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L20/L40/L80 Series of Tape Libraries

General Information Manual

StorageTek

L20/L40/L80 Series of Tape Libraries

General Information Manual

Fourth Edition (March 2002)
This edition contains 102 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:

Information Development
Storage Technology Corporation
One StorageTek Drive
Louisville, CO 80028-2201
USA

Summary of Changes

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

Date	***Edition***	***Description***
May 2001	First	Initial release
July 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	Clarified firmware upgrade requirements Changed Library Status to Library Status tool Updated "Features and Benefits"

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Contents

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Tables

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Preface

This general information manual provides high-level information about StorageTek's L20, L40, and L80 Tape Libraries. For publications that contain more detailed information, see "Related Publications" on page xii.

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 11 chapters and an appendix:

- Chapter 1, "Product Overview," introduces the L20/L40/L80 series of 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 libraries.
- Chapter 4, "Adaptive Media Technology," describes how the libraries adapt to different media.

- Chapter 5, "SCSI and Fibre Channel Connectivity," describes the libraries' connectivity options.
- Chapter 6, "Advanced Robotics," describes the robotics in the 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 L20/L40/L80 series of tape libraries.
- Chapter 9, "Typical Customer Environments," lists the typical networks and environments in which the tape libraries operate.
- Chapter 10, "High Availability and Reliability," describes the design of the tape libraries for reliability.
- Chapter 11, "Serviceability," lists the service options available for the libraries.
- Appendix A, "Specifications," provides product specifications for the 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:

- *L20 Tape Library CRU Instructions*, PN 96002
- *L20 Tape Library FRU Instructions,* PN 96041
- *L20 Tape Library User's Guide*, PN 95961
- *L20 Tape Library Installation Guide,* PN 96052
- *L40 Tape Library Ordering Guide*, PN MT5011

- *L40 Tape Library Service Manual*, PN 96026
- *L40 Tape Library User's Guide*, PN 96005
- *L40 Tape Library CRU Instructions,* PN 96031
- *L40 Tape Library Installation Manual,* PN 96053
- *L40/L80 Tape Library Drive CRU Instructions*, PN 96006
- *L80 Tape Library Ordering Guide*, PN MT5012
- *L80 Tape Library Service Manual*, PN 96022
- *L80 Tape Library User's Guide*, PN 96021
- *L80 Tape Library CRU Instructions,* PN 96051
- *L80 Installation Manual,* PN 96054

Additional Information

StorageTek offers several methods for you to obtain additional information. Please use one of these methods when you want to obtain the latest edition of this or any other StorageTek customer publication.

StorageTek's External Web Site

StorageTek's external Web site provides marketing, product, event, corporate, and service information. In addition, the external Web site serves as an entry point to the Customer Resource Center (CRC) and to the e-Partners site. 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
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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 L20/L40/L80 series of tape libraries are self-contained, fully automated cartridge tape storage systems. This series of libraries provides an easy upgrade path from a 10-cartridge model to an 80-cartridge model.

The libraries can be configured for either high voltage differential (HVD) or low voltage differential (LVD) small computer system interfaces (SCSI). The HVD interface allows longer cable lengths, but is slower; the LVD interface restricts cable length, but is faster.

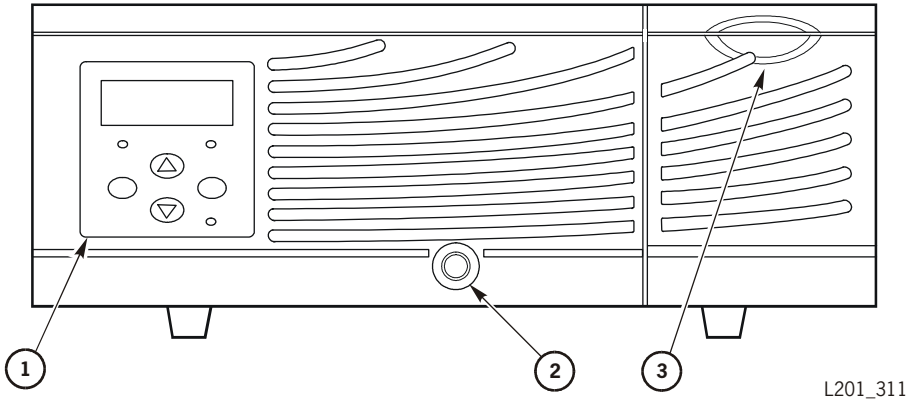
The libraries can be configured for SCSI interfaces or, with the addition of the Fibre Channel router, for Fibre-to-SCSI operation.

The L20 and L40 tape libraries can be placed on a desktop (with optional cosmetic cover and elastomer feet), the L80 tape library can be placed on the floor (deskside version with cosmetic cover and a base with casters), or any of the three can be mounted in a standard 483 mm (19 in.) rack.

■ External Components

The following figures identify the external components of the L20/L40/L80 series of tape libraries.

Figure 1-1. L20 Tape Library—Front View (L201_311)



1. Operator panel (including status display)—used for configuration and diagnostic testing
2. Lock for slide-out cartridge drawer—when open, you may access all cartridges
3. Cartridge access port (CAP)—used for entering and removing cartridges without interrupting library operation

Figure 1-2. L40 Tape Library—Front View (L201_312)

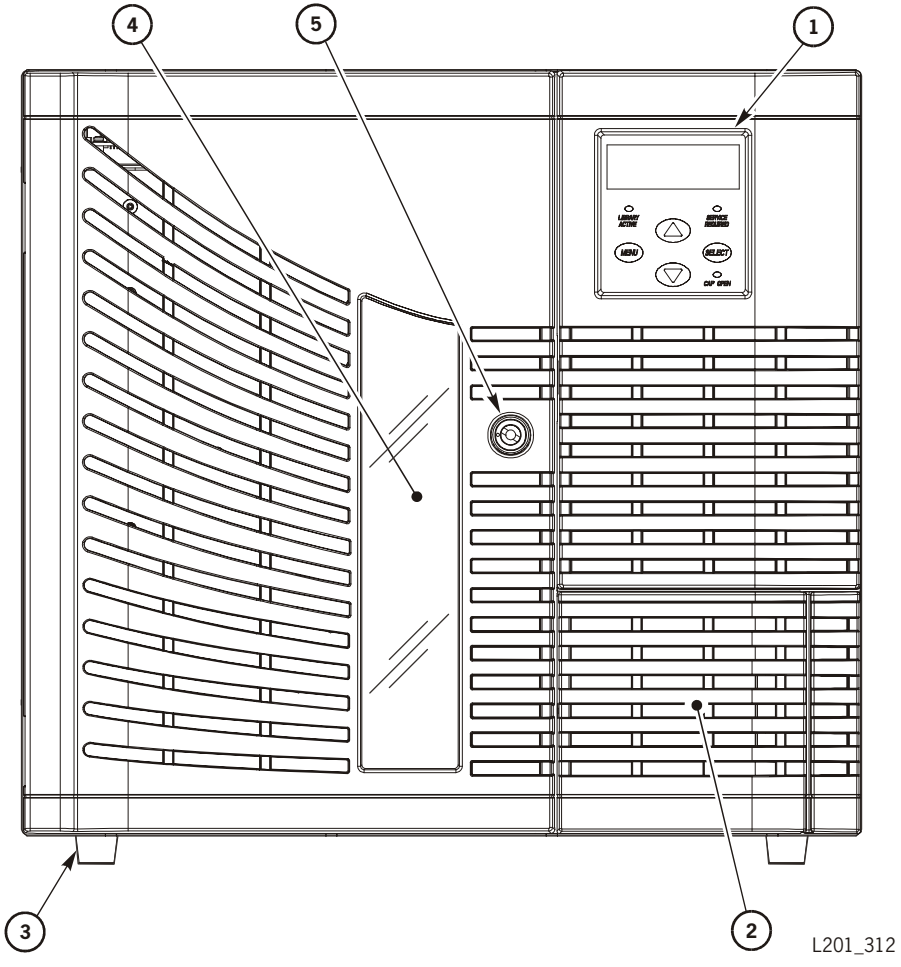


Figure 1-2. L40 Tape Library—Front View (Continued) (L201_312)

1. Operator panel (including status display)—used for configuration and diagnostic testing
2. Cartridge access port (CAP)—used for entering and removing cartridges without interrupting operation
3. Elastomer feet for desktop version
4. Viewing window
5. Door lock

Figure 1-3. L80 Tape Library—Front View (L201_313)

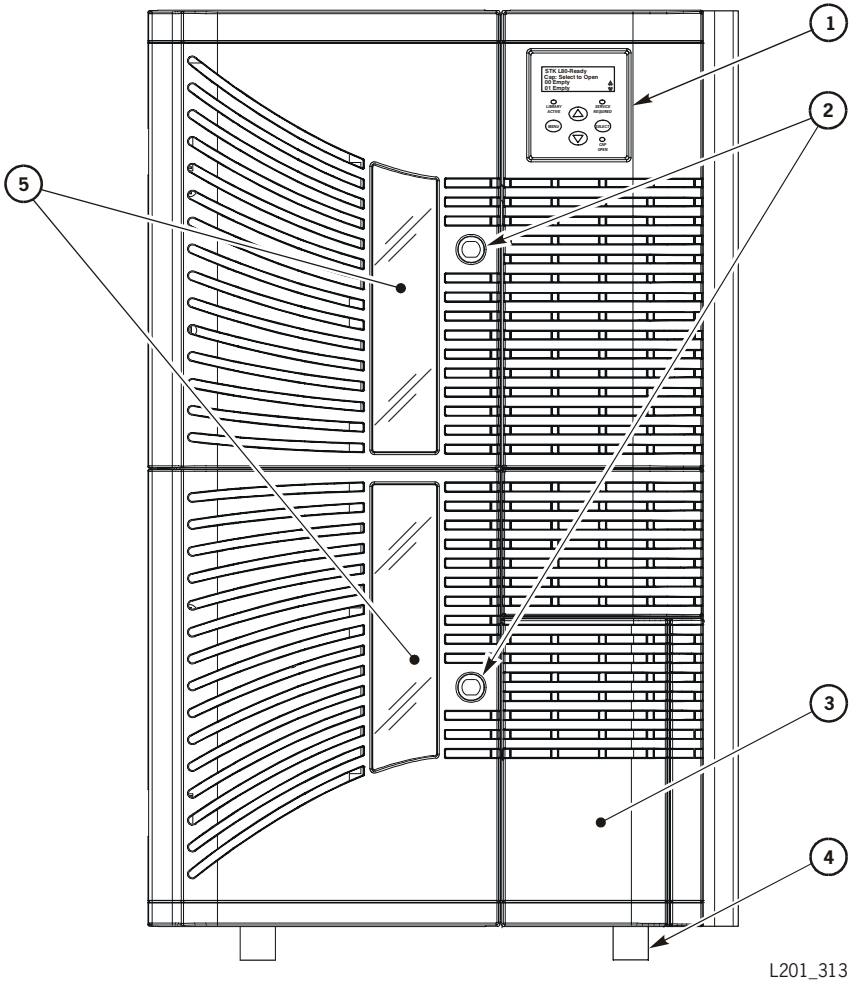


Figure 1-3. L80 Tape Library—Front View (Continued) (L201_313)

