Quantum

SDLT 600

Product Manual

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Contact Information

Telephone numbers and street addresses change frequently; for the latest, up-to-date contact information, visit the web site:

www.quantum.com

The *Support* section of the web site lists telephone numbers, street addresses, time zones, and other pertinent facts.

Revision History

The table below lists all revisions made to this document in chronological order.

Document Release	Date	Summary of Changes
A01	September 15, 2003	Initial Release
A02	March 30, 2004	Maintenance Release

User Manual Statements for Class A Equipment (Internal SDLT 600 Tape Drive System)

This equipment generates, uses, and may emit radio frequency energy. The 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 radio frequency interference in a commercial installation.

Operation of this equipment in a residential area may cause interference, in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

Any modifications to this device—unless expressly approved by the manufacturer—can void the user's authority to operate this equipment under Part 15 of the FCC rules.

Note: Additional information on the need to interconnect the device with shielded (data) cables or the need for special devices, such as ferrite beads on cables, is required if such means of interference suppression was used in the qualification test for the device. This information will vary from device to device and needs to be obtained from the EMC (Electromagnetic Compatibility) group or product manager.

Warning!

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Achtung!

Dieses ist ein Gerät der Funkstörgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkstörungen auftreten, in welchen Fällen der Benutzer für entsprechende Gegenmaßnahmen verantwortlich ist.

Warning!

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Attention!

Ceci est un produit de Classe A. Dans un environnement domestique, ce produit risque de créer des interférences radioélectriques, il appartiendra alors à l'utilisateur de prendre les mesures spécifiques appropriées.

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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
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User Manual Statements for Class B Equipment (Tabletop SDLT 600 Tape Drive System)

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. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference that may cause undesirable operation.

Any modifications to this device—unless expressly approved by the manufacturer—can void the user's authority to operate this equipment under Part 15 of the FCC rules.

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 TV technician for help.

Note: Additional information on the need to interconnect the device with shielded (data) cables or the need for special devices, such as ferrite beads on cables, is required if such means of interference suppression was used in the qualification test for the device. This information will vary from device to device and needs to be obtained from the EMC (Electromagnetic Compatibility) group or product manager.

This Class B digital apparatus complies with Canadian ICES-003.

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取扱説明書に従って正しい取り扱いをして下さい。

Table of Contents

List of Tables

List of Figures

CHAPTER 1

Introduction

This chapter provides supplementary information about using the SDLT 600 tape drive system *Product Manual*. The chapter discusses the following topics:

- "Purpose and Scope" describes the type of information found in the manual, and its intended use by the Quantum customer.
- "Referenced Documents" lists various documents that are cross-referenced within this manual.
- "Related Documents" is a list of other documents that may be helpful to the user.
- "Structure of this Manual" describes what information is within the other chapters of the manual.
- "Conventions" defines the writing style conventions used to designate specific elements of presentation.
- "For More Information" lists web sites and telephone numbers for obtaining product information not found in this manual.
- "Reader Comments" provides contact information for your comments, suggestions, and corrections for this manual.

1.1 Purpose and Scope

This product manual serves as an easy-to-use comprehensive information source and product catalog to familiarize Quantum customers and systems professionals with the SDLT 600 tape drive systems. The manual is a comprehensive source of information about the SDLT 600 tape drive systems; it describes both the internal and tabletop versions of the SDLT 600 tape drive.

1.2 Referenced Documents

- *SDLT 600 Fibre Channel Interface Guide (81-81202-01)*
- *SDLT 600 SCSI Interface Guide (81-81200-01)*
- *SDLT 600 Design and Integration Guide (81-81196-01)*
- *Super DLTtape™ Interactive Library Interface Specification (6464162-01).*

1.3 Related Documents

- *SDLT 600 Product Specification (81-81218-01)*
- *SDLT 600 User Reference Guide (81-81220-01).*

1.4 Structure of this Manual

- **Chapter 1, "Introduction,"** is the chapter you are currently reading.
- **Chapter 2, "SDLT 600 Tape Drive Product Information,"** describes various features of the SDLT 600 tape drive technology and the modular design used to build this exciting product.
- **Chapter 3, "SDLT 600 Tape Drive Specifications,"** lists various specifications for the SDLT 600 tape drive system: product, functional, environmental, and recording media.
- **Chapter 4, "Installing Your Tape Drive,"** contains handling and pre-installation guidelines, configuration advice, plus mounting and installation information for your SDLT 600 tape drive.
- **Chapter 5, "Using Your Tape Drive,"** contains information on running the self-test, descriptions of the front panel controls and LEDs, procedures for updating the firmware (microcode), and various pointers for caring for your SDLT 600 tape drive.
- **Chapter 6, "Regulatory Compliance,"** lists various regulations that apply to the SDLT 600 tape drive.
- **Appendix A, "Super DLTtape I and Super DLTtape II Data Cartridges,"** provides information for the Super DLTtape™ I and Super DLTtape II data cartridges including handling and inspection procedures, information on the write-protect switch, and how to load and unload a data cartridge.

- **Appendix B, "DLTtape VS1 Data Cartridge,"** provides information for the DLTtape™ VS data cartridge including handling and inspection procedures, information on the write-protect switch, and how to load and unload a data cartridge.
- **"Glossary"** provides definitions for technical terms and acronyms used throughout the document.

1.5 Conventions

This manual uses the following conventions to designate specific elements.

Table 1-1. Typographical Conventions

Element	Convention	Example
Commands	Uppercase (unless case-sensitive)	FORMAT UNIT
Messages	Uppercase	INVALID PRODUCT NUMBER
Hexadecimal Notation	Number followed by lowercase h	25h
Binary Notation	Number followed by lowercase b	101b
Decimal Notation	Number without suffix	512
Acronyms	Uppercase	POST
Abbreviations	Lowercase, except where standard usage requires uppercase	Mb (megabits) MB (megabytes)
Dimensions in Figures	No units specified (Inches understood unless otherwise specified)	0.57 EJECT DISTANCE

1.6 For More Information

The web site ***http://www.dlttape.com*** includes more valuable information about SDLT systems; or to locate very specific product-related information, visit ***http://www.quantum.com/SDLT***.

For personalized information about Quantum's reliable data protection products, call 1-800-624-5545 in the U.S.A. and Canada.

1.7 Reader Comments

Quantum is committed to providing the best products and service. We encourage your comments, suggestions, and corrections for this manual. Please send all comments to this address:

Quantum Technical Publications
4001 Discovery Dr.
Suite 1100
Boulder, Colorado USA 80303

CHAPTER 2

SDLT 600 Tape Drive Product Information

This chapter describes the features of the Quantum SDLT 600 tape drive system. This chapter covers the following topics:

- "Overview" describes basic features of the system.
- "Product Features" lists key features of the SDLT 600 tape drives.
- "Tape Drive Technology" includes photographs of the tape drive, and introduces important basic features.
- "Modular Design" introduces tape drive components such as the tape heads, media, data cartridge, and host interface.
- "Quantum Diagnostics Tools" describes tools and utilities that provide the ability to run diagnostics and test for drive functionality.
- "TapeAlert" describes a built-in tape device status monitoring and messaging utility.
- "Medium Auxiliary Memory" introduces an SDLT 600 tape drive feature that provides key input for Quantum's DLTSage suite of maintenance diagnostics software.

2.1 Overview

The Quantum SDLT 600 tape drive system is a highly scalable tape drive designed for multiple product generations. It is a follow-on to the DLT product family. The SDLT 600 tape drive system comprises both the tape drive and the data cartridge. The system is available in three models: a tabletop (or external) unit, an internal unit for server installation, and a library model for installing in tape automation systems. The model SDLT 600 tape drive system provides 300 Gigabyte (GB) of storage capacity with a transfer speed of 36 Megabyte per second (MB/sec) native; 600 GB of storage capacity with a transfer speed of 72 MB/sec compressed.

Figure 2-1 on page 2-2 shows pictures of the internal and tabletop models. The library model (not shown) is identical to the internal, but with a different front bezel.

For detailed engineering specifications, refer to Chapter 3, "SDLT 600 Tape Drive Specifications."

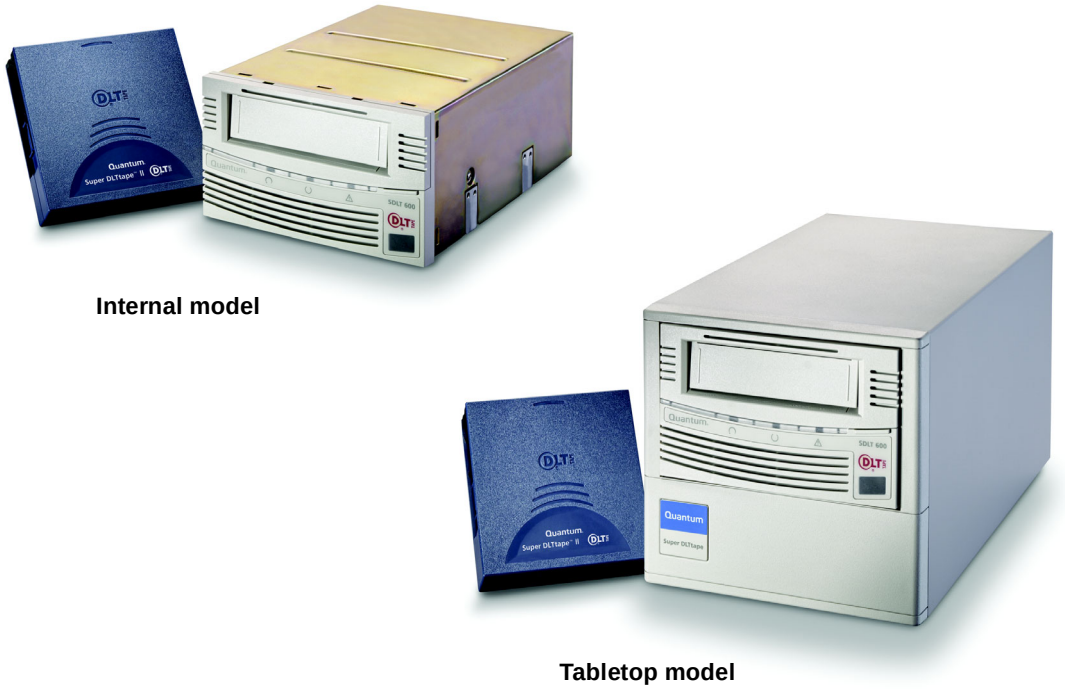

Figure 2-1. SDLT 600 Tape Drive Systems

2.2 Product Features

The SDLT 600 tape drive system offers the following product features:

- A streaming tape drive that uses half-inch wide Super Digital Linear Tape (Super DLTtape II) media.
- A standard 5.25-inch full-height form factor to simplify integration into system and tape library solutions.
- Backward read compatibility for SDLT 220 and SDLT 320 tape drive formats with the Super DLTtape I data cartridge type; and the DLT VS160 tape drive format with DLTtape™ VS1 data cartridge type.
- DLTSage iTalk (and Pocket DLTSage iTalk)—Infrared (wireless) interface that provides a remote testing base allowing customers and integrators to access system diagnostic information from the front of the SDLT 600 tape drive system.

- The SDLT 600 tape drive is available in either Ultra 160 or Fibre Channel interface versions. (Fibre Channel not available with the tabletop model).

For more information on the SDLT 600 tape drive features and other product information, you can access the DLT Group web site at:

http://www.dlttape.com/DLTtape/Overview.htm

This web page provides information that is constantly updated as needed. Refer to this web site often to obtain the most current information.

2.3 Tape Drive Technology

The SDLT 600 tape drive incorporates various new state-of-the-art technologies that contribute to the SDLT architecture. Some of these ideas are trademarked, others are patented. The following subsections introduce the important technologies that together, comprise the SDLT 600 tape drive system.

2.3.1 Laser Guided Magnetic Recording

The SDLT 600 tape drive systems (shown in Figure 2-1) are based on Quantum's Laser Guided Magnetic Recording (LGMR) technology. LGMR provides a unique combination of the best optical and magnetic technologies, which results in dramatically higher capacities by substantially increasing the number of recording tracks on the data-bearing surface of the media. By recording data magnetically on the data-bearing side of the media and using servo movement optically on the backside, LGMR optimizes highly proven technologies to deliver the most efficient, reliable, and scalable data backup solution to the mid-range market.

2.3.2 Pivoting Optical Servo

Pivoting Optical Servo (POS) is a Quantum-invented, optically-encoded servo system, that combines high-density magnetic read/write data recording with laser servo guiding. The POS provides high-duty-cycle applications, which decreases cost and increases user convenience. The POS enables the head to track dynamic variations in tape motion which allows Quantum to provide a track count with an order of magnitude increase over previous products.

2.3.3 Magneto Resistive Cluster Heads

Magneto Resistive Cluster (MRC) heads are a densely packed array of small, cost-effective Magneto Resistive (MR) tape heads precisely positioned using advanced thin-film processing technology. SDLT MRC heads provide high wafer usage efficiency resulting in low head costs, are less susceptible to variations in tape speed, yield higher track density and capacity, and provide a multi-channel architecture for increased transfer rate and performance.

2.3.4 Advanced Partial Response Maximum Likelihood

Improving on Partial Response Maximum Likelihood (PRML) technology traditionally used in disk drives and communication systems, Quantum's advanced PRML channel technology, co-developed with Lucent Technologies, brings new levels of performance and capacity to high-performance linear tape products. This provides high-encoding efficiency recording densities for greater capacity and performance that enables SDLT to increase transfer rates and capacity substantially.

2.3.5 Advanced Metal Powder Media

Advanced Metal Powder (AMP) media is a state-of-the-art media using durable metal powder technology for recording very high densities of data. The back side of the AMP media receives a specially formulated coating to accept the optical servo tracks. Because the servo information is on the back side of the media, the entire data-bearing side of the media is available for recording data and eliminates the need for pre-formatting. In addition, AMP media meets the needs of multiple generations of the SDLT technology.

2.3.6 Positive Engagement Tape Leader Buckling Mechanism

The positive engagement tape leader buckling mechanism is a highly robust mechanism that increases data cartridge life and supports the extensive duty-cycle environments found in high-end and automation environments.

This mechanism engages the tape leader upon data cartridge load and disengages it upon data cartridge unload. It uses a solid metal pin attached to the drive leader to link with molded clips permanently attached to the tape leader inside the data cartridge. The Positive Leader Link design makes the buckling of Super DLTtape media a totally reliable mechanical process.

2.4 Modular Design

The SDLT 600 tape drive is designed as a total system. The system includes a complex interaction of a number of important components including such items as the tape path, tape heads, media, data cartridge, and host interface.

As shown in Figure 2-2 on page 2-5, the SDLT 600 tape drive consists of five distinct modules:

- Data Control Module (DCM)
- Tape Control Module (TCM)
- Front Panel Module (FPM)
- Electronic Interface Module (EIM)
- Super DLTtape II Data Cartridge (Data Cartridge).

The modular concept makes the SDLT 600 tape drive system easy to manufacture and configure. Each module is optimized to perform a specific set of functions and designed to interface with the other modules in a well defined and flexible manner.

The following subsections provide a brief overview of each module.

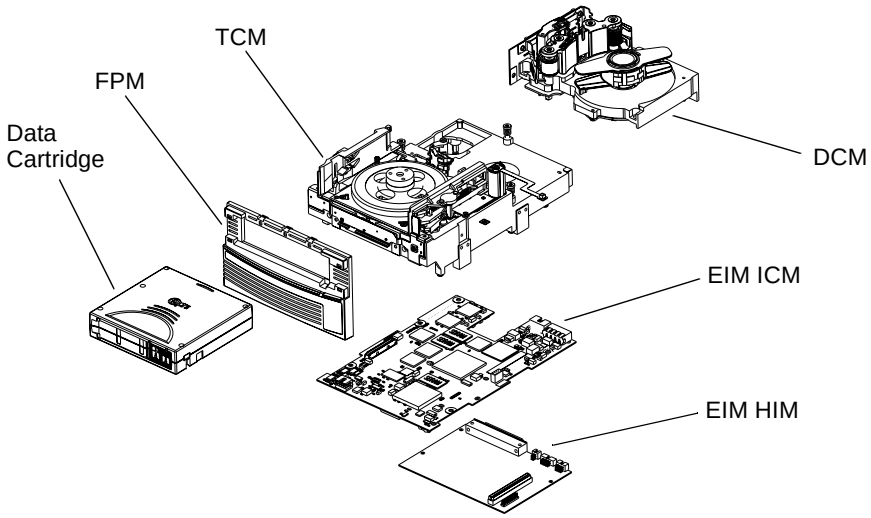

Figure 2-2. SDLT 600 Tape Drive Modular Design

NOTE: Despite the deliberate modularity of each module, with the exception of the FPM, individual users should not “swap” modules. The FPM is the only module that is field replaceable. Customer adjustments to the TCM, DCM, or EIM will void the tape drive’s warranty.

2.4.1 Data Control Module

The Data Control Module (DCM) contains several of the functions and features of Quantum's LGMR technology, which is at the heart of the SDLT technology. Of the five technologies that constitute the LGMR technology, two are in the DCM. These are the POS and the MRC heads.

The main functions of the DCM are to provide the path and guides for all tape motion inside the tape drive and to write data to and read data from the tape. In addition to the POS and MRC heads described in Section 2.3.2, "Pivoting Optical Servo" on page 2-3 and Section 2.3.3, "Magneto Resistive Cluster Heads" on page 2-4, the DCM contains a number of components that interact to perform these functions. These components include:

- Advanced head guide assembly
- Take-up reel
- Drive motor
- Optical servo system
- Tape heads.

In addition to its mechanical components, the DCM also contains printed circuit boards that control the functions of the DCM and the tape heads.

2.4.2 Tape Control Module

The Tape Control Module (TCM) implements the functions required to buckle and unbuckle the tape and control the tape motion. The TCM consists of a variety of components:

- TCM Printed Circuit Board Assembly (PCBA)
- Base Plate
- Data Cartridge Receiver
- Positive Engagement Tape Leader Buckling Mechanism
- Tape supply motor assembly
- Floor plate assembly.

TCM PCBA

The TCM has its own PCBA that controls the functions of the TCM and interfaces with the main controller board in the EIM. By designing the TCM as a distinct module, it allows manufacturing and testing the TCM as a stand-alone module, simplifying the design, manufacturing, and troubleshooting processes.

Base Plate

The SDLT 600 tape drive base plate is an aluminum die casting with precisely machined surfaces. The casting acts as the support platform for the other modules and for the tape drive enclosure. The base plate also includes the precision mounting holes used to install SDLT 600 tape drives into a server or tape library. The SDLT 600 tape drive base plate, and therefore the entire SDLT 600 tape drive, conforms to the 5.25 inch, full-height form factor.

Data Cartridge Receiver

On tape insertion, the data cartridge receiver assembly guides the tape into its operating position, opens the data cartridge door, unlocks the data cartridge brakes, engages the data cartridge drive motor, and secures the tape for operation. On tape ejection, the data cartridge receiver assembly reverses the process and automatically ejects the tape a fixed distance from the front of the tape drive.

Positive Engagement Tape Leader Buckling Mechanism

The buckling mechanism is responsible for engaging the tape leader upon data cartridge load and disengaging it on data cartridge unload. See Section 2.3.6, “Positive Engagement Tape Leader Buckling Mechanism” on page 2-4 for more information.

2.4.3 Front Panel Module

The Front Panel Module (FPM) of the system (sometimes referred to as the bezel) performs a number of functions:

- Protecting the front of the TCM from physical damage
- Channeling airflow through the system
- Aligning the data cartridge when it is inserted into the system
- Providing system status and information through LEDs
- Enabling data cartridge ejection
- Delivering the overall cosmetic look of the system.

The FPM is a single module with lenses for the system’s LEDs and a button to activate the drive eject switch. The SDLT 600 tape drive front panel contains no electronics.

2.4.4 Electronic Interface Module

The Electronic Interface Module (EIM) is the electronic heart of the SDLT 600 tape drive system. It provides the main control function for the system and the interface from the system to the host computer, library, or autoloader. The EIM provides the Advanced PRML feature of Quantum's SDLT technology. Refer to "Advanced Partial Response Maximum Likelihood" on page 2-4 for a brief description of PRML.

The EIM consists of two major boards: the Integrated Controller Module (ICM), and a separate Host Interface Module (HIM). The ICM contains the main controller and servo microprocessor, the custom-designed SDLT ASICs, and the cache memory while the HIM implements the interface between the host system and the tape drive. This allows easy configuration of the tape drive to match different host interfaces by simply substituting the appropriate HIM card.

As with the other major modules of the SDLT technology, the EIM is manufactured and tested as a distinct module.

2.4.5 Super DLTtape II Data Cartridge

As with all tape technologies, the Super DLTtape II data cartridge is a key part of the overall system. The main function of the data cartridge is to provide the magnetic recording media used by the system to store customer information. The data cartridge also provides the protective casing that allows safe media movement and storage.

From the outside, the Super DLTtape II data cartridge looks very similar to the Super DLTtape I and DLTtape VS1 data cartridges. The basic geometry, write protection switch, and label space are the same. This simplifies the integration of the SDLT 600 tape drive into existing operating environments and into automated tape libraries. The Super DLTtape II data cartridge is easy to recognize; it has a different color than the Super DLTtape I and DLTtape VS1 data cartridges, and contains a distinctive pattern molded into the shell. The DLTtape logo and the product name are also molded into the shell, which ensure you have a genuine Quantum Super DLTtape II data cartridge.

2.5 Quantum Diagnostics Tools

Quantum frequently provides new and updated tools to use with its tape drives. These tools include such items as upgrades for product software and firmware, and diagnostic software that may be newly developed. All these tools are available on Quantum's web site.

NOTE: These tools are only available to registered Quantum customers.

Refer to the following procedure to access these tools.

1. Go to the Quantum web site: ***http://www.quantum.com***.
2. Click **SERVICE AND SUPPORT** in the upper menu bar. This opens the Service and Support window.
3. Explore the various pages that comprise Service and Support until you find what you need.

New tools and utilities get added frequently, so check back often.

2.6 TapeAlert

SDLT 600 tape drives are delivered with TapeAlert™ features built in. The internal SDLT firmware constantly monitors the device's hardware and media, checking for errors and potential difficulties. It flags any problems identified on the SCSI log page, where 64 bytes are reserved for use by TapeAlert.

