



# StorageTek™

## L40

Tape Library

**User's Guide**

96005  
Revision: P





# L40 Tape Library

User's Guide

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# Summary of Changes

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EC	Date	Edition	Description
111578	December 2000	First	Initial release
111598	January 2001	Second	Refer to this edition for a description of the changes.
111631	April 2001	Third	Refer to this edition for a description of the changes.
111649	June 2001	Fourth	Refer to this edition for a description of the changes.
111708	December 2001	Fifth	Refer to this edition for a description of the changes.
111732	March 2002	Sixth	Refer to this edition for a description of the changes.
111770	June 2002	Seventh	Refer to this edition for a description of the changes.
111784	August 2002	Eighth	Refer to this edition for a description of the changes.
111828	February 2003	Ninth	Refer to this edition for a description of the changes.
111846	June 2003	Tenth	Refer to this edition for a description of the changes.
111923	July 2004	Eleventh	Refer to this edition for a description of the changes.
111948	January 2005	Twelfth	Refer to this edition for a description of the changes.
111975	May 2005	Thirteenth	Refer to this edition for a description of the changes.
114172	October 2006	P	Cover, Copyright, Preface and Safety: Added the Sun boilerplate verbiage.  Preface: Removed the reference to Appendix B.  Chapter 2: Updated <a href="#">“Adding Cell and Drive Capacity”</a> to show the latest numbers.  Removed Appendix B and placed the information into Appendix A.

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# Contents

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<b>Summary of Changes</b> .....	<b>iii</b>
<b>Contents</b> .....	<b>v</b>
<b>Figures</b> .....	<b>ix</b>
<b>Tables</b> .....	<b>x</b>
<b>Preface</b> .....	<b>xi</b>
Organization .....	xi
Alert Messages .....	xii
Mensajes de alerta .....	xii
Conventions .....	xiii
Related Publications .....	xiv
Additional Information .....	xv
Sun's External Web Site .....	xv
Customer Resource Center .....	xv
Partners Site .....	xv
Hardcopy Publications .....	xv
<b>Safety</b> .....	<b>xvii</b>
Rack Safety and Precautions .....	xvii
Fiber-optic Safety .....	xviii
Laser Product Label .....	xviii
Fiber-optic Cable Installation .....	xix
Fiber-optic Cable Handling .....	xix
Electrostatic Discharge Damage Prevention .....	xx
<b>Seguridad</b> .....	<b>xxi</b>
Seguridad y precauciones del bastidor .....	xxi
Seguridad de fibras ópticas .....	xxii
Etiqueta del producto láser .....	xxii
Instalación de cables de fibra óptica .....	xxiii
Manipulación de cables de fibra óptica .....	xxiii
Prevención de daños por descarga electrostática .....	xxiv
<b>Notices</b> .....	<b>xxv</b>
United States FCC Compliance Statement .....	xxv
CISPR 22 and EN55022 Warning .....	xxv

Japanese Compliance Statement .....	xxvi
Taiwan Warning Label Statement .....	xxvi
Internal Code License Statement .....	xxvii
<b>1: General Information .....</b>	<b>1-1</b>
Views and Locations .....	1-1
Cartridge Storage Cells .....	1-7
Robot .....	1-9
Cartridge Access Port .....	1-9
Electronics Module .....	1-9
LLC Card .....	1-9
Personality Module .....	1-10
Power System .....	1-10
Drives .....	1-10
Audit of Library .....	1-12
Safety Features .....	1-13
Tape Management Software .....	1-13
Serviceability .....	1-13
Environmental Specifications .....	1-13
Drive and Cartridge Weights .....	1-14
Drive Power Specifications .....	1-14
Library Power Specifications .....	1-15
Library Dimensions .....	1-15
<b>2: Configuration .....</b>	<b>2-1</b>
Operator Panel .....	2-1
Buttons .....	2-2
Indicators .....	2-2
Operator Panel Menus .....	2-3
Configuration .....	2-3
Configuring the Library .....	2-4
Fast Load Feature .....	2-4
Auto Clean Feature .....	2-4
Configuring the Drives .....	2-6
Configuring the Network .....	2-7
Setting the Warning and Shutdown Temperatures .....	2-8
Resetting the Library .....	2-8
Reconfiguring the Library .....	2-9
General .....	2-9
Auto Clean .....	2-9
Adding Cell and Drive Capacity .....	2-9
Conversion Bill .....	2-10



Part Numbers .....	2-10
Recording Configuration Information .....	2-11
Upgrading Firmware .....	2-12
Copying Firmware .....	2-12
Downloading Firmware .....	2-13
Verifying Firmware Edition .....	2-14
<b>3: Library Operation .....</b>	<b>3-1</b>
Automated Mode .....	3-1
Inserting a Cartridge through the CAP .....	3-1
Removing a Cartridge through the CAP .....	3-2
Monitoring the Operator Panel for Messages .....	3-2
Viewing the Status of the Library .....	3-2
Viewing the Status of the Drives .....	3-3
Viewing the Status of the Personality Module .....	3-4
Viewing the Status of the Hardware Monitor .....	3-5
Viewing the Status of the CAP .....	3-6
Reviewing the Event Log .....	3-7
Using Cleaning Cartridges .....	3-7
Using the Clean Menu .....	3-7
Setting the Cleaning Cartridge Warning Count .....	3-9
Viewing the Cleaning Cartridge Information .....	3-10
Exporting a Cleaning Cartridge through the CAP .....	3-10
Importing Cleaning Cartridges through the CAP .....	3-11
Using Library Status Tool .....	3-13
Requirements .....	3-14
Setting up Java Policy Permissions .....	3-14
Generating Reports .....	3-16
Loading Code .....	3-19
Rebooting the Library .....	3-20
SNMP .....	3-21
Library Admin .....	3-21
Powering-off the Library .....	3-22
Manual Mode .....	3-22
Opening the Front Door .....	3-23
Inserting the Cartridges into Cells .....	3-24
Locating a Cartridge .....	3-26
Removing a Cartridge from the Hand .....	3-27
Inserting a Cartridge into a Drive .....	3-28
Removing a Cartridge from a Drive .....	3-28
Replacing a Cleaning Cartridge .....	3-29
Cleaning a Drive .....	3-30

Returning the Library to Ready Status ..... 3-31

**4: Troubleshooting and Diagnostic Tests ..... 4-1**

    Troubleshooting the Library ..... 4-1

    Library Self-Test and Event Log ..... 4-4

        Diagnostics Menu ..... 4-4

        Library Self-Test ..... 4-5

        Event Log ..... 4-6

        Demo Mode ..... 4-6

**5: Cartridge Information ..... 5-1**

    Handling Cartridges ..... 5-1

    Inspecting Cartridges ..... 5-1

    Maintaining Cartridges ..... 5-2

    Cartridge Requirements ..... 5-2

    Ordering Cartridges and Labels ..... 5-3

    DLT Cartridges ..... 5-4

        Applying Cartridge Labels ..... 5-5

        Setting the Write-Protect Switch ..... 5-6

        DLTtape Cartridge Environmental Specifications ..... 5-7

    SDLT Cartridges ..... 5-8

    Ultrium Cartridges ..... 5-9

        Cartridge Label Codes ..... 5-10

        Applying Cartridge Labels ..... 5-10

        Setting the Write-protect Switch ..... 5-11

        Ultrium Cartridge Environment Specifications ..... 5-12

**A: Customer Support ..... A-1**

    Customer Services Support Center ..... A-1

    Customer-initiated Maintenance ..... A-1

    Sun's Worldwide Offices ..... A-2

**Glossary ..... Glossary-1**

**Index ..... Index-1**

# Figures

---

Figure 1-1. Library Front View .....	1-2
Figure 1-2. Library Rear View .....	1-3
Figure 1-3. Library Internal View of Components .....	1-5
Figure 1-4. Robotic Components .....	1-6
Figure 1-5. DLT Drive Serial Number, Warranty ID Number Locations .....	1-6
Figure 1-6. Valid Storage Cells .....	1-8
Figure 1-7. L40 Rack Version Dimensions and Weight .....	1-16
Figure 1-8. L40 Desktop Version Dimensions and Weight .....	1-17
Figure 2-1. Operator Panel Components .....	2-1
Figure 3-1. Sample Library Status Tool Screen .....	3-13
Figure 3-2. Report Selection Screen .....	3-17
Figure 3-3. Sample Report .....	3-18
Figure 3-4. Library Code Load Screen .....	3-19
Figure 3-5. Library Reboot Screen .....	3-20
Figure 3-6. Determining the Valid Storage Cells .....	3-25
Figure 3-7. Inserting the Cartridges .....	3-26
Figure 3-8. Hand Belt .....	3-27
Figure 5-1. DLT Cartridge Components .....	5-4
Figure 5-2. DLT Cartridge Volume Number Label .....	5-6
Figure 5-3. DLT and SDLT Cartridge Differences .....	5-8
Figure 5-4. Ultrium Cartridge Components .....	5-9
Figure 5-5. Ultrium Cartridge Label .....	5-10
Figure 5-6. Setting the Ultrium Write-Protect Switch .....	5-11

# Tables

---

Table 1-1. LTO Drive Backward Readability .....	1-11
Table 1-2. Drive Interfaces .....	1-11
Table 1-3. Library Environmental Specifications .....	1-13
Table 1-4. Drive and Cartridge Weights .....	1-14
Table 1-5. Drive Power Specifications .....	1-14
Table 1-6. Library Power Specifications .....	1-15
Table 2-1. Library Information/Configuration Menu (Lib Info/Cfg Menu) .....	2-5
Table 2-2. Drive Information/Configuration Menu (Drive Info/Cfg Menu) .....	2-6
Table 2-3. Network Information/Configuration Menu (Network Info/Cfg Menu) .....	2-7
Table 2-4. Hardware Monitor Menu .....	2-8
Table 2-5. Conversion Bill for Adding Cell and Drive Capacity .....	2-10
Table 2-6. Part Numbers for Adding Cell and Drive Capacity .....	2-10
Table 2-7. L40 Tape Library Configuration Information .....	2-11
Table 2-8. Hyperterminal Connection: .....	2-13
Table 3-1. Library Status Messages .....	3-2
Table 3-2. Drive Status Messages .....	3-3
Table 3-3. Personality Module Status Messages .....	3-4
Table 3-4. Hardware Monitor Status Messages .....	3-6
Table 3-5. CAP Status Messages .....	3-6
Table 3-6. Clean Menu Criteria .....	3-8
Table 3-7. Clean Menu Information .....	3-9
Table 3-8. Report Options .....	3-16
Table 3-9. Clean Menu .....	3-30
Table 4-1. Troubleshooting Table .....	4-1
Table 4-2. SCSI Device/Bus Types: Issues .....	4-4
Table 4-3. Diagnostics Menu .....	4-4
Table 5-1. DLT Cartridge Codes .....	5-5
Table 5-2. DLT Cartridge Environmental Specifications .....	5-7
Table 5-3. SDLT Cartridge Tape Specifications .....	5-9
Table 5-4. Ultrium Cartridge Codes .....	5-10
Table 5-5. LTO Gen 2 and 3 Cartridge Tape Specifications .....	5-12
Table 5-6. LTO Gen 1 Cartridge Tape Specifications .....	5-13

# Preface

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This guide, while intended primarily for users of the library, might also contain information that can be used by system administrators. The guide describes how to operate, configure, and troubleshoot the library. Most of the information pertains to library hardware. For specific drive information or for client-generated software commands and console messages, refer to your drive or software documentation.

## ■ Organization

This guide has five chapters, one appendix, a glossary, and an index:

- Chapter 1** “General Information” contains an overview of the major hardware components and the specifications.
- Chapter 2** “Configuration” familiarizes you with the operator panel and describes how to configure the library and drives. It also describes how to upgrade firmware.
- Chapter 3** “Library Operation” describes the tasks you can perform while the library is operating in automated and manual modes.
- Chapter 4** “Troubleshooting and Diagnostic Tests” describes how to correct problems with the library and drives. It also describes tests and how to examine the event log.
- Chapter 5** “Cartridge Information” describes how to prepare, inspect, store, and clean cartridges.
- Appendix A** “Customer Support” describes how customers should contact Customer Support Services.
- Glossary** The “Glossary” defines new or special terms and abbreviations used in this publication.
- Index** The “Index” assists in locating information in this guide.

## ■ 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 you of conditions that might result in damage to hardware, corruption of data, or corruption of application software. A caution always precedes the information to which it pertains.**

**WARNING:**

**A warning alerts you to conditions that might result in long-term health problems, injury, or death. A warning always precedes the information to which it pertains.**

## ■ Mensajes de alerta

Los mensajes de alerta llaman la atención hacia información de especial importancia o que tiene una relación específica con el texto principal o los gráficos.

**Nota:** Una nota expone información adicional que es de interés especial. Una nota puede señalar excepciones a las normas o procedimientos. Por lo general, aunque no siempre, las notas van después de la información a la que hacen referencia.

**PRECAUCIÓN:**

**Una precaución informa sobre situaciones que podrían conllevar daños del hardware, de los datos o del software de aplicación. Las precauciones van siempre antes de la información a la que hacen referencia.**

**ADVERTENCIA:**

**Una advertencia llama la atención sobre condiciones que podrían conllevar problemas de salud crónicos, lesiones o muerte. Las advertencias van siempre antes de la información a la que hacen referencia.**

## ■ Conventions

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

Item	Example	Description of Convention
Buttons	<b>MENU</b>	Font and capitalization follows label on product
Commands	Mode Select	Initial cap
Document titles	<i>System Assurance Guide</i>	Italic font
Emphasis	<i>not</i> or <i>must</i>	Italic font
File names	<code>esc.txt</code>	Monospace font
Hypertext links	<a href="#">Figure 2-1 on page 2-5</a>	Blue (prints black in hardcopy publications)
Indicators	<i>Open</i>	Font and capitalization follows label on product
Jumper names	TERMPWR	All uppercase
Keyboard keys	<Y> <Enter> or <Ctrl+Alt+Delete>	Font and capitalization follows label on product; enclosed within angle brackets
Menu names	Configuration Menu	Capitalization follows label on product
Parameters and variables	Device = <i>xx</i>	Italic font
Path names	<code>c:/mydirectory</code>	Monospace font
Port or connector names	SER1	Font and capitalization follows label on product; otherwise, all uppercase
Positions for circuit breakers, jumpers, and switches	ON	Font and capitalization follows label on product; otherwise, all uppercase
Screen text (including screen captures, screen messages, and user input)	<code>downloading</code>	Monospace font
Switch names	<b>Power</b>	Font and capitalization follows label on product
URLs	<a href="http://www.sun.com">http://www.sun.com</a>	Blue (prints black in hardcopy publications)

## ■ Related Publications

You can find additional information in the following publications:

<b>Library Documentation</b>	<b>Part Number</b>
<i>L40 Tape Library CRU Instructions</i>	96031
<i>L40 Tape Library Installation Manual</i>	96053
<i>L40 Tape Library Ordering Guide</i>	MT5011
<i>L40/80 Tape Library Drives CRU Instructions</i>	96006

<b>Tape Drive Documentation</b>	<b>Part</b>
<i>DLT 7000 Tape Drive Product Manual</i>	31313450x
<i>DLT 8000 Tape Drive Product Manual</i>	Quantum: 81-60118-0x
<i>DLT1 Installation and Operations Guide</i>	Benchmark: 000826-0x
<i>DLT1 Product Specification</i>	Benchmark: 000827-0x
<i>SDLT 220 and SDLT 320 Product Manual</i>	CD included with drive
<i>Hewlett Packard Ultrium Tape Drive Manual</i>	CD included with drive
<i>IBM Ultrium Tape Drive Manual</i>	CD included with drive
<i>Certance/Quantum LTO Tape Drive Product Manual</i>	CD included with drive

<b>Other Publications</b>	<b>Part Number</b>
<i>American National Standard Dictionary for Information Processing Systems</i>	ANSI X3/TR-1-82
<i>American National Standard Magnetic Tape and Cartridge for Information Interchange</i>	ANSI X3B5/87-009
<i>Crossroads Fibre Router User's Manual</i>	DS30110
<i>StorageNet 3300 Fibre Channel Router User Manual</i>	461273-01
<i>Fiber Optic User's Guide</i>	9433
<i>Magnetic Tape Labels and File Structure for Information Interchange</i>	ANSI X3.27-1978
<i>SCSI-3 Parallel Interface (SPI)</i>	ANSI X3T9.2/91-010R7
<i>Small Computer System Interface</i>	ISO 9316:1989



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The URL for StorageTek™ brand-specific information is:  
<http://www.sun.com/storagetek/>

### Customer Resource Center

The StorageTek product Customer Resource Center (CRC) is a Web site that enables members to resolve technical issues by searching code fixes and technical documentation for StorageTek brand products. 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. Customers who have a current warranty or a current maintenance service agreement may apply for membership by clicking on the Request Password button on the CRC home page. employees may enter the CRC through the SunWeb PowerPort.

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

### Partners Site

The StorageTek Partners site is a Web site for partners with a StorageTek Partner Agreement. This site provides information about products, services, customer support, upcoming events, training programs, and sales tools to support StorageTek Partners. Access to this site, beyond the Partners Login page, is restricted. On the Partners Login page, employees and 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 StorageTek Partners site is:  
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<http://www.sun.com/partners/>

### Hardcopy Publications

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

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# Safety

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The following pages describe common practices concerning rack installation, fiber optics, and electrostatic discharge.

## ■ Rack Safety and Precautions

### **WARNING:**

#### ***Possible personal injury:***

- ***Lifting hazard:*** The library weighs 44.45 kg (98 lb) plus the weight of the drives. Use at least two people and a mechanical device to lift and position the library.
- **Also consider the library's total weight when you are placing other equipment into the rack. To prevent an unbalanced situation, install the heaviest equipment on the bottom and the lightest equipment on the top. Failure to do so might cause the rack to become unstable and tip over.**

Observe the following safety precautions when you are installing the library into a rack:

- If the rack has front or rear doors, do *not* allow the doors to interfere with the library's ventilation. The rack's internal ambient temperature should not exceed the recommended operating temperature range of the library. The maximum rack air ambient temperature is 40°C (104°F).
- Ensure that rack doors provide adequate clearance to the library.
- Ensure that the combination of the library with other equipment in the rack does not create an overcurrent condition, whether the equipment is connected directly to the branch circuit or to a power distribution strip.
- Ensure that all equipment in the rack has reliable earth ground, whether the equipment is connected directly to the branch circuit or to a power distribution strip.

**Note:** The library relies on the ground pin of the power cord for its earth ground.

## ■ Fiber-optic Safety

**WARNING:**

***Eye hazard.* Never look directly into a fiber-optic cable, a fiber-optic connector, or a laser transceiver module. Hazardous conditions might exist from laser power levels that are capable of causing injury to the eye.**

**Be especially careful when using optical instruments with this equipment. Such instruments might increase the likelihood of eye injury.**

The laser transceivers in fiber-optic equipment can pose dangers to personal safety. Ensure that anyone who works with this Sun StorageTek equipment understands these dangers and follows safety procedures. Ensure that the optical ports of every laser transceiver module are terminated with an optical connector, a dust plug, or a cover.

Each fiber-optic interface in this Sun StorageTek Fibre Channel equipment contains a laser transceiver that is a Class 1 Laser Product. Each laser transceiver has an output of less than 70  $\mu$ W and a wavelength of 850 nm. Sun StorageTek's Class 1 Laser Products comply with EN60825-1(+A-11) and with sections 21 CFR 1040.10 and 1040.11 of the Food and Drug Administration (FDA) regulations.

The following translations are for users in Finland and Sweden who wish to identify laser safety and classification:

CLASS 1 LASER  
LUOKAN 1 LASERLAITE  
KLASSE 1 LASER APPARAT

## Laser Product Label

In accordance with safety regulations, a label on each Sun StorageTek Fibre Channel product identifies the laser class of the product and the place and date of the manufacturer. The label appears on top of a Fibre Channel tape drive and near the Fibre Channel connectors on a Fibre Channel tape library. A copy of the label is shown here:

---

CLASS 1 LASER PRODUCT  
LASER KLASSE 1  
APPAREIL A LASER DE CLASSE 1  
COMPLIES WITH 21 CFR 1040.10 AND 1040.11

---

# Fiber-optic Cable Installation

Follow these guidelines when you install fiber-optic cables:

## 1. Cable routing:

- **Raised floor:** You may install fiber-optic cables under a raised floor. Route them away from any obstruction, such as existing cables or other equipment.
- **Cable tray or raceway:** Place the cables in position; do not pull them through the cable tray. Route the cables away from sharp corners, ceiling hangers, pipes, and construction activity.
- **Vertical rise length:** Leave the cables on the shipping spool, and lower them from above; do not pull the cables up from below. Use proper cable ties to secure the cable.
- **General:** Do not install fiber-optic cables on top of smoke detectors.

## 2. Cable management:

- Leave at least 4.6 m (15 ft) of cable at each end for future growth.
- Use strain reliefs to prevent the weight of the cable from damaging the connector.
- Review all information in this manual and in any related manuals about safely handling fiber-optic cables.

## 3. Connector protection:

- Insert connectors carefully to prevent damage to the connector or fiber.
- Leave the connector's protective cover in place until you are ready to make connections.
- Replace the connector's protective cover when the connector is disconnected.
- Clean the connector before making a connection. Make sure that there are no obstructions and that keyways are aligned.

# Fiber-optic Cable Handling

Observe these precautions when you handle fiber-optic cables:

- Do not coil the cable to less than 96 mm (3.75 in.) in diameter.
- Do not bend the cable to less than 12 mm (0.5 in.) in radius. It is most important that a cable's bend radius be no less than 20 times the diameter of the cable.
- Do not pull on the cables; carefully place them into position.
- Do not grasp the cables with pliers, grippers, or side cutters; do not attach pulling devices to the cables or connectors.

- Keep cables away from sharp edges or sharp protrusions that could cut or wear through the cable; make sure that cutouts in the equipment have protective edging.
- Protect the cable from extreme temperature conditions.
- Install the connector's protective cover whenever the connector is not connected.

## ■ Electrostatic Discharge Damage Prevention

Before you touch any internal components in the library, including drives, you must take precautions against electrostatic discharge (ESD).

### **CAUTION:**

***Components are sensitive to static electricity: Even a small electrostatic discharge can damage an electrical component that is inside the library. A damaged component might not fail immediately, but over time, it will become worse and might eventually cause an “intermittent” problem. Be sure that you touch an *unpainted* metal surface of the library before you reach inside the library or touch the drives or optional interface equipment.***

### **Before you touch any internal components:**

1. With your finger, touch an *unpainted* metal surface of the library. In some libraries, you can touch the library's frame. In other libraries, you might have to touch a bolt on the wall or on the door frame.
2. Keep your body movement to a minimum as you touch the drives or the library components.

**Antistatic wrist straps that have clip-on ends are commercially available.**

# Seguridad

---

Las siguientes páginas describen prácticas habituales sobre instalación en bastidor, fibras ópticas y descargas electrostáticas.

## ■ Seguridad y precauciones del bastidor

### **ADVERTENCIA:**

#### ***Posibilidad de lesiones físicas:***

- ***Peligro de levantamiento:*** La biblioteca pesa 44,45 kg (98 lb), a lo que hay que añadir el peso de las unidades. Para levantar la biblioteca y colocarla en su posición se requieren como mínimo dos personas.
- **Al colocar otros equipos en el bastidor, considere también el peso total de la biblioteca. Para evitar un desequilibrio de la carga, coloque los equipos más pesados abajo y los más ligeros arriba. De lo contrario, el bastidor podría desestabilizarse y caerse.**

Al instalar la biblioteca en el bastidor, adopte las siguientes precauciones de seguridad:

- Si el bastidor tiene puertas delanteras o traseras, *no permita* que las puertas interfieran con la ventilación de la biblioteca. La temperatura ambiente en el interior del bastidor no debe ser superior a la temperatura de servicio recomendada de la biblioteca. La temperatura ambiente máxima del interior del bastidor es de 40 °C (104 °F).
- Asegúrese de que las puertas del bastidor permitan el acceso adecuado a la biblioteca.
- Asegúrese de que la combinación de la biblioteca con otros equipos instalados en el bastidor no provoque situaciones de sobretensión, tanto si el equipo está conectado directamente al circuito derivado o a una regleta de distribución.
- Asegúrese de que todos los equipos del bastidor dispongan de una puesta a tierra fiable, tanto si el equipo está directamente conectado al circuito derivado o a una regleta de distribución

**Nota:** La puesta a tierra de la biblioteca se conecta a través de la patilla de puesta a tierra del enchufe.

## ■ Seguridad de fibras ópticas

### **ADVERTENCIA:**

***Riesgo para la vista.* Nunca mire directamente el interior de un cable de fibra óptica, un conector de fibra óptica o un módulo transceptor de láser. Los niveles de potencia del láser pueden conllevar situaciones de riesgo, susceptibles de lesionar la vista.**

**Tenga especial cuidado al utilizar instrumentos ópticos con estos equipos. Dichos instrumentos pueden incrementar las probabilidades de lesiones oculares.**

Los transceptores de láser de los equipos de fibra óptica pueden suponer un peligro para la seguridad física. Asegúrese de que toda persona que trabaje con estos equipos de Sun StorageTek entienda los peligros y siga los procedimientos de seguridad. Asegúrese de que todos los puertos ópticos de los módulos transceptores de láser estén terminados con un conector óptico, una cubierta o un tapón de protección contra el polvo.

Todas las interfaces de fibra óptica de estos equipos de canal de fibra de Sun StorageTek contienen un transceptor de láser, categorizado como Producto láser de Clase 1. Cada transceptor láser tiene una salida de menos de 70  $\mu$ W y una longitud de onda de 850 nm. Los productos de láser de clase 1 de Sun StorageTek cumplen las normas EN60825-1(+A-11) y las secciones 21 CFR 1040.10 y 1040.11 de las normas de la Administración para la Calidad de Alimentos y Medicamentos (FDA).

