StorageTek™ L80
Tape Library

User's Guide

96021
Revision: M

L80
Tape Library

User's Guide

We welcome your feedback. Please contact the Sun Learning Services Feedback System at:

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Please include the publication name, part number, and edition number in your correspondence if they are available. This will expedite our response.

Summary of Changes

EC Number	Date	Revision	Change
111641	April 2001	First	Initial release
111662	July 2001	Second	Refer to this edition for a description of the changes.
111708	December 2001	Third	Refer to this edition for a description of the changes.
111732	March 2002	Fourth	Refer to this edition for a description of the changes.
111770	June 2002	Fifth	Refer to this edition for a description of the changes.
111784	September 2002	Sixth	Refer to this edition for a description of the changes.
111828	March 2003	Seventh	Refer to this edition for a description of the changes.
111846	June 2003	Eighth	Refer to this edition for a description of the changes.
111923	July 2004	Ninth	Refer to this edition for a description of the changes.
111948	January 2005	Tenth	Refer to this edition for a description of the changes.
111975	May 2005	Eleventh (K)	Refer to this edition for a description of the changes.
114172	October 2006	M	Cover, Copyright, Preface and Safety: Added the Sun boilerplate verbiage. Preface: Removed the reference to Appendix C. Chapter 2: Updated "Adding Cell and Drive Capacity" to show the latest numbers. Removed Appendix C and placed the latest information into Appendix B.

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Preface

This guide, while intended primarily for users of the library, might also contains 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, two appendixes, a glossary, and an index:

Chapter 1	"General Information" introduces the major hardware components and provides the library 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 Testing" 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 handle, inspect, and maintain cartridges.
Appendix A	"SCSI HVD or LVD Considerations" describes how to configure your library's interface.
Appendix B	"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 and in other L80 publications.

Item	Example	Description of Convention
Acronyms	CSA	All uppercase
Buttons	MENU	Text and capitalization follow label on product
Commands	Mode Select	Initial cap
Document titles	*System Assurance Guide*	Italic
Emphasis	*not* or *must*	Italic
File names	`fsc.txt`	Monospace font
Hypertext links	Figure 2-1 on page 2-5	Blue (prints black in hard-copy publications)
Indicators	*Open*	Text and capitalization follow label on product
Jumper names	TERMPWR	All uppercase
Keyboard keys	<Y> <Enter> or <Ctrl+Alt+Delete>	Text and capitalization follow label on product; enclosed within angle brackets
Menu names	Configuration Menu	Capitalization follows interface; usually title caps
Parameters and variables	Device = *xx*	Italic
Path names	`c:/mydirectory`	Monospace font
Port or connector names	SER1	Text and capitalization follow label on product; otherwise, all uppercase
Positions for circuit breakers, jumpers, and switches	ON	Text and capitalization follow label on product; otherwise, all uppercase
Screen text (including screen captures, screen messages, and user input)	`downloading`	Monospace
Switch names	Power	Text and capitalization follow label on product
URLs	www.sun.com	Blue (prints black in hard-copy publications); underlined; split at forward slash or period

Related Publications

Additional information is available in the following publications:

Library Documentation	Part Number
L40/L80 Tape Library Drives Customer Replaceable Units (CRU) Instructions	96006
L80 Tape Library CRU Instructions	96051
L80 Tape Library Ordering Guide	MT5012
L80 Tape Library Installation Manual	96054

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

Other Publications	Part Number
American National Standard Dictionary for Information Processing Systems	ANSI X3/TR-1-82
American National Standard Magnetic Tape and Cartridge for Information Interchange	ANSI X3B5/87-009
Crossroads Fibre Router User's Guide	DS30110
StorageNet 3300 Fibre Channel Router User Manual	461273-01
StorageNet 3400 Multi-Protocol Router User Manual	461271-01
Fiber Optic User's Guide	9433
Magnetic Tape Labels and File Structure for Information Interchange	ANSI X3.27-1978
SCSI-3 Parallel Interface (SPI)	ANSI X3T9.2/91-010R7
Small Computer System Interface	ISO 9316:1989

Additional Information

Sun Microsystems, Inc. (Sun) offers several methods for you to obtain additional information.

Sun's External Web Site

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

The URL for the external Web site is: http://www.sun.com

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:
http://members.storagetek.com

The URL for partners with a Sun Partner Agreement is:
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

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

Rack Safety and Precautions

WARNING:
Possible personal injury:

- ***Lifting hazard:*** **Use a mechanical device to lift and position the library. The library weighs approximately 64 to 122 kg (140 to 270 lb). If a mechanical device is not available, remove the drive trays, power supplies, cartridges, and front door to reduce the weight. Use at least two people.**
- **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 40ºC (104ºF).
- Ensure that rack doors provide adequate clearance to the library.
- Ensure that the library and 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 the 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 μW 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 seguridad eléctrica, ergonomía, instalación en bastidor, fibras ópticas y descargas electrostáticas.

Seguridad y precauciones del bastidor

ADVERTENCIA:
Posibilidad de lesiones físicas:

- ***Peligro de levantamiento:*** **Utilice un dispositivo mecánico para levantar la biblioteca y colocarla en su posición. La biblioteca pesa entre 64 y 122 kg (140 a 270 lb). Si no se dispone de un dispositivo mecánico, desmonte las bandejas de unidades, fuentes de alimentación, cartuchos y la puerta delantera para reducir el peso. Esta operación debe ser realizada como mínimo por 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 biblioteca y otros equipos no creen una situación de sobrecorriente, tanto si el equipo está conectado directamente al circuito derivado como si lo está a una regleta de distribución de alimentación.
- Asegúrese de que el equipo del bastidor disponga de una puesta a tierra fiable, tanto si el equipo está conectado directamente al circuito derivado como a una regleta de distribución de alimentación.

  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 μW 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 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, colóquele 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 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 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.

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General Information

1

This chapter introduces the major hardware components and provides the library specifications.

The L80 tape library is a self-contained, fully-automated, cartridge tape storage system that holds one to eight drives. The library can have cell capacities of 40, 60, or 80.

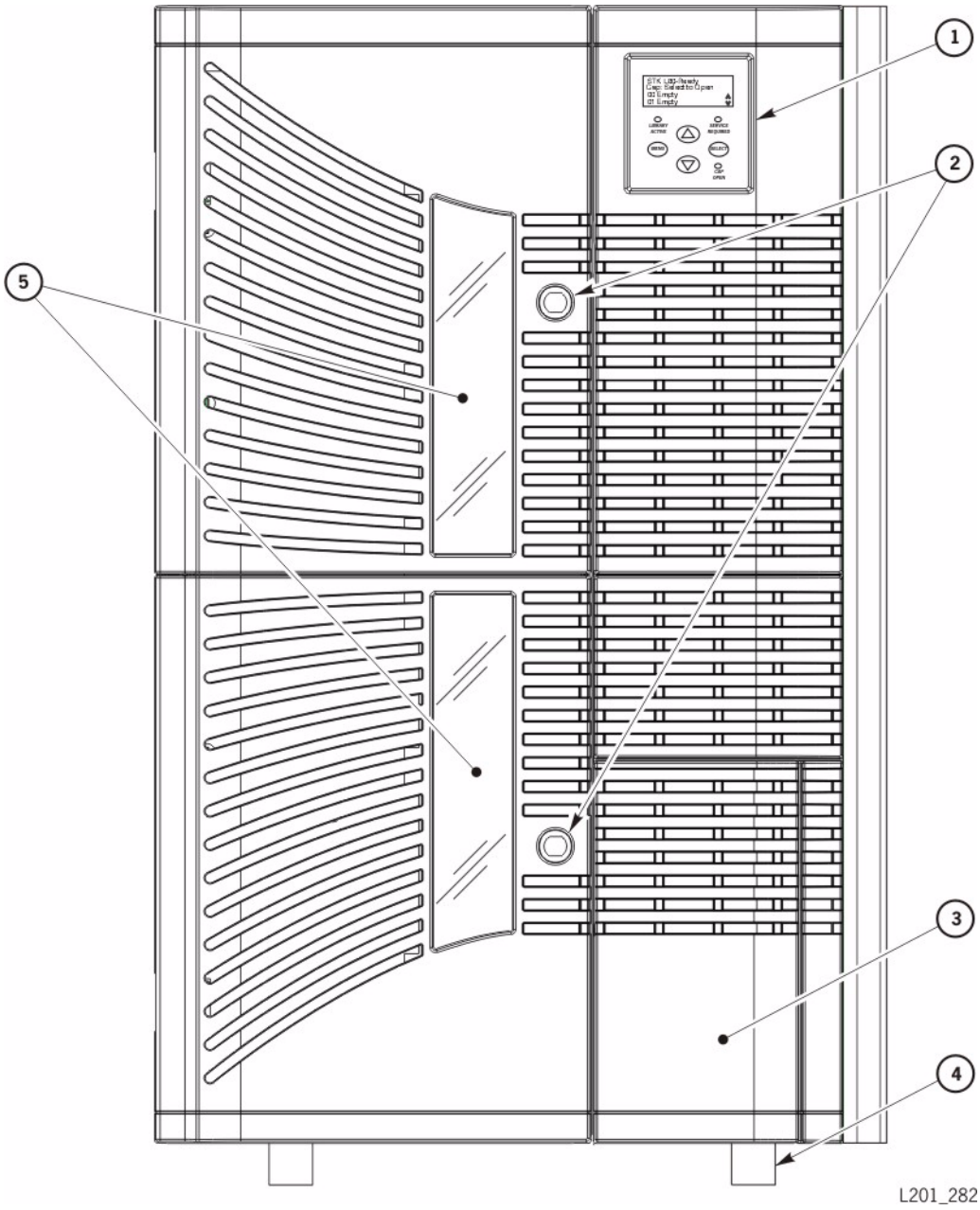
Note: You can configure your library as a 64-cell library for third party software licensing.

You can place the library on the floor (deskside version with cosmetic cover and a base with casters) or install it in a standard 483-mm (19-in.) rack.

Views and Locations

Figure 1-1 on page 1-2 through Figure 1-5 on page 1-7 show library component locations; component descriptions follow the figures.

Figure 1-1. Library Front View of Components (L201_282)



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

Figure 1-2. Library Rear View of Components (L201_281)

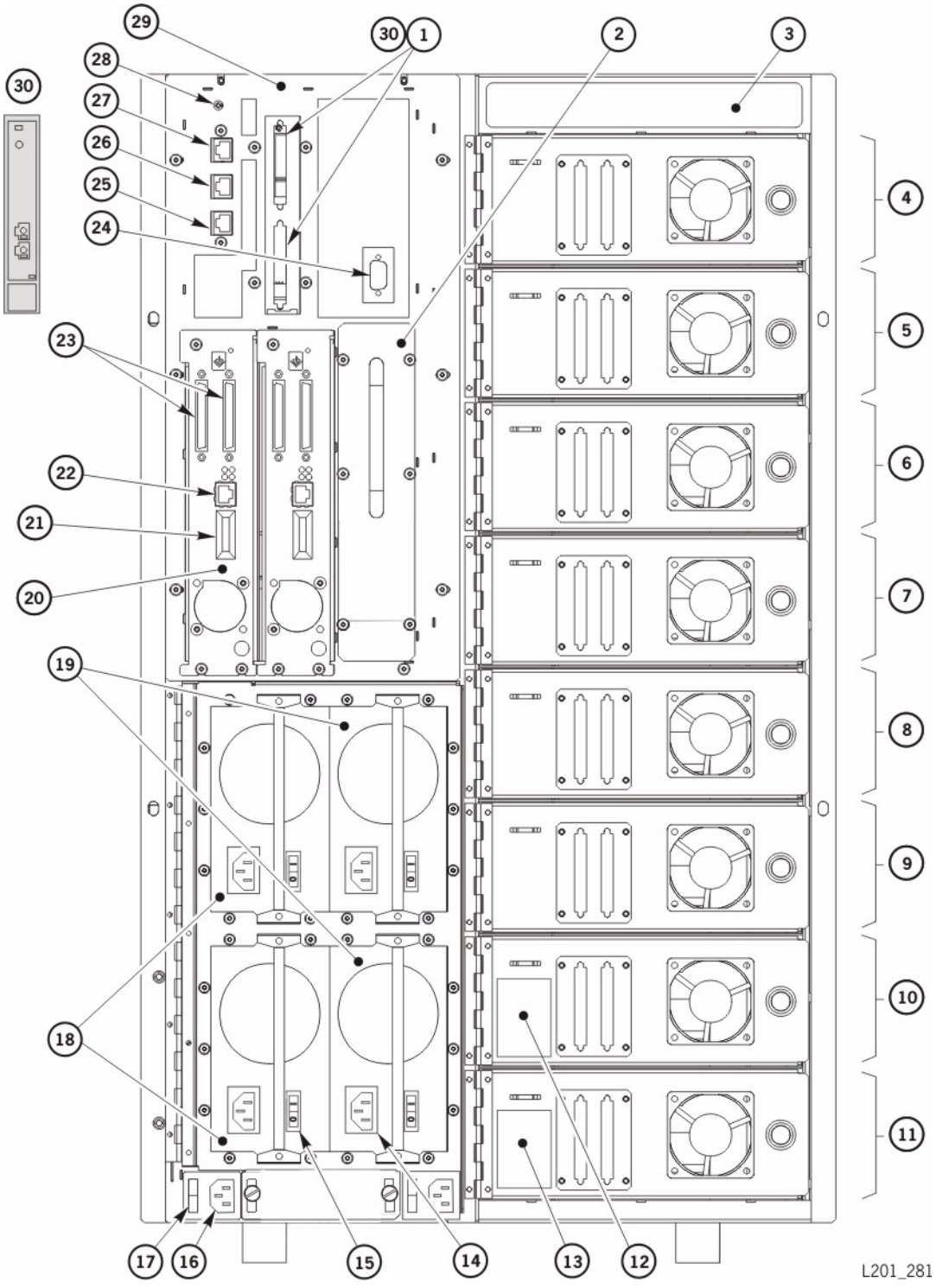


Figure 1-2. Library Rear View of Components (Continued) (L201_281)

1. Library LVD/HVD SCSI ports
2. Fibre Channel router card power cord access plate
3. Library serial number and agency label
4. Drive 0
5. Drive 1
6. Drive 2
7. Drive 3
8. Drive 4
9. Drive 5
10. Drive 6
11. Drive 7
12. Library warranty identification number
13. Dual power label
14. Power receptacle (4)
15. Power-on/off switch (4)
16. Input line receptacle, for standard supply on the left and redundant supply on the right (2)
17. Input line switch, for standard supply on the left and redundant supply on the right (2)
18. Standard AC power supplies
19. Redundant AC power supplies
20. Fibre Channel router card (2) (optional)
21. Fibre Channel router port (2)
22. Fibre Channel router CSE serial port (2)
23. SCSI ports to connect library and drives when using the Fibre Channel router card
24. Personality module connector
25. Customer Services Engineering (CSE) port
26. Reserved for Development Engineering
27. Ethernet/Web access—Library Status (Web interface) connection
28. Library RESET button—use a wooden pencil *(never* a screwdriver or other electrical conductor) to press this button to prevent damaging the button or the LLC card.
29. Electronics module
30. Optional Native Fibre port (card in EM)

Note: From a *software* viewpoint, the top drive that is installed is Drive 0. If all eight drives are installed, the top drive is Drive 0 and the bottom is Drive 7.

