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L180/L700e Tape Libraries

General Information Manual

StorageTek

L180/L700e Tape Libraries

General Information Manual

Fifth Edition (September 2002)
This edition contains 100 pages. See "Summary of Changes" on page iii for the revision history and summary of changes made to this publication

Information contained in this publication is subject to change. In the event of changes, this publication will be revised. Comments concerning the contents of this publication should be directed to:

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Summary of Changes

The following is the history and summary of changes for this publication:

Date	*Edition*	*Description*
May 2001	First	Refer to this edition for a description of the changes.
September 2001	Second	Refer to this edition for a description of the changes.
December 2001	Third	Refer to this edition for a description of the changes.
March 2002	Fourth	Refer to this edition for a description of the changes.
September 2002	Fifth	Updated "Related Publications" Added T9940B information Added SDLT 320 information Added ESCON information

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Preface

This general information manual (GIM) provides high-level information about StorageTek's L180 and L700e Tape Libraries. For publications that contain more detailed information about the L180 or L700e Tape Libraries, see "Related Publications" on page xiii.

Intended Audience

This manual presents information for data processing and application-development personnel, such as MIS managers, storage administrators, system analysts, and performance specialists.

Organization

This manual contains:

- Chapter 1, "Product Overview," introduces the L180 and L700e Tape Libraries.
- Chapter 2, "Features and Benefits," provides information about the benefits and features of the libraries.
- Chapter 3, "Configuration Flexibility," describes the flexibility of the L180 and L700e Tape Libraries.
- Chapter 4, "Adaptive Media Technology," describes how the L180 and L700e adapt to different media.

- Chapter 5, "Connectivity," describes the libraries' connectivity options.
- Chapter 6, "Advanced Rotational Robotics," describes the robotics in the L180 and L700e Tape Libraries.
- Chapter 7, "Power System," describes the power system options.
- Chapter 8, "User Interfaces," describes the ways in which a user can interact with and monitor the L180 or L700e Tape Library.
- Chapter 9, "Typical Customer Environments," lists the typical networks and environments in which the L180 and L700e Tape Libraries operate.
- Chapter 10, "High Availability and Reliability," describes the design of the L180 and L700e Tape Libraries for reliability.
- Chapter 11, "Serviceability," lists the service options available for the L180 and L700e Tape Libraries.
- Appendix A, "Specifications," provides product specifications for the L180 and L700e tape Libraries.
- "Glossary" defines technical terms used in this manual.
- "Index" provides a way to quickly access specific information.

■ Related Publications

Refer to the following publications for additional information:

Library Documentation	Part Number
L180 Tape Library Operator's Guide	95895
L700e Tape Library Operator's Guide	95845
L180/L700 Tape Library Uninterruptible Power Supply	96047
APC Uninterruptible Power Supply manuals and online information.	Available from APC or see www.apc.com

Tape Drive Documentation	Part Number
T9x40 Tape Drive System Assurance Guide	MT5003
T9840 Tape Drive User's Reference Manual	95739
T9940 Tape Drive Operator's Guide	95989
DLT 7000 Tape Drive Product Manual	313134501
DLT 8000 Tape Drive Product Manual	81-60118-02 (DLT)
IBM Ultrium Tape Drive Guides	CD included with drive
Hewlett Packard Ultrium Tape Drive Manual	CD included with drive
Seagate LTO Tape Drive Product Manual	CD included with drive

■ Additional Information

StorageTek offers several methods for you to obtain additional information.

StorageTek's External Web Site

StorageTek's external Web site provides marketing, product, event, corporate, and service information. The external Web site is accessible to anyone with a Web browser and an Internet connection.

The URL for StorageTek is http://www.storagetek.com

Customer Resource Center

StorageTek's CRC is a Web site that enables members to resolve technical issues by searching code fixes and technical documentation. CRC membership entitles you to other proactive services, such as HIPER subscriptions, technical tips, answers to frequently asked questions, addenda to product documentation books, and online product support contact information.

The URL for the CRC is http://www.support.storagetek.com.

e-Partners Site

StorageTek's e-Partners site is a Web site that provides information about products, services, customer support, upcoming events, training programs, and sales tools to support StorageTek's e-Partners. Access to this site, beyond the
e-Partners Login page, is restricted. On the e-Partners Login page, current partners who do not have access can request a login ID and password and prospective partners can apply to become StorageTek resellers.

The URL for the e-Partners site is http://members.storagetek.com.

Hardcopy Publications

Contact a StorageTek sales or marketing representative to order additional paper copies of this publication or to order other StorageTek customer publications in paper format.

Alert Messages

Alert messages call your attention to information that is especially important or that has a unique relationship to the main text or graphic.

Note:
A note provides additional information that is of special interest. A note might point out exceptions to rules or procedures. A note usually, but not always, follows the information to which it pertains.

Caution
A caution informs the reader of conditions that might result in damage to hardware, corruption of data, corruption of application software, or long-term health problems in people. A caution always precedes the information to which it pertains.

Warning
A warning alerts the reader to conditions that might result in injury or death. A warning always precedes the information to which it pertains.

Conventions

Typographical conventions highlight special words, phrases, and actions in this publication.

Item	***Example***	***Description of Convention***
Document titles	*System Assurance Guide*	Italic font
Emphasis	*not* or *must*	Italic font
File names	`fsc.txt`	Monospace font
Hypertext links	Figure 2-1 on page 2-5	Blue (prints black in hardcopy publications)
URLs	www.storagetek.com	Blue (prints black in hardcopy publications)

Product Overview

1

The L180 Tape Library is designed for midsize UNIX and Windows NT environments, and the L700e Tape Library is designed for large, distributed open systems implementations in UNIX and Windows NT environments. StorageTek's L180 and L700e architecture includes Fibre Channel readiness, low voltage differential (LVD) or high voltage differential (HVD) adaptability, integration with system management frameworks, lightweight magnesium-alloy robotics, the proprietary StorageTek digital vision system, and flexible high availability.

The adaptive media technology in the L180 supports up to 6 T9840 tape drives, 10 Digital Linear Tape (DLT), Super DLT (SDLT), or Linear Tape-Open (LTO) Ultrium drives, or a combination, and single L700e supports up to 12 T9840/T9940 tape drives, 20 DLT, SDLT, or LTO Ultrium drives, or a combination. Two L700e Libraries can be connected with a pass-thru port to double this capacity.

The L180 and L700e perform 450 exchanges per hour. An optional onboard JAVA-based Web server for monitoring and performance diagnosis enables the library to remain competitive for the long term, which protects your investment.

StorageTek's tape libraries feature a wide-based gripper mechanism enhancing cartridge stability and enabling faster moves. The advanced

cartridge-cell design provides pinpoint cartridge location resulting in simpler mechanics. That translates to faster, more accurate, and reliable movements.

These features enable the libraries to remain competitive by providing expansion possibilities, which protect your investment for the long term.

■ Comparison of Models

This table provides a quick over-view of the differences between the L180 and L700e Tape Libraries.

Table 1-1. Comparison Table

Library	***L180***	***L700e***
Cartridge Slot Maximums	84, 140, 174	216, 384, 678, 1,344*
Drives (DLT or LTO Ultrium)	1 - 10	1 - 20
Drives (T9840)	1 - 6	1 - 12 (T9840 or T9940)
Height	165.4 cm (56.1 in.)	184.6 cm (72 in.)
19-inch rack space	6 u	13 u
Capacity (max., uncompressed)		
DLT 7000	6.09 TB	23.73 TB
DLT 8000	6.96 TB	27.12 TB
Super DLT (SDLT) 220	19.14 TB	74.58 TB
Super DLT (SDLT) 320	27.84 TB	108.48 TB

Table 1-1. Comparison Table (Continued)

Library	*L180*	*L700e*
LTO Ultrium	17.40 TB	67.80 TB
T9840	3.48 TB	13.56 TB
T9940A	NA	40.68 TB
T9940B	NA	135.6 TB

❖ **Note:**
1,344 cartridge slot maximum is with 2 L700e libraries with 2 expansion frames with and a PTP

❖ **Note:**
The L700e replaces the L700 Tape Library. The L700e features a modification to the frame that allows for the installation of a pass-thru port, (PTP) which connects two L700e libraries.

■ Library Components

Before you read this manual to understand how these libraries can help you with your data storage and retrieval needs, see Figure 1-1 on page 1-4, Figure 1-2 on page 1-6, and Figure 1-3 on page 1-8 to orient yourself to the components of the L180 and L700e Tape Libraries.

Figure 1-1. L180 Tape Library (C67086)

