system. The new ID is effective at the next power-on.
	The parameters for the SCSI adapter might be incorrect.	Check the SCSI adapter installation and ID assignment.
	The SCSI signal cable might be loose.	Make sure the connector on each end of the cable is seated.

Table 15: Troubleshooting Chart

If	Then	Action
The system does not recognize the SDLT drive.	The SCSI bus might not be correctly terminated.	If the SDLT drive is the last or only device on the bus, make sure the terminator is installed on the drive. If the SDLT drive is not the last or only device on the bus, check the cable connections and make sure that the terminator is installed at the end of the bus.
	The SCSI terminator might not be at the end of the bus, or more than two terminators might be present.	Be sure to install a terminator at each end of the bus. One terminator is usually installed on the system.
	The SCSI bus might be too long.	Limit the bus length to the ANSI SCSI standard of 3 m (9.9 ft) for a single ended (SE) cable.
	Too many devices might be on the bus.	Limit the number of devices on the bus to eight (sixteen for a wide bus), including the SCSI controller.
The SDLT drive does not power up.	The SDLT drive has no power.	With the SDLT power switch off, check the SDLT power connections.

Table 15: Troubleshooting Chart

If	Then	Action
The amber indicator is on.	A drive fault has occurred.	Try to unload the cartridge and re-initialize the drive by turning the drive power off and then on again. The green light will flash. If re-initializing is successful, the lights illuminate steadily again and go off.
Fatal or nonfatal errors occur for which a cause cannot be determined.	The bus termination or SCSI signal cable connections might be incorrect.	Ensure the SCSI bus is correctly terminated. (External drives only)
	The AC main power source grounding might be incorrect.	Plug the SDLT drive into a grounded AC main power outlet on the same line powering the server.

After taking the action listed in Table 15, power on the SDLT drive to rerun POST.

Library and Tape Tools

The HP Library and Tape Tool (LTT) is a tape management and diagnostic tool to help you install and support your HP storage product. In addition to LTT's diagnostic and troubleshooting ability, it offers useful information about your products and provides automated firmware update checks from the Internet, with the ability to retrieve the latest firmware versions.

Complete instructions and download of LTT are available at:

www.hp.com/support/tapetools

Regulatory Compliance Notices

A

Federal Communications Commission Notice

Part 15 of the Federal Communications Commission (FCC) Rules and Regulations has established Radio Frequency (RF) emission limits to provide an interference-free radio frequency spectrum. Many electronic devices, including computers, generate RF energy incidental to their intended function and are, therefore, covered by these rules. These rules place computers and related peripheral devices into two classes, A and B, depending upon their intended installation. Class A devices are those that may reasonably be expected to be installed in a business or commercial environment. Class B devices are those that may reasonably be expected to be installed in a residential environment (i.e., personal computers). The FCC requires devices in both classes to bear a label indicating the interference potential of the device as well as additional operating instructions for the user.

The rating label on the device shows which class (A or B) the equipment falls into. Class B devices have an FCC logo or FCC ID on the label. Class A devices do not have an FCC logo or FCC ID on the label. Once the class of the device is determined, refer to the following corresponding statement.

Class A Equipment

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at personal expense.

Class B Equipment

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful 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 or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio or television technician for help.

Modifications

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by Hewlett-Packard Company may void the user's authority to operate the equipment.

Cables

Connections to this device must be made with shielded cables with metallic RFI/EMI connector hoods in order to maintain compliance with FCC Rules and Regulations.

Declaration of Conformity for products marked with the FCC logo - United States only

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

For questions regarding your product, contact:

Hewlett-Packard Company

P. O. Box 692000, Mail Stop 530113

Houston, Texas 77269-2000

Or, call

1-800- 652-6672

For questions regarding this FCC declaration, contact:

Hewlett-Packard Company

P. O. Box 692000, Mail Stop 510101

Houston, Texas 77269-2000

Or, call

(281) 514-3333

To identify this product, refer to the Part, Series, or Model number found on the product.

Canadian Notice (Avis Canadien)

Class A Equipment

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Class B Equipment

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

European Union Notice

$C\epsilon$

Products bearing the CE marking comply with the EMC Directive (89/336/EEC) and the Low Voltage Directive (73/23/EEC) issued by the Commission of the European Community and if this product has telecommunication functionality, the R&TTE Directive (1999/5/EC).