Figure 1-3. Library Internal View of Components (L201_270)

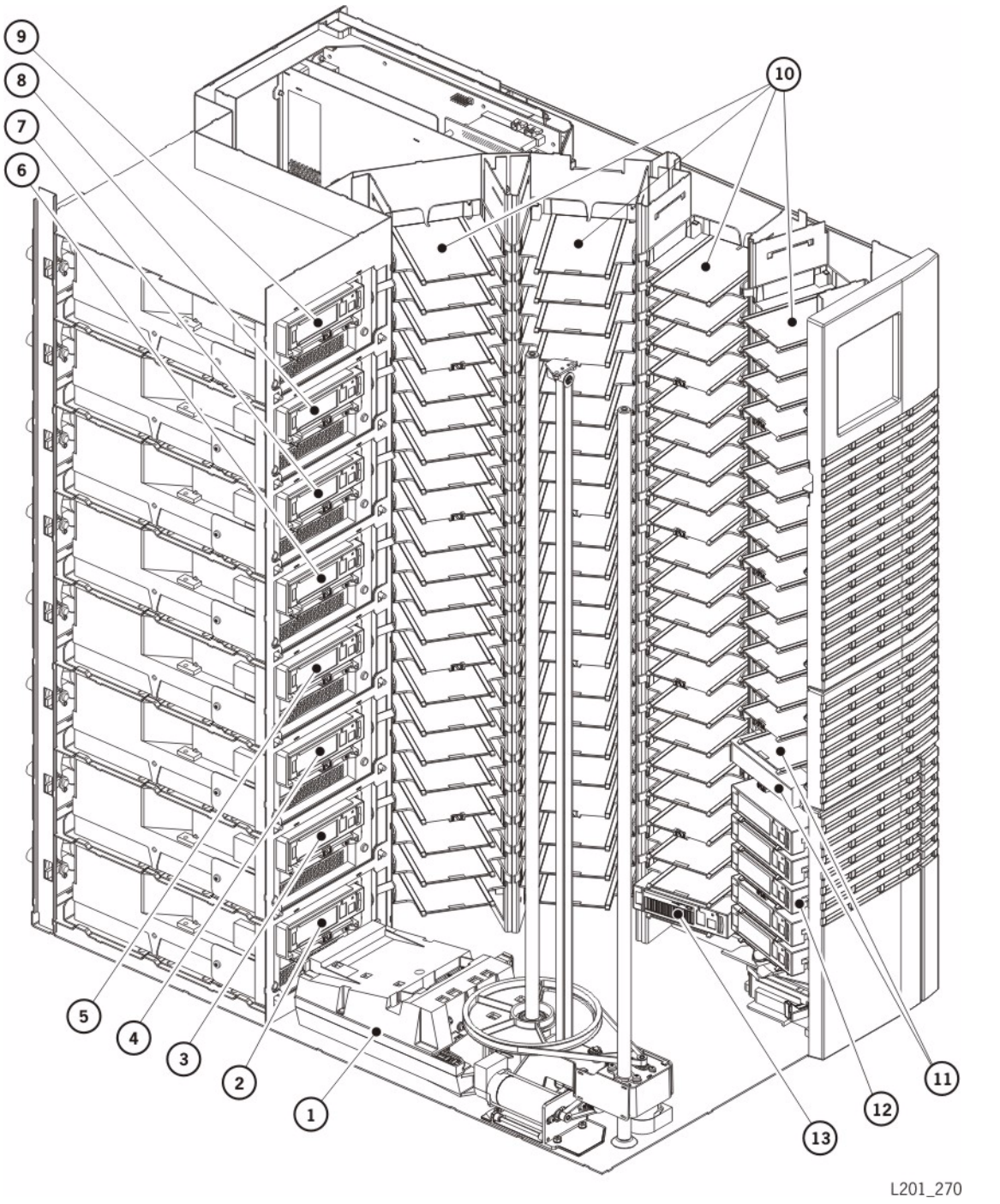
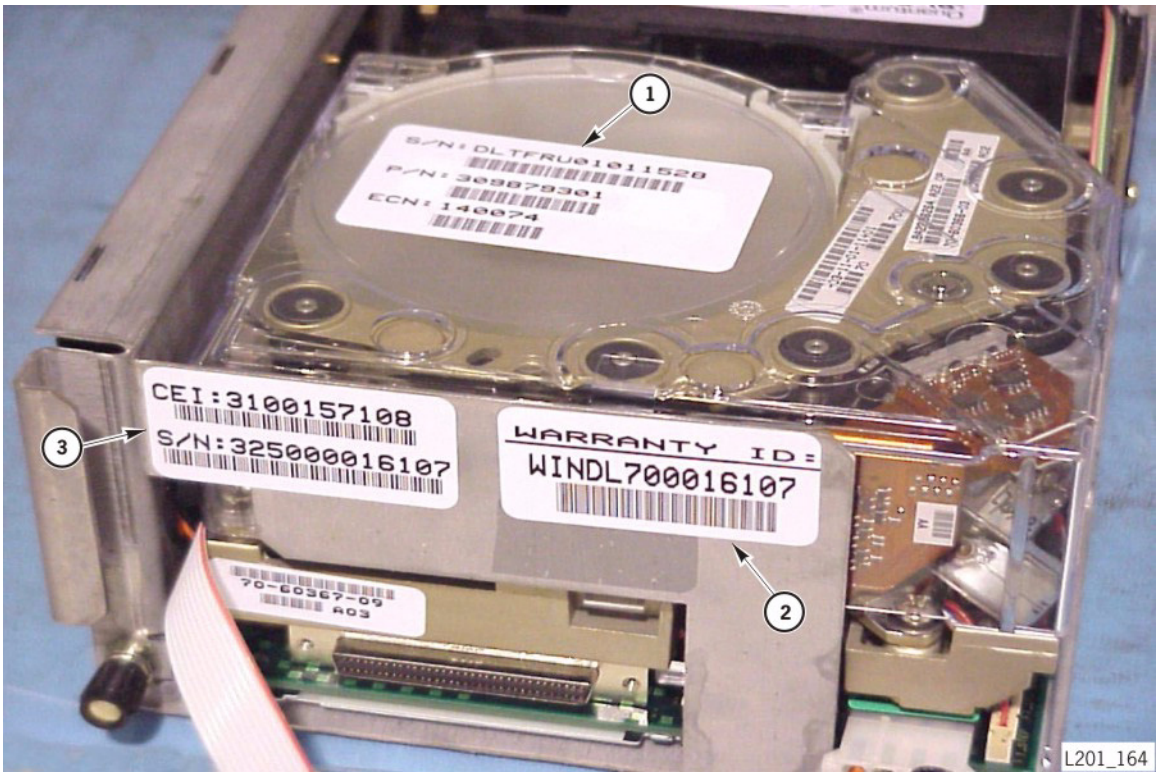


Figure 1-3. Library Internal View of Components (Continued) (L201_270)

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

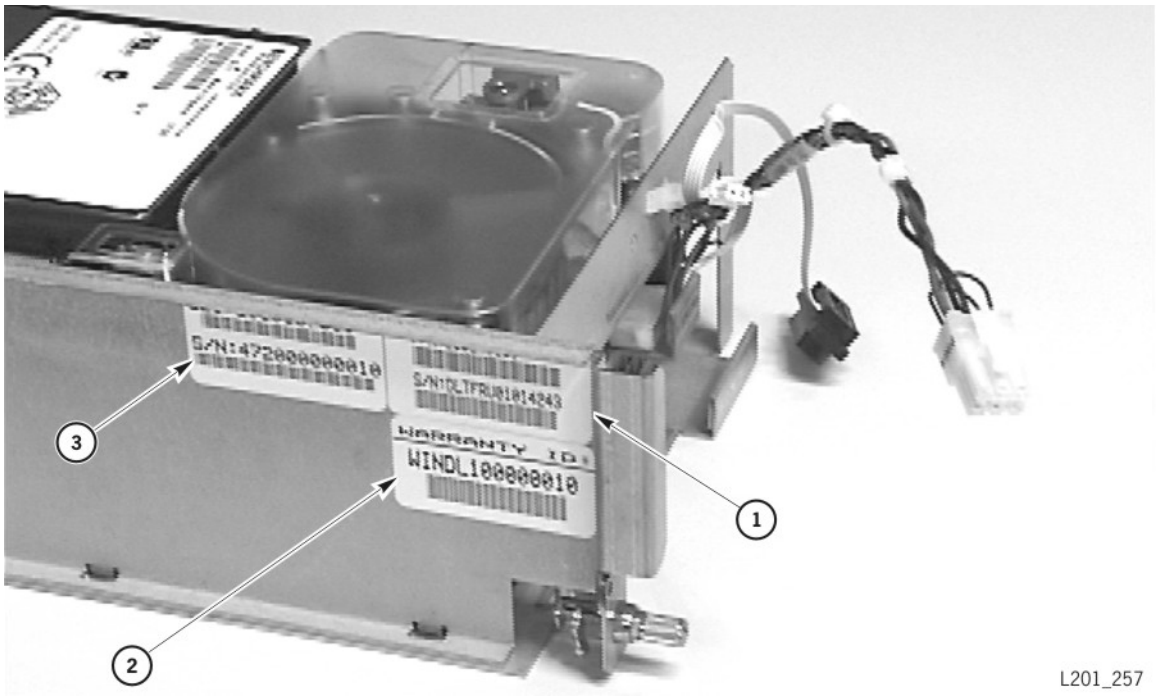
Note: From a *software* viewpoint, the top drive that is installed is Drive 0. If all eight drives are installed, the top drive is Drive 0 and the bottom is Drive 7.

Figure 1-4. DLT Drive Serial Number, Warranty ID Number Locations (L201_164)



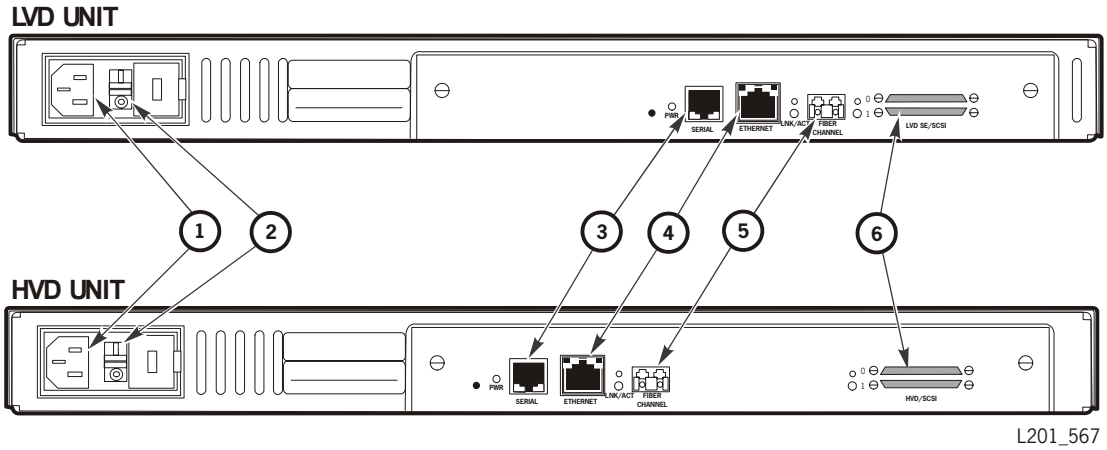
1. Field Replaceable Unit (FRU) serial number (The drive was ordered to replace a drive that failed.)
2. Warranty ID number
3. Configuration end item (CEI) serial number (The drive was ordered for the initial library installation.)

Figure 1-5. DLT1 Drive Serial Number, Warranty ID Number Locations (L201_257)



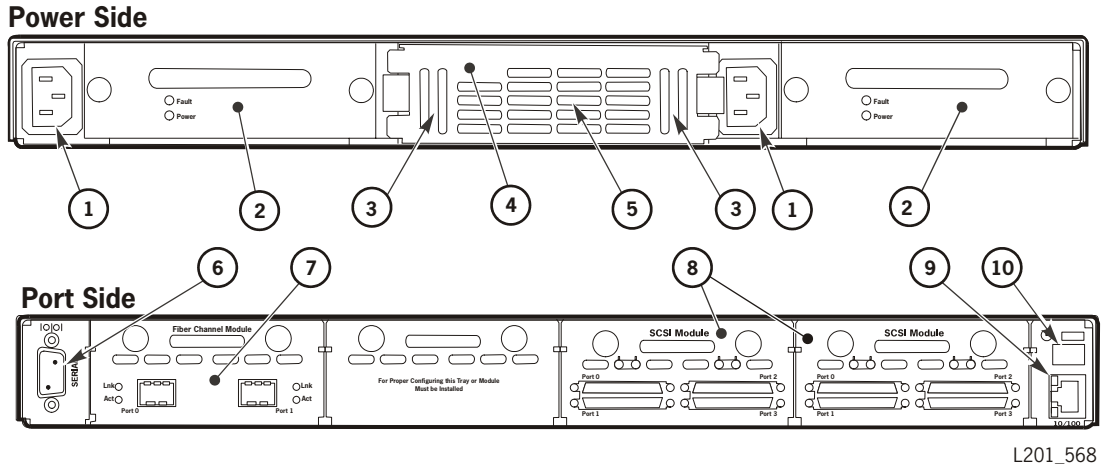
1. FRU serial number (The drive was ordered to replace a drive that failed.)
2. Warranty ID number
3. CEI serial number (The drive was ordered for the initial library installation.)