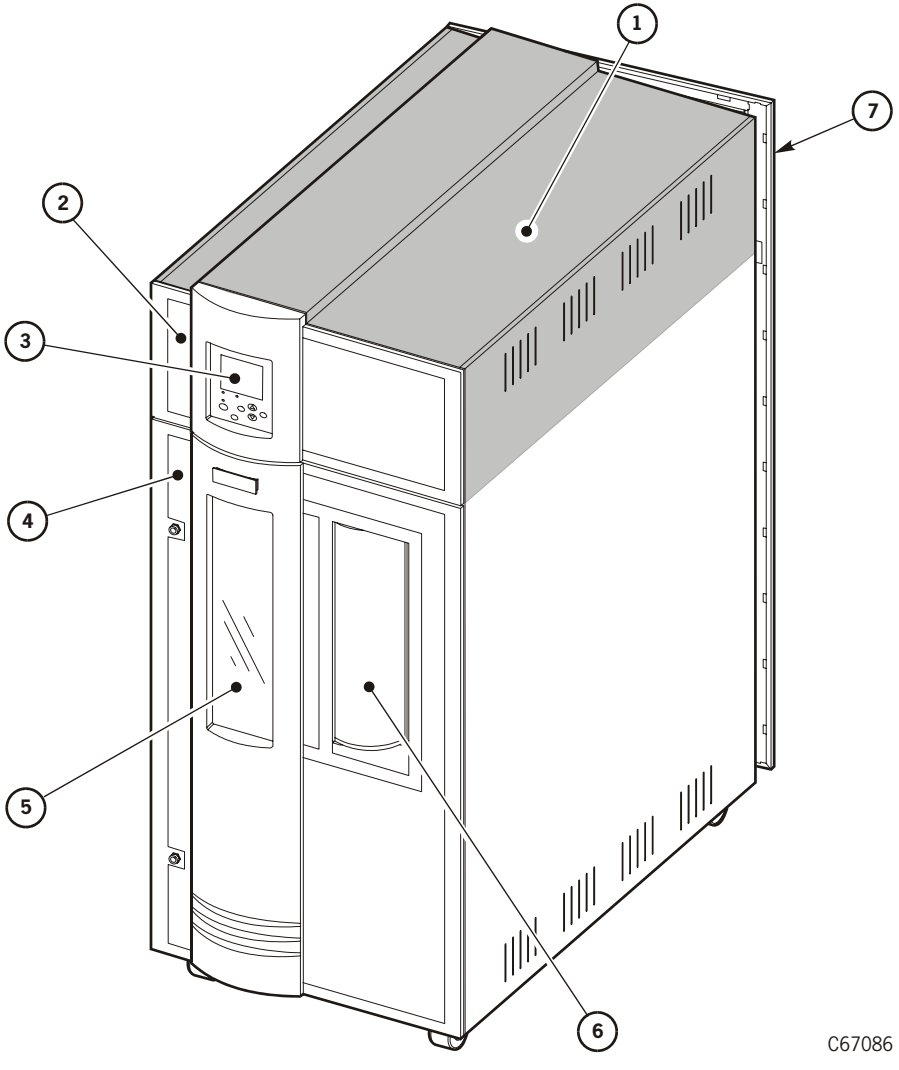
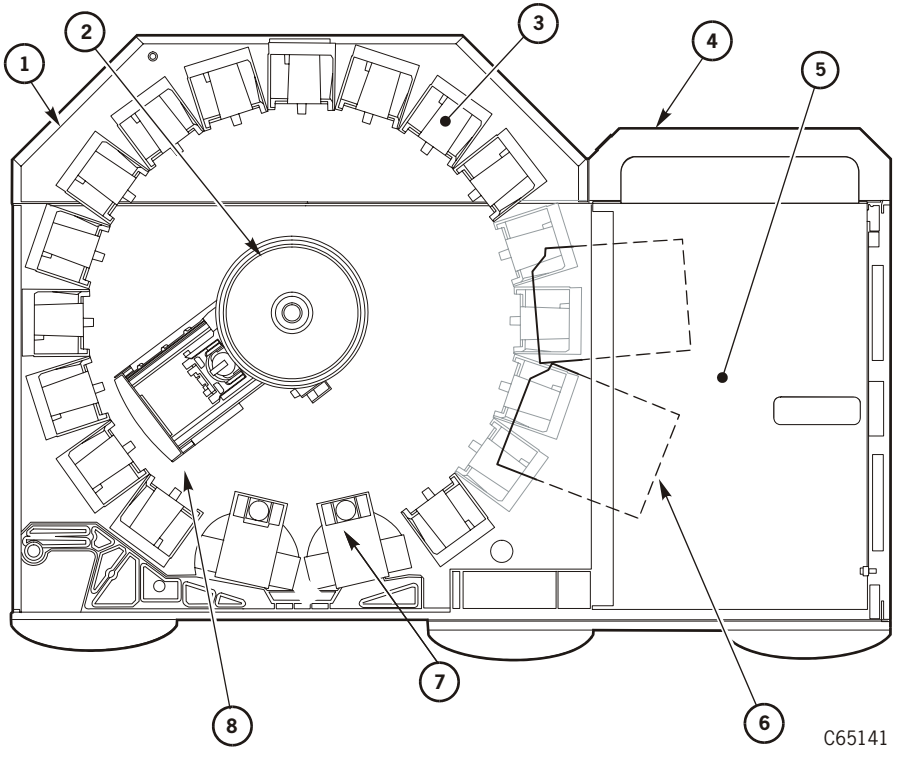


Figure 1-1. L180 Tape Library (Continued) (C67086)

1. 6 units (u) of 19 in. rack space
2. Rack door
3. Operator panel
4. Front door
5. Window
6. Cartridge access port (shown closed)
7. Rear door

Figure 1-2. L700e Tape Library, Top View (C65141)

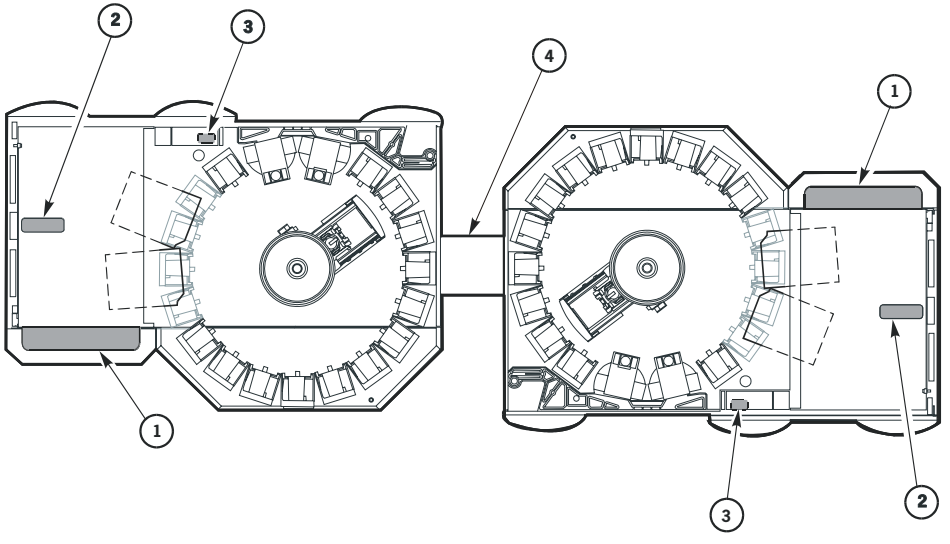


1. Expansion frame (optional)
2. Rotating robot
3. A cartridge cell
4. Rear door
5. 13 units (U) of 19 in. rack space
6. A tape drive column

Figure 1-2. L700e Tape Library, Top View (Continued) (C65141)

7. Cartridge access port (one standard, a second CAP is optional)
8. Hand assembly

Figure 1-3. L700e Dual Configuration, Top View (C67364)



1. Tape drive signal cables
2. Cables to/from 13U cabinet area
3. Power cable
4. Pass-thru port (PTP)

Features and Benefits

2

StorageTek's L180 and L700e Tape Libraries perform 450 exchanges per hour. L-Series Library Admin, an optional onboard JAVA-based Web server for monitoring and diagnosis, enables the library to remain competitive for the long term, which protects your investment.

Table 2-1 lists features and benefits of the StorageTek L180 and L700e Tape Libraries.

Table 2-1. Features and Benefits

Features	***Benefits***
450 exchanges per hour 4 second average cell to drive time	Jobs complete faster.
84 to 180 cartridge cells (L180) 216 to 678 cartridge cells (L700e) or up to 1,344 with two L700e libraries connected with a pass-thru port	Expandability protects your investment by allowing you to add capacity without changing libraries.

Table 2-1. Features and Benefits (Continued)

Optional onboard Web server enables remote configuration firmware download, performance monitoring, and maintenance	Permits quick and easy upgrades. Allows you to control your library directly through Netscape and Internet Explorer. Intuitive operation minimizes training. Provides out-of-band monitoring and management.
Simple Network Management Protocol (SNMP) agent supports remote administration using OpenView™, UniCenter TNG™ and other third-party software.	Provides seamless integration into enterprise-level systems-management frameworks.
6 u(L180) or 13 u (L700e) of 19-inch rack space	Localize and install network components (routers, hubs, switches, UPS units, and so on) within the integrated rack space.
Up to 10 (20, 40) DLT, SDLT, or LTO Ultrium drives and up to 6 (12, 24) T9840(/T9940) drives in the L180 (L700e, with PTP)	Provides high availability, high throughput, and quick backups.
Up to 10 cells in a cartridge access port (CAP) (L180), or up to 40 cells in two CAPs (L700e)	Permits quick and easy loading for batch jobs without interrupting library operation. Includes operator-friendly magazine.
Native Fibre-Channel ready	Provides ease of cabling, high throughput, and remote operation

Table 2-1. Features and Benefits (Continued)

Compact PCI™ expansion card	Ensures expandability and standards compliance.
Mix media types during concurrent operation (DLT, SDLT, LTO Ultrium, T9840, and T9940 (L700e only))	Creates freedom to adapt to future tape drive technology without changing libraries.
Redundant and uninterruptible power supplies, cooling fans, monitoring systems, and SCSI TapeAlert notification	Ensures maximum uptime and availability of your critical data.
Drives are mounted to easily removable slide trays	Drive replacement is easy, requires no special tools, and does not interrupt library operation.
High-resolution graphical interface	Intuitive operation ensures easy to use.

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Configuration Flexibility

3

The flexibility of the L180 and L700e Tape Libraries provide unparalleled investment protection. You can configure the library to meet your present needs, then later add more cell arrays, and tape drives, within the same footprint. Inserting cartridges into the library is easy through the library's cartridge access port (CAP). You can also customize the library by adding a server or other components to the internal 19-inch rack. Native Fibre-Channel capability provides flexible topology and increases the allowed distance from the data source needed for the library to operate.

Cartridge Capacity

The L180 Tape Library comes with maximum cartridge capacities of 84, 140, or 174 (Figure 3-1 on page 3-2), which, depending on configuration, means a data storage capacity of 1.68 to 19.14 TB. Six additional cartridge cells are dedicated for cleaning and diagnostic cartridges.

The L700e Tape Library comes with maximum cartridge capacities of 216, 384, 678, or 1,344 (with PTP) (Figure 3-2 on page 3-4), which offers native data storage capacity of 4.32 TB to 147.84 TB (with two L700e libraries with PTP). Twelve additional cartridge cells are dedicated for cleaning and diagnostic cartridges (see Table 3-1 on page 3-6). Libraries with a 384-cartridge capacity can be expanded to 678 by adding an expansion frame

containing 294 cartridge cells. The addition of a second drive column reduces the cartridge count by 60.