Compliance with these directives implies conformity to the following European Norms (in parentheses are the equivalent international standards and regulations):

- EN 55022 (CISPR 22) - Electromagnetic Interference
- EN55024 (IEC61000-4-2, 3, 4, 5, 6, 8, 11) - Electromagnetic Immunity
- EN61000-3-2 (IEC61000-3-2) - Power Line Harmonics
- EN61000-3-3 (IEC61000-3-3) - Power Line Flicker
- EN 60950 (IEC 60950) - Product Safety

Taiwan Notice

警告使用者：

這是甲類的資訊產品，在居住的環境中使用時，可能
會造成射頻干擾，在這種情況下，使用者會被要求採
取某些適當的對策。

Japanese Notice

ご使用になっている装置にVCCIマークが付いていましたら、次の説明文を
お読み下さい。

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準
に基づくクラスB情報技術装置です。この装置は、家庭環境で使用すること
を目的としていますが、この装置がラジオやテレビジョン受信機に近接して
使用されると、受信障害を引き起こすことがあります。
取扱説明書に従って正しい取り扱いをして下さい。

VCCIマークが付いていない場合には、次の点にご注意下さい。

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に
基づくクラスA情報技術装置です　この装置を家庭環境で使用すると電波
妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ず
るよう要求されることがあります。

Electrostatic Discharge

B

To prevent damage to the system, be aware of the precautions you need to follow when setting up the system or handling parts. A discharge of static electricity from a finger or other conductor may damage system boards or other static-sensitive devices. This type of damage may reduce the life expectancy of the device.

To prevent electrostatic damage, observe the following precautions:

- Avoid hand contact by transporting and storing products in static-safe containers.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.
- Place parts on a grounded surface before removing them from their containers.
- Avoid touching pins, leads, or circuitry.
- Always be properly grounded when touching a static-sensitive component or assembly.

Grounding Methods

There are several methods for grounding. Use one or more of the following methods when handling or installing electrostatic-sensitive parts:

■   Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megohm ± 10 percent resistance in the ground cords. To provide proper grounding, wear the strap snug against the skin.

■   Use heel straps, toe straps, or boot straps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.

■   Use conductive field service tools.

■   Use a portable field service kit with a folding static-dissipating work mat.

If you do not have any of the suggested equipment for proper grounding, have an authorized reseller install the part.

Note: For more information on static electricity, or for assistance with product installation, contact your authorized reseller.

Specifications

C

This appendix covers the following topics:

- Dimensions and weight
- Altitude
- Acoustic emissions
- Temperature and humidity ranges
- Power requirements
- Air-Cooling requirement

Dimensions and Weight

Table 16: Dimensions and Weight

Dimensions	Internal Drive Without Rails		External Drive	
Height	86.4 mm	3.42 in	160.02 mm	6.3 in
Width	148.3 mm	5.84 in	175.26 mm	6.9 in
Depth	212.1 mm	8.36 in	325.12 mm	12.8 in
Weight	2.4 kg	5.30 lbs	6.35 kg	14.0 lbs

Altitude

Table 17: Altitude

Action	Feet
Operating	-500 to 30,000 feet

Acoustic Emissions

Acoustics - Preliminary declared values per ISO9296 and ISO 7779/EN27779:

Table 18: Acoustic Noise Emissions, Nominal

	Noise Power Emission Level (LNPEc)		Sound Pressure Level (LPAc)	
Product	**Idle**	**Streaming**	**Idle**	**Streaming**
Internal Drive	-	5.9	-	47.0
External Drive	5.4	5.9	42.0	46.0

Temperature and Humidity Ranges

Table 19: Temperature and Humidity Ranges

Actions	Temperature	Humidity
Storage with Data Cartridge	18×C to 28×C 64×F to 82×F	40 to 60% RH, non-condensing
Storage without Data Cartridge	-40×C to 66×C -40×F to 150×F	10 to 95% RH, non-condensing Maximum wet bulb temperature = 46×C
Operation	10×C to 40×C 50×F to 104×F	20 to 80% RH, non-condensing Maximum wet bulb temperature = 25×C

Power Requirements

Table 20: Power Requirements - Internal Drive

Voltage	Current Typical	Current Maximum
+5 V (+/-5%) bus*	3.73 A	6.30 A
+12 V (+/-5%) bus*	1.3 A	4.80 A
*Note: Voltage is measured at the power bus connector pins.		

Table 21: Power Requirements - External Drive

Voltage	Maximum Power
100 to 240 VAC	46 W

Air-Cooling Requirement

Table 22: Cooling Requirements

Ambient temperature	Air flow velocity of 125 linear feet per minute
Note: Air flow is measured directly in front of the bezel.	