Figure 1-6. SN3300 Fibre Channel Router Components (L201_567)



1. Power receptacle
2. Power switch
3. Serial port
4. Ethernet port
5. Fibre channel port
6. SCSI ports

Figure 1-7. SN3400 Fibre Multi-Protocol Router Components (L201_568)



1. Power receptacles
2. Power modules
3. Exhaust vents
4. Fan module
5. Air intake
6. Serial port
7. Fibre channel port module
8. SCSI port modules
9. Ethernet port
10. Standby power switch

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 drive slots and five CAP cells are not included when determining data cell capacity.

The following figure shows the cell locations. 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.

You can attach a cell barrier clip as shown in the Figure 2-5 on page 2-17 to indicate the configuration of the cell capacity in your library.

Robot

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

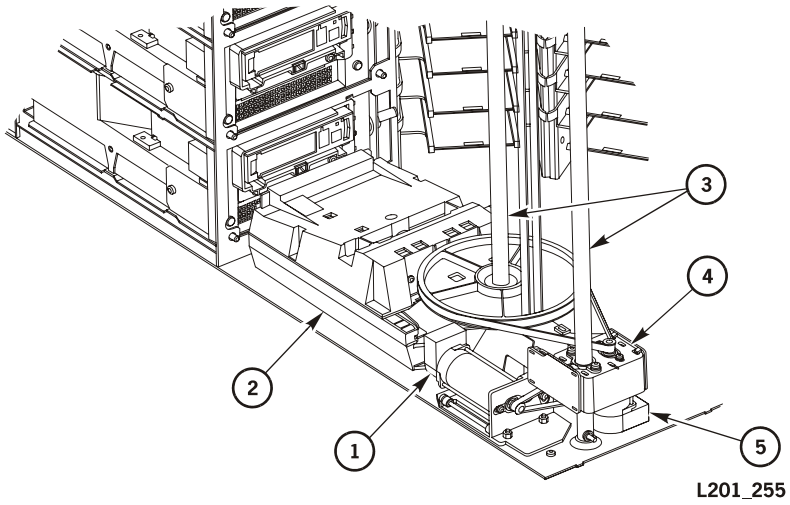
The robot (see Figure 1-8), behind the front door, consists primarily of the:

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

Most of the robotic components are on the Z shaft.The hand on the Z carriage, moves up, down, and around the shaft to access the cells, drives, and CAP.

The camera, on the hand, reads the bar code volume serial numbers on the cartridges.

Figure 1-8. Robotic Components (L201_255)



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

Hand

The hand is composed primarily of the reach carriage, reach belt, reach motor, and the camera. The hand mounts to the Z carriage on the Z shaft.

The camera is composed primarily of the LLL card (light source), LLJ card (charge-coupled device imager), and the camera. The cartridge detect sensor on the LLL card detects whether a cartridge is seated in the hand. The proximity sensor detects whether a cartridge is in the cell immediately in front of the hand.

The camera is operational when you:

- Initialize the library (The camera is initialized at the calibration label above the CAP.)
- Audit (the robot audits the library)
- Insert cartridges into the CAP

During normal operation, the camera is OFF and the robot locates the cartridges by referring to the volume serial number and cell location within the LLC card memory.

If a hand failure occurs, the LLC card posts a fault symptom code (FSC) to the FSC log.

Cartridge Access Port (CAP)

The cartridge access port (CAP) is on the bottom right side of the front of the library (see Figure 1-1 on page 1-2). The CAP contains up to five storage cells, designed as a removable magazine. You can leave the magazine in the CAP location and place cartridges into the cells, or remove the magazine, fill or empty the cells outside of the library, and place the magazine back into the CAP location.

You can use the CAP to add cartridges to the library without interrupting the robot operation. For instance, if you enable Auto Clean, a message appears on the operator panel stating that a drive requires cleaning. When you press `SELECT` for the CAP open option on the operator panel, the robot opens the CAP. You can place a cleaning cartridge into the CAP for the robot to retrieve and place into the drive.

The CAP contents menu is accessible from the `Main Menu`. The CAP Contents menu is an information-only screen. The menu displays the cartridge type and the cartridge code for each cartridge in the CAP magazine. For more information, see "Viewing the Status of the CAP" and "Viewing the Status of the CAP Magazine" on page 3-8.

Interfaces

The L80 has library interfaces, drive interfaces, and user interfaces.

Library Interfaces

The library interfaces are small computer system interface (SCSI HVD and LVD) or, with the addition of an optional Fibre Channel router, Fibre Channel-to-SCSI LVD.

In the future, Native Fibre will be available. It will:

- Allow the library to connect to Fibre Channel networks
- Increase the client server-to-library distance from 25 m (82 ft) to 500 m (1,640 ft)
- Be less expensive than a router

Drive Interfaces

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 1-1. Drive Interfaces

Drive Name	Interface	
	HVD[1]	**LVD**[2]
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
HP Ultrium LTO 1, LTO 2, and LTO 3	No	Yes
Certance Ultrium LTO 2 and LTO 3	No	Yes

Table 1-1. Drive Interfaces

Drive Name		Interface
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.

For more information, see Appendix A, "SCSI HVD or LVD Considerations."

Using an optional internal or external fibre channel router, you can interface to a SCSI LVD drive using fibre channel protocol. The library has slots for two Fibre Channel router cards, each router can support up to four drives. Two external Fibre Channel routers are available—one supports up to four drives (Figure 1-6 on page 1-8), the other up to eight drives (Figure 1-7 on page 1-8). Properly terminate each SCSI bus with an LVD or LVD/SE multimode terminator.

The Fibre Channel to LVD router:

- Allows the library to be connected to a 1 GB (2 GB when an external router is used) Fibre network (arbitrated loop and switched fabric)
- Allows the use of less expensive LVD SCSI drives
- Makes it easier to connect in a Fibre network
- Allows third-party copy (automated transfer of data from drive to drive without client-server intervention)
- Increases the client server-to-library distance from 12 m (39.37 ft) to 500 m (1,640 ft)
- Allows connectivity between Fibre networks and the library and SCSI drives

User Interfaces

The user interfaces are the operator panel and the Web.

Operator Panel

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

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

For more information, see "Monitoring the Operator Panel for Messages" on page 3-3.

Web Interface

By connecting a 10baseT Ethernet interface to the library's Ethernet port, you can easily monitor the library activity through a workstation. For more information, see "Using the Library Status Tool" on page 3-25.

Electronics Module

The electronics module (EM) consists of the internal LLC card, interface connections, and the personality module on the EM frame. One or two Fibre Channel router cards can also be installed in the EM.

LLC Card

The LLC card is the processor card. The card contains all the necessary hardware to maintain the robotic components. The card also controls an operator panel interface, a SCSI interface (HVD or LVD selectable), an Ethernet/Web interface, drive serial ports, and a CSE port.

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 key that stores the library cell capacity information. The module reflects a capacity of 40, 60, or 80 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.

See "Viewing the Status of the Personality Module" on page 3-5 and "Adding Cell and Drive Capacity" on page 2-15 for more information.

Power System

The library has two standard AC power supplies. You can also order and install two redundant power supplies so that the library and all the drives will continue to operate if the standard power supplies fail.

The power supplies are installed into two racks at the rear of the library. The standard power supplies are on the left side, and the redundant power supplies are on the right side, as shown in Figure 1-9 on page 1-15.

Each rack provides up to 50 percent of the total power.

Notes:

1. If you install only the two standard power supplies, the top rack contains one power supply that provides 50 percent of the total power and the bottom rack contains the second power supply that provides the other 50 percent of the total power.
2. If you install all four power supplies, each power supply provides 25 percent of the total power.
3. If a power supply fails, the LLC card posts an error to the fault symptom code (FSC) log. The Hardware Monitor menu on the library operator panel also shows which power supply has failed.

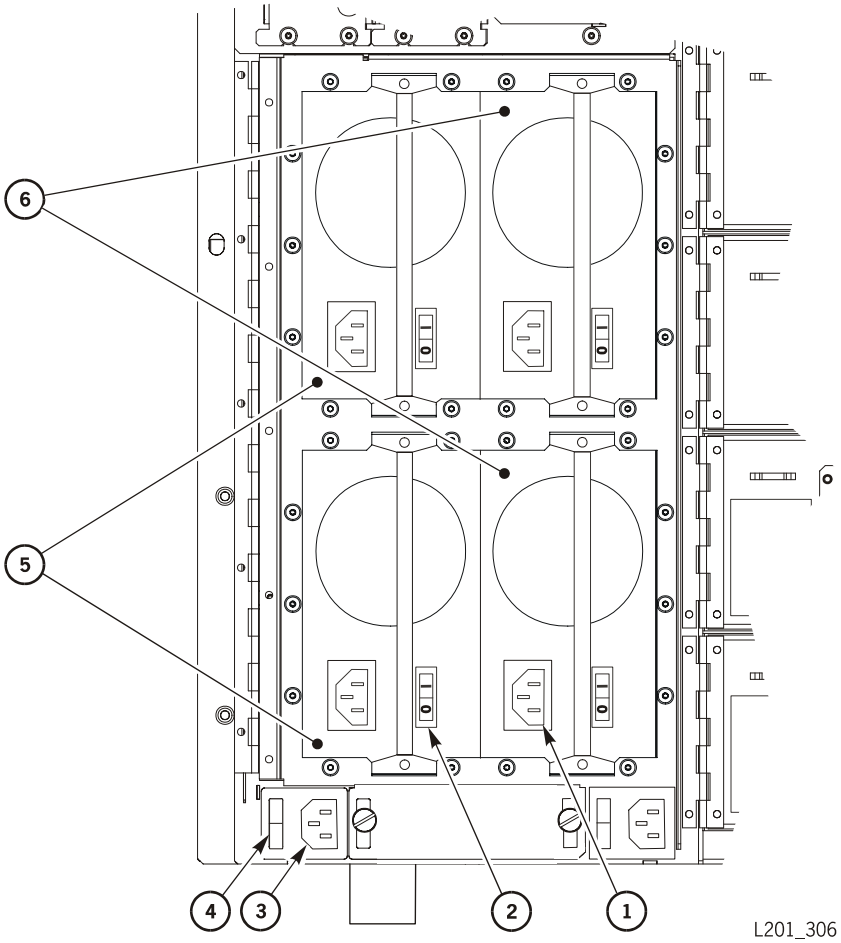
Each supply has a switch. All switches must be in the ON (|) position during normal operation.

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

To power-off the library, turn off the two input line switches. If you are replacing a power supply, turn off only that corresponding switch and *do not* turn off the input line switches.

Note: The power supply switches must always ON; use the input line switches to turn the power ON or OFF.

Figure 1-9. Power Supply Locations (L201_306)



1. Power receptacle (4)
2. Power-on/off switch (4)
3. Input line receptacle (2)
4. Input line switch (2)
5. Standard AC power supplies
6. Redundant AC power supplies

Power Failure

The following table describes how the library and drives will receive power if any power supply fails:

Table 1-2. Power Failures

Library power configuration	If...	and your library has...	The result is...
Two standard power supplies	one supply fails	one to four drives	The library and drives will operate.
		five to eight drives	The library and drives will not operate.

Table 1-2. Power Failures

Library power configuration	If...	and your library has...	The result is...
Two standard power supplies and two redundant power supplies	one supply fails	one to eight drives	The library and drives will operate.

Note: Both racks (at least one power supply in each rack) must be ON to support more than four drives during a power supply failure.

Drives

You can install one to eight drives. The library supports two types:

- 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 1-3 on page 1-17 for information on the LTO drives backward read compatibility.

- Digital Linear Tape (DLT) drives:
  - Quantum Corporation's DLT 7000E, DLT 8000, and SuperDLT
  - 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.

For specific drive information, refer to the drive documents listed in "Related Publications" on page xvi.

Table 1-3. 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

Library Audit

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

- Power-on the library
- Open and close the door
- Close the CAP

The camera on the hand reads the labels on the cartridges and firmware assigns the cell locations. The LLC card records these cell locations.

After an audit of the library is complete, 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 tape management 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

If you unlock and open the front door, an electronic interlock removes power from the robot. In addition, the LLC card is housed inside the electronics module to prevent you from coming into contact with sensitive electronics.

Tape Management Software

The tape management software controls tape read and write operations and moves the robot. When the library is in automated mode, these operations occur without manual intervention. The software determines the location of the cartridge by accessing the audit data uploaded from the library. The software then allocates the drive to receive the cartridge.

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

Physical Specifications

The following table lists the library's physical specifications.

Table 1-4. Physical Specifications

Item	Specification
Width	483 mm (19 in.)
Height	800 mm (31.5 in.)
Depth (without cables)	765.175 mm (30.125 in.)
Weight of library with two power supplies, and without drives and cartridges	63.5 kg (140 lb)
HP Ultrium LTO drive and tray	5.0 kg (11 lb)
Seagate Ultrium LTO drive and tray	5.5 kg (12 lb)
IBM Ultrium LTO drive and tray	5.8 kg (12.7 lb)
SuperDLT drive and tray	3.17 kg (7 lb)
DLT1 drive and tray	2.72 kg (6 lb)
DLT drive and tray	5.4 kg (12 lb)
Ultrium 100 GB cartridge	220 g (7.8 oz)
DLT cartridge	223 g (7.9 oz)

Library Power Specifications

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

Table 1-5. Library Power Specifications

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

Drive Power Specifications

The following table lists the drive power specifications.