Las siguientes traducciones están dirigidas a usuarios de Finlandia y Suecia que deseen identificar la categoría y clasificación de seguridad de los dispositivos láser:

LÁSER DE CLASE 1  
LUOKAN 1 LASERLAITE  
KLASSE 1 LASER APPARAT

## Etiqueta del producto láser

De conformidad con las normas de seguridad, cada producto de canal de fibra de Sun StorageTek lleva una etiqueta que identifica la clase de láser del producto, y el lugar y fecha de fabricación. Esta etiqueta aparece sobre la unidad de cinta de canal de fibra, así como en las proximidades de los conectores de las bibliotecas de cintas de canal de fibra. A continuación puede verse una copia de dicha etiqueta:

---

CLASS 1 LASER PRODUCT  
LASER KLASSE 1  
APPAREIL A LASER DE CLASSE 1  
CUMPLE LAS NORMAS 21 CFR 1040.10 Y 1040.11

---



## Instalación de cables de fibra óptica

Para instalar cables de fibra óptica, efectúe este procedimiento:

### 1. Tendido del cable:

- **Tarima:** Los cables de fibra óptica pueden instalarse debajo de tarimas. Al tenderlos, manténgalos apartados de cualquier obstrucción, como por ejemplo otros cables o equipos.
- **Escalerilla portacables o canaleta de cables:** Sitúe los cables en su posición. No tire de ellos a través de la escalerilla portacables. Al tender los cables, manténgalos apartados de esquinas afiladas, colgadores de techo, conductos, tuberías y actividades de construcción.
- **Longitud de elevación vertical:** Deje los cables en la bobina original y bájelos desde arriba. No tire de ellos desde abajo. Utilice los fijadores adecuados para inmovilizarlos.
- **General:** No instale cables de fibra óptica encima de detectores de humo:

### 2. Instalación de los cables:

- Deje como mínimo 4,6 m (15 pies) de cable en cada extremo, en previsión de futuras extensiones.
- Utilice protectores contra tirones para evitar que el peso del cable dañe el conector.
- Repase en el presente manual, así como de manuales afines, toda la información relativa a la manipulación segura de cables de fibra óptica.

### 3. Protección de los conectores:

- Inserte los conectores con todo cuidado para evitar dañar éstos o la fibra.
- No quite la cubierta de protección del conector hasta que esté preparado para realizar las conexiones.
- Al desconectar el conector, vuelva a colocar la cubierta de protección.
- Antes de realizar una conexión, limpie el conector. Asegúrese de que no haya obstrucciones y de que las ranuras de chavetas estén alineadas.

## Manipulación de cables de fibra óptica

Al manipular cables de fibra óptica, tenga en cuenta las siguientes precauciones:

- No enrolle el cable a menos de 96 mm (3,75") de diámetro.
- No curve el cable a menos de 12 mm (0,5") de radio. Sun StorageTek recomienda que el radio de curvatura de un cable no sea inferior a 20 veces el diámetro del cable.
- No tire de los cables: colóquelos con cuidado en su posición.

- No aferre los cables con alicates, pinzas ni fresas. No una los cables ni los conectores a dispositivos de tracción.
- Mantenga los cables apartados de bordes y salientes afilados que pudieran cortarlos o desgastarlos. Asegúrese de que los orificios del equipo dispongan de bordes protectores.
- Proteja los cables contra temperaturas extremas.
- En toda ocasión en que el conector no esté conectado, colóquelo su cubierta de protección.

## ■ Prevención de daños por descarga electrostática

Antes de tocar cualquier componente interno de la biblioteca, incluidas las unidades de cinta, debe tomar las precauciones adecuadas frente a descargas electrostáticas (DES).

### **PRECAUCIÓN:**

***Los componentes son sensibles a la electricidad estática: Incluso una pequeña descarga electrostática puede dañar un componente eléctrico del interior de la biblioteca. Un componente dañado puede no fallar inmediatamente pero, con el tiempo, se deteriora y puede causar un problema "intermitente". Asegúrese de tocar una superficie metálica sin pintar de la biblioteca antes de tocar el interior de la misma, las unidades de cinta o los equipo de interfaz opcionales.***

### **Antes de tocar un componente interno:**

1. Toque con el dedo una superficie metálica *sin pintar* de la biblioteca. En algunas bibliotecas se puede tocar el marco. En otras, puede tocar un tornillo de la pared o el marco de la puerta.
2. No mueva demasiado el cuerpo mientras toca las unidades de cinta o los componentes de la biblioteca.

**Puede adquirir muñequeras antiestáticas con extremos de mordazas.**

# Notices

---

Please read the following compliance and warning statements for this product.

**CAUTION:**

***Potential equipment damage:* Cables that connect peripherals must be shielded and grounded; refer to cable descriptions in the instruction manuals. Operation of this equipment with cables that are not shielded and not correctly grounded might result in interference to radio and TV reception.**

**Changes or modifications to this equipment that are not expressly approved in advance by Sun StorageTek will void the warranty. In addition, changes or modifications to this equipment might cause it to create harmful interference.**

## ■ United States FCC Compliance Statement

The following compliance statement pertains to Federal Communications Commission Rules 47 CFR 15.105:

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

## ■ CISPR 22 and EN55022 Warning

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

## ■ Japanese Compliance Statement

The following compliance statement in Japanese pertains to VCCI EMI regulations:

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

**English translation:** This is a Class A product based on the Technical Requirement of the Voluntary Control Council for Interference by Information Technology (VCCI). In a domestic environment, this product may cause radio interference, in which case the user may be required to take corrective actions.

## ■ Taiwan Warning Label Statement

The following warning label statement pertains to BSMI regulations in Taiwan, R.O.C.:

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

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

# ■ Internal Code License Statement

The following is the Internal Code License Agreement from Sun StorageTek:

## NOTICE

### INTERNAL CODE LICENSE

PLEASE READ THIS NOTICE CAREFULLY BEFORE INSTALLING AND OPERATING THIS EQUIPMENT. THIS NOTICE IS A LEGAL AGREEMENT BETWEEN YOU (EITHER AN INDIVIDUAL OR ENTITY), THE END USER, AND STORAGE TECHNOLOGY CORPORATION (“STORAGETEK”), THE MANUFACTURER OF THE EQUIPMENT. BY OPENING THE PACKAGE AND ACCEPTING AND USING ANY UNIT OF EQUIPMENT DESCRIBED IN THIS DOCUMENT, YOU AGREE TO BECOME BOUND BY THE TERMS OF THIS AGREEMENT. IF YOU DO NOT AGREE WITH THE TERMS OF THIS AGREEMENT, DO **NOT** OPEN THE PACKAGE AND USE THE EQUIPMENT. IF YOU DO NOT HAVE THE AUTHORITY TO BIND YOUR COMPANY, DO **NOT** OPEN THE PACKAGE AND USE THE EQUIPMENT. IF YOU HAVE ANY QUESTIONS, CONTACT THE AUTHORIZED STORAGETEK DISTRIBUTOR OR RESELLER FROM WHOM YOU ACQUIRED THIS EQUIPMENT. IF THE EQUIPMENT WAS OBTAINED BY YOU DIRECTLY FROM STORAGETEK, CONTACT YOUR STORAGETEK REPRESENTATIVE.

1. **Definitions:** The following terms are defined as followed:
  - a. “Derivative works” are defined as works based upon one or more preexisting works, such as a translation or a musical arrangement, or any other form in which a work may be recast, transformed, or adapted. A work consisting of editorial revision, annotations, elaboration, or other modifications which, as a whole, represent an original work of authorship, is a Derivative work.
  - b. “Internal Code” is Microcode that (i) is an integral part of Equipment, (ii) is required by such Equipment to perform its data storage and retrieval functions, and (iii) executes below the user interface of such Equipment. Internal code does not include other Microcode or software, including data files, which may reside or execute in or be used by or in connection with such Equipment, including, without limitation, Maintenance Code.
  - c. “Maintenance Code” is defined as Microcode and other software, including data files, which may reside or execute in or be used by or in connection with Equipment, and which detects, records, displays, and/or analyzes malfunctions in the Equipment.
  - d. “Microcode” is defined as a set of instructions (software) that is either imbedded into or is to be loaded into the Equipment and executes below the external user interface of such Equipment. Microcode includes both Internal Code and Maintenance Code, and may be in magnetic or other storage media, integrated circuitry, or other media.
2. The Equipment you have acquired by purchase or lease is manufactured by or for StorageTek and contains Microcode. By accepting and operating this Equipment, you acknowledge that StorageTek or its licensor(s) retain(s) ownership of all Microcode, as well as all copies thereof, that may execute in or be used in the operation or servicing of the Equipment and that such Microcode is copyrighted by StorageTek or its licensor(s).
3. StorageTek hereby grants you, the end user of the Equipment, a personal, nontransferable (except as permitted in the transfer terms below), nonexclusive license to use each copy of the Internal Code (or any replacement provided by StorageTek or your authorized StorageTek distributor or reseller) which license authorizes you, the end user, to execute the Internal Code solely to enable the specific unit of Equipment for which the copy of Internal Code is provided to perform its data storage and retrieval functions in accordance with StorageTek’s (or its licensor’s) official published specifications.
4. Your license is limited to the use of the Internal Code as set forth. You may not use the Internal Code for any other purpose. You may not, for example, do any of the following:
  - (i) access, copy, display, print, adapt, alter, modify, patch, prepare Derivative works of, transfer, or distribute (electronically or otherwise) or otherwise use the Internal Code;
  - (ii) reverse assemble, decode, translate, decompile, or otherwise reverse engineer the Internal Code (except as decompilation may be expressly permitted under applicable European law solely for the purpose of gaining information that will allow

interoperability when such information is not otherwise readily available); or

(iii) sublicense, assign, or lease the Internal Code or permit another person to use such Internal Code, or any copy of it.

If you need a backup or archival copy of the Internal Code, StorageTek, or your authorized StorageTek distributor or reseller, will make one available to you, it being acknowledged and agreed that you have no right to make such a copy.

5. Nothing in the license set forth in paragraph 3 above or in this entire Notice shall convey, in any manner, to you any license to or title to or other right to use any Maintenance code, or any copy of such Maintenance Code. Maintenance Code and StorageTek's service tools and manuals may be kept at your premises, or they may be supplied with a unit of Equipment sent to you and/or included on the same media as Internal Code, but they are to be used only by StorageTek's customer service personnel or those of an entity licensed by StorageTek, all rights in and to such Maintenance Code, service tools and manuals being reserved by StorageTek or its licensors. You agree that you shall not use or attempt to use the Maintenance Code or permit any other third party to use and access such Maintenance Code.
6. You, the end user, agree to take all appropriate steps to ensure that all of your obligations set forth in this Notice, particularly in paragraphs 4 and 5, are extended to any third party having access to the Equipment.
7. You may transfer possession of the Internal Code to another party only with the transfer of the Equipment on which its use is authorized, and your license to use the Internal Code is discontinued when you are no longer an owner or a rightful possessor of the Equipment. You must give such transferee all copies of the Internal Code for the transferred Equipment that are in your possession, along with a copy of all provisions of this Notice. Any such transfer by you is automatically (without further action on the part of either party) expressly
8. You acknowledge that copies of both Internal Code and Maintenance Code may be installed on the Equipment before shipment or included with the Equipment and other material shipped to you, all for the convenience of StorageTek's service personnel or service providers licensed by StorageTek, and that during the warranty period, if any, associated with the Equipment, and during periods in which the Equipment is covered under a maintenance contract with StorageTek or service providers licensed by StorageTek, both Internal Code and Maintenance Code may reside and be executed in or used in connection with such Equipment, and you agree that no rights to Maintenance Code are conferred upon you by such facts. StorageTek or the licensed service provider may keep Maintenance Code and service tools and manuals on your premises but they are to be used only by StorageTek's customer service personnel or those of service providers licensed by StorageTek. You further agree that upon (i) any termination of such warranty period or maintenance contract period; or (ii) transfer of possession of the Equipment to another party, StorageTek and its authorized service providers shall have the right with respect to the affected Equipment to remove all service tools and manuals and to remove or disable all Maintenance Code and/or replace Microcode which includes both Internal Code and Maintenance Code with Microcode that consists only of Internal Code.

subject to all the terms and conditions of this Notice passing in full to the party to whom such Equipment is transferred, and such transferee accepts the provisions of this license by initial use of the Internal Code. You cannot pass to the transferee of the Equipment any greater rights than granted under this Notice, and shall hold StorageTek harmless from any claim to the contrary by your transferee or its successors or assigns. In addition, the terms and conditions of this Notice apply to any copies of Internal Code now in your possession or use or which you hereafter acquire from either StorageTek or another party.

# General Information

# 1

The library is a self-contained, fully automated cartridge tape storage system that holds one to four drives. The library is available as an upgradeable 20-cartridge model or a 40-cartridge model.

The library can be configured for either high voltage differential (HVD) or low voltage differential (LVD) SCSI interfaces. The HVD interface allows longer cable lengths, but throughput is lower than LVD. The LVD interface restricts cable lengths, but provides faster throughput.

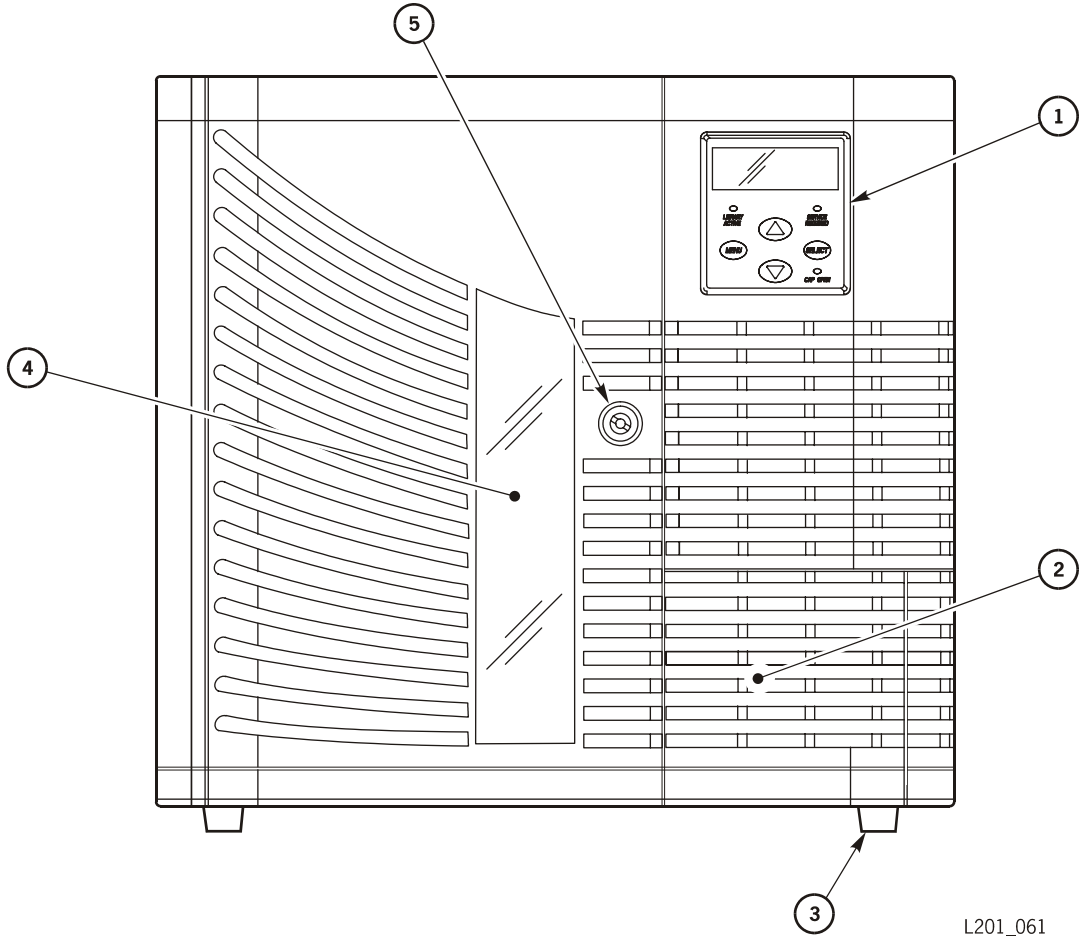
The library can be configured for SCSI interfaces or, with the addition of an internal or external Fibre Channel router, configured for Fibre-to-SCSI operation.

The library can be placed on a desktop (with optional cosmetic cover and elastomer feet) or mounted in a standard 483 mm (19 in.) rack.

## ■ Views and Locations

The following figures show library views and the locations of components. The major components are described in the following sections.

Figure 1-1. Library Front View (L201\_061)

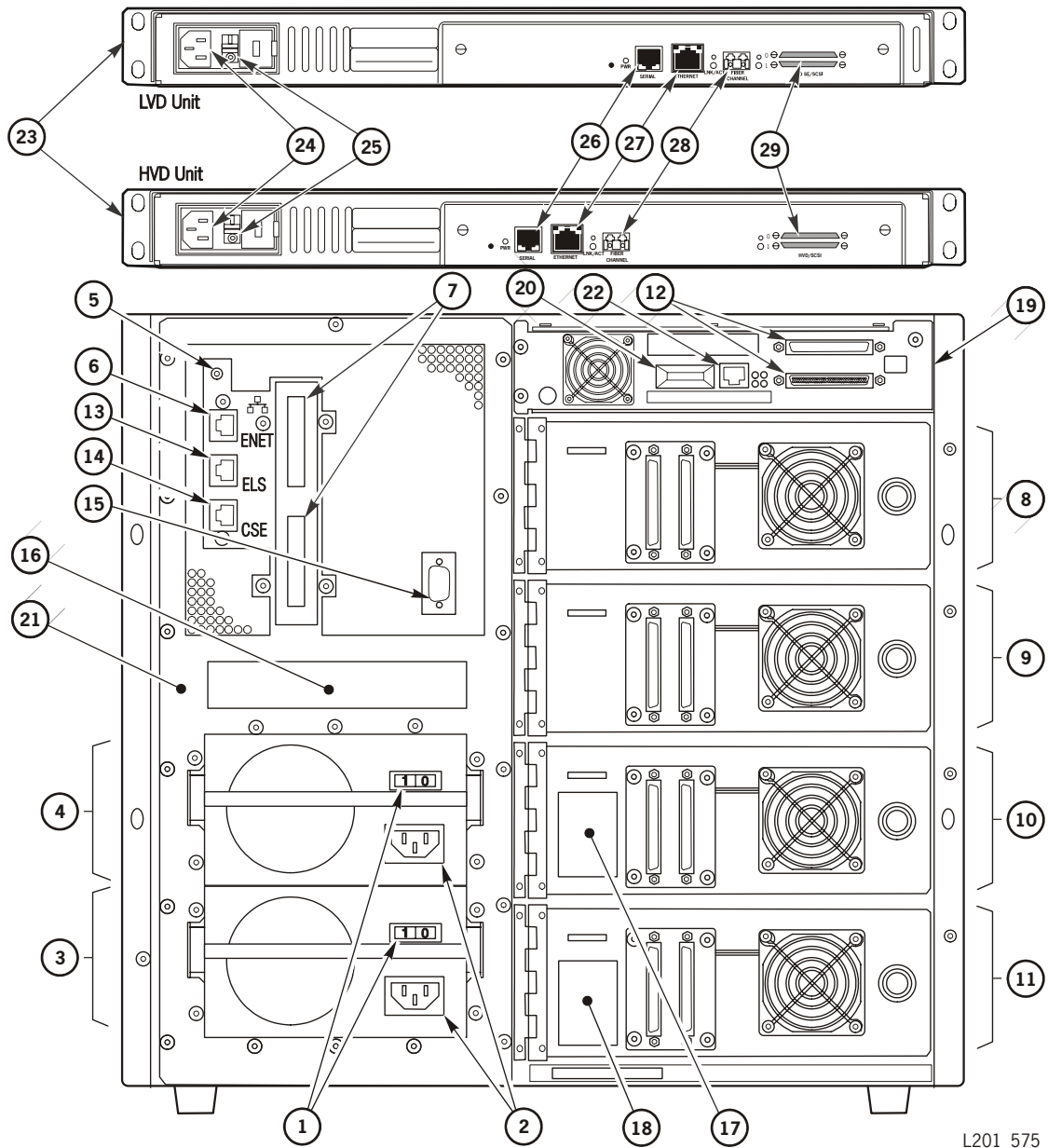


L201\_061

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



Figure 1-2. Library Rear View (L201\_575)



L201\_575

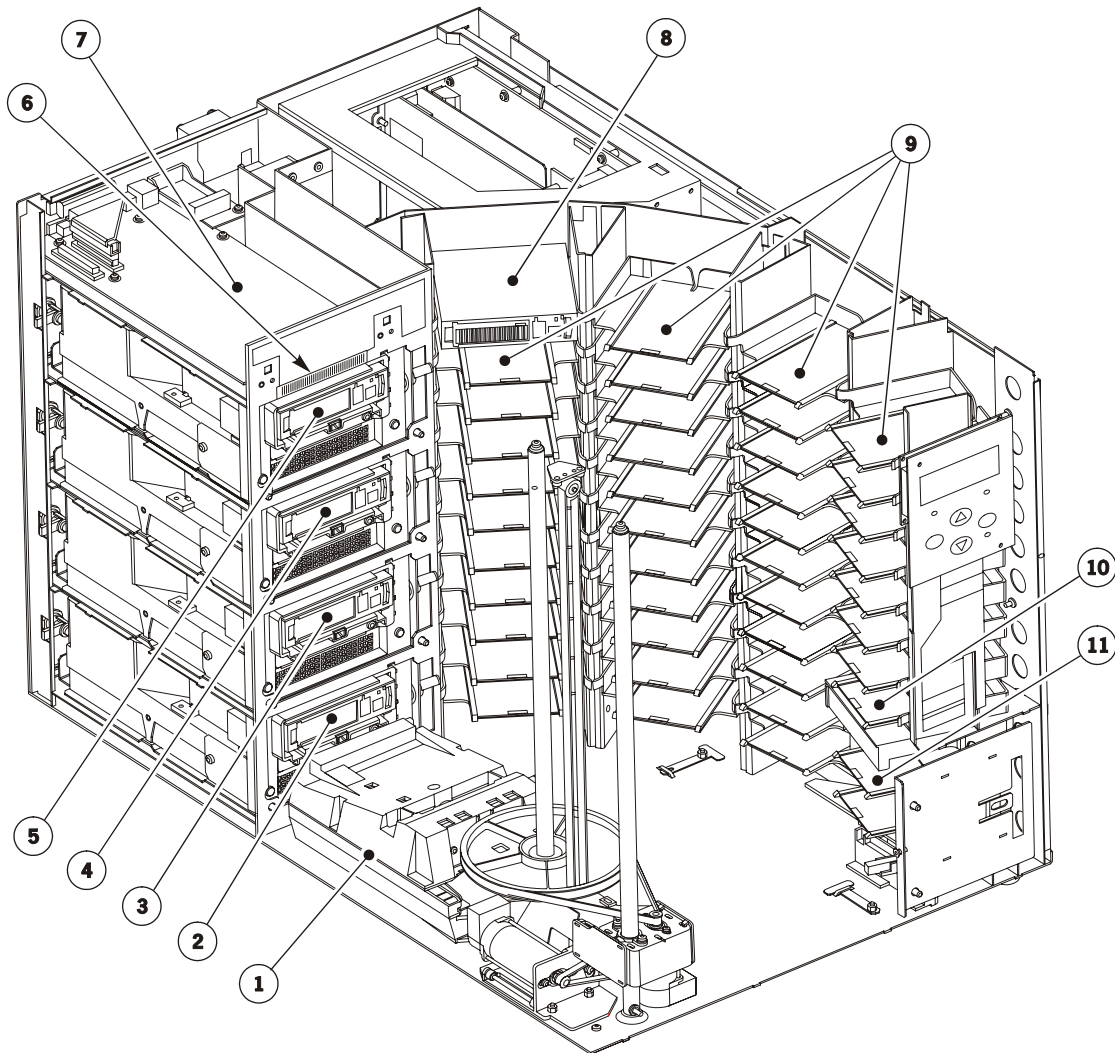
**Figure 1-2. Library Rear View (L201\_575)**

- 
- |   |   |
|---|---|
| 1. Power-on/off switches  | 15. Personality module connector                        |
| 2. Power receptacles  | 16. Library serial number and agency label              |
| 3. Standard power supply  | 17. Library warranty identification number              |
| 4. Redundant power supply   | 18. Dual power label                                    |
| 5. Library RESET button—use a wooden pencil<br>( <i>never</i> a screwdriver or other electrically-<br>conductive item) to press this button | 19. Fibre Channel router card (optional)                |
| 6. Ethernet/Web port  | 20. Fibre Channel router card port                      |
| 7. Library LVD/HVD SCSI ports   | 21. Electronics module                                  |
| 8. SCSI port for Drive 0 (See note.)  | 22. Fibre Channel router card CSE serial port           |
| 9. SCSI port for Drive 1 (See note.)  | 23. External Fibre Channel Router (optional)            |
| 10. SCSI port for Drive 2 (See note.)   | 24. External Fibre Channel Router Power Receptacle      |
| 11. SCSI port for Drive 3 (See note.)   | 25. External Fibre Channel Router Power Switch          |
| 12. Fibre Channel router card SCSI ports  | 26. External Fibre Channel Router Serial Port           |
| 13. Reserved for development engineers, not for<br>customer use   | 27. External Fibre Channel Router Ethernet port         |
| 14. Customer Services Engineering (CSE) serial port   | 28. External Fibre Channel Router Fibre Channel<br>port |
|   | 29. External Fibre Channel Router SCSI Bus ports        |
- 

**Note:** From a *software* viewpoint, the top drive that is installed 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 would be Drive 0 and the drive beneath it would be Drive 1.