Manually Removing a Cartridge

D

When the normal cartridge unload process is not possible, manually removing a cartridge from the SDLT drive is required.

This appendix covers the following topics:

- Tools
- Preparing the SDLT drive
- Disassembling the SDLT drive
    — Removing the bezel
    — Removing the cover
    — Rewinding the tape into the cartridge
    — Removing the left guide
    — Disconnecting the leader pin from the cartridge buckle
    — Removing the cartridge
- Assembling the SDLT drive

Tools

- Torx T8 screwdriver (combination electric/manual optional)
- Tweezers

Preparing the SDLT Drive

1. Make sure the SDLT drive is powered off.

2. If the SDLT is:

   — An internal drive, remove it from its enclosure (server, library, and so on) and disconnect the power and SCSI cables.

   — An external drive, remove the AC power cord and SCSI cables.

3. The bezel, cover, and left guide must be removed in order to extract the cartridge. It is also necessary to fully rewind all the tape into the cartridge. See the following sections for procedures on removing these parts and rewinding the cartridge.

Disassembling the SDLT Drive

The following procedures describe how to remove components of the drive to access the cartridge when it is inside the drive.

Removing the Bezel

The bezel is removed by simultaneously pulling on the bezel ❸ and depressing the locking tabs ❷ which secure it to the drive cover ❶ (see Figure 7). There are seven locking tabs which secure the bezel to the drive cover.
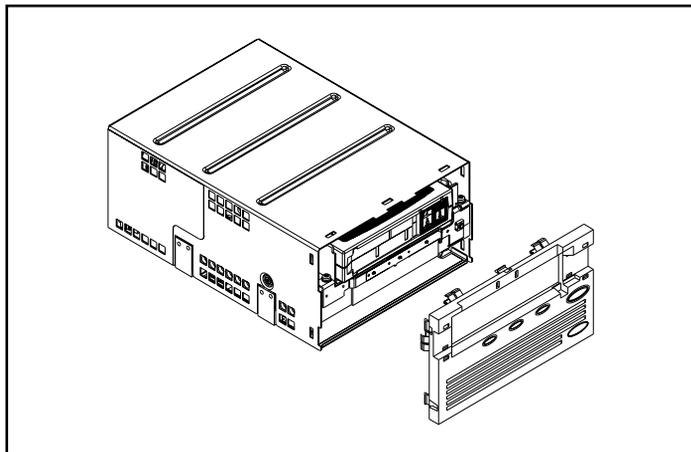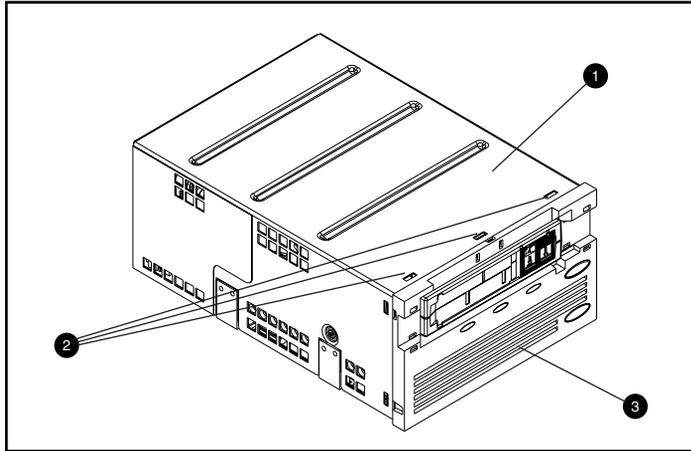
Figure 7: Removing the Bezel

Removing the Cover

The SDLT cover is secured to the drive with three screws. Two screws are located on either side of the drive and the third is located at the back of the drive. To remove the cover, remove all the screws ❶ with a Torx T8 screwdriver and lift the cover upward (see Figure 8).
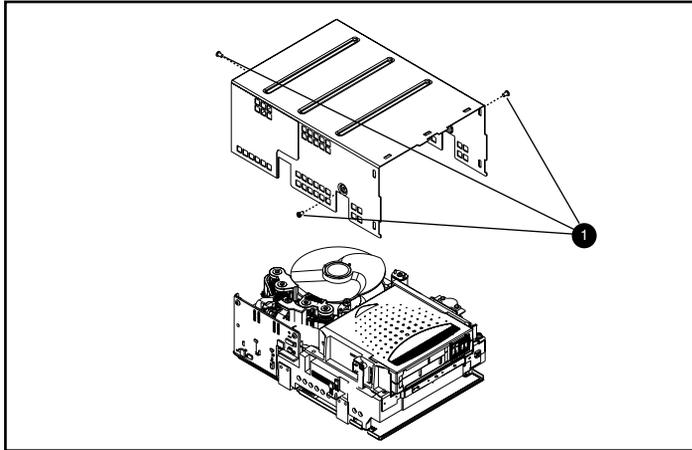
Figure 8: Removing the cover