After a backup, the TapeAlert-compatible backup application automatically reads the device's TapeAlert SCSI log page to check for any problems. If an error is flagged, your backup software displays a clear warning message on your screen, and adds the TapeAlert messages to its logs. These messages are standard across all applications that support TapeAlert, and give clear explanation of the problem and suggested resolution. For example, if you were attempting to back up onto an expired tape, you would see the following message:

WARNING: The data cartridge has reached the end of its useful life:

Copy any data you need to another tape.
Discard the old tape.

2.7 Medium Auxiliary Memory

Medium Auxiliary Memory (MAM) is a feature in the SDLT 600 tape drive that produces various attributes about the data cartridge and records them in a log file on the media itself. These attributes provide the underlying information for Quantum's DLTSage suite of predictive and preventive maintenance diagnostics software.

For more information about MAM, see the *SDLT 600 SCSI Interface Guide (81-81200-01)* or the *SDLT 600 Fibre Channel Interface Guide (81-81202-01)*. For more information about DLTSage, see the *DLTSage Implementation Guide (81-81201-01)*.

CHAPTER 3

SDLT 600 Tape Drive Specifications

This chapter describes various specifications that apply to the Quantum SDLT 600 tape drive system:

- "Product Specifications" provides tape drive specifications
- "Functional Specifications" provides functional specifications for the tape drive
- "Environmental Specifications" provides environmental specifications for operating the tape drive
- "Recording Media Specifications" provides media specifications for Super DLTtape II data cartridges.

3.1 Product Specifications

The following subsections contain full product specifications for the Quantum SDLT 600 tape drive.

3.1.1 Host Interface

The tabletop model of the SDLT 600 tape drive has an Ultra 160 SCSI interface. The internal model has either a Fibre Channel interface or an Ultra 160 SCSI interface. These versions provide two possible parallel SCSI interface types and one Fibre Channel interface type that can be configured to run at a fast speed or a low speed. For details, refer to Table 3-1 on page 3-2, which provides speeds and options for the SDLT 600 tape drive interface versions.

Table 3-1. SDLT 600 Tape Drive Interface Versions Speeds and Options

Interface Versions	Speeds	Protocol Options
Fibre Channel *	• 100 MB/second • 200 MB/second	• Class3 • Connect to N port, NL port, FL port • FC-MI • FC-AL-2 • FCP-2 • FC-FS • SCSI-3 (SAM-2, SPC-2, or SSC)
Ultra 160	• 160 MB/second maximum burst speed **	• Multi-mode Single-Ended (MSE) provides one of two differential senses: - Low Voltage Differential (LVD) running up to 160 MB/second, or - Single Ended (SE) running up to 40 MB/second • Ultra 160 2/FAST-20/Asynchronous • SCSI-3 (SAM-2, SPC-2, and SSC) • Supports up to 15 hosts
* Fibre Channel interface not available in the tabletop model. ** The SCSI bus itself limits this speed, not the design of SDLT 600 tape drive or Super DLTtape II media.		

Ultra 160 SCSI Interface

The Ultra 160 SCSI interface provides a low-voltage differential (LVD) mode running up to 160 MB/second and a single-ended (SE) mode running up to 40 MB/second.

NOTE: The host computer's SCSI controller card may limit these speeds. To achieve the best performance, make sure the SCSI controller card can operate at 160 MB/second.

The tape drive automatically senses the SCSI bus mode and switches between LVD and SE accordingly. Although the tape drive defaults to LVD, it switches to SE if the SCSI bus operates in SE mode. For example, if the SCSI controller card is SE (or multimode set to SE), the tape drive automatically switches to SE mode. Also, if any device on the SCSI bus is SE, the entire bus switches to SE, including the tape drive.

In SE mode, the SCSI bus can support up to 7 devices using cable lengths up to 3 meters. In LVD mode, the SCSI bus can support up to 15 devices using cable lengths up to 25 meters.

For more information about the SCSI interface, refer to the *SDLT 600 SCSI Interface Guide (81-81200-01)*.

Fibre Channel Interface

The Fibre Channel interface runs at speeds up to either 1 Gb/second or 2 Gb/second, depending on the configuration you choose during installation.

Fibre Channel can support up to 126 devices in a loop configuration. Longwave transceivers (with fiber optic cable) support distances up to 10 kilometers; shortwave transceivers (with fiber optic cable) support distances up to 500 meters.

For more information about the Fibre Channel interface, refer to the *SDLT 600 Fibre Channel Interface Guide (81-81202-01)*.

3.1.2 Physical Interface

The SDLT 600 tape drive has the interfaces shown in Table 3-2 available from the back panel (per type, per port).

Table 3-2. SDLT 600 Tape Drive Interfaces

Interface Versions	Physical Characteristics
Fibre Channel	Topology-constrained (force point-to-point)
	1 Gbit or 2 Gbit interface (selectable at time of installation)
	850 nanometer LC connector transceiver (optional)
Parallel SCSI	MSE, LVD
	Ultra 160
	SCSI ID (user selectable at time of installation)
	TERMPWR connector style: 4-pin
	Connector style: 68-pin high density SCSI

3.1.3 Physical Dimensions and Weights

Table 3-3 provides physical dimensions for the SDLT 600 tape drive system.

Table 3-3. SDLT 600 Tape Drive Physical Dimensions

	Internal Version	Library Version	Tabletop Version
Height	82.55 mm (3.25 in.) without front bezel 85.73 mm (3.38 in.) with front bezel	82.55 mm (3.25 in.) without front bezel 85.73 mm (3.38 in.) with front bezel	164.46 mm (6.48 in.)
Width	146.05 mm (5.75 in.) behind front bezel 148.59 mm (5.85 in.) with front bezel	146.05 mm (5.75 in.) behind front bezel 148.59 mm (5.85 in.) with front bezel	174.75 mm (6.88 in.)
Depth	203.20 mm (8.00 in.) from back of front bezel 215.40 mm (8.48 in.) including front bezel	203.20 mm (8.00 in.) from back of front bezel 212.22 mm (8.36 in.) including front bezel	320.04 mm (12.60 in.)
Note: Mounting hole pattern for the bottom and sides of the system is industry standard.			

Table 3-4 shows the weights of the SDLT 600 tape drive.

Table 3-4. SDLT 600 Tape Drive Shipping Weight

	Internal Version	Tabletop Version
Weight*	2.38 kg (5 lbs. 4 oz)	6.27 kg (13 lbs. 13 oz)
Shipping Weight*	3.77 kg (8 lbs. 5 oz)	9.90 kg (21 lbs. 13 oz)
* Weights depend on configuration. The packaging used may change the shipping weight.		

3.1.4 Compression

The tape drive contains on-board hardware to compress and decompress data using a DLZ algorithm. The default setting for data compression is on.

3.1.5 Storage Capacity

Table 3-5 provides native and compressed capacity ranges for the Super DLTtape II data cartridge:

Table 3-5. SDLT 600 Tape Drive Storage Capacity

Mode	Capacity
Native Storage Capacity	300 GB
Compressed Storage Capacity	600 GB (2:1 compression ratio)

In accordance with industry practice, a typical compression ratio of 2:1 is quoted. The redundancy and type of data files being written determine the actual compression ratios achieved.

3.1.6 Data Integrity

SDLT 600 tape drive data transfer errors are extremely rare; Table 3-6 shows data integrity for the overall SDLT 600 tape drive system.

Table 3-6. Data Transfer Error Rates

Error Type	Frequency
Detected, Recoverable (ECC) READ	< 1 error in 10^6 bytes read
Detected, Unrecoverable READ	< 1 error in 10^{17} bits read
Undetected READ	< 1 error in 10^{27} bits read
Rewrite of Data	< 1 per 10^6 bytes written

3.1.7 Maximum Data Transfer Rate

Table 3-7 shows the maximum sustained (and burst) data transfer rates for the SDLT 600 tape drive.

Table 3-7. Maximum Data Transfer Rates

Configuration	Native	Compressed*	Burst Max**
SCSI Ultra 160 (MSE LVD mode)	36 MB/sec	72 MB/sec	160 MB/sec
SCSI Ultra 160 (SE mode)	36 MB/sec	40 MB/sec	40 MB/sec
Fibre Channel (1 Gbps)	36 MB/sec	72 MB/sec	100 MB/sec
Fibre Channel (2 Gbps)	36 MB/sec	72 MB/sec	200 MB/sec

* The compression rates shown assume an industry standard 2:1 compression ratio. Actual compression ratios achieved depend on the redundancy of data files being recorded. For non-compressible (expanding) data, this results in a reduction in capacity and transfer rate for the data. Fully random data is the worst case for compressibility.
** The SCSI bus limits burst speeds, not the design of SDLT 600 tape drive or Super DLTtape II media.

NOTE: Cable lengths and cable type may limit attainable transfer rate; for details, refer to: *SDLT 600 Design and Integration Guide (81-81196-01).*

3.1.8 Head Life and MTBF

The projected mean time between failures (MTBF) for the overall SDLT 600 tape drive system is 250,000 hours, not including the heads. Head life is a minimum of 30,000 tape motion hours and an average of 50,000 media motion hours.

NOTE: The manufacturer does not warrant that predicted MTBF is representative of any particular unit installed for customer use. Actual figures vary from unit to unit.

3.1.9 Media Durability

Table 3-8 shows the number of media passes and full media uses to expect from a Super DLTtape II data cartridge.

Table 3-8. Super DLTtape II Data Cartridge Media Durability

	Media Durability
Media passes*	1,000,000
Full media uses**	250

* A media pass occurs with any movement (in either direction) of the surface of the media over the tape head.
** A full media use is an operation that reads or writes (with verify off) the full capacity of the data cartridge.

3.1.10 Data Cartridge Life Expectancy

Table 3-9 shows the number of load and unload cycles you can expect before the data cartridges need to be replaced.

Table 3-9. Loading and Unloading the Data Cartridge (Maximum)

	Super DLTtape II Data Cartridge
Data cartridge load/unload cycles*	5,000
Media insertions**	20,000

* A load/unload cycle is when a data cartridge is inserted into the receiver, loaded to BOT, calibrated, and then unloaded.
** An insertion is when a data cartridge is inserted into the receiver and then unloaded.

3.1.11 Positive Engagement Tape Leader Buckling Mechanism

This buckling mechanism engages the tape leaders upon data cartridge load and disengages them upon data cartridge unload.

Component level tests of buckle arm components have shown at least 250,000 cycles on an SDLT 600 tape drive without failure, breakage, or binding; this includes the take-up leader, the supply leader, and the media itself.

3.2 Functional Specifications

The following subsections contain functional specifications for the Quantum SDLT 600 tape drive.

3.2.1 Performance Data

Table 3-10 provides performance data for the SDLT 600 tape drive system. For a comparison of SDLT 600 tape drive storage capacities, refer to Section 3.1.5, “Storage Capacity” on page 3-5.

Table 3-10. SDLT 600 Tape Drive Performance Data

Feature	SDLT 600 Tape Drive
Drive Read/Write Transfer Rate*	36 MB/second, native 72 MB/second, compressed
Tracks	40 logical tracks 640 physical tracks
Track Density	1502 tracks per inch (tpi)
Linear Bit Density	233 Kbits per inch (Kbpi)
Read/Write Tape Speed	108 inches per second (ips)
Rewind Tape Speed	160 ips
Linear Search Tape Speed	160 ips
Average Rewind Time**	77 seconds
Maximum Rewind Time**	156 seconds
Average Access Time** (from BOT)	79 seconds
Maximum Access Time** (from BOT)	190 seconds
Load to BOT**	18 seconds (typical) 63 seconds (unformatted tape)
Unload from BOT**	19 seconds
Nominal Tape Tension	Stationary: 3.0 ± 0.5 oz Operating Speed: 3.5 ± 0.5 oz

* Depending on data type and SCSI bus limitations/system configuration.

** Note that data is typical; times may be longer if error recovery time is necessary, or if the command times out for any reason. For information on SCSI command timeout values, refer to *SDLT 600 Design and Integration Guide*, 81-81196-01.

3.2.2 Shock and Vibration Specifications

The following tables provide non-operating and operating shock and vibration specifications for the SDLT 600 tape drive system.

Table 3-11. Non-Operating Shock Specifications (Unpackaged)

Shock (Unpackaged)		
Pulse Shape	**Square wave**	**½ sine pulse**
Peak Acceleration	40 G	140 G
Duration	10 ms (180 inches/second)	2 ms
Application	X,Y,Z axes, twice in each axis (once in each direction)	

Table 3-12. Non-Operating Shock Specifications (Packaged, Drop)

Shock (Packaged, Drop)	**Height of Drop**	**Number of Drops**	**Package Weight**
Drop	42 inches	16 drops total	0 lbs. < package weight ≤ 20 lbs.
	36 inches	16 drops total	20 lbs. < package weight ≤ 50 lbs.

Table 3-13. Non-Operating Vibration Specifications (Unpackaged)

Vibration (Unpackaged)		
Type	**Sine**	**Sweep**
Frequency Range	5 to 500 to 5 Hz	Upward and downward sweep
Acceleration Level	0.02" DA 1.0 G	Between 5 and 31 Hz (crossover) Between 31 and 500 Hz (crossover)
Application	X,Y,Z axes	Sweep rate = ½ octave/minute
Type	**Random**	
Frequency Range	10 to 500 Hz	
Acceleration Level	2.0 G	
PSD Envelope	0.008 G^2/Hz	
Application	X,Y,Z axes	Sweep rate = 60 minutes/axis

Table 3-14. Non-Operating Vibration Specifications (Packaged)

Vibration (Packaged)	
Type	**Random**
Frequency Range	Truck Profile* (0.5 Grms) Air Profile* (1.0 Grms)
Application	X,Y,Z axes (30 minutes, each profile and each axis, for a total of 3 hours)
Type	**Sine, Sweep, and Dwell**
Frequency Range	5 to 150 to 5 Hz; 0.5 octave/minute, 0.5 G
Application	X,Y,Z axes; dwell at lowest resonant frequency in axis for 30 minutes. Additional 30 minutes for each additional resonance; up to 4 resonances total.
* Air and truck profiles are specified in ASTM D4728, Standard Test Method for Random Vibration Testing of Shipping Containers.	

Table 3-15. Operating Shock and Vibration Specifications

Shock		
Pulse Shape	**½ sine pulse**	
Peak Acceleration	10 G	
Duration	10 ms	
Application	X,Y,Z axes, twice in each axis (once in each direction)	
Vibration		
Type	**Sine**	**Sweep**
Frequency Range	5 to 500 to 5 Hz	Upward and downward sweep
Acceleration Level	0.25 G 0.010" DA	Between 22 and 500 Hz Between 5 and 22 Hz (crossover)
Application	X,Y,Z axes	Sweep rate = 1.0 octave/minute

3.2.3 Current and Power Requirements

Table 3-16 on page 3-12 lists the current and power requirements for the two versions of the SDLT 600 tape drive system (internal and tabletop) configured with the SCSI interface. Table 3-17 on page 3-13 lists the current and power requirements for the internal version of the SDLT 600 tape drive system configured with the Fibre Channel interface. The library version of the SDLT 600 tape drive uses the same amount of power as the internal version with both the SCSI and Fibre Channel interfaces. The tabletop version requires AC power.

The tape drive draws the highest current (and power) during the native write modes. *Standby* is measured with the tape loaded and tensioned or untensioned, and *Idle* is measured with power on with no tape loaded. (The power drawn in these two modes is similar enough that they are listed together.)

NOTE: In Table 3-16 and Table 3-17, the current and DC power values pertain to the internal tape drive, while the AC power values apply to the tabletop tape drive.

Table 3-16. Current and Power Requirements (SCSI Interface)

Mode	5 V Current (A) MaxPk[1]	MaxMean[2]	Typ[3]	12 V Current (A) MaxPk[1]	MaxMean[2]	Typ[3]	DC Power (W) Max[4]	Typ[5]	AC Power (W) Max[6]	Typ[7]
Standby/Idle	2.6	2.6	2.4	0.2	0.1	0.1	14	14	47	45
Media Loading/ Unloading	6.2	5.3	3.4	2.7	0.9	0.7	30	26	64	56
600 Write– Motor Start[8]	4.3	4.0	3.7	1.3	0.3	0.3	23	22	51	48
600 Write– Streaming	5.4	5.1	4.9	0.7	0.5	0.4	30	30	65	63
Max for SDLT 600 tape drive Modes[9]	n/a	5.3	n/a	n/a	0.9	n/a	30	n/a	70	n/a

1. The Max-Peak value represents short current spikes drawn for durations of < 50ms. On the 12V supply, the peaks correspond to the pulse-width-modulated switching of the motors. These values are calculated from the average of Peak-ripple-current + 2 sigma, measured at nominal DC voltage.
2. The Max-Mean value is the average of the maximum RMS current drawn during this operating mode. These values are calculated from the average of RMS current + 3 sigma, measured at nominal DC voltage.
3. The typical current is calculated from the average of all RMS current drawn during this operating mode, measured at nominal DC voltage.
4. The Max DC power is calculated from the typical DC power + 3 sigma, measured at nominal DC voltage. This value takes into account that the peak currents on the 5V and 12V do not occur at the same time.
5. The Typical DC power is calculated from the average RMS DC power drawn during this operating mode, measured at nominal DC voltage. This value also takes into account that the peak currents on the 5V and 12V do not occur at the same time.
6. The Max AC power is calculated from the typical AC power in tabletop tape drives + 3 sigma.
7. The Typical AC power is calculated from the average of AC power drawn in tabletop tape drives.
8. These events last < 1 second and occur at a duty cycle of less than 25%.
9. The Max values for each mode are based on the Max-Mean values, since the peak values are of very short duration.

(**Common Notes**)

(**1**) Voltage tolerance: 5V ±5%, 12V ±5%; Room temperature 24 °C. AC power measured at 117 V, 60 Hz.

(**2**) DC Current, MaxMean, and DC/AC Power Max refer to the statistically calculated maximum average requirement based on a sample population of tape drives. These values do not reflect the peak current or power requirement; this amount is given by the DC MaxPk current.

Table 3-17. Current and Power Requirements (Fibre Channel Interface)

Mode	5 V Current (A) MaxPk[1]	MaxMean[2]	Typ[3]	12 V Current (A) MaxPk[1]	MaxMean[2]	Typ[3]	DC Power (W) Max[4]	Typ[5]	AC Power (W) Max[6]	Typ[7]
Standby/Idle	3.5	3.5	3.1	0.2	0.1	0.1	18	17	n/a	n/a
Media Loading/ Unloading	5.4	4.4	4.4	2.7	0.7	0.7	30	30	n/a	n/a
600 Write– Motor Start[8]	4.6	4.3	4.2	1.3	0.3	0.3	25	25	n/a	n/a
600 Write– Streaming	5.9	5.6	5.5	0.7	0.5	0.4	33	33	n/a	n/a
Max for SDLT 600 tape drive Modes[9]	n/a	5.6	n/a	n/a	0.7	n/a	33	n/a	n/a	n/a

1. The Max-Peak value represents short current spikes drawn for durations of < 50ms. On the 12V supply, the peaks correspond to the pulse-width-modulated switching of the motors. These values are calculated from the average of Peak-ripple-current + 2 sigma, measured at nominal DC voltage.
2. The Max-Mean value is the average of the maximum RMS current drawn during this operating mode. These values are calculated from the average of RMS current + 3 sigma, measured at nominal DC voltage.
3. The typical current is calculated from the average of all RMS current drawn during this operating mode, measured at nominal DC voltage.
4. The Max DC power is calculated from the typical DC power + 3 sigma, measured at nominal DC voltage. This value takes into account that the peak currents on the 5V and 12V do not occur at the same time.
5. The Typical DC power is calculated from the average RMS DC power drawn during this operating mode, measured at nominal DC voltage. This value also takes into account that the peak currents on the 5V and 12V do not occur at the same time.
6. The Max AC power is calculated from the typical AC power in tabletop tape drives + 3 sigma.
7. The Typical AC power is calculated from the average of AC power drawn in tabletop tape drives.
8. These events last < 1 second and occur at a duty cycle of less than 25%.
9. The Max values for each mode are based on the Max-Mean values, since the peak values are of very short duration.

(**Common Notes**)

(**1**) Voltage tolerance: 5V ±5%, 12V ±5%; Room temperature 24 °C. AC power measured at 117 V, 60 Hz.

(**2**) DC Current, MaxMean, and DC/AC Power Max refer to the statistically calculated maximum average requirement based on a sample population of tape drives. These values do not reflect the peak current or power requirement; this amount is given by the DC MaxPk current.

3.2.4 SDLT 600 Tape Drive System Recording Method

The SDLT 600 tape drive system uses the Partial Response Maximum Likelihood (PRML) 32/33 encoding method for reading/writing SDLT 600 tape drive format. It uses the same algorithmm for reading SDLT 220, SDLT 320, and the DLT VS160 tape drive formats.

3.3 Environmental Specifications

The SDLT 600 tape drive system operates in environments that include general offices and work spaces with systems capable of maintaining standard comfort levels.

The following subsections provide the environmental specifications for the SDLT 600 tape drive systems (both the internal and the tabletop configurations). For long-term trouble-free operation, the manufacturer strongly recommends that SDLT 600 tape drives be used in a clean, smoke-free environment.

3.3.1 Air Flow Requirements

The internal tape drive requires adequate air flow to dissipate the heat resulting from continuous drive operation. Specifically, the air flow must be sufficient to keep the tape path temperature below 50 °C.

To allow enough air into the tape drive to keep the tape path below this temperature, it is important to keep the cooling holes in the rear and the grill in the front of the tape drive clear of any obstructions that may hinder the air flow. For more details about airflow, refer to the *SDLT 600 Design and Integration Guide (81-81196-01).*

NOTE: It is also important to limit the ambient air temperature to no greater than 40 °C.

3.3.2 Temperature and Humidity

The ambient operating environment for the tape drive may not exceed the limits shown in Table 3-18. (The specifications shown in the table are valid for both the internal and tabletop tape drives.)

Table 3-18. Temperature and Humidity Specification

Specification	Operating Limits	Non-Operating Limits (Power On, No Tape Loaded)
Wet Bulb Temperature	25 °C (77 °F)	25 °C (77 °F)
Dry Bulb Temperature Range	10 °C to 40 °C (50 °F to 104 °F)	10 °C to 40 °C (50 °F to 104 °F)
Temperature Gradient	11 °C (20 °F)/hour (across range)	15 °C (27 °F)/hour (across range)
Relative Humidity	20% to 80% (non-condensing)	10% to 90% (non-condensing)
Humidity Gradient	10%/hour	10%/hour

3.3.3 Storage and Shipment

The ambient storage and shipment environment for the tape drive may not exceed the limits shown in Table 3-19. (The specifications shown in the table are valid for both the internal and tabletop tape drives.)