---

Figure 1-3. Library Internal View of Components (L201\_063)

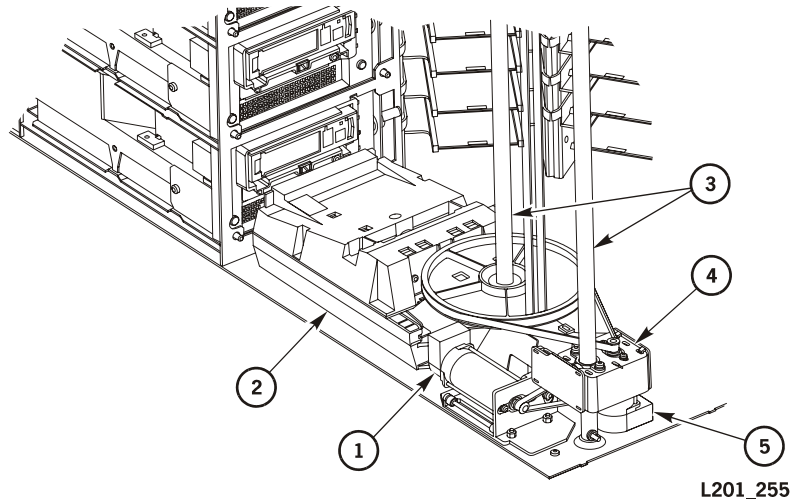


L201\_063

- |   |   |
|---|---|
| 1. Hand Assembly  | 7. Fibre Channel router card (optional)     |
| 2. Drive 3  | 8. Cartridge                                |
| 3. Drive 2  | 9. Columns 0 through 3, with 3 on far right |
| 4. Drive 1  | 10. Cleaning cartridge cell                 |
| 5. Drive 0  | 11. CAP cells (two)                         |
| 6. Library vision calibration label; the master target is below it. |   |

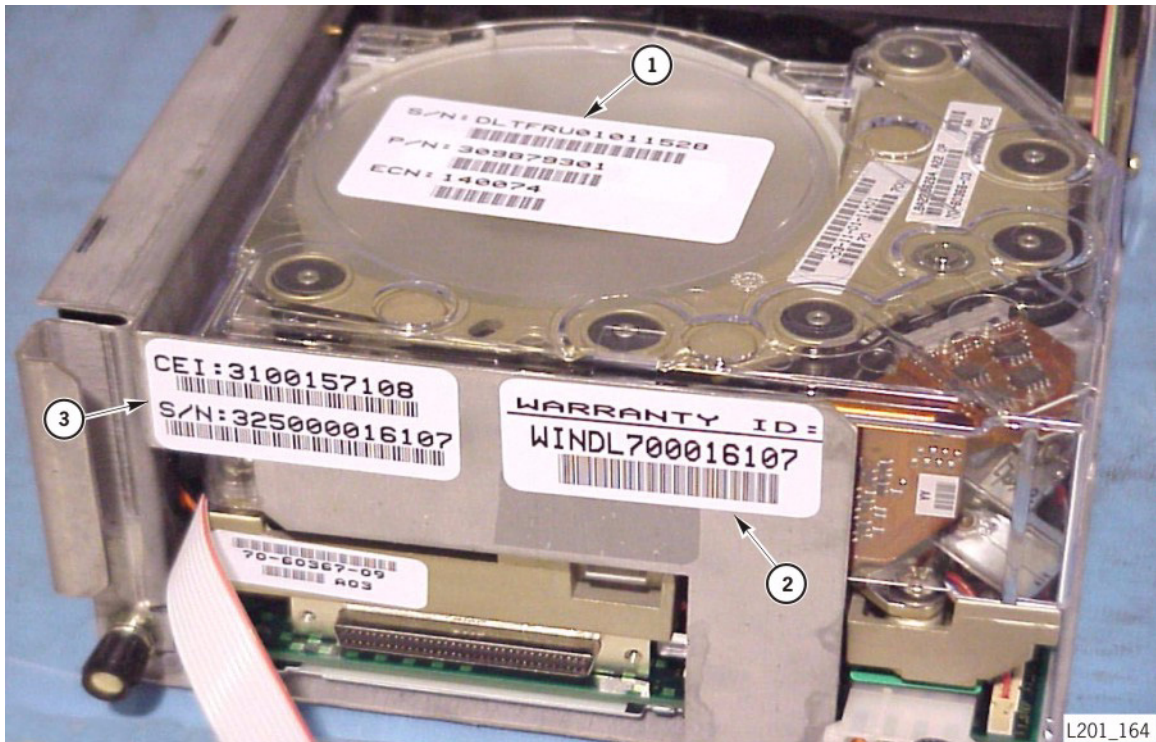
**Note:** From a *software* viewpoint, the top drive that is installed is Drive 0. If all four drives are installed, the top drive is Drive 0 and the bottom is Drive 3. If drives are installed only in the two middle slots, the top drive installed would be Drive 0 and the drive beneath it would be Drive 1.

Figure 1-4. Robotic Components (L201\_255)



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

Figure 1-5. DLT Drive Serial Number, Warranty ID Number Locations (L201\_164)



- 1. FRU serial number
- 2. Warranty ID number
- 3. CEI serial number

## ■ Cartridge Storage Cells

The cartridge storage cells are stacked in four columns arranged around the robot. The tape management software locates cartridges by their cell numbers.

The library has two capacities:

- A 20-cell library has 20 data cartridge cells, four drive slots, a cleaning cartridge cell, two CAP cells, and Auto Clean can be enabled or not enabled. If Auto Clean is not enabled, the cleaning cartridge cell remains empty, and *cannot* be used for a data cartridge.
- A 40-cell library has 40 data cartridge cells, four drive slots, one cleaning cartridge cell, two CAP cells, and Auto Clean can be enabled or not enabled. If Auto Clean is enabled, the cleaning cartridge cell is used for a cleaning cartridge. If Auto Clean is not enabled, the cleaning cartridge cell can be used for a data cartridge, making the total data cartridge capacity 41 cells.

**Notes:** The CAP cells are not used for cartridge storage. Those two cells and the drive slots are not considered when determining the 20, 40, or 41 total data cartridge count.

If desired for third-party software licensing reasons, you can set your capacity to 32. See [“Configuring the Library” on page 2-4](#).

When you order the library, you determine the capacity (total number of cells) you can use by the part numbers you choose.

If you choose to use the Auto Clean feature, you *must* insert a cleaning cartridge in the reserved cell (directly above the CAP). Then configure the library for Auto Clean, and reinitialize the library. Drives will be automatically cleaned when required.

The following figure shows the cell locations for the 20-cell capacity and 40-cell capacity libraries. 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. For a 20-cell capacity, the cells in Column 0 and the top nine cells of Column 1 are recognized. For a 40-cell capacity, all of the data cells are recognized.

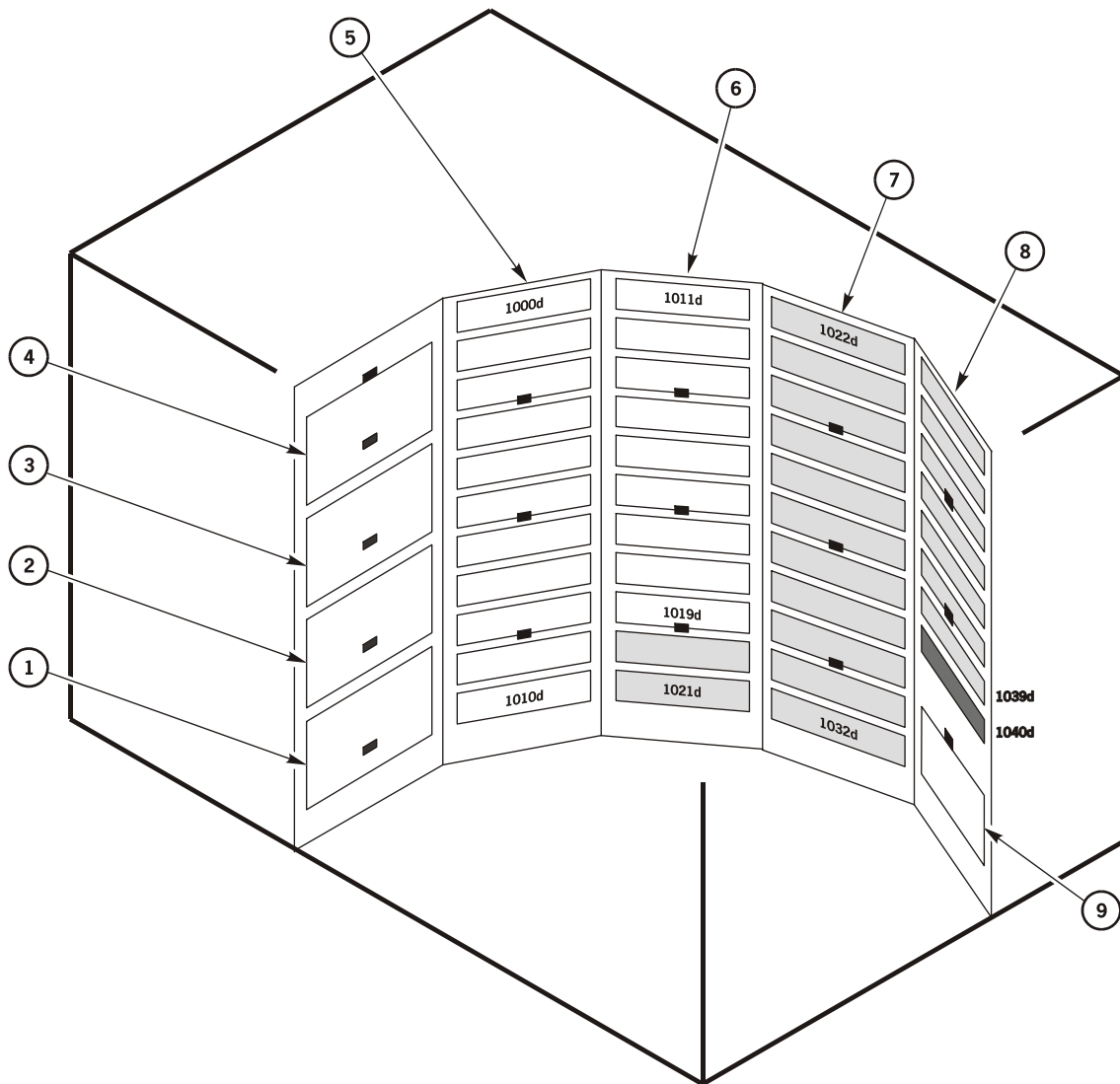
If you want to upgrade from the 20-cell capacity to the 40-cell capacity, contact your Sun StorageTek reseller.

**Notes:** In a 40-cell capacity library, if Auto Clean is not enabled, the cell used for the cleaning cartridge can be used for a data cartridge, making the total data cartridge capacity 41 cells.

The CAP cells are not used for cartridge storage. Those two cells and the drive slots are not considered when determining the 20, 40, or 41 total data cartridge count.

If you configured your library as a 32-cell library, you may not use the data cells on Column 3, or the cell at the bottom of Column 2.

Figure 1-6. Valid Storage Cells (L201\_038)



L201\_038

- |                 |                    |
|-----------------|--------------------|
| 1. Drive slot 3 | 6. Column 1        |
| 2. Drive slot 2 | 7. Column 2        |
| 3. Drive slot 1 | 8. Column 3        |
| 4. Drive slot 0 | 9. CAP (two cells) |
| 5. Column 0     |                    |

**Note:** In a 40-cell capacity library, if Auto Clean is not enabled, the cleaning cartridge cell can be used for a data cartridge, for a total of 41 data cells.

Column 0 and 1 white cells are used for minimum configuration.

Column 2 and 3 gray cells are added for maximum configuration.

Black cell above the CAP is used for cleaning cartridge if Auto Clean is enabled.

Small back rectangles are targets.



## ■ Robot

The robot moves cartridges among the storage cells, drives, and cartridge access port (CAP).

The robot, behind the front door, consists primarily of the:

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

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

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

## ■ Cartridge Access Port

The cartridge access port (CAP) can be used to add cartridges to the library without interrupting normal robotic operation. For instance, if Auto Clean is not enabled, the operator can use the operator panel to place a cleaning cartridge into the CAP when a message appears on the operator panel that a drive requires cleaning. The CAP contains two cartridge storage cells.

## ■ Electronics Module

The electronics module (EM) consists primarily of the LLC card and the power supply. The LLC card is inside the EM, on the left side as you face the EM from the rear of the library. The power supplies are in the bottom section of the EM. The interface connections and personality module are on the EM frame. See [Figure 1-2 on page 1-3](#) for the location of these components.

### LLC Card

The LLC card is the processor card. It contains all the necessary hardware to maintain the robotics, servo, and vision control. It also sustains an operator panel interface, a SCSI interface (HVD or LVD selectable), an Ethernet interface, four drive serial ports, and a CSE port.

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

## Personality Module

The personality module is a connector that stores the library cell capacity information. The module reflects a capacity of 20 or 40 cells. The library does not operate unless an authorized module is attached to the rear of the EM.

*Attach the module before powering-on the library for proper initialization. Only remove the module when installing an upgrade conversion bill or replacing the library.*

## Power System

The library has one standard power supply. A second supply can be ordered and installed to provide redundant power to the library and drives. 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.

Each supply has a switch. If you have two supplies, both switches must be in the ON position during normal operation.

- The ON position is |.
- The OFF position is O.

## ■ Drives

You can install one to four drives. The library supports two types of drives.

- Ultrium Linear Tape-Open (LTO) drives

LTO technology was developed by IBM, Hewlett-Packard, and Seagate to provide a clear and viable choice in an increasingly complex array of tape storage options. LTO is an “open format” technology, which means that users will have multiple sources of product and media. The open nature of LTO technology also provides a means of enabling compatibility among different vendor’s offerings.

- Quantum’s (Certance) LTO 3
- Hewlett-Packard’s LTO 1, LTO 2, and LTO 3
- IBM’s LTO 1, LTO 2, and LTO 3
- Seagate LTO 1 and LTO 2

See [Table 1-1 on page 1-11](#) for information on the LTO drives backward read compatibility.

- Digital Linear Tape (DLT) drives:
  - Quantum Corporation’s DLT 7000E, DLT 8000, and Super DLT
  - Benchmark Storage Innovations, Inc’s DLT1



**CAUTION:**

**Possible data corruption:** Do not mix DLT 7000 and DLT 8000 drives in the same library. If a DLT 7000 cartridge is inserted into a DLT 8000 drive, the tape can be read and written on in 7000 mode. If a DLT 8000 cartridge is inserted into a DLT 7000 drive and a read command is issued, the drive will indicate Medium Error/Calibration Error (03/8000). If a write command is issued at load point, as with most drives, the drive will write over any data present.

**CAUTION:**

**Data loss:** Do not mount SDLT 320-formatted cartridges into SDLT 220 drives. An SDLT 220 drive will overwrite the 320 data. To avoid this, carefully manage the locations of the cartridges within your library, and designate the correct drive type for your read/write operations.

See “DLT Cartridges” on page 5-4 for other cartridge restrictions.

The following table details the LTO drives backward readability.

**Table 1-1. LTO Drive Backward Readability**

	LTO Gen 2 Drive	LTO Gen 3 Drive
LTO 1 media	Read and write	Read only
LTO 2 media	Read and write	Read and write
LTO 3 media	No action	Read and write

The drive interfaces are SCSI high voltage differential (HVD) or SCSI low voltage differential (LVD). The HVD interface allows longer cable lengths, but throughput is slower than with the LVD interface. The LVD interface restricts cable lengths, but provides faster throughput.

The following table shows the types of drives and the interfaces that are supported.

**Table 1-2. Drive Interfaces**

Drive Name	Interface	
	HVD <sup>1</sup>	LVD <sup>2</sup>
DLT 7000E	Yes	No
DLT 8000	Yes	Yes
DLT1	No	Yes
Super DLT 320	Yes	Yes
Super DLT 600	No	Yes
Seagate Ultrium LTO 1	Yes	Yes

**Table 1-2. Drive Interfaces**

Drive Name		Interface
HP Ultrium LTO 1, LTO 2, and LTO 3	No	Yes
Certance Ultrium LTO 2 and LTO 3	No	Yes
IBM Ultrium LTO 1, LTO 2, and LTO 3	No	Yes

**Notes:**

1. The maximum speed of data transfer is at 40 MB/s
2. The maximum speed of data transfer is at 80 MB/s

Using an optional internal or external fibre channel router, you can interface to a SCSI LVD drive using fibre channel protocol.

**Notes:** You cannot enable Auto Clean if your library contains both LTO and DLT drives. This is because the library only has one cell for the cleaning cartridge, and the LTO and DLT drives use different types of cartridges. If both types of drives are installed, you should clean the drives manually, by placing the appropriate cleaning cartridge into the CAP when required.

Some software allows you to put cleaning cartridges into data cartridge cells. When a drive needs cleaning, the drive sends a message to the software, and the software instructs the robot to get the correct cleaning cartridge and place it into the drive. By placing cleaning cartridges into data cells, you reduce your total data cell capacity.

For specific drive information, refer to your drive publications.

## ■ Audit of Library

An audit is the method by which the library keeps track of all cartridge locations within the library. An audit occurs when:

- You power-on the library
- You open and close the door
- You close the CAP

The camera on the hand assembly reads the labels on the cartridges and firmware assigns the cell locations. The LLC card keeps a record of these locations.

When an audit of the library is completed, you must update the tape management database within the server. *Both the library audit and the tape management software audit information must match for correct operation.*

Refer to your software publications for the procedure to update the tape management database.

**Note:** If you manually exchange a cartridge from a drive for one in storage, you must update the tape management database or an error will occur.

## ■ Safety Features

Safety features are incorporated into the library. If you unlock and open the front door, an electronic interlock removes power from the robot. In addition, the LLC card and the power supply are housed inside the electronics module to prevent you from coming into contact with hazardous voltages and sensitive electronics.

## ■ 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 an 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.

For command descriptions and instructions, refer to your software publications.

## ■ Serviceability

The library can be serviced from the front, right, and rear. Each of these areas should have a service clearance of 610 mm (2 ft).

**Note:** When the library is installed in a rack, it cannot be serviced from the right.

## ■ Environmental Specifications

The following table lists the library environmental specifications. Refer to your drive vendor's publication and Web site for drive specifications.

**Table 1-3. Library Environmental Specifications**

Item	Measurements		
	Operating	Storage	Transporting
Temperature	+10 to +40°C +50 to +104°F	+10 to +40°C +50 to +104°F	-40 to +60°C -40 to +140°F
Humidity	20 to 80%	10 to 95%	10 to 95%
Wet bulb (maximum, non-condensing)	+29.2°C +84.5°F	+35°C +95°F	+35°C +95°F
Altitude	-76 to 3,048 m (-250 to 10,000 ft)		

## ■ Drive and Cartridge Weights

The following table lists the drive and cartridge weights.

**Table 1-4. Drive and Cartridge Weights**

<b>Item</b>	<b>Weight</b>
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)

## ■ Drive Power Specifications

The following table lists the drive power specifications.

**Table 1-5. Drive Power Specifications**

<b>Drive</b>	<b>Volt- Amperes</b>	<b>Current</b>	<b>Heat output</b>
DLT1	38 VA	0.30 A at 120 VAC 0.16 A at 240 VAC	130 Btu/hr
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
Super DLT	58 VA	0.47 A at 120 VAC 0.24 A at 240 VAC	198 Btu/hr
HP Ultrium LTO	46 VA	0.37 A at 120 VAC 0.19 A at 240 VAC	157 Btu/hr
IBM Ultrium LTO	69 VA	0.56 A at 120 VAC 0.29 A at 240 VAC	236 Btu/hr
Seagate Ultrium LTO	47 VA	0.38 A at 120 VAC 0.20 A at 240 VAC	160 Btu/hr

## ■ Library Power Specifications

The following table lists the power specifications for the library without drives.

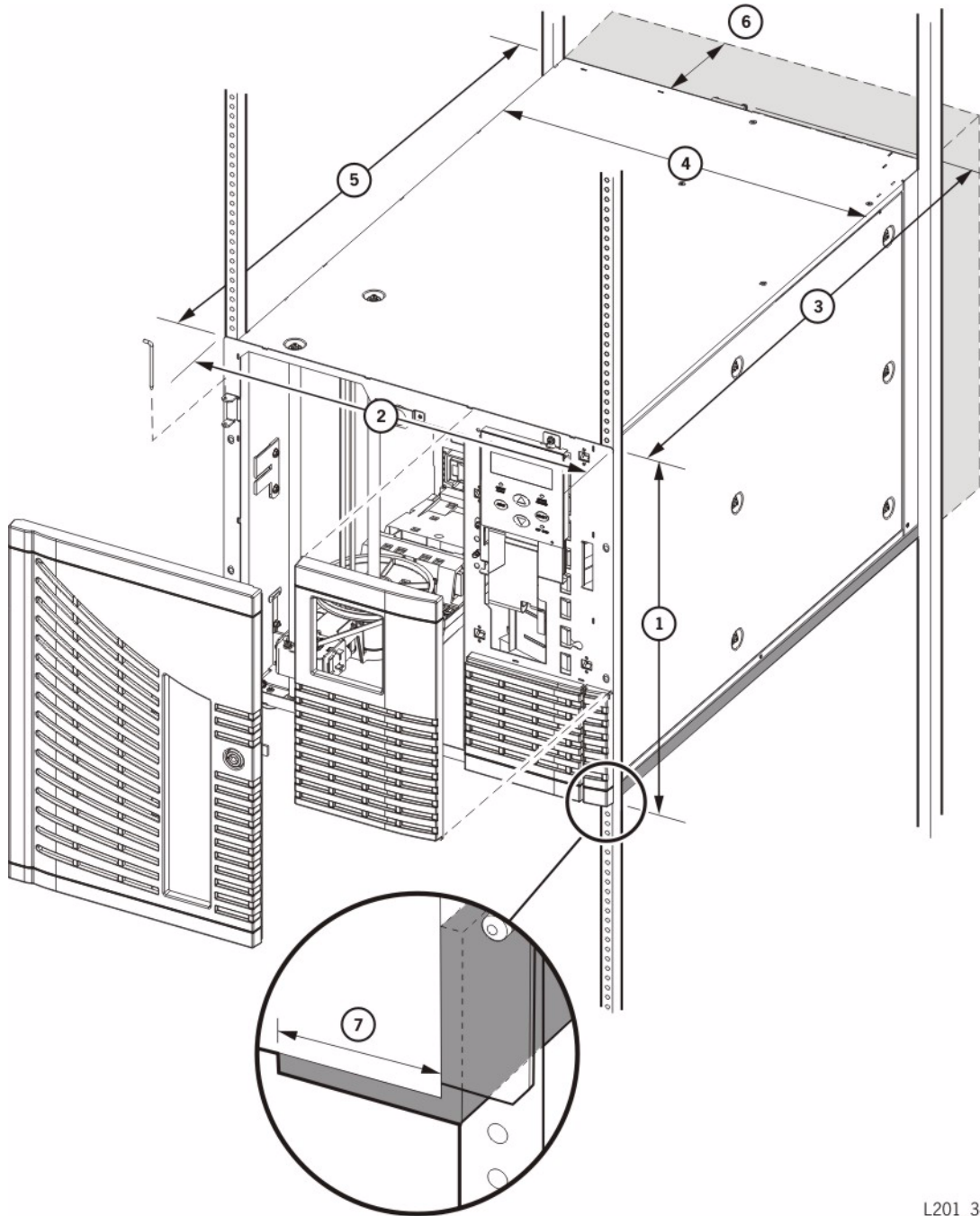
**Table 1-6. Library Power Specifications**

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

## ■ Library Dimensions

The following pages show the dimensions and weight for the rack and desktop versions.

Figure 1-7. L40 Rack Version Dimensions and Weight (L201\_343)

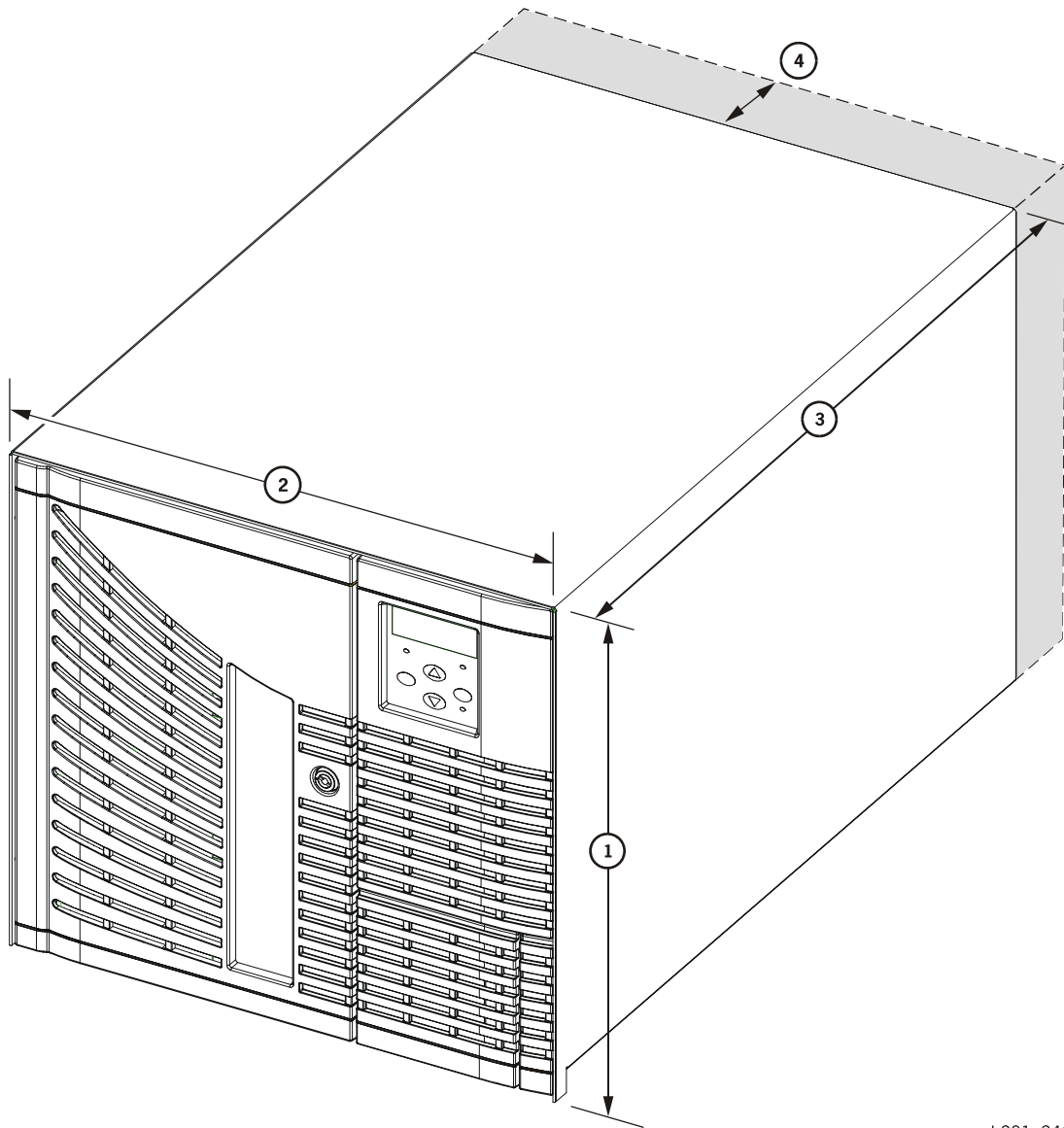


L201\_343

- |   |  |
|---|--|
| 1. 442 mm (17.39 in.) height                            | 6. 102 mm (4.0 in.) dedicated fan exhaust clearance area (shaded volume provides for cable and cooling clearances) |
| 2. 483 mm (19.0 in.) width of front with flange         | 7. 37 mm (1.44 in.) edge of library to inside edge of rail   |
| 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 |  |

Weight (library only) 44.45 kg (98 lb)

Figure 1-8. L40 Desktop Version Dimensions and Weight (L201\_346)



L201\_346

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)

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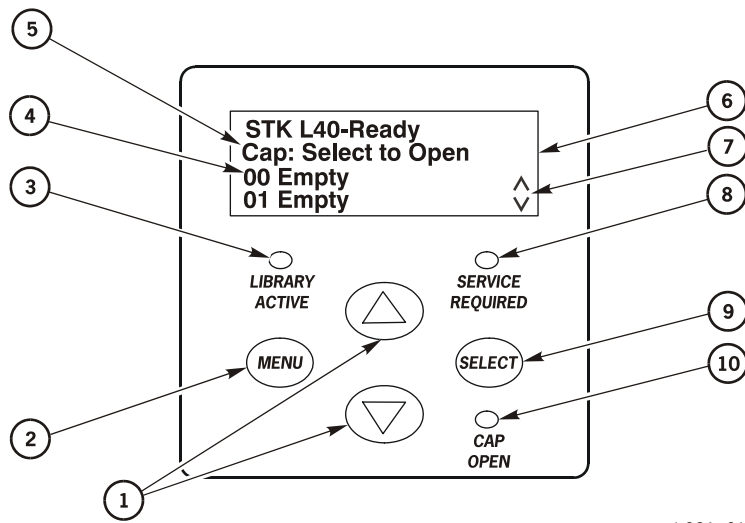


This chapter familiarizes you with the operator panel and describes how to configure the library and drives. It also describes how to upgrade firmware.