1. Operator panel (including status display)—used for configuration and diagnostic testing
2. Door locks
3. Cartridge access port (CAP)—used for entering and removing cartridges without interrupting operation
4. Casters for deskside version
5. Viewing windows

■ Comparison of Models

This table provides a quick overview of the L20, L40, and L80 tape libraries.

Table 1-1. Library Model Comparison

Library	*L20*	*L40*	*L80*
Cartridge Slots	10, 20	20, 40	40, 60, 80
Height (in rack units)	4 U	10 U	18 U
Drives	1–2	1–4	1–8
Capacity (maximum uncompressed)			
DLT1	800 GB	1.6 TB	3.2 TB
DLT 7000	700 GB	1.4 TB	2.8 TB
DLT 8000	800 GB	1.6 TB	3.2 TB
SuperDLT	2.2 TB	4.4 TB	8.8 TB
LTO Ultrium	2.0 TB	4.0 TB	8.0 TB

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Features and Benefits

2

Table 2-1 lists features and benefits of the StorageTek L20/L40/L80 series of tape libraries.

Table 2-1. Features and Benefits

Features	*Benefits*
From 10 to 80 cartridge cells	Expandability protects your investment by allowing you to add capacity as you need it.
Mixed media support, simultaneously	Creates freedom to adapt to future tape drive technology without changing libraries.
Multiple upgrade path options	Allows you to increase the performance and capacity quickly and easily. In-frame upgrade paths allow you to change the number of drives, number of media slots, and type of drive technology, or you can perform a frame to frame upgrade.

Table 2-1. Features and Benefits (Continued)

Library Status tool	Helps reduce administration costs and maximize operational efficiency. Remotely monitor library activity, tape drives, software, and media, as well as reboot the library, perform remote code (Firmware) downloads, and generate reports.
Multiple leading tape technologies offered, including: Linear Tape–Open (LTO) Ultrium, Super Digital Linear Tape (SDLT), DLT 8000, and DLT 1 drives	Provides high availability, high throughput, and quick backups.
Cartridge access port (CAP)	Permits quick and easy loading for batch jobs without interrupting library operation.
SAN-ready option	Connectivity to Fibre Channel. Allows data to be shared by multiple servers and provides simple scalability, ensuring enterprise-class business continuity.
Compact PCI™ expansion card	Ensures expandability and standards compliance.
Autosensing and configuration	Prevents improper orientation of cartridges. At initialization or power-on, the robot attempts to pick up any unreadable, unlabeled, or improperly placed cartridges. If unretrievable, library status will be “not ready.”

Table 2-1. Features and Benefits (Continued)

Average cell to drive time 7.6 seconds for the L80, 8 seconds for the L40, and 10.5 seconds for the L20.	Jobs complete faster.
Autoloader Mode (L20 only)	Autoloader mode provides sequential operation of the library, allowing you to control the automatic mount and dismount for a series of cartridge tapes. This mode does not require sophisticated software, yet still provides unattended backup that reduces administrative costs.
Redundant power supplies and fans (L40 and L80), and cooling-system monitoring	Ensures maximum uptime and availability of your critical data. Provides the ability to operate from two separate AC circuits.
Hot-swappable tape drives, power supplies, and fans	The drives are mounted on customer replaceable drive trays, which makes drive replacement easy, requires no special tools, and does not interrupt library operation (when configured with more than one drive).
High-resolution GUI (graphical user interface)	Intuitive operation ensures easy use.
HVD or LVD SCSI or Fibre Channel interfaces available	Allows adaptability to your system's configuration.

Table 2-1. Features and Benefits (Continued)

Digital vision camera system	High resolution camera system used for calibration and configuration of the library, tape drives, and media. This precision helps reduce wear on the tape drives, media, and cartridge cells.

Configuration Flexibility

3

The flexibility of the L20/L40/L80 series of tape libraries provides unparalleled investment protection. You can configure a library to meet your present needs, then, as your requirements grow, so can the library. In the same footprint, you can add more cartridge capacity and drives to expand from a smaller back-up-and-restore solution with a minimum of one drive and 10 cartridges to a powerful product with up to eight drives and 80 cartridges. You can customize the library by adding a combination of drives in the drive column. Inserting cartridges into the library is also easy through the library's cartridge access port (CAP).

■ Cartridge Capacity

The tape management software locates cartridges by their cell numbers. You determine the library capacity (total number of cells) when you order the library. You can order the L20 with 10 or 20 cells, the L40 with 20 or 40 cells, or the L80 with 40, 60, or 80 cells.

❖ **Note:**

For third-party software licensing reasons, StorageTek can configure the L20 with 15 cells, the L40 with 32 cells, and the L80 with 64 cells.

Do not include the drive slots and the CAP cells when determining data-cell capacity. In fully configured libraries (L040-40 and L080-80), if Auto Clean is *not* enabled, you can use the cleaning cells to store data cartridges. If Auto Clean *is* enabled, the cleaning cells must contain cleaning cartridges.

Although you are able to see all the storage cells, the software only recognizes the data cells that are designated for the capacity that you ordered, which is controlled by the personality module. You can attach a cell barrier clip (in the L40 and L80) to indicate the configuration of the cell capacity in your library to ensure that cartridges are manually inserted in viable positions.

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.

■ Cartridge Access Port

You insert cartridges into the tape library through the cartridge access port (CAP). The CAP holds one cartridge in the L20, two cartridges in the L40, and five in a removable magazine in the L80. With the CAP, you can load batch jobs quickly and easily without interrupting library operation.

■ Compatibility with Storage Solutions

Complementing its own software products, StorageTek has teamed with leading software vendors 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 3-1.

Table 3-1. Compatible Storage Solutions

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

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Adaptive Media Technology

4

One of the greatest strengths of the L20/L40/L80 series of tape libraries is the adaptive media technology, which encompass 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. The libraries will also support new drive and media types when they are available.

StorageTek also provides starter kits that have prelabeled cartridges with number ranges that are unique for each kit. See your StorageTek representative for more information.

■ Supported Drives

The L20 tape library supports Digital Linear Tape (DLT) 7000, DLT 8000, and Super DLT (SDLT) from Quantum Corporation, DLT1 tape drives from Benchmark Storage Innovations, and Linear Tape–Open (LTO) Ultrium drives (when available) from the LTO Consortium. The library may contain one or two drives.

The L40 and L80 tape libraries support DLT1, DLT 7000, DLT 8000, SDLT drives and LTO Ultrium drives.

You may mix drive types within a library, but please observe the following cautions:

- StorageTek does not advise you to mix DLT 7000 and DLT 8000 drives in the same library. When you place a DLT 7000 cartridge into a DLT 8000 drive, the drive will read but not write on the cartridge. When you place a DLT 8000 cartridge into a DLT 7000 drive, the drive assumes that the cartridge is blank and writes over the existing data on the cartridge.
- DLT1 drives use only DLTtape IV cartridges.

The flexibility of using different types of drives protects your investment. For example, you can initially purchase an L80 Tape Library with DLT 8000 drives. As performance requirements increase, you can add Ultrium 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.

Audit of Library

An audit is how the library keeps track of all cartridges within the library. An audit occurs when you:

- Power-on the library
- Open and close the door (drawer in the L20)
- Enter an audit request at the host console

The camera on the hand reads the labels on the cartridges, microcode assigns the cell locations, and the LLC processor card records the assignments. When the Media Check feature is on, the robot attempts to pick up any unreadable, unlabeled, or improperly placed cartridges. If unretrievable, library status will be "not ready."

Tape Management Software

The tape management software provides the instructions to perform tape read and write operations and robotic move operations. When the library is in automated mode, these operations occur without manual intervention. The software determines where the cartridge is located by accessing audit data uploaded from the library. The software then allocates the drive to receive the cartridge.

Electronics Module

The electronics module (EM) consists primarily of the LLC card, which is inside the EM, on the left side as you face the EM from the rear of the library. The interface connections and personality module are on the EM frame. One or two Fibre Routers can also be installed in the EM depending on the library model.

LLC Card

The LLC card, in the EM, is the processor card. It contains all the hardware necessary to maintain the robot, servo, and vision control. It also contains an operator panel interface, a SCSI interface (HVD or LVD, selectable), an Ethernet interface, eight (L80), four (L40), or two (L20) serial drive ports, and a Customer Services Engineering (CSE) port.

The card stores the library capacity information from the personality module and the volume serial numbers of the cartridges in the library cells.

Personality Module

The personality module is a connector that stores the library cell capacity information (10, 20, 40, 60, or 80 cells). The library will not operate unless an authorized module is attached to the rear of the EM.

SCSI and Fibre Channel Connectivity

5

The libraries include an embedded SCSI controller that supports both single-ended and high voltage differential (HVD) UltraSCSI for DLT SCSI drives, and low voltage differential (LVD) for LTO Ultrium drives. You do not need additional interface cards to support synchronous transfer rates up to 40 MB/s.