Rewinding the Tape into the Cartridge

The magnetic recording tape must be fully rewound into the cartridge before removing the cartridge from the drive.
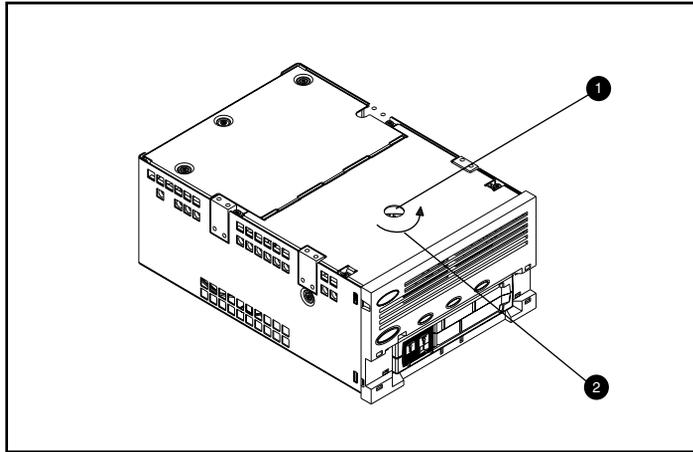
Figure 9: Rewinding the tape into the cartridge

The tape is rewound by accessing the motor spindle through the access hole located at the bottom of the drive (see Figure 9).

To rewind the tape into the cartridge:

1. Turn the drive upside down and lay flat on a hard surface.

2. Insert a T8 Torx screwdriver into the motor spindle access hole ❶.

3. Turn the screwdriver counterclockwise ❷ until the cartridge leader buckle is fully seated within the cartridge.

The linear tape speed when the tape is almost fully rewound into the cartridge should be approximately6 inches/second. The motor spindle revolutions per minute (RPM) are approximately 30 RPM. If most of the tape is wound on the cartridge reel, which can be seen with the cover removed, it is possible to rewind at a much higher tape speed, decreasing the speed near the end.

> ⚠ **Caution:** Do not place the SDLT drive upside down when the cover is removed.

Removing the Left Guide

To remove the left guide:

1. Remove the two T8 Torx screws ❶ (see Figure 10).

2. Pull the sheet metal panel ❷ towards the front of the drive so that the left guide ❸ may be lifted upward.

The left guide has a flex circuit attached which goes below the tape deck. Lay the left guide ❸ flat (as shown in Figure 10), leaving the cartridge in the drive.
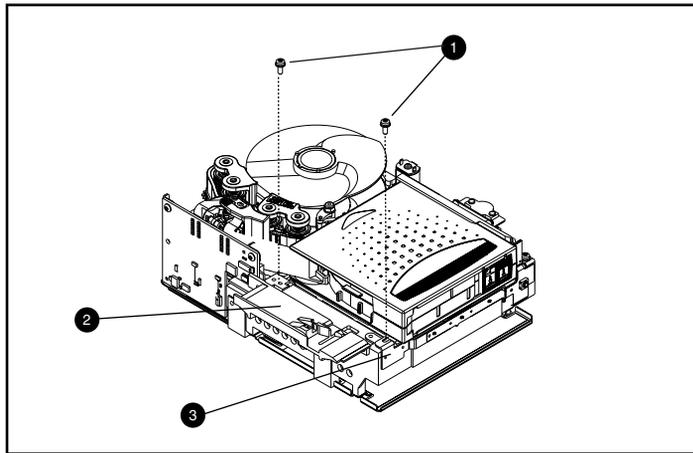
Figure 10: Removing the left guide