Table 1-6. Drive Power Specifications

Drive	Volt- Amperes	Current	Heat output
DLT 7000E	72 VA	0.59 A at 120 VAC 0.30 A at 240 VAC	256 BTU/hr
DLT 8000	65 VA	0.53 A at 120 VAC 0.27 A at 240 VAC	222 BTU/hr
DLT1	38 VA	0.30 A at 120 VAC 0.16 A at 240 VAC	130 BTU/hr
SuperDLT	58	0.47 A at 120 VAC 0.24 A at 240 VAC	198 BTU/hr
Seagate Ultrium LTO	47 VA	0.38 A at 120 VAC 0.20 A at 240 VAC	160 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	0.56A at 120 VAC 0.29A at 240 VAC	236 BTU/hr

Environmental Specifications

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

Table 1-7. Library Environmental Specifications

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

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Configuration

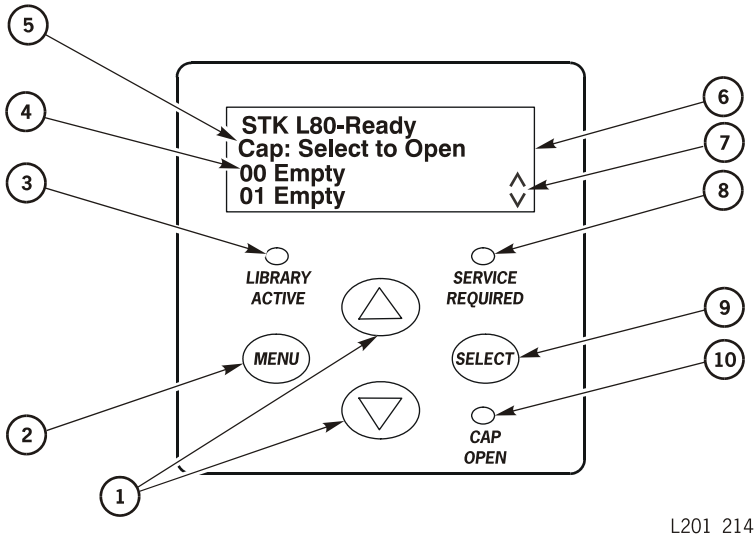
2

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

Operator Panel

The following figure and paragraphs 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 displayed. Use the Arrow buttons to scroll.
8. *SERVICE REQUIRED* indicator
9. SELECT button
10. *CAP OPEN* indicator

Buttons

The operator panel has four buttons:

MENU	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.
SELECT	This button chooses the option next to 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.
▲ ▼	The ▲ (up) and ▼ (down) buttons move the cursor to the selection you want in a menu screen. When the cursor is in a data field, these arrows increase and decrease the values of the numbers and letters shown in that field.

Indicators

The operator panel has three indicators:

LIBRARY ACTIVE	This green indicator flashes when the LLC card is active.
CAP OPEN	This amber indicator is lit when the CAP door is open.
SERVICE REQUIRED	This red indicator is lit when operator intervention is required. Check the operator panel display for messages. If the indicator is lit solidly and not flashing, use the Diagnostics menu to see the fault symptom code (FSC). This indicator flashes if: • One or more fans fail • The temperature reaches the warning threshold • A power supply fails

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 has the following options:

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

Configuration

After the initialization is complete, you can configure the library and drives. 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**

The service engineer configures the library and drives during installation, and records the information in a table. Before you enter or modify the configuration information, it is helpful to have a record of the service engineer's library configuration table.

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

- Library Info/Cfg
- Network Info/Cfg (if you have the Library Status Monitor)
- 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 then 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 one or two cleaning cartridges into the designated cells
- Reinitialized the library

When a drive requires cleaning and Auto Clean is enabled, the hand retrieves a cleaning cartridge from one of the two cleaning cartridge cells, mounts the cartridge onto the drive, and returns the cartridge to one of the two cells 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 that drive.

If Auto Clean is *Off*, a `Clean Needed` message appears on the status display of the operator panel when a drive requires cleaning. You must load a cleaning cartridge into that drive.

Notes: Your library could contain more than two types of drives. The types of cleaning cartridges that are in the cleaning cartridge cells determine which types of drives can be automatically cleaned. The DLT1 and SDLT drives use a unique cleaning cartridge. The LTO drives use vendor specific or the standard ultrium cleaning cartridge. The DLT 7000E and DLT 8000 drives share the same type of 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 below.

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 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); for example, 06/30/2000.
Time	*hh*:*mm*	Enter the current time, where *hh* is 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 SELECT button.
Auto Clean	Off (default) On	See "Auto Clean Feature" on page 2-4 and make your selection.
# Cells	40 60 80 64	The personality module sets the 40, 60, or 80 entry. You can choose the 64 option for third-party software licensing reasons.
SCSI Type	HVD LVD	The LLC card sets the SCSI type during initialization. Your library interface can be either high voltage differential (HVD) or low voltage differential (LVD). See Appendix A, "SCSI HVD or LVD Considerations" for more information.
Version		The firmware sets this entry.

Note: If you modify the SCSI ID, Auto Clean, or the # Cells data fields or if you choose the 64 cell option, and press the MENU button to exit the configuration menu, the status display shows Needing Lib Reset: SELECT to RESET the Library. You can then reset the library by pressing the SELECT button.

Configuring the Drives

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

For more information about this menu, see "Viewing the Status of the Drives" on page 3-4.

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 not be the same as other devices on the SCSI bus. Valid IDs can vary, depending on the type of drive. See your drive documentation for more information. **Note:** 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 inline power switches 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 Table 3-2 on page 3-4 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 "Drives" on page 1-16.
Vendor		The drive vendor is set automatically during initialization.
Code Ver		The code version of your drive is set automatically during initialization.

Configuring the Network

To use the Library Status Tool (a web-based library monitor), you must configure the network. The network configuration is also important for setting up the simple network management protocol (SNMP).

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.

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

Data Field	Valid Values	Explanation
Library Name:	*name*	Enter the name for the library in your network, where *name* is up to 11 alphanumeric characters. This name has no effect on library operation. This name is also called the Domain Name.
IP Address:	*nnn.nnn.nnn.nnn*	Enter the address for network monitoring, where *n* is 0–9. **Note:** You cannot assign an address such as `255.255.255.255.`
Network Gateway:	*nnn.nnn.nnn.nnn*	Enter the gateway connection between subnets, where *n* is 0–9. You require this connection only when such a connection exists and is necessary for library operation.
Subnet Mask:	*nnn.nnn.nnn.nnn*	Enter this data to make the library accessible through a subnet on a larger network, where *n* is 0–9. Enter this information only when applicable.
Web Password		The default is `horizon`. To change the password, press the SELECT button, and use the arrows to change each letter.
Ethernet Address	*nn.nn.nn.nn.nn.nn*	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 will show `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 the tape. Refer to the documentation from the tape 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 report LLC card fan, drive fan, or 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 Under the Hardware Monitor" on page 3-6.

Table 2-4. Hardware Monitor Menu

Data Field	Explanation
High Temp	The display will show the highest *Celsius* temperature. If desired, press `Select` to clear the temperature.
Warn Temp	Use the arrows to set the desired *Celsius* temperature. When the library reaches the temperature, the *SERVICE REQUIRED* indicator blinks.
Shutdown Temp	Use the arrows to set the desired *Celsius* temperature. When the library reaches the temperature, the *SERVICE REQUIRED* indicator remains lit and no additional move requests are accepted. **Note:** The value for the shutdown temperature must be at least 2ºC higher than the value for the warning temperature.

Resetting the Library

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 inline power switches to the O position, then to the | position.

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.**

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 inline power switches to the O position, then to the | position.

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.

Valid Storage Cells

Figure 2-2 on page 2-10 shows the cell locations for the 40-cell capacity and 80-cell capacity libraries. Although you are able to see all the storage cell locations, the tape management software only recognizes the cells that are designated for the capacity that you ordered. You can attach a cell barrier clip as shown in Figure 2-5 on page 2-17 to indicate the configuration of the cell capacity in your library.

The label on the personality module shows the library capacity you first ordered. Three personality module part numbers are available:

Table 2-5. Part Numbers for the Personality Module

Capacity	Part Number
40 cells	31363390x
60 cells	31363420x
80 cells	31363450x

Contact your sales representatives or reseller if you want to upgrade the capacity of your library (for example, from 40 cells to 80 cells).

Figure 2-2. Valid Storage Cells (L201_149)

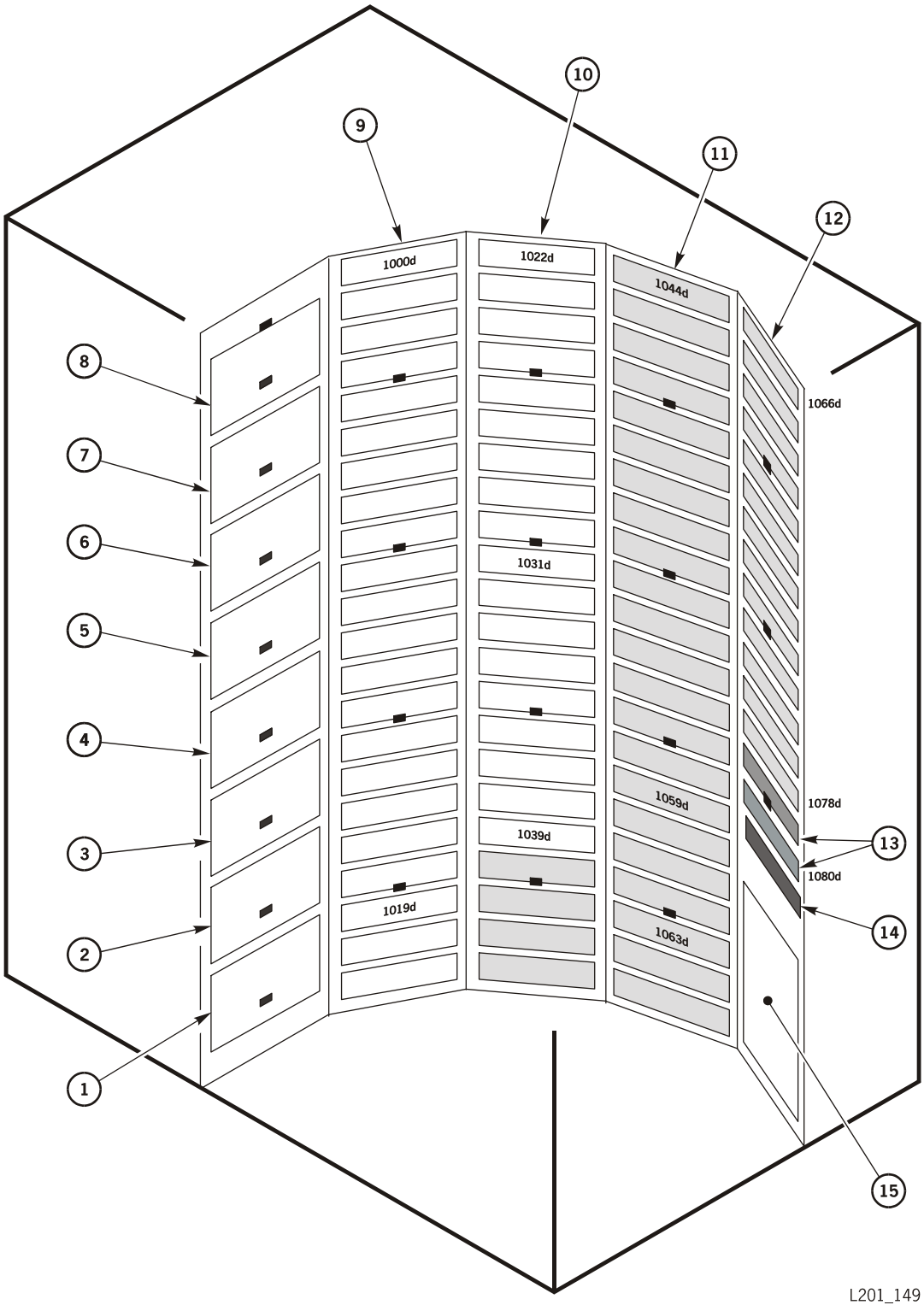


Figure 2-2. Valid Storage Cells (L201_149)

1. Drive Slot 7
2. Drive Slot 6
3. Drive Slot 5
4. Drive Slot 4
5. Drive Slot 3
6. Drive Slot 2
7. Drive Slot 1
8. Drive Slot 0
9. Column 0
10. Column 1
11. Column 2
12. Column 3
13. Cleaning cartridge cells (2) when Auto Clean is On
14. Library calibration label
15. CAP (five cells)

Note: In an 80-cell capacity library, if Auto Clean is Off, you can place data cartridges into the cleaning cartridge cells, making the total capacity 81. If Auto Clean is On, the total capacity is 79.

Legend:

- Use the white cells in Columns 0 and 1 for the 40-cell configuration.
- Use the white cells in Columns 0 and 1 and the light gray cells in Columns 1, 2 and 3 for the 80-cell configuration.
- Use the two dark gray cells above the CAP for cleaning cartridges if Auto Clean is enabled.
- The small, black rectangles are targets.

CAUTION:
Do not place a white cartridge into cell 1044d, or you will cause an initialization failure.