## Operator Panel

The following figure and pages describe the components on the library operator panel. Chapter 3, “Library Operation” contains the lists of status messages and their meanings.

Figure 2-1. Operator Panel Components (L201\_214)



L201\_214

1. Arrow buttons to select menu options and to scroll display lines
2. MENU button
3. LIBRARY ACTIVE indicator
4. Drive status
5. CAP status
6. Operator panel display
7. Arrows indicate more information can be seen on the screen. Use the Arrow buttons to scroll.
8. SERVICE REQUIRED indicator
9. SELECT button
10. CAP OPEN indicator

## Buttons

The operator panel has four buttons:

<b>MENU</b>	This button toggles operation between the Main Menu and the initial status display. It also returns you to the previous (higher level) menu from a submenu.
<b>SELECT</b>	This button chooses the option indicated by the cursor (>) shown in the status display. In a data field, this button moves the cursor to the next character. You must press this button until you come to the end of the character line to move on to the next field.
<b>▲ ▼</b>	The ▲ (up) and ▼ (down) arrow buttons move the cursor to the selection you want in a menu screen. When the cursor is in a data field, the arrows increase and decrease the values of the numbers and letters shown in that field.

## Indicators

The operator panel has three indicators:

<i>LIBRARY ACTIVE</i>	This green indicator flashes when the LLC card is active.
<i>CAP OPEN</i>	This amber indicator is lit when the CAP door is open.
<i>SERVICE REQUIRED</i>	<p>This red indicator is lit when operator intervention is required. Check the operator panel display for messages.</p> <p>If the indicator is lit solidly and not flashing, use the Diagnostics menu to see the fault symptom code (FSC).</p> <p>This indicator flashes if:</p> <ul style="list-style-type: none"><li>• One or more fans fail</li><li>• The temperature reaches the warning threshold</li><li>• A power supply fails</li></ul>

## ■ Operator Panel Menus

Use the buttons on the operator panel to access the library menus. Press the **MENU** button to view the Main Menu. To view submenus, use the arrow (**▲ ▼**) buttons to move the cursor to any menu and press the **SELECT** button to view that menu.

The Main Menu's options are:

- Door Operations
- Diagnostics
- CAP Contents
- Lib Info/Cfg
- Network Info/Cfg
- Drive Info/Cfg
- Personality Mod
- Hardware Monitor
- Clean

## ■ Configuration

After initialization is completed, you can configure the library. The following paragraphs and tables describe the configuration entries. Check off the tasks in the list as you complete them.

1. [“Configuring the Library” on page 2-4](#)
2. [“Configuring the Drives” on page 2-6](#)
3. [“Configuring the Network” on page 2-7](#)
4. [“Setting the Warning and Shutdown Temperatures” on page 2-8](#)

As you enter configuration information, record your choices in [Table 2-7 on page 2-11](#).

Use the operator panel buttons to enter information in the following menus to configure the library:

- Library Info/Cfg
- Network Info/Cfg (if you use Library Status)
- Drive Info/Cfg
- Hardware Monitor (to set the warning and shutdown temperatures)

## Configuring the Library

Two of the entries in [Table 2-1 on page 2-5](#) are discussed in the following paragraphs.

### Fast Load Feature

The Fast Load feature adjusts the timing of the hand during cartridge load operations:

- When the Fast Load feature is On, the hand mounts a cartridge into a drive and the hand immediately begins its next task; it does not wait for the drive to complete its loading cycle.
- When the Fast Load feature is Off (the default), the hand waits at the drive location until the tape is fully loaded before it begins its next task.

**Note:** Some tape management software does not support the Fast Load feature. Consult your system administrator before enabling this feature.

### Auto Clean Feature

The drives are cleaned to prevent read and write errors. The library supports two methods for cleaning drives:

- Automatic cleaning (Auto Clean)
- Manual cleaning

The Auto Clean feature is enabled when you have:

- Configured the library for Auto Clean
- Inserted a cleaning cartridge into the designated cell
- Reinitialized the library

When a drive requires cleaning with Auto Clean enabled, the hand retrieves a cleaning cartridge from the cleaning cartridge cell, mounts the cartridge into the drive, and returns the cartridge to the cleaning cartridge cell after cleaning is complete.

If Auto Clean is On and you want to clean a drive *before* the drive requests a cleaning, you can manually load the correct cleaning cartridge into the drive.

If Auto Clean is Off, a `Clean Needed` message appears on the status display of the operator panel when a drive requires cleaning. See [“Cleaning a Drive” on page 3-30](#) for the procedure.

**Notes:** Your library could contain more than two types of drives. You cannot enable Auto Clean if your library contains both LTO and DLT drives. This is because the library only has one cell for the cleaning cartridge, and the LTO and DLT drives use different types of cartridges.

The DLT1 and SDLT drives use unique cleaning cartridges. The DLT 7000E and DLT 8000ECN drives share the same type of cleaning cartridge. The LTO drives use vendor-specific or the standard Ultrium cleaning cartridge.

Some tape management software does not support the Auto Clean feature. Consult your system administrator before enabling this feature.

Access the `Lib Info/Cfg` Menu and complete the fields as shown in the following table.

**Table 2-1. Library Information/Configuration Menu (Lib Info/Cfg Menu)**

Data Field	Valid Values	Explanation
SCSI ID: (see Note)	00–15	Enter the SCSI identification (ID) that you have chosen for the library; for example, 00.
Date:	mm/dd/yyyy	Enter the current date, where mm is the month (01–12), dd is the day (01–31), and yyyy is the year (2000–2010); for example, 05/19/2001.
Time:	hh:mm	Enter the current time, where hh is the hour (00–23) and mm is the minutes (00–59); for example, 15:39.
Fast Load:	Off (default) On	See “Fast Load Feature” on page 2-4 and make your selection.
Media Check	Off (default) On	During initialization or power-on, the robot tries to grab any unreadable, unlabeled, or improperly placed cartridges. If the robot cannot grab one of those cartridges, the library status will be “not ready.” To change the setting, press the <b>SELECT</b> button.
Auto Clean: (see Note)	Off (default) On	See “Auto Clean Feature” on page 2-4 and make your selection.
# Cells: (see Note)	20 32 40	The personality module sets the 20 or 40 entry.  You can choose the 32 option for third-party software licensing reasons. Press either the up or down arrow to toggle to 32.
SCSI Type:	HVD LVD	The LLC card sets the SCSI type during initialization.
Version		The firmware sets this entry.
<b>Note:</b> If you modify the SCSI ID, Auto Clean, or the # Cells data fields, or choose the 32 cells option, and press the <b>MENU</b> button to exit the configuration menu, the status display shows <code>Needing Lib Reset: SELECT to RESET the Library</code> . Press the <b>SELECT</b> button to reset the library.		

## Configuring the Drives

Access the Drive Info/Cfg Menu and complete the fields for *all* drives installed in your library.

**Note:** For more information about this menu, see [“Viewing the Status of the Drives” on page 3-3](#).

**Table 2-2. Drive Information/Configuration Menu (Drive Info/Cfg Menu)**

Data Field	Valid Values	Explanation
SCSI Id:	00–15	Enter the SCSI ID you have chosen for this drive, for example, 00. This ID must be different from the IDs of other drives on the SCSI bus. Valid IDs can vary, depending on the type of drive. Refer to your drive documentation for more information.  <b>Note:</b> If you change the SCSI IDs and a Fibre Channel router is installed, you must reinitialize the router by either a soft reboot through the CSE interface or by pressing the power switch to the O position, then to the   position.
On Bus Status:	On Off	On indicates that the drive is on the same SCSI bus as the library. Off indicates that the drive is connected to a different SCSI bus.
Status	Loaded	This is the status of the drive. See <a href="#">Table 3-2 on page 3-3</a> for a list of the statuses.
Type	DLT 7000 DLT 8000 BNHMK DLT1 SDLT 220 SDLT 320, SDLT 600, SGT LTO HP LTO IBM LTO	The type of drive is set automatically during initialization. For more information see
Vendor		The drive vendor is set automatically during initialization.
Code Ver:	20	The code version of your drive is set automatically during initialization.

## Configuring the Network

To use Library Status, you must configure the network. Access the **Network Info/Cfg Menu** and complete the required fields as shown in the following table.

**Note:** Ask your system administrator for the IP address, the network gateway, and the subnet mask.

See [“Using Library Status Tool” on page 3-13](#).

**Table 2-3. Network Information/Configuration Menu (Network Info/Cfg Menu)**

Data Field	Valid Values	Explanation
Library Name:	<i>name</i>	Enter the name for the library in your network, where <i>name</i> is up to 11 alphanumeric characters. This name has no effect on library operation. This name is also called the Domain Name.
IP Address:	<i>nnn.nnn.nnn.nnn</i>	Enter the address for network monitoring, where <i>n</i> is 0–9.  <b>Note:</b> You cannot assign an address such as 255.255.255.255.
Network Gateway:	<i>nnn.nnn.nnn.nnn</i>	Enter the gateway connection between subnets, where <i>n</i> is 0–9. This is required only when such a connection exists and is necessary to library operation.
Subnet Mask:	<i>nnn.nnn.nnn.nnn</i>	Enter this data to make the library accessible through a subnet on a larger network, where <i>n</i> is 0–9. This field is required only when applicable.
Web Password		The default is <code>horizon</code> . To change the password, press the <b>SELECT</b> button, and use the arrows to change each letter.
Ethernet Address:	<i>nn.nn nn.nn.nn.nn</i>	The Ethernet address is set automatically.

**Note:** If you change any of the network configuration values, and you press the **MENU** button to exit the configuration menu, the status display shows `Needing Lib Reset: SELECT to Reset the Library`. Press the **SELECT** button to reset the library.

## Setting the Warning and Shutdown Temperatures

Use this menu to protect media. Refer to the documentation from the media manufacturer to determine what temperatures to set. The high temperature is automatically recorded.

You are not required to set the warning and shutdown temperatures. The display still will show LLC card fan, drive fan, and power supply failures.

Access the **Hardware Monitor Menu** and complete the required fields as shown in the following table. For more information about this menu, see [“Viewing the Status of the Hardware Monitor” on page 3-5](#).

**Table 2-4. Hardware Monitor Menu**

Data Field	Explanation
High Temp:	The display shows the high <i>Celsius</i> temperature. If desired, press <b>SELECT</b> to clear the temperature.
Warn Temp:	Use the arrows to set the desired <i>Celsius</i> temperature. When the library reaches the temperature, the <i>SERVICE REQUIRED</i> indicator blinks.
Shutdown Temp:	Use the arrows to set the desired <i>Celsius</i> temperature. When the library reaches the temperature, the <i>SERVICE REQUIRED</i> indicator remains lit and no additional move requests are accepted.

**Note:** The value for the shutdown temperature must be at least 2°C higher than the value for the warning temperature.

## ■ Resetting the Library

### **CAUTION:**

***Possible equipment damage: Use a wooden pencil (never a screwdriver or other electrical conductor) to press the RESET button to prevent damaging the button or the LLC card.***

To activate the configuration information in the library’s memory, you must reset the library. After entering all your configuration information, use a wooden pencil to press the **RESET** button on the rear of the library, or press the power switch **Off**, then **On**.

Resetting the library by pressing the **RESET** button will make the library configuration active, *but it will not cause the library to perform an audit*. If an audit is required because cartridges have been moved, you must open and shut the door, or press the power switch **Off**, then **On**.



After you set some of the configuration values described in this chapter, you reset the library using the operator panel. When you press the **MENU** button to exit the configuration menu, the status display shows `Needing Lib Reset: SELECT to Reset the Library`. Press the **SELECT** button to reset the library.

## ■ Reconfiguring the Library

For some situations, you might need to change the configuration of the library. These situations are discussed below.

### General

If you want to reconfigure the library later, you can use the same procedures presented in [“Configuration” on page 2-3](#). When the configuration is changed, pressing the **MENU** button to exit the configuration menu displays `Needing Lib Reset: SELECT to Reset the Library`. Press the **SELECT** button to reset the library.

**Note:** If you change configuration settings in the library, make sure you also review the configuration of your tape management and application software to make sure they match the library’s configuration.

### Auto Clean

If you decide to enable the Auto Clean feature, you must set the Auto Clean field in the `Lib Info/Cfg Menu` to `On` (see [Table 2-1 on page 2-5](#)), and insert a cleaning cartridge into the cell directly above the CAP. For more information about configuring the library for Auto Clean, see:

- [“Auto Clean Feature” on page 2-4](#)
- [“Configuring the Library” on page 2-4](#)
- [“Reconfiguring the Library” on page 2-9](#)

### Adding Cell and Drive Capacity

If your storage needs have increased, you might want to increase your cell capacity and the number of drives in your library. You can do this either by ordering a conversion bill or by ordering a part number, listed in the tables.

For either method:

- You retain your existing external SCSI cables, drives, and media.
- You might wish to order additional external SCSI cables, drives, and media to fill your new configuration.

## Conversion Bill

By ordering an upgrade conversion bill, you can increase the capacity of your library within the same library frame. You will receive an upgrade module and a set of instructions that will direct you through the upgrade process. You will use the operator panel to have the firmware update the personality module to reflect the increased cell capacity of your library. Then, if desired, you can add additional external SCSI cables, drives, and media that can be ordered separately.

Use the following table to order the desired conversion bill.

**Table 2-5. Conversion Bill for Adding Cell and Drive Capacity**

Description	Conversion Bill
L40 20-cell capacity to L40 40-cell capacity	YXL40/80-20-CART

## Part Numbers

If your storage needs grow beyond the maximum capacity of your current library, you can increase your capacity with a frame upgrade. Frame upgrades can be ordered using the part numbers below. You actually receive a physically larger frame. You will use the external SCSI cables, drives and media from your old library, and might want to order additional external SCSI cables, drives, and media to fill the new library.

Use the following table to order the desired part number.

**Table 2-6. Part Numbers for Adding Cell and Drive Capacity**

Description	Code
L80, 40 slots, HVD, Sun StorageTek	YSL80-40-HV-STK
L80, 40 slots, LVD, Sun StorageTek	YSL80-40-LV-STK
L80, 60 slots, HVD, Sun StorageTek	YSL80-60-HV-STK
L80, 60 slots, LVD, Sun StorageTek	YSL80-60-LV-STK
L80, 80 slots, HVD, Sun StorageTek	YSL80-80-HV-STK
L80, 80 slots, LVD, Sun StorageTek	YSL80-80-LV-STK

**Note:** If you no longer have the original packing material from your old library, you can use the packing material from the new library to return your old library.

# ■ Recording Configuration Information

Record your library configuration in the following table. You will refer to it when making a service call or ordering features and upgrades.

**Table 2-7. L40 Tape Library Configuration Information**

Library Serial Number _____
Library Warranty Number _____
Version: 20 cells <input type="checkbox"/> 32 cells <input type="checkbox"/> 40 cells <input type="checkbox"/>
Library Code Version _____
Library SCSI ID _____
Number of Drives Installed _____
Drive 0 Serial Number _____
Drive 0 Warranty Number _____
Drive 0 SCSI ID _____
Drive Type _____ On Bus <input type="checkbox"/> Off Bus <input type="checkbox"/>
Drive 1 Serial Number _____
Drive 1 Warranty Number _____
Drive 1 SCSI ID _____
Drive Type _____ On Bus <input type="checkbox"/> Off Bus <input type="checkbox"/>
Drive 2 Serial Number _____
Drive 2 Warranty Number _____
Drive 2 SCSI ID _____
Drive Type _____ On Bus <input type="checkbox"/> Off Bus <input type="checkbox"/>
Drive 3 Serial Number _____
Drive 3 Warranty Number _____
Drive 3 SCSI ID _____
Drive Type _____ On Bus <input type="checkbox"/> Off Bus <input type="checkbox"/>
Fast Load: Off <input type="checkbox"/> On <input type="checkbox"/>
Auto Clean: Off <input type="checkbox"/> On <input type="checkbox"/>
Network: Library Name _____
IP Address _____ Subnet Mask _____ Network
Gateway _____
Hardware Monitor _____
Warning Temperature _____
Shutdown Temperature _____

## ■ Upgrading Firmware

This section describes how to use the Hyperterminal method to upgrade firmware. See “Using Library Status Tool” on page 3-13 to use the Library Status to upgrade firmware.

Firmware is factory-installed on all new libraries. The firmware resides within a Flash PROM chip on the LLC card.

You can upgrade your library by installing new firmware obtained from the StorageTek Customer Resource Center Web site.

Upgrading firmware requires that you have:

- A personal computer (PC) that contains:
  - Software capable of performing a Z-modem transfer
  - An available serial port
- Familiarity with Windows Hyperterminal and Procomm software
- A cable for the PC's serial port. This cable is available by ordering upgrade kit 313730701 or field bill 101502.

### **CAUTION:**

***System problems:* Always quiesce or stop the tape management software before starting the upgrade procedure.**

***Hardware damage:* Do not manually reset or cycle power during the upgrade procedure or you will damage the LLC card and will need to order a new card.**

Before performing the following procedure, make sure you:

- Initialize the library.
- Close the doors.

## Copying Firmware

1. Access the StorageTek Customer Resource Center Web site at:

<http://www.support.storagetek.com>

Login to the website. If you do not have a login, click Request a CRC password.

2. Click on More under Code Downloads.
3. Click L40 Tape Library under Tape Libraries.
4. Click on the code under Available Code.
5. Save the zip file to a directory on your PC or to a diskette.
6. Open the zip file and extract the `release.prm` file to a directory

## Downloading Firmware

**Note:** Please read through this procedure before starting; there is a *two-minute time limit* after step 8.

1. Quiesce or stop the tape management software controlling the library.
2. Attach the PC cable to the connector marked CSE (the bottom connector) at the rear of the library.
3. Open a Hyperterminal session
  - For older PCs, click on Start>Programs>Accessories>Hyperterminal, and open a Hyperterminal session.
  - For WIN2000 PCs, click on Start>Programs>Accessories>Communications >Hyperterminal, and open a Hyperterminal session.
4. New sessions prompt you for a name and icon. Choose any name and any icon.  
A connection window appears.
5. Change Connect Using ... to COM Port, typically Port 1.
6. Configure the connection within the file properties:

**Table 2-8. Hyperterminal Connection:**

Older PCs	WIN2000 PCs
Baud rate = 38,400	Baud rate = 38,400
Data bits = 8	Data bits = 8
Parity bit = None	Parity bit = None
Stop bit = 1	Stop bit = 1
Direct to comm flow = none	Hardware flow control = on

7. Once configured, click on OK and press Enter.  
The command line interface (CLI) prompt appears. (If it does not, disconnect/connect from the Call tab for new settings to become effective.)
8. At the CLI prompt, type in download.  
The following message appears:  

```
This command results in a new image being loaded into PROM. Please download the image using Z-modem protocol (Transfer>Send file). You have two minutes to start the transfer.
```
9. From the Hyperterminal Transfer tab, click Transfer>Send file.  
A Send File window appears.

10. With protocol set to Z-modem, browse to the location of the `release.prm` file you copied.
11. Click on SEND.

A window displays the download status.

**CAUTION:**

***Hardware damage: Do not manually reset or cycle power. Any interruption during this period will corrupt the library's memory and damage the LLC card. You must then order a new card.***

The library operator panel displays:

```
Download Started. Warning! Warning! Do not reset
library until download done.
```

12. *Wait* for the following message:

```
DOWNLOAD COMPLETE. RESET LIBRARY OR MENU TO RETURN TO
PREVIOUS MENU
```

13. Respond with 'yes' to reboot the machine and activate the firmware. Or, you may press the inline power switches to the O position, then to the | position.

**Note:** The new firmware become active only when you reboot or turn the power switches Off and On.

## Verifying Firmware Edition

You can verify that the new firmware version is correctly loaded by either:

1. Typing `version` at the CLI prompt on your PC, or
2. Pressing the Menu button on the operator panel:
  - a. Arrow down to the LIB/CONFIG menu
  - b. Press SELECT

The library configuration is displayed, including the firmware version currently operating.

---

This chapter describes the tasks you can perform while the library is operating in automated and manual modes.

## ■ Automated Mode

Automated mode is the normal operating mode of the library. The controlling software instructs the hand assembly to move cartridges among the storage cells, drives, and cartridge access port (CAP) without operator intervention.

Operator tasks that are performed in automated mode include:

- [“Inserting a Cartridge through the CAP”](#)
- [“Removing a Cartridge through the CAP”](#) on page 3-2
- [“Monitoring the Operator Panel for Messages”](#) on page 3-2
- [“Using Cleaning Cartridges”](#) on page 3-7
- [“Using Library Status Tool”](#) on page 3-13
- [“Powering-off the Library”](#) on page 3-22

## Inserting a Cartridge through the CAP

Make sure you refer to [“Electrostatic Discharge Damage Prevention”](#) on page xx before proceeding.

To insert a cartridge into the CAP:

1. Look at the CAP status on the operator panel display and wait until the display shows `CAP: Select to Open`.
2. Press `Select`.

The robot will open the CAP and the status will show `CAP: Opening`.

3. Place the cartridge into one of the two CAP cells, making sure the tape label is on the top and the volume number is facing you.
4. Close the CAP.

## Removing a Cartridge through the CAP

To remove a cartridge from the CAP:

1. Press `Select` to open the CAP door.
2. Remove the cartridge from the CAP.
3. Close the CAP door.

## Monitoring the Operator Panel for Messages

You can monitor the operator panel display for messages at any time during library operation. In particular, the status display shows messages for:

- Library
- Drives
- Personality module
- Hardware monitor
- CAP

## Viewing the Status of the Library

To view the status information for the library, look at the first line in the status display.

**Table 3-1. Library Status Messages**

Status Message	Explanation
Lib Init Required	The library requires initialization. This message might appear momentarily after you close the front door of the library. If the message remains on the screen, open and close the front door. The library then begins its initialization cycle.
Library Not Ready	The library is not available to perform tape management actions. Some status information might be available through the network interface.
STK L40-Ready	The library has completed initialization and is ready to perform tape management actions.
STK L40-Maint Mode	The library is not ready because it is performing diagnostic tests.
Library Requires User Intervention	The robot failed.



## Viewing the Status of the Drives

To view an explanation of the status information for the drives:

1. Press the **MENU** button to return to the Main Menu.
2. Press the arrow buttons until the > sign appears to the left of **Drive Info/Cfg**.
3. Press the **SELECT** button.
4. Use the arrow buttons to scroll to the desired drive.
5. Press the **SELECT** button.
6. Scroll through the status information.
7. Press the **MENU** button twice to return to the Main Menu.

**Table 3-2. Drive Status Messages**

<b>Status Message</b>	<b>Explanation</b>
Busy	This drive is reading or writing.
Cartridge In	This drive contains a cartridge, but it is not loaded.
Clean Failed	The attempt to clean this drive failed. This message appears only if a cartridge is not loaded into the drive.
Cleaning	The drive is being cleaned.
Clean Needed	This drive requires cleaning. This message appears only when a cartridge is not loaded into the drive.
Empty	A cartridge is not loaded into this drive.
Init Required	You must initialize this drive.
Inop	This drive is inoperable.
Loaded	A cartridge is loaded into this drive.
Loading	The drive is loading a cartridge.
Not Communicate	This drive is not communicating with the library. (This drive might be powered-off.)
Not Connected	This drive is not connected to the library.
Not Functional	This drive is not operating properly.
Rewinding	The drive is rewinding the cartridge.
Rewound	The drive has rewound the cartridge.
Unknown Drive	The library does not recognize the type of drive in this location.
Unloading	The drive is unloading a cartridge.

## Viewing the Status of the Personality Module

Viewing library personality information lets you determine the library's capacity, vendor, and how the library's name and vendor name appear on a SCSI interface.

To view the library's personality module information:

1. Press the **MENU** button to return to the Main Menu.
2. Press the arrow buttons until the > sign appears to the left of **Personality Module**.
3. Press the **SELECT** button. The **PERS MODULE Menu** is displayed.
4. Use the arrow buttons to line up the > sign with **PERS MODULE INFO**.
5. Press the **SELECT** button.
6. Use the arrow buttons to scroll through the information stored in the personality module.
7. Press the **MENU** button twice to return to the Main Menu.

**Note:** The **INSTALL UPGRADE** portion of the **PERS MODULE Menu** is only used when you want to upgrade your library. Your upgrade kit includes instructions for this procedure.