These configuration options enable you to add cartridge capacity without changing libraries. In addition, simpler mechanics and pinpoint cartridge location translate to faster, more accurate movements.

Figure 3-1. L180 Cartridge-Cell Arrays, CAP, and Drive Column (C67091)

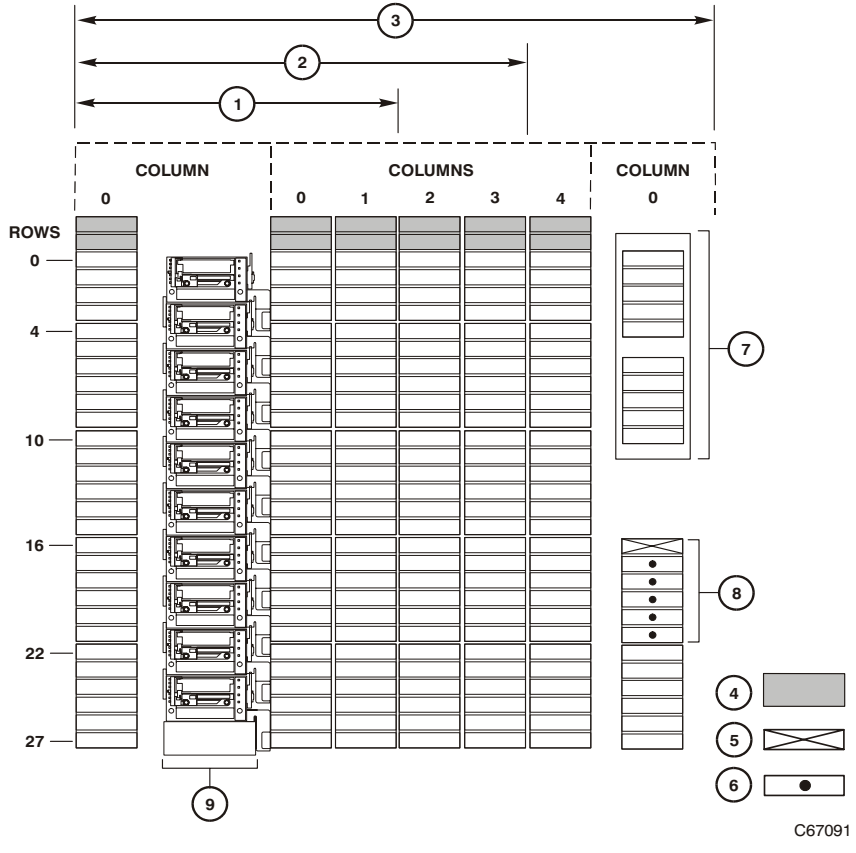


Figure 3-1. L180 Cartridge-Cell Arrays, CAP, and Drive Column (Continued)

1. 84-cartridge-cell configuration
2. 140-cartridge-cell configuration
3. 174-cartridge-cell configuration
4. Blocked storage cells (no cartridges permitted)
5. Swap cell
6. Cells reserved for cleaning or diagnostic cartridges
7. CAP with two magazines of five cartridges
8. Reserved cell array with a swap cell and cells reserved for cleaning and diagnostic cartridges
9. Drive column (shown with DLT, SDLT or LTO Ultrium drives installed)

Figure 3-2. L700/L700e Cartridge-Cell Arrays, CAPs, and Drive Columns (C65142)

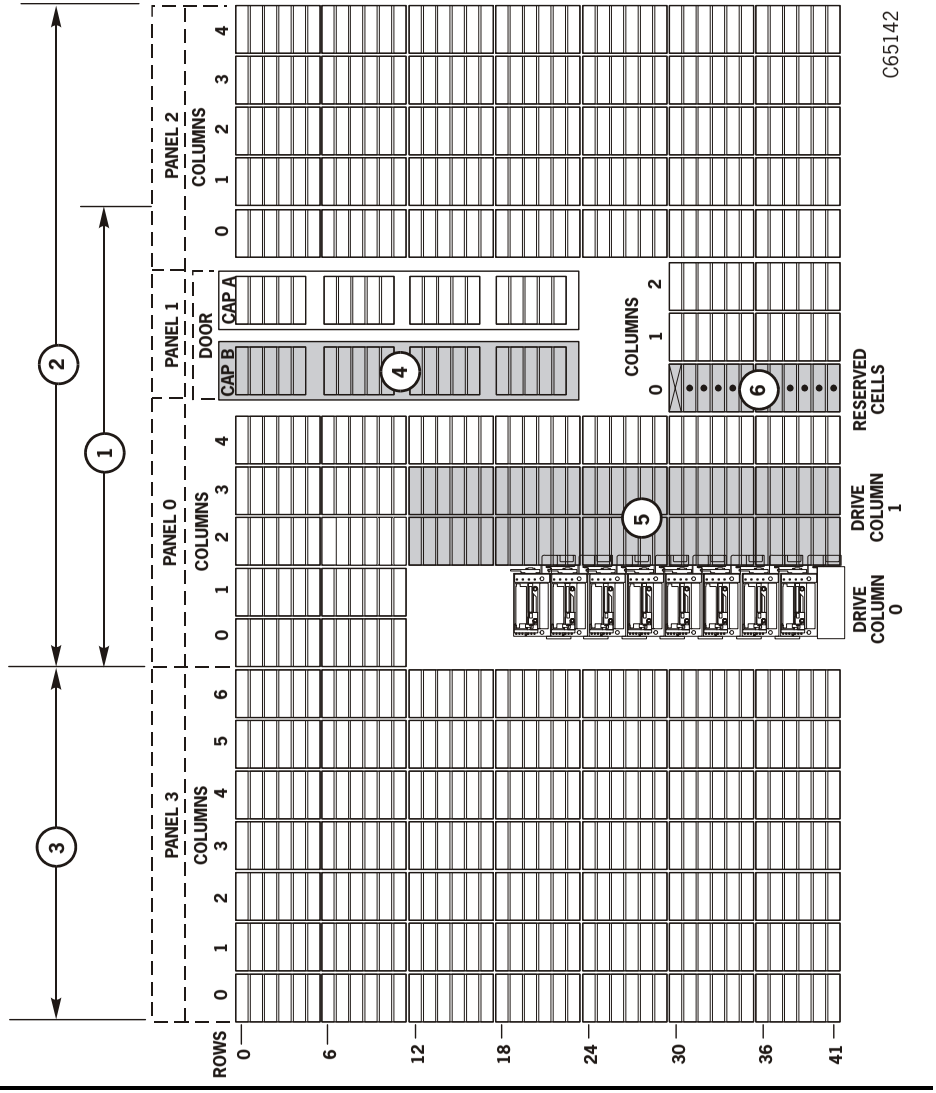


Figure 3-2. L700/L700e Cartridge-Cell Arrays, CAPs, and Drive Columns (Continued) (C65142)

1. 1. 216-cartridge-cell configuration
2. 2. 384-cartridge-cell configuration
3. 2 + 3. 678-cartridge-cell configuration
4. 3. Expansion frame
5. 4. Optional second CAP
6. 5. Optional second drive column (displaces 60 cartridge cells)
7. 6. Reserved for swap cell (top) and cleaning and diagnostic cartridges

❖ **Note:**

Two L700e libraries connected with a pass-thru port will have double the number of available cells minus 6 cells for each library with a 678-cell or 384-cell configuration (for the installation of the PTP).

Table 3-1. L700/L700e Library Capacity Variations

Expansion Frame	*Second Drive Column*	*Panel 2 Access*	*Total Data Cartridge Cells[1]*	*Reserved Cells[2]*	*Total User Cells*
Yes (Full)	No	Entire	678	12	690
	Yes	Entire	618	12	630
No (2/3)	No	Entire	384	12	396
	Yes	Entire	324	12	336
No (1/3)	No	Partial	216	12	228
	Yes	Partial	l56	12	168

[1] These numbers do not include cells in the CAP or the reserved area.

[2] The reserved cells are composed of one swap cell and 11 cleaning and/or diagnostic cartridge slots. They are shown in Figure 3-2 on page 3-4.

❖ **Note:**
Two L700e libraries connected with a pass-thru port will have the cell count for each L700e library minus 6 cells for each library with a 678-cell or 384-cell configuration (for the installation of the PTP).

■ Cartridge Access Port

You insert cartridges into the L180 and L700e Tape Libraries through the cartridge access port (CAP). For the L180, the CAP holds up to 10 cartridges that are contained in two removable five-cartridge magazines. For the L700e, each of the cartridge access ports (CAP) hold up to 20 cartridges and loads through four removable five-cartridge magazines. A second optional

CAP can be added to double the CAP capacity. The second CAP replaces the front window supplied in the basic L700e.

The magazines boast a patented, easy-loading feature that enables them to swing out for loading and unloading. They also lift out for remote storage or vaulting.

With the CAP, you can load batch jobs quickly and easily without interrupting library operation. Version 2.0 (or later) of the library firmware can automatically import and export cleaning cartridges through the CAP.

■ Drive Column

The drives for the L180 or L700e Tape Library are installed in a drive column. Besides supporting a combination of drives (see "Adaptive Media Technology") and providing easy slide-in plug-ins to power the drives, the drive column tilts the drives slightly so that the tape cartridges are more secure when they are loaded into the drives.

A second drive column, available for the L700e, allows you to add 10 DLT, SDLT, or LTO Ultrium drives, or 6 T9840/T9940 drives, or a combination of any of these drives. When you add a second drive tower, a second power distribution unit (PDU) is also required. The second drive tower displaces 60 cartridge cells.

■ Internal Rack

A StorageTek feature unique to these tape libraries is the 6 units (1 u = 1.75 in.) of 19-inch rack space in the L180 or 13 units in the L700e that you can use for custom integration. With the internal rack, under-the-cover customization is enhanced. You can use the space for integrating RAID, bridge/router, a Fibre Channel hub, or a server. The library's rack space enables you to maintain all of your resources, accessories, cables (through

cable cutouts), and connectors in a single, secure enclosure. You can supply power and any additional cooling needs if your configuration requires it.