Table 3-19. Tape Drive Storage and Shipment Specifications

Specification*	Storage (Unpacked or Packed)	Shipping
Wet Bulb Temperature	46 °C (114 °F)	46 °C (114 °F)
Dry Bulb Temperature	–40 °C to 66 °C (–40 °F to 150 °F)	–40 °C to 66 °C (–40 °F to 150 °F)
Temperature Gradient	20 °C (36 °F)/hour (across range)	20 °C (36 °F)/hour (across range)
Relative Humidity	10 to 95% (non-condensing)	10 to 95% (non-condensing)
Humidity Gradient	10%/hour	10%/hour

* Note that these specifications apply to the tape drive only. Media specifications are listed in "Recording Media Specifications" on page 3-16.

3.3.4 Altitude

Both the internal and tabletop tape drives operate in normal pressures from –500 to 10,000 feet when operated within the ambient operating environments specified in Section 3.3.2, “Temperature and Humidity” on page 3-15.

The SDLT 600 tape drive will operate to 30,000 feet for temperatures within 15 ± 5 °C.

3.4 Recording Media Specifications

Super DLTtape II media differs slightly from previous generations of Super DLTtape media. Table 3-20 shows overall specifications for Super DLTtape II media.

Table 3-20. Super DLTtape II Media Specifications

Characteristic	Specification
Overall tape thickness	8.0 µm
Media length, total	2066 feet
Media length, usable	1957 feet

3.4.1 Media Structure

Super DLTtape II media comprises several layers, as shown in Figure 3-1 on page 3-17.

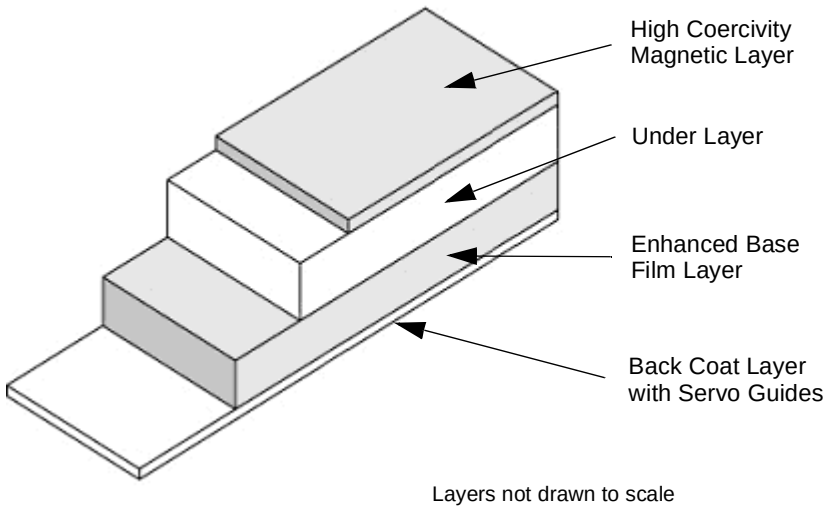

Figure 3-1. Multiple Layers Comprise Super DLTtape II Media

3.4.2 Physical Data Cartridge

A durable plastic case encloses the Super DLTtape II media, as shown in Figure 3-2.

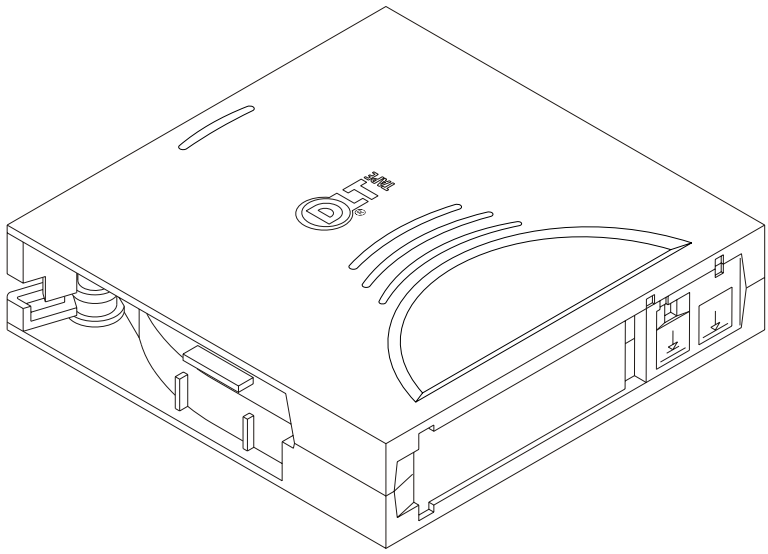

Figure 3-2. Super DLTtape II Data Cartridge

3.4.3 Media Shipping, Operating, and Storage Specifications

Table 3-21 describes the optimum media shipping conditions.

Table 3-21. Super DLTtape II Media Shipping Limits

Shipping Conditions	
Temperature	–18 °C to 49 °C (0 °F to 120 °F)
Relative Humidity	20 to 80% (non-condensing)
Maximum Wet Bulb Temperature	26 °C (79 °F)
Maximum Dew Point	2 °C (36 °F)

Table 3-22 describes the optimum media operation conditions.

Table 3-22. Super DLTtape II Media Operating Limits

Operating Conditions	
Temperature	10 ° to 40 °C (50 ° to 104 °F)
Relative Humidity	20% to 80% (non-condensing)

Table 3-23 describes the optimum media storage conditions.

Table 3-23. Super DLTtape II Media Storage Limits

Storage Conditions	Archival	Non Archival
Temperature	18 ° to 28 °C (64 ° to 82 °F)	16 ° to 32 °C (60 ° to 90 °F)
Relative Humidity	40% to 60% (non-condensing)	20% to 80% (non-condensing)

3.4.4 Backward-Read Compatibility Transfer Rates

The SDLT 600 tape drive system features a backward-read compatibility (BRC) mode. When in BRC mode, the SDLT 600 tape drive is capable of reading SDLT 220 and SDLT 320 tape formats in a Super DLTtape I data cartridge, as well as the DLT VS160 tape format in the DLTtape VS1 data cartridge.

Table 3-24 lists the BRC transfer rates for the SDLT 600 tape drive.

Table 3-24. SDLT 600 Tape Drive Backward-Read Compatibility (BRC) Transfer Rates

Format	Data Cartridge Type	Native Capacity	BRC Transfer Rate (80% of Native Read Transfer Rate)*
SDLT 320 Tape Drive	Super DLTtape I	160 GB	12.8 MB/sec**
SDLT 220 Tape Drive	Super DLTtape I	110 GB	8.8 MB/sec**
DLT VS160 Tape Drive	DLTtape VS1	80 GB	6.4 MB/sec**

* The manufacturer strives to operate BRC transfer rate at 100% of native read transfer rate, but guarantees 80%.
** Transfer rates shown are nominal based on 80% of actual native read transfer rate of uncompressed data.

NOTE: SDLT 600 tape drive will eject a data cartridge written in DLT formats other than DLT VS160.

CHAPTER 4

Installing Your Tape Drive

This chapter describes how to install the SDLT 600 tape drive. This includes configuration jumper settings, connector pin assignments, installation instructions, power and signal cabling descriptions, and operating instructions. This chapter also includes information on configuring and connecting the tabletop version of the tape drive into a system.

This chapter covers the following topics:

- "Warranty Note" provides a general reminder of certain precautions to follow so that you do not void your warranty.
- "Safety, Handling, and ESD Protection" describes appropriate safeguards to use when working with the SDLT 600 tape drive system.
- "Pre-Installation Guidelines" describes proper steps to take before installing the tape drive in a system. This includes recording the model and serial numbers, and checking that the proper SCSI (or Fibre Channel) controller and cable have been delivered.
- "Configuring and Installing an Internal Tape Drive with SCSI Interface" describes how to configure and install an internal tape drive with the SCSI interface into a system.
- "Configuring and Installing an Internal Tape Drive with Fibre Channel Interface" describes how to configure and install an internal tape drive with the Fibre Channel interface into a system.
- "Configuring and Installing a Tabletop Tape Drive" describes how to configure and install the tabletop version of the tape drive.
- "Confirming the Installation" describes how to confirm that the tape drive has been installed correctly.

4.1 Warranty Note

Please refer to the warranty before installing your tape drive. Certain actions taken during installation could void the warranty if not properly conducted.

Generally, the Limited Product and Limited Repair Warranties are contingent upon proper use in the application for which the product is intended; and do not cover the product if you perform any of the following actions:

- Modify the product without the manufacturer's written approval.
- Subject the product to unusual physical, environmental, or electrical stress, including damage caused by handling or shipping in unapproved containers or packaging.
- Disturb any warranty labels, or the integrity of the product in any other way.
- Remove or damage the serial number label to the extent that warranty status of the product cannot be determined.

4.2 Safety, Handling, and ESD Protection

Inappropriate or careless handling of SDLT 600 tape drive systems may result in damage to the product. Follow the precautions and directions to prevent damaging the SDLT 600 tape drive system. In addition, follow the steps in Section 4.3, "Pre-Installation Guidelines" to ensure that you have the correct hardware for your system configuration.

4.2.1 Safety Precautions

For your safety, follow all safety procedures described here and in other sections of the manual.

1. Power off the system before installing or removing the tape drive to prevent the possibility of electrical shock or damage to the tape drive. Unplug the unit that contains—or is to contain—the tape drive from AC power to provide an added measure of safety.

2. Read, understand, and observe all label warnings.

3. The POS uses a Class I laser product. This laser product complies with 29 CFR 1200 and 29 CFR 1910 as applicable on the date of manufacture.

> **WARNING!** If you open the tape drive chassis, you may become exposed to invisible laser emission which could be harmful if you are directly exposed to the beam.

4.2.2 Handling

Damage to the SDLT 600 tape drive system can occur as the result of careless handling, vibration, shock, or electrostatic discharge (ESD). For more details about ESD, refer to "Electrostatic Discharge Protection" on page 4-3.

> **CAUTION** Always handle the SDLT 600 tape drive system with care to avoid damage to the precision internal components. Hold the internal tape drive by the sides, or the tabletop tape drive by the bottom. Never hold either tape drive by inserting fingers into the receiver area on the front of the tape drive. Damage to the receiver area may occur if you lift or carry it in this manner.

Follow these guidelines to avoid damage to the tape drive:

- Always observe prescribed ESD precautions.
- Keep the internal tape drive in its anti-static bag until ready to install.
- Always use a properly fitted wrist strap or other suitable ESD protection when handling the tape drive.
- Hold the internal tape drive only by its sides.
- Do not bump, jar, or drop the tape drive. Use care when transporting the tape drive.
- Always handle the tape drive carefully and gently. A drop of ¼ inch onto a bench or desktop may damage a tape drive.
- Never place the tape drive so that it rests on its front bezel. Always gently place the tape drive flat, printed circuit board (PCB) side down, on an appropriate ESD-protected work surface to avoid the tape drive being accidentally knocked over.
- Do not pack other materials with the tape drive in its anti-static bag.
- Place the tape drive in the anti-static bag before placing it in a shipping container.
- Do not stack objects on the tape drive.
- Do not expose the tape drive to moisture.
- Do not place foreign objects inside the tape drive's receiver area.

4.2.3 Electrostatic Discharge Protection

Several electrical components of the SDLT 600 tape drive system are sensitive to static electricity and electrostatic discharge (ESD). Even a static buildup or discharge that is too slight to feel can be sufficient to destroy or degrade a component's operation.

To minimize the possibility of ESD-related damage to the system, the drive's manufacturer strongly recommends using both a workstation anti-static mat and an ESD wrist strap. When correctly installed and properly used, these devices reduce the buildup of static electricity that might harm the system.

Observe the following precautions to avoid ESD-related problems:

- Leave the tape drive in its anti-static bag until you are ready to install it in the system.
- Always use a properly fitted and grounded wrist strap or other suitable ESD protection when handling the SDLT 600 tape drive system and observe proper ESD grounding techniques.
- Hold the tape drive only by its sides.
- Place the tape drive on a properly grounded anti-static work surface pad when it is out of its protective anti-static bag.
- Do not use the bag as a substitute for the work surface anti-static pad. The outside surface of the bag may not have the same anti-static properties as the inside surface. It could actually increase the possibility of ESD problems.
- Do not remove covers to use any test equipment to check components on the PCBAs. There are no user-serviceable components on the tape drive.

4.3 Pre-Installation Guidelines

Before you begin, check the contents of the box and record the applicable numbers. Since the tape drive may be *either* SCSI *or* Fibre Channel interface type (*never both*), check for SCSI (or Fibre Channel) controller and associated cable compatibility. Also confirm software and operating system compatibility. Finally, check the tape drive to be certain it is operating properly before installing it in a system.

1. Unpack and review the contents of the box for any physical damage. If you find damaged items, contact your tape drive provider.

2. Record the model and serial number of the SDLT 600 tape drive system. These numbers provide specific information about the SDLT 600 tape drive system and will be very helpful if you must contact technical support. You can find these numbers on the bottom of the tape drive enclosure.

The Model Number is a character string usually beginning with the letters “TR.”

Model Number: TR_____

The Serial Number is a character string beginning with the letters “RB.”

Serial Number: RB_____

3. Check the enclosed SCSI (or Fibre Channel) cable to ensure it is compatible with the SCSI (or Fibre Channel) controller card in the host computer.

4. Check the SCSI (or Fibre Channel) interface on the host computer to ensure that it is compatible with the tape drive. Refer to Table 3-1 on page 3-2 for a list of the possible interfaces that are available and the various options with each. Remember that a single ended or low voltage differential tape drive will only work with a system that has an MSE controller card installed.

5. Confirm that your back-up software and operating system are compatible with the tape drive. Refer to ***www.dlttape.com*** for the most up-to-date compatibility information.

4.4 Configuring and Installing an Internal Tape Drive with SCSI Interface

This section provides information for configuring and installing a tape drive with SCSI interface into a system. See “Configuring and Installing a Tabletop Tape Drive” on page 4-20for information on configuring and installing a tabletop tape drive.

CAUTION	Before you begin, review the safety, ESD, and handling precautions described at the beginning of this chapter to avoid personal injury or damage to equipment.

Configuring the SDLT 600 tape drive system with SCSI interface includes the following tasks:

- Setting the SCSI ID for the tape drive (default = SCSI ID 5)
- Configuring the tape drive to provide TERMPWR
- Setting the configuration jumper (default = wide SCSI enabled).

If you want to change any of the settings, refer to the applicable subsection; otherwise proceed directly to the tape drive’s installation procedures in “Installing the Internal Tape Drive” on page 4-9.

4.4.1 Setting the Internal Tape Drive SCSI ID

Each device on the SCSI bus must have a unique SCSI ID address assigned to it. For specific recommendations for assigning SCSI IDs, refer to your system or SCSI controller documentation.

Set the SCSI ID by using jumpers on a set of pins at the rear of the tape drive. This section discusses setting the SCSI ID on the internal tape drive via the jumper block. Table 4-1 and Table 4-2 show the SCSI ID address and jumper settings.

Figure 4-1 on page 4-6 shows the empty 10-pin jumper block that you use to set the SCSI ID. Figure 4-2 on page 4-7 shows the location of the 10-pin SCSI ID block on the back of the tape drive.

If you decide it is necessary to change the tape drive's SCSI ID, use your fingers to move the jumpers to the pattern corresponding to the ID you want (see Figure 4-1 and the related table of SCSI jumper settings in Table 4-1 on page 4-7 and Table 4-2 on page 4-8).

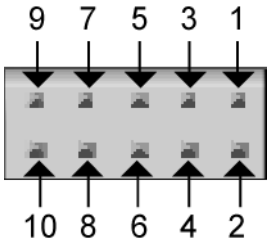

Figure 4-1. Detail of the Empty SCSI ID Jumper Block

You can configure internal tape drives for SCSI ID addresses that range from 0 to 15 in one of two ways:

- Jumper the 10-pin SCSI ID block located on the back of the tape drive (Figure 4-2 on page 4-7).
- Set the SCSI ID through firmware in a library setting. (The firmware default = SCSI ID 5 and assumes no jumpers are installed on the jumper block.).

The default setting for the tape drive is 5; the host adapter setting is typically SCSI ID 7. If you choose to omit all jumpers from the SCSI ID block, the tape drive will use the default setting of 5.

Table 4-1. SCSI ID Address Selections (Graphical Format)

SCSI ID	0	1	2	3
Jumper Block				
SCSI ID	4	5 (default)	6	7
Jumper Block				
SCSI ID	8	9	10	11
Jumper Block				
SCSI ID	12	13	14	15
Jumper Block				

NOTE: The computer system and the tape drive SCSI IDs are only checked at power-on. To change the SCSI ID after installation, power off both the system and the tape drive, change the tape drive's SCSI ID, power on the tape drive, and then power on the system.

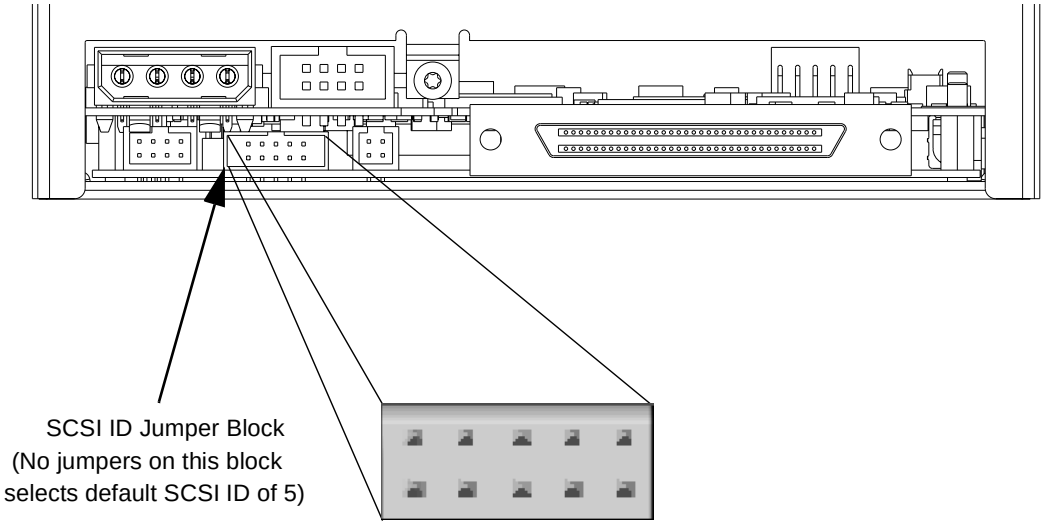

Figure 4-2. 10-pin SCSI ID Jumper Block on Rear of Tape Drive

Table 4-2. SCSI ID Address Selections (Tabular Format)

SCSI ID	Jumper Across Pins				
	9-10*	**7-8**	**5-6**	**3-4**	**1-2**
0	1	0	0	0	0
1	1	0	0	0	1
2	1	0	0	1	0
3	1	0	0	1	1
4	1	0	1	0	0
5 (default)	0	0	0	0	0
6	1	0	1	1	0
7	1	0	1	1	1
8	1	1	0	0	0
9	1	1	0	0	1
10	1	1	0	1	0
11	1	1	0	1	1
12	1	1	1	0	0
13	1	1	1	0	1
14	1	1	1	1	0
15	1	1	1	1	1
0 = NO JUMPER INSTALLED, 1 = JUMPER INSTALLED					
* Jumpering Pins 9-10 forces the tape drive to ignore the firmware value and read the value jumpered on the block.					

4.4.2 Configuring the Internal Tape Drive for TERMPWR

You must terminate a SCSI bus at each end of the bus. Terminate all signals not defined as RESERVED, GROUND, or TERMPWR exactly once at each end of the bus. At least one device must supply terminator power (TERMPWR).

To enable TERMPWR, install the jumper across Pins 1 and 2 (see Figure 4-3) on the TERMPWR jumper block. Remove the jumper to disable TERMPWR. Pins 3 and 4 on this block are reserved and require no jumper.

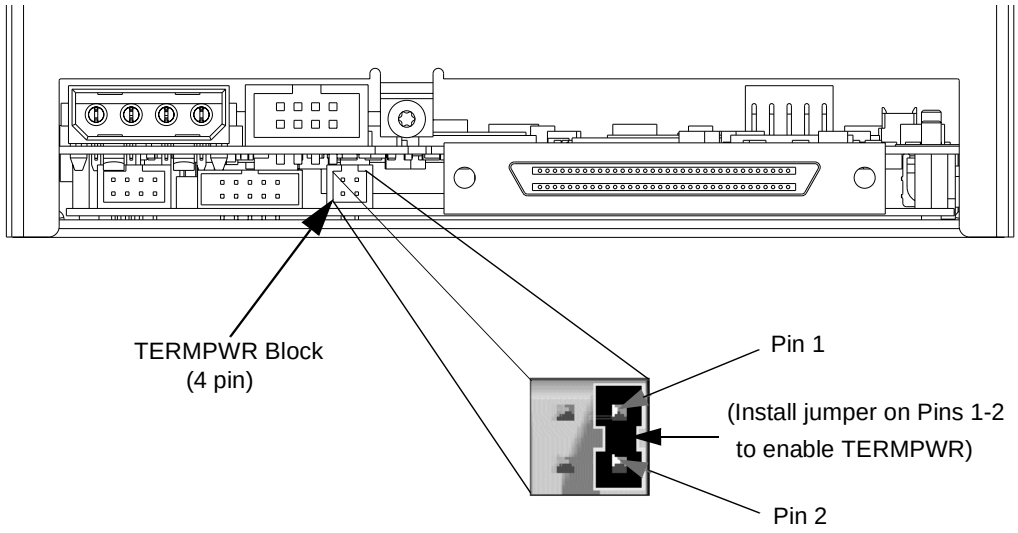

Figure 4-3. TERMPWR Jumper Block on Rear of Tape Drive

4.4.3 Installing the Internal Tape Drive

"Securing the Internal Tape Drive" on page 4-10 describes installing the tape drive by securing the tape drive in its bay or chassis and connecting the SCSI bus (or Fibre Channel) and power cables. When you have finished mounting and installing the tape drive, proceed directly to "Confirming the Installation" on page 4-25 to confirm the installation.