**Table 3-3. Personality Module Status Messages**

Status Item	Status Message	Explanation
Status:		Validity of the personality module.
	PRESENT	A valid personality module is attached to the LLC card.
	NOT PRESENT	A personality module is not attached to the LLC card.
	UNKNOWN	Valid vendor information has not been loaded into this library.
Type:		Vendor information and whether you can install a feature.
	Normal	Normal operating data is available.
	Upgrade	You can use the personality module attached to the LLC card to install a feature. This type of personality module is an upgrade module, and is available through a conversion bill. See <a href="#">“Recording Configuration Information” on page 2-11</a> .
	Used Upgrade	The feature on the attached upgrade module has already been installed on a library.
	Write in Progress	The installation of the information from the personality module has been interrupted. The personality module is no longer valid.

**Table 3-3. Personality Module Status Messages (Continued)**

Status Item	Status Message	Explanation
Version:		Version number for the personality module.
Lib Vendor ID:		The identity number for the library vendor.
Lib Vendor Name:		The name of the library vendor; for example, STK for Storage Technology Corporation.
Lib Product Name:	Normal type	The product name assigned by the library vendor; for example, L40 .
	Upgrade type	The product name for which the upgrade is valid.
Lib Size:	Normal type	The maximum available cell capacity of the library.
	Upgrade type	The number of cells that would be added.
SCSI Vendor Name:		The library vendor name reported on the SCSI interface.
SCSI Product Name:		The library product name reported on the SCSI interface.
Feature List	Library Status	The library has a free version of the Web-enabled software used for monitoring the library.
	Library Admin.	The library has the upgrade version of the Library Status Tool.

## Viewing the Status of the Hardware Monitor

Viewing the information under Hardware Monitor lets you know:

- If the LLC card fan, drive fans, and power supply are functioning. If a fan or power supply fails, see the appendixes to report the problem.
- The current Celsius temperature and high Celsius temperature of the library.

You can set the warning and shutdown temperatures during configuration to protect the tape media.

If the temperature reaches the warning temperature, the **SERVICE REQUIRED** indicator blinks. If the temperature reaches the shutdown temperature, the indicator remains lit, and no additional move requests are accepted. When the temperature drops 2°C below the warning or shutdown temperature, the condition will be cleared.

If desired, you can press **SELECT** to clear the highest temperature. The display will show the current temperature.

**Note:** If you did not set the warning and shutdown temperatures during configuration, the display only will show the current and high temperatures.

To view the Hardware Monitor information:

1. Press the **MENU** button to return to the Main Menu.
2. Press the arrow buttons until the > sign appears to the left of Hardware Monitor.
3. Press the **SELECT** button. The Hardware Monitor Menu is displayed.
4. Use the arrow buttons to scroll through the information.

**Table 3-4. Hardware Monitor Status Messages**

Message	Meaning
Current Temp: 26	The current Celsius temperature of the library.
High Temp: 27	The highest Celsius temperature of the library since the last time this field was reset.
Fans: OK	The LLC card fan and drive fans are functioning.
Fans: Fail !Drive Slot 0 Fan	The Drive Slot 0 fan is not functioning.
Power: OK	The power supply or supplies are functioning.
Power: Fail !Top	The top power supply is not functioning.
Warn Temp:	The number that was set during configuration.
Shutdown Temp:	The number that was set during configuration.

## Viewing the Status of the CAP

To view the status information for the CAP, look at the second line in the display.

**Table 3-5. CAP Status Messages**

Message	Meaning
CAP: Open	The CAP is open.
CAP: Select to Open	The CAP is closed.
CAP: Opening	The robot is opening the CAP.
CAP: Locked	The client server has issued a software command that locks the CAP until a previous command is completed.

## Reviewing the Event Log

The event log records significant messages and fault symptom codes (FSC) that the library has generated during operation.

To review the event log:

1. Press the **MENU** button to display the **Main Menu**.
2. Press the arrow button until the **>** sign lines up with **Diagnostics**.
3. Press the **SELECT** button. The **Diagnostics Menu** is displayed.
4. Press the arrow buttons until the **>** sign appears to the left of **Event Log**.
5. Press the **SELECT** button. The display shows the event log screen.
6. Use the arrow buttons to scroll through the log.

Below is a sample entry on the event log's screen, followed by an explanation of the entry's elements:

05 3788 03 CAP

03/15/2004 14:46:14

**05** is the event log line number.

**3788** is the FSC.

**03** is the number of times this FSC has occurred.

**CAP** is the mechanical device.

**03/15/2004** is the date the FSC occurred. The fields, from left to right, are month, day, and year.

**14:46:14** is the time the FSC occurred. The fields, from left to right, are hour, minutes, and seconds.

**Note:** The electronic FSC dictionary, which lists additional information about FSCs and responses to them, is available through your service representative or other Sun representative. Contact your service provider for more information.

## Using Cleaning Cartridges

The following topics concern using cleaning cartridges to clean the drives

### Using the Clean Menu

The **Clean Menu** provides information about the library's cleaning cartridges. The menu allows you to change the warning count for each type of cleaning cartridge and import/export cleaning cartridges. It also lets you check the number of times a cleaning cartridge has been used. The information displayed in the **Clean Menu** depends on whether **Auto Clean** is **On** and a valid cleaning cartridge is in the designated cleaning cell.

To view the Clean Menu:

1. Press the **MENU** button to display the Main Menu.
2. Press the arrow button until the > sign lines up with Clean.
3. Press the **SELECT** button. The Clean Menu appears.

The following table describes how the Clean Menu works:

**Table 3-6. Clean Menu Criteria**

If	On selecting a drive to clean
Auto Clean is On and no cleaning cartridge is in the cleaning cells	The message No Clean Cartridges Import one or more to Clean is displayed. Do the following: <ol style="list-style-type: none"> <li>1. Use the operator panel to return to the library status screen.</li> <li>2. Open the CAP and insert a valid cleaning cartridge for the drive being cleaned.</li> <li>3. Return to the Clean Menu.</li> </ol>
Auto Clean is Off and no cleaning cartridge is in the cleaning cells	The message No Clean Cartridges Import one or more to Clean is displayed. Follow the procedure given above to insert a valid cleaning cartridge in the CAP for the drive being cleaned.
Auto Clean is Off	Only the drive to clean is displayed.
Auto Clean is On and more than one cleaning cartridge is in the CAP	Select the Import Clean Carts option. See <a href="#">“Importing Cleaning Cartridges through the CAP” on page 3-11.</a>

The following table describes the Clean Menu information:

**Table 3-7. Clean Menu Information**

Option	Description
Drive to clean	The drive selected for cleaning
Set Warn Counts	The number of times you want to use the cleaning cartridge for the selected drive before the library exports a new cleaning cartridge through the CAP. For more information, see <a href="#">“Setting the Cleaning Cartridge Warning Count” on page 3-9.</a>
Clean Cart Info	A screen that lists the details of all the cleaning cartridges in the library (for example, usage count). For more information, see <a href="#">“Viewing the Cleaning Cartridge Information” on page 3-10.</a>
Import Clean Carts	A procedure for moving cleaning cartridges from the CAP to the cleaning cells. For more information, see <a href="#">“Importing Cleaning Cartridges through the CAP” on page 3-11.</a>
Export Clean Carts	A procedure for moving cleaning cartridges from the cleaning cells to the CAP. For more information, see <a href="#">“Exporting a Cleaning Cartridge through the CAP” on page 3-10.</a>

## Setting the Cleaning Cartridge Warning Count

Cleaning cartridges have a limited life span. After multiple uses, replace the cleaning cartridge and dispose of it at your site.

If Auto Clean is On, use the operator panel to set the maximum number of times a cleaning cartridge can be used (or the “warning count”). Refer to your drive vendor’s publication and Web site for the recommended use and life of the drive’s cleaning cartridge.

To set the warning count for a cleaning cartridge:

1. Press the **MENU** button to display the Main Menu.
2. Press the arrow button until the > sign lines up with Clean.
3. Press the **SELECT** button. The Clean Menu appears.
4. Use the arrow button to line up the cursor with the appropriate drive’s Set Warn Counts option.
5. Press the **SELECT** button. The screen turns into the edit mode and the cursor lines up with the selected drive’s warning count.
6. Use the up and down arrow buttons to change the value of the warning count.
7. Press the **SELECT** button to save the changes. You may press the **MENU** button to abort.

8. Press the **MENU** button to return to the Clean Menu.

**Note:** When a cleaning cartridge in the reserved cell has exceeded the warning count, the operator panel displays an asterisk (\*) in the library ready status line.

## Viewing the Cleaning Cartridge Information

The Cleaning Cartridge Information Menu gives you details of the media type, cartridge code, and the usage count of the cleaning cartridge in the cleaning cell.

Below is sample display:

DLT CLN123 4

**DLT** is the media type.

**CLN123** is the cartridge code.

**4** is the number of times the cleaning cartridge has been used (usage count).

**Note:** If the usage count reaches the warning count set for the cleaning cartridge, EXP (expired) appears as the usage count.

### **CAUTION:**

**Take precautions with used cleaning cartridges. When you place a cleaning cartridge into the library for the first time, the library indicates a usage count of 0. When the usage count exceeds its limit, you must replace it with a new one. See “Replacing a Cleaning Cartridge” on page 3-29.**

To view the cleaning cartridge information:

1. Press the **MENU** button to display the Main Menu.
2. Press the arrow button until the > sign lines up with Clean.
3. Press the **SELECT** button. The Clean Menu appears.
4. Use the arrow button to line up the > sign with the appropriate drive's Clean Cart Info
5. Press the **SELECT** button. The Clean Info Menu appears.
6. Press the **MENU** button to return to the Clean Menu.

## Exporting a Cleaning Cartridge through the CAP

When one or more cleaning cartridges have expired, you can export the cartridges from the cleaning cell to the CAP.

Before exporting a cleaning cartridge through the CAP, make sure:

- The library configuration is set for Auto Clean
- The correct cleaning cartridge is in the cleaning cell directly above the CAP.
- The library re-initialization is completed.



To export a cleaning cartridge through the CAP:

1. Press the **MENU** button to return to the **Main Menu**.
2. Press the arrow buttons until the > sign lines up with **Clean**.
3. Press the **SELECT** button. The **Clean Menu** appears.
4. Use the arrow button to line up the > sign with the appropriate drive's **Export Clean Carts** option
5. Press the **SELECT** button. The **CLEAN EXPORT MENU** appears.

The **CLEAN EXPORT MENU** lists all the cleaning cartridges in the cleaning cell by media type and cartridge code.

6. To select the cleaning cartridge to export:
  - a. Use the arrow buttons to line up the > sign with the desired cartridge entry on the list.
  - b. Press the **SELECT** button to export the cleaning cartridge.

**Note:** If no cleaning cartridges are in the cleaning cell, you will see a message **No Clean Cartridges to export**.  
If the CAP cells are full, you will see a message **Export Failed** or **CAP may be full**.

7. Press the **MENU** button to return to the **Clean Menu**.

## Importing Cleaning Cartridges through the CAP

When you want to replace the cleaning cartridges in the cleaning cell, the fastest way to do so without re-initializing the library is to import the new cleaning cartridges from the CAP to the cleaning cell.

Before importing a cleaning cartridge through the CAP, make sure:

- The library configuration is set for **Auto Clean**.
- The correct cleaning cartridge (for the drives that need cleaning) is present in the cleaning cell directly above the CAP.
- The library re-initialization is completed.

To import cleaning cartridges through the CAP into the cleaning cell:

1. Load cartridges into the magazine. See [“Inserting a Cartridge through the CAP” on page 3-1](#).
2. Press the **MENU** button to return to the **Main Menu**.
3. Press the arrow buttons until the > sign lines up with **Clean**.
4. Press the **SELECT** button. The **Clean Menu** appears.

5. Use the arrow button to line up the > sign with the appropriate drive's Import Clean Carts option.

6. Press the **SELECT** button. The CLEAN IMPORT MENU appears.

The CLEAN IMPORT MENU lists all the cleaning cartridges in the cleaning cell by media type and cartridge code.

7. To select the cleaning cartridges to import:

- a. Use the arrow buttons to line up the > sign with the desired cartridge entry on the list

- b. Press the **SELECT** button to import the cleaning cartridge.

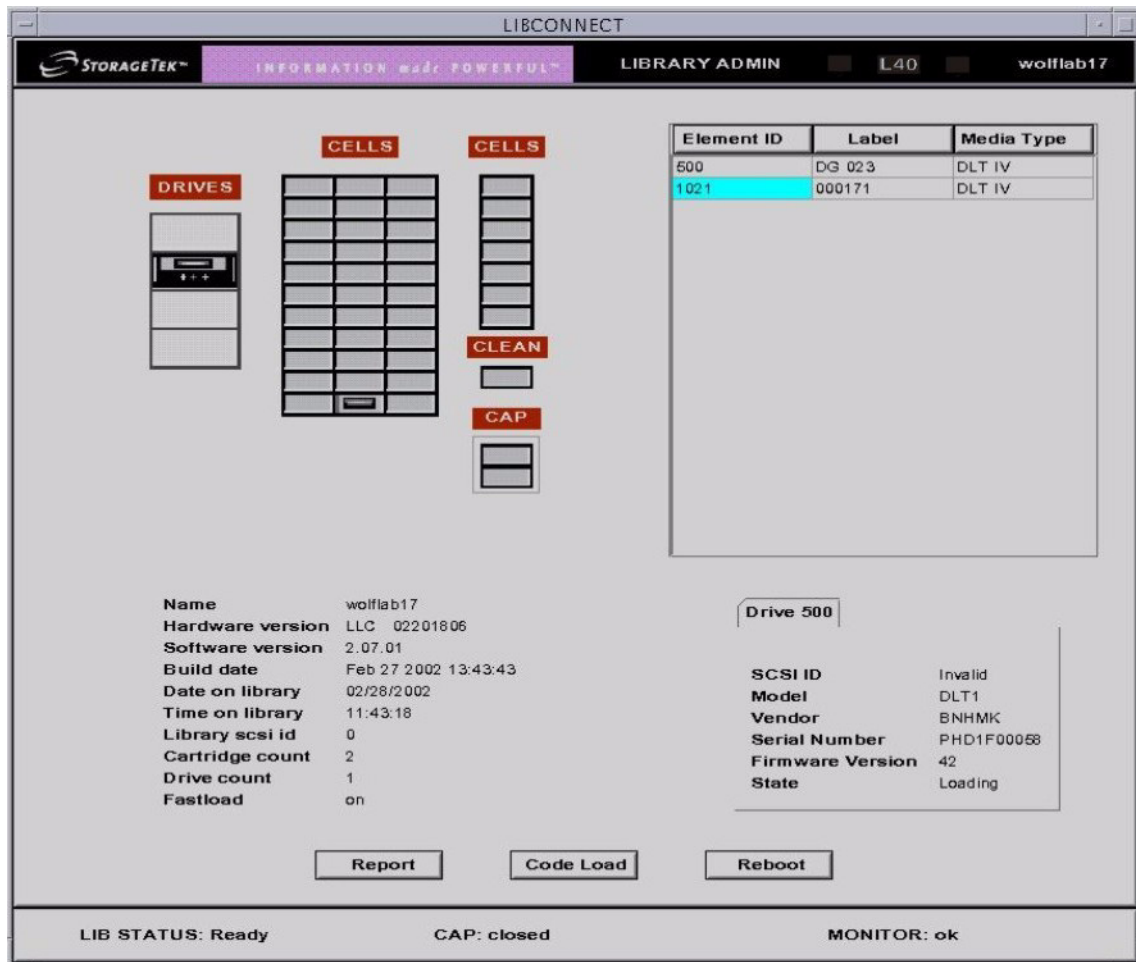
**Note:** If no cleaning cartridges are in the CAP cells, you will see a message No Clean Cartridges to import from CAP.

If the cleaning cell is full, you will see a message Clean cells are full.

8. Press the **MENU** button to return to the Clean Menu.

## ■ Using Library Status Tool

Figure 3-1. Sample Library Status Tool Screen (L201\_513)



L201\_513

The Library Status Tool is a proprietary embedded software that resides internal to the library and is activated using a Web browser. This software is available on every library at no charge. It uses Java-applets to send information using the Web.

Using the Library Status Tool you can:

- Load code
- Reboot the library
- Generate reports on library, drives, fault symptom codes (FSCs), and tape inventory

## Requirements

To use the Library Status Tool you must:

- Make sure the library is powered-on and initialized.
- Set up the following network configuration using the operator panel on the library:
  - The IP address for the library name
  - The subnet mask
  - The network gateway

**Note:** See “Configuring the Network” on page 2-7 to set up the above values.

- Use Internet Explorer (5.0 or later) or Netscape (4.5 or later) as the Web browsers.
- Install the Java Runtime Environment (JRE) plug-in version 1.4 or later on the host computer. You can download the Java plug-in from <http://java.sun.com>.
- Connect a standard 10baseT Ethernet cable to the library's Ethernet port. This enables the Library Status Tool to communicate with the library.

## Setting up Java Policy Permissions

Before using the Library Status Tool to load code or save reports, you must use the policytool from Sun Microsystems to set appropriate permissions. Use of the policytool is required because the Library Status Tool, a Web interface, uses non-signed Java applets.

**To set up permissions:**

1. Create folders on your computer hard drive to save reports (for example, `c:\reports`) and load code (for example, `c:\code`).
2. To load code, download the appropriate code version from the following Web site on to your computer:

<http://www.support.storagetek.com>

3. From your computer, launch the Java policytool. The Java policytool is located in the Java installation directory (for example, `C:\jdk1.3.0_02\bin`).

The file is called `policytool` in UNIX and `policytool.exe` in Microsoft® Windows®.

4. If you have already set up a policy file for the library, the policy file name with the full path is displayed. Click `Edit Policy Entry`.

If you don't have a policy file for the library:

- a. An error window is displayed stating it `Could not find policy file <path/ filename>`. Write down the full path and filename mentioned in the error window and click OK. This filename is used to save the policy in Step 9.
- b. Click `Add Policy Entry`.

- c. In the Policy Entry window type: `http://<library IP>/libconnect.jar` in the CodeBase field, where library IP is the 12-digit library IP address (for example, 129.80.58.95).
5. Click `Add Permission`.
6. From the `Permissions` pull down menu, select `FilePermission`.
7. Specify one of the following in the `Target Name` field:
  - To load code from the Library Status Tool, type the full path and the name of the firmware file you downloaded to the hard drive (for example, `C:/code/firmware.prm`).
  - To save a report to your hard drive from the Library Status Tool, type the full path and the name of the file you wish to save the report page to (for example, `C:/report/report.txt`).
- Note:** Independent of the operating system, use a forward slash when specifying the path for the filename.  
Also, write down this path and filename; you have to enter this same path and filename when saving the report or loading code in the Library Status Tool.
8. From the `Actions` pull down, do one of the following:
  - a. Click `Read` for code download.
  - b. Click `Write` or `write`, `read`, `write`, `delete`, `execute` to save the report to a file.
  - c. Click `OK`.
9. Click `Done`.
10. Select `File > Save` to save the policy.  
If an error was displayed when you launched the policytool:
  - a. From the `File` menu select `Save As`.
  - b. Type the name of the policy and the full path as noted in Step 4a.
11. Select `File > Exit` to close the Java policytool.

**To start the Library Status Tool:**

1. Open Internet Explorer (5.0 or later) or Netscape (4.5 or later).
2. Enter the IP address in the Address Bar.

The Element ID section lists the volume number and media type for each cartridge.

The Drive section lists such items as the SCSI ID, model, vendor, serial number, firmware version, and state (such as loaded or unloaded).

The Library section lists such items as the library name, LLC card version, software version, build date, current date and time, SCSI ID, cartridge count, drive count, and whether fastload is On or Off.

## Generating Reports

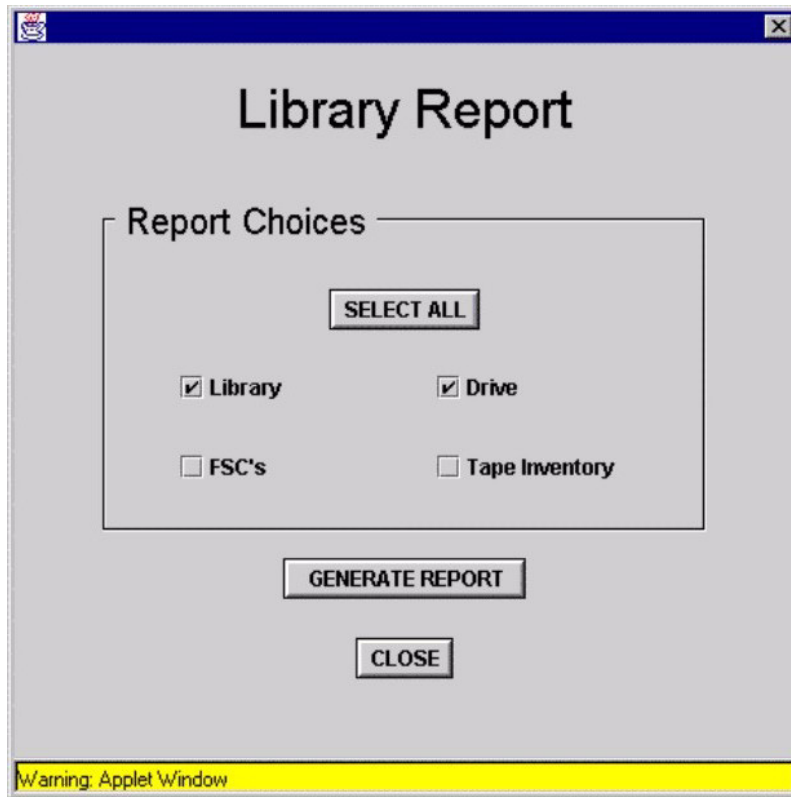
To generate a report:

1. Select **REPORTS** from the Library Status Tool initial screen.
2. Select from the following Report options:

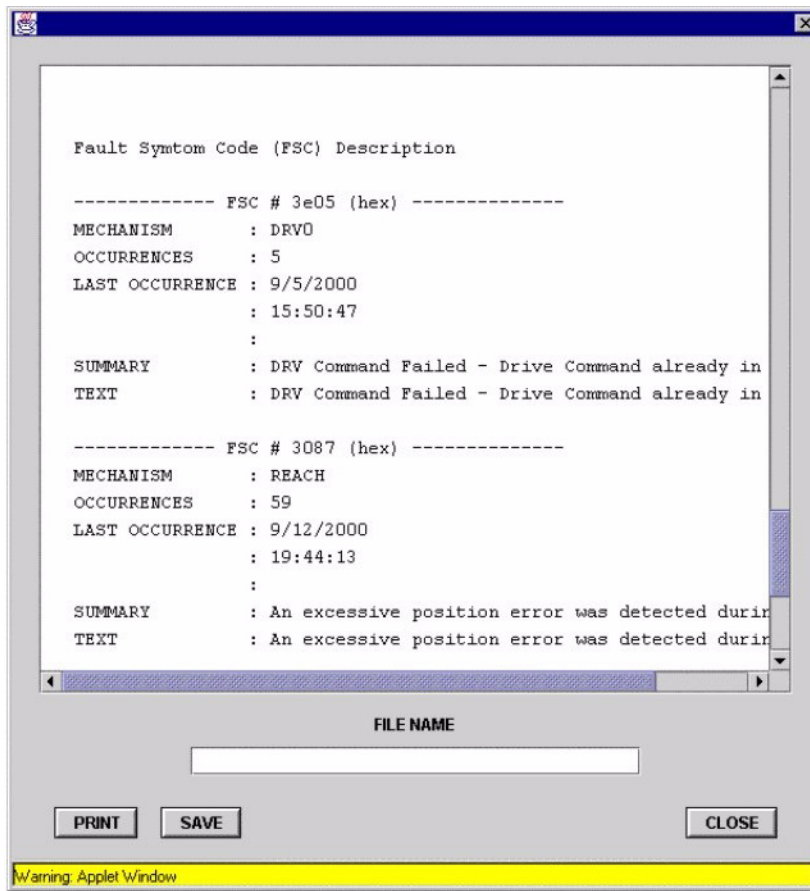
**Table 3-8. Report Options**

<b>Click</b>	<b>For Information on...</b>
Library	The library including the library name, ID, SCSI type, number of CAP cells
Drive	The drives installed in the library including their current state
FSCs	Fault symptom codes with their descriptions/occurrences from the library's Event Log
Tape Inventory	The cartridges in the storage cells, the CAP, and the drives
Select All	All of the above

Figure 3-2. Report Selection Screen (L201\_508)



L201\_508

**Figure 3-3. Sample Report (L201\_511)**

L201\_511

Before saving the report to your computer hard drive, see [“Setting up Java Policy Permissions” on page 3-14](#) to set up the appropriate permissions.

To save the report to a file, type the name of the report and click **Save**.

**Note:** This is the filename you entered in the Targetname field during the Java policy tool configuration. This filename is case sensitive.



## Loading Code

Before loading code to the library, see “Setting up Java Policy Permissions” on page 3-14 to set up the appropriate permissions.

To load code to the library:

1. Select Code Load from the Library Status Tool initial screen.

The following screen is displayed.

**Figure 3-4. Library Code Load Screen (L201\_519)**



L201\_519

2. In the Code Load screen type the name of the file containing the code to load.

**Note:** This is the filename you entered in the Targetname field during the Java policy tool configuration. This filename is case sensitive.

**CAUTION:**

**Do not interrupt the code load process as it may damage the LLC card.**

It takes about 90 seconds to complete the code load.

A library reboot is necessary when the code load is complete.