■ Compatibility with Storage Solutions

Complementing its own software products, StorageTek has teamed with leading software developers in the areas of backup and archive, hierarchical storage management, media management, and disaster recovery. These relationships ensure easy connectivity with leading solutions, such as those shown in Table 3-2. Please contact your sales representative for a list of more vendors.

Table 3-2. Compatible Storage Solutions

Vendor	***Product***
Computer Associates	ARCserv NetArchive
Hewlett-Packard	Omniback
Legato	NetWorker
Sterling	Alexandria
Tivoli	ADSM
VERITAS	Backup EXEC NetBackup

Adaptive Media Technology

4

One of the greatest strengths of the L180 and L700e Tape Libraries is the adaptive media technology, which encompasses the ability to read the volume serial number (VOLSER) labels on the cartridges stored in the library. Adaptive media technology consists of a collection of innovations that allow the library to accommodate multiple drive types and their corresponding media simultaneously.

Unique to its class, the L180 and L700e Tape Libraries support a variety of drives as shown in Table 4-1 on page 4-2. With the range of choices from DLT, SDLT, and LTO Ultrium drives to the high-performance, high duty-cycle of the T9840, and T9940 (L700e only) drives, these libraries excel at handling high-volume applications. The libraries will also support new drive and media types when they are available.

StorageTek has also created cartridge tape starter kits to help you start using your library. These kits have pre-labeled cartridges with number ranges that are unique for each kit (so multi-media applications will not have duplicate numbers). See the *L180/L700e Ordering and Configuration Guide* (MT9112) for more information.

The flexibility of using different types of drives protects your investment in other technologies. For example, you can initially purchase an L180 Tape Library with DLT 8000 drives. As performance requirements increase, you

can add StorageTek T9840 drives. This flexibility also enables smooth data migration from one type of media to another—all within the same library. Your system adapts freely to future drive technology without requiring you to purchase a new library.

Table 4-1. Compatible Tape Drives

Tape Library	*Drive Type*	*Interface Type*
L180 and L700e	DLT 7000	SCSI Fast/Wide Single-ended and Differential
L180 and L700e	DLT 8000	SCSI Fast/Wide Differential
L180 and L700e	SDLT	SCSI Fast/Differential
L180 and L700e	LTO Ultrium	Fibre Channel (see your StorageTek representative)
		SCSI Fast/Wide Single-ended and Differential
L180 and L700e	StorageTek T9840	Fibre Channel
		SCSI Differential
		ESCON (T9840B only)
L700e only	StorageTek T9940	Fibre Channel
		SCSI Differential

The L180 Tape Library can accommodate a maximum of 10 DLT, SDLT, or LTO Ultrium drives, or 6 T9840 drives and one DLT, SDLT, or LTO Ultrium drive. A single L700e doubles this number with a maximum of 20 DLT, SDLT, or LTO Ultrium drives, or 12 T9840/T9940 drives and 2 DLT, SDLT, or LTO Ultrium drives. With two L700e tape libraries connected with a pass-thru port, there is a maximum of 40 DLT, SDLT, or LTO Ultrium drives, or 24 T9840/T9940 drives and 4 DLT, SDLT, or LTO Ultrium drives. You can combine drive types in the library, and you can add drives to the library as

needed. Table 4-2 shows the supported combinations of drives for the L180 (or for one of two possible drive columns in the L700e). Figure 4-1 on page 4-4 illustrates one combination of drives.

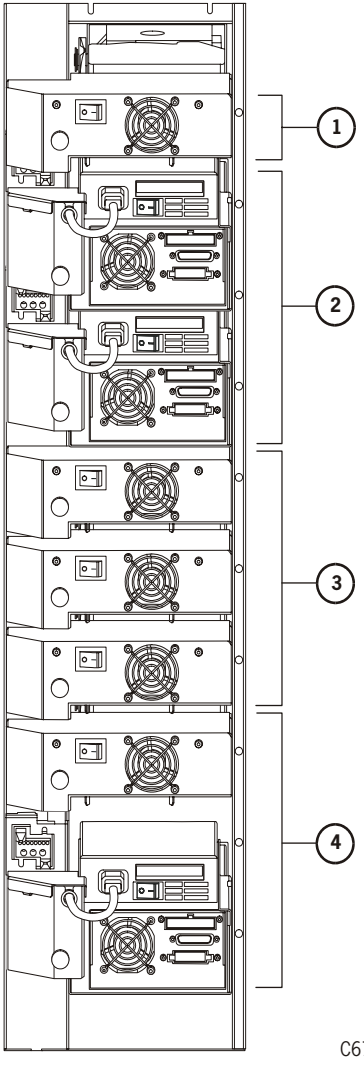
Table 4-2. Drive Combinations

*T9840/T9940**	*DLT, SDLT, or LTO Ultrium*
0	10
1	8
2	7
3	5
4	4
5	2
6	1

* Because of size restrictions, the T9940 only fits in the L700e Tape Library.

❖ **Note:**
These numbers are for a single drive column in the L180 or L700e. For L700e libraries with a second drive column, these numbers double, and for two L700e libraries with a pass-thru port, these numbers quadruple.

Figure 4-1. Drive Column with Drives (L180 or L700e) (C67241)



1. This area accommodates only one DLT, SDLT, or LTO Ultrium drive (shown).
2. This area accommodates two StorageTek T9840/T9940 drives (shown), three DLT, SDLT, or LTO Ultrium drives, or one T9840/T9940 drive and one DLT, SDLT, or LTO Ultrium drive.
3. This area accommodates three DLT, SDLT, or LTO Ultrium drives (shown), two T9840/T9940 drives, or one T9840/T9940 drive and one DLT, SDLT, or LTO Ultrium drive.
4. This area accommodates one T9840/T9940 drive and one DLT, SDLT, or LTO Ultrium drive (shown), three DLT, SDLT, or LTO Ultrium drives, or two T9840/T9940 drives.

❖ **Note:**
The T9940 tape drive is only available for the L700e Tape Library.

Connectivity

5

StorageTek keeps your options open by providing SCSI or Fibre Channel connectivity for the following paths:

- The data path, which moves data to and from the drives
- The control path, which transfers client commands for library move options

The enterprise system connection (ESCON) interface is also available for T9840B drives. The library firmware must be version 3.01 or later to use this interface.

You can choose to either combine or separate the control and data paths. For example, you can have a Fibre Channel data path to the drives and a SCSI control path to the library. You can also combine control and data paths into one Fibre Channel cable for maximum throughput at a greater distance.

SCSI and Fibre Channel Drives

DLT, and SDLT drives currently run only on a SCSI interface; T9840/T9940, and LTO Ultrium drives can run on either a SCSI or a Fibre Channel interface (see your service representative about LTO Fibre Channel). The

type of drive interface is integrated into the drive module. This modular design allows either a SCSI or Fibre Channel drive to be installed into any drive position. Both SCSI and Fibre Channel drives may coexist within the same library.

The library includes an embedded SCSI controller that supports both single-ended and high voltage differential (HVD) UltraSCSI for DLT and T9840/T9940 SCSI drives, HVD UltraSCSI for SDLT, and low voltage differential (LVD) for LTO Ultrium drives. No additional interface cards are required to support synchronous transfer rates up to 40 MB/s.

❖ **Note:**
An additional MPU and MPW card are required for the library controller to run LVD.

The L180 and L700e Tape Libraries are designed to make the transition from SCSI to Fibre Channel as easy as possible. The library, DLT, SDLT, LTO Ultrium, and T9840/T9940 SCSI devices also can be converted to Fibre Channel through a bridge router network that may be mounted on the internal rack inside the library. In addition, you can upgrade the library as other Fibre Channel drives or network devices become available.

■ SCSI Interface

The L180 and L700e Tape Libraries are SCSI-3 compliant, using standard SCSI control protocols with StorageTek and third-party software for connectivity and tape management.

StorageTek offers the StorageTek L-Series Library Admin, which remotely configures and monitors the library using a SCSI bus. For more information, see "StorageTek Framework Library Monitor" in Chapter 8, "User Interfaces."

Native Fibre Channel

Enterprise-class applications demand cutting-edge interface technologies. The L180 and L700e Tape Libraries offer the Fibre Channel option (Feature Code IF01), which contains a 2 GB Fibre Channel interface card in a rugged, two-slot, Compact PCI card cage. This expansion bus to the library increases Fibre Channel interface possibilities. Its standard industrial computing platform provides a non-proprietary hardware interface to the library. StorageTek's Fibre Channel option conforms to ANSI X3.230-1994 (FC-PH) standards for target mode operation.

Easily upgraded in the field by a service representative, the Fibre Channel option is attached to the library controller card in the electronics module, leaving the internal rack area available for other Fibre Channel components. The option provides SC connectors for the Fibre Channel control path to the library. Multimode fiber-optic cables can be routed from these connectors to a Fibre Channel switch or other equipment that has been installed in the internal rack. After the option is installed, the library automatically detects the presence of the Fibre Channel card and it makes Fibre Channel the default command interface.

Installing the Fibre Channel option provides the following:

- Attachment to primary UNIX platforms, such as Hewlett-Packard, Sun, and SGI
- Public and private loop support
- 100 MB/s transfer rate

Using the Fibre Channel interface requires multimode 50µm fiber-optic cables with SC connectors.

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Advanced Rotational Robotics

6

StorageTek's L180 and L700e Tape Libraries use advanced rotational robotics to move cartridges among the CAP, cells, and drives inside the library (Figure 6-1 on page 6-2). The space-efficient rotational robotics use less raised-floor space per number of cartridges than competing products.