Inserting the Cartridges in the Storage Cells

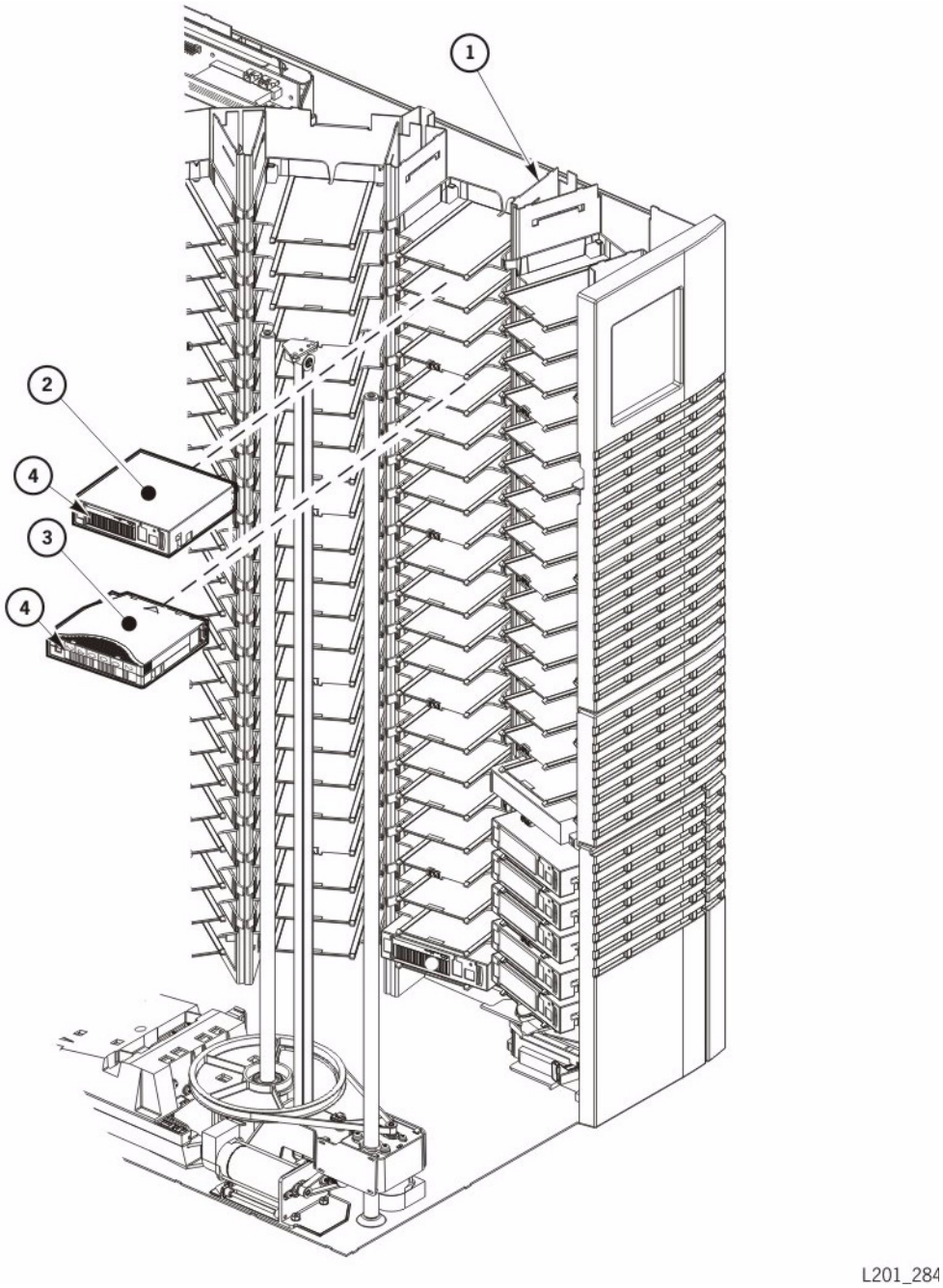
Make sure you read the electrostatic discharge procedure in "Electrostatic Discharge Damage Prevention" on page xxii before proceeding.

CAUTION:
Tape or hardware damage: **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 may fail on start up, and the operator panel may display an error message or the hand and cartridges may be damaged.**

Note: The following instructions assume you have correctly labeled all cartridges. Refer to "Applying Cartridge Labels" on page 5-5.

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."

Figure 2-3. Inserting Cartridges into Cells (L201_284)



1. Storage cells
2. DLT cartridge
3. Ultrium cartridge
4. Cartridge label

Depending on the model and configuration of your library, some storage cells cannot be used. See Figure 2-2 on page 2-10.

Note: To correctly orient the cartridges, insert each cartridge with the volume label out and the hub down. Place the cartridges *inside* the storage cells and *not* above the cells.

To insert cartridges into the library:

1. 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.

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

2. Close the library door. Lock both the door latches. Turn the key toward your right to the fully locked position.

3. Put the key in a secure place.

CAUTION:
Do not place a white cartridge into cell 1044d (see Figure 2-2 on page 2-10), or you will cause an initialization failure.

Reconfiguring the Library

The following paragraphs describe some situations when you may need to change the configuration of the library.

General

If you want to reconfigure the library later, you can use the same procedures described in "Configuration" on page 2-3. After changing the configuration, press 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 you must insert a cleaning cartridge in at least one of the two cleaning cells directly above the CAP. For more information about configuring the library for Auto Clean, see:

- "Auto Clean" on page 2-13
- "Configuring the Library" on page 2-4

Adding a Drive

If your library arrived with no drives installed, or if you want to add more drives to your library, make sure that you add drives by starting at the empty slot nearest to the top and then working your way down. From a software viewpoint, the drive are numbered from top (0) to bottom (7). By adding drives in this order, the client software will correctly reflect the drives previously installed.

Observe the following precautions before installing a drive:

CAUTION:
***Possible data loss or system problem:* If you must disconnect the external SCSI cables, make sure you stop all processes on the system.**

- If the drives are daisy-chained, stop all data processing on the channel to which the drives are connected before disconnecting the drives.
- Make sure there is no activity on the SCSI bus before disconnecting the external SCSI cables. Stop all processes on the host.
- Make sure all signals are terminated at each end of the SCSI bus. Do not mix single-ended and differential terminators.

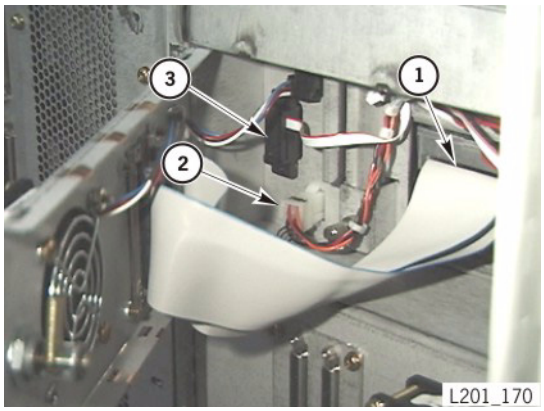
To add a drive:

1. At the rear of the library, turn the drive door latch to your left, and open the door.
2. Slide the drive tray into the desired slot and turn the drive tray latch to your right.

CAUTION:
***Possible cartridge mounting failures:* Make sure the tray is securely latched by pulling back on the tray and check that it does not come loose.**

3. Make sure the tray is securely latched by pulling back on the tray. It should not move.
4. Connect the drive SCSI connector, P903, to the drive.
5. Connect the drive power cable, P904A/B, to the library.
6. Connect the serial interface connector, P6A/B, to the drive.
7. Close the drive door and secure it by turning the drive door latch to your right.
8. Reset the library.
9. Reconfigure the drives. See "Configuring the Drives" on page 2-6.

Figure 2-4. Drive Connectors (L201_170)



1. Drive SCSI connector, P903
2. Drive power cable, 904A/B
3. Serial interface connector, P6A/B

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 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 Bills

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 2-6. Conversion Bills for Adding Cell and Drive Capacity

Description	Conversion Bill
L80 40-cell to L80 60-cell L80 60-cell to L80 80-cell	YXL40/80-20-CART
L80 40-cell to L80 80-cell	YXL80-40-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 frame.

Table 2-7. L80 Library Part Numbers

Description	Part Number
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

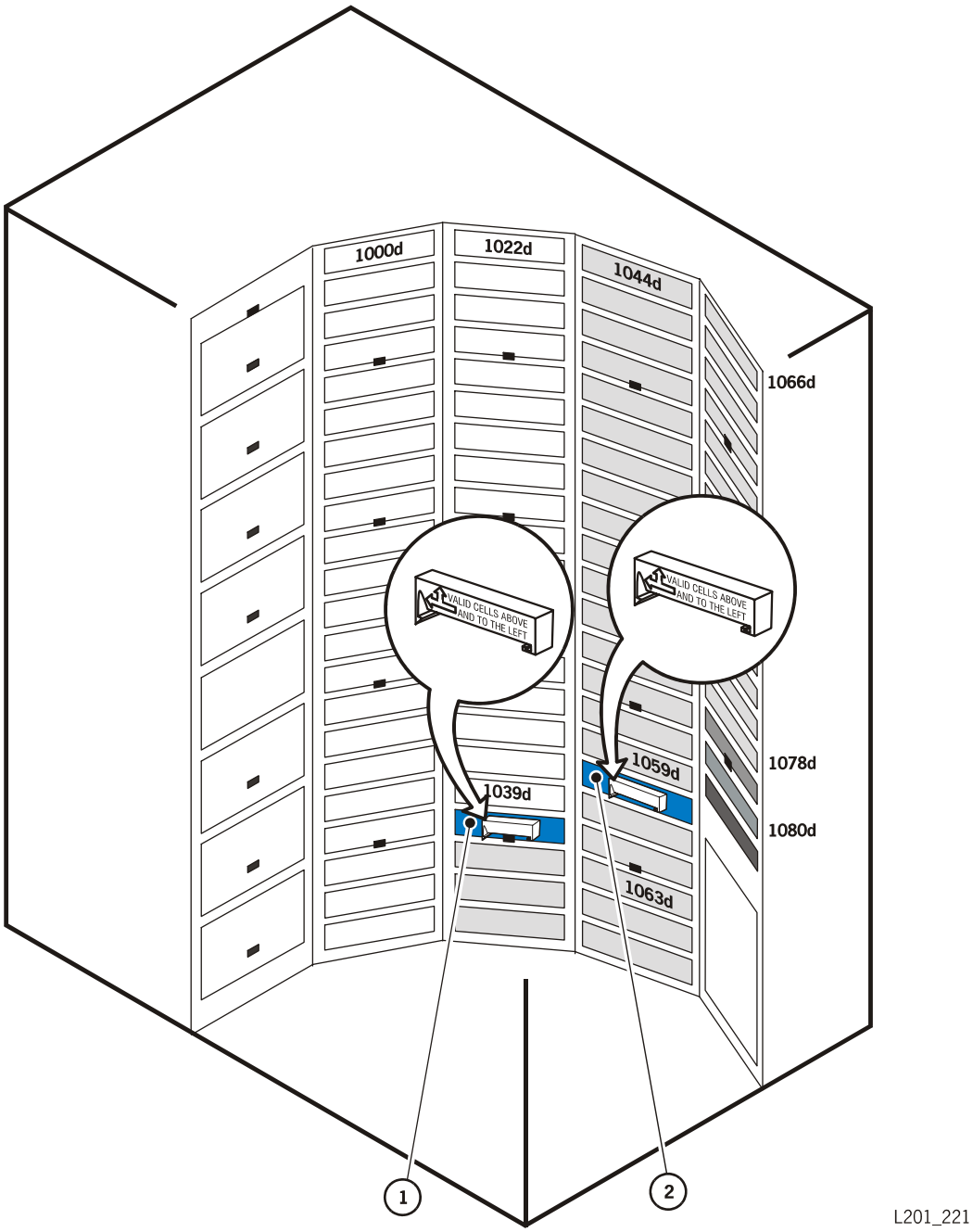
Note: If you no longer have the original packing material from your old library, you can use the packing material from the new library to return your old library.

Attaching the Cell Barrier Clip

If your library is not an 80-cell capacity model, the tape management software only recognizes the data cells designated for the capacity that you ordered. You can attach a cell barrier clip as shown in the Figure 2-5 to indicate the configuration of the cell capacity in your library.

See "Viewing the Status of the Personality Module" on page 3-5, to get information about your library's cell capacity.

Figure 2-5. Attaching the Cell Barrier Clip (L201_221)



1. Cell barrier clip location for 40-cell model library
2. Cell barrier clip location for 60-cell model library

Upgrading 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 E-Business Web site.

Requirements

To upgrade firmware, you must have:

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

Procedure

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 following the procedure, make sure you:

- Initialize the library
- Close the library doors

Copying Firmware

1. Access the StorageTek's Web site at:

   http://www.support.storagetek.com

   Enter your user ID and password..
2. Click on `Tape Storage` under Product Information.
3. Scroll down to `L80 Support`.
4. Click on the `Code` icon.

5. Click on the available code.
6. Save the zip file to a directory on your PC or to a diskette.
7. 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's 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.

    The operator panel displays the status of the download.

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 becomes 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.

Library Operation

3

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 to move cartridges among the storage cells, drives, and cartridge access port (CAP) without intervention.

Operator tasks in the automated mode include:

Inserting a Cartridge through the CAP

Make sure you refer to "Electrostatic Discharge Damage Prevention" on page xxii before proceeding.

To insert a cartridge into the CAP:

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

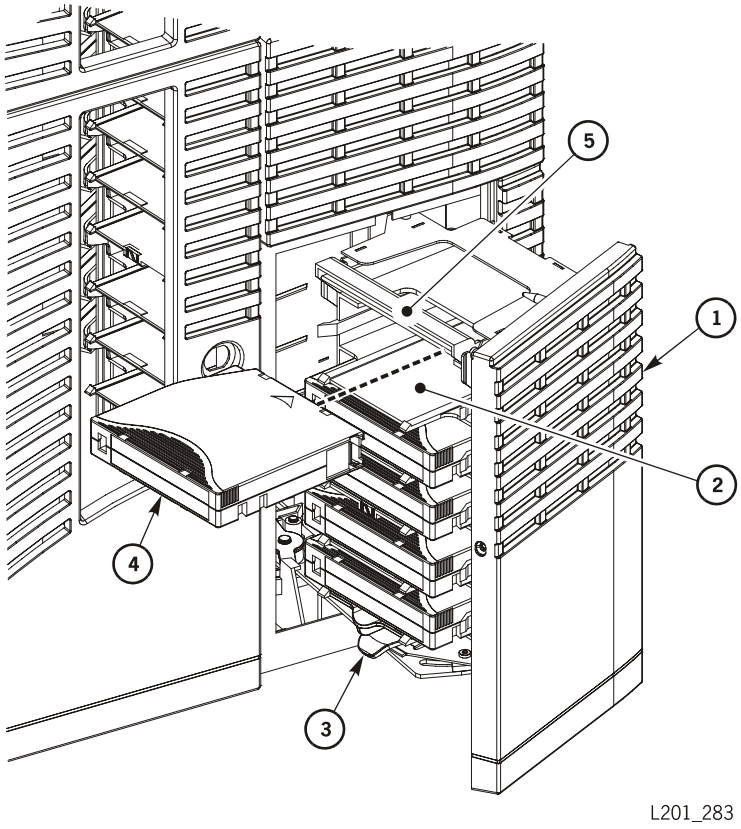
   The robot opens the CAP and the status shows `CAP: Opening`.
3. Insert cartridges in one of the following ways:

   - Place the cartridges directly into the CAP cells.
   - Load the cartridges after removing the magazine from the library. To remove the magazine, press the finger tab at the bottom front center of the magazine and tilt the magazine toward you; hold the magazine handle and lift.