Figure 4-4 shows two perspective views of the internal tape drive.

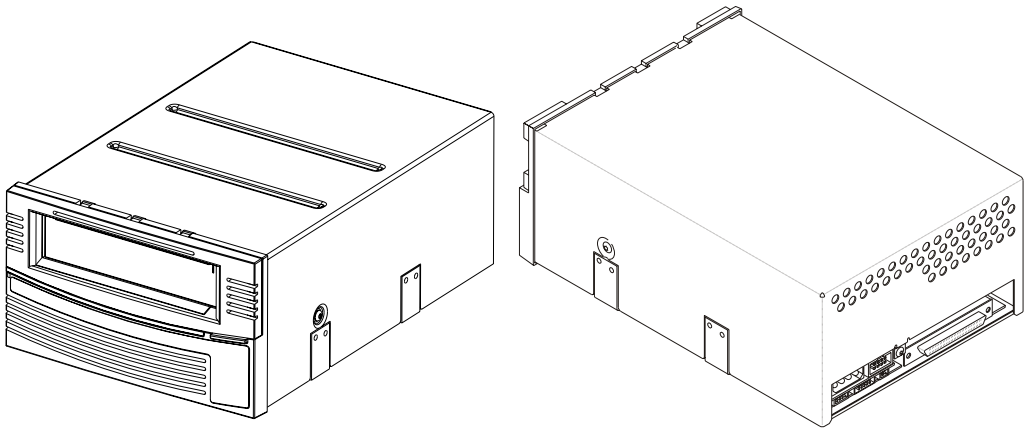

Figure 4-4. SDLT 600 Tape Drive—Front and Rear Views

Securing the Internal Tape Drive

This section describes how to mount and secure the tape drive in the system.

> **NOTE:** In some system configurations, it may be more convenient to connect the SCSI bus and power cables to the tape drive before securing it in the system.

Because of the variety of mounting possibilities for tape drives, the instructions presented here are general in nature. Use these instructions only as a guide for mounting the tape drive in your system.

Mount the tape drive in the system by performing the following steps:

1. Position the tape drive in the system and align the tape drive mounting holes (side or bottom) with those in the system. Figure 4-5 on page 4-11 shows the mounting locations and dimensions for the tape drive.

> **CAUTION** The screws used to mount the tape drive must be M3 x 8mm long. This type of screw is exactly the proper length and will not damage the tape drive.

2. Using four M3 x 8mm long screws, secure the tape drive in the bay or chassis.

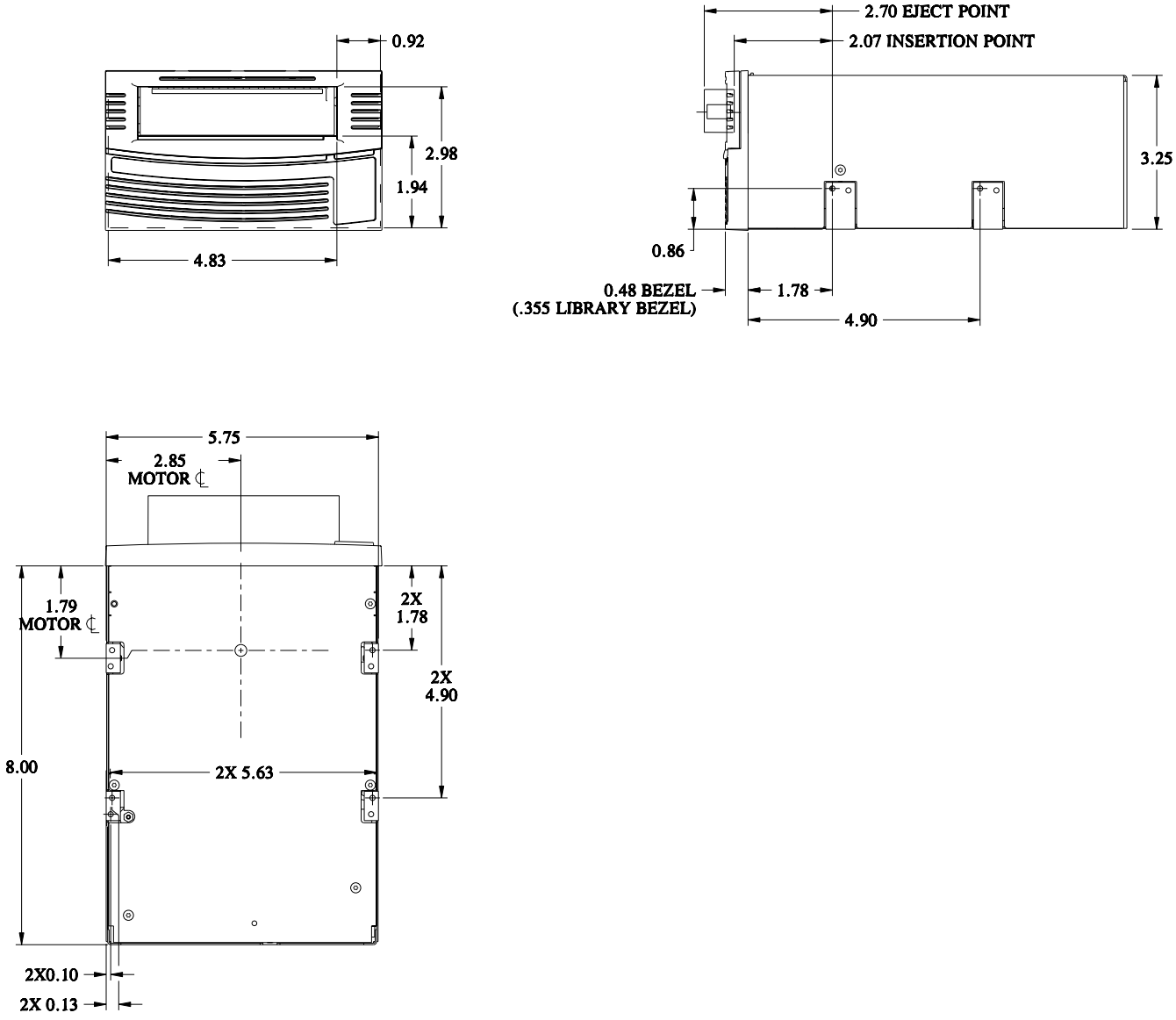

Figure 4-5. Internal Tape Drive Mounting Locations – Front, Side, and Bottom Dimensions

Connecting the Internal Tape Drive Cables

This section discusses three connectors on the back of the internal SDLT 600 tape drive: 1) SCSI, 2) power, and 3) optional library/loader connectors. Figure 4-12 on page 4-24 shows some typical AC power cord connectors used for the tabletop model.

SCSI and Power Connectors

Figure 4-6 on page 4-13 shows the pin orientation for the 68-pin SCSI connector and 4-pin power connector located on the back of the internal tape drive.

The tables list pin assignments for the two possible SCSI connectors: Multi-mode Single-Ended (MSE)/Single Ended (SE) mode in Table 4-3 on page 4-13, and MSE Low Voltage Differential (LVD) mode in Table 4-4 on page 4-15. Pin assignments for the power connector are listed in Table 4-5 on page 4-16.

1. Before connecting the SDLT 600 tape drive to the host computer, be certain the tape drive and computer are powered off.

2. Ensure that your SCSI cables and terminators are SPI-3 (or SPI-4) compatible. SPI refers to SCSI Parallel Interface; you can learn more about this standard at the web site ***http://www.t10.org*** .

3. If you are connecting several devices to the SCSI bus, connect only the tape drive to the host computer at this time. Confirm that the host computer and tape drive are communicating correctly before adding additional devices.

4. The SCSI bus must be terminated at each end. You may need to terminate this tape drive if one of the following conditions exist:

   - The SDLT 600 tape drive is the only device connected to the SCSI bus.
   - The SDLT 600 tape drive is one of several devices connected to the SCSI bus, and it is the last device connected to the SCSI bus.

5. If either condition exists in step 4, attach a “Y” adaptor cable to the tape drive’s SCSI connector; then attach the SCSI cable to one leg of the “Y” and attach the terminator to the other leg. Carefully connect the cables, to avoid bending or damaging the connector pins.

NOTE: You must supply the “Y” adaptor cable to connect both the SCSI connector and the terminator to the tape drive.

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6. Attach the power cables to the tape drive. Check the SCSI cable and termination connections and ensure that they are attached correctly and seated firmly.

Optional Loader Connector

The 8-pin optional loader connector provides signals to be used when the tape drive is part of a loader/library configuration. Figure 4-6 on page 4-13 shows the location of this connector; Table 4-6 on page 4-16 lists the pin assignments for the loader connector.

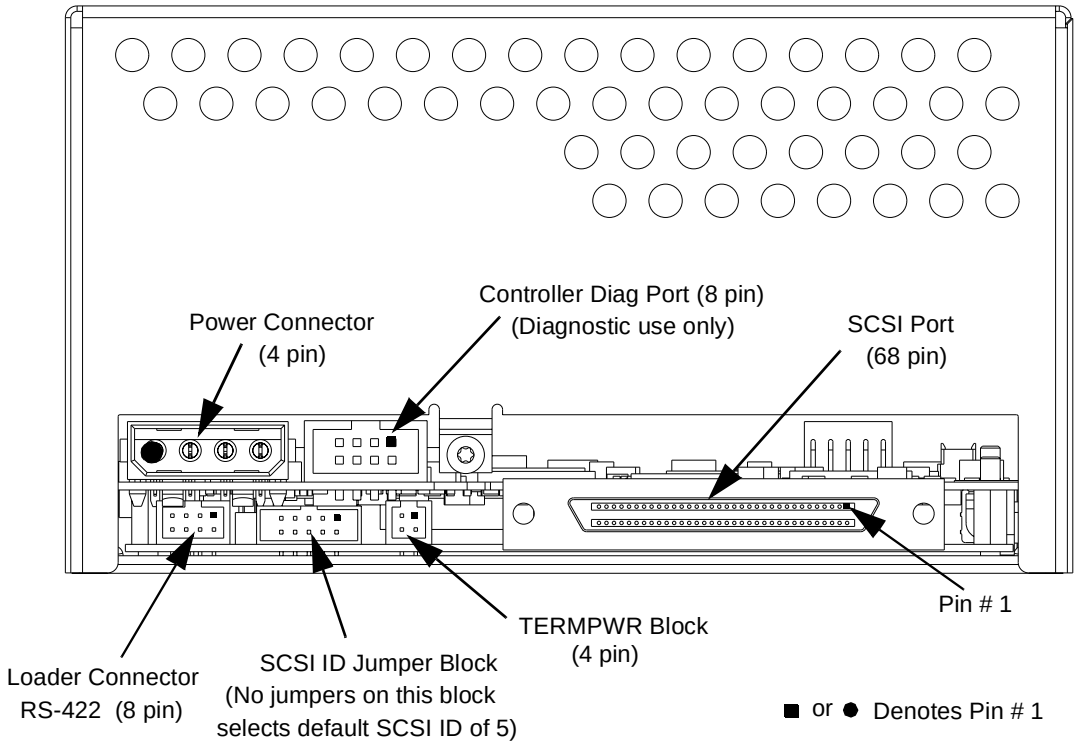


Figure 4-6. Connectors on the Back Panel of SDLT 600 Tape Drive

Table 4-3. MSE and SE Mode SCSI Connector Pin Assignments

Signal Name	Pin Number	Pin Number	Signal Name
Ground	1	35	-DB(12)
Ground	2	36	-DB(13)
Ground	3	37	-DB(14)
Ground	4	38	-DB(15)
Ground	5	39	-DB(P1)
Ground	6	40	-DB(0)
Ground	7	41	-DB(1)
Ground	8	42	-DB(2)
Ground	9	43	-DB(3)

Table 4-3. MSE and SE Mode SCSI Connector Pin Assignments (Continued)

Signal Name	Pin Number	Pin Number	Signal Name
Ground	10	44	-DB(4)
Ground	11	45	-DB(5)
Ground	12	46	-DB(6)
Ground	13	47	-DB(7)
Ground	14	48	-DB(P0)
Ground	15	49	Ground
DIFFSENS	16	50	Ground
TERMPWR	17	51	TERMPWR
TERMPWR	18	52	TERMPWR
Reserved	19	53	Reserved
Ground	20	54	Ground
Ground	21	55	-ATN
Ground	22	56	Ground
Ground	23	57	-BSY
Ground	24	58	-ACK
Ground	25	59	-RST
Ground	26	60	-MSG
Ground	27	61	-SEL
Ground	28	62	-C/D
Ground	29	63	-REQ
Ground	30	64	-I/O
Ground	31	65	-DB(8)
Ground	32	66	-DB(9)
Ground	33	67	-DB(10)
Ground	34	68	-DB(11)
Note: The minus sign (-) next to a signal indicates active low.			

Table 4-4. MSE LVD Mode SCSI Connector Pin Assignments

Signal Name	Pin Number	Pin Number	Signal Name
+DB(12)	1	35	-DB(12)
+DB(13)	2	36	-DB(13)
+DB(14)	3	37	-DB(14)
+DB(15)	4	38	-DB(15)
+DB(P1)	5	39	-DB(P1)
+DB(0)	6	40	-DB(0)
+DB(1)	7	41	-DB(1)
+DB(2)	8	42	-DB(2)
+DB(3)	9	43	-DB(3)
+DB(4)	10	44	-DB(4)
+DB(5)	11	45	-DB(5)
+DB(6)	12	46	-DB(6)
+DB(7)	13	47	-DB(7)
+DB(P)	14	48	-DB(P)
Ground	15	49	Ground
DIFFSENS	16	50	Ground
TERMPWR	17	51	TERMPWR
TERMPWR	18	52	TERMPWR
Reserved	19	53	Reserved
Ground	20	54	Ground
+ATN	21	55	-ATN
Ground	22	56	Ground
+BSY	23	57	-BSY
+ACK	24	58	-ACK
+RST	25	59	-RST
+MSG	26	60	-MSG
+SEL	27	61	-SEL

Table 4-4. MSE LVD Mode SCSI Connector Pin Assignments (Continued)

Signal Name	Pin Number	Pin Number	Signal Name
+C/D	28	62	-C/D
+REQ	29	63	-REQ
+I/O	30	64	-I/O
+DB(8)	31	65	-DB(8)
+DB(9)	32	66	-DB(9)
+DB(10)	33	67	-DB(10)
+DB(11)	34	68	-DB(11)

Table 4-5. 4-Pin Power Connector Pin Assignments

Pin Number	Signal Name
1	+12 VDC
2	Ground (+12V return)
3	Ground (+5V return)
4	+5 VDC

Table 4-6. 8-Pin Loader Connector Pin Assignments

Signal Name	Pin Number	Pin Number	Signal Name
Ground	1	5	SEND_TO_LOADER_H
REC_FROM_LOADER_H	2	6	SEND_TO_LOADER_L
REC_FROM_LOADER_L	3	7	Ground
Ground	4	8	LOADER_PRESENT_L

4.5 Configuring and Installing an Internal Tape Drive with Fibre Channel Interface

This section provides information for configuring and installing a tape drive with the Fibre Channel interface into a system.

4.5.1 Fibre Channel Introduction

Fibre Channel is the name of an integrated set of standards developed by the American National Standards Institute (ANSI). The intention of the Fibre Channel specification is to develop a practical, inexpensive, yet expandable means of quickly transferring data between workstations, mainframes, supercomputers, desktop computers, storage devices, display terminals, and other peripherals.

Fibre Channel is an open T11 and ANSI standard based on a block-oriented serial network protocol that brings together some of the best features of the channel world and the network world. Fibre Channel is full-duplex (meaning that data can travel in both directions simultaneously), and offers a variety of different cabling options.

Fibre Channel is a high performance serial link transport protocol that supports higher level protocols such as the FDDI, SCSI, HIPPI, and IPI. Fibre Channel addresses the need for very fast transfers of large amounts of information. The majority of Fibre Channel devices available in the market today operate at speeds of 1 to 2 Gb/s.

For complete information on how Fibre Channel is implemented in the Quantum SDLT 600 tape drive, refer to the *SDLT 600 Fibre Channel Interface Guide (81-81202-01)*.

NOTE: Fibre Channel interface is ONLY available with the internal model, it is not available with the tabletop model.

CAUTION Before you begin, review the safety, ESD, and handling precautions described in "Safety, Handling, and ESD Protection" on page 4-2 to avoid personal injury or damage to equipment.

Figure 4-7 on page 4-18 shows the SDLT 600 Fibre Channel connectors and jumper blocks located on the rear of the unit.

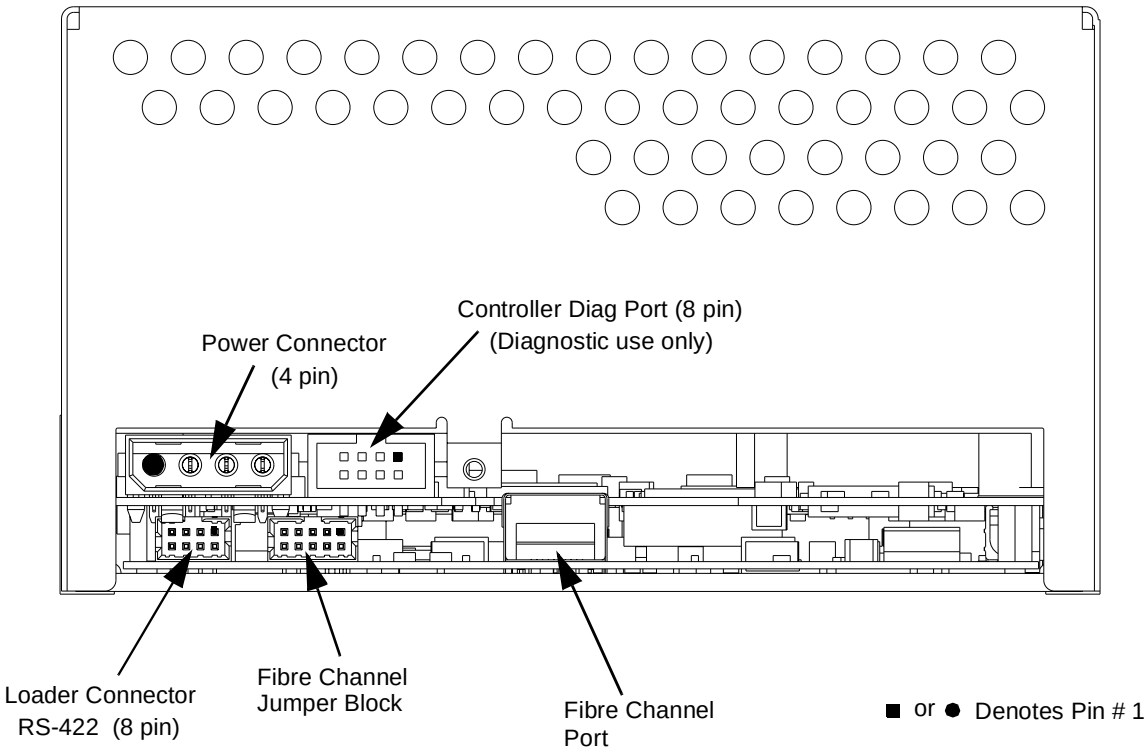


Figure 4-7. SDLT 600 Fibre Channel Connectors and Jumpers

Follow these steps to connect a Fibre Channel tape drive:

- Secure the tape drive.
- Connect the power.
- Connect the library/loader (optional).
- Connect the Fibre Channel cable.

Each of these steps is discussed in the subsections that follow.

4.5.2 Secure the Tape Drive

This section describes how to mount and secure the tape drive in the system.

NOTE: In some system configurations it may be more convenient to connect the Fibre Channel and power cables to the tape drive before securing it in the system.

Because of the variety of mounting possibilities for tape drives, the instructions presented here are general in nature. Use them only as a guide for mounting the tape drive in your system.

Mount the tape drive in the system by performing the following steps:

1. Make sure the host computer and all peripheral devices are powered off.
2. Position the tape drive in the system and align the mounting holes (side or bottom) with those in the system. Figure 4-5 on page 4-11 shows the mounting locations and dimensions for the tape drive.

> **CAUTION** The screws used to mount the tape drive must be M3 x 8mm long. This type of screw is exactly the proper length and will not damage the tape drive.

3. Using four M3 x 8mm long screws, secure the tape drive in the bay or chassis.

4.5.3 Connect the Power

Figure 4-7 on page 4-18 shows the location of this connector; pin assignments for the power connector are listed in Table 4-5 on page 4-16.

1. Before connecting the SDLT 600 tape drive to the host computer, be certain the tape drive and computer are powered off.
2. If you are connecting several devices to the system, connect only the tape drive to the host computer at this time. Confirm that the host computer and tape drive are communicating correctly before adding additional devices.
3. Attach the power cable to the tape drive.
4. Check all cable and termination connections and ensure that they are attached correctly and seated firmly before you power on the system.

4.5.4 Optional Loader Connector

The 8-pin optional loader connector provides signals to be used when the tape drive is part of a loader/library configuration. Figure 4-7 on page 4-18 shows the location of this connector; Table 4-6 on page 4-16 lists pin assignments for the loader connector.

4.5.5 Connect the Fibre Channel Cable

1. Fibre Channel cables are “hot-swappable”—meaning you may connect and disconnect them with unit power on. Therefore, unlike other systems, the tape drive and computer may remain on to connect the SDLT 600 tape drive to the host computer.

2. Insert the fiber optic cable into the Fibre Channel port on the back of the tape drive as shown in Figure 4-8. The connector is fully seated when it snaps into the port.