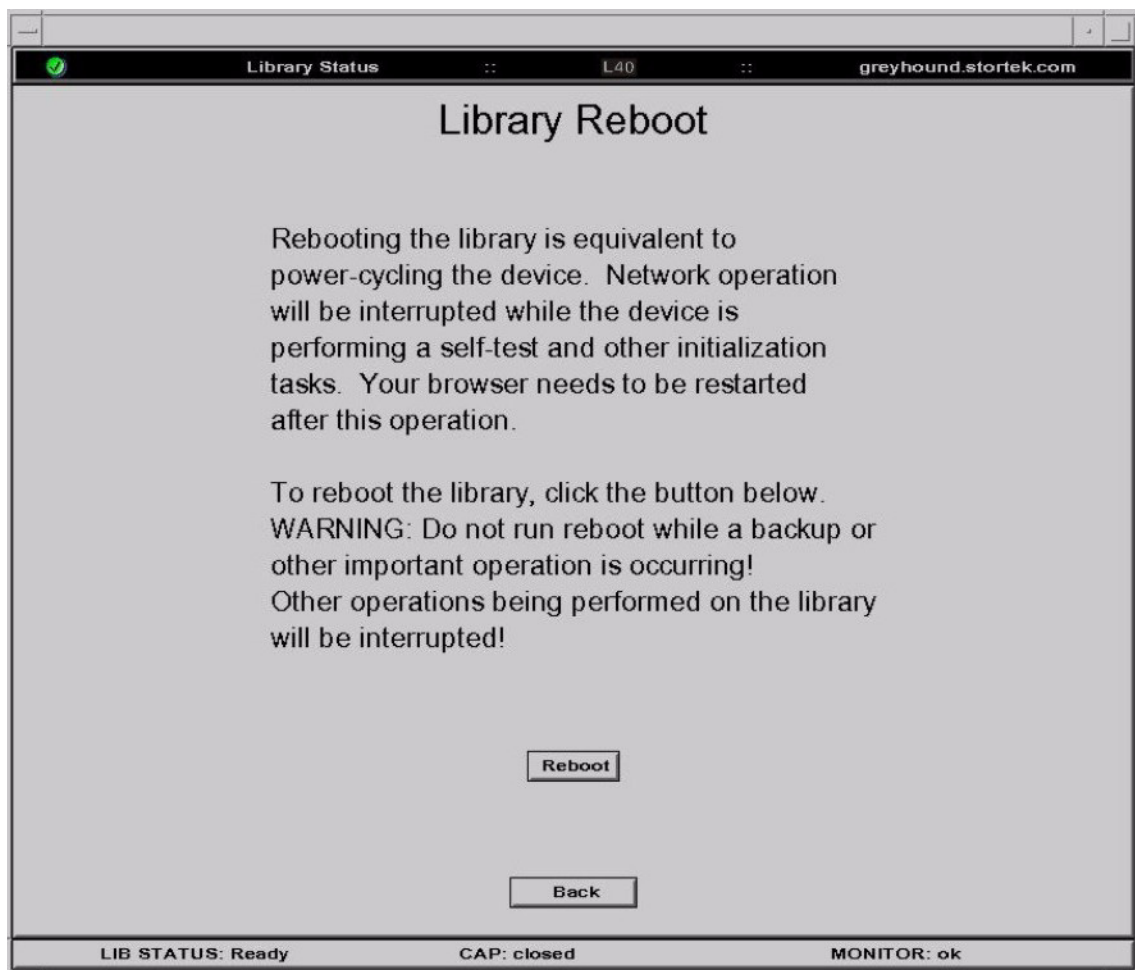
## Rebooting the Library

To reboot the library:

1. Select Reboot from the Library Status Tool initial screen.

The following screen is displayed.

**Figure 3-5. Library Reboot Screen (L201\_518)**



L201\_518

2. Click Reboot.

## SNMP

Sun StorageTek's L-series libraries support Version 1 of the simple network management protocol (SNMPv1). SNMP is an application layer protocol that performs network management operations over an Ethernet connection using a User Datagram Protocol (UDP/IP).

SNMP allows systems administrators to query the library for configuration, operation, and statistical information. SNMP also allows the library to inform the systems administrator of potential problems.

Systems administrators and network managers use SNMP to monitor and receive status from the library, such as:

- Operational state of the library (such as microcode level, serial number, online)
- Status of the cartridge access port (such as open, closed, number of cells)
- Library elements (number of hands, columns, panels, cells, CAPs)
- Number of storage cells and media types stored in the library
- Number and types of drives installed in the library
- Many other variables defined in the database

Refer to the *L40 Tape Library Installation Manual*, 96053, for information on SNMP setup and configuration.

## Library Admin

The Sun StorageTek L-series Library Admin is now available for the L40 tape library. This is an upgrade version of the Library Status tool that has enhanced maintenance and diagnostic capabilities. So, in addition to the features of the Library Status tool, the Library Admin includes the ability to:

- Get a virtual view of the library's cells.
- Obtain valuable statistics on the library, drives, cells, and the cleaning cartridge.
- View and modify the configuration of the library, drives, network, and also set the cleaning cartridge threshold. Under the network configuration, you can add and modify the SNMP agents and recipients.
- Run diagnostic routines such as the demo mode and library self-test. You can also remotely clean a drive.

For instructions on using the L-Series Library Admin, access the online help provided within the software.

**Note:** When you order the Library Admin, you will receive a personality module and a set of upgrade instructions. The upgrade instructions contain some important procedures you need to follow to install and set up the Library Admin.

The conversion bill for upgrading to the Library Admin in an L40 tape library is 63040.

## ■ Powering-off the Library

To power-off the library:

**CAUTION:**

***Possible equipment or cartridge damage or data loss. If you power-off the library without performing the following procedure, you risk possible equipment or cartridge damage or loss of data.***

1. Make sure all jobs have completed processing.
2. Quiesce the library to make sure the library and drives are offline.

**Note:** Refer to your client server software publication for instructions.

3. Move the power-on/off switch to the OFF position (O).

## ■ Manual Mode

This section describes the operation of the library in manual mode. Manual mode occurs when the library is taken offline by the client software, or loses power.

Operator tasks that are performed in manual mode include:

- [“Opening the Front Door” on page 3-23](#)
- [“Inserting the Cartridges into Cells” on page 3-24](#)
- [“Removing a Cartridge from the Hand” on page 3-27](#)
- [“Locating a Cartridge” on page 3-26](#)
- [“Inserting a Cartridge into a Drive” on page 3-28](#)
- [“Removing a Cartridge from a Drive” on page 3-28](#)
- [“Replacing a Cleaning Cartridge” on page 3-29](#)
- [“Cleaning a Drive” on page 3-30](#)
- [“Returning the Library to Ready Status” on page 3-31](#)

**Note:** If you encounter any problems that might need resolution by a service representative, use the information in the appendixes to obtain the appropriate assistance.

## Opening the Front Door

Before you perform *any* tasks inside the library, you must always select the Door Operations Menu on the operator panel so that the library is prepared for manual mode.

**CAUTION:**

***Possible hand damage:* Always wait for the OK To Open Door message to be displayed on the operator panel before opening the door. This ensures that the hand is safely retracted.**

To safely open the front door:

1. Press the MENU button to return to the Main Menu.
2. The arrow sign (>) will appear to the left of Door Operations.
3. Press the SELECT button.

The status display shows the DOOR MENU: Push SELECT to Prepare Library for Opening Door message.

4. Press the SELECT button.

The status display shows the Are you sure? message.

5. Press the SELECT button again.

The library stops all processes in an orderly way, ensures that any cartridge in the hand is fully seated, and safely retracts the hand. When the status display shows the OK to Open Door message, you may open the door.

**CAUTION:**

***Possible hand damage:* Always wait for the operator panel to display OK To Open Door before opening the door. This ensures that the hand is fully seated and retracted.**

6. Insert the key into the lock on the door and turn the key counterclockwise to open the front door of the library.

## Inserting the Cartridges into Cells

Make sure you refer to “[Electrostatic Discharge Damage Prevention](#)” on page xx before proceeding.

Depending on the version and configuration of your library, some storage cells cannot be used. Read the legend on the page following [Figure 3-6 on page 3-25](#).

**Note:** You do not have to insert a cartridge into every storage cell. The library automatically audits cartridges and empty cells as part of its initialization routine.

### **CAUTION:**

**Do not place a white cartridge into cell 1022d (see [Figure 3-6 on page 3-25](#)), or you will cause an initialization failure.**

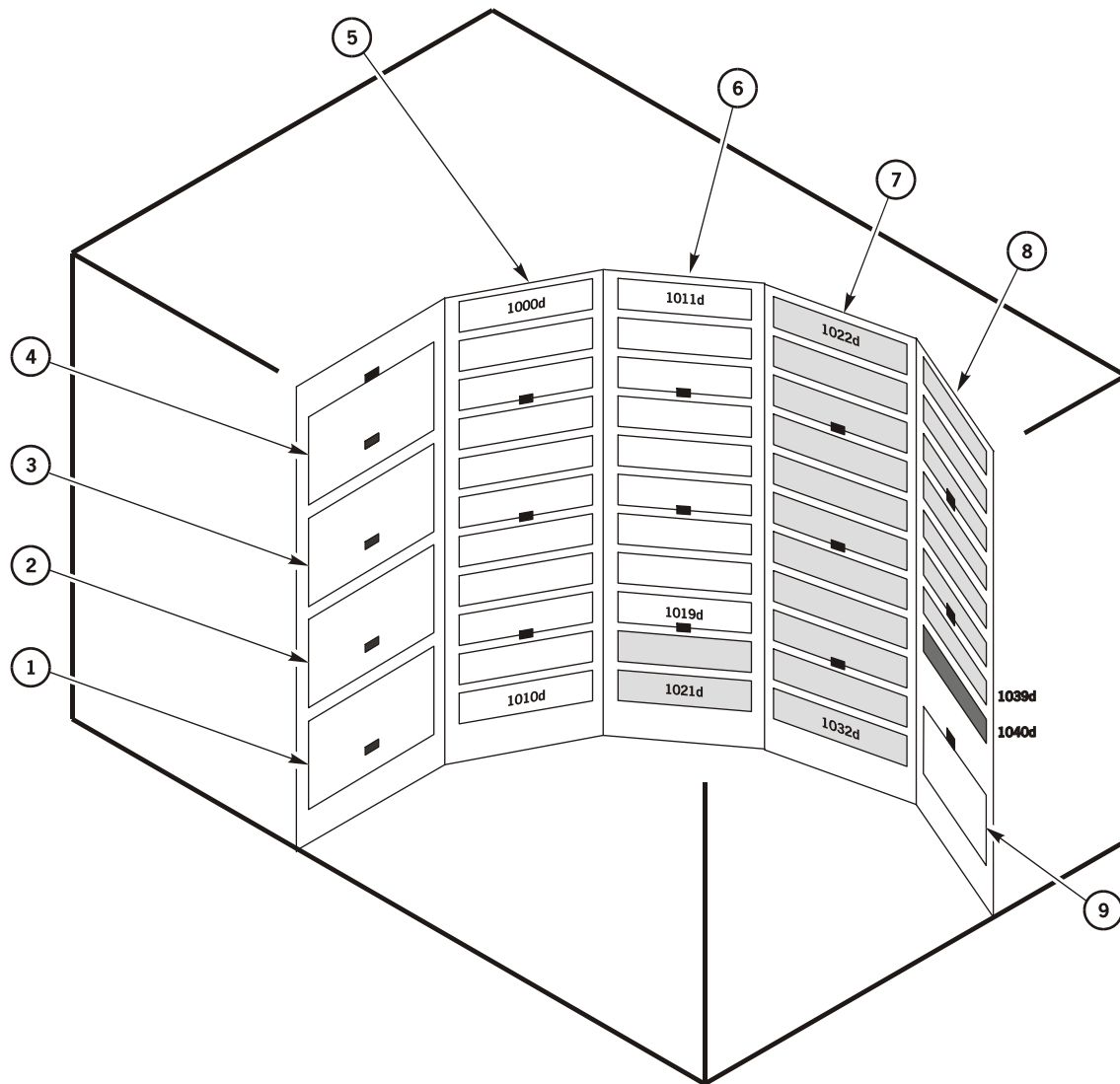
**Inserting the cartridges correctly is critical for library operation. If you do not orient the cartridges correctly or do not insert them all the way into the storage cells, the library might fail, and the operator panel might display an error message. Make sure you insert the cartridge *inside* the black array, not above or beneath it. [Figure 3-7 on page 3-26](#) shows the correct way to insert cartridges into storage cells.**

Check the cartridges to make sure that they are correctly labeled, as described in the user’s guide.

The media check feature, if enabled, ensures that there are no unreadable, unlabeled, or improperly placed cartridges. If the robot cannot grab one of these cartridges, the library status will be “not ready.”

Insert as many cartridges into the library as you want and as your configuration allows, making sure you seat them all the way into the storage cells.

Figure 3-6. Determining the Valid Storage Cells (L201\_038)



L201\_038

- |                 |                    |
|-----------------|--------------------|
| 1. Drive Slot 3 | 6. Column 1        |
| 2. Drive Slot 2 | 7. Column 2        |
| 3. Drive Slot 1 | 8. Column 3        |
| 4. Drive Slot 0 | 9. CAP (two cells) |
| 5. Column 0     |                    |

**Note:** In a 40-cell capacity library, if Auto Clean is not enabled, the cleaning cartridge cell can be used for a data cartridge, for a total of 41 data cells.

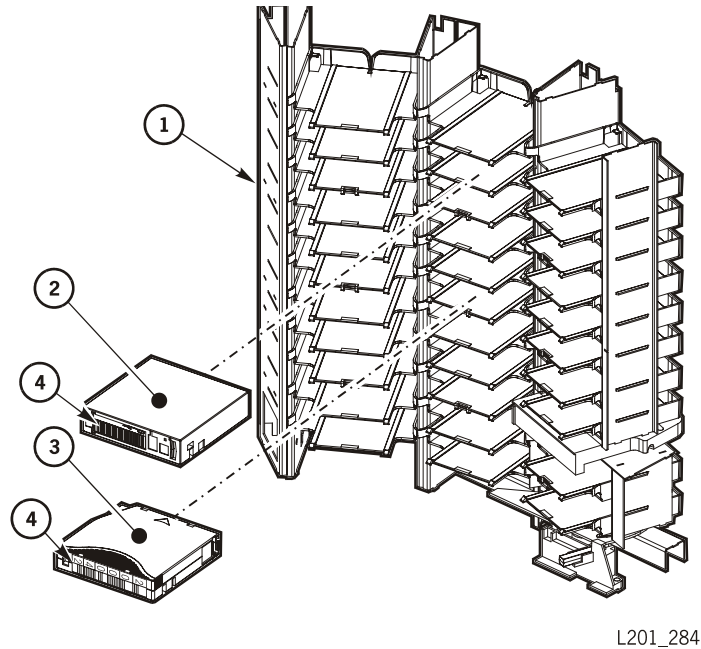
Use Columns 0 and 1 white cells for the 20-cell configuration.

Use Columns 0 and 1 white cells and Columns 2 and 3 gray cells for the 40-cell configuration.

Use the black cell above the CAP for a cleaning cartridge if Auto Clean is enabled.

The small, black rectangles are targets.

Figure 3-7. Inserting the Cartridges (L201\_284)



L201\_284

- |                  |                      |
|------------------|----------------------|
| 1. Storage Cells | 3. Ultrium cartridge |
| 2. DLT cartridge | 4. Volume number     |

## Locating a Cartridge

To locate a particular cartridge inside the library:

1. Open the door.
2. Locate the particular cartridge by its volume label and cell.
3. Remove the cartridge from the cell by sliding the cartridge out.
4. Close the library door.



## Removing a Cartridge from the Hand

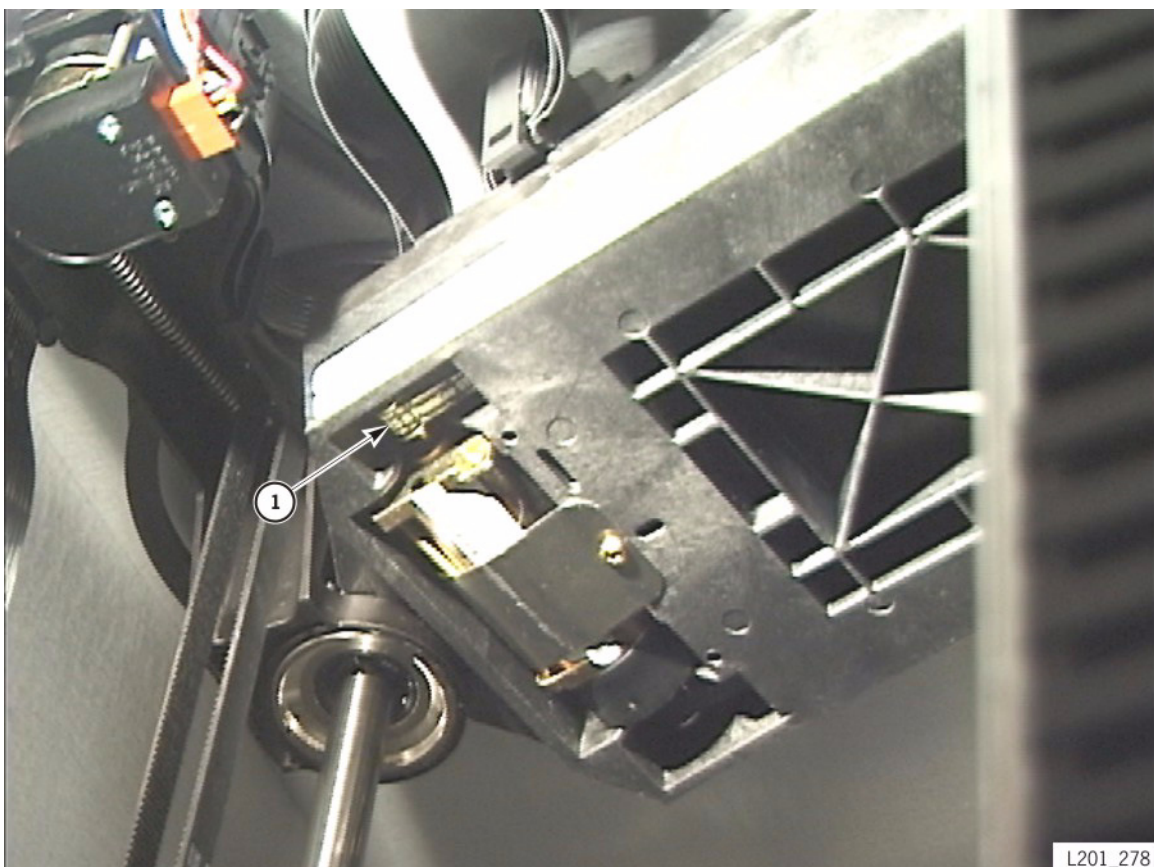
**CAUTION:**

**ESD hazard:** Refer to **“Electrostatic Discharge Damage Prevention”** on page xx before continuing.

To remove a cartridge from the hand:

1. Open the door.
2. Move the robot until it is in front of an empty cell or drive slot, and high enough so that you can reach under the hand.

Figure 3-8. Hand Belt (L201\_278)



1. Belt

3. Move the belt on the bottom right side of the hand until the cartridge is placed into the cell.
4. Move the belt in the opposite direction until the reach mechanism is retracted.
5. Move the robot so that you can access the cell.

6. If the cartridge is in a valid cell for your configuration, leave it there. If it is not, remove it and place it into a valid cell.
7. Close the library door.

## Inserting a Cartridge into a Drive

To manually insert a cartridge into a drive:

1. Obtain the volume label, location, and drive number from the server console.
2. Open the door.
3. Locate the cartridge (see “[Locating a Cartridge](#)” on page 3-26).
4. For DLT drives, make sure the DLT drive handle is up and the *Operate Handle* indicator (green LED) is steadily lit.

**Note:** If the handle is down, wait for the *Operate Handle* LED to be steadily lit before moving the handle up. If the *Operate Handle* LED is flashing while the handle is up, move the handle down and wait for the *Operate Handle* indicator to be steadily lit. Then move the handle up.

**CAUTION:**  
***Potential equipment damage. You must insert the cartridge properly or you will damage the drive. Use only DLT cartridges for DLT drives and LTO cartridges for LTO drives.***

5. Hold the cartridge so that the volume number is facing you and can be read from right to left.
6. Insert the cartridge into the drive and push the cartridge into the back of the drive until it is firmly seated. Hold the cartridge in place for three seconds.
7. For DLT drives, move the DLT drive handle down.
8. Close the library door.

## Removing a Cartridge from a Drive

To manually remove a cartridge from a drive:

1. Obtain the drive number from the server console.
2. Open the door.
3. Locate the appropriate drive.

**CAUTION:**  
***Possible data loss. Failure to perform the next step could result in data loss.***

4. Press the **Unload** button on the drive and wait approximately 12 seconds until the operation completes.

When the operation is completed, the green *Operate Handle* LED remains steadily lit.

5. For DLT drives, move the DLT drive handle up.

The cartridge ejects about 12.7 mm (0.5 in.).

**CAUTION:**

***Potential equipment damage. Wait at least three seconds before pulling the cartridge out of the drive. Immediately removing the cartridge might damage the cartridge or drive leaders.***

6. Gently pull the cartridge from the drive.

**Note:** If the cartridge does not come out of the drive, remount the cartridge. Then, for DLT drives, return to Step 5.

7. Store the cartridge in an empty cell or outside the library.

**Note:** If you store the cartridge in an empty cell, you must reinitialize the library and update the tape management's database (see [“Returning the Library to Ready Status” on page 3-31](#)).

8. Close the library door.

## Replacing a Cleaning Cartridge

Cleaning cartridges have a limited life span. Refer to your drive publication to determine how many times a cleaning cartridge should be used. When the usage count exceeds its limit, you must replace it with a new one.

To replace a cleaning cartridge:

1. Open the door.
2. Remove the expired cleaning cartridge from the cell directly above the CAP.
3. Insert the new cleaning cartridge into that cell.

**Note:** Refer to [Table 5-1 on page 5-5](#) and [Table 5-4 on page 5-10](#) to make sure your cartridge has the correct vendor and usage label.

4. Close the library door.

The status display shows that initialization tests are running.

5. Wait until the initialization tests complete before performing another task.

## Cleaning a Drive

The `Clean` Menu is used to initiate the manual cleaning of drives.

**Note:** Even if Auto Clean is enabled, you may still manually clean a drive using the instructions below.

**Table 3-9. Clean Menu**

<b>Drive to Clean:</b>	The drive to clean is always displayed. You can always edit this number, regardless of the state of Auto Clean.
<b>Usage Count:</b>	If Auto Clean is on, a usage count (the number of times the cartridge has been used to clean a drive) is displayed in the status display.
	<b>Note:</b> The cleaning cartridge must be used in a drive once for the correct usage to be displayed.

At the operator panel menu:

1. Press the arrow buttons until the `>` sign appears to the left of `Clean`.
2. Press the **SELECT** button.

The status display shows the `Drive to Clean: 00` message.

3. Press the **SELECT** button.

The underscore (`_`) appears under the right `0`.

4. Use the arrow buttons to select the drive to clean.
5. Press the **SELECT** button.

The status display shows the `Are you sure?` and the `Lib will be off-line` messages.

6. When the CAP opens, insert a cleaning cartridge into a CAP cell.

**Note:** Refer to [Table 5-1 on page 5-5](#) and [Table 5-4 on page 5-10](#) to make sure your cartridge has the correct vendor and usage label.

7. When the cleaning operation is done, retrieve the cleaning cartridge from the CAP.

## Returning the Library to Ready Status

To return the library to ready status:

1. Make sure cartridges are inserted correctly in the cells or drives and that they do not block the path of the hand assembly.
2. For DLT drives, check that the drives are ready by making sure the green *Operate Handle* LED is steadily lit and the drive handle is up.
3. Close the door and lock it by rotating the key counterclockwise; put the key in a safe place.
4. Make sure the power-on/off switch is set to the ON position (|).
5. Check the status display of the operator panel to make sure the initialization tests are running.
6. Enter the command to upload the audit data to the tape management software.

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# Troubleshooting and Diagnostic Tests

## 4

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This chapter describes how to correct problems with the library and drives. It also describes tests and how to examine the event log.

If you encounter any problems with the library, you should take several steps before contacting Customer Support Services (CSS) or European Customer Support Services (ECSS). These steps either help you resolve the problem or help identify the problem to CSS or ECSS.

Use the information in this chapter to diagnose and resolve the problem with the library. If you must contact CSS, or ECSS, see the appendixes for more information.

## ■ Troubleshooting the Library

Before running diagnostic tests, check the following areas of the library using these troubleshooting tips:

**Table 4-1. Troubleshooting Table**

<b>Problem</b>	<b>What to do</b>
Library does not power-on. The operator panel does not display any messages.	<ol style="list-style-type: none"><li>1. Make sure that the library power switch is in the ON position.</li><li>2. Check all power cord connections.</li><li>3. Replace power cord.</li><li>4. Make sure that there is power to the outlet.</li></ol>

**Table 4-1. Troubleshooting Table (Continued)**

Problem	What to do
Service Required (red) LED is constantly lit.	<p><b>Perform the following procedure:</b></p> <ol style="list-style-type: none"> <li>1. Check the operator panel for any displayed error messages. Note error messages reported.</li> <li>2. Make sure that the personality module is correctly installed and secured.</li> <li>3. Open the front door (see <a href="#">“Opening the Front Door” on page 3-23</a>). Observe and note the state of the cartridges, hand, and drives.               <ol style="list-style-type: none"> <li>a. Make sure that all cartridges are fully seated and properly oriented in their cells.</li> <li>b. Make sure that all packing materials have been removed.</li> <li>c. Inspect the library floor for any foreign objects or debris; remove them if found.</li> <li>d. Check the status of the drives.</li> </ol> </li> <li>4. Close the front door.</li> <li>5. Open the drive doors and check the following:               <ol style="list-style-type: none"> <li>a. Make sure that the drives are fully seated and locked forward by pushing and pulling on the rear of the drive tray. Any motion of the tray indicates that it requires reseating and locking down. If the drives are not fully seated, continue through e). Otherwise, go to step f).</li> <li>b. Turn the drive tray latch all the way to your left. This loosens the latch to its fully unlocked position.</li> <li>c. Slide the drive tray properly into the slot.</li> <li>d. Turn the latch all the way to the right to engage the latch and clamp it firmly into the frame.</li> <li>e. Pull back on the tray to make sure the tray is securely latched. It should not move.</li> <li>f. Make sure that all connectors are properly plugged into their respective connectors.</li> </ol> </li> <li>6. Close and secure the drive doors.</li> <li>7. Power-on the library and, after the library initializes, perform the self-test function (see <a href="#">“Library Self-Test and Event Log” on page 4-4</a>) from the operator panel.</li> </ol>



**Table 4-1. Troubleshooting Table (Continued)**

Problem	What to do
The client computer cannot communicate with the library or drives.	<ol style="list-style-type: none"> <li>1. Make sure that all cables are securely attached to their connectors on the rear of the library, the drives, and the client computer.</li> <li>2. Make sure that SCSI terminators are installed where required.</li> <li>3. Make sure that each SCSI device on the same bus has a unique address and that the last device is properly terminated.</li> <li>4. Make sure that the interfaces are matched for LVD or HVD operation. See <a href="#">Table 4-2 on page 4-4</a>.</li> </ol>
The library is unable to communicate with the drives.	Open the drive door and make sure all cables are properly seated.
Drive status on the operator panel displays Not communicating.	Open the drive door and make sure all cables are properly seated.
Repeated or excessive drive cleanings or cleaning messages.	<ol style="list-style-type: none"> <li>1. Replace cleaning cartridge with a new cleaning cartridge.</li> <li>2. Run the Library Self-Test (see <a href="#">“Library Self-Test and Event Log” on page 4-4</a>) and note if errors are reported for the drive.</li> <li>3. Run any client computer-based drive diagnostic tests.</li> </ol>
Cartridge stuck in drive or hand.	See <a href="#">“Removing a Cartridge from a Drive” on page 3-28</a> or <a href="#">“Removing a Cartridge from the Hand” on page 3-27</a> .
Drive is unable to eject a cartridge.	<ol style="list-style-type: none"> <li>1. Open the front door (see <a href="#">“Opening the Front Door” on page 3-23</a>).</li> <li>2. See <a href="#">“Removing a Cartridge from a Drive” on page 3-28</a>.</li> </ol>

**Table 4-2. SCSI Device/Bus Types: Issues**

If you plug a . . .	Into . . .	The result is . . .
Single-ended device	Single-ended bus	Proper connection
	LVD bus	Single-ended mode
	HVD bus	Operation disabled
Low voltage differential device	Single-ended bus	Single-ended mode
	LVD bus	Proper connection
	HVD	<i>Potential damage</i> /disabled device
High voltage differential device	Single-ended bus	Disabled device
	LVD bus	<i>Potential damage</i> /disabled device
	HVD bus	Proper connection

## ■ Library Self-Test and Event Log

If you have used the troubleshooting tips to try to correct a problem and the problem is not resolved, run the Library Self-Test or display the Event Log.