   Note: When placing cartridges in the CAP cells, make sure the hub is down and the volume serial number is facing you. (See Figure 3-1 on page 3-2)
4. Return the magazine to its closed position. If you removed the CAP magazine, make sure you place it back in the library.

Note: Do not insert unlabeled cartridges in the CAP or storage cells. The client software determines what happens when you insert a cartridge with an unreadable label. Under ordinary conditions, the camera on the hand audits the CAP and recognizes that a cartridge is present, but the client software may direct the hand to move the cartridge, or, the library to stop operating. Other software may prompt you to type in a label number when no volume serial number is detected. Typing in a label number may cause a problem during an audit because the camera still will not be able to read the unreadable volume serial number on the cartridge

Figure 3-1. Inserting Cartridges into the CAP Magazine (L201_283)



1. CAP outer cover
2. CAP cell location
3. Finger tab
4. Cartridge
5. Removable CAP magazine

Removing a Cartridge from the CAP

To remove a cartridge from the CAP:

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

Monitoring the Operator Panel for Messages

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

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

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. Some status information might be available through the network interface.
`STK L80-Ready`	The library has completed initialization and is ready to perform tape management requests.
`STK L80-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 display the `Main Menu`.
2. Press the arrow buttons until the > sign lines up with `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. To return to the `Main menu`, press the MENU button twice.

Table 3-2. Drive Status Messages

Status Message	Explanation
`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 in the drive.
`Cleaning`	The drive is being cleaned.
`Clean Needed`	This drive requires cleaning. This message appears only when a cartridge is not loaded in the drive.
`Empty`	A cartridge is not loaded in this drive.
`Init Required`	You must initialize this drive.
`Inop`	This drive is inoperable.
`Loaded`	A cartridge is loaded in 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`	This drive is rewinding the cartridge.
`Rewound`	The drive has rewound.
`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 display the `Main Menu`.
2. Press the arrow buttons until he > sign lines up with `Personality Module`.
3. Press the SELECT button. `PERS MODULE MENU` is displayed.
4. Use the arrow buttons to line up the > sign with `PERS MODULE INFO` and press SELECT.
5. Use the arrow buttons to scroll through the information stored in the personality module.
6. To return to the `Main menu`, press the MENU button twice.

Note: Use the `INSTALL UPGRADE` portion of the `PERS MODULE MENU` only 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 "Adding Cell and Drive Capacity" on page 2-15.
	`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.
`Version`		Version number for the personality module.

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

Status Item	Status Message	Explanation
Library Vendor ID		The identity number for the library vendor.
Library Vendor Name		The name of the library vendor; for example, STK for StorageTek.
Library Product Name:		
	Normal type	The product name assigned by the library vendor; for example, L80
	Upgrade type	The product name for which the upgrade is valid.
Library 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 Under the Hardware Monitor

Viewing the information under the Hardware Monitor lets you know:

- If the LLC card fan, drive fans, and power supplies are functioning. If a fan or power supply fails, see Appendix B to report the problem.
- The current Celsius temperature and highest 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 2ºC 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 the warning and shutdown temperatures were not set during configuration, the screen will show only the current and high temperatures.

To view the Hardware Monitor information:

1. Press the MENU button to display the `Main Menu`.
2. Press the arrow buttons until the he > sign lines up with `HARDWARE MONITOR`.
3. Press the SELECT button. `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 and drive fans are functioning.
`Fans: Fail !Drive Slot 0 Fan`	The drive slot 0 fan is not functioning, for example.
`Power: OK`	The power supplies are functioning.
`Power: Fail !Top Left`	The top left power supply is not functioning, for example.
`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 a 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 host has issued a software command that locks the CAP until a previous command is completed.

Viewing the Status of the CAP Magazine

To check the status of a CAP magazine and its contents:

1. Press the MENU button to display the `Main Menu`.
2. Press an arrow button until the cursor lines up with `CAP Contents`.
3. Press the SELECT button. The `CAP CONTENTS MENU` appears.

   The `CAP CONTENTS MENU` displays the cartridge type (for example, DLT) and the cartridge code (for example, DG0123) example for each cartridge in the CAP magazine.

Table 3-6. CAP Magazine Status Messages

Message	Meaning
`EMPTY`	This magazine cells do not contain a cartridge.

Reviewing the Event Log

The event log records significant messages and errors that the library has generated during operation. A service representative or other Sun StorageTek representatives may ask you to review the library's event log for fault symptom codes (FSC). Using the FSCs you can better analyze library-related problems.

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. `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 panel displays 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 code is the FSC.

03 indicates 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 StorageTek representative. Contact your service provider for more information.

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 if a valid cleaning cartridge is present in the designated cleaning cells.

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 3-7. Clean Menu Criteria

If	On selecting a drive to clean
Auto Clean is On and there is no cleaning cartridge in the cleaning cells	The message `No Clean Cart Available, import one or more to clean` is displayed. Do the following: 1. Using the operator panel return to the library status screen. 2. Open the CAP and insert a valid cleaning cartridge for the drive being cleaned. 3. Return to the `Clean menu`.
Auto Clean is Off and there is no cleaning cartridge in the cleaning cells	The message `No Clean Cart Available, 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 there is more than one cleaning cartridge in the CAP	Select the `Import Clean Carts` option. "Importing Cleaning Cartridges through the CAP" on page 3-13.

The following table describes the Clean menu information:

Table 3-8. Clean Menu Information

Option	Description
Drive to Clean	The drive selected for cleaning
Set Warn Counts	The number times you want use the cleaning cartridge for the selected drive before the library exports a new cleaning cartridge through the CAP. For more information see "Setting the Cleaning Cartridge Warning Count" on page 3-11.
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 "Viewing the Cleaning Cartridge Information" on page 3-12.
Import Clean Carts	A procedure for moving cleaning cartridges from the CAP to the cleaning cells. For more information see "Importing Cleaning Cartridges through the CAP" on page 3-13.
Export Clean Carts	A procedure for moving cleaning cartridges from the cleaning cells to the CAP. For more information see "Exporting a Cleaning Cartridge through the CAP" on page 3-13.

Setting the Cleaning Cartridge Warning Count

Cleaning cartridges have a limited life span. After multiple uses, replace the cleaning cartridge and dispose 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"). Check your tape drive'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 screens 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. To return to the Clean menu, press the MENU button.

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 cells.

Below is a sample display of the Cleaning Cartridge Information:

```
DLT CLN123 4
```

DLT is the media type.

CLN123 is the cartridge code.

4 is the number of time 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 3-20.**

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, line up the > sign with the appropriate drive's `Clean Cart Info`.
5. Press the SELECT button. The `Clean Info` menu appears.
6. To return to the `Clean menu`, press the MENU button.

Exporting a Cleaning Cartridge through the CAP

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

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

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

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, 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 cells 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 there are no cleaning cartridges in the cleaning cells, 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. To return to the `Clean menu`, press the MENU button.

Importing Cleaning Cartridges through the CAP

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

Before importing the a cleaning cartridge through the CAP, ensure that:

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

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

1. Load cartridges into the magazine. See "Inserting a Cartridge through the CAP" on page 3-1.
2. Press the MENU button to return the display 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 cells 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 there are no cleaning cartridges in the CAP cells, you will see a message `No Clean Cartridges to import from CAP.` If the cleaning cells are full, you will see a message `Clean cells are full.`
8. To return to the `Clean menu`, press the MENU button.

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 job processing is complete.
2. Quiesce the host software to make sure the library and drives are offline.

   Note: Refer to your host software documentation for instructions.
3. Move the power-on/off switches to the OFF position (O).

Manual Mode

The following pages describe 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 in the manual mode include:

Note: If you encounter any problems that might need resolution by a service representative, see Appendix B 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 equipment or cartridge damage. **If you open the door without performing this procedure, you risk possible hand or cartridge damage.**

Possible hand damage: **To ensure that the hand is safely retracted, wait for the `OK To Open Door` message on the operator panel before opening the door.**

To position the hand assembly by using the Door Operations menu:

1. Press the MENU button to return to the Main Menu.

   The arrow sign (>) appears to the left of `Door Operations`.

2. Press the SELECT button.

   The operator panel displays `DOOR MENU: Push SELECT to Prepare Library for Opening Door` message.

3. Press the SELECT button.

   The operator panel displays `Are you sure?`

4. Press the SELECT button again.

   The library stops all processes in an orderly manner, 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.

5. Insert the key into the locks on the door and turn the key to your left to open the front door of the library. You may have to open two door locks.

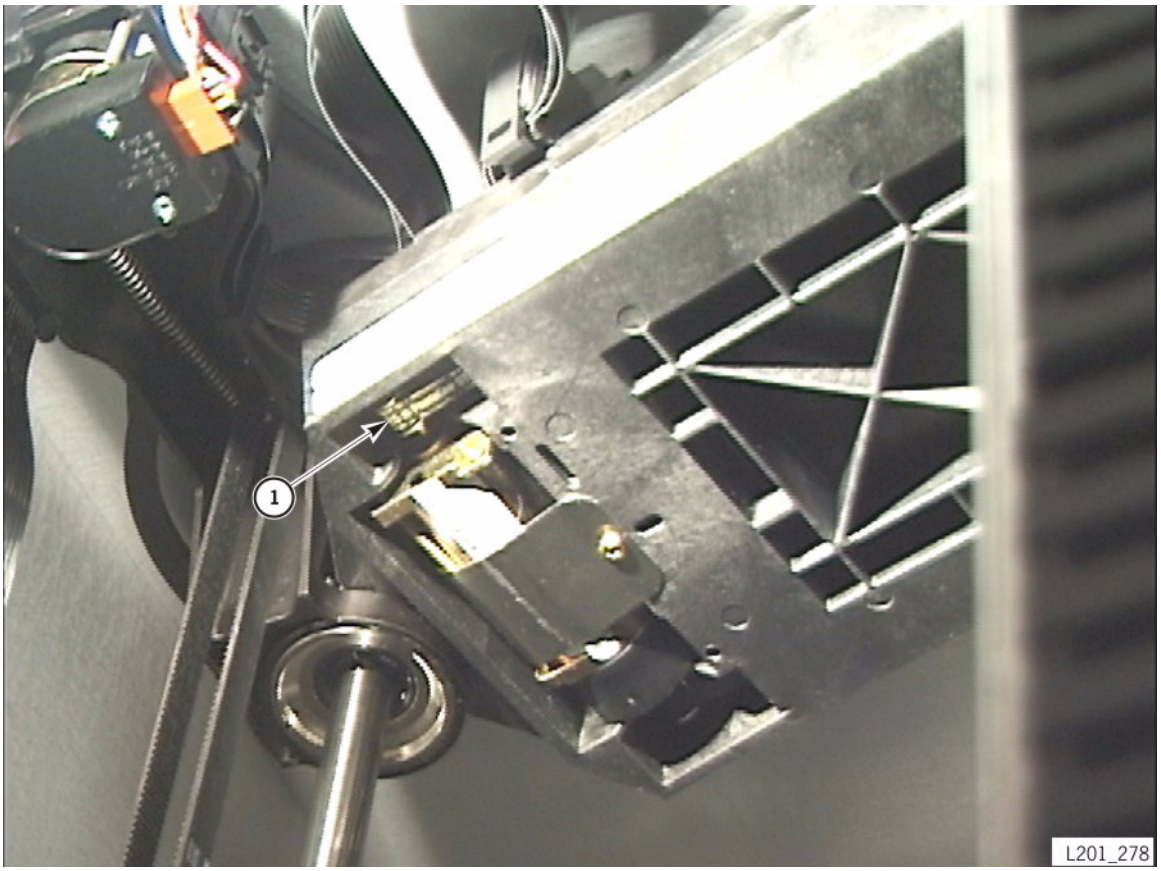
Removing a Cartridge from the Hand

CAUTION:
ESD hazard: **Refer to "Electrostatic Discharge Damage Prevention" on page xxii before continuing.**

To remove a cartridge from the hand:

1. Open the door.
2. Manually move the robot until it is in front of an empty cell, and high enough so that you can reach under the hand.
3. Locate and turn the belt (see Figure 3-2 on page 3-18) 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 retracts and returns to its original position.
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. Return the library to ready status (see "Returning the Library to Ready Status" on page 3-22).

Figure 3-2. View of the Hand Belt from the Floor (L201_278)



1. Hand belt

Locating a Cartridge

To locate a particular cartridge inside the library:

1. Open the door.
2. Locate the particular cartridge by the volume label and cell.
3. Remove the cartridge from the cell by gently lifting and pulling the cartridge out.
4. Return the library to ready status (see "Returning the Library to Ready Status" on page 3-22).

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 3-18).
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. For Ultrium drives, hold the cartridge so that the volume serial number is facing you and the hub is down.
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.

Manually Removing a Cartridge from a Drive

To manually remove a cartridge from a drive:

1. Obtain the drive number from the host 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 for a few seconds until the operation is complete.

   When the operation is complete, the green *Operate Handle* LED remains steadily lit for the DLT drives.
5. For DLT drives, move the drive handle up.

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.**

6. Gently pull the cartridge from the drive.

   Note: If the cartridge does not come out of the drive, remount the cartridge and 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 3-22).

8. Return the library to ready status (see "Returning the Library to Ready Status" on page 3-22).

Replacing a Cleaning Cartridge

Cleaning cartridges have a limited life. Refer to your drive documentation to determine how many times a cleaning cartridge can be used. When the usage count exceeds its limit (see "Viewing the Cleaning Cartridge Information" on page 3-12), 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 cleaning cells 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 door and reinitialize the library (see "Returning the Library to Ready Status" on page 3-22).

   The status display shows that initialization tests are running.