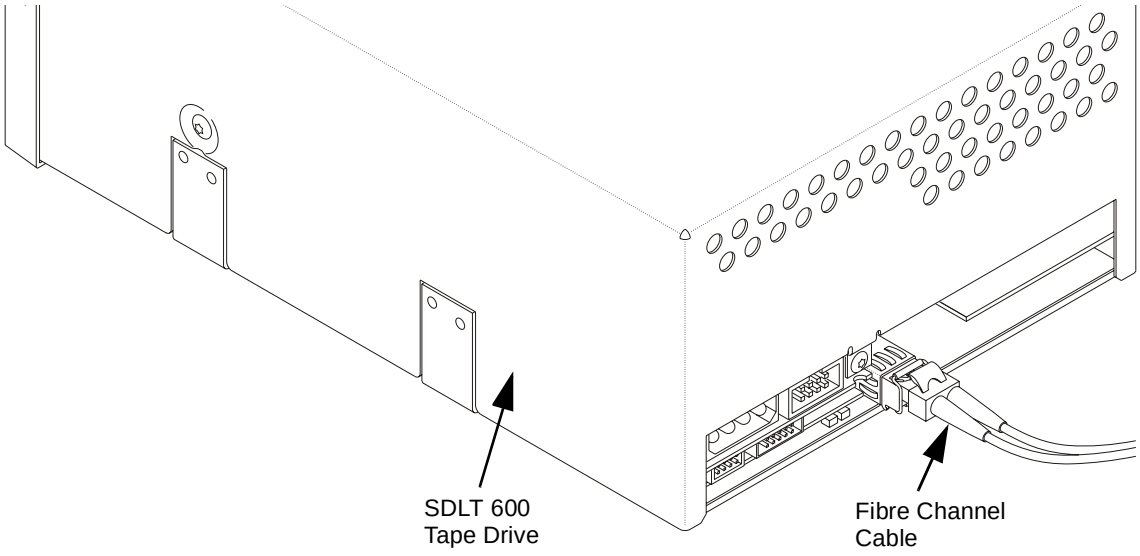


Figure 4-8. Connecting the SDLT 600 Fibre Channel Cable

4.6 Configuring and Installing a Tabletop Tape Drive

This section provides instructions for configuring and installing the tabletop model of the SDLT 600 tape drive.

NOTE: The tabletop model comes ONLY with the SCSI interface. The Fibre Channel interface is not available.

4.6.1 Configuring the Tape Drive

Figure 4-9 on page 4-21 shows the location of the controls and connectors for the tabletop tape drive. This model of tape drive is normally configured to meet customer specifications before leaving the factory, so should not require any internal configuration changes on site.

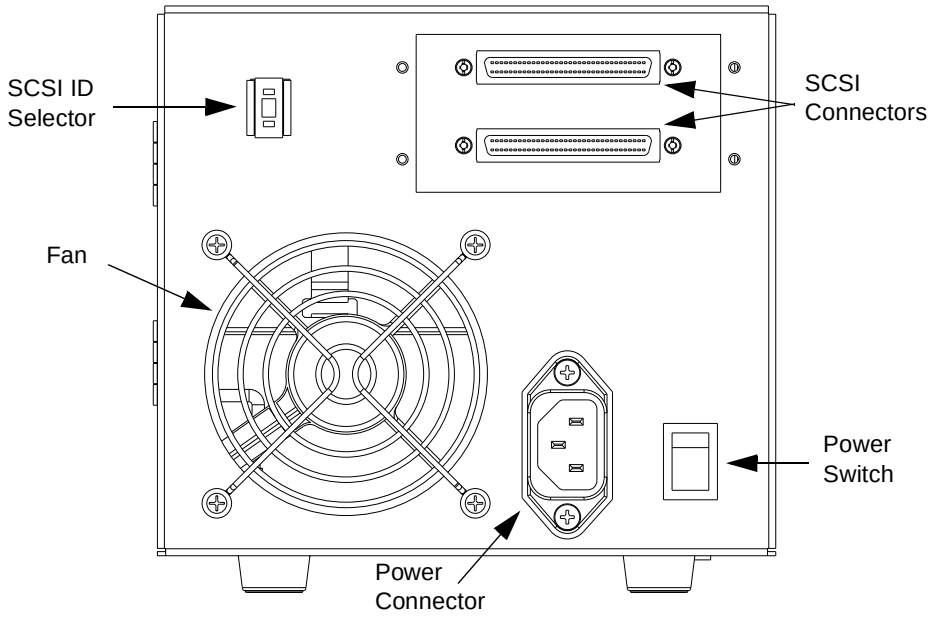


Figure 4-9. Back Panel of the Tabletop Model

SCSI ID

The SCSI ID default for the tabletop tape drive is set to 3; you can configure the tape drive for SCSI ID addresses that range from 0 to 15 using the SCSI ID pushbutton. Press the button above or below the ID number display to set the desired SCSI ID. The top button increases the ID number, the bottom button decreases the ID number. Figure 4-10 on page 4-22 shows a close-up view of the SCSI ID switch and its location on the rear of the tabletop model of the SDLT 600 tape drive.

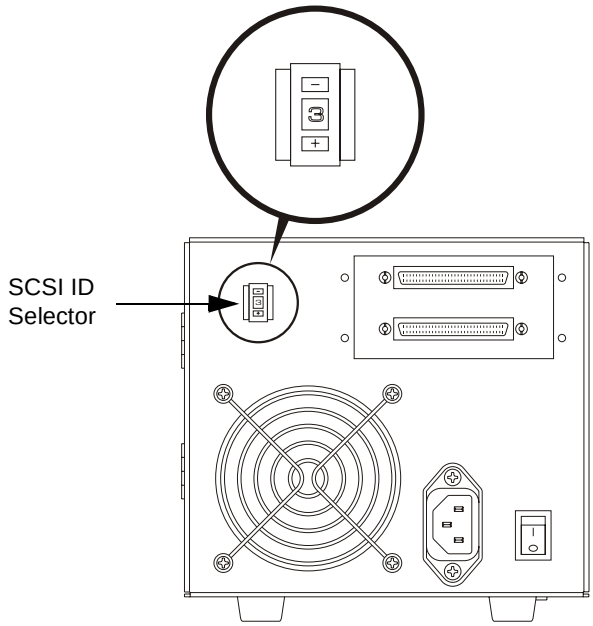


Figure 4-10. SCSI ID Selector Switch for the SDLT 600 Tape Drive Tabletop Model

TERMPWR

The factory preconfigures the TERMPWR setting for the tabletop tape drive according to specific customer requirements. You can not select TERMPWR on site.

4.6.2 Installing the Tabletop Tape Drive

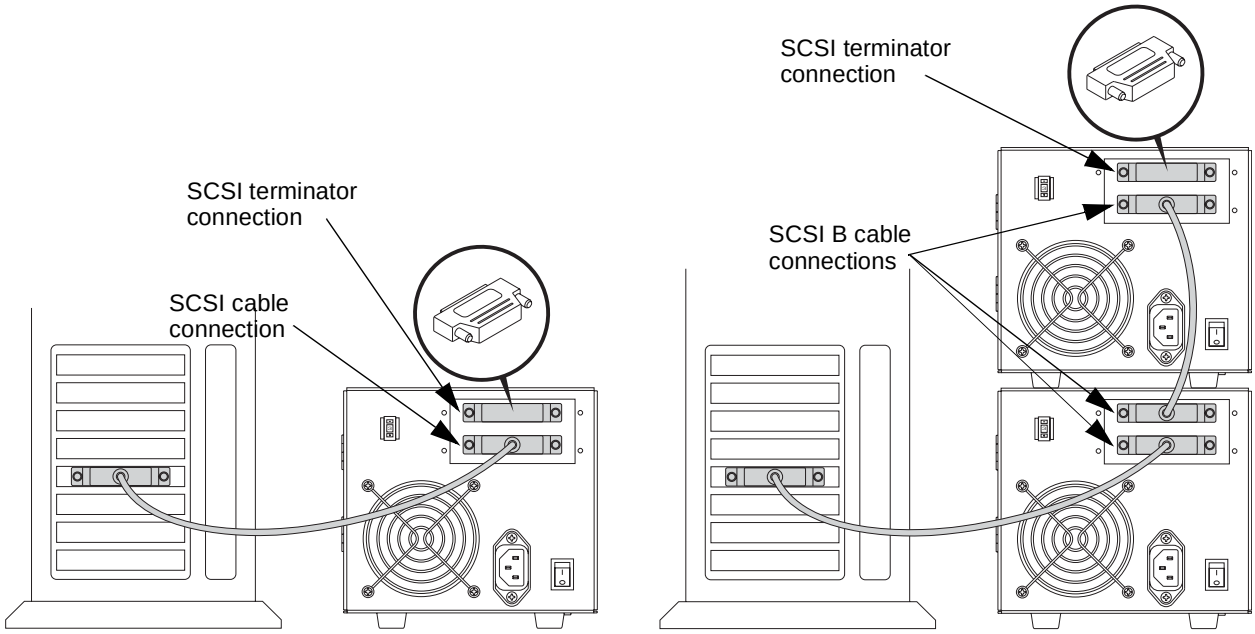
Tabletop tape drive installation consists of connecting SCSI bus and power cables.

Figure 4-9 on page 4-21 shows the location of the two SCSI bus connectors and power connector on the back of the tabletop tape drive.

SCSI Cables

You can connect the SCSI bus cable leading from the host adapter to either of the tape drive SCSI connectors. If the tape unit is the last device on the bus, then you should install a SCSI terminator on the open connector. If the bus continues from the tape drive to another SCSI device, then install a SCSI

bus cable between the open connector and the next device on the bus. Figure 4-11 illustrates these two connection methods.



A) Cabling For Single Tape Drive Connection **B)** Cabling For Daisy-Chain Connection

Figure 4-11. Cabling Options for the SDLT 600 Tape Drive Tabletop Model

1. Prior to connecting the SDLT 600 tape drive to the host computer, be certain the tape drive and computer are turned off.

2. If you are connecting several devices to the SCSI bus, connect only the tape drive to the host computer at this time. Confirm that the host computer and tape drive are communicating correctly before adding additional devices.

3. You must terminate the SCSI bus at each end. To install the SCSI terminator, place it into the unused SCSI connector on the rear of the tabletop tape drive and tighten the screws to secure it.

   - If the SDLT 600 tape drive is the only device connected to the SCSI bus, attach the SCSI terminator to one of the connectors on the back of the tape drive (see Figure 4-11, **A**).
   - If the SDLT 600 tape drive is one of several devices connected to the SCSI bus, and it is the last device connected to the SCSI bus, attach the SCSI terminator to one of the connectors on the back of the tape drive (see Figure 4-11, **B**).

4. Align the appropriate SCSI cable to its matching connector on the tape drive. Carefully connect the cable, to avoid bending or damaging the connector pins. Check the SCSI cable and termination connections and ensure that they are attached correctly and seated firmly.

5. Snap the wire cable clamps into place to secure the cables.

AC Power Cable

An AC power cord is supplied with each tabletop unit. Carefully inspect the power cord and ensure that the cord is the appropriate cord for your country or region based on the criteria below.

> **WARNING!** Do not attempt to modify or use a tabletop 100–115 V AC power cord for 220–240 V AC input power. Modifying the power cord in any way can cause personal injury and severe equipment damage.

The AC power cord used with the tabletop unit must meet the following criteria:

- The power cord should be a minimum of 18/3 AWG, 60 °C, type SJT or SVT.
- UL and CSA certified cordage rated for use at 250 VAC with a current rating that is at least 125% of the current rating of the product.
- You must terminate the AC plug in a grounding-type male plug designed for use in your country or region. It must also have marks showing certification by an agency acceptable in your country or region.
- The tabletop unit cord connector must be an IEC type CEE-22 female connector.
- The cord must be no longer than 4.5 meters (14.5 feet).
- The cord must be FCC compliant with emissions specifications.

Figure 4-12 shows the AC power cord plug-end types for 115 VAC and 220/240 VAC usage.

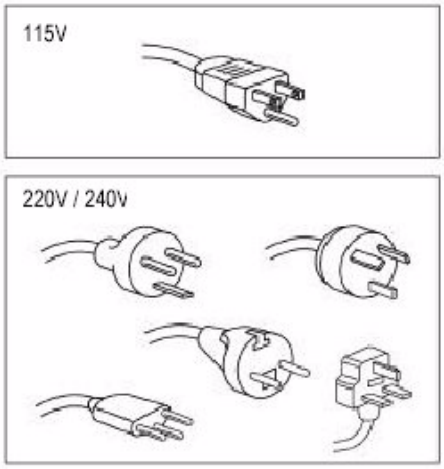


Figure 4-12. AC Power Cord Connector Types

The tabletop unit power supply has an auto-sensing feature; it requires no adjustment or switch setting changes for different AC sources.

Refer to Figure 4-9 and Figure 4-12. Connect one end of the AC cord into the power connector on the back of the tabletop tape drive; connect the other end of the cord to the AC outlet. Upon completion, proceed to the next section to confirm the installation.

4.7 Confirming the Installation

To confirm the installation, power on the SDLT 600 tape drive system and the host computer. The screens displayed at power-on contain BIOS, operating system, and SCSI controller information. If the first screen displays host adapter and SCSI ID information, then the installation is successful. Refer to “Troubleshooting” on page 5-12 if the installation is not successful.

CHAPTER 5

Using Your Tape Drive

This chapter describes how to start using your SDLT 600 tape drive system. This includes making a trial back-up, cleaning the tape mechanism, and various troubleshooting information. This chapter also includes information on the LEDs and buttons on the front panel of the system.

This chapter covers the following topics:

- "Power-On Self-Test" describes the sequence of activities that occur when power is first applied to the tape drive.
- "Performing a Trial Back-up" describes how to back up a sample file to ensure proper operation of the system.
- "Updating the Firmware" describes how to update the firmware (microcode) that resides inside the tape drive and controls its behavior.
- "Cleaning the Tape Mechanism" describes the considerations to keep in mind when using SDLT cleaning tapes.
- "Front Panel Controls and LEDs" describes the functionality of the front panel controls and LEDs.
- "Troubleshooting" lists troubleshooting tips and diagnostic tools to use if the tape drive system fails.

5.1 Power-On Self-Test

The SDLT 600 tape drive system performs a Power-On Self-Test (POST) each time the tape drive is powered on. POST normally completes in 10 to 15 seconds—when a data cartridge is not in the tape drive— when the unit is powered on. However, if a data cartridge is in the tape drive when the unit is powered on, POST duration is longer, depending on how much tape in the data cartridge may be loaded in the tape drive.

While POST is running, the SDLT 600 tape drive system responds BUSY to SCSI commands. The SDLT 600 tape drive system also responds to various SCSI messages during POST.

During this time, if a host tries to negotiate Synchronous or Wide transfers, the SDLT 600 tape drive system negotiates to Asynchronous or Narrow. It may take longer than the duration of POST for the tape drive to become ready.

Table 5-1 provides the sequence of operation to expect when power is turned on. See Figure 5-1 to help familiarize yourself with the LEDs on the front panel.

Table 5-1. SDLT 600 Tape Drive LED Lighting Pattern During Power-On Self-Test (POST)

Stage	What You Observe
1 (Power On)	All LEDs illuminate for approximately one second.
2	The LEDs flash on, then off in a progressing pattern from left to right. Stages 1 and 2 generally complete within approximately five seconds.
3	The right LEDs remain off, the left LED illuminates steadily, and the middle LED flashes until POST completes. This stage typically lasts for 5 to 10 seconds.
4	When POST is complete, the middle LED stops flashing and remains illuminated; the left LED turns off, and right LED remains off.
POST Failure	If POST fails, the middle and right LEDs illuminate steadily and the left LED flashes.
Note: If a data cartridge is in place when power is turned on, all stages remain the same except stage 3. It may take a considerably longer time for stage 3 to complete due to tape rewind and searching operations that occur during that stage.	

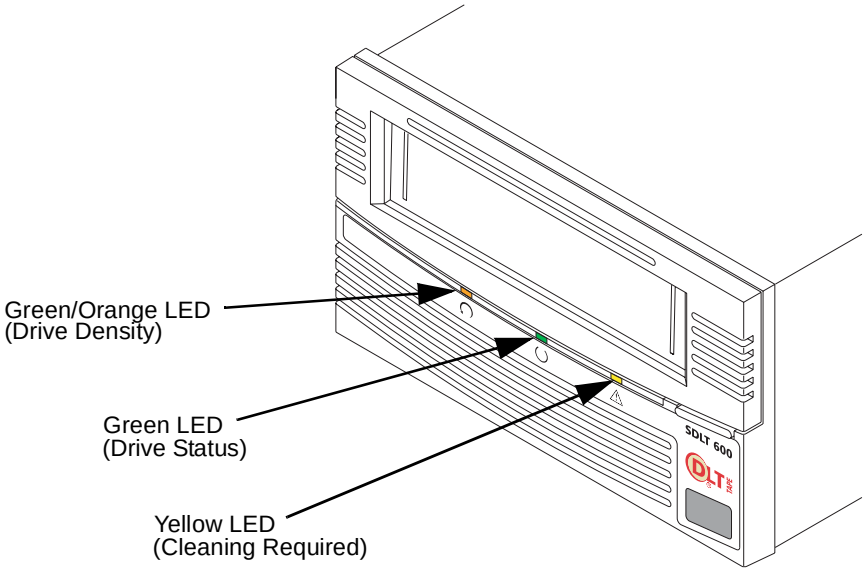


Figure 5-1. SDLT 600 Tape Drive Front Panel LEDs

5.2 Performing a Trial Back-up

Complete the following steps to perform a trial backup and verify correct tape drive installation:

- Insert a data cartridge. Push the data cartridge completely into the system. The tape will load automatically.
- Choose a sample file set from the host computer.
- Create a backup file and then restore the file set. If the backup file completely restores, without any errors, you installed the system correctly.
- If you experience errors, doublecheck the tape drive's configuration and setup, using the ideas provided in "Troubleshooting" on page 5-12.
- After you have exhausted all troubleshooting alternatives, contact your service representative.
- Press the Eject button to unload the data cartridge. If you are unsure which button is the Eject button, refer to Figure 5-2 on page 5-9.

NOTE: You can review specific instructions for loading a data cartridge in Appendix A, "Super DLTtape I and Super DLTtape II Data Cartridges" and Appendix B, "DLTtape VS1 Data Cartridge"

5.3 Updating the Firmware

When you need to update the firmware in a tape drive, you can do it either of two ways:

- By directly using the SCSI bus
- By creating a firmware image data cartridge (CUP/FUP) to use in either a manual firmware update or in a library setting.

DLTSage provides the tool that allows you to update the tape drive's firmware using the SCSI bus, or to create a CUP/FUP data cartridge for an SDLT 600 tape drive. DLTSage is available on Quantum's web site, ***http://www.quantum.com***. Section 2.5, "Quantum Diagnostics Tools," in Chapter 2 provides details on locating DLTSage in Quantum's web site.

The following subsections briefly describe both methods of updating the tape drive firmware.

5.3.1 Update the Firmware Using the SCSI Bus

Quantum provides upgrades for product software and firmware that may be newly developed. These updates are available on Quantum's web site.

NOTE: These tools are only available to registered Quantum customers.

Refer to the following procedure to access and download these updates.

1. Go to the Quantum web site: ***http://www.quantum.com***.
2. Click **SERVICE AND SUPPORT** in the upper menu bar. This opens the Service and Support window.
3. Explore the various pages that comprise Service and Support until you find the update you need.
4. Download the DLTSage package and refer to that tool's built-in online help for detailed instructions to use while updating the firmware.

5.3.2 Create a CUP/FUP Data Cartridge

To update your tape drive firmware you may create a CUP/FUP data cartridge from the update information found on Quantum's web site.

NOTE: These tools are only available to registered Quantum customers.

Refer to the following procedure to access these updates for creating a CUP/FUP data cartridge.

1. Go to the Quantum web site: ***http://www.quantum.com***.
2. Click **SERVICE AND SUPPORT** in the upper menu bar. This opens the Service and Support window.
3. Explore the various pages that comprise Service and Support until you find the update you need.
4. Download the DLTSage package and refer to that tool's built-in online help for detailed instructions about how to create the data cartridge.

5.3.3 Using a CUP/FUP Data Cartridge

Follow these steps to use a CUP/FUP data cartridge:

1. Verify that the tape drive is turned on (power is applied), and the middle (Drive Status) LED on the front panel of the tape drive is on, but not flashing.

2. Verify that the tape drive's cartridge opening is empty. (In other words, if any other cartridge is in the tape drive, unload and eject it.)

3. Press and hold the Eject button for six seconds; after six seconds, the left (Drive Density) LED begins to flash.

4. Release the Eject button, then quickly press and release the Eject button again. At this point, the left (Drive Density) and middle (Drive Status) LEDs start flashing synchronously in a regular, rhythmic pattern. The tape drive is now in Firmware Upgrade mode.

   You now have a "window" of one minute to insert the CUP/FUP data cartridge. If you do *not* insert a CUP/FUP data cartridge and the one minute time window expires, both LEDs stop flashing, although the middle (Drive Status) LED remains on (steadily illuminated). The tape drive is now out of Firmware Upgrade mode and can be used in a normal manner (once you insert a data cartridge). To put the tape drive back in Firmware Upgrade mode, repeat the previous steps 2, 3, and 4.

5. Insert the CUP/FUP data cartridge.

6. After you insert the CUP/FUP data cartridge, the left (Drive Density) and middle (Drive Status) LEDs change their pattern and start flashing in an alternating pattern. The tape drive is now performing the firmware upgrade.

NOTE: The firmware upgrade fails the microcode update process if the firmware personalities do not match; the history log records this information, as well as the reason for the failure.

---

7. Wait several minutes for the update process to complete. The left (Drive Density) and middle (Drive Status) LEDs flash the entire time that memory is being updated.

8. When the update is complete, the tape drive resets itself and goes through POST. The tape drive rewinds the CUP/FUP data cartridge, unloads it, and ejects it. SCSI status indicates that microcode has been updated (06h, 3F, 01).

NOTE: If the tape drive is mounted in a tape automation library, the CUP/FUP data cartridge rewinds to BOT and unbuckles in preparation for unloading, but does not automatically eject.

5.3.4 Firmware (Code) Update Troubleshooting

Try these remedial actions if the tape drive's code update fails:

- Updating the same revision

  If you request a code update that is the same as the code revision already on the tape drive, the system updates the controller code but not the servo-specific code. The steps for this type of update are the same as for a normal update.

- Updating fails, which causes the tape drive to be reset; the problem can result from any of the following circumstances:
  - Data cartridge contains incompatible update image.
  - Data cartridge does not contain an update image.
  - No data cartridge in the tape drive.

5.4 Cleaning the Tape Mechanism

This section discusses the SDLT 600 tape drive cleaning tape, maintenance considerations, and important compatibility issues you need to be aware of.

NOTE: When your backup software indicates needed cleaning, or the yellow LED on the tape drive comes on, use the SDLT CleaningTape to clean the unit. Do not clean the tape drive unless the tape drive specifically indicates cleaning is necessary.