StorageTek has designed the libraries to make the transition from SCSI to Fibre Channel as easy as possible. You can convert the library, DLT, and Ultrium SCSI devices to Fibre Channel through a bridge router network mounted inside the library. In addition, you can upgrade the library as other Fibre Channel drives become available. See Table 5-1 on page 5-2 for a list of drives and supported interfaces.

The library interfaces are small computer system interface (SCSI HVD and LVD) or, with the addition of the Fibre Router, Fibre Channel-to-SCSI LVD. You can convert all SCSI LVD drives to Fibre Channel through an optional Fibre Router that is inside the library. The Fibre Router converts the library and SCSI signals to Fiber Channel protocol. One router converts up to four drives. The second router converts the additional drives. Properly terminate each SCSI bus with an LVD or LVD/SE multimode terminator.

Table 5-1. Compatible Drives and Interfaces

Drive Name	*Interface*	
	HVD[1.]	**LVD[2.]**
DLT 7000E	Yes	No
DLT 8000	Yes	Yes
DLT1	No	Yes
Super DLT	Yes	Yes
Seagate Ultrium LTO	Yes	Yes
HP Ultrium LTO	Yes[4.]	Yes
IBM Ultrium LTO	Yes[3.]	Yes

1. The maximum speed of data transfer is at 40 MB/s
2. The maximum speed of data transfer is at 80 MB/s
3. Single-ended to HVD converter card is part of the drive assembly.
4. LVD to HVD converter card is part of the CRU for the drive.

The Fibre Channel to LVD router:

- Allows the library to be connected to a 1 GB Fibre network (arbitrated loop and switched fabric)
- Allows the use of less expensive LVD SCSI drives
- Makes it easier to connect in a Fibre network
- Allows third-party copy (automated transfer of data from drive to drive without host intervention)
- Increases the host-to-library distance from 12 m (39.37 ft) to 500 m (1,640 ft)
- Allows connectivity between Fibre networks and the library and SCSI drives

Advanced Robotics

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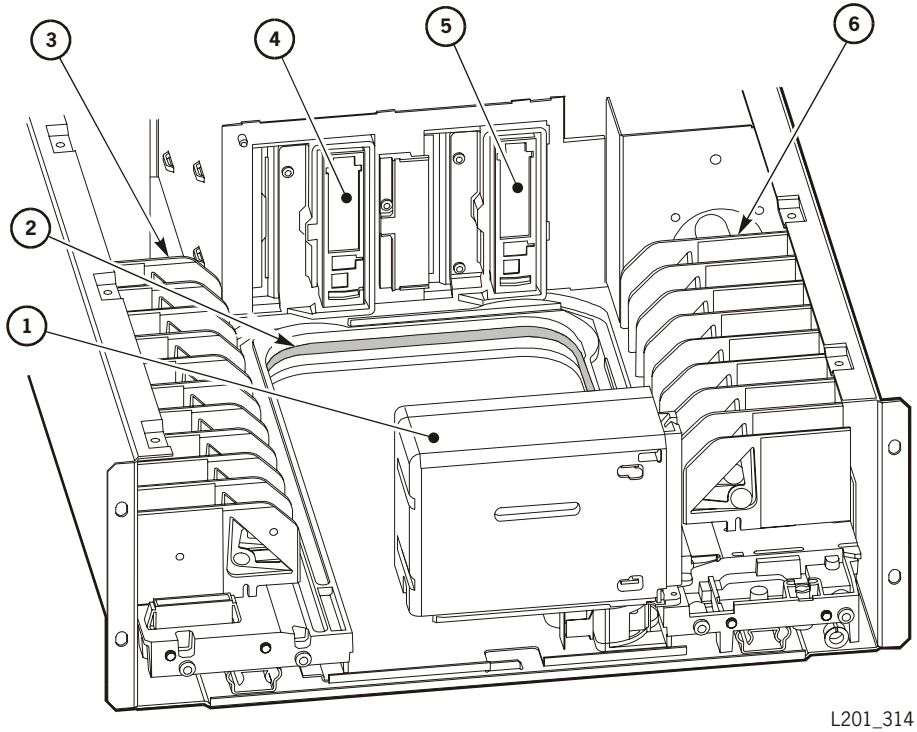
StorageTek's L20, L40, and L80 libraries use advanced rotational robotics to move cartridges among the CAP, storage cells, and drives inside the library. The space-efficient rotational robots use less raised-floor space per number of cartridges than competing products.

L20

The L20 picker, on a U-shaped track, contains a bar code scanner and camera. The U-shaped track is attached to the floor of the library. The track enables the picker mechanism to travel 180 degrees, thereby enabling the picker to access all cells in the library. The library tracks cartridges by the volume serial numbers and associated cell locations. The library defines the cartridge locations during the audit and stores the information in two places: the library's memory and the tape management database. The camera reads the bar code volume serial numbers on the cartridges and the library calibration targets. Figure 6-1 on page 6-2 show the internal view of the L20 tape library.

Figure 6-1. L20 Library—Internal View (L201_314)



1. Picker—moves along its U-shaped track and removes (“gets”) and places (“puts”) cartridges into storage cells or drives.
2. U-shaped track (for robot movement)
3. Cartridge storage cells
4. Drive 0
5. Drive 1
6. Cartridge storage cells

L40 and L80

In the L40 and L80, the robot, behind the front door, consists primarily of the:

- Theta assembly for lateral movement
- Z drive assembly for vertical movement
- Hand to mount and dismount cartridges

Most of the robotic components are mounted on the Z shaft. The hand on the Z carriage moves up and down the shaft to access the cells. The cells are stacked in columns; the columns are arranged around the robot. The hand rotates about the shaft.

The camera, on the hand, reads the bar code volume serial numbers on the cartridges, and the library and CAP calibration targets.

Figure 6-2. L40 Library—Internal View (L201_315)

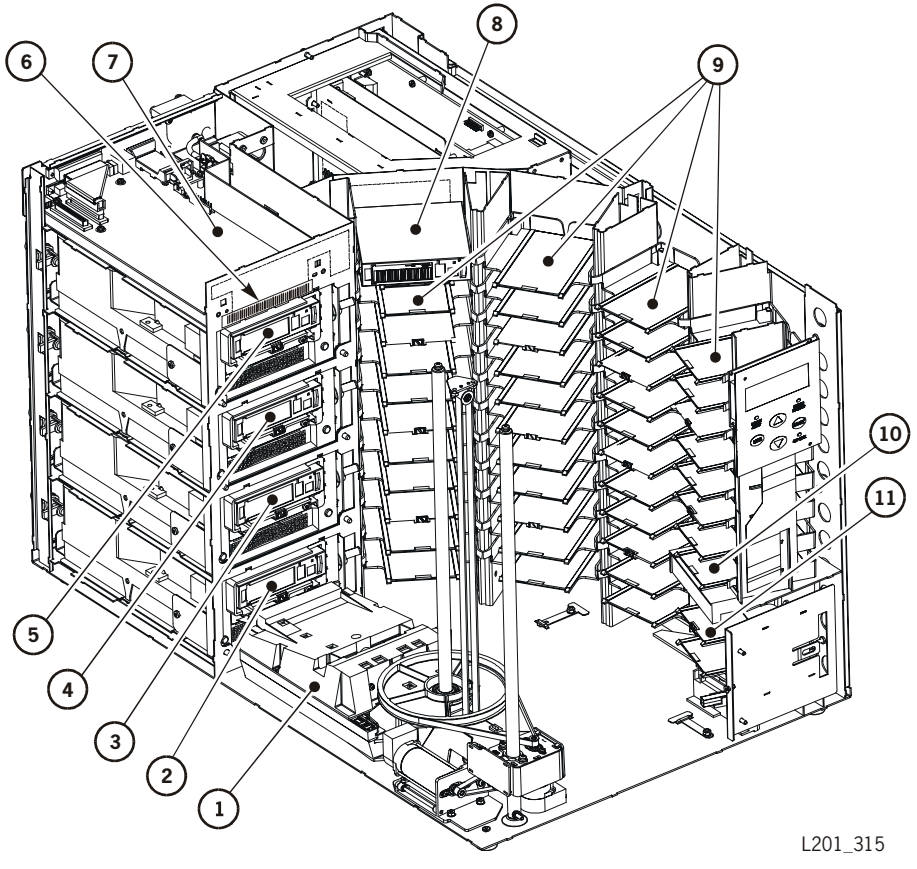


Figure 6-2. L40 Library—Internal View (Continued) (L201_315)

1. Hand Assembly
2. Drive 3
3. Drive 2
4. Drive 1
5. Drive 0
6. Library vision calibration label and master target
7. Fibre Channel Router
8. Cartridge
9. Columns 0 through 3, with 3 on far right
10. Cleaning cartridge cell
11. CAP cells (two)

❖ **Note:**
The top drive is Drive 0. If all four drives are installed, the top drive is Drive 0 and the bottom is Drive 3. If drives are installed only in the two middle slots, the top drive installed is Drive 0 and the drive below it is Drive 1.