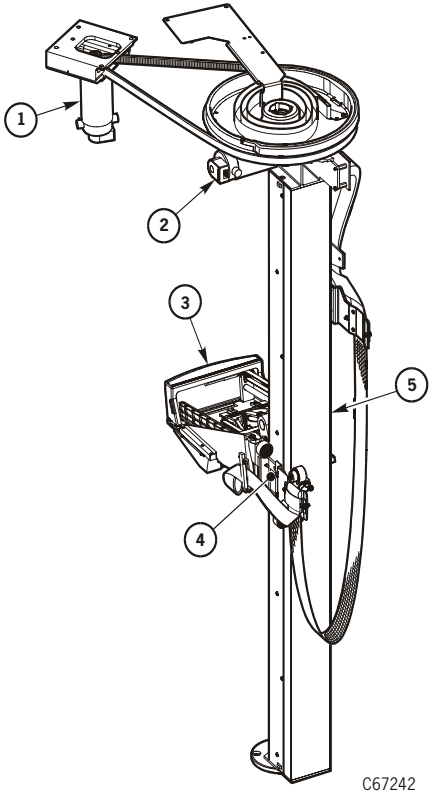
The cartridge-handling system consists of:

- The Z column assembly, which controls the vertical positioning
- The theta motor, which controls the horizontal positioning
- The hand-camera assembly, which catalogs the cartridges using StorageTek's Digital Vision System

The L180 and L700e Tape Libraries feature ball-bearing construction throughout—rather than less-expensive, but noisier, bushings—for all motors, rollers, and fans, resulting in quiet and reliable performance. Light and strong materials in the robotics enable high performance while maintaining rugged design.

The library robotics operate the drive cartridge-load handles directly rather than using stepper motors. This type of operation results in high performance, increased reliability, and simplicity.

Figure 6-1. Advanced Rotational Robotics (C67242)



1. Theta motor
2. Z motor
3. Hand-camera assembly
4. Z carriage
5. Z column

■ Vertical and Horizontal Positioning

The Z column assembly contains a Z column and Z carriage (hand). The theta motor rotates the Z column horizontally to enable the hand to gain access to all cells in the library. The Z motor moves the hand vertically to access the storage cells, drives, and the CAP.

■ Advanced Hand-Camera Design

The hand-camera assembly contains the hand (or "gripper"), a bar-code scanner, and a digital camera. The gripper assembly, which is on the Z carriage, grasps and releases cartridges. The gripper is wide-based, so it enhances cartridge stability and enables faster moves. In fact, the robotics are capable of performing 450 exchanges per hour, so your job is completed faster.

The hand-camera reads the volume serial numbers on the cartridge labels after they are inserted into the L180 or L700e Tape Library. The catalog is stored in the library's memory so that the library "knows" the cartridges stored in it and their locations. In addition, StorageTek's hand-camera uses an innovative design, the Digital Vision System, that accommodates different media types.

■ Digital Vision System

StorageTek's L180 and L700e Tape Libraries use a patented Digital Vision System for cartridge management, adaptive targeting, and self-calibration. Self-calibration enables the library to adapt to mechanical parameters that might change over time. This feature creates a more robust, reliable library that will perform dependably over the long term.

Most automated libraries use a common laser bar-code scanner for reading labels on cartridges. Common scanners—virtually identical to those used in retail stores—do not provide the advantages of StorageTek's Digital Vision System, which can read marginal bar-code labels. In addition, the Digital Vision System provides an exclusive feature that detects empty cells on the fly, reducing audit time.

Power System

7

The power system of the L180 and L700e Tape Libraries consists of the following:

- A standard AC power distribution unit that operates within a line voltage of 100 to 127 VAC or 200 to 240 VAC, 50 or 60 Hz, with a circuit breaker
- A standard DC power supply

An optional redundant power system is also available.

AC Power Distribution

The design of the L180 and L700e Tape Libraries distributes AC line power to each drive module within the library providing these key advantages over traditional DC power distribution:

- The possibility of experiencing a power system glitch during the addition or removal of a drive is eliminated. (In a DC bus system, this problem is usually addressed with complex pre-charge circuits, extra pre-charge booster power supplies, and special mechanical staging connectors.)
- Future drive technologies can be easily incorporated without changing the library power units.

In the L180 and L700e Tape Libraries, adding drives to the system is as safe and simple as plugging additional appliances into a standard AC wall outlet.

Optional Second Power System

The L180 and L700e Tape Libraries offer a second DC power supply and an AC power distribution unit as an optional feature (Feature Code RMPS) for the library robotics system. This feature includes an optional AC power distribution unit (PDU) and a second DC power supply. If either PDU fails in a dual configuration, the operating PDU can supply power to half of the installed drives as well as to the library robotics. There are two line cords and two, hot-swappable power supplies. The second power system, when connected to a separate AC circuit, provides a partial redundant power solution for the entire library with the following limitations:

- The library robotics receive power from both circuits, so the robotics remain operational if either circuit is active.
- For newer models of the L180 Tape Library (serial number 5525 and later), the risk of an output failure of a single tape drive's power supply bringing down the entire tape drive system is eliminated. In newer models of the L180 Tape Library, half the tape drives are attached to one AC circuit; the other half attach to the other AC circuit. Therefore, a single AC circuit failure brings down only half of the drives; the remainder of the drives remain operational. If you have an older model of the L180 Tape Library, you can purchase an upgrade (a special power cable that is installed by a trained service representative) so that your library can benefit from this feature.

In addition, the library continually monitors the status of these power supplies and automatically reports a power supply failure.

For the L700e, the additional power distribution unit (PDU) is required when a redundant main power supply or a second drive tower is added. One additional PDU will support both the redundant main power supply and the second drive tower.

APC Uninterruptible and Redundant AC Power Supply

An American Power Conversion (APC) uninterruptible and redundant AC power supply option is available that provides full AC redundancy and uninterruptible power protection to the L180 or L700e library during a power outage. This is an optional feature designed to mitigate the effects of blackouts, brownouts, sags and surges in AC power. The power option consists of two uninterruptible power supply (UPS) units, an Ethernet interface, a redundant switch, and a power outlet strip. The UPS units provide power conditioning by filtering out small fluctuations and disturbances in the AC line voltage. The redundant switch alternates between the two UPS units to provide power to the library. The power strip allows you to directly connect up to eight additional components to the APC power option. If site power fails, the APC power option will supply power to the equipment until the UPS batteries are exhausted. The APC power option must be connected to two separate AC power circuits. When selecting this feature, you must also order a auxiliary rack area cooling fan specific to the L180 or L700e to cool the AC power option components as well as other rack components.

❖ **Note:**

The rack area cooling fan can also be ordered to provide protection for other rack area components that generate excess heat.

Installing the fan in an older L180 or L700 may require the installation of a different door. See the *L180/L700e Ordering and Configuration Guide* (MT9112) L180 or L700 field bill for more information.

User Interfaces

8

User interfaces permit you to configure, share, monitor, and diagnose the L180 or L700e Tape Library.

Three are *standard*:

- Operator panel
- CSE port
- SER1 (service) port

Three are *optional*:

- L-Series Library Admin (Web based)
- Framework Library Monitor (SNMP based)
- Library Manager

Operator Panel

This graphical user interface (GUI) is easy to use. It includes:

- A large display for improved viewing of library features
- Buttons for configuring the library
- Indicators for identifying status

The simple menu system presents all necessary configuration and status functions, as well as instructions for configuring the library.

The operator panel displays library and drive status, configuration, diagnostic sequences, and fault symptom code logs to help you keep the library operating and diagnose problems quickly.

■ CSE Port and SER1 (Service) Port

With the library's CSE and SER1 ports, the service representative can update your library from an attached laptop computer. As StorageTek makes product enhancements, your library stays current and your investment is protected.

The L180 and L700e Tape Libraries enable the service representative to obtain diagnostic information from the library's SER1 (service) port. Using a remote laptop device or through a serial modem (RJ-45) connection, the service representative can:

- Run remote diagnostic tests (with the library offline)
- Access the fault symptom code log
- Clear the fault symptom code log

Complete diagnostic information helps the service representative resolve problems and get the library up and running as quickly as possible.

■ StorageTek L-Series Library Admin

StorageTek's L180 and L700e Tape Libraries feature L-Series Library Admin as an optional, Web-based GUI that enables you to monitor and perform library operations remotely. Unlike client-based interfaces available in other products, the library's onboard applet eliminates the need for *any* external server; the library can be directly attached to a 10-baseT Ethernet link and

any TCP/IP device. From the workstation on which a Web browser is installed, you can manage and configure the library while it is in use without interrupting data movement.

After it is installed, L-Series Library Admin is intuitive to use and requires minimal training because it uses the standard Internet protocols. The Java-based GUI allows you to use standard Web browsers—Netscape or Internet Explorer—to improve the library's availability and to benefit from the library's full remote capabilities, such as:

- Viewing real-time library status information, including:
  - Cell-based and drive-based activity statistics
  - Library and cartridge access port (CAP) configurations
  - Cartridge inventory
  - Gets and puts
  - Jobs completed
  - Cycles left on cleaning tapes
- Performing some library configuration tasks remotely using graphical representations of the library, drives, cartridge labels, and cartridge locations
- Monitoring library performance to ensure that backups and other tape jobs get completed
- Downloading new firmware code for quick and easy upgrades
- Maintaining system and vendor contact information
- Remotely rebooting the library
- Viewing the fault symptom code log, which provides remote access to library history information
- Running diagnostics

The Web-browser GUI (which includes online documentation) and a Java 1.2.2 plug-in enable you to easily access detailed product information.

You can receive most of the statistics for the library as a whole or for individual drives or cells. Selecting and viewing the displayed statistics is easy; you use the context-sensitive pop-up menus from the embedded web page. In addition, you can optimize library and network performance and schedule the replacement of cleaning cartridges by using the statistics for predictive analysis.

L-Series Library Admin monitors a single L-Series library within a single browser session and uses the Ethernet port for connection. L-Series Library Admin does not work within a framework environment, so it does not support Simple Network Management Protocol (SNMP).

L-Series Library Admin (Product HRZNLSA, Feature (size) Code LS3X for the L180, and Feature (size) Code LS4X for the L700e) includes the Personality Module, the CD-ROM, the CD insert, and the installation instructions. With L-Series Library Admin to configure, monitor, and perform system diagnosis, you enjoy full control of the L180 or L700e Tape Libraries from a remote location.