5. Wait until the initialization test is complete before performing another task.

Manually Cleaning a Drive

Use the Clean menu 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

`Drive to Clean:`	The number of the drive to clean (for example, drive 1). You can always edit this number, regardless of the state of Auto Clean.
`Usage Count:`	If Auto Clean is on, a usage count (the number of times the cartridge has been used to clean a drive) is displayed. **Note:** 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; then press the SELECT button.

   The status display shows the `Are you sure?` and the `Lib will be off-line` messages.
5. 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.
6. Wait for the cleaning operation to complete before retrieving 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* indicator is steadily lit and the drive handle is up.
3. Close and lock the two door by rotating the key toward your left; 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. Place the library and drives online by entering the appropriate commands at the server console.
7. Enter the command to upload the audit data to the tape management software.

Library Status Tool

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 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.

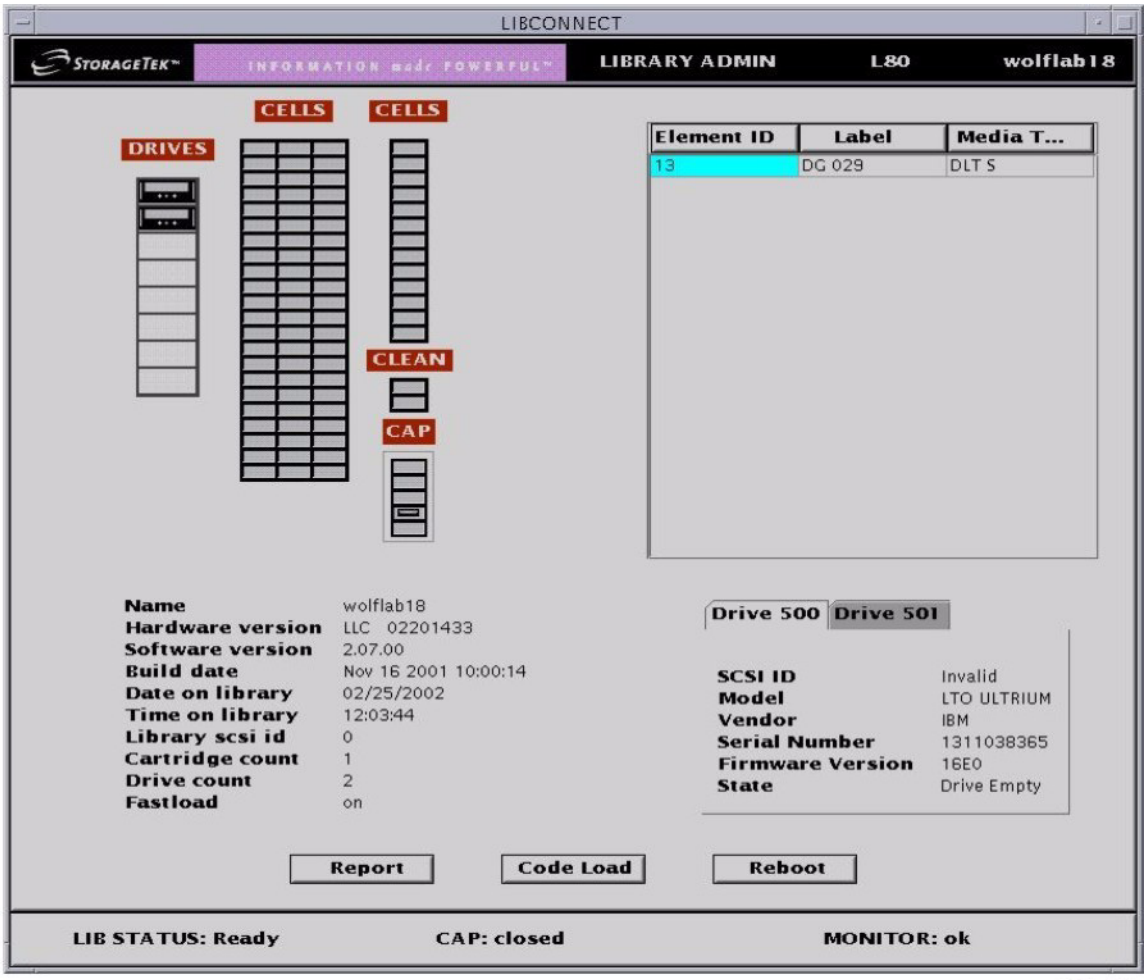
    If an error was displayed when you launched the policytool:
    a. From the `File` menu select `Save As`.
    b. Type the name of the policy and the full path as noted in Step 4a.
11. Select `File > Exit` to close the Java policytool.

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.

Using the Library Status Tool

Figure 3-3. Sample Library Status Tool Monitor Screen (L201_514)



L201 514

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:

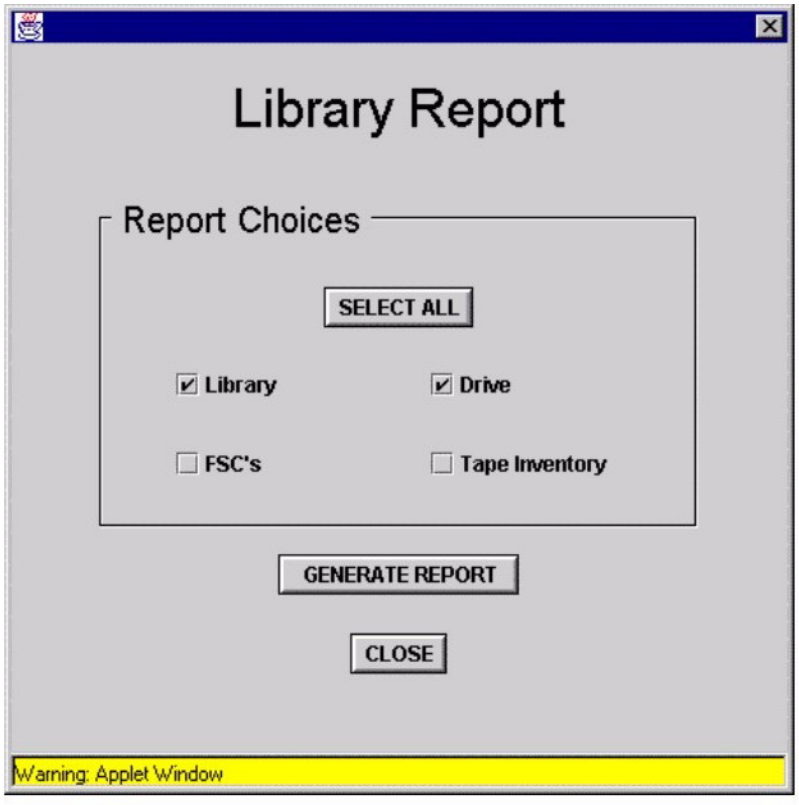
1. Select `Reports` from the Library Status tool initial screen.

Select from the following Report options:

Table 3-10. Report Options

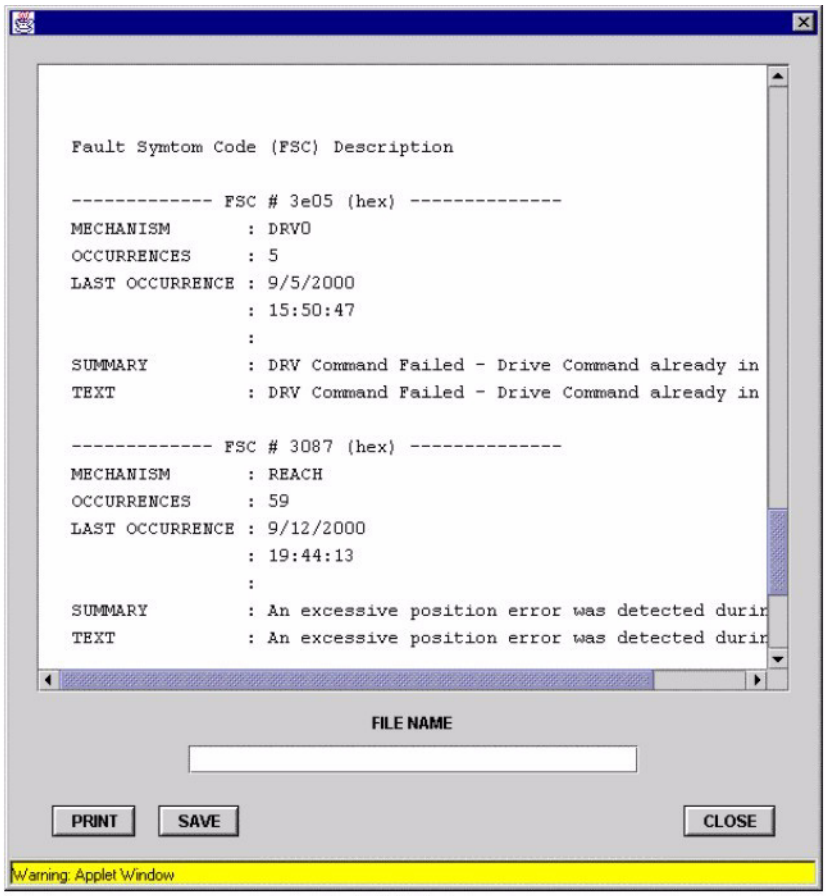
Click	For Information on...
Library	The library including the library name, ID, SCSI type, number of CAP cells
Drive	The drives installed in the library including their current state
FSCs	Fault symptom codes with their descriptions/occurrences from the library's Event Log
Tape Inventory	The cartridges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

Figure 3-4. Report Selection Screen



L201_508

Figure 3-5. Sample Report (L201_511)



L201_511

Before saving the report to your computer hard drive, see "Setting up Java Policy Permissions" on page 3-23 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 3-23 to set up the appropriate permissions.

To load code to the library:

1. Select `Code Load` from the Library Status tool initial screen.
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.
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

See the *L80 Tape Library Installation Manual*, *96054* for information on SNMP setup and configuration.

Library Admin

The Sun StorageTek L-series Library Admin is now available for the L80 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 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 L80 tape library is 63041.

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Troubleshooting and Testing

4

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.

If you must contact CSS, or ECSS, see Appendix B 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

Problem	What to do
Library does not power-on. The operator panel does not display any messages.	1. Make sure that the library power switch is in the ON position. 2. Check all power cord connections. 3. Replace power cord. 4. Make sure that there is power to the outlet.
The client computer cannot communicate with the library or drives.	1. Make sure that all cables are securely attached to their connectors on the rear of the library, the drives, and the client computer. 2. Make sure that SCSI terminators are installed where required. 3. Make sure that each SCSI device on the same bus has a unique address and that the last device is properly terminated. 4. Make sure that the interfaces are matched for LVD or HVD operation.

Table 4-1. Troubleshooting Table (Continued)

Problem	What to do
`Service Required` (red) LED is constantly lit.	**Perform the following procedure:** 1. Check the operator panel for any displayed error messages. Note error messages reported. 2. Make sure that the personality module is correctly installed and secured. 3. Open the front door (see "Opening the Front Door" on page 3-16). Observe and note the state of the cartridges, hand, and drives. a. Make sure that all cartridges are fully seated and properly oriented in their cells. b. Make sure that all packing materials have been removed. c. Inspect the library floor for any foreign objects or debris; remove them if found. d. Check the status of the drives. 4. Close the front door. 5. Open the drive doors and check the following*:* 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). b. Turn the drive tray latch all the way to your left. This loosens the latch to its fully unlocked position. c. Slide the drive tray properly into the slot. d. Turn the latch all the way to the right to engage the latch and clamp it firmly into the frame. e. Pull back on the tray to make sure the tray is securely latched. It should not move. f. Make sure that all connectors are properly plugged into their respective connectors. 6. Close and secure the drive doors. 7. Power-on the library and, after the library initializes, perform the self-test function (see "Library Self-Test and Event Log" on page 4-3**)** from the operator panel.

Table 4-1. Troubleshooting Table (Continued)

Problem	What to do
The library is unable to communicate with the drives. 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.	1. Replace cleaning cartridge with a new cleaning cartridge. 2. Run the Library Self-Test (see "Library Self-Test and Event Log" on page 4-3) and note if errors are reported for the drive. 3. Run any client computer-based drive diagnostic tests.
Cartridge stuck in drive or hand.	See "Manually Removing a Cartridge from a Drive" on page 3-19 or "Removing a Cartridge from the Hand" on page 3-17.
Drive is unable to eject a cartridge.	1. Open the front door (see "Opening the Front Door" on page 3-16). 2. See "Manually Removing a Cartridge from a Drive" on page 3-19.

Library Self-Test and Event Log

If you have used the troubleshooting tips to try to correct a problem and the problem is still exists, run the library self-test or display the event log and note the FSC.

Diagnostics Menu

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

Table 4-2. Diagnostics Menu

`Library Self-Test`	The library self-test: • Performs the normal initialization tests • Performs a "get" and "put" for each cartridge in the library • If a diagnostic cartridge is present, mounts and dismounts this cartridge on Drive 0, and then on the other drives. Problems with the library displays in the status.
Event Log	The event log displays the 20 most recent events and errors.

With the information you obtain from 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 Appendix B.

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. A remove and insert is performed on each data cartridge in each cell.
3. If a diagnostic cartridge is in the library and at least one drive is installed, then a mount and dismount of the diagnostic cartridge is performed in each drive, starting with Drive 0.

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

To run the Library Self-test:

1. Press the MENU button to display 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.

   The status display shows the `Running Init Test` message while the Library Self-Test runs. After the Library Self-Test is complete, the status displays the `Command Completed` message.

   Note: If the test is not successful, make a note of the messages in the status display so that you can report them to CSS or ECSS. For more information, see Appendix B.
7. When the library self-test is successful, press the MENU button twice to return to the Main Menu.

Event Log

The Event Log is a history of library activities, errors, and FSCs. Note any FSCs displayed because they are meaningful to the service engineers.

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

Demo Mode

Demo Mode also appears in the Diagnostics Menu, but is used for *demonstration purposes only*; it will *not* help you troubleshoot the library.

CAUTION:
Demo mode is not intended for customer use.

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Cartridge Information

5

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

CAUTION:
Possible cartridge or tape drive damage: **Use only Ultrium cartridges for Ultrium drives, DLT cartridges for DLT 7000E and DLT 8000 drives, and DLTtape IV for DLT1 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:

- 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 moisture or direct sunlight.
- 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 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."