Figure 6-3. L80 Library—Internal View (L201_316)

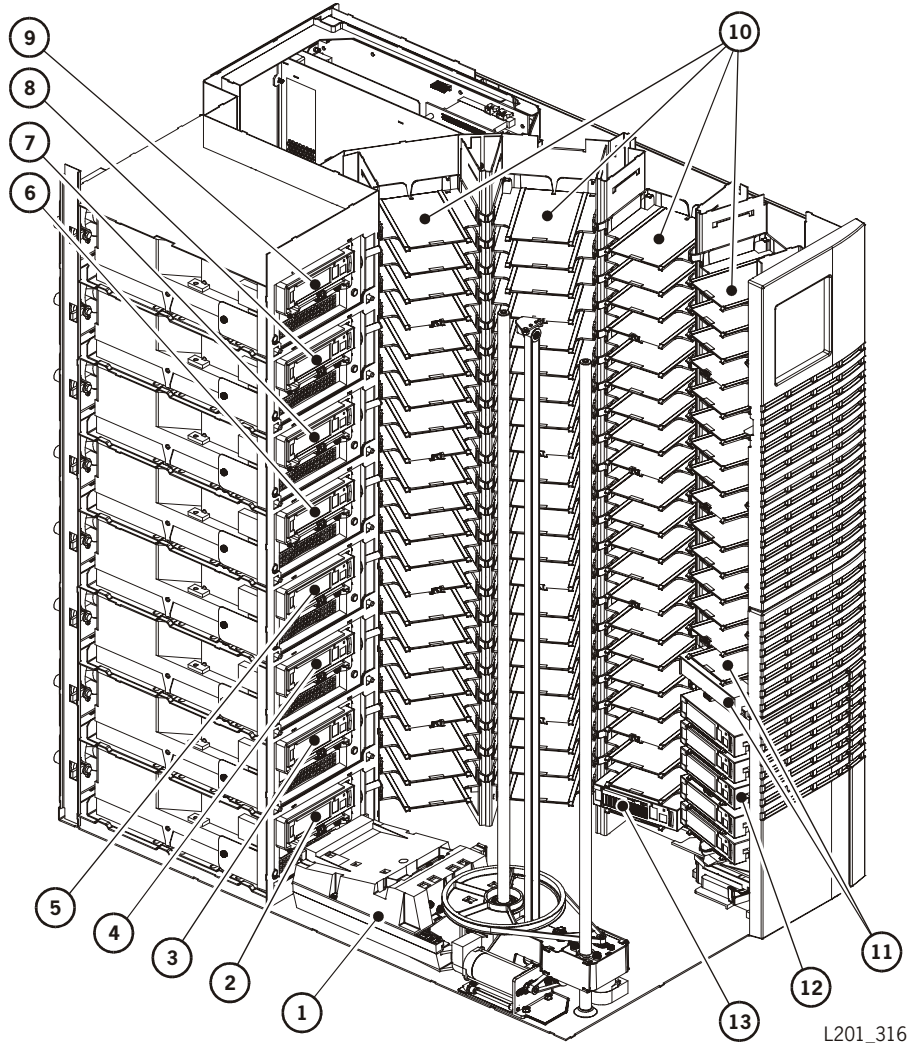
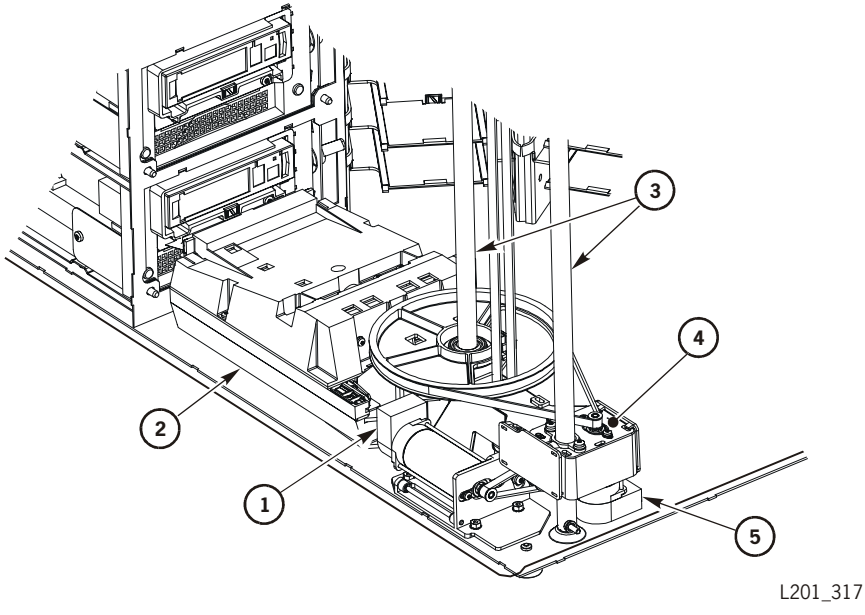


Figure 6-3. L80 Library—Internal View (Continued) (L201_316)

1. Hand
2. Drive 7 (See note.)
3. Drive 6
4. Drive 5
5. Drive 4
6. Drive 3
7. Drive 2
8. Drive 1
9. Drive 0
10. Cartridge storage cells (columns 0 through 3, with 3 on far right)
11. Two optional cleaning cartridge cells
12. CAP with removable five-cell magazine
13. Cartridge

❖ **Note:**
The top drive is Drive 0. If all eight drives are installed, the top drive is Drive 0 and the bottom is Drive 7. If drives are installed only in the two middle slots, the top drive installed is Drive 0 and the drive below it is Drive 1.

Figure 6-4. L40 and L80 Robotic Components (L201_317)



1. Z motor
2. Hand assembly
3. Z shafts
4. Z carriage
5. Theta motor

■ Advanced Hand-Camera Design

The hand (or picker in the L20) is composed primarily of the reach carriage, reach belt, reach motor, and the camera. The hand mounts to the Z carriage on the Z shaft. The robot can exchange 200 cartridges per hour, so your job is completed faster.

The camera reads the volume serial numbers on the cartridge labels after you insert them into the tape library. The library records cartridge numbers and location. In addition, StorageTek's camera uses an innovative design, the Digital Vision System, that accommodates different media types.

■ Digital Vision System

StorageTek's L20/L40/L80 series of tape libraries uses 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—such as those used in grocery 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 detects empty cells while in motion, reducing audit time.

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Power System

7

The L20 and L40 libraries have one standard power supply. For the L40, you can order a second supply to provide redundant power to the library and drives. The L80 has two standard power supplies, and you can order two redundant power supplies.

When you use the redundant power supplies, each supply should be plugged into a separate circuit and powered-on to provide redundant power. If one supply fails, the second supply automatically provides power.

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User Interfaces

8

The user interfaces include the operator panel and the Ethernet/Web port.

■ Operator Panel

This display has a simple menu system that presents all necessary configuration and status functions, as well as instructions for configuring the library.

The operator panel displays library and drive status, drive and media type, configuration, diagnostic sequences, and an event log to help you keep the library operating and diagnose problems quickly.

■ Library Status tool

By connecting a 10baseT Ethernet interface to the library's Ethernet port, you can easily monitor the library activity remotely through a workstation.

❖ **Note:**

To upgrade firmware, you will need:

- a personal computer (PC)
- software capable of performing a Z-modem transfer (for example, Library Status tool, Windows Hyperteminal, or Procomm) and familiarity with this software
- an available serial port
- a cable for the PC's serial port (for more information on this cable, see the Upgrading Firmware section of the relevant library's user's guide)

Typical Customer Environments

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Enterprises of all sizes will benefit greatly from the StorageTek L20/L40/L80 series of tape libraries' high performance, high availability, and flexibility. The libraries' architecture provides agility to accommodate future technological changes in the marketplace.

UNIX Networks

Organizations with large UNIX networks gain a competitive advantage from the libraries' fast-loading speeds and parallel data paths, which speed throughput. Typical configurations for the L40 and L80 include database servers, application servers, and file servers.

Small and Midsize Environments

The libraries' high performance benefits small and midsize environments. Typical configurations include:

- L20: especially useful for small environments
- L40 and L80: Multiple hosts to a single library
- L40 and L80: Network-attached library for centralized monitoring and diagnosing machine performance

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High Availability and Reliability

10

The StorageTek L20/L40/L80 series of tape libraries meets or exceeds the needs of the market segment that demands the libraries' ultra-high availability feature. In fact, reliability begins before you receive your tape library. The L20 library features a locking pin that holds the picker stationary during shipping, and the L40 and L80 are packed with foam to stabilize the robot. To set up the library, remove the locking pin or foam, connect the power, connect the host, add and configure the drives, label and add the cartridges, and apply power. The library is ready to go.

After the tape library is installed, StorageTek continues to provide you with maximum uptime and availability of your critical data. As the market leader in tape automation, StorageTek understands the critical library elements that improve the overall availability of the entire system.

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

- Robust Mechanical Design
- Fault-Tolerant Cooling System
- Critical Component Monitoring and Error Notification

Robust Mechanical Design

StorageTek brings enterprise-class reliability to the L20/L40/L80 series of tape libraries. All subassemblies are streamlined; for example, cabling is simplified to reduce the number of connectors. Also, the hand (or picker) uses a quiet and simple design, which results in high performance.

The 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

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

Fault-Tolerant Cooling System

In addition to the fans contained in each drive module, the libraries provide exhaust fans for cooling the library electronics. This cooling system continues to function while a cooling fan is replaced by a service representative.

StorageTek uses only the most reliable fans, which feature ball-bearing construction designed for a mean time between failures of 360,000 hours.

The library system constantly monitors the electronics module, and the microcode uses rotation sensing to detect the fan speed to maintain an optimum temperature. If a fan fails, the microcode displays an error on the operator panel.

Critical Component Monitoring and Error Notification

The libraries monitor their own critical components, such as the drives, robot, fan status, internal library temperature, and power supplies.

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Serviceability

11

All serviceable components are easily accessible, and StorageTek has designed your library for:

- No Periodic or Scheduled Maintenance
- Hot-Swappable Power Supplies (L40/L80)

StorageTek offers several service options and safety features to help minimize downtime for your library.

- Service Offerings
- Safety Features

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 Power Supplies (L40/L80)

If a 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 service circuit fails.

If your system includes the optional power system, you can replace the faulty power supply while the tape library is running. With the functional power supply still providing power to the robot and half the drive system, you can replace the faulty power supply and connect it into the drawer connectors.

■ Service Offerings

StorageTek has designed the L20/L40/L80 libraries so the customer or end user can install and service the libraries at the CRU (Customer Replacement Unit) level. The standard level of service and warranty offering is Advanced Exchange, however, both Elite and Select on-site services are available.