■ StorageTek Framework Library Monitor

Remote monitoring through the optional Framework Library Monitor provides a world of monitoring and notification possibilities. Framework Library Monitor provides monitoring of several SCSI-attached tape libraries, including the L180 and L700e Tape Libraries, from within a system management framework on standard UNIX and Windows NT systems. With Framework Library Monitor, remote monitoring tasks are fully supported, such as:

- Status of libraries, drives, and cartridge access ports
- Library event handling
- E-mail and pager notification

Framework Library Monitor software monitors the tape library associated with all data backup, recovery, hierarchal storage management, or vertical application jobs across a SCSI bus, without interfering with the controlling application's operation. In a manner consistent with other network hardware, the monitor alerts you to library events, warnings, or failures as they are communicated to the system management framework. The monitor enables fast, accurate responses and allows you to customize ways to handle library events.

Framework Library Monitor consists of two components, which provide seamless integration into enterprise-level, systems-management frameworks:

- An SNMP agent that runs on the server to which the tape library is attached. SNMP provides a standards-based approach to monitoring the controlling the tape library, and it runs on the following library agents:
  - ✦ Sun Solaris 2.5.1, 2.6, 2.7 (32 and 64 bit) on SPARC
  - ✦ HP-UX 10.20, 11.0 (32 and 64 bit) on HP9000 S700-800
  - ✦ Microsoft Windows NT 4.0 (SP5 Intel)
  - ✦ IBM AIX 4.3.2 on Power

- A monitor that runs on the same server as the system management framework. Monitor products include:
  - Hewlett-Packard's OpenView Network Node Manager™
    - 5.01 and 6.01 on HP-UX 11.00 (32 and 64 bit) on HP9000 S700-800
    - 6.01 on HP-UX 11 (32 and 64 bit) on HP9000 S700-800
    - 5.02 and 6.01 on Microsoft Windows NT 4.0 (SP5 Intel)
    - 6.01 on Solaris 2.6 on SPARC
  - Computer Associates Unicenter TNG™ 2.1 and 2.2 on Microsoft Windows NT 4.0 (SP5 Intel)
  - IBM Tivoli 3.6 Netview™ 5.1 on Microsoft Windows NT 4.0 (SP5 Intel)

Framework Library Monitor V3.1 includes a Library Agent port to AIX 4.3.2 on Power and Solaris 7 (64 bit) on SPARC platforms, plus Library Monitor for OpenView NNM 6.01 on Solaris 2.6 (SPARC)

Framework Library Monitor (Feature Code HRZN-001, Feature (size) Code FS3X for the L180, and Feature (size) Code FS4X for the L700e) allows the framework user to view and monitor SCSI-attached libraries, which was not previously possible under network-based framework products.

❖ **Note:**
The Framework Library Monitor product is a plug-in to one of the three supported network frameworks—CA Unicenter, Tivoli NetView, or HP OpenView—and cannot function without one of the supported network frameworks.

StorageTek Library Manager

The Library Manager (Product HRZN003) provides sharing and common robotics control for SCSI-attached, automated tape libraries. Its advantages include:

- Running in an open-systems environment, supporting Windows NT and Windows 2000 platforms
- Standardization through the automated cartridge system application programming interface (ACS API)
- Support for the following backup applications: VERITAS NetBackup, Legato NetWorker, CA ARCserveIT, HP Omniback II, and SGI TMF
- Java-based GUI
- Library sharing and centralized management
- Scalable support for tape libraries
- Reduced cost. Through library sharing and centralized management, the Library Manager significantly reduces your overall investment in capital equipment. The Library Manager also eliminates the administrative burden associated with stand-alone storage systems, freeing system administrators for other tasks.
- Transparent sharing of the L180 or L700e Tape Library across multiple heterogeneous applications and servers, with separate control-path management that is fully supported by backup products from major vendors.

The following table compares the functions of the three optional StorageTek products.

Table 8-1. Comparison of StorageTek Product Functions

	Framework Library Monitor	L-Series Library Admin	Library Manager
SNMP monitoring from management framework	X		
Launch L-Series Library Admin from framework	X		
Detailed monitoring and status of individual libraries		X	
Event handling	X	X	X
Library sharing among applications			X
Browser-based GUI		X	
Reporting		X	X
Tape operations: enter, eject, mount, dismount, and query			X
Library management: reporting, state and status, configuration, startup, and shutdown			X

Typical Customer Environments

9

Enterprises of all sizes will benefit greatly from the StorageTek L180 and L700e Tape Libraries' high performance, high availability, and flexibility. The library's architecture provides agility to accommodate future technological changes in the marketplace.

Storage Area Networks (SANs)

The L180 and L700e Tape Libraries are part of StorageTek's SAN architecture, which provides a portfolio of world-class storage and networking projects, called the StorageNet family of SAN solutions. The L180 and L700e libraries are just part of the StorageNet family, but they are an important one because they offer Fibre Channel and SCSI connectivity and provide a maximum cartridge capacity of 174 to 1,344. The proven reliability of these libraries makes them an ideal choice to meet the demanding needs of networked and shared tape environments. These libraries are compatible with most backup software products and supports operation through optional library manager and monitor software. Of course, these StorageTek libraries have the unique ability to mix drive and media types in the same library.

As part of StorageTek's family of SAN solutions, the L180 and L700e libraries can accommodate T9840, DLT, SDLT, and LTO Ultrium tape drives, and

additionally, the T9940 for the L700e Tape Library. These drives cover a broad range of price and performance. In particular, these libraries, with their compatible drives, offer:

- Low cost, high capacity for backup and large streaming jobs
- High performance, moderate capability for fast restore, hierarchical storage management, and interactive jobs.

Networks

Organizations with large networks will gain a competitive advantage from fast loading and parallel data paths, which speed throughput. Typical applications include:

- Database servers
- Application servers
- File servers

Small and Midsize Environments

The library's high performance also benefits small and midsize environments. Typical configurations include:

- Multiple servers to a single library
- Network-attached library for centralized monitoring and diagnosing machine performance

High Availability and Reliability

10

The StorageTek L180 and L700e Tape Libraries meet or exceed the needs of the market segment that demands the libraries' ultra-high availability features. In fact, reliability begins before you receive the L180 or L700e Tape Library. The libraries feature a locking mechanism that holds the robotics stationary during shipping. To set up the library, the service representative removes the locking pin, connects the power, connects the host, adds and configures the drives, and turns it on. It's ready to go.

After the L180 or L700e Tape Library is installed, StorageTek continues to provide you with maximum uptime and availability of your critical data. As the market leader in the tape automation market, StorageTek fully understands the critical elements of a tape library that improve the overall availability of the entire subsystem.

In particular, StorageTek has focused on the following items to provide significant benefit to you, the customer:

- A robust mechanical design
- Self-contained drives
- A fault-tolerant cooling system
- Critical component monitoring and error notification

Robust Mechanical Design

StorageTek brings enterprise class reliability to the L180 and L700e Tape Libraries. All subassemblies are streamlined; for example, cabling is simplified to reduce the number of connectors. Also, the cartridge-gripper mechanism uses a quiet and simple design, which results in high performance.

The L180 and L700e Tape Libraries use highly integrated electronics. All the main library functions reside on a single controller card, resulting in a more reliable, cost-effective solution than a motherboard with several plug-in modules. This minimalist approach enables the library to yield both high value and reliability (see Table 10-1).

Table 10-1. Reliability Measurements of the L180 Tape Library

Mean exchanges between failures	2,000,000
Mean time to repair	Less than 30 minutes
Mean time between failures	360,000 hours (full operation)

Self-Contained Drives

When key components of a system are distributed throughout the library system, fault isolation becomes difficult and encourages a trial-and-error approach to fixing a problem. In the L180 or L700e Tape Library, each drive module incorporates all of the drive's critical components located in one self-contained unit. If a drive experiences a problem, the drive is identified, and it can be replaced without disrupting library operation. This eliminates the need to go through a lengthy fault isolation process.

Another advantage of the libraries' self-contained drive modules is that each drive module supports the unique cooling and power requirements of the enclosed tape drives. By keeping all critical drive components in a single

module, the library optimizes power and cooling. Two examples illustrate this point:

- The drive modules are optimized to direct the airflow across critical components of the drive. By including the fan as a part of the module, both the fan size and speed can be customized to best meet the drive's requirements.
- If the drive logic power requirements change, the power supply provided with the drive can accommodate the change. This modularity enables the L180 or L700e to support the migration to future drive technologies with unique power requirements, concurrently with existing drives in a single library.

Highly reliable, self-contained, drive modules keep your library running without interruption.

Fault-Tolerant Cooling System

In addition to the fans contained in each drive module, the L180 and L700e Tape Libraries provide two exhaust fans for cooling the library electronics. This fault-tolerant system continues to function while a cooling fan is replaced by a service representative.

StorageTek uses only the highest reliable fans, which feature ball-bearing construction specified for a mean time between failures of 360,000 hours. If one fan in the electronics bay fails, operation continues uninterrupted.

The library system constantly monitors the electronics bay, and the firmware uses rotation sensing to detect the fan speed to maintain an optimum temperature. If a fan begins to fail, the firmware triggers a failure event notification to the library operator panel.

Critical Component Monitoring and Error Notification

The L180 and L700e Tape Libraries are designed to self-monitor critical library components, such as the drives, robotics, cooling system, and power supplies.

StorageTek's L180 and L700e support SCSI TapeAlert™, which defines a standard notification format for possible system failures. The firmware monitors drive and library performance statistics to warn of possible drive or library component failure. The automated notification system logs a fault symptom code to indicate the location of the failure.

Serviceability

11

The StorageTek L180 and L700e Tape Libraries are designed with high availability, reliability, and serviceability in mind. In addition, StorageTek offers several service options to help minimize down-time for your library.

All serviceable components are easily accessible, and StorageTek has provided for additional features in the following areas:

- No periodic or scheduled maintenance
- Hot-swappable drive modules
- Hot-swappable DC power supply
- Hot-swappable fans

No Periodic or Scheduled Maintenance

StorageTek is the only library manufacturer to provide a robotic system designed to operate without scheduled or periodic maintenance for the entire life of the product. Your library continues to operate because its components do not require lubrication or belt-retensioning.