5.4.1 Occasional Cleaning of Tape Head

SDLT 600 tape drives occasionally require preventive cleaning. The amount of ambient pollution and particulates in the environment, to a large degree, dictates the cleaning frequency.

Clean your tape drive only when cleaning is necessary. Your backup software or the yellow alert LED located on the front bezel of the tape drive notify you if you need to clean the tape drive; the location of this LED (and other front bezel LEDs) is shown in Figure 5-2 on page 5-9.

Clean the SDLT 600 tape drive with the SDLT CleaningTape, which is also used to clean the SDLT 220 and SDLT 320 tape drives.

CAUTION Use ONLY the SDLT CleaningTape. Other cleaning tapes, such as CleaningTape III or DLT VS CleaningTape, are incompatible with the SDLT 600 tape drive heads.

5.4.2 When to Use the Cleaning Tape

The SDLT 600 tape drive uses a built-in tape cleaning algorithm in conjunction with a *cleaning tape*. The SDLT CleaningTape is packaged in a plastic case, and is light gray in color.

A yellow LED located on the front bezel of the SDLT 600 tape drive indicates when cleaning is needed; Figure 5-2 on page 5-9 shows the location of this LED (and other front bezel LEDs).

5.4.3 Life Expectancy of the Cleaning Tape

Each SDLT CleaningTape is good for 20 uses. Use one of the labels that is supplied with the tape to track the number of uses.

5.4.4 Compatibility of the Cleaning Tape

The SDLT CleaningTape is intended for use in SDLT 600 tape drives, autoloaders, and libraries only. Alternatively stated, the SDLT CleaningTape only cleans the SDLT MRC heads.

5.4.5 Loading the Cleaning Tape Into a Tabletop Tape Drive

NOTE: To use the cleaning tape in an Autoloader or Library tape drive, refer to your owner's manual.

Follow these steps to load an SDLT CleaningTape into an SDLT 600 tabletop tape drive:

1. Insert the cleaning tape, with the Front Slide Label Slot facing outward, into the tape drive until the tape drive engages with the cleaning tape and begins to take up the cleaning media. The green Drive Status LED flashes and the cleaning cycle begins automatically.
2. When the cleaning cycle completes, the cleaning tape automatically ejects from the tape drive and the yellow alert LED turns off.

NOTE: On the last cleaning, the cleaning tape will not eject. Use the Eject button on the front of the tape drive to eject the expired cleaning tape and dispose of the cleaning tape.

3. Remove the cleaning tape, place it back into its plastic case, and mark the label after each cleaning.

5.5 Front Panel Controls and LEDs

All controls and LEDs are on the tape drive's front panel. See Figure 5-2 for details. Use these controls and LEDs to operate the tape drive and monitor the SDLT 600 tape drive system's activities. Table 5-2 on page 5-10 and Table 5-3 on page 5-11 describe Control and LED functionality.

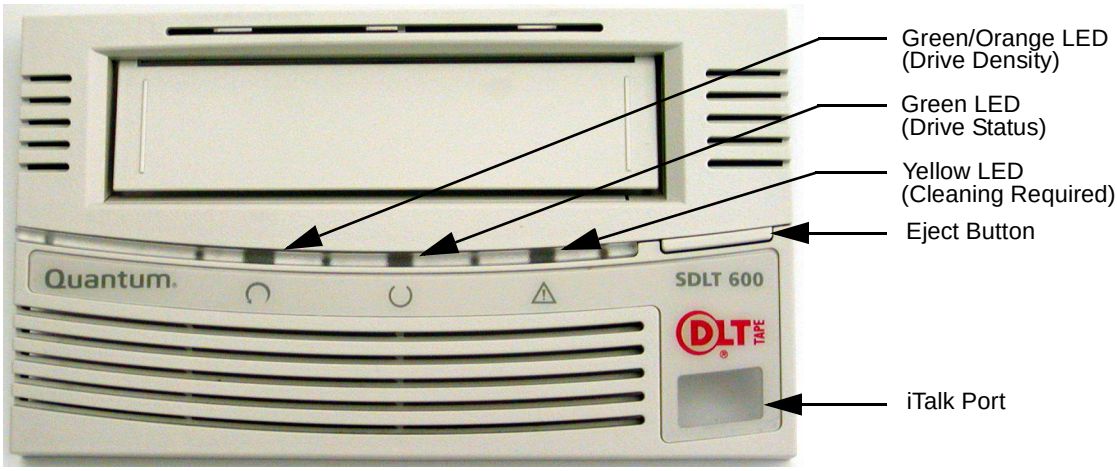


Figure 5-2. SDLT 600 Tape Drive Front Panel

On the SDLT 600 tape drive, the leftmost LED is dual color (green/orange). This LED is the Density Indicator. When you insert a Super DLTtape II data cartridge, this LED illuminates green. When the tape drive detects a backward read compatible (BRC) data cartridge, this LED illuminates orange. (The SDLT 600 tape drive backward reads Super DLTtape I data cartridges formatted in an SDLT 220 or SDLT 320 tape drive, or DLTtape VS1 data cartridges formatted in a VS160 tape drive.)

If a DLTtape IV data cartridge is inserted, the Drive Density LED is off. Table 5-2 summarizes these combinations.

Table 5-2. Dual-Color Drive Density LED Appearance for Type of Data Cartridge Loaded

Possible Data Cartridge Scenario	LED Color/State
No data cartridge is inserted	Off
SDLT 600 tape drive formatted Super DLTtape II data cartridge inserted	Green/On
Blank Super DLTtape II data cartridge inserted	Green/On
Super DLTtape II data cartridge ejected	Green/Remains On
SDLT 220 tape drive formatted Super DLTtape I data cartridge inserted	Orange/On
SDLT 320 tape drive formatted Super DLTtape I data cartridge inserted	Orange/On
Blank Super DLTtape I data cartridge inserted	Orange/On
Any Super DLTtape I data cartridge ejected	Off
DLT VS160 tape drive formatted DLTtape VS1 data cartridge inserted	Orange/On
Blank DLTtape VS1 data cartridge inserted	Orange/On
DLTtape VS1 data cartridge ejected	Off
Any DLTtape IV data cartridge inserted	Off
SDLT 600 tape drive “reset”	All LEDs illuminate briefly and then illuminate in sequence until the reset completes

Table 5-3 explains the function of the other LEDs and controls in the front panel.

Table 5-3. How to Interpret the Front Panel LEDs and Other Controls

LED/Button/ Port Title	Color/Symbol	Action	Explanation
Drive Density LED	Orange/Green 	On/Off	See Table 5-2 on page 5-10.
Drive Status LED	Green 	Flashing	The tape drive is in use. This includes functions such as: • The tape is moving. • The tape drive is calibrating, reading, writing, or rewinding the tape. • The tape drive is loading, unloading, or rewinding.
		On	The tape drive is idle. There may or may not be a data cartridge in the tape tape drive.
		Off	The tape drive has not been powered on or is not plugged into a power source.
Cleaning Required LED	Yellow 	On	Cleaning is required. Refer to "Cleaning the Tape Mechanism" on page 5-6 for cleaning information.
		Off	Cleaning is not required.
Eject Button		Press	Use the Eject button to eject the tape data cartridge from the tape drive. When you press the button, the tape drive completes any active writing of data to the tape, then ejects the data cartridge. Refer to the applicable data cartridge appendix for detailed data cartridge handling procedures.
Infrared Communication Port			This infrared port, also known as iTalk, provides a wireless remote testing base for customers and integrators to access system diagnostic information. See your Quantum sales representative for more information.
Notes: **1** Whenever the tape drive resets, all LEDs illuminate briefly and then illuminate in sequence until the reset completes. **2** Whenever the tape drive encounters an error, all LEDs flash together.			

5.6 Troubleshooting

The following subsections provide troubleshooting information that might be helpful should the system fail its Power-On Self-Test (POST).

Refer to the data cartridge appendices in this manual (Appendix A, “Super DLTtape I and Super DLTtape II Data Cartridges” and Appendix B, “DLTtape VS1 Data Cartridge”) for complete visual inspection instructions for Super DLTtape I & II, and DLTtape VS1 data cartridges.

The web site ***http://www.dlttape.com*** also includes valuable information about SDLT systems.

5.6.1 POST Troubleshooting

Table 5-4 provides troubleshooting tips that you will find useful in the event that your SDLT 600 tape drive system fails its POST.

If, after attempting the recommended actions listed in the table, the problem still exists or recurs, a hardware failure may be the cause. Contact your service representative.

Table 5-4. Troubleshooting Chart

If…	Then…	You should…
System does not recognize the SDLT 600 tape drive system.	System may not be configured to recognize the interface ID.	Configure system to recognize the SDLT 600 tape drive system’s ID.
	Interface ID may not be unique.	Change the interface ID and reconfigure the system. The new ID becomes effective at the next power on or interface bus reset.
	Interface adapter parameters may not be correct.	Check interface adapter documentation.
	Interface signal cable may be loose.	Ensure interface cable is fully seated at each connector end.
	Interface terminator may be loose or not present on the bus.	Ensure correct, secure termination of bus.

Table 5-4. Troubleshooting Chart (Continued)

If…	Then…	You should…
System does not recognize the SDLT 600 tape drive system. (continued)	Interface bus may not be terminated correctly.	If the SDLT 600 tape drive system is last or only device on bus (except for adapter), be certain the terminator is installed on the SDLT 600 tape drive system. If the SDLT 600 tape drive system is not the last or only device on the bus, check the cable connections and ensure that the bus is properly terminated at each end.
	Interface terminator may not be at end of bus or more than two terminators may be present.	Ensure that a terminator is installed at each end of the bus. One terminator is usually installed at the host end of the bus.
	Interface bus may be too long.	Limit bus length to ANSI interface standard for the interface interface being used.
	Too many devices on the bus.	Limit the number of devices on the bus (including the interface adapter) to match the limits of the interface being used.
	A device may not have been turned on and a valid interface ID may not have been configured before the system powering on and loading BIOS.	Turn the tape drive power on first, and then turn on power to the system. Do this so that the tape drive is properly recognized by the system.
The tape drive does not power on.	No power is reaching the tape drive.	Check the tape drive's power cable connection at the back of the system.
Nonfatal or fatal errors have occurred for which the cause cannot be determined.	Interface bus termination or the interface bus cable connections may be incorrect. The AC power source grounding may be incorrect (tabletop version).	Ensure the SCSI bus is terminated and that all connections are secure. Use an AC outlet for the tabletop tape unit on the same AC line used by the host system.

5.6.2 Over Temperature Condition

The SDLT 600 tape drive has a thermal sensor located in the tape path. This sensor, which is used to accurately monitor the air temperature in the tape path, issues a TapeAlert warning at 47 °C, and detects an overtemp condition when the temperature in the tape path reaches 50 degrees C. When the tape path temperature sensor detects an overtemp condition, the tape rewinds, unloads, and ejects from the tape drive. (As long as the tape drive is *not* mounted in a tape automation library, the tape ejects.) SCSI status indicates the tape drive is in the over temperature condition.

If the tape drive is mounted in a tape automation library, the data cartridge rewinds to BOT and unbuckles in preparation for unloading, but does not automatically eject. For more information, refer to *SDLT 600 Design and Integration Guide (81-81196-01).*

CHAPTER 6

Regulatory Compliance

This chapter describes various regulations that apply to the SDLT 600 tape drive:

- "Safety Regulations" describes compliance with various standards published by international safety organizations.
- "Electromagnetic Field Specifications" describes the susceptibility of the SDLT 600 tape drive to ambient electromagnetic fields, and describes the susceptibility of the system to unexpected electrostatic discharge.
- "Acoustic Noise Emissions" describes compliance with various acoustic standards.

6.1 Safety Regulations

This section lists the safety regulations that the SDLT 600 tape drive meets or exceeds.

6.1.1 Safety Certifications

The SDLT 600 tape drive meets or exceeds the following safely requirements:

- UL 60950: Information Technology Including Electrical Business Equipment (USA)
- EN60950/IEC 950: Information Technology Including Electrical Business Equipment (Europe)
  - EN60825-1 Information Technology Equipment

The SDLT 600 tape drive is also certified to bear the GS mark.

The SDLT 600 tape drive is a Class I laser product that complies with 21 CFR 1040.10 as applicable on the date of manufacture.

6.2 Electromagnetic Field Specifications

SDLT 600 tape drives are electrical devices; as such, this equipment generates, uses, and may emit radio frequency energy. The tape drives may emit energy in other frequencies, as well, as discussed in the following subsections.

6.2.1 Electromagnetic Emissions

The internal version of the SDLT 600 tape drive system complies with FCC Class A in a standard enclosure; the tabletop version complies with FCC Class B limits.

6.2.2 Electromagnetic Interference Susceptibility

Table 6-1 provides regulations and certifications held by the SDLT 600 tape drive for Electromagnetic Interference (EMI).

Table 6-1. EMI Regulations and Certifications

Type	Regulation/Certification
EEC Directive 89/336 CE	EN55022 (EU) EN55024 (EU)
CFR 47, 1995	FCC Rules Part 15B Class B
IECS-003	Canada
V-3/97.04	VCCI Class B (Japan)
CNS 13438	BSMI Class A (Taiwan)
AS/NZS 3548	Australia/New Zealand

6.2.3 Immunity and ESD Limits

Table 6-2 lists the immunity and ESD failure level limits to which the SDLT 600 tape drive has been tested.

Table 6-2. Electromagnetic Interference (EMI) Test Summary

Test Name	Test Specification	Required Performance
EN55022: 1998 Radiated and Conducted Emissions		
Radiated Electromagnetic Emissions	EN55022: 1998	Class B
Conducted Electromagnetic Emissions		
Current Harmonics and Flicker Emissions Tests		
AC Power Supply Harmonic Emissions	EN61000-3-2	As per the standard
AC Power Supply Voltage Flicker	EN61000-3-3	As per the standard
EN55024: 1998 Immunity Tests		
Electrostatic Discharge Immunity	EN61000-4-2	Criteria A
Radiated Electromagnetic Immunity	EN61000-4-3	Criteria A
Electrical Fast Transient / Burst Immunity	EN61000-4-4	Criteria B
Electrical Surge Immunity	EN61000-4-5	Criteria B
Conducted Electromagnetic Immunity	EN61000-4-6	Criteria A
Power Frequency Magnetic Field Immunity	EN61000-4-8	Criteria A
AC Voltage Dips and Interrupts Immunity	EN61000-4-11	Criteria B

6.3 Acoustic Noise Emissions

Table 6-3 lists acoustic noise emission levels, both as noise power and sound pressure, for the SDLT 600 tape drive. The table provides the preliminary declared values per ISO 9296 and ISO 7779/ EN27779.

Table 6-3. Acoustic Noise Emissions, Nominal

Mode	**Noise Power Emission Level (LNPEc)**		**Sound Pressure Level (LPAc)***	
	Internal	Tabletop	Internal	Tabletop
Idle	Not applicable	5.4 Bel	Not applicable	42 dB
Streaming	5.9 Bel	5.9 Bel	47 dB	53 dB
* Sound pressure level measured at front of tape drive.				

APPENDIX A

Super DLTtape I and Super DLTtape II Data Cartridges

This appendix discusses Super DLTtape I and Super DLTtape II data cartridge information. Information in this appendix includes the following topics:

- Recognizing Quantum Super DLTtape I and II Data Cartridges
- Data Cartridge Handling Guidelines
- Data Cartridge Inspection Procedure
- Data Cartridge Write-protect Switch
- Loading a Data Cartridge
- Unloading a Data Cartridge.

Refer to Appendix B for DLTtape VS1 data cartridge information.

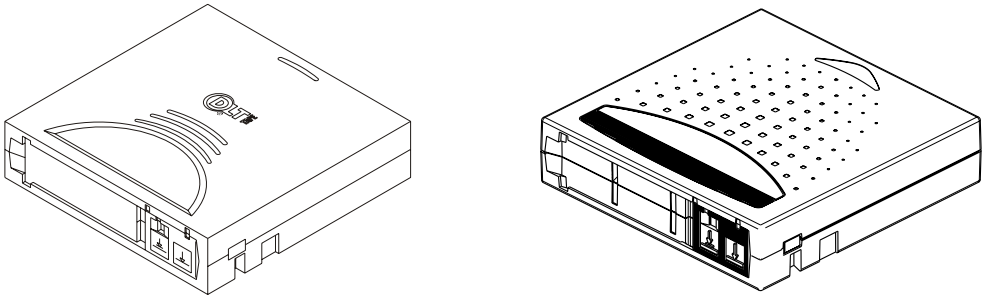
A.1 Recognizing Quantum Super DLTtape I and II Data Cartridges

The Super DLTtape I data cartridge is dark green. The Super DLTtape II data cartridge is dark blue. Both data cartridges have a keying feature that prevent insertion into the older generation DLT tape drives.

NOTE: You cannot insert the Super DLTtape II data cartridge into an SDLT 220 or SDLT 320 tape drive; or any other earlier model Quantum tape drive.

Other than color differences, the basic geometry, write protection switch, and label space for the Super DLTtape I and Super DLTtape II, the data cartridges are basically the same. This simplifies the integration of the SDLT 600 tape drive into existing operating environments and into automated tape libraries.

The SDLT 600 tape drive is backward read compatible with Super DLTtape I data cartridges formatted in the SDLT 220 or SDLT 320 tape drive. Figure A-1 shows outside characteristic differences of the Super DLTtape I and Super DLTtape II data cartridges.



Super DLTtape II
Read AND Write
with SDLT 600

Super DLTtape I
Read ONLY
with SDLT 600

Figure A-1. Super DLTtape Data Cartridges Read by SDLT 600 Tape Drive

NOTE: The Super DLTtape I and Super DLTtape II data cartridges have a keying feature to ensure you cannot load them into a previous generation DLT tape drives.

A.2 Data Cartridge Handling Guidelines

By following general handling procedures, conducting careful visual inspections of data cartridges on a regular, ongoing basis, and being certain to store data cartridges within their environmental limits, you will greatly reduce any chance that you will experience problems with your data cartridges or cause damage to your Super DLTtape system. **Respect your media as much as you do your data**.

Ensure that your data cartridge backup solution performs reliably by following these general handling guidelines:

- Always keep each data cartridge in its protective plastic case when it is not in the tape drive.
- When carrying data cartridges in their cases, always orient the cases so that the grooves in the cases interlock. This prevents the cases from slipping apart and falling.
- Never stack the data cartridges in a stack of more than five.

- When placing data cartridges in archival storage, be certain you stand each data cartridge vertically.
- Do not carry data cartridges loosely in a box or any other container. Allowing data cartridges to jostle together exposes them to unnecessary physical shock.
- Always observe the proper environmental conditions for storing data cartridges. Refer to the data cartridge reference card supplied with each data cartridge. The ambient operating environment for the data cartridge is

Temperature	10 °C to 40 °C (50 °F to 104 °F)
Relative Humidity	20% to 80% (non-condensing)

NOTE: If storage or transportation of a data cartridge has exposed it to conditions outside the ambient values shown above, you should "condition" the data cartridge to its operating environment for a 24-hour period.

- Maintain clean and smoke-free operating and storage environments.
- Never expose the data cartridge to moisture or direct sunlight.
- Do not place data cartridges on or near devices that may produce magnetic fields, such as computer monitors, motors, or video equipment. Such exposure can alter or erase data on the media.
- Avoid unnecessary opening of the data cartridge door; this may expose the media to contamination or physical damage.
- Do not touch or allow direct contact with the media or tape leader. Dust or natural skin oils can contaminate the data cartridge and impact media performance.
- A dropped data cartridge may have dislodged, loosened, or damaged internal components. If you drop a data cartridge, give it a thorough visual inspection, as described in "Data Cartridge Inspection Procedure" on page A-4.
- Never apply adhesive labels or "sticky" notes on the top, side, or bottom of your Super DLTtape I or Super DLTtape II data cartridge. Only use the slide-in type label provided with each data cartridge and slide it into the label slot on the data cartridge.
- Do not use graphite pencils, water-soluble felt pens, or other debris-producing writing instruments on your labels. Never erase a label—replace it.
- Be certain you place the unused data cartridge labels in the protective box so that you do not inadvertently pick them up along with the data cartridge during subsequent usage. A static electricity charge on a data cartridge may cause a label to cling to the data cartridge. A label that is accidentally inserted into the tape drive along with a data cartridge can prevent the hub reel and drive gear from meshing.
- Follow all data cartridge handling instructions that accompany your data cartridges or tape drive.

A.3 Data Cartridge Inspection Procedure

Ensure your data cartridge backup solution performs reliably by following the Visual Mechanical Inspection (VMI) procedures described in this subsection. These steps will help you identify any potential data cartridge problems, and will prevent accidental loss of data or damage to your SDLT 600 tape drive system.

You should do an inspection if any of these conditions occur:

- As a general practice whenever you change or load a new data cartridge.
- If a data cartridge is dropped or subjected to some hard physical shock.
- If the SDLT 600 tape drive becomes inoperable after loading a data cartridge.
- If you receive a shipment of data cartridges that show any sign of shipping damage.

Follow these steps to visually inspect an Super DLTtape I or Super DLTtape II data cartridge:

1. Remove the data cartridge from its protective plastic case.
2. Check for loose debris attached to the shell, and for other contamination (oily, slimy, or sticky substances) that may have built up on the surface of the shell.
3. Check the data cartridge for any obvious cracks or other physical damage to the shell. Rotate the data cartridge in your hands, looking for broken or missing parts.
4. Grasp the data cartridge to view the bottom as shown in Figure A-2. (The media access door is on the top edge and the write protect switches are on the bottom edge.)