L20/L40/L80 availability is restricted to areas that can support the Advanced Exchange warranty offering. The L20/L40/L80 Advanced Exchange service warranty level does not require StorageTek to return the original serial number asset to the customer. The warranty entitles customers to 1 hour of free telephone installation support. Customers with cases under warranty can submit calls to the Call Center at any time; however, StorageTek will only respond Monday through Friday, 8am to 5pm local time, excluding holidays.

Elite on-site service is StorageTek's comprehensive high-availability system support solution, and is in place to support around-the-clock, mission-critical computing environments. Select on-site service is designed for customers that are in need of business-critical support, 8 a.m. to 5 p.m. local time, Monday through Friday (9 x 5). The on-site offerings may be restricted

in some geographies. StorageTek offers library installation service for a fee, which does not include drive installation.

StorageTek's international subsidiaries may establish their own Advanced Exchange processes, depending on their relationships with the distributors, customs, and taxation issues. They may have a unique warranty offering due to the differences in the warranty delivery processes.

The sales representative will ensure the customer is aware of all prerequisites and compatibility issues. The L20/L40/L80 Connectivity Matrix is on the L20/L40/L80 web page on the CRC. StorageTek will not accept calls for software not listed in the matrix.

■ Safety Features

Safety features are incorporated into the libraries. If you unlock and open the front door (drawer in the L20), an interlock removes power from the robot. In addition, the LLC card and the AC power supply are housed inside the electronics module (in the L20 and L40) to prevent you from coming into contact with hazardous voltages and sensitive electronics.

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Specifications

A

This appendix provides the following product specifications for the L20, L40, and L80 tape libraries:

- Physical Specifications
- Power Specifications
- Drive Power Specifications
- Environmental Specifications
- Agency Certifications

■ Physical Specifications

Figure A-1. L20 Tape Library, Desktop (L201_338)

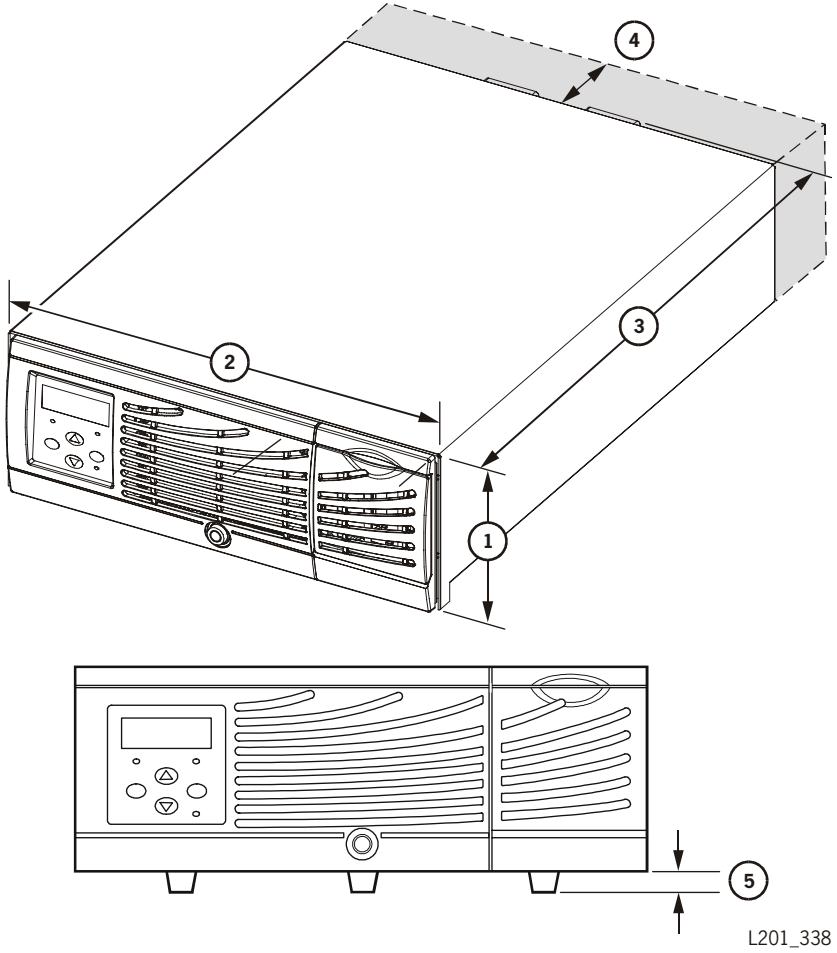

Figure A-1. L20 Tape Library, Desktop (Continued) (L201_338)

1. 178 mm (7.0 in.) height
2. 483 mm (19.0 in.) width
3. 706 mm (27.78 in.) depth without cables
4. 102 mm (4.0 in.) dedicated fan exhaust clearance area (shaded volume provides for cable and cooling clearances)
5. 16 mm (0.625 in.) foot height

Weight (library only): 23.4 kg (51.6 lb)

Figure A-2. L20 Tape Library, Rack installed (L201_335)

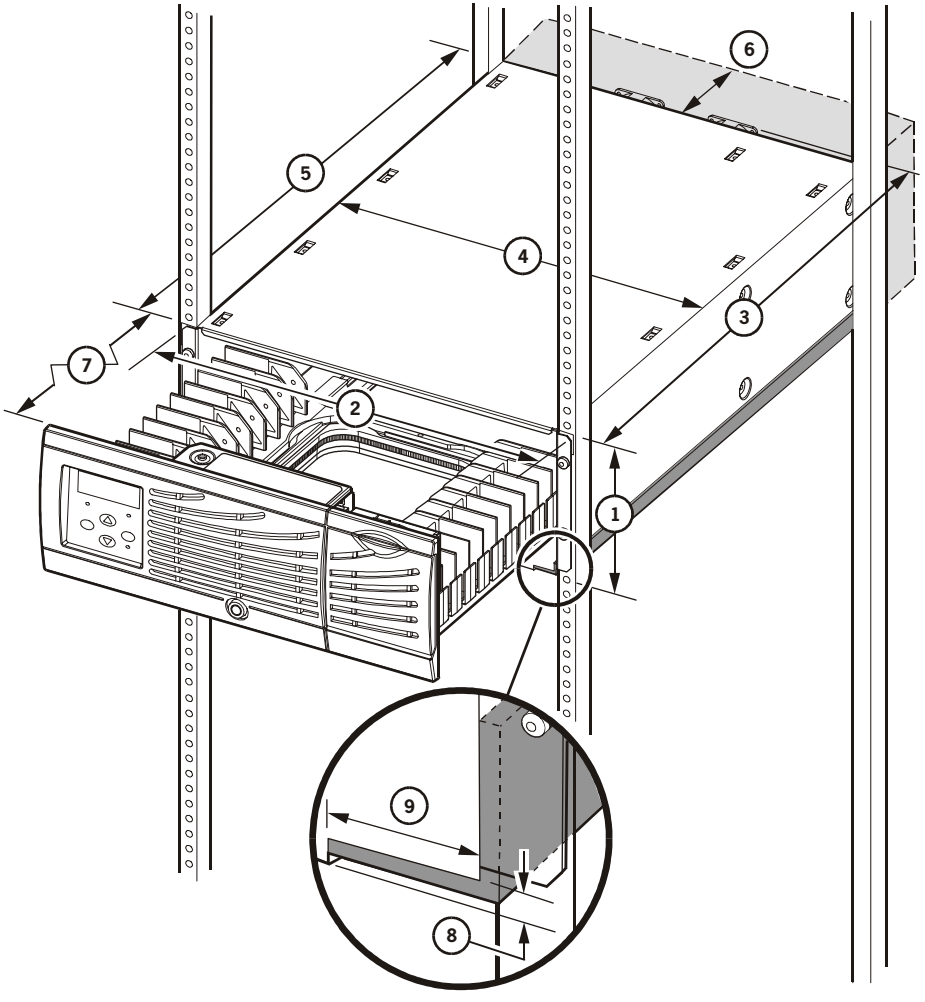

Figure A-2. L20 Tape Library, Rack installed (Continued) (L201_335)

1. 176 mm (6.94 in.) height
2. 484 mm (19.05 in.) width of front with flange
3. 706 mm (27.78 in.) depth with fan, without cables
4. 448 mm (17.65 in.) width
5. 680 mm (26.78 in.) depth without fan, without cables
6. 102 mm (4.0 in.) dedicated fan exhaust clearance area (shaded volume provides for cable and cooling clearances)
7. 356 mm (14.0 in.) drawer travel distance
8. 2.3 mm (0.090 in.) shaded area represents optional rail support
9. 37 mm (1.44 in.)

Weight (library only): 21.8 kg (48 lb)

Figure A-3. L40 Tape Library, Desktop (L201_339)