Disconnecting the Leader Pin from Cartridge Buckle

To disconnect the leader pin from the cartridge buckle ❶, use a pair of tweezers. Then place the leader pin in the hooks of the buckler (see Figure 11 for the buckler location).
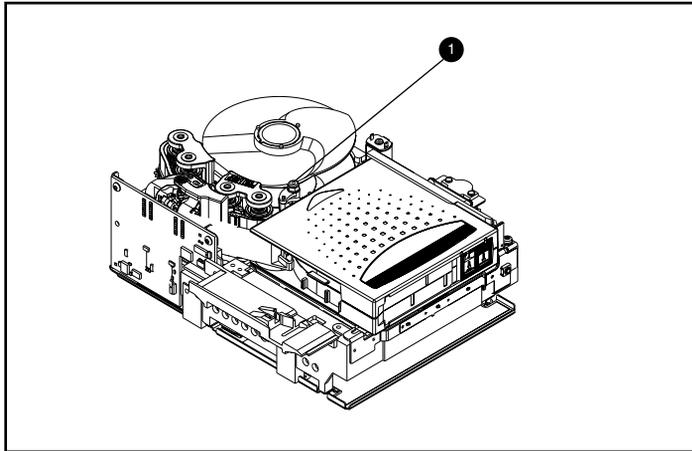
Figure 11: Disconnecting the leader pin from the cartridge buckler

Removing the Cartridge

The cartridge can be removed from the drive by lifting up towards the left guide and back (see Figure 12).
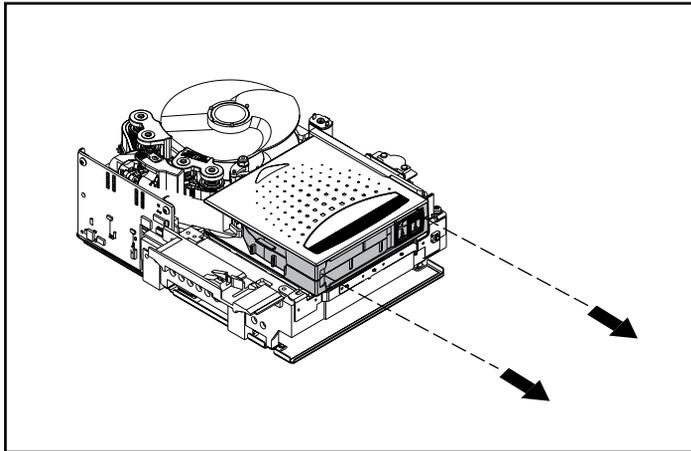
Figure 12: Removing the cartridge

Note: There may be some noise when removing the cartridge due to the drive components interfaced with cartridge. This is normal and should not cause damage to either the cartridge or drive.

Assembling the SDLT Drive

When the cartridge is removed from the SDLT drive, assemble the drive in the reverse order, torquing the screws to 5 in-lbs.

Note: Document the original defect symptoms and be sure to note that the drive has been disassembled in the field to recover a tape.

Density Select

E

Most backup software specifies that the tape drive write at its highest density. With the SDLT 320 tape drive, this density is SDLT 320 format.

The Density Select application, available on the Density Select Software CD included in the SDLT kit, provides a way for you to write data cartridges with an SDLT 320 tape drive that are backward compatible with SDLT 220 tape drives.

Specifying a Device

When you start the Density Select application, it scans the bus for SCSI devices and lists those devices in the Device list box by SCSI ID. The options in the Density Select window are unavailable until you select an SDLT 320 tape drive.

To specify a device, select the SDLT 320 tape drive from the Device drop-down list box.

The full name of the device displays in the message bar at the bottom of the Density Select window.

Selecting a Density

The SDLT 320 tape drive supports two density options: 160/320 or 110/220. To specify a density when using blank media:

1. Select the SDLT320 or SDLT220 format option.

2. Be sure the Default density override checkbox is checked.

3. Click Apply.

    The 220 LED blinks to indicate that a request has been made for media to be written in a different format.

Note: The density selection is valid only for the current data cartridge in the tape drive. When you eject the data cartridge, power cycle the tape drive, or restart the backup, the tape drive returns to SDLT320 format.

Using Media Previously Written in SLDT 320 Format

To specify a density when using media previously written in SDLT 320 format:

1. Rewind the tape to start writing from the beginning of tape (BOT).

2. Select the SDLT220 format option.

3. Be sure the Default density override checkbox is checked.

4. Click Apply.

    The 220 LED blinks to indicate that a request has been made for media to be written in a different format.

Note: You cannot write multiple formats to the same Super DLTtape I data cartridge.

Using Media Previously Written in SDLT 220 Format

If you do not select a density and you want to append data to a Super DLTtape I data cartridge that was previously written in SDLT220 format, the drive will write the appended data in the SDLT220 format.

To specify a density when using media previously written in SDLT 220 format:

1. Rewind the tape to start writing from the beginning of tape (BOT).
2. Select the SDLT320 format option.
3. Be sure the Default density override checkbox is checked.
4. Click Apply.

    The 220 LED blinks to indicate that a request has been made for media to be written in a different format.

Note: You cannot write multiple formats to the same Super DLTtape I data cartridge.

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