### Diagnostics Menu

This submenu provides self-test routines and a display of the Event Log.

**Table 4-3. Diagnostics Menu**

<b>Library Self-Test</b>	<p>The Library Self-Test:</p> <ul style="list-style-type: none"> <li>• Performs the normal initialization tests</li> <li>• Performs a “get” and “put” for each cartridge in the library</li> <li>• If a diagnostic cartridge is present, mounts and dismounts this cartridge to Drive 0, and then to the other drives.</li> </ul> <p>Problems with the library are shown in the status display.</p>
<b>Event Log</b>	The Event Log displays the 20 most recent events and errors.

With the information you obtain in the form of messages generated by the diagnostic tests, you can contact CSS or ECSS, or initiate a maintenance request to resolve the problem. For more information, see the appendixes.

## Library Self-Test

The Library Self-Test routine includes two default tests and an optional third test:

1. The library goes through a normal initialization.
2. Each data cartridge is removed from its cell and returned to its cell.

*If a diagnostic cartridge is within the library and at least one drive is installed:*

3. The diagnostic cartridge will be mounted into and dismounted from each drive, starting with Drive 0.

**Note:** The diagnostic cartridge is a blank data cartridge that has DG in the volume label.

To run the Library Self-test:

1. Press the **MENU** button to return to the Main Menu.
2. Press the arrow buttons until the > sign appears to the left of **Diagnostics**.
3. Press the **SELECT** button.

The status display shows the **Diagnostics** menu.

4. Press the arrow buttons until the > sign appears to the left of **Library Self-Test**.
5. Press the **SELECT** button.

The status display shows the **Are you sure?** message.

6. Press the **SELECT** button again.

The status display shows the **Running Init Test** message while the Library Self-Test runs. When the Library Self-Test is completed, the status display shows the **Command Completed** message.

**Note:** If the test did not complete successfully, make a note of the messages shown in the status display so that you can report them to CSS or ECSS. For more information, see the appendixes.

7. When the Library Self-Test completes, press the **MENU** button twice to return to the Main Menu.

## Event Log

The Event Log displays the last 20 most recent events and errors. This will give you a history of library actions, equipment errors, and a fault symptom code (FSC) that correlates to the event or problem. *Always write down the FSC*; this information is very important for the personnel in maintenance support.

When an FSC appears on the operator panel, line up the cursor with the FSC and press **SELECT** to display more information.

## Demo Mode

**Note:** Demo Mode will also appear in the Diagnostics Menu, but is used for *demonstration purposes only*; it will *not* assist you in troubleshooting the equipment. *Demo mode is not intended for customer usage.*

---

This chapter describes how to handle, inspect, and maintain cartridges.

**CAUTION:**

***Possible cartridge or tape drive damage: Use only Ultrium LTO cartridges in Ultrium LTO drives. Use only DLT cartridges in DLT drives.***

## ■ Handling Cartridges

Improper handling of cartridges can result in a loss of data or damage to a library component.

To handle a cartridge correctly:

- Make sure the leader is latched every time you pick up a cartridge.
- Keep cartridges *clean*.
- Inspect a cartridge before each use, and *never* put a damaged cartridge into a drive or library.
- Never pull tape from a cartridge.
- Never open a cartridge.
- Do not handle tape that is outside the cartridge; the tape edge might be damaged.
- Do not expose the tape or cartridge to direct sunlight or moisture.
- Do not expose a recorded cartridge to magnetic fields; this might destroy data on the tape.

## ■ Inspecting Cartridges

A defective or dirty cartridge can damage a drive. Always inspect a cartridge before inserting it into a drive or a library. Look for:

- Cracked or broken cartridge
- Broken leader
- Broken leader latch
- Damaged write-protect switch
- Liquid in the cartridge

- Labels not firmly or neatly attached or extending over the cartridge edge
- Any other obvious damage

## ■ Maintaining Cartridges

It is important to keep your tape cartridges in good condition. A defective or dirty cartridge can damage a drive. If you suspect a problem with a cartridge, inspect it for the possible defects listed in “Inspecting Cartridges” on page 5-1

The following sections describe how to store cartridges and clean their exteriors.

When you store a cartridge:

- Leave it in its protective wrapping until you are ready to use it.
- Choose a clean environment that duplicates the conditions of the room in which it is used.
- Make sure the cartridge has been in its operating environment for at least 24 hours.

When you clean a cartridge exterior:

### **CAUTION:**

***Potential damage to cartridges. Do not use certain solvents to remove labels or to clean cartridges because they can damage the cartridges. Do not use acetone, trichloroethane, toluene, xylene, benzene, ketone, methylethyl ketone, methylene chloride, ethyldichloride, esters, ethyl acetate, or similar chemicals.***

Wipe all dust, dirt, and moisture from the cartridge with a lint-free cloth.

Use Tape Cleaner Wipes, PN 4046289-01, to clean the cartridges. These wipes are saturated with isopropyl alcohol. Do *not* let any solution touch the tape or get inside the cartridge.

## ■ Cartridge Requirements

Cartridges must meet specifications defined in *American National Standard Magnetic Tape and Cartridge for Information Interchange*, ACS X3B5.

Refer to your drive vendor’s publication and Web site for specific cartridge requirements and specifications.

Colored cartridges are approved only if the measured reflection density is greater than 0.1 as measured by an X-rite 404G color reflection densitometer. For more information about colored cartridges, contact your Sun marketing representative.

Colored measurements are:

Bandwidth	ANSI Status T Wide band (380 to 780 nm)
Measuring range	Density (0.00 to 2.50) D
Accuracy	$\pm 0.02$ D
Repeatability	$\pm 0.01$ D
Aperture diameter	3.4 mm (0.13 in.)

## ■ Ordering Cartridges and Labels

Contact your authorized selling agent for Sun StorageTek-approved labeled cartridges.

### Note:

- You must select the volume serial number (VOLSER) range and other label options when ordering cartridges.
- If you choose to order additional labels, order them from any standard media vendor (such as those listed above).

Labels used in Sun StorageTek libraries can be made by any vendor that produces a label that meets the Sun StorageTek Label Specification. Some vendors (not all inclusive) are:

- EDP/Colorflex <http://www.colorflex.com>
- NetC <http://www.netcllc.com>
- WrightLine/American Eagle Systems <http://www.americaneaglesys.com>
- Dataware <http://www.datawarelabels.com>

These Web sites contain links to third party sites. These links are provided as a convenience to you and not as an endorsement by Sun. Sun is not responsible for the content of these linked Web sites and does not make any representations regarding the content or accuracy of any content on such Web sites.

For technical questions, contact the StorageTek Sales Support at:

**Telephone:** 1.800.ask4stk (1.800.275.4785)

**E-mail:** [sales\\_support@storagetek.com](mailto:sales_support@storagetek.com).

## ■ DLT Cartridges

The following sections describe DLT cartridges.

DLT 8000 and DLT 7000 drives from Quantum or Benchmark DLT1 drives most commonly use DLTtape IV cartridges.

DLT1 drives use only DLTtape IV cartridges. DLT1 drives can read—but not write to—DLTtape IV cartridges formatted by DLT 4000 drives. DLT1 drives require a unique cleaning cartridge.

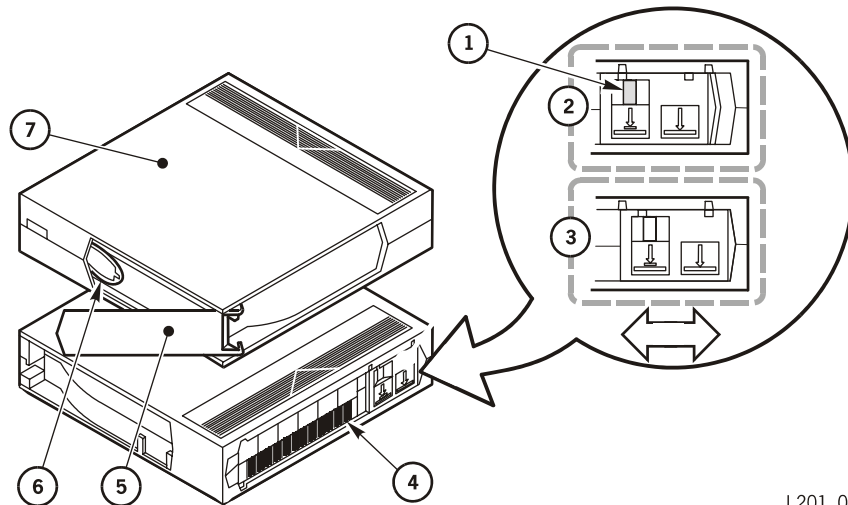
Some drives can also read and write data on Type III and III XT cartridges. Consult your sales representative or the drive documentation to determine the best tape to use in your library.

**CAUTION:**

**Data loss: Do not mount SDLT 320-formatted cartridges into SDLT 220 drives. An SDLT 220 drive will overwrite the 320 data. To avoid this, carefully manage the locations of the cartridges within your library, and designate the correct drive type for your read/write operations.**

See “Drives” on page 1-10 for other cartridge restrictions.

Figure 5-1. DLT Cartridge Components (L201\_052)



L201\_052

- |   |                              |
|---|------------------------------|
| 1. Orange indicator that denotes write-protection   | 4. Volume number label       |
| 2. Write-protection is on (the orange indicator is visible): data can only be read from the tape  | 5. Leader latch              |
| 3. Write-protection is off (the orange indicator is not visible): data can be written to the tape | 6. Tape leader               |
|   | 7. Top side of the cartridge |



## Applying Cartridge Labels

Cartridge labels reflect the cartridge media and usage. If your cartridges were not ordered with labels already applied, you must apply them yourself. You must correctly label all cartridges for library use.

**CAUTION:**

***Possible misread of volume number label: Make sure the edges of the labels do not curl; curling causes the cartridges to stick in the drive loader and the robot will misread the label.***

**Table 5-1. DLT Cartridge Codes**

Label	Type of Cartridge
D	DLTtape IV data cartridges
C	DLTtape III data cartridges
E	DLTtape IIIXT data cartridges
CLN	Cleaning cartridges <sup>1</sup>
DG	Diagnostic cartridge (apply a DG label to a blank data cartridge to be used for diagnostic tests) <sup>2</sup>
S	All SDLT cartridges

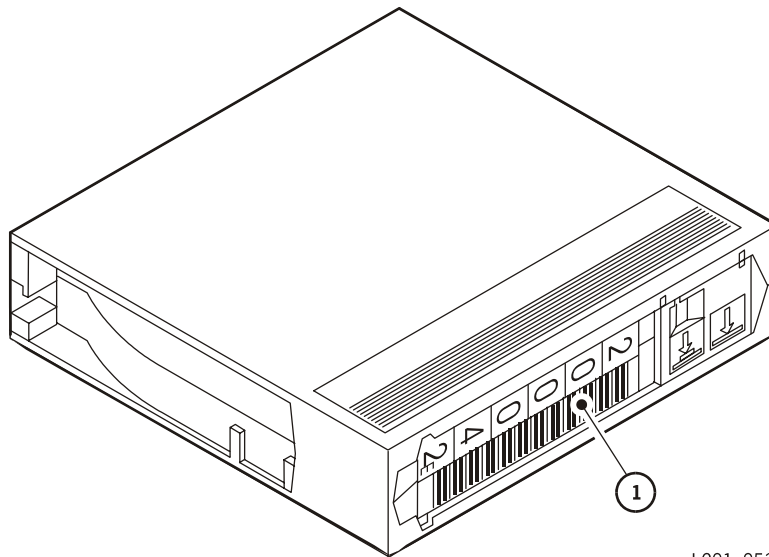
<sup>1</sup>SDLT cleaning cartridge part number is 10009840x, label is 31374480x.  
<sup>2</sup>SDLT diagnostic cartridge part number is 10009970x, label is 31371250x.

Perform these steps before applying the label into the recessed area on the cartridge:

1. Make sure the cartridge has been at room temperature for at least 24 hours.
2. Clean the surface where the labels will be placed using a cleaning solution made for this purpose (see [“Maintaining Cartridges”](#) on page 5-2).
3. Locate the type of label that you require (see [Table 5-1](#)).
4. Hold the cartridge so that the write-protect switch is toward you.
5. Slide the label under the slots in the recessed area.

Figure 5-2. DLT Cartridge Volume Number Label (L201\_053)

---



- 
1. Volume number label
- 

## Setting the Write-Protect Switch

You can set the write-protect switch so the cartridge is *write-enabled*. See [Figure 5-1 on page 5-4](#), and slide the switch to the right so the orange indicator is not visible. In this position, the drive can write as well as read data. This setting is recommended when inserting cartridges into the library.

You can set the write-protect switch so that the cartridge is *read-only* (nothing can be written on the tape). Slide the switch to the left so that the orange indicator is visible. In this position, the drive can only read data from the tape, but cannot write data on it.

## DLTtape Cartridge Environmental Specifications

Contact the manufacturer of your cartridges for the most current operating, storage, and other specifications (Table 5-2).

**Table 5-2. DLT Cartridge Environmental Specifications**

<i>Operating environment</i>	
Temperature	10°C to 40°C (50°F to 104°F)
Relative humidity	20% to 80% non-condensing
Wet-bulb temperature	25°C (77°F) maximum
<b>CAUTION:</b>	
<b>Potential damage to cartridges. Temperatures above 49°C (120°F) might damage the tapes. If during storage or transportation a cartridge has been exposed to conditions exceeding the above values, before using the cartridge, keep the cartridge within those operating environment specifications for at least as long as the time that the cartridge exceeded the specifications, up to two hours. Make sure that the cartridge has no moisture on it.</b>	
<b>When storing DLT cartridges, the stray magnetic field at any point on the tape shall not exceed 4000A/m.</b>	
<i>Cartridge storage environment</i>	
Temperature	16°C to 32°C (61°F to 90°F)
Relative humidity	20% to 80% non-condensing
Wet-bulb temperature	26°C (79°F) maximum
<i>Cartridge storage environment for cartridges intended for archiving data for one year or more</i>	
Temperature	18°C to 26°C (64°F to 79°F)
Relative humidity	20% to 60%

## ■ SDLT Cartridges

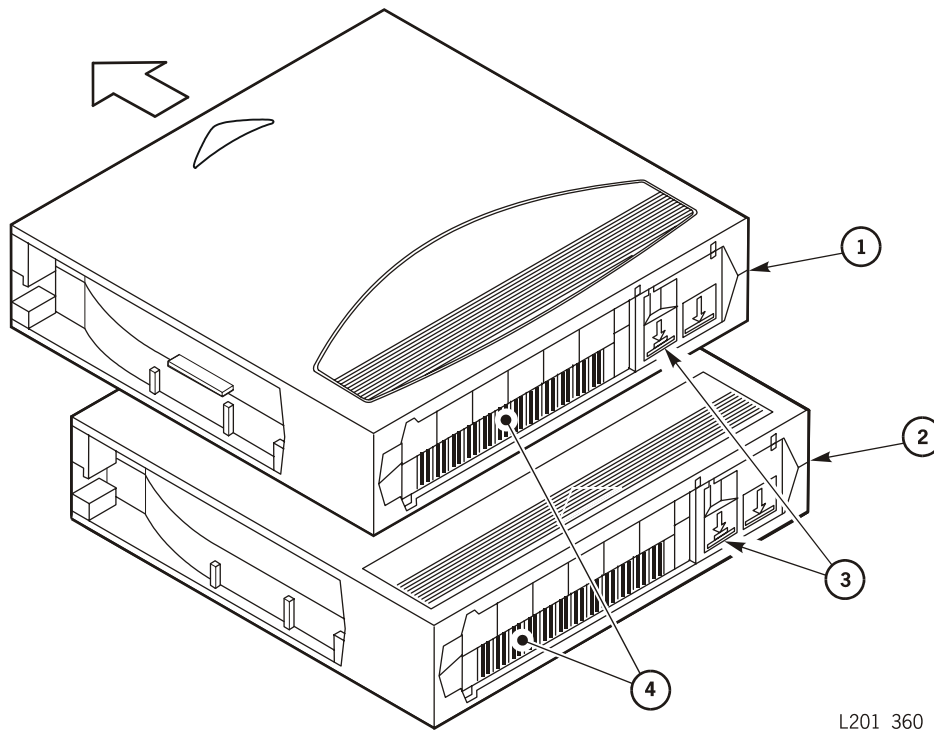
SDLT cartridge components are shown in the top cartridge of [Figure 5-3](#).

SDLT drives use unique data and cleaning cartridges. Differences between the SDLT and standard DLT/DLT1 cartridges are shown in [Figure 5-3](#).

**CAUTION:**

*Data loss:* Do not mount SDLT 320-formatted cartridges into SDLT 220 drives. An SDLT 220 drive will overwrite the 320 data. To avoid this, carefully manage the locations of the cartridges within your library, and designate the correct drive type for your read/write operations.

Figure 5-3. DLT and SDLT Cartridge Differences (L201\_360)



L201\_360

1. SDLT cartridge
2. DLT cartridge
3. Write-protect switches
4. Volume serial number (VOLSER) labels

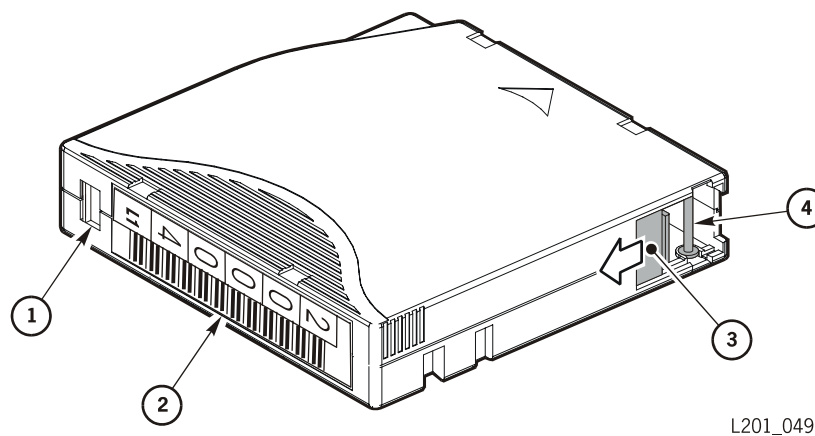
**Table 5-3. SDLT Cartridge Tape Specifications**

Performance	SDLT 600
Capacity, native (uncompressed)	300 GB
Archival life	30 years
Tape drive compatibility	SDLT600
Form factor	Half inch
Width	105.6 mm (4.16 in.)
Length	105.3 mm (4.15 in.)
Depth	25.4 mm (1.0 in.)
Weight	222.5 g (7.85 oz)
Humidity	20%-80%
Temperature (non-condensing)	10° to 40°C (50° to 104°F)
Wet bulb maximum	26°C (78°F)

## ■ Ultrium Cartridges

The following sections describe Ultrium cartridges.

**Figure 5-4. Ultrium Cartridge Components (L201\_049)**



- |   |                |
|---|----------------|
| 1. Write-protect switch (data cartridge has red switch, cleaning cartridge has gray switch) | 3. Access Door |
| 2. Volume number label  | 4. Leader pin  |

## Cartridge Label Codes

Cartridge labels reflect the cartridge media and usage (Table 5-4). The letter located next to the last number in the volume label reflects the media. Cleaning cartridges must match the drive type.

**Table 5-4. Ultrium Cartridge Codes**

Label	Type of Cartridge
L <sub>1</sub>	Gen1 data cartridge
L <sub>2</sub>	Gen2 data cartridge
L <sub>3</sub>	Gen3 data cartridge
C <sub>1</sub> plus CLN	Cleaning cartridge for Hewlett-Packard
C <sub>2</sub> plus CLN	Cleaning cartridge for IBM
C <sub>3</sub> plus CLN	Cleaning cartridge for Seagate
L plus DG	Diagnostic cartridge (apply a DG label to a blank data cartridge to be used for diagnostic tests)

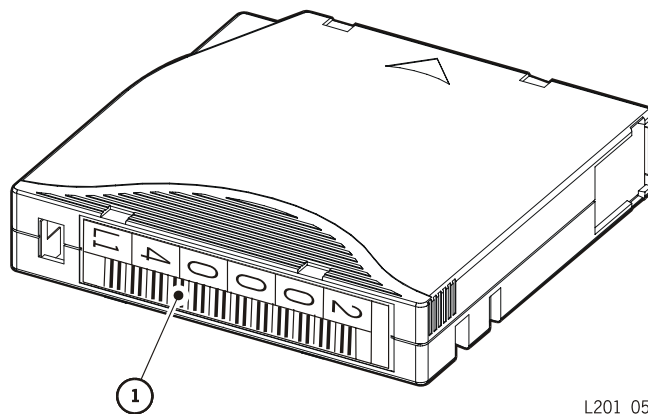
## Applying Cartridge Labels

Cartridge labels reflect the cartridge media and usage. If your cartridges were not ordered with labels already applied, you must apply them yourself. You must correctly label all cartridges for library use.

**CAUTION:**

***Possible misread of volume number label: Make sure the edges of the labels do not curl; curling causes the cartridges to stick in the drive loader and the robot will misread the label.***

**Figure 5-5. Ultrium Cartridge Label (L201\_050)**



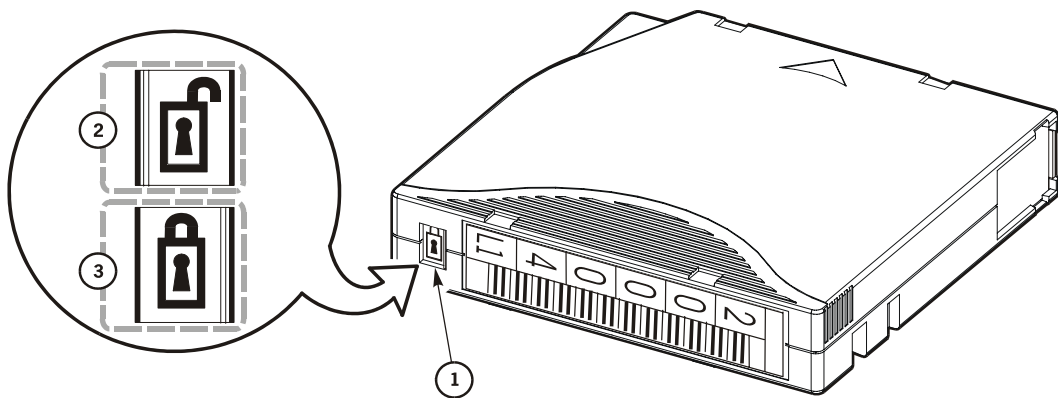
1. Volume number label

## Setting the Write-protect Switch

You can set the write-protect switch so the cartridge is *write-enabled*. Slide the switch to reveal the “open lock” symbol to write-enable the tapes. In this position, the drive can write as well as read data. This setting is recommended when inserting cartridges into the tape library.

You can set the write-protect switch so that the cartridge is *read-only* (nothing can be written on the tape). Slide the switch to reveal the “closed lock” symbol. In this position, the drive can only read data from the tape, but cannot write data to it.

**Figure 5-6. Setting the Ultrium Write-Protect Switch (L201\_051)**



L201\_051

1. Write-protect switch (data cartridge has red switch, cleaning cartridge has gray switch)
2. Write-enabled
3. Write-protected

## Ultrium Cartridge Environment Specifications

The following tables list the LTO Gen 1, 2, and 3 specifications.

**Table 5-5. LTO Gen 2 and 3 Cartridge Tape Specifications**

Specification	L2 Cartridge	L3 Cartridge
Capacity, native (uncompressed)	200 GB	400 GB
Capacity (compressed) **	400 GB	800 GB
Read and write tape speed	5.9 m/s	5.9 m/s
Search and rewind speed	7.0 m/s	7.0 m/s
Archival life	15–30 years	15–30 years
Number of tracks	512 tracks	704 tracks
Dimensions		
Width	107 mm (4.2 in.)	107 mm (4.2 in.)
Height	22.9 mm (0.9 in.)	22.9 mm (0.9 in.)
Depth	102 mm (4.0 in.)	102 mm (4.0 in.)
Weight	210.0 g (0.46 lb)	210.0 g (0.46 lb)
Temperature (non-condensing)		
Operating	10 to 40°C (50 to 104°F)	10 to 40°C (50 to 104°F)
Shipping	-23 to 49°C (-10 to 120°F)	-23 to 49°C (-10 to 120°F)
Wet bulb	26°C (78°F)	26°C (78°F)
Humidity	20–80%	20–80%
** Assuming a 2:1 compression ratio.		