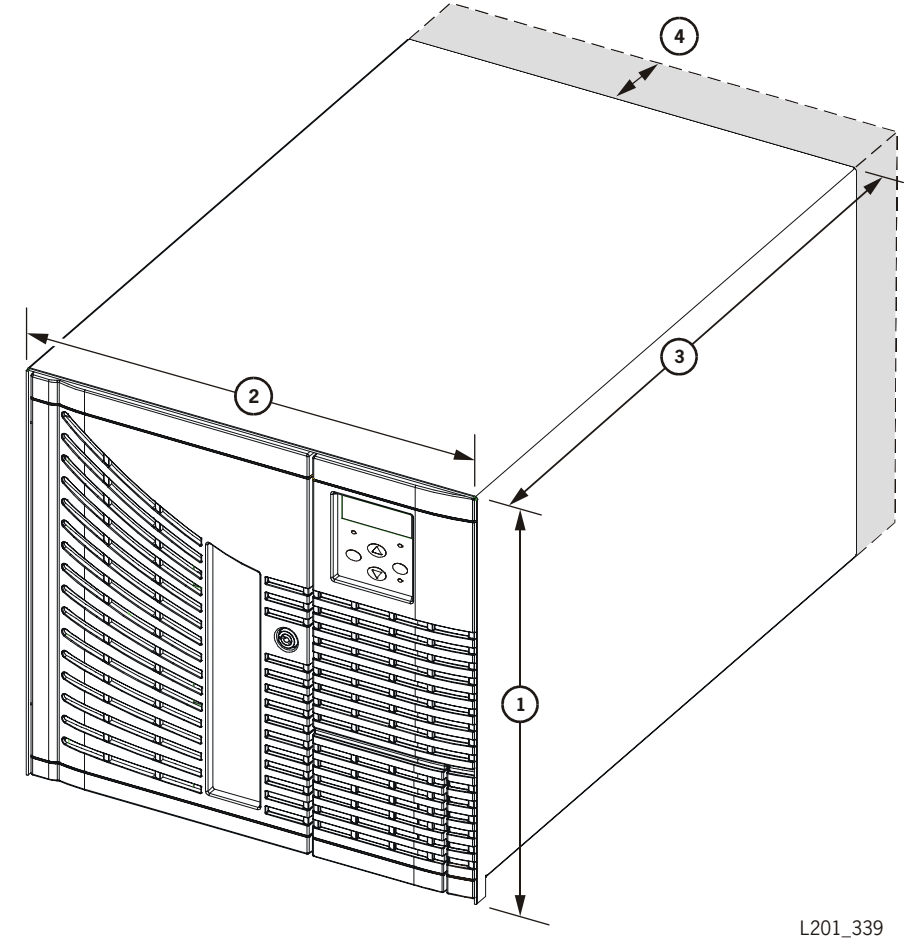

Figure A-3. L40 Tape Library, Desktop (Continued) (L201_339)

1. 455 mm (17.90 in.) height with feet; feet are 16 mm (0.625 in.)
2. 490 mm (19.30 in.) width
3. 724 mm (28.50 in.) depth without cables
4. 102 mm (4.0 in.) dedicated fan exhaust clearance area (shaded volume provides for cable and cooling clearances)

Weight (library only): 44.45 kg (98 lb)

Figure A-4. L40 Tape Library, Rack installed (L201_336)

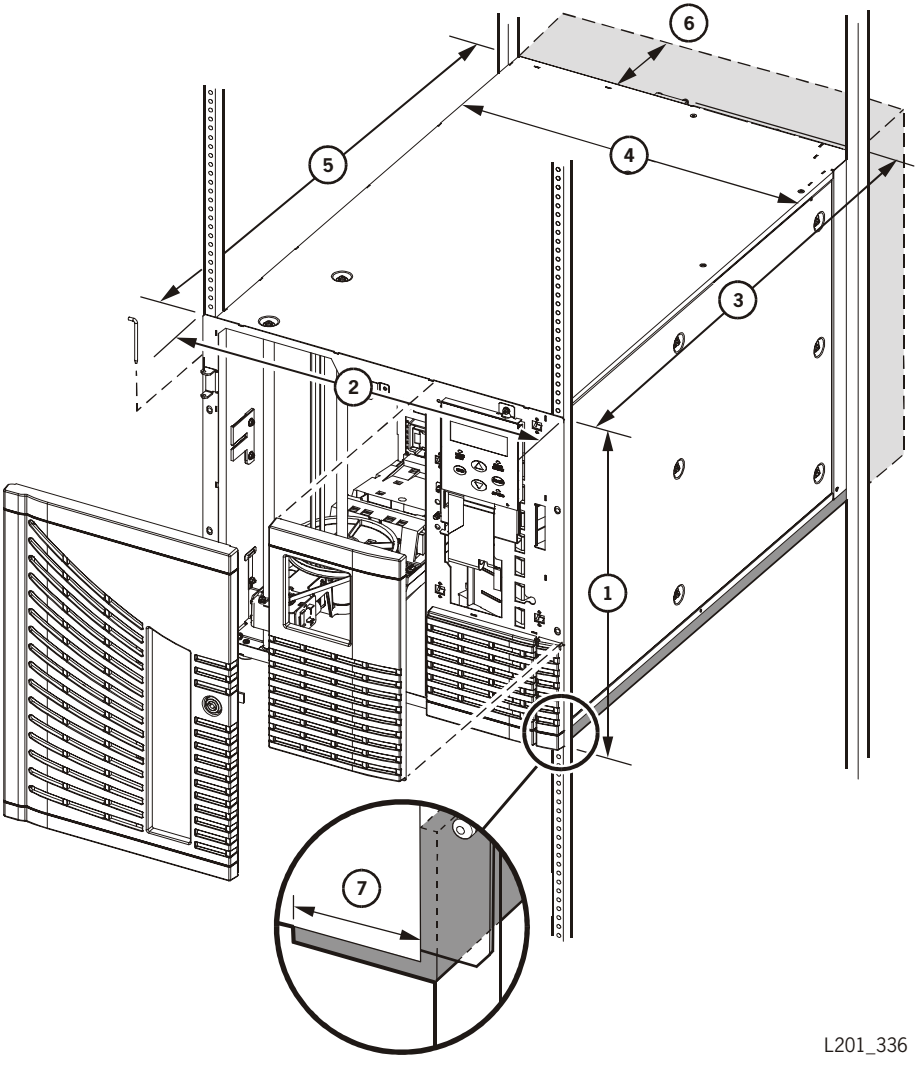

Figure A-4. L40 Tape Library, Rack installed (Continued) (L201_336)

1. 442 mm (17.39 in.) height
2. 483 mm (19.0 in.) width of front with flange
3. 728 mm (28.65 in.) depth with fan, without cables
4. 448 mm (17.65 in.) width
5. 702 mm (27.65 in.) depth without fan, without cables
6. 102 mm (4.0 in.) dedicated fan exhaust clearance area (shaded volume provides for cable and cooling clearances)
7. 37 mm (1.44 in.) edge of library to inside edge of rail

Weight (library only): 44.45 kg (98 lb)

Figure A-5. L80 Tape Library, Deskside (L201_340)

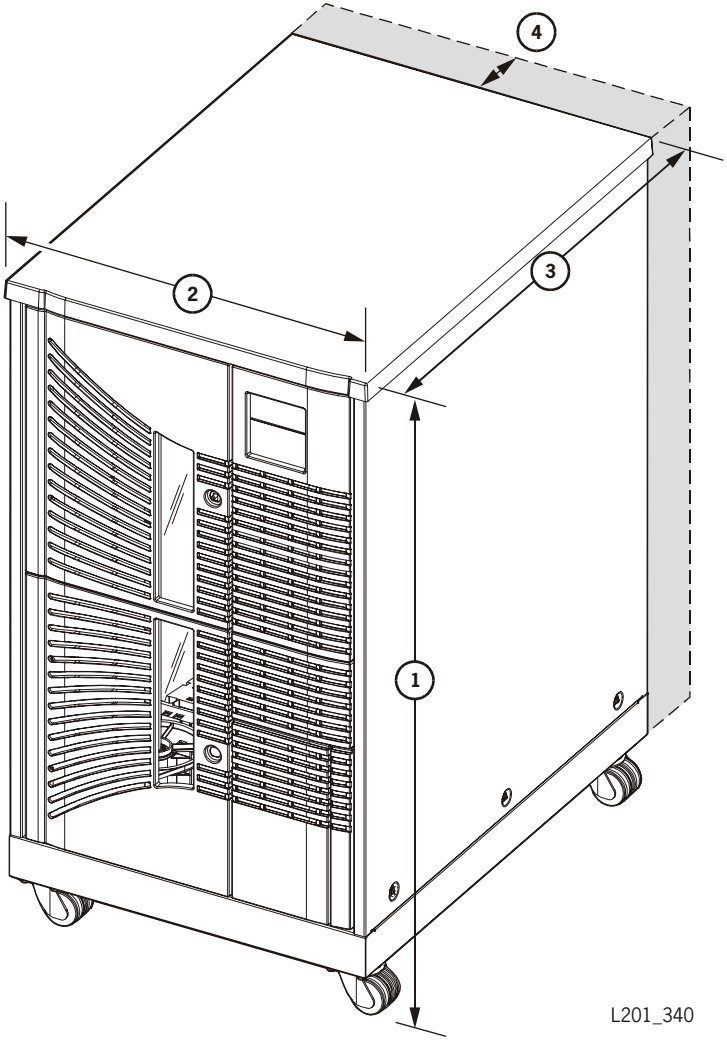

Figure A-5. L80 Tape Library, Deskside (Continued) (L201_340)

1. 1011 mm (39.80 in.) height including castors; castors are 72 mm (2.85 in.)
2. 540 mm (21.25 in.) width
3. 740 mm (29.15 in.) depth without cables
4. 102 mm (4.0 in.) dedicated fan exhaust clearance area (shaded volume provides for cable and cooling clearances)

Weight (library only): 63.5 kg (140 lb)

Figure A-6. L80 Tape Library, Rack installed (L201_337)