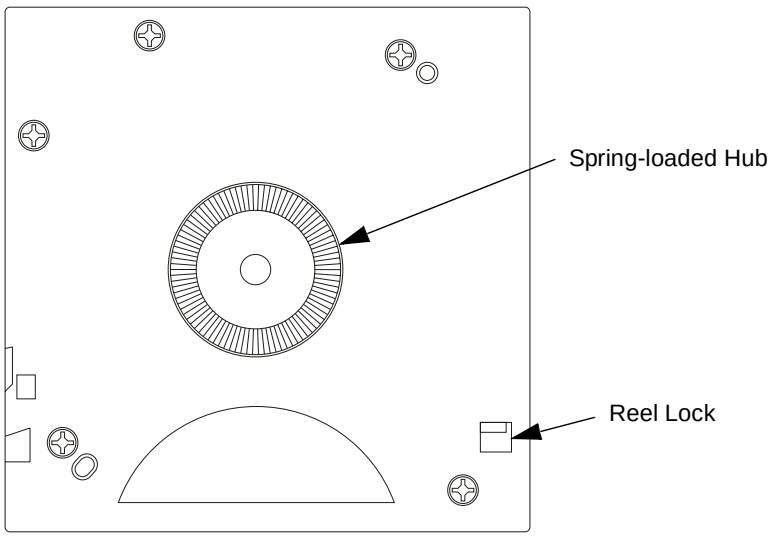


Figure A-2. Bottom View of Super DLTtape II Data Cartridge

5. Refer to Figure A-3 and check the reel lock openings to ensure the small plastic tabs inside are partially visible. The reel locks are black. The reel locks can break if you drop the data cartridge. *If the reel lock tabs are not visible, do not use the data cartridge.*

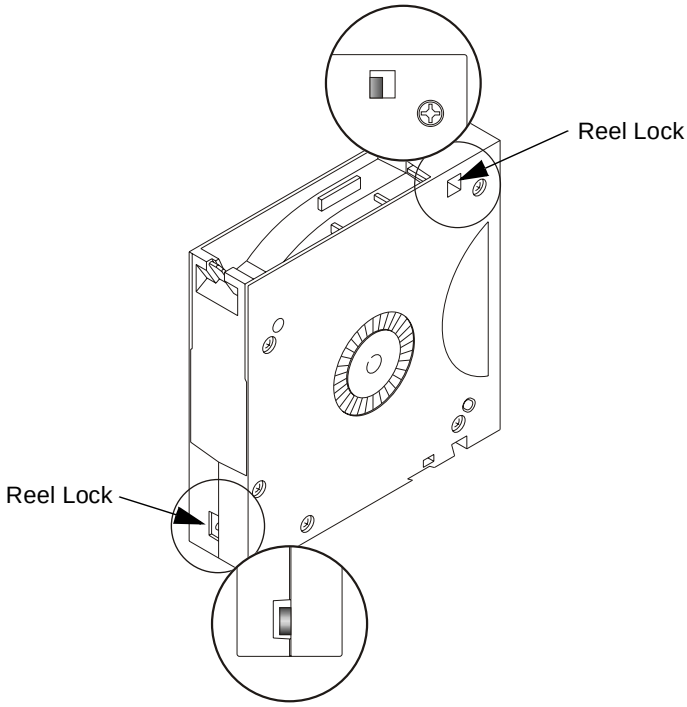


Figure A-3. Super DLTtape II Data Cartridge Reel Locks

6. Once again, look at the end of the data cartridge, holding it as shown in Figure A-4.

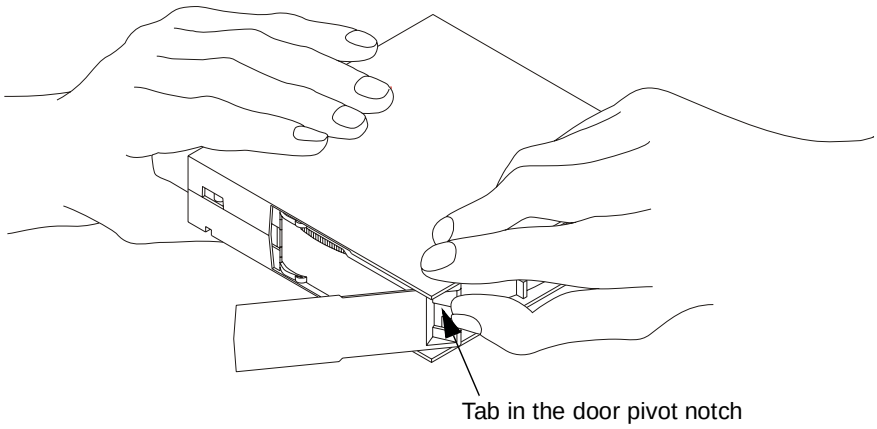


Figure A-4. Opening the Super DLTtape II Data Cartridge Door

7. Open the data cartridge door by pressing on the tab in the door pivot notch as shown in Figure A-4. Use care that you do not touch the tape leader.

8. Compare what you see inside the data cartridge door to Figure A-5. Look for damage to the data cartridge clips, including:

- Bent or towed-in appearance on one or both clips
- Improper seating (clips should be fully retracted towards the left side of the opening)
- Bending of the leader bar that supports the clips.

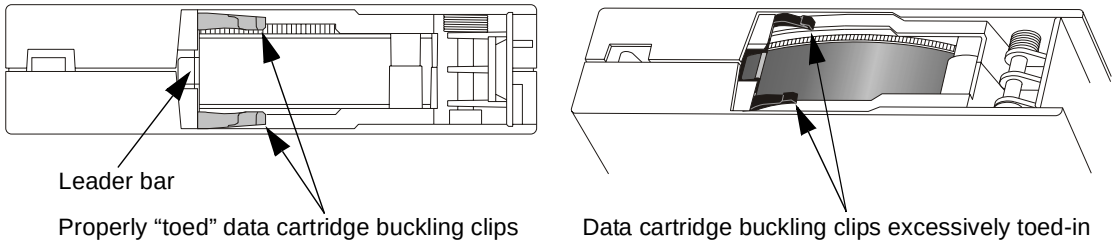


Figure A-5. Problems to Look for Inside the Data Cartridge Door

9. Examine the visible tape leader for excessive debris, oily or sticky residue, condensed droplets of moisture, or any other signs of contamination.

10. Finally, check for proper operation of the data cartridge’s write-protect switch (refer to Figure A-6 on page A-7). This sliding switch, located on the end of the data cartridge used for the label, should snap smartly back and forth, and the orange tab should be visible when the data cartridge is set to provide write protection (you cannot write over the data already on the media).

A.4 Data Cartridge Write-protect Switch

Each data cartridge has a write-protect switch that you can use to prevent accidental erasure of data. Before inserting the data cartridge into the tape drive, position the write-protect switch on the front of the data cartridge (Figure A-6) according to the type of operations you expect to perform.

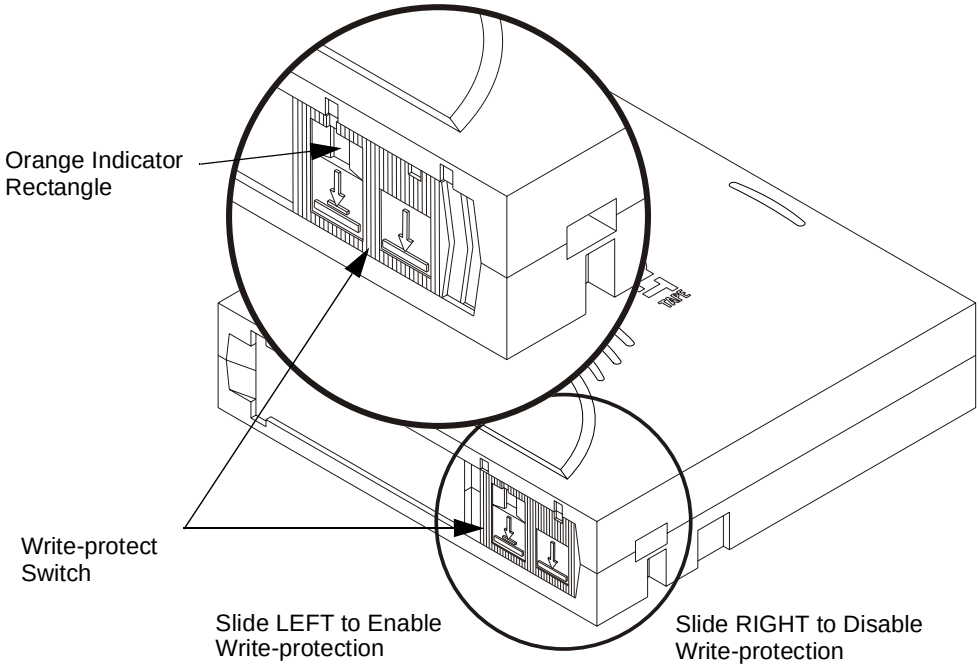


Figure A-6. Write-Protect Switch on Super DLTtape II Data Cartridge

- Slide the write-protect switch to the left to **enable** write protection (you can read existing data; however, you cannot write over existing data on the media, nor append additional data to the media). When you move the write-protect switch to the left, a small orange rectangle is visible. This is your visual reminder that you cannot write data to the media.
- Slide the write-protect switch to the right to **disable** write protection (you can write over existing data on the media, and you can append additional data to the media unless the data cartridge is write-protected via firmware). When write-protection is disabled, no orange rectangle is visible.

For more details, refer to Table A-1 on page A-8.

Table A-1. Write-Protect Switch Positions

Write-protect Switch Position	Orange Write-protect Indicator	Result
Before Loading the Data Cartridge		
Enabled (Slide switch to left)	Visible	You cannot write data to the media. You cannot overwrite existing data on the media. You cannot append additional data to the media.
Disabled (Slide switch to right)	Not Visible	Unless the data cartridge is write-protected via firmware: - You can write data to the media. - You can overwrite existing data on the media. - You can append additional data to the media.
After Loading the Data Cartridge and During Operation		
If you move the write-protect switch from its right (disabled) position to its left (enabled) position	Visible	If the tape drive is currently writing to a data cartridge, the write-protect feature does not take effect until *after* the current write operation completes.
If you move the write-protect switch from its left (enabled) position to its right (disabled) position	Not Visible	The data cartridge becomes write-enabled *after* a variable amount of seconds.

A.5 Loading a Data Cartridge

Complete this subsection to load a data cartridge into the front of the tape drive; refer to Figure A-7 as needed.

1. Insert the data cartridge into the front of the tape drive, as shown in Figure A-7.
2. Push the data cartridge fully into the tape drive.

   The Drive Status LED flashes to show that the media is loading. When the media reaches the Beginning of Tape (BOT) marker, the LED lights steadily. The data cartridge is now ready for use.

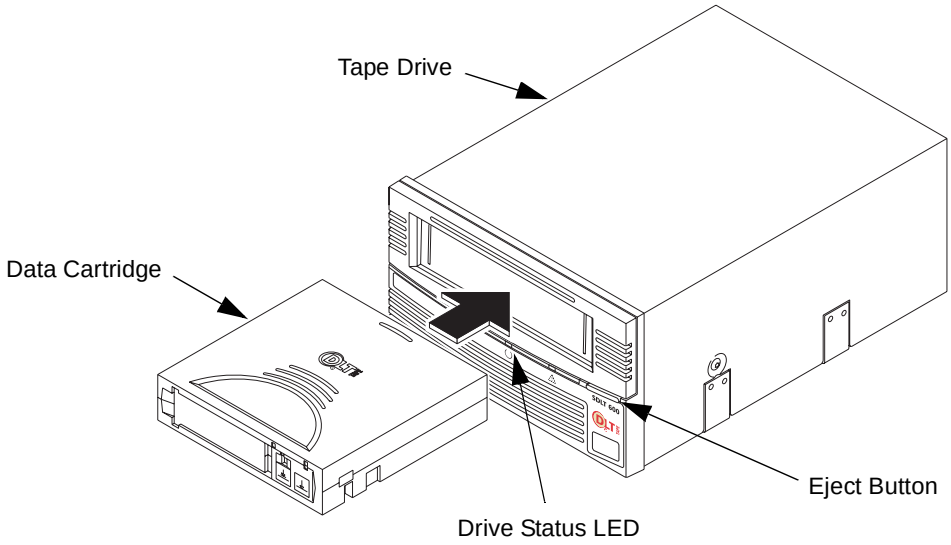


Figure A-7. Loading a Super DLTtape II Data Cartridge

A.6 Unloading a Data Cartridge

Follow these steps to unload a data cartridge; refer to Figure A-7 on page A-9 as needed.

> **CAUTION** Remove the data cartridge from the tape drive BEFORE turning off host power. Failure to remove a data cartridge may result in data cartridge or tape drive damage.
>
> Do NOT rush removal of the data cartridge. Wait until the tape drive ejects the data cartridge and the Drive Status LED lights steady before removing the data cartridge.

1. Press the Eject button (or issue an appropriate system software command); the tape drive completes any active writing of data to the media, then rewinds. The Drive Status LED flashes as the media rewinds.

   When the media is finished rewinding, the tape drive ejects the data cartridge and the Drive Status LED lights steadily.

2. Remove the data cartridge from the tape drive and return the data cartridge to its plastic case to protect it from damage.

APPENDIX B

DLTtape VS1 Data Cartridge

The SDLT 600 tape drive is backward read compatible with DLTtape VS1 data cartridges formatted in the DLT VS 160 tape drive. Data backed up using a DLTtape VS1 data cartridge in a DLT VS160 tape drive is retrievable using the SDLT 600 tape drive.

By following general handling procedures, conducting careful visual inspections of data cartridges on a regular, ongoing basis, and being certain that you store data cartridges within their environmental limits, you will greatly reduce any chance that you will experience problems with your data cartridges or cause damage to your SDLT system. **Respect your media as much as you do your data**.

This appendix discusses to the DLTtape VS1 data cartridge; refer to Appendix A for Super DLTtape I and Super DLTtape II data cartridge information.

Information in this appendix includes the following topics:

B.1 Data Cartridge Handling Guidelines

Ensure your data cartridge backup solution performs reliably by following these general handling guidelines:

- Always keep each data cartridge in its protective plastic case when it is not in the tape drive.
- When carrying data cartridges in their cases, always orient the cases so that the grooves in the cases interlock. This prevents the cases from slipping apart and falling.
- Never stack the data cartridges in a stack of more than five.

- When placing data cartridges in archival storage, be certain you stand each data cartridge vertically.
- Do not carry data cartridges loosely in a box or any other container. Allowing data cartridges to hit together exposes them to unnecessary physical shock.
- Always observe the proper environmental conditions for storing data cartridges. Refer to the data cartridge reference card supplied with each data cartridge. The ambient operating environment for the data cartridge is

Temperature	10 °C to 40 °C (50 °F to 104 °F)
Relative Humidity	20% to 80% (non-condensing)

NOTE: If storage or transportation of a data cartridge has exposed it to conditions outside the ambient values above, you should "condition" the data cartridge to its operating environment for a 24-hour period.

- Maintain clean operating, working, and storage environments.
- Do not expose the data cartridge to moisture or direct sunlight.
- Do not place data cartridges on or near devices that may produce magnetic fields, such as computer monitors, motors, or video equipment. Such exposure can alter or erase data on the media.
- Avoid unnecessary opening of the data cartridge door; this may expose the media to contamination or physical damage.
- Do not touch or allow direct contact with media or tape leader. Dust or natural skin oils can contaminate the data cartridge and impact media performance.
- Do not insert any data cartridge that has been dropped into the SDLT 600 tape drive without at least a thorough visual inspection, as described in "Data Cartridge Inspection Procedure" on page B-3. A dropped data cartridge may have dislodged, loosened, or damaged internal components.
- Never apply adhesive labels or notes on the top, side, or bottom of your DLTtape VS1 data cartridge. Only use the user slide-in type label provided with each data cartridge and slide it into the label slot on the data cartridge.
- Do not use graphite pencils, water-soluble felt pens, or other debris-producing writing instruments on your labels. Never erase a label—replace it.
- Be certain you place the unused data cartridge labels in the protective box so that you do not inadvertently pick them up along with the data cartridge during subsequent usage. A static electricity charge on a data cartridge may cause a label to cling to the data cartridge. A label that is accidentally inserted into the tape drive along with a data cartridge can prevent the hub reel and drive gear from meshing.
- Follow all data cartridge handling instructions that accompany your data cartridges or tape drive.

B.2 Data Cartridge Inspection Procedure

Ensure your data cartridge backup solution performs reliably by following the Visual Mechanical Inspection (VMI) procedures described in this subsection. These steps help you identify any potential data cartridge problems, and prevent accidental loss of data or damage to your SDLT 600 tape drive system.

You should do an inspection if any of these conditions occur:

- As a general practice whenever you change or load a new data cartridge.
- If a data cartridge is dropped or subjected to some hard physical shock.
- If the SDLT 600 tape drive becomes inoperable after loading a data cartridge.
- If you receive a shipment of data cartridges that show any sign of shipping damage.

Follow these steps to visually inspect a DLTtape VS1 data cartridge:

1. Remove the data cartridge from its protective plastic case.
2. Gently shake the data cartridge. Listen for any rattling or sounds of any loose pieces inside the data cartridge. *If you hear anything loose inside, do not use the data cartridge.*
3. Check the data cartridge for any obvious cracks or other physical damage to the shell. Rotate the data cartridge in your hands, looking for broken or missing parts.
4. Grasp the data cartridge to view the bottom as shown in Figure B-1. (The media access door is on the top edge and the write protect switches are on the bottom edge.)

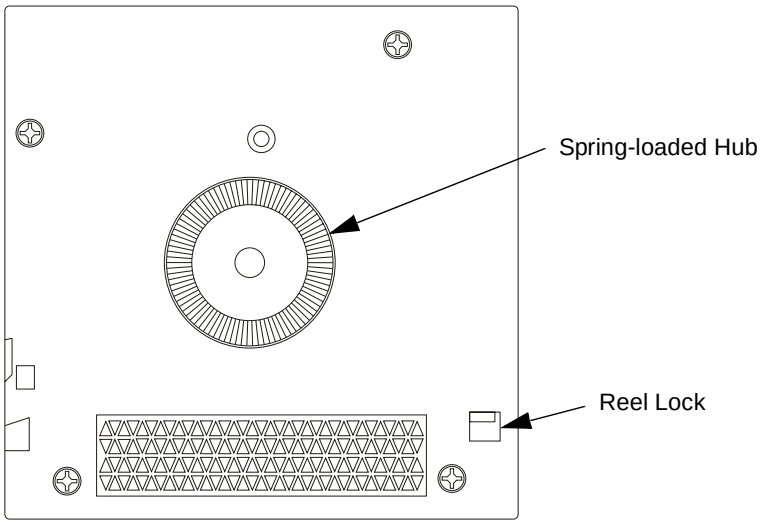


Figure B-1. Bottom View of DLTtape VS1 Data Cartridge

5. Refer to Figure B-2 and check the reel lock openings to ensure the small plastic tabs inside are partially visible. The reel locks are black. The reel locks can break if you drop the data cartridge. *If the reel lock tabs are not visible, do not use the data cartridge.*

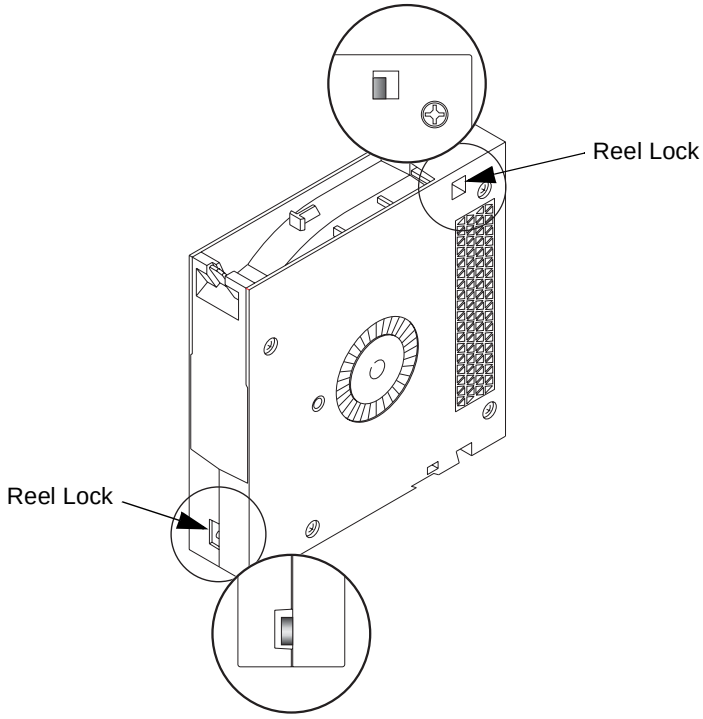


Figure B-2. DLTtape VS1 Data Cartridge Reel Locks

6. Look closely at the spring-loaded reel hub on the bottom of the data cartridge. Verify that the hub is centered within the circular opening in the data cartridge. Gently press the hub and be certain that it springs back into place—centered within its circular opening and completely flush with the plastic shell. Figure B-3 shows a defective spring-loaded reel hub. Do not use a data cartridge that fails this step.

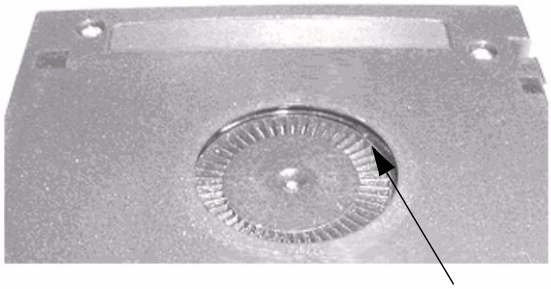


Figure B-3. Faulty Data Cartridge Spring-loaded Reel Hub

7. Once again, look at the end of the data cartridge, holding it as shown in Figure B-4.

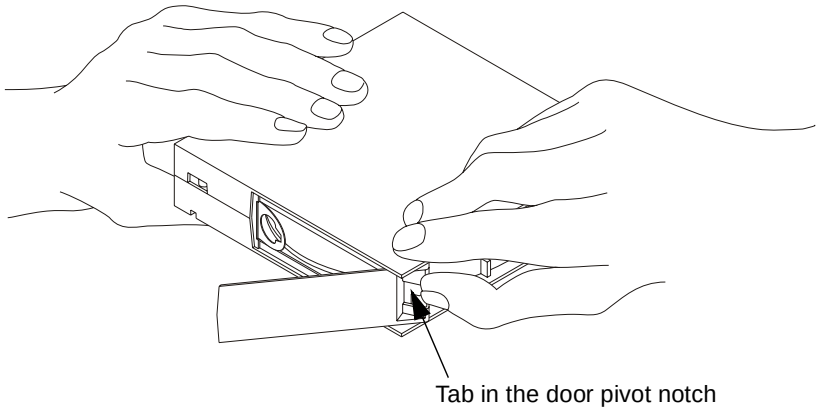


Figure B-4. Opening the DLTtape VS1 Data Cartridge Door

8. On the right side corner of the data cartridge is a small tab in a cut-out portion (the door pivot notch) of the data cartridge. Using your thumb, gently lift up on the tab and swing the door open as shown in Figure B-4.