**Table 5-6. LTO Gen 1 Cartridge Tape Specifications**

Specification	L1 Cartridge
Capacity, native (uncompressed)	100 GB
Capacity (compressed) **	200 GB
Read and write tape speed	4.0 m/s
Search and rewind speed	7.0 m/s
Archival life	15–30 years
Number of tracks	384 tracks
Dimensions	
Width	107 mm (4.2 in.)
Length	22.9 mm (0.9 in.)
Depth	102 mm (4.0 in.)
Weight	210.0 g (0.46 lb)
Temperature (non-condensing)	
Operating	10 to 40°C (50 to 104°F)
Shipping	-23 to 49°C (-10 to 120°F)
Wet bulb	26°C (78°F)
Humidity	20–80%
** Assuming a 2:1 compression ratio.	

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# Customer Support

# A

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This appendix describes how to contact Customer Support Services.

## ■ Customer Services Support Center

Customer support is available 24 hours a day, seven days a week, to customers with Sun or StorageTek maintenance contracts and to Sun employees. You can find additional information about customer support on the Customer Resource Center (CRC) Web site at:

<http://www.support.storagetek.com>

## ■ Customer-initiated Maintenance

Customer-initiated maintenance begins with a telephone call from you to Sun Microsystems StorageTek Support. You receive immediate attention from qualified Sun personnel, who record problem information and respond with the appropriate level of support.

To contact Sun Microsystems StorageTek Support about a problem:

1. Use a telephone to call the StorageTek Customer Services Support Center at:

**☎ 1-800-525-0369** (from within the United States) or

**☎ 303-673-4056** (from outside the United States) or

See “Sun’s Worldwide Offices” on page A-2 for information about International customer support centers.

2. Describe the problem to the call taker. The call taker will ask several questions and will either route your call to a trained support technician or dispatch a service representative.

If you have the following information when placing a service call, the process will be much easier:

<b>Account name</b>	_____
<b>Site location number</b>	_____
<b>Contact name</b>	_____
<b>Telephone number</b>	_____
<b>Equipment model number</b>	_____
<b>Device address</b>	_____
<b>Device serial number (if known)</b>	_____
<b>Urgency of problem</b>	_____
<b>Fault Symptom Code (FSC)</b>	_____
<b>Problem description</b>	_____
	_____
	_____
	_____
	_____
	_____

## ■ Sun's Worldwide Offices

You may contact any of Sun's worldwide offices to discuss complete storage, service, and support solutions for your organization. You can find address and telephone number information on Sun's external Web site at:

<http://www.sun.com/worldwide/>

# Glossary

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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 the parentheses that follow some definitions 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).

**(E)** The ANSI/Electronic Industries Association (EIA) Standard-440-A, *Fiber Optic Terminology*.

**(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 by IBM.

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

## 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 a cartridge tape in an automated library.

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

**automated mode** A relationship between a library and the client. In automated mode, the robot moves the cartridges among the storage cells, CAP, and drives in response to client commands. This is the normal operating mode of a library that is communicating with the client.

## B

**B** *See* byte.

**backward read compatible (BRC)** The ability of an SDLT 220 tape drive to read recorded data from an earlier version of DLT tape drive. *Contrast with* non-backward read compatible (NBRC).

**baud** The communications transfer rate for serial data.

**bit** (1) A unit of information equal to a 1 or a 0.

**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** A facility that transfers data between two devices with only one device having control at a time.

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

## C

**C** (1) Celsius. (2) Centigrade.

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

**CAP** *See* cartridge access port.

**cartridge** A storage device that consists of magnetic tape on supply and take-up reels, in a protective housing. (IBM)

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

**cartridge drive** The unit that houses the magnetic-tape transports and controllers that store and retrieve data for the host system in a cartridge subsystem.

**cartridge tape** A composite of the plastic housing and the magnetic tape.

**catalog** (1) The inventory of all cartridge tape storage locations in a library; this inventory is by library number, panel, row, column. (2) A stored list of backed up files and directories and the locations of the backup copies.

**cell** The location in the library in which a cartridge is stored.

**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.

**command line interface (CLI)** The CSE port on the LLC card.

**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** *See* 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 replaceable unit (CRU)** (1) An assembly that a customer is allowed to replace in its entirety when it fails.

### Customer Resource Center (CRC)

StorageTek's Web-based service that provides technical information to customers with Sun StorageTek maintenance contracts. A log-in and password are required.

## D

**daisy chain** (1) A method of device interconnection for determining interrupt priority by connecting the interrupt sources serially. (2) A device interconnection cable.

**diagnostic cartridge** A data cartridge 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.

**DC** Direct current.

**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)** (1) A trademarked name for Quantum cartridge tapes and drives. (2) A type of magnetic tape storage device marketed by several companies. DLT cartridges are 1/2-inch wide and come in several sizes ranging from 20 to over 80 GB.

**dismount** To remove a cartridge from a drive.

**DLT** *See* Digital Linear Tape.

**DLT1** A low cost, high-capacity tape drive manufactured by Benchmark Storage Innovations and Quantum Corporation. It features a native capacity of 40 GB using DLTtape IV media with a sustained transfer rate up to 3 MB/s.

**domain** (1) A shared user authorization database which contains users, groups, and their security policies. (2) A set of interconnected network elements and addresses that are administered together and that may communicate.

**Domain Name Service (DNS)** A service that translates domain names into IP addresses. Because domain names are alphabetic, they are easier to remember than IP addresses. *See* library name.

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

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

**Dynamic Host Configuration Protocol (DHCP)** (1) Server software that automatically sets the library IP address, subnet mask, and name. (2) Server software that automatically sets IP address, net mask, and gateway. (IBM)

## E

**electronics module** 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 discharge of an accumulated electrical charge (static) that can severely damage delicate components and degrade electrical circuitry.

**element** An externally addressable component of a library, such as a drive, CAP, or storage cell.

**enabled** (1) Active. (2) On.

**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. (IBM)

**Ethernet address** A six-byte address that makes a library accessible to a network. *See also* Ethernet, Internet Protocol (IP) address, library name, and 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)** A four-character hexadecimal code generated in response to an error to help isolate failures within the device.

**FC** *See* Fibre Channel.

**FRU** *See* field replaceable unit.

**fiber-optic cable** A jacketed cable of thin strands of glass that carries pulses of light that 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. (E)

**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.

**field replaceable unit (FRU)** An assembly that is replaced in its entirety when any one of its components fails. (IBM)

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

**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 ROM. (T) Also known as “microcode.”

**FSC** *See* fault symptom code.

## G

**g** gram.

**Gateway** A 32-bit, or 4-byte number, in dotted decimal format (typically written as four numbers separated by periods, such as 107.4.1.3 or 84.2.1.111) that is applied to an IP Address to identify router interface.

**GB** *See* gigabyte.

**get** An activity in which a robotic hand obtains a cartridge from a cell or drive.

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

## H

**HBA** *See* host bus adapter.

**hand assembly** 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 cartridge volume labels.

**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 slower in data transfer rates than LVD (low voltage differential).

**host** The primary computer on a network, with which other computers interact.

**host bus adapter (HBA)** A circuit installed in a multi-platform host or device that interfaces between the device and the 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. (I)

**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. (I)

**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.

**interface** Hardware, software, or both, that links systems, programs, or devices. (IBM)

**Internet Protocol (IP)** A stacked set of protocols, developed by the United States Department of Defense, to facilitate communication between dissimilar computers over networks.

**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

**label** An identifier associated with a removable media or cartridge. Labels may be humanly readable, machine readable, or both. *Synonymous with* VOLSER and volume serial number.

**lb** An abbreviation for pound.

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

**Library Admin** *See* StorageTek L-Series Library Admin.

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

**Library Status Tool** A proprietary software that resides internal to the library and is activated using a Web browser. It is used to monitor the library, load code, reboot library, and to generate reports on library, drives, fault symptom codes (FSCs), and tape inventory.

**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.

**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** Milliamperes 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.

**media type** A type of removable media. For example, a DLT IV media type indicates that the cartridge is for use in a Quantum DLT drive.

**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)** 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 ( $\mu$ )** A prefix that means one one-millionth ( $10^{-6}$ ).

**microcode** *See* firmware.

**millimeter (mm)** A unit of measure equal to 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.

**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 file system (NFS)** A distributed file system and its associated network protocol.

**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.

**non-backward read compatible (NBRC)** The inability of an SDLT 220N tape drive to read recorded data from an earlier version of DLT tape drive. *Contrast with* backward read compatible (BRC).

## O

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

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

**open fiber control (OFC)** Open Fiber Control (OFC) cables incorporate a safety mechanism that prevents damage to the human eye when the connection (link) is disconnected.

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

**operating system** Software that controls the execution of program and that may provide services such as resource allocation, scheduling, input/output control, and data management. Although operating systems are predominately software, partial hardware implementations are possible. (I)

**oz** An abbreviation for ounce. A unit of weight equal to 28.35 grams.

## 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 assembly.

**port** (1) A specific communications end point within a host. A port is identified by a port number. (IBM) (2) A specific end-point for communications within a host or from a host to a peripheral device or vice versa. (3) In Fibre Channel, it is an access point in a device where a link attaches. Examples of this port are N\_Port, NL\_Port, F\_Port, and FL\_Port.

**put** An activity in which a robotic hand releases a cartridge into a cell or drive.

## Q

**quiesce** (1) Allowing all activity to complete before any new activity is allowed to start. (2) To bring a device or an application to a state where all processing has been suspended and there are no tasks in progress.

## R

**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** The cells in the library in which only cleaning cartridges, diagnostic cartridges, or swapped data cartridges may reside. Only one of these cells is a swap cell.

**robot** An electromechanical device that moves cartridges among the cartridge access ports, the storage cells, and the drives.

## S

**s** Seconds.

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

**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. *Synonymous with* target.

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

**Simple Network Management Protocol (SNMP)** A protocol for monitoring and managing systems and devices in a network.

**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.

**SNMP** *See* Simple Network Management Protocol.

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

**StorageTek L-Series Library Admin** An optional interface that simulates internet browser operation for the library. This is an upgrade of the Library Status Tool.

**submenu** A menu related to and reached from a main menu. (IBM)

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

**Super DLT** The next generation of DLT (Digital Linear Tape) products, which remains a standard for mid-range operating systems.

**swap cell** The cell among the reserved cells into which the robot might temporarily place a cartridge.

## T

**tape** *See* magnetic tape.

**tape drive** *See* drive.

**tape transport interface (TTI)** An interface to control/monitor tape movement.

**target** A machine-readable optical pattern used to determine robot position. *See also* SCSI device.

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

**thumbscrew** The large, cylindrical, rough-edged handle on the rear of a drive tray that, when a person turns it, lets the person secure the drive to the drive column.

## U

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

## 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** A data carrier that mounts and dismounts as a unit; for example, a reel of magnetic tape or a disk pack.

**volume serial number (VOLSER)** 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

**warning count** A user-determined limit that indicates the number of times a cleaning cartridge will be used before it must be exported from the library.

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

**write-protect (WP)** To set the switch on 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 motor** The motor responsible for the vertical movement of the hand assembly in the library.

**Z shafts** The columns (or tubes) which allow the hand assembly in the library to move vertically.

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# Index

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## A

- AC power supply
  - location, 1-4
- adding cell and drive capacity, 2-9
- advertencia
  - mensajes en el manual, 1-xii
  - peso de la biblioteca en el bastidor, xxi
- advertencia, descripción, 1-xii
- agreement, internal code, xxvii
- alert messages in manual, 1-xii
- applying DLT cartridge labels, 5-5
- applying Ultrium cartridge labels, 5-10
- arrow buttons, 2-2
- audit data, 1-12
- Auto Clean feature
  - setting, 2-5
  - understanding, 2-4
  - valid storage cells when off, 1-7
- automated mode operations
  - inserting a cartridge through the CAP, 3-1
  - monitoring the operator panel, 3-2
  - powering-off the library, 3-22
  - removing a cartridge through the CAP, 3-2
  - setting cleaning cartridge warning count, 3-9
  - using Library Status Tool, 3-13

## B

- buttons
  - arrow, 2-2
  - library reset, 1-4, 2-8
  - MENU**, 2-2
  - SELECT**, 2-2

## C

- cables de fibra óptica
  - conectores, xxiii
  - instalación, xxiii
  - manipulación, xxiii
- CAP OPEN* indicator, 2-2
- CAP. *See* cartridge access port
- capacity

- adding, 2-9
  - L40 options, 1-7
- cartridge access port (CAP)
  - inserting a cartridge through, 3-1
  - removing a cartridge through, 3-2
  - status messages, 3-6
- cartridge specifications
  - SDLT, 5-9
- cartridges
  - applying DLT labels, 5-5
  - applying Ultrium labels, 5-10
  - cleaning the exterior, 5-2
  - cleaning. *See* cleaning cartridges
  - colored specifications, 5-2
  - DLT
    - label codes, 5-5
    - label location, 5-6
    - write-protect switch setting, 5-6
  - handling, 5-1
  - inserting into cells, 3-24
  - inserting into drive, 3-28
  - inserting into library, 3-26
  - inserting through the CAP, 3-1
  - inspection, 5-1
  - labels
    - Ultrium prefixes, 5-10
  - locating, 3-26
  - maintaining, 5-2
  - ordering, 5-3
  - removing from drive, 3-28
  - removing through the CAP, 3-2
  - requirements, 5-2
  - SDLT 220, 5-8
  - specifications
    - DLT/DLT1, 5-7
  - storing, 5-2
  - Ultrium
    - label codes, location, 5-10
    - write-protect switch setting, 5-11
  - weight, 1-14
  - write-protect switch setting
    - SDLT 220, 5-8
- caution
  - cleaning cartridges, 3-10

- messages in manual, 1-xii
- mixing DLT cartridges, 1-11
- removing cartridge from drive, 3-29
- safety precautions, xvii
- SDLT 320 data loss, 5-4, 5-8
- shielded cables, xxv
- static electricity, xx
- caution, description, 1-xii
- CE compliance statement, xxv
- cells valid location, 3-25
- cleaning
  - a cartridge's exterior, 5-2
  - a drive manually, 3-30
- cleaning cartridges
  - DLT label prefix, 5-5
  - label prefix
    - Ultrium, 5-10
  - manually cleaning a drive, 3-30
  - replacing, 3-29
  - Ultrium label prefix, 5-10
- client software, 1-13
- colored cartridge specifications, 5-2
- columns location, 3-25
- command line interface (CLI) port
  - PC setup, 2-13
- CompacTape labels, 5-6
- compliance statements
  - CE, xxv
  - FCC, xxv
  - Japanese, xxvi
  - Taiwan, xxvi
- configuration menus
  - Drive, 2-6
  - Library, 2-4
  - Network, 2-7
  - temperatures, 2-8
- configuring the library
  - resetting the library, 2-8
  - setting temperatures, 2-8
  - understanding the Auto Clean feature, 2-4
  - understanding the Fast Load feature, 2-4
  - using the Drive Info/Cfg menu, 2-6
  - using the Lib Info/Cfg menu, 2-4
  - using the Network Info/Cfg menu, 2-7
- controlling software, 1-13
- conventions in manual, xiii
- conversion bills, 2-9
- CSE serial port location, 1-4

- Customer Resource Center (CRC), 1-xv
- Customer Services Support Center (CSSC), A-1
- Customer-initiated maintenance, A-1

## D

- data, audit, 1-12
- Demo test, 4-6
- desktop installation
  - dimensions, 1-17
- diagnostic cartridge
  - DLT label prefix, 5-5
  - Ultrium label prefix, 5-10
- diagnostic cartridges
  - label prefix
    - Ultrium, 5-10
- diagnostic tests
  - Demo, 4-6
  - Library Self-Test, 4-5
- Diagnostics menu, 4-4
- digital linear tape. *See* DLT/DLT1 cartridges, DLT/DLT1 drives
- dimensions
  - desktop installation, 1-17
  - rack installation, 1-16
- DLT cartridges
  - label location, 5-5
  - ordering, 5-3
  - write-protect switch setting, 5-6
- DLT/DLT1 cartridges
  - environment specifications, 5-7
- downloading firmware, 2-12
  - using Library Status, 3-19
- Drive Info/Cfg menu, 2-6
- drives
  - configuration table, 2-11
  - inserting cartridge into, 3-28
  - manually cleaning, 3-30
  - power specifications, 1-14
  - removing cartridge from, 3-28
  - SCSI ports, 1-4
  - viewing the status, 3-3
  - weight, 1-14
- dual power label location, 1-4

## E

- electronics module location, 1-4



environmental specifications, 1-13  
 ESD prevention, xx  
 Ethernet port location, 1-4  
 etiqueta de producto láser, xxii  
 etiqueta, producto láser, xxii  
 event log, 3-7

## F

Fast Load feature  
   setting, 2-5  
   understanding, 2-4  
 fault symptom code (FSC), 3-7  
 FCC compliance statement, xxv  
 features  
   Auto Clean, 2-4, 2-5  
   Fast Load, 2-4, 2-5  
   safety, 1-13  
 fiber-optic cables  
   connectors, xix  
   handling, xix  
   installation, xix  
 fibre router card location, 1-4  
 firmware  
   upgrading, downloading, 2-12  
   verifying edition, 2-14  
 firmware downloading  
   using Library Status, 3-19

## H

handling cartridges, 5-1  
 hardcopy publications from StorageTek, 1-xv  
 Hardware Monitor menu, 2-8  
 hyperterminal  
   protocol setup, 2-13

## I

IDs, SCSI. *See* SCSI IDs  
 indicators, operator panel, 2-2  
 information menus  
   Drive, 2-6  
   Library, 2-4  
   Network, 2-7  
   temperatures, 2-8  
 inserting cartridge into drive, 3-28

inserting cartridges into cells, 3-24  
 inspecting  
   cartridges, 5-1  
 instalación  
   cables de fibra óptica, xxiii  
 installation  
   fiber-optic cables, xix  
   inserting cartridges, 3-24  
 interfaces  
   Library Status Tool, 3-13  
   operator panel, 3-2  
 internal code license, xxvii

## J

Japanese compliance statement, xxvi

## L

L40  
   *See* library  
 label, laser product, xviii  
 labels  
   applying to DLT cartridges, 5-5  
   applying to Ultrium cartridges, 5-10  
   DLT codes, 5-5  
   Ultrium prefixes, 5-10  
 laser product label, xviii  
 Lib Info/Cfg menu, 2-4  
 library  
   components and function, 1-1  
   configuration table, 2-11  
   configuring, 2-3  
   controlling software, 1-13  
   diagnostic tests, 4-4  
   dimensions and weight, 1-16  
   dual power label location, 1-4  
   electronics module location, 1-4  
   powering-off, 3-22  
   reconfiguring, 2-9  
   reset button, 1-4  
   resetting, 2-8  
   returning to ready status, 3-31  
   safety features, 1-13  
   SCSI IDs, 2-5  
   SCSI port, 1-4  
   serial number location, 1-4  
   specifications, 1-13

- status port location, 1-4
- troubleshooting, 4-1
- viewing the status, 3-2
- warranty ID location, 1-4
- LIBRARY ACTIVE* indicator, 2-2
- Library Admin, 3-21
- Library Self-Test test, 4-5
- Library Status Tool description, 3-13
- license, internal code, xxvii
- Linear Tape Open (LTO). *See* Ultrium
- linear tape-open (LTO). *See* drives, Ultrium
  - cartridges
- locating a cartridge, 3-26
- locations
  - AC power supply, 1-4
  - cells, 3-25
  - columns, 3-25
  - CompacTape labels, 5-6
  - CSE serial port, 1-4
  - DLT volume label, 5-6
  - dual power label, 1-4
  - electronics module, 1-4
  - Ethernet port, 1-4
  - fibre router card, port, 1-4
  - library serial number, 1-4
  - Library Status port, 1-4
  - library warranty ID, 1-4
  - personality module, 1-4
  - power receptacle, 1-4
  - reset button, 1-4
  - robotic components, 1-6
  - SCSI ports, 1-4
- LTO cartridges
  - environment specifications, 5-12

## M

- maintaining cartridges, 5-2
- manual mode operations
  - cleaning a drive, 3-30
  - inserting cartridge into drive, 3-28
  - locating a cartridge, 3-26
  - opening front door, 3-23
  - removing cartridge from drive, 3-28
  - removing cartridge from hand, 3-27
  - replacing cleaning cartridge, 3-29
  - returning library to ready status, 3-31
- manually cleaning a drive, 3-30

- mensajes de alerta en el manual, 1-xii

- MENU** button, 2-2

- menus

- Diagnostics, 4-4
  - Drive Info/Cfg, 2-6
  - Hardware Monitor, 2-8
  - Lib Info/Cfg, 2-4
  - Network Info/Cfg, 2-7
  - overview, 2-3

- messages, monitoring, 3-2

- mode operations

- automated. *See* automated mode operations
  - manual. *See* manual mode operations

- monitoring

- operator panel, 3-2

- montaje en bastidor

- seguridad, xxi

## N

- Network Info/Cfg menu, 2-7

- notas, descripción, 1-xii

- notes, description, 1-xii

## O

- operations

- automated mode. *See* automated mode operations

- manual mode. *See* manual mode operations

- setting write-protect switch

- SDLT 220, 5-8

- operator panel

- description, 2-1

- indicators, 2-2

- menus, 2-3

- monitoring for messages, 3-2

- using for configuration, 2-3

- organization of this guide, xi

- orienting cartridges correctly, 3-26

## P

- panel, operator. *See* operator panel

- Partners Web site, 1-xv

- PC

- hyperteminal setup, 2-13

peligro  
     para la vista a causa del láser, xxii  
 personal computer. *See* PC  
 personality module  
     location, 1-4  
     status, 3-4  
 ports location, 1-4  
 power  
     drive specifications, 1-14  
     receptacle location, 1-4  
 power supply locations, 1-4  
 powering-off the library, 3-22  
 precaución  
     electricidad estática, xxiv  
     mensajes en el manual, 1-xii  
 precaución, descripción, 1-xii  
 precauciones  
     manipulación de cables de fibra óptica, xxiii  
     precauciones de seguridad, xxi  
 precautions  
     handling fiber-optic cables, xix  
 prefix, cartridge labels  
     Ultrium data cartridges, 5-10  
 prevención de DES, xxiv  
 protección contra electricidad estática, xxiv  
 protect switch, write  
     DLT/DLT1/SDLT cartridges, 5-8

## R

rack installation  
     dimensions, 1-16  
 rack-mounting  
     safety, xvii  
 ready status, returning the library to, 3-31  
 reconfiguring the library, 2-9  
 removing cartridge from drive, 3-28  
 replacing cleaning cartridge, 3-29  
 requirements for cartridges, 5-2  
 reset button  
     location, 1-4  
     pressing, 2-8  
 resetting the library, 2-8  
 robot  
     component locations, 1-6  
     description, 1-9  
 running the Library Self-Test, 4-5

## S

safety  
     ESD prevention, xx  
     features, 1-13  
     fiber optics, xviii  
     laser product label, xviii  
     precautions, general, xvii  
     rack-mounting, xvii  
 SCSI  
     drive IDs, 2-6  
     library ID, 2-5  
     ports location, 1-4  
 SDL600 cartridges  
     environment specifications, 5-9  
 SDLT 220  
     cartridge, 5-8  
     write-protect switch, 5-8  
 seguridad  
     etiqueta de producto láser, xxii  
     fibras ópticas, xxii  
     montaje en bastidor, xxi  
     precauciones, generales, xxi  
     prevención de DES, xxiv  
**SELECT** button, 2-2  
 serial number location, 1-4  
 server software, 1-13  
*SERVICE REQUIRED* indicator, 2-2  
 setting  
     write-protect  
         SDLT 220, 5-8  
 setting cleaning cartridge warning count, 3-9  
 setting write-protect  
     DLT cartridge, 5-6  
     Ultrium cartridge, 5-11  
 SNMP description, 3-21  
 software, controlling, 1-13  
 specifications  
     cartridge environment  
         DLT/DLT1, 5-7  
         LTO, 5-12  
         SDLT600, 5-9  
     colored cartridge, 5-2  
     drive and cartridge weight, 1-14  
     drive and cartridge weights, 1-14  
     drive power, 1-14  
     environmental, 1-13  
     static electricity safety, xx

status  
 cartridge access port (CAP), 3-6  
 drive, 3-3  
 library, 3-2  
 personality module, 3-4  
 ready, returning the library to, 3-31  
 storage cells location, 3-25  
 storage cells, valid, 1-7  
 StorageTek  
 Customer Resource Center (CRC), 1-xv  
 hardcopy publications, 1-xv  
 L-series Library Admin, 3-21  
 Partners site, 1-xv  
 Web site, 1-xv  
 storing cartridges, 5-2  
 Sun  
 Customer Resource Center (CRC), 1-xv  
 Partners Web site, 1-xv  
 Web site, 1-xv  
 worldwide offices, A-2  
 switch  
 write-protect  
 SDLT 220, 5-8  
 switch setting  
 DLT write-protect, 5-6  
 Ultrium write-protect, 5-11

## T

table, configuration, 2-11  
 Taiwan warning statement, xxvi  
 tape cartridge. *See* cartridges  
 tape library  
*See* library  
 telephone numbers  
 support, A-1  
 temperatures  
 setting, 2-8  
 troubleshooting, library and drives, 4-1

## U

Ultrium  
 cartridge  
 applying labels, 5-10  
 cleaning cartridge labels, 5-10  
 Ultrium cartridges  
 applying label, 5-10  
 ordering, 5-3  
 write-protect switch setting, 5-11  
 upgrade, 2-12  
 upgrading firmware, 2-12

## V

valid storage cells, 1-7  
 viewing  
 drive status, 3-3  
 library status, 3-2  
 personality module status, 3-4  
 volume number label  
 DLT, 5-6  
 Ultrium, 5-9  
 volume serial number label  
 types, 5-10

## W

warning  
 eye hazard from laser, xviii  
 library weight in rack, xvii  
 messages in manual, 1-xii  
 warning statement, Taiwan, xxvi  
 warning, description, 1-xii  
 warranty ID location, 1-4  
 Web sites  
 downloading firmware, 2-12  
 WIN2000, hyperterminal setup, 2-13  
 write-protect switch setting  
 DLT, 5-6  
 SDLT 220, 5-8  
 Ultrium, 5-11



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