Hot-Swappable Drive Modules

All drives reside in an easy-to-remove drive module. This unique design allows a failed drive, particularly a Fibre Channel drive, to be removed or replaced without special tools while the library remains powered on and fully operational to all other drives in the system. The drive trays use blind-mate drawer connectors, making drive replacement easy without interrupting service.

In addition, the drawer connectors automatically connect both power and drive interface signals. The SCSI interface to the drive module attaches to a panel-mounted Y cable to maintain SCSI bus integrity. This unique cabling scheme allows the library to concurrently support drives with single-ended SCSI, high voltage differential (HVD) SCSI, and Fibre Channel interfaces. The drive module design makes drive replacement as simple as possible, while still maintaining flexibility to support migration to future drive interfaces.

Hot-Swappable Power Supplies

If an optional DC power supply fails, the library stays functional with all drives in the drive column operational. The only time that some drives might become non-operational is if the AC service circuit fails.

If your system includes the optional DC power system, you can replace a DC power supply in the event of a DC power failure while the library is running. With the functional power supply still providing power to the robotics and half the drive system, you can replace the failed power supply and connect it into the drawer connectors.

Service Offerings

In the event that the L180 or L700e Tape Library requires service, StorageTek offers two options of service to meet customer requirements for all elements of storage solutions, including hardware, software, and selected hardware products.

StorageTek provides support services at different levels as shown in Table 11-1.

Table 11-1. Service Offerings

Service Level	*Days per Week*	*Hours per Day*	*On-site Service?*	*Response Time*
A	7	24	Yes	Within 4 hours
B	5	11	Yes	Within 4 hours

StorageTek's service representatives, from nearly 200 locations, support customers worldwide.

For more details on these service offerings, contact your StorageTek sales representative.

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Specifications

A

This appendix provides the following product specifications for the L180 and L700e Tape Libraries:

- Physical Specifications
- Library Capacity and Throughput
- Power Specifications
- Environmental Requirements
- Agency Certifications

❖ **Note:**
The L180 and L700e site planning information is subject to change. For current information, contact your StorageTek account or territory executive.

■ Physical Specifications

Table A-1, Table A-3, and Table A-4 list the physical specifications for the L180 and L700e Tape Library, the drives and cartridges, and the conversion bills.

Table A-1. L180 Physical Specifications without packaging

Height	1.65 m (65.1 in.)
Width with covers	71.9 cm (28.3 in.)
Depth with covers	1.25 m (49.3 in.)
Weight with covers, without drives or cartridges	274.4 kg (605 lb)

Table A-2. L700e Physical Specifications without packaging

Height	1.85 m (72 in.)
Width with covers	1.56 m (61.3 in.)
Depth (See note below)	95.3 cm (37.5 in.)
Depth with expansion frame	1.12 m (44.1 in.)
Weight with cover, without drives or cartridges	345 kg (761 lb)

❖ **Note:**
Building entry requirements: The local service person can easily reduce the depth of the machine to 73.7 cm (29 in.) to accommodate movement through doorways.

Table A-3. Drives and Cartridges Physical Specifications

DLT drive and tray weight	5.3 kg (11.7 lb)
DLT cartridge weight	223 g (7.85 oz)
SDLT drive and tray weight	3.17 kg (7 lb)
SDLT cartridge weight	223 g (7.85 oz)
T9840 drive and tray weight	7.4 kg (16.3 lb)
T9940 drive and tray weight	9.6 kg (21.2 lb)
T9840 cartridge weight	262 g (9.17 oz)
T9940 cartridge weight	262 g (9.17 oz)
IBM LTO Ultrium drive and tray weight	5.8 kg (12.8 lb)
HP LTO Ultrium drive and tray weight	5.0 kg (11.0 lb)
Seagate LTO Ultrium drive and tray weight	5.5 kg (12.1 lb)
LTO Ultrium 100-GB cartridge weight	220 g (7.8 oz)

Table A-4. L180 Conversion Bill Physical Specifications

Description	***Weight***	***Height***	***Width***	***Depth***
Optional power distribution unit	3.2 kg (7 lb)	30 cm (12 in.)	27 cm (10.5 in.)	17 cm (6.5 in.)
Optional power supply	4.1 kg (9 lb)	46 cm (18 in.)	33 cm (13 in.)	19 cm (7.5 in.)
Optional APC uninterruptible and redundant power supply	28.6 kg (63 lb)	8.9 cm (3.5 in.)	48.3 cm (19 in.)	45.7 cm (18 in.)

Table A-4. L180 Conversion Bill Physical Specifications (Continued)

Description	*Weight*	*Height*	*Width*	*Depth*
Optional Fan	3.2 kg (7.1 lb)	8.9 cm (3.5 in.)	16 cm (6.3 in.)	52.3 cm 20.6 in.)
LVD Converter Kit (includes card and cage)				
Card	0.14 kg (0.31 lb)	16 cm (6.3 in.)	10 cm (3.9 in.)	NA
Card cage	1.2 kg (2.6 lb)	27 cm (10.6 in.)	17 cm (6.7 in.)	3.3 cm (1.3 in.)

Table A-5. L700e Conversion Bill Physical Specifications

Description	*Weight*	*Height*	*Width*	*Depth*
Second 20-cell CAP	15.8 kg (35 lb)	123 cm (48.5 in.)	33 cm (13 in.)	34 cm (13.5 in.)
Second drive column	20.7 kg (46 lb)	124 cm (49 in.)	43 cm (17 in.)	44 cm (17.5 in.)
Second power distribution unit	3.2 kg (7 lb)	30 cm (12 in.)	27 cm (10.5 in.)	17 cm (6.5 in.)
Redundant power supply	4.1 kg (9 lb)	46 cm (18 in.)	33 cm (13 in.)	19 cm (7.5 in.)
Expansion frame	36 kg (79 lb)	183 cm (72 in.)	157 cm (62 in.)	30 cm (12 in.)
PTP	43 kg (92 lb)	175.4 cm (69 in.)	64.9 cm (25.5 in.)	40.4 cm (15.9 in.)
Optional APC uninterruptible and redundant power supply	51.7 kg (114 lb)	13.2 cm (5.2 in.)	48.3 cm (19 in.)	63.5 cm (25 in.)

Table A-5. L700e Conversion Bill Physical Specifications (Continued)

Description	*Weight*	*Height*	*Width*	*Depth*
Optional Fan	6.3 kg (13.9 lb)	10.7 cm (4.2 in.)	33.0 cm (13 in.)	38.1 cm (15 in.)
LVD Converter Kit (includes card and cage)				
Card	0.14 kg (0.31 lb)	16 cm (6.3 in.)	10 cm (3.9 in.)	NA
Card cage	1.2 kg (2.6 lb)	27 cm (10.6 in.)	17 cm (6.7 in.)	3.3 cm (1.3 in.)

Library Capacity and Throughput

Table A-6 and Table A-7 list the capacities of the libraries, Table A-8 on page A-7 and Table A-9 on page A-7 show the libraries throughput, and Table A-10 on page A-8 provides the average cartridge access time.

Table A-6. Capacity of the L180 Tape Library

Cartridge Type	*Cartridge Capacity*	*Native (Uncompressed)*
DLT 8000	40 GB	6.96 TB
DLT 7000	35 GB	6.09 TB
SDLT 220	110 GB	19.14 TB
SDLT 320	160 GB	27.84 TB
LTO Ultrium	100 GB	17.40 TB
T9840	20 GB	3.48 TB

Table A-7. Capacity of the L700e Tape Library

Cartridge Type	*Cartridge Capacity*	*Native (Uncompressed)*
DLT 8000	40 GB	27.12 TB
DLT 7000	35 GB	23.73 TB
SDLT 220	110 GB	74.58 TB
SDLT 320	160 GB	108.48 TB
LTO Ultrium	100 GB	67.80 TB
T9840	20 GB	13.56 TB
T9940A	60 GB	40.68 TB
T9940B	200 GB	135.6 TB

Table A-8. Throughput of the L180 Tape Library

Drive Type	*Drive Capacity*	*Native (Uncompressed)*
DLT 8000	10 drives, 6 MB/s	216 GB/hr
DLT 7000	10 drives, 5 MB/s	180 GB/hr
SDLT 220	10 drives, 11 MB/s	396 GB/hr
SDLT 320	10 drives, 16 MB/s	576 GB/hr
LTO Ultrium	10 drives, 15 MB/s	540 GB/hr
T9840A	6 drives, 10 MB/s	216 GB/hr
T9840B	6 drives, 19 MB/s	410 GB/hr

Table A-9. Throughput of the L700e Tape Library

Drive Type	*Drive Capacity*	*Native (Uncompressed)*
DLT 8000	20 drives, 6 MB/s	432 GB/hr
DLT 7000	20 drives, 5 MB/s	360 GB/hr
SDLT 220	20 drives, 11 MB/s	792 GB/hr
SDLT 320	20 drives, 16 MB/s	1.152 TB/hr
LTO Ultrium	20 drives, 15 MB/s	1.080 TB/hr
T9840A	12 drives, 10 MB/s	432 GB/hr
T9840B	12 drives, 19 MB/s	821 GB/hr
T9940A	12 drives, 10 MB/s	432 GB/hr
T9940B	12 drives, 30 MB/s	1.296 TB/hr

Table A-10. Average Cartridge Access Time

Drive Type	*Average Cartridge Access Time*
DLT 8000	7 seconds
DLT 7000	7 seconds
SDLT 220	12 seconds
SDLT 320	12 seconds
LTO Ultrium	4.5 seconds
T9840	4.5 seconds
T9940 (L700e only)	18 seconds

■ Power Specifications

Table A-11 lists the power specifications for the L180 and L700e Tape Libraries.