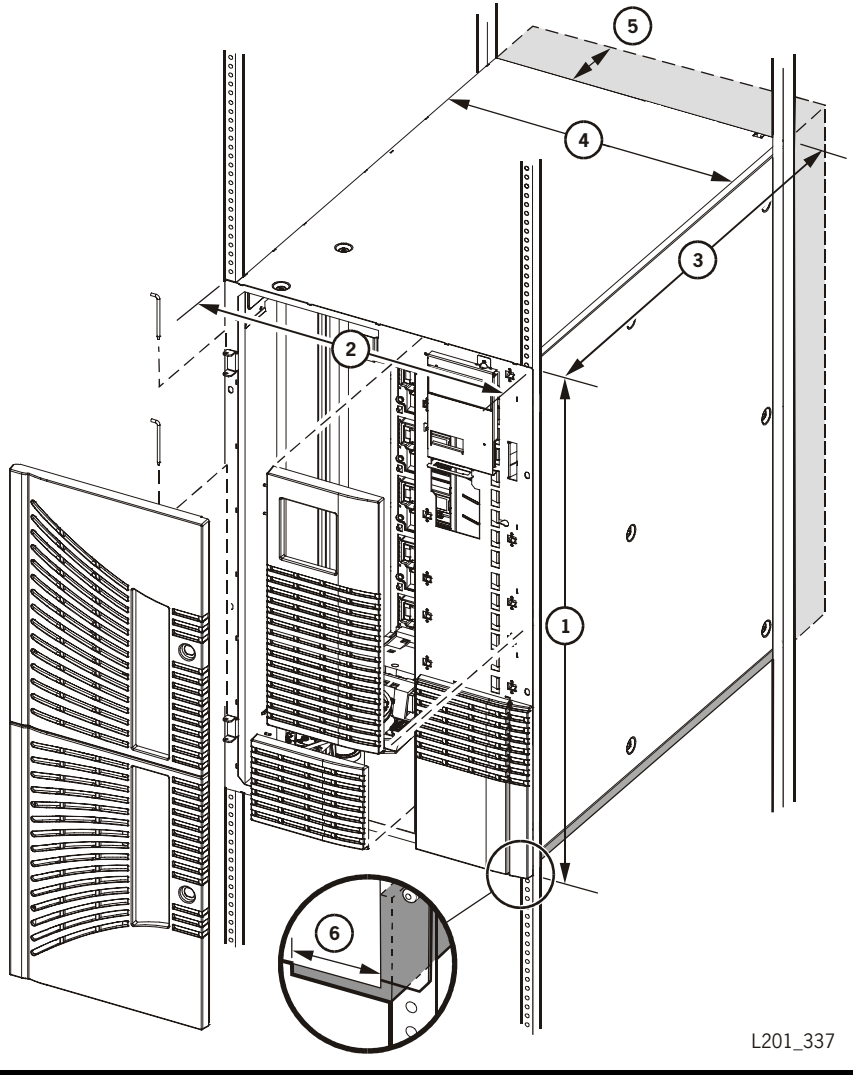

Figure A-6. L80 Tape Library, Rack installed (Continued) (L201_337)

1. 797 mm (31.39 in.) height
2. 483 mm (19.0 in.) width of front with flange
3. 697 mm (27.44 in.) depth without cables;
   not shown: fans protrude 27 mm (1.06 in.) from back
4. 448 mm (17.65 in.) width
5. 102 mm (4.0 in.) dedicated fan exhaust clearance area (shaded volume provides for cable and cooling clearances)
6. 37 mm (1.44 in.)

Weight (library only): 63.5 kg (140 lb)

Table A-1. Drive and Tray and Cartridge Weights

DLT drive and tray	5.4 kg (12 lb)
DLT1 drive and tray	2.72 kg (6 lb)
Super DLT drive and tray	3.17 kg (7 lb)
DLT cartridge	223 g (7.9 oz)
HP Ultrium LTO drive and tray	5.0 kg (11 lb)
IBM Ultrium LTO drive and tray	5.8 kg (12.7 lb)
Seagate Ultrium LTO drive and tray	5.5 kg (12 lb)
Ultrium 100 GB cartridge	220 g (7.8 oz)

■ Power Specifications

The following tables list the power specifications for the libraries without drives.

Table A-2. L20 Power Specifications

Input voltage	100–240 VAC, single phase
Frequency	50/60 Hz
Maximum power consumption (library)	1.4 A at 120 V *or* 0.71 A at 240 V
Maximum heat output	560 Btu/hr
Voltage-amperes	170 VA

Table A-3. L40 and L80 Power Specifications

Input voltage	100–240 VAC, single phase
Frequency	50/60 Hz
Maximum power consumption (library)	1.42 A at 120 V *or* 0.75 A at 240 V
Maximum heat output	614 Btu/hr
Voltage-amperes	180 VA

■ Drive Power Specifications

Table A-4. Drive Power Specifications

Drive	*Volt Amperes*	*Current*	*Heat output*
DLT 7000E	72 VA	0.59 A at 120 VAC 0.30 A at 240 VAC	256 Btu/hr
DLT 8000	65 VA	0.53 A at 120 VAC 0.27 A at 240 VAC	222 Btu/hr
DLT1	38 VA	0.30 A at 120 VAC 0.16 A at 240 VAC	130 Btu/hr
Seagate LTO	47 VA	0.38 A at 120 VAC 0.20 A at 240 VAC	160 Btu/hr
HP LTO	46 VA	0.37 A at 120 VAC 0.19 A at 240 VAC	157 Btu/hr
IBM LTO	69 VA	0.56 A at 120 VAC 0.29 A at 240 VAC	236 Btu/hr
Super DLT	58 VA	0.47 A at 120 VAC 0.24 A at 240 VAC	198 Btu/hr

■ Environmental Specifications

Table A-5. Environmental Specifications

	Operating	*Storage*	*Transporting*
Temperature	+10 to +40ºC +50 to +104ºF	+10 to +40ºC +50 to +104ºF	-40 to +60ºC -40 to +140ºF
Humidity	20 to 80%	10 to 95%	10 to 95%
Wet bulb (maximum, noncondensing)	+29.2ºC +84.5ºF	+35ºC +95ºF	+35ºC +95ºF
Altitude	-76 to 3,048 m (-250 to 10,000 ft)		

■ Agency Certifications

Table A-6. Agency Certifications

Category	*Certification*
Safety	CSA standard CAN/CSA-C22.2 no. 950-M93
	UL standard 1950, Third Edition
	EN60950
Emissions	FCC 47, Part 15, Subpart B, Class A
	VCCI Class A
	European Union CE emissions standards
	Canadian EMC Law; ICES-003
Immunity	European Union CE immunity standards

Glossary

This glossary defines abbreviations and new or special terms in this publication.

A

A Ampere.

AC Alternating current.

access time The time interval between the time data is requested and data is delivered.

adapter A card that provides the physical interface between the host system I/O bus and the SCSI or Fibre channel bus. *See also* host bus adapter.

application software Software that is specific to the solution of an application problem.

audit An operation to catalog or record the physical location of all cartridges in an automated library. During a library audit the volume serial number in the cartridge tape inventory is physically verified.

auto clean A feature of an automated library that allows a cleaning cartridge to automatically clean a drive when it requires cleaning. The host software must support the auto clean function.

B

B *See* byte.

baud The communications transfer rate for serial data.

bit (1) A unit of information equal to a 1 or a 0. (2) Either of the digits 0 or 1 when used in the binary numeration system.

British thermal unit (Btu) A standard measure of a device's heat output. The amount of heat required to raise one pound of water one degree Fahrenheit.

Btu *See* British thermal unit.

bus One or more conductors, which connect the functional units and transmit signals or power. It is a facility that transfers data between

several devices located between two end points, with only one device capable of transmitting at a given moment.

byte A number of bits, treated as a unit, and representing a character.

C

C Centigrade, Celsius

CAP *See* cartridge access port.

camera A system that reads volume serial number label on cartridges, instead of scanning the labels with a laser. A camera performs faster and more accurately than a laser scanner.

cartridge A storage device that consists of magnetic tape.

cartridge access port (CAP) A device in the library that allows an operator to insert or remove cartridges during library operations.

cartridge code An identifier of the cartridge media and usage.

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

central processing unit (CPU) A functional unit that processes coded instructions and performs a task.

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

cleaning cells *See* reserved cells.

client server The primary computer on a network, with which other computers interact. A server is a processor, usually composed of a central processing unit and memory, that typically communicates with peripheral devices over channels or networks, to perform input/output operations such as network control. It also provides end users with computation services and database access. Also called host.

compress To save storage space by eliminating gaps, empty fields, redundancy, and unnecessary data to shorten the length of records or files.

config *See* configuration.

configuration (config) The physical description of a library listing the panel types, cartridge capacity, type of host connection, and number of drives.

configuration error An error that results from incorrect configuration values.

controlling (host) software The logical interface between the host operating system and the library components.

CRU Customer replaceable unit.

CSE port A slot that enables a remote or laptop computer user to run diagnostic tests, examine the fault symptom code (FSC) log, download firmware, or connect the library to a remote modem.

Customer Resource Center (CRC) StorageTek's Web-based service that provides technical information to customers with StorageTek maintenance contracts. A log-in and password are required.

Customer Support Services (CSS) StorageTek's customer services organization. Customers with StorageTek maintenance contracts may contact CSS.

D

daisychain A method of device interconnection for determining interrupt priority by connecting the interrupt sources serially.

DC Direct current.

diagnostics Tests, accessible through the library operator panel, that allows a user to run offline tests within the library.

diagnostic cartridge An empty cartridge (no data or code) identical to a data cartridge with a "DG" label. This cartridge is used to run tests on the library without the risk of losing information written on a data cartridge.

diff *See* differential.

differential (diff) A SCSI bus alternative that 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.).

differential operation A SCSI bus alternative in which the signal from the SCSI chip passes through a set of differential drivers and receivers. This alternative provides better signal quality with less cross-talk and noise but requires more power to drive the signal. *Contrast with* single-ended operation.

Digital Linear Tape (DLT) A trademarked name for Quantum cartridges and drives.

Digital Linear Tape1 (DLT1) A trademarked name for Benchmark drives. These drives use DLT cartridges.

dismount To remove a cartridge from a drive.

DLT/DLT1 drive A drive that reads and writes on a DLT tape.

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

E

electronics module (EM) A unit in the library consisting primarily of the internal LLC card, interface connections, and the personality module on the EM frame.

electrostatic discharge (ESD) An undesirable release of an accumulated electrical charge (static) that can severely damage delicate equipment and degrade electrical circuitry.

enabled (1) Active. (2) On.

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 transporting, another for storage, and another for operation.

equipment rack A free-standing cabinet or framework that holds electronic equipment.

ESD *See* electrostatic discharge.

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.

Ethernet address A six-byte address that makes a library accessible to a network. *See also*

Internet Protocol (IP) address, library name, subnet mask.

Event log A file, accessible through the operator panel, that contains events that occurred during the functional operation of the library.

F

F Fahrenheit.

fast load A mode of library operation permitting the robot to retrieve another cartridge before receiving load confirmation from a drive.

fault symptom code (FSC) Four hexadecimal characters generated within the library as a result of a subsystem failure.

FC *See* Fibre Channel.

FCC *See* Federal Communications Commission.