9. Look at the end of the data cartridge, holding it as shown in Figure B-5. Use care that you do not touch the tape leader.

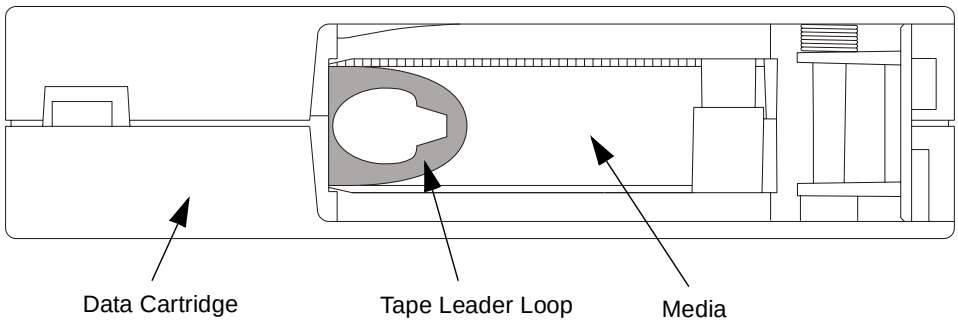


Figure B-5. End View of DLTtape VS1 Data Cartridge (Tape Leader Loop in its Correct Position)

10. Inside the door, you will see the media and tape leader loop. The loop should stick up about an eighth of an inch when viewed from the edge; the loop must be a closed loop.

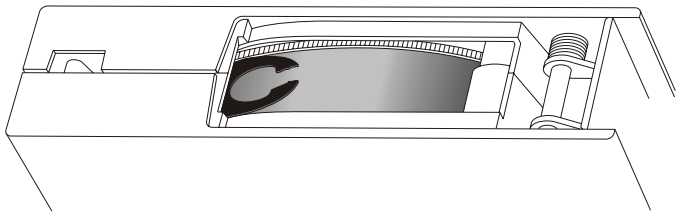
11. Examine the visible tape leader to ensure it is in the correct position as shown in Figure B-5. *If the loop is torn, bent, pulled in, or not sticking up about an eighth of an inch, do not use the data cartridge.*

12. Examine the tape leader for any excessive debris, oily or sticky residue, condensed droplets of moisture, or any other signs of contamination.

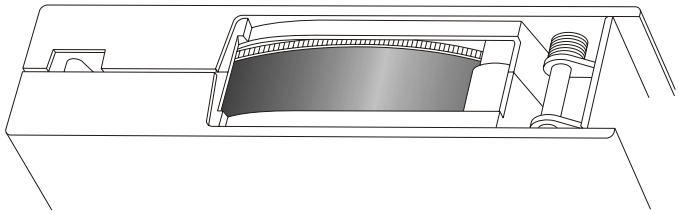
Compare what you see inside the data cartridge door to illustrations in Figure B-6. Look for faulty items including:

- A broken tape leader loop
- A swallowed tape leader loop
- Loose media inside the data cartridge.

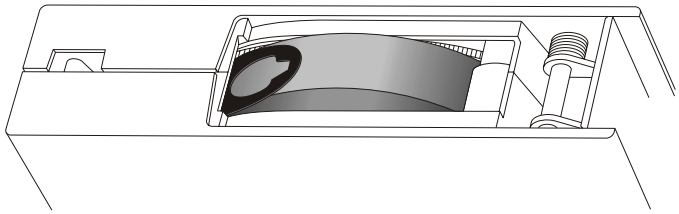
Do not use a data cartridge that exhibit any of the type of problems shown in these examples.



Broken tape leader loop



Swallowed tape leader loop



Loose media inside the data cartridge

Figure B-6. DLTtape VS1 Data Cartridges with Visible Damage

13. Finally, check for proper operation of the data cartridge's write-protect switch (refer to Figure B-7 on page B-7). This sliding switch, located on the end of the data cartridge used for the label, should snap smartly back and forth, and the orange tab should be visible when the data cartridge is set to provide write protection (you cannot write over the data already on the media).

B.3 Data Cartridge Write-Protect Switch

Each data cartridge has a write-protect switch that you can use to prevent accidental erasure of data. Before inserting the data cartridge into the tape drive, position the write-protect switch on the front of the data cartridge (Figure B-7) according to the type of operations you expect to perform.

Since the DLTtape VS1 data cartridge is a read-only data cartridge when used in the SDLT 600 tape drive, the write-protect switch (in this configuration) does not apply.

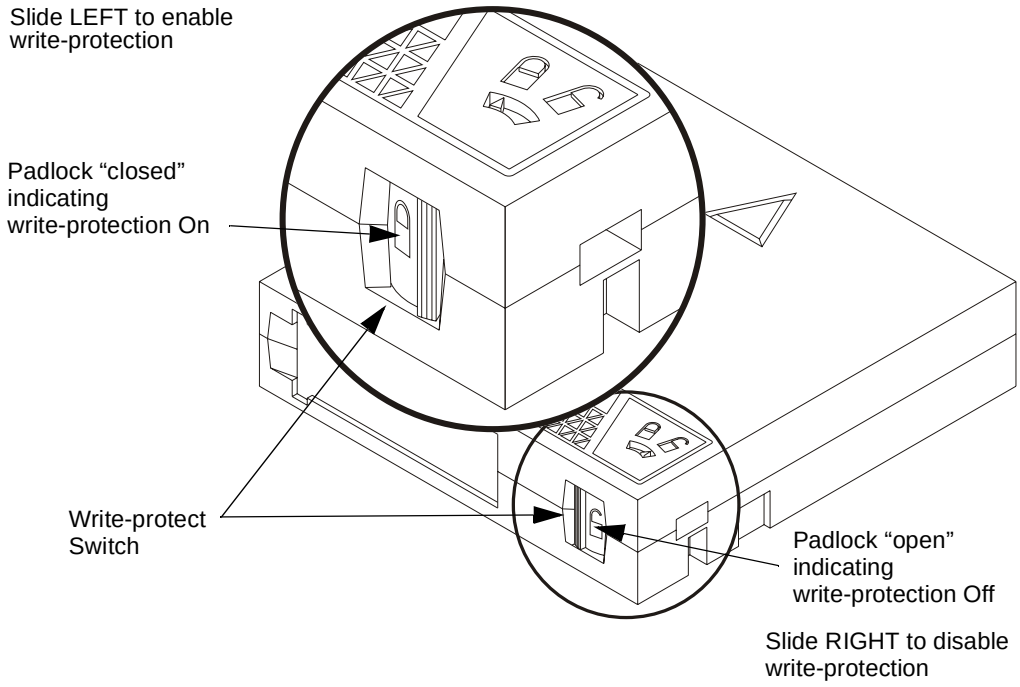


Figure B-7. Write-Protect Switch on DLTtape VS1 Data Cartridge

- Slide the write-protect switch to the left to **enable** write protection (you can read existing data; however, you cannot write over existing data on the media, nor append additional data to the media). When you move the write-protect switch to the left, a small “closed” padlock is visible. This is your visual reminder that you cannot write data to the media.
- Slide the write-protect switch to the right to **disable** write protection (you can write over existing data on the media, and you can append additional data to the media unless the data cartridge is write-protected via firmware). When write-protection is disabled, a small “open” padlock is visible.

B.4 Loading a Data Cartridge

Complete this subsection to load a data cartridge into the front of the tape drive; refer to Figure B-8 as needed.

To load a data cartridge, follow these steps:

1. Insert the data cartridge into the front of the tape drive, as shown in Figure B-8.
2. Push the data cartridge fully into the tape drive.

   The Drive Status LED flashes to show that the media is loading. When the media reaches the Beginning of Tape (BOT) marker, the LED lights steadily. The data cartridge is now ready for use.

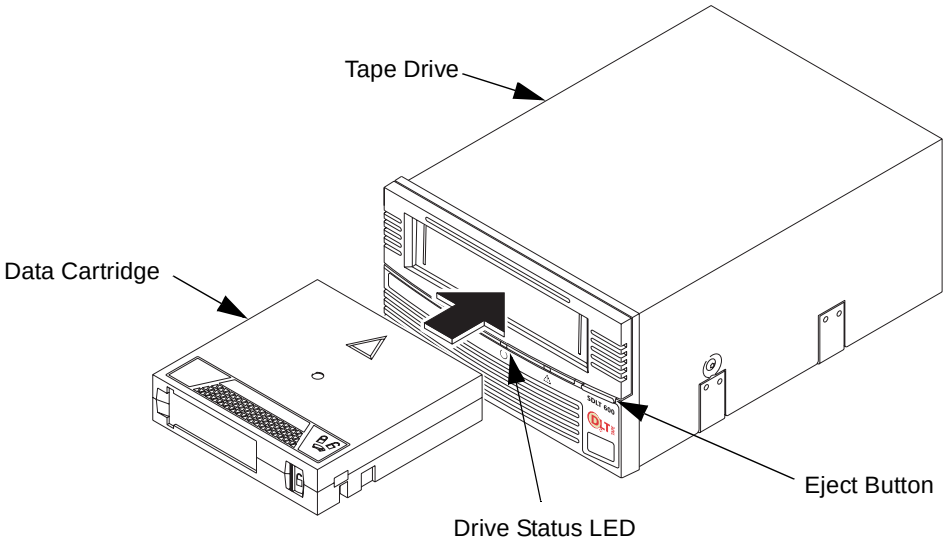


Figure B-8. Loading a DLTtape VS1 Data Cartridge

B.5 Unloading a Data Cartridge

Complete this subsection to unload a data cartridge; refer to Figure B-8 on page B-8 as needed.

> **CAUTION** Remove the data cartridge from the tape drive BEFORE turning off host power. Failure to remove a data cartridge may result in data cartridge or tape drive damage.
>
> Do NOT rush removal of the data cartridge: premature removal can cause tape leader failure. Wait until the tape drive ejects the data cartridge and the Drive Status LED lights steadily before removing the data cartridge.

1. Press the Eject button (or issue an appropriate system software command); the tape drive completes any active writing of data to the media. The Drive Status LED flashes as the media rewinds.

   When the media is finished rewinding, the tape drive ejects the data cartridge and the Drive Status LED lights steadily.

2. Remove the data cartridge from the tape drive and return the data cartridge to its plastic case to protect the data cartridge from damage.

Glossary

The following is an alphabetical list of specialized words and technical terms with their definitions, commonly used in the tape drive and tape media industry.

A

AC	Alternating Current.
Access	(v.) To read, write, or update information on a storage medium, such as magnetic tape. (n.) The operation of reading, writing, or updating stored information.
Access Time	The interval between the time a request for data is made by the system and the time the data is available from the tape drive.
Advanced PRML	Advanced Partial Response Maximum Likelihood. The advanced PRML channel technology provides high-encoding efficiency recording densities for greater capacity and performance.
Allocation	The process of assigning particular areas of the media to particular data or instructions.
AMP Media	Advanced Metal Powder Media. A state-of-the-art media first designed for Super DLTtape I. It incorporates durable metal powder technology for high-density data storage and embedded non-magnetic information for head tracking.
Archiving	The removal or copying of data from the computer system onto secondary storage media that is safely stored away.
ASIC	Application Specific Integrated Circuit.
ASTM	American Society for Testing and Materials.

B

Backup	A copy of a file, directory, or volume on a separate storage device from the original, for the purpose of retrieval in case the original is accidentally erased, damaged, or destroyed.
Bad Data Block	A block that cannot reliably hold data because of a media flaw or damaged format markings.
Base Plate	An aluminum die casting that acts as the support platform for the other modules and for the tape drive enclosure. The base plate includes the precision mounting holes used to install SDLT tape drives into a server or tape library.
Bezel	(Also known as the faceplate.) A plastic panel that extends the face of a tape drive so that it covers a computer's drive bay opening. The internal model of SDLT 600 has two bezels: a library bezel and an internal bezel.
BIOS	Basic Input/Output System. A set of routines that work closely with the hardware to support the transfer of information between various elements of the system, such as memory, disks, and peripheral devices.
Block	A sector or group of sectors. SDLT 600 supports block sizes up to 16 MB.
BOM or BOT	Beginning of Media or Beginning of Tape. The physical beginning of the media.
BRC	Backward-Read Compatibility. The ability of a current tape drive product to read data cartridges written on earlier model tape drives.
Buckling Mechanism	The buckling mechanism engages the tape leaders upon data cartridge load and disengages them on data cartridge unload.
Buffer	An area of RAM reserved for temporary storage of data that is waiting to be sent to a device. The data is usually on its way to or from the tape drive or some other peripheral device.
Bus	The part of a chip, circuit board, or interface designed to send and receive data.

C

Cache	Specialized RAM used as a buffer between a fast CPU or I/O channel and storage which has a relatively slow access time (for example, tape or diskette), to avoid slowing down the former.
Cartridge Receiver	At media insertion, the cartridge receiver assembly is responsible for guiding the media into its operating position, opening the door, unlocking the cartridge brakes, and securing the media for operation. At media ejection, the cartridge receiver assembly reverses the process and automatically ejects the data cartridge a fixed distance from the front of the tape drive.
Compressed Capacity	Capacity after data has been processed, using either software or hardware, to reduce storage space while maintaining data integrity. (See also Data Compression.)
CSA	Canadian Standards Association, also known as CSA International.
CTM	Cartridge Tape Module. The main function of the SDLT's CTM is to provide the magnetic recording media used by the tape drive to store customer information. The CTM also provides the protective cartridge that allows the media to be removed and stored safely.

D

Data Compression	A process that reduces the amount of storage space required to hold a particular block of data. Data transfer speed and total media capacity are affected by the data compression achieved. In accordance with industry practice, a typical compression ratio is 2:1 of data storage. Actual compression ratios achieved depend on the redundancy of data files being written.
DC	Direct Current.
DCM	Data Control Module. The main functions of the DCM are to provide the path and guides for the all media motion inside the tape drive and to write data to and read data from the media.

Device	According to the SCSI specification, multiple SCSI devices can be connected to a single SCSI bus. Each SCSI device contains a SCSI ID number that can be set in the range 0 to 15.
Device Driver	A low-level (usually kernel-mode) operating system component that enables a PC to communicate with peripheral devices such as printers, CD-ROMs, and tape drives. Each kind of device requires a different driver.
Differential	A term referring to the electrical characteristics of the signal used on the SCSI bus interface. Differential signals minimize the effect of common mode signal noise and allow the SCSI bus to operate reliably over greater distances at a higher speed.
DLTSage	A suite of predictive and preventive maintenance diagnostics software, sold and supported by Quantum Corporation.
DLZ	Digital Lempel-Ziv 1 Algorithm. Named after Abraham Lempel and Jacob Ziv. A data compression technique used in all SDLT tape drives.

E

EEPROM	Electronically Erasable Programmable Read-Only Memory. An integrated circuit memory chip that can store programs and data in a non-volatile state. These devices store firmware in DLT and SDLT tape drives, and can be erased and reprogrammed with new data.
EIM	Electronic Interface Module. The SDLT EIM consists of two major boards—the Integrated Controller Module (ICM) board and a separate Host Interface Module (HIM) board.
Encoding	(n.) Characters (or bytes) of information converted to magnetic patterns on the media. (v.) The process of converting to the desired pattern.
EOD	End of Data. Location on media where the last session stopped.
EOM or EOT	End of Media or End of Tape. Logical EOM allows space to complete a write operation; physical EOM signifies that the media is completely used.
Erase	The removal of data from media.

Error	A message that occurs when there is a loss of ability to interpret recorded data. Usually due to magnetic issues or defects in or on the media.
ESD	Electrostatic discharge. A sudden discharge of electrostatic energy that can damage delicate electronic circuitry.

F

FCC	Federal Communications Commission.
Fibre Channel	A high-speed serial architecture that allows either optical or electrical connections at data rates from 265 MB to 2 Gb per second.
Firmware	Permanent or semi-permanent instructions and data programmed directly into the circuitry of a programmable read-only memory or electronically erasable programmable read-only memory chips. Used for controlling the operation of the computer or tape device. Distinct from software, which is stored in random access memory and can be altered with ease.

G

GB	Gigabyte. A unit of measure equal to 1000 Megabytes (MB) or 1,000,000,000 bytes.

H

Head	The tiny electromagnetic coil and metal pole used to create and read back the magnetic patterns on the media. Also known as the read/write head.
HiFN	An ASIC (Application Specific Integrated Circuit) for the SDLT that handles data compression.

HIM	Host Interface Module. This board is one of two boards that make up the EIM. The HIM implements the interface between the host system and the tape drive; it comes in two different variations, SCSI and Fibre Channel.
HRE	Hard Read Error.
HWE	Hard Write Error.
Hz	Hertz. A measure of frequency (cycles per second).

I

ICM	Integrated Controller Module. This board is one of two boards that make up the EIM. The ICM contains the main controller and servo micro-processor, the custom-designed SDLT ASICs, and the cache memory.
IEC	International Electrotechnical Commission, an international standards organization for electronics and electrotechnical matters.
IEEE	Institute of Electrical and Electronics Engineers.
Interface	A hardware or software protocol, contained in the electronics of the tape controller and tape drive, that manages the exchange of data between the tape drive and computer. The most common interfaces for small computer systems are AT (IDE) and SCSI.
iTalk	DLTSage iTalk (and Pocket DLTSage iTalk). This software allows you to access system diagnostic information from your tape drive using an infrared communication port located on the front panel of the tape drive.

J

Jumper	A tiny connector box that slips over two pins that protrude from a circuit board. When in place, the jumper connects the pins electrically. The jumper can be moved to change electrical connections.

K

KB	Kilobyte. A unit of measure equal to 1 thousand (1024) bytes.

L

LED	Light Emitting Diode.
LGMR	Laser Guided Magnetic Recording technology.
LSB	Least Significant Bit.
LUN	Logical Unit Number.
LVD	Low Voltage Differential. LVD is a physical interface with power low enough to allow integration within the SCSI controller chip. Ultra 160 SCSI uses a low-voltage differential interface.

M

MAM	Medium Auxiliary Memory (MAM) is an SDLT 600 tape drive feature that provides information about the status and prior use history of an SDLTtape II data cartridge.
Mb	Megabit. A unit of measure equal to 100,000 bytes.
MB	Megabyte. A unit of measure equal to 1 million bytes.
MRC Heads	Magneto Resistive Cluster Heads. A cluster of small, cost-effective Magneto Resistive (MR) tape heads packed densely together.
MSB	Most Significant Bit.
MSE	Multi-mode Single-Ended. A signaling alternative for multi-mode SCSI devices that allows multi-mode SCSI devices to operate when SE SCSI devices are present on the bus.
MTBF	The probable average number of service hours between failures.

N

Native Capacity	The capacity of a given media product in its basic recording format (without the use of data compression).
Native Mode	Refers to the uncompressed storage capacity of a media subsystem. (See Native Capacity.)
Node	In reference to a Fibre Channel network, a node is any device attached to the network.

P

Parity	A method of generating redundant information that can be used to detect errors in stored or transmitted data.
Peripheral	A device added to a system as a complement to the basic central processing unit (CPU), such as a disk drive, tape drive, or printer.
POS	Pivoting Optical Servo™. An optically-assisted servo system that combines high-density magnetic read/write data recording with laser servo guiding.
Port	In reference to a Fibre Channel network, a port connects a node to the network.
Positive Engagement Buckling Mechanism	A highly robust, solidly engineered tape leader-buckling mechanism for heavy-duty-cycle automated environments.
POST	Power-On Self-Test (POST). When power is applied to the tape drive, it performs a POST.
PRML	See Advanced PRML.

Q

QEZ	An Application Specific Integrated Circuit (ASIC) for the SDLT 600 tape drive.
qTalk	One of the utilities comprising Quantum's DLTSage, qTalk lets users communicate with other computers via a serial line that's usually connected to a modem.

R

Restore	To replace data on the hard drive with data obtained from another media device.

S

SAN	Storage Area Network.
SCSI	Small Computer System Interface. An American National Standards Institute (ANSI) standard for the interface between a computer and peripheral controllers.
SDLT	The next-generation DLTtape family of products.
SE	Single-Ended. A term referring to the electrical characteristics of the signal used on the SCSI bus interface. For each signal that needs to be sent across the bus, there exists a wire to carry it. SE SCSI uses one line for each signal, with all lines using a common ground reference.
Seek	The movement of a read/write head to a specific data track.
Server	A powerful computer system with a large drive capacity that serves the information access and communication needs of multiple users.

Shelf Life	The length of time that media can be stored without losing its magnetic strength. For Super DLTtape II media, this period is 30 years or more.
SRAM	Static RAM. A memory chip that requires power to hold its content.

T

Take-up Reel	The reel inside every tape drive onto which DLTtape or Super DLTtape media is wound. The in-the-drive take-up reel enables DLTtape and Super DLTtape systems to operate using a single-reel cartridge and thereby pack more media and data into every data cartridge.
TapeAlert™	A firmware feature that monitors and returns the results of the tape drive's on-going self-diagnosis activity.
Tape Path	The path through which media moves from the data cartridge, past the read/write head, and onto the take-up reel.
TB	Terabyte. A unit of measure equal to 1000 Gigabytes (GB).
TCM	Tape Control Module. The SDLT TCM consists of a variety of components; the most significant of these include the base plate, the cartridge receiver, the tape supply motor assembly, the floor plate assembly, and the buckling mechanism.
Termination	A physical requirement of the SCSI bus. A terminator is a device that attaches to both ends of an electrical bus and prevents reflection or echoes of signals that reach the end of the bus.
Track	A linear or angled pattern of data written on a media surface. SDLT tape drives write information on multiple tracks simultaneously.
Transfer Rate	The speed at which the data moves between a host (that is, tape drive) and a recorded device. Usually expressed as bytes/sec or bits/sec.
TUR	Tape Unit Ready.
TUV	Technischer Uberwachungs Verein (German Safety Agency).

U

UL	Underwriters Laboratory; a United States safety organization.
Ultra 160	An SDLT 600 tape drive SCSI interface that provides a low-voltage differential (LVD) mode running up to 160 MB/sec and a single-ended (SE) mode running up to 40 MB/sec.
Unformatted Capacity	The total number of usable byes on the media, including the space that will be required later to record location, boundary definitions, and timing information. (See also Native Capacity.)

X

XEZ	An Application Specific Integrated Circuit (ASIC) for the SDLT 600 tape drive.

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