Table A-11. L180 and L700e Library Power Specifications

Power cable	**U.S./Canada:** 100 to 127 VAC UL/CSA power cable **International:** 200 to 240 VAC HAR power cable
Input voltage range	100 to 127 VAC / 200 to 240 VAC

Table A-11. L180 and L700e Library Power Specifications (Continued)

Input current	Library:	1.0 A @ 120 VAC 0.50 A @ 240 VAC
	DLT 7000:	0.92 A @ 120 VAC 0.46 A @ 240 VAC
	DLT 8000:	0.80 A @ 120 VAC 0.42 A @ 240 VAC
	SDLT:	Refer to specific manual
	T9x40:	Refer to specific manual
	LTO Ultrium:	Refer to specific manual
Power configuration	**U.S./Canada:** Single-phase 100 to 127 VAC, 50/60 Hz, 15 A service, 3-wire **International:** Single-phase 200 to 240 VAC, 50/60 Hz, 10 A service, 3-wire	
Power consumption (maximum continuous)	Library only: Tape drives:	120 W Refer to specific manual
Maximum heat output	Library only: Tape drives:	410 Btu/hr Refer to specific manual

Table A-12. L700e Single Drive Column

Power cable	**U.S./Canada:** 100 to 127 VAC UL/CSA power cable **International:** 200 to 240 VAC HAR power cable
Input voltage range	100 to 127 VAC / 200 to 240 VAC
Power configuration	**U.S./Canada:** Single-phase 100 to 127 VAC, 50/60 Hz, 15 A service, 3-wire **International:** Single-phase 200 to 240 VAC, 50/60 Hz, 10 A service, 3-wire
Power consumption	Library only = 1.0 A @ 120 V; 0.5 A @ 240 V
Maximum heat output	Library only = 410 Btu/hr

Table A-13. L700e Optional Second Drive Column

Power cable	**U.S./Canada:** 100 to 127 VAC UL/CSA power cable **International:** 200 to 240 VAC HAR power cable
Input voltage range	100 to 127 VAC / 200 to 240 VAC
Power configuration	**U.S./Canada:** Single-phase 100 to 127 VAC, 50/60 Hz, 15 A service, 3-wire **International:** Single-phase 200 to 240 VAC, 50/60 Hz, 10 A service, 3-wire
Power consumption	Library only = 1.0 A @ 120 V; 0.5 A @ 240 V
Maximum heat output	Library only = 410 Btu/hr

■ Environmental Requirements

Table A-14 describes environmental requirements for the L180 and L700e Tape Libraries.

Table A-14. Environmental Specifications

Temperature	
Operating	15° to 32°C (59° to 90°F)
Storage	10° to 40°C (50° to 104°F)
Shipping	-40° to 60°C (-40° to 140°F)
Relative Humidity	
Operating	20% to 80% (noncondensing)
Storage	10% to 95% (noncondensing)
Shipping	10% to 95% (noncondensing)
Wet Bulb Maximum	
Operating	29.2°C (84.5°F)
Storage	35°C (95°F)
Shipping	35°C (95°F)
Altitude	
Operating	0 to 3.05 km (0 to 10,000 ft)
Storage	0 to 3.05 km (0 to 10,000 ft)
Shipping	0 to 15.24 km (0 to 50,000 ft)

■ Agency Certifications

Table A-15 lists agency certifications for the L180 and L700e Tape Library.

Table A-15. Agency Certifications

Category	*Certification*
Safety	CSA: CAN/CSA-C22.2 no. 950-M95
	UL: UL 1950, Third Edition
	ERG Nemko GS: EN60950
Emissions	FCC 47 CFR 15, Subpart B, Class A
	EMC Framework AS/NZS 3548: 1996 (Australia, also accepted in New Zealand.)
	VCCI Class A (Japan)
	European Union CE EN55022 Class A emissions standards
	Canadian EMC Law; ICES-003
Immunity	European Union CE EN50082-1:1992 immunity standards

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Glossary

This glossary defines terms and abbreviations in this and other product related publications.

Some of the definitions are taken from the *IBM Dictionary of Computing*. The letters in parentheses following the definition indicate the source of the definition:

(A) *The American National Standard Dictionary for Information Systems*, ANSI X3.172-1990, copyright 1990 by the American National Standards Institute (ANSI).

(I) The *Information Technology Vocabulary*, developed by Subcommittee 1, Joint Technical Committee 1, of the International Organization for Standardization and International Electrotechnical Commission (ISO/IEC/JTC1/SC1).

(IBM) *The IBM Dictionary of Computing*, copyright 1994.

(T) Draft international standards committee drafts, and working papers being developed by the ISO/IEC/JTC1/SC1.

A

audit An operation to catalog or record the physical location of a cartridge tape in an automated library.

B

backup Pertaining to a procedure, technique, or hardware that recovers lost or destroyed data or that keeps a system operating. (T)

bar code label A barcoded external label that is both human- and machine-readable. The format of this label is unique and must be supplied by a StorageTek-approved vendor.

bus A facility that transfers data between several devices located between two end points, with only

one device capable of transmitting at a given moment. (T)

C

CAP *See* cartridge access port.

cartridge access port (CAP) In a StorageTek library, a window through which an operator feeds tape cartridges into and retrieves tape cartridges from a library.

cell A slot in the library in which a cartridge is stored.

cleaning cartridge A tape cartridge that contains special material to clean the tape path in a transport.

controller A device that coordinates and controls the operation of one or more input/output devices, such as workstations, and synchronizes the operation of such devices with the operation of the system as a whole. (IBM)

D

data migration The process of moving data from one storage system to another without converting the data.

data path A communication pathway allows the tape drives to exchange data with the client.

diagnostic cartridge An empty cartridge tape (no data or code) with a "DG" label, which is used for diagnostic routines.

diagnostic tests Automated offline tests that a service representative uses to evaluate and troubleshoot equipment.

differential (diff) A SCSI bus alternative, which provides better signal quality with less crosstalk and noise but requires more power to drive the signal. The maximum cable length is 25 m (82 ft).

Digital Linear Tape (DLT) A trademarked name for Quantum cartridge tapes and tape drives.

DLT *See* Digital Linear Tape.

drive A device for moving magnetic tape and controlling its movement. (IBM)

E

environmental requirement Any of the physical conditions required for the protection and correct

operation of a functional unit; the requirement is usually specified as a nominal value and a tolerance range. For a device, more than one set of environmental requirements exists; for example, one set for transport, another for storage, and another for operation. (T) (A)

Ethernet A 10 Mb/s-baseband local area network that allows multiple stations to access the transmission medium at will without prior coordination, avoids contention by using carrier sense and deference, and resolves contention by using collision detection and transmission. Ethernet uses carrier sense multiple access with collision detection. (IBM)

F

fault symptom code (FSC) A four-character hexadecimal code generated in response to an error to help isolate failures within the device.

Fibre Channel (FC) The National Committee for Information Technology Standards standard that defines an ultra high-speed, content-independent, multilevel data transmission interface that supports multiple protocols simultaneously. Fibre Channel supports connectivity to millions of devices over copper and/or fiber-optic physical media and provides the best characteristics of both networks and channels over diverse topologies.

firmware An ordered set of instructions and data stored in a way that is functionally independent of main storage; for example, microprograms stored in a read-only memory. (T)

FSC *See* fault symptom code.

H

hand-camera assembly A part of the library robot whose function is grasping cartridge tapes and moving them between storage cells and tape drives. The camera reads cartridge volume serial numbers during library audits and normal operation.

L

library A robotic system that stores, moves, mounts, and dismounts cartridges that are used in data read or write operations.

Linear Tape–Open (LTO) A technology developed jointly by HP, IBM, and Seagate for new tape storage options. LTO technology is an open format, which means that users have multiple sources of products and media. The open nature of LTO technology also provides a means of enabling compatibility between different vendors' offerings.

LTO *See* Linear Tape-Open.

M

mean exchange between failures (MEBF) One mount is defined as moving the hand to a slot and retrieving a cartridge, moving to a transport and inserting the cartridge, and verifying the cartridge is inserted correctly. One dismount is defined as moving the hand to a transport and retrieving a cartridge, moving to a slot and inserting the cartridge. One exchange is defined as one mount and one dismount.

mean time between failures (MTBF) For a stated period in the life of a functional unit, the mean value of the lengths of time between consecutive failures under stated conditions. (I) (A)

mean time to recovery (MTTR) For a stated period in the life of a functional unit, the average time required for corrective maintenance. *Synonymous with* mean time to repair. (T)

mean time to repair *Synonym for* mean time to recovery. (T)

MEBF *See* mean exchange between failures.

medium (1) A physical carrier of electrical or optical energy. (2) A physical material in or on which data may be represented. (IBM)

MTBF *See* mean time between failures.

MTTR *See* mean time to recovery.

N

network An arrangement of nodes and branches that connects data processing devices to one another through software and hardware links to facilitate information interchange.

P

pass-thru port (PTP) an automatic mechanism that transfers cartridge tapes from one library to another.

PDU *See* power distribution unit.

power distribution unit (PDU) A device for the distribution of AC line power from one inlet to multiple outlets. Multiple PDUs, in a rack-mount cabinet or deskside storage system, provide higher availability because the power continues if one PDU (or its alternating current [AC] source if the PDUs use separate AC sources) loses power.

protocol A set of semantic and syntactic rules that determines the behavior of functional units in achieving communication. (I)

R

rack A free-standing framework that holds equipment.

robot An electromechanical device that moves cartridge tapes between storage cells and tape drives.

S

SCSI *See* small computer systems interface.

single-ended A SCSI bus alternative, it is an inexpensive bus requiring less power than the differential alternative. The maximum cable length is 6 m (20 ft.).

small computer systems interface (SCSI) A local interface operating over a wide range of transfer rates using a common command set for all devices attached to the interface. It connects host computer systems to a variety of peripheral devices.

T

tape drive An electromechanical device that moves magnetic tape and includes the mechanisms for writing and reading data to and from the tape.

theta motor The motor responsible for the lateral movement of the hand mechanism in a library storage module.

Z

Z-column The column that enables the hand-camera assembly in the library to move vertically.

Z carriage The assembly that moves the hand vertically up and down the Z-column to the storage cells, the drives, and the cartridge access port in a library storage module or library.

Z motor The mechanism that moves the hand assembly vertically in a library storage module or library.

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