Federal Communications Commission (FCC) A board of commissioners appointed by the President under the Communications Act of 1934 with the power to regulate all interstate and foreign communications by wire and radio originating in the United States.

fiber Any filament made of dielectric material that guides light, regardless of its ability to send signals.

fiber-optic cable A jacketed cable of thin strands of glass that carries pulses of light; these pulses transmit data for high-speed transmissions over medium to long distances. The cable can be single mode, which carries a single signal from a laser or light-emitting diode light source, or multimode, which carries multiple signals from either light source.

fiber optics The branch of optical technology concerned with the transmission of radiant power through fibers made of transparent materials such as glass, fused silica, and plastic.

Fibre Channel (FC) The standard from the National Committee for Information Technology Standards 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.

file-protect To prevent the destruction or overwriting of data stored on cartridge tape. *See also* write-protect.

firmware An ordered set of instructions. The firmware resides within a Flash PROM chip on the LLC card. Also known as "microcode."

format The arrangement or layout of data on a data medium.

FRU Field replaceable unit.

FSC *See* fault symptom code.

G

g gram.

gateway Specialized hardware that connects to otherwise incompatible systems, using different protocols and media, operating locally or over wide areas.

GB *See* gigabyte.

gigabyte (GB) One billion (10^9) bytes. When referring to storage capacity, 1,073,741,824 in decimal notation.

H

hand A part of the library robot whose function is to grasp cartridges and move them between storage cells and drives. A camera on the hand assembly reads the volume serial number label on a cartridge.

Hertz (Hz) A unit of frequency equal to one cycle per second. For example, in the United States, power line frequency is 60 Hz, or a change in voltage polarity 120 times per second.

high voltage differential (HVD) A type of SCSI interface. The HVD interface allows longer cable lengths of up to 25 m (82 ft), but throughput is lower than LVD (low voltage differential).

host The primary computer or a server on a network, that "hosts" some service used by or from other computers (for example, web

servers, file servers, and application servers).

host bus adapter A device that connects the host computer system and the SCSI bus.

host controlling software The logical interface between the host operating system and the library components.

hot swapping A method of component replacement in which the system containing the component remains online during removal of the failed component and insertion of a replacement.

Hz *See* Hertz.

I

in. *See* inch.

inch A unit of measure equal to 25.4 mm.

indicator A device that provides a visual or other indication of the existence of a defined state.

initialization The operations required for setting a device to a starting state, before the use of a data medium, or before implementation of a process.

initial program load (IPL) A process that activates a machine reset and loads system programs to prepare a computer system for operation. Processors having diagnostic programs activate these programs at initial program load execution. Devices running firmware usually reload the functional firmware from a diskette or disk drive at initial program load execution.

initialization routine A startup-diagnostic routine performed automatically by the library when it is powered on or reset.

interface Hardware, software, or both, that links systems, programs, or devices.

interlock switch A switch that disconnects power to the library when the front door is opened.

Internet Protocol (IP) address A four-byte value that identifies a library and makes it accessible through a network. IP addresses are logically divided into two parts: the network (similar to a telephone area code), and the system on the network (similar to a phone

number). *See also* Ethernet address, library name, subnet mask.

intervention required Operator action is required (such as removing a cartridge from the drive).

K

kb *See* kilobit.

kB *See* kilobyte.

kilobit (kb) (1) One thousand bits (10^3 bits). (2) 1,024 bits (2^{10}) of storage.

kilobyte (kB) (1) One thousand bytes (10^3 bytes). (2) 1,024 bytes (2^{10}) of storage.

kilovolt-ampere (kVA) An electrical unit of power equal to one thousand volt-amperes.

kVA *See* kilovolt-ampere.

L

lb pound.

LCD *See* liquid crystal display.

leader block. The mechanism that loads the tape through the tape path of a drive.

LED *See* light-emitting diode.

library name An assigned name that maps to the IP address for a library. *See also* Ethernet address, Internet Protocol (IP) address, subnet mask.

light emitting diode (LED) A light emitting electronic device that uses little energy and is used mainly on status panels to indicate an on or off condition.

liquid crystal display (LCD) A display device that creates characters by means of the action of reflected light on patterns formed by a liquid that becomes opaque when it is energized.

linear tape open (LTO) An 'open format' technology developed by IBM, Hewlett-Packard, and Seagate to provide a clear and viable choice in an increasingly complex array of tape storage options. The open nature of the LTO technology provides a means of enabling compatibility among different vendor's offerings.

LLC card A processor card. The card contains the hardware to maintain the robotic components. The card also controls an operator

panel interface, a SCSI interface (HVD or LVD selectable), an Ethernet/Web interface, drive serial ports, and a CSE port. It stores the library capacity information from the personality module, and the volume numbers of the cartridges in the library cells.

low voltage differential (LVD) A type of SCSI interface. LVD interface restricts cable lengths, 12 m (30.4 ft), but provides faster throughput.

M

m *See* meter.

mA Milliampere or one one-thousandth (10^{-3}) of an ampere.

magazine A container that holds cartridges in the cells provided and is inserted into the CAP.

magnetic tape A tape with a magnetizable layer on which data can be stored. *Synonymous with tape.*

Main menu The top-level menu on the operator panel display.

manual mode A relationship between a library and all attached clients. Tape libraries operating in manual mode have been placed offline to all client CPUs and require human assistance to perform cartridge operations.

Mb *See* megabit.

MB *See* megabyte.

Mb/s Megabits per second.

MB/s *See* megabytes per second.

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.

megabit (Mb) (1) One million (10^6) bits. (2) 1,048,576 (20^{20}) bits of storage.

megabyte (MB) (1) One million (10^6) bytes. (2) 1,048,576 (20^{20}) bytes of storage.

megabytes per second (MB/s or MB/sec) A measurement that usually describes the speed of data transfer.

meter (m) A metric measurement of length equal to 1.0936 yards, 3.2808 feet, or 39.3696 inches.

micro (µ) A measurement that is one one-millionth (10^{-6}).

microcode *See* firmware.

micron A unit of length equal to one one-millionth (10^{-6}) part of a meter.

millimeter (mm) A unit of measure equal to one one-thousandth (10^{-3}) of a meter or 0.04 in.

millisecond (ms) One thousandth (10^{-3}) of a second.

milliwatt (mws) One thousandth (10^{-3}) of a watt.

mm *See* millimeter.

mount a cartridge The process by which the library robot retrieves a cartridge from a cell and places it into a drive.

ms *See* millisecond.

MTBF Mean time between failures.

mV Millivolt or one one-thousandth (10^{-3}) of a volt.

mws *See* milliwatt.

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.

network gateway A four-byte notation that makes the library accessible to a large network, which consists of two or more subnets, through a gateway connection.

O

offline Neither controlled by, nor communicating with, a computer. *Contrast with* online.

online Pertaining to the operation of a functional unit when under the direct control of the computer. *Contrast with* offline.

operator panel (1) The panel that enables a user to configure and diagnose the library or drive. (2) The user interface for libraries or drives.

operator panel controls The buttons, such as MENU, SELECT, and Up and Down arrows, on the operator panel.

operator panel LEDs The indicators, such as *LIBRARY ACTIVE*, *CAP OPEN*, and *SERVICE REQUIRED*, on the operator panel.

operating system A program that acts as an interface between a user of a computer and the computer hardware. The purpose of an operating system is to provide an environment in which a user may execute programs. Operating systems provide a software platform on top of which other application programs can run.

oz ounce.

P

peripheral device Any device that communicates with a particular host or computer. Peripheral devices include disk subsystems, tape subsystems, printers, scanners, CD-ROMs, optical devices, and communication devices.

personality module A connector key, which connects to the library through a DB9 connector. The personality module stores the library cell capacity information.

picker ***See*** **hand.**

port An access point in a device to which a link attaches.

Q

quiesce A process that allows all activities to complete before any new activity starts.

R

rack A free-standing framework that holds equipment.

redundant power supply This power supply shares the power load with the standard power supply so that if one component were to fail, the other supply could take over fully without interruption to the library operation.

reserved cells One or more cells directly above the CAP. If Auto Clean is enabled, the cell or cells hold a cleaning cartridge each.

reset button Pressing this button starts an initial program load (IPL) of the library.

robot Electromechanical device for locating and moving cartridges.

S

s Seconds.

safety interlock switch A switch that disconnects power to the library when the front door is opened.

SCSI *See* small computer systems interface.

SCSI bus The interface connecting peripheral devices to a host operating system.

SCSI device A host adapter or control unit attached to the SCSI bus.

SCSI ID The bit-significant representation of an address on the SCSI bus.

single-ended operation A SCSI bus alternative in which the signal passes directly between SCSI chips on either end of the cable. *Contrast with* differential operation.

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.

storage cells The locations where cartridges are kept in the library.

submenu A menu related to and reached from a main menu.

subnet mask A four-byte notation that resolves routing within a network. *See also* Ethernet address, Internet Protocol (IP) address, library name.

T

tape *See* magnetic tape.

tape drive *See* drive.

target A marker on component in the library used by the robot for calibration during audits.

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

U

Ultrium The single hub implementation of the LTO specification for tape storage devices. *See also* LTO.

V

V Volts, usually expressed as VAC (volts alternating current) or VDC (volts direct current).

VAC Volts alternating current.

VDC Volts direct current.

VOLSER *See* volume serial number.

volume serial number (VOLSER) (1) An alphanumeric label that the host software uses to identify a volume. It attaches to the spine of a cartridge and is both human- and machine-readable.

W

write-enabled A setting on cartridge tapes that allows data to be written on the tape.

write-protect (A process of setting the switch On in a cartridge tape to prevent data from being written on the tape. Reading data is still possible. *See also* file-protect.

Y

Y-cable A communications cable that has two connectors at one end and one connector at the other.

Z

Z carriage The portion of the robot on which the hand assembly rests.

Z shafts The columns (or tubes) which allows the hand mechanism in the library to move vertically.

Z motor The motor responsible for the vertical movement of the hand assembly in the library.

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