The following pages 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.

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.**

When you clean a cartridge exterior:

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

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 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	±0.02 D
Repeatability	±0.01 D
Aperture diameter	3.4 mm (0.13in.)

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 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 Sales Support at:

Telephone: 1.800.ask4stk (1.800.275.4785)
E-mail: 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.

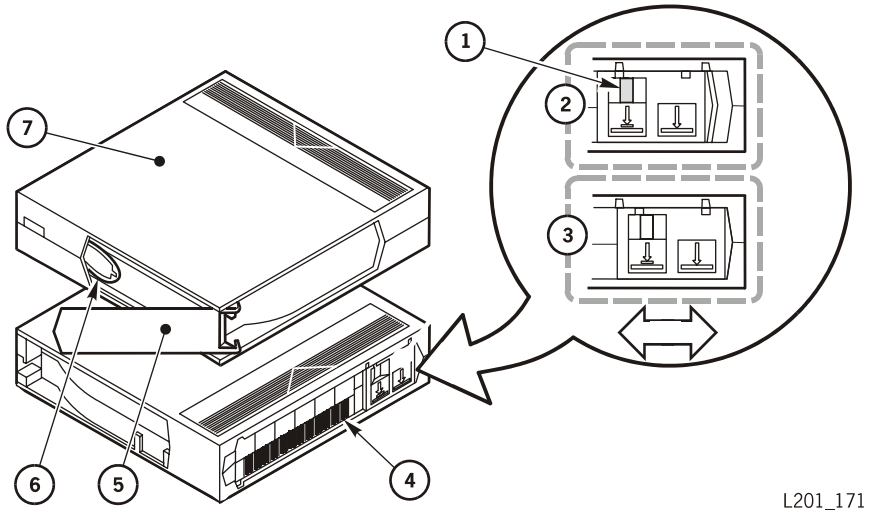
DLT1 drives use only DLTtape IV cartridges. DLT1 drives can read—but not write to—DLTtape IV cartridges formatted by DLT 4000 drives. DLT1 drives require a unique cleaning cartridge.

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 1-16 for other cartridge restrictions.

Figure 5-1. DLT Cartridge Components (L201_171)



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

Applying Cartridge Labels

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

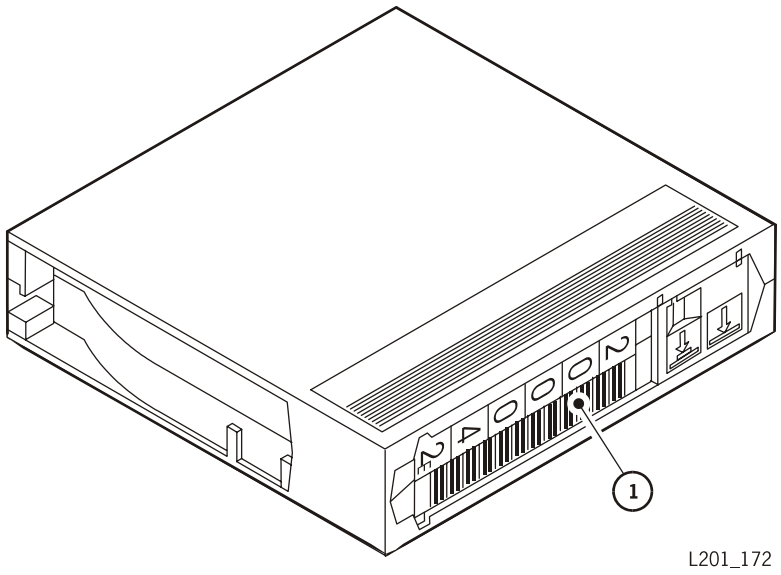
Table 5-1. DLT Cartridge Codes

Label	Type of Cartridge
D	DLTtape IV data cartridges
C	DLTtape III data cartridges
E	DLTtape IIIXT data cartridges
CLN	Cleaning cartridges
DG	Diagnostic cartridge (apply a DG label to a blank data cartridge to be used for diagnostic tests)

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 on page 5-5).
4. Hold the cartridge so that the write-protect switch is toward you.
5. Slide the label under the groove in the recessed area.

Figure 5-2. DLT Cartridge Volume Label (L201_172)



1. Volume Label

Setting the Write-Protect Switch

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.

You can also 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.

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

Operating environment	
Temperature	10ºC to 40ºC (50ºF to 104ºF)
Relative humidity	20% to 80% non-condensing
Wet-bulb temperature	25ºC (77ºF) maximum

CAUTION:
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.**

When storing DLT cartridges, the stray magnetic field at any point on the tape shall not exceed 4000A/m.

Cartridge storage environment	
Temperature	16ºC to 32ºC (61ºF to 90ºF)
Relative humidity	20% to 80% non-condensing
Wet-bulb temperature	26ºC (79ºF) maximum
Cartridge storage environment for cartridges intended for archiving data for one year or more	
Temperature	18ºC to 26ºC (64ºF to 79ºF)
Relative humidity	20% to 60%

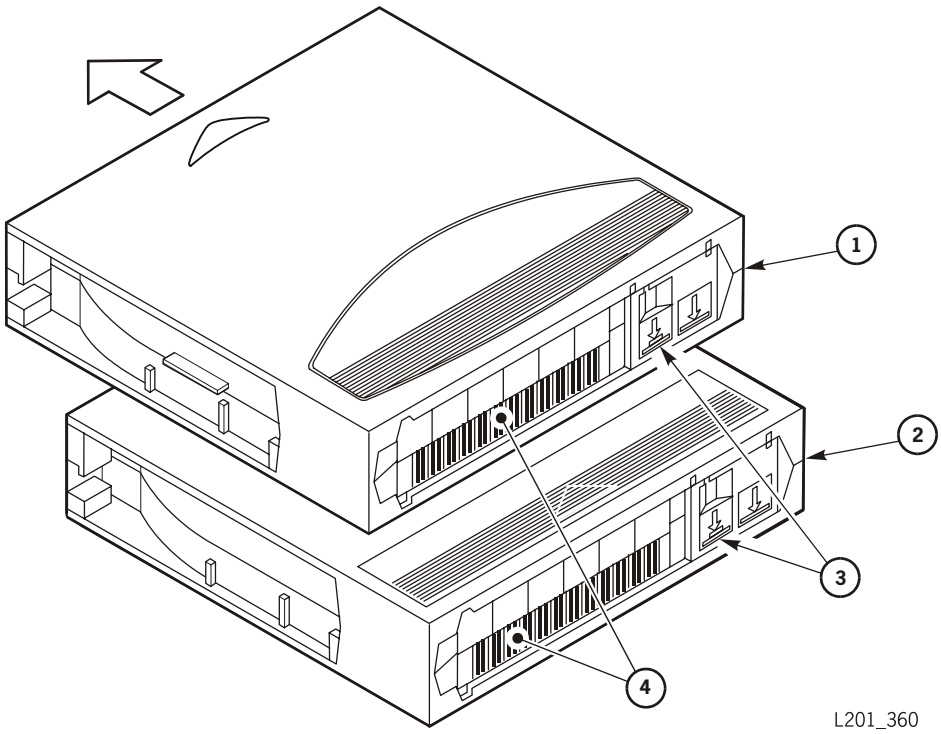
SDLT Cartridges

SDLT drives use their unique data and cleaning cartridges.

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.**

The following illustration shows the differences between the SDLT and standard DLT/ DLT1 cartridges.

Figure 5-3. SDLT and DLT Cartridge Differences (L201_360)



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

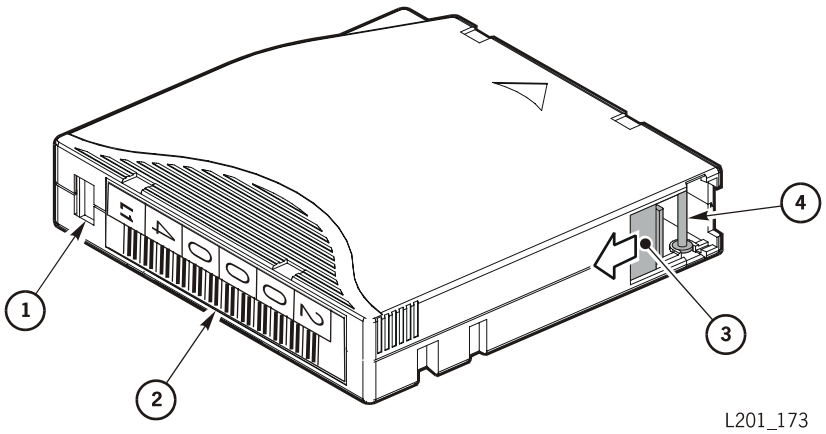
Table 5-3. SDLT Cartridge Tape Specifications

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 pages describe Ultrium cartridges.

Figure 5-4. Ultrium Cartridge Components (L201_173)



1. Write-protect switch (a data cartridge has a red switch; a cleaning cartridge has a gray switch.)
2. Volume label
3. Access door
4. Leader pin

Applying Cartridge Labels

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

Possible misread of volume 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 volume label.**

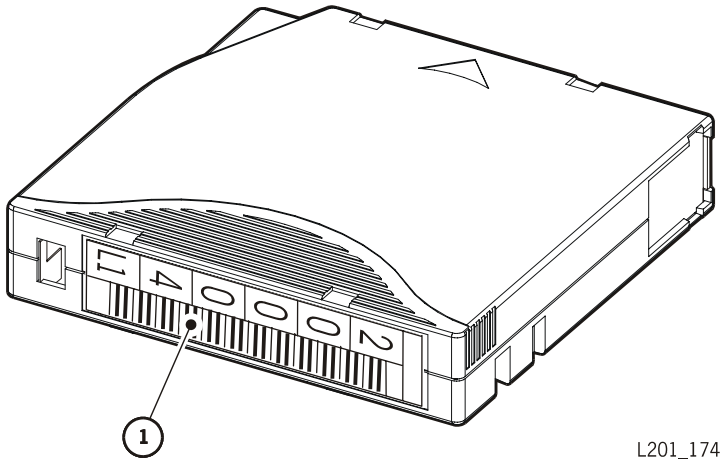
Table 5-4. Ultrium Cartridge Codes

Label	Type of Cartridge
L_1	Gen1 data cartridge
L_2	Gen2 data cartridge
L_3	Gen3 data cartridge
C_1 plus CLN	Cleaning cartridge for Hewlett-Packard
C_2 plus CLN	Cleaning cartridge for IBM
C_3 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)

CAUTION:
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 before placing the label, using a cleaning solution made for this purpose.
3. Locate the type of label that you require.
4. Hold the cartridge so that the write-protect switch is toward you.
5. Attach the label to the cartridge as shown in the following figure.

Figure 5-5. Ultrium Cartridge Label (L201_174)



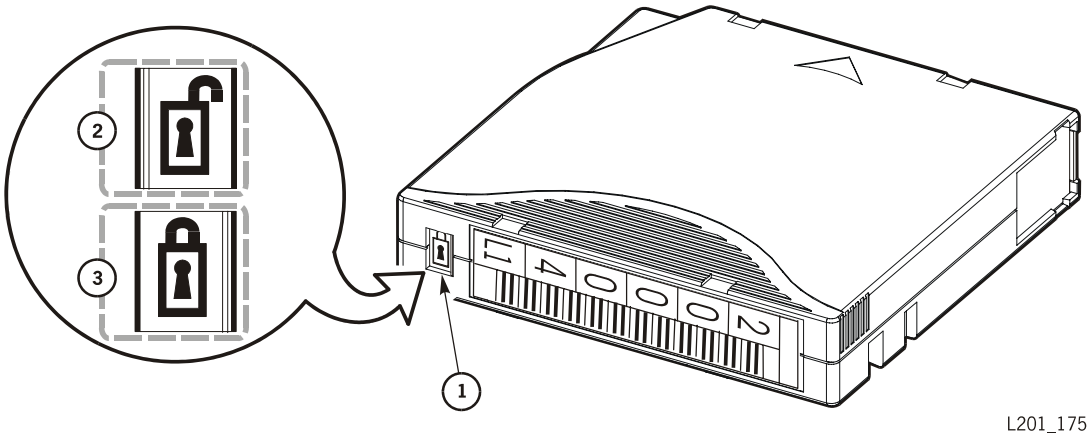
1. Volume label

Setting the Write-protect Switch

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 on it.

You can also 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. See Figure 5-6. In this position, the drive can write as well as read data. This setting is recommended when inserting cartridges into the tape library.

Figure 5-6. Setting the Ultrium Write-Protect Switch (L201_175)



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 Height Depth Weight	 107 mm (4.2 in.) 22.9 mm (0.9 in.) 102 mm (4.0 in.) 210.0 g (0.46 lb)	 107 mm (4.2 in.) 22.9 mm (0.9 in.) 102 mm (4.0 in.) 210.0 g (0.46 lb)
Temperature (non-condensing) Operating Shipping Wet bulb	 10 to 40°C (50 to 104°F) -23 to 49°C (-10 to 120°F) 26°C (78°F)	 10 to 40°C (50 to 104°F) -23 to 49°C (-10 to 120°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 Length Depth Weight	 107 mm (4.2 in.) 22.9 mm (0.9 in.) 102 mm (4.0 in.) 210.0 g (0.46 lb)
Temperature (non-condensing) Operating Shipping Wet bulb	 10 to 40°C (50 to 104°F) -23 to 49°C (-10 to 120°F) 26°C (78°F)
Humidity	20–80%
** Assuming a 2:1 compression ratio.	

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SCSI HVD or LVD Considerations

A

This appendix describes how to configure your library's interface.

Your library interface is hardware configured as either high voltage differential (HVD) or low voltage differential (LVD). The HVD interface allows longer cable lengths but throughput is lower than LVD; the LVD interface restricts cable lengths, but provides faster throughput.

CAUTION:
***Potential for equipment damage:* Do not mix low voltage differential and high voltage differential operation on the same bus.**

SCSI Cable Restrictions

The library and drives support *only* SCSI Type-3 connectors. If you use SCSI Type-1 or -2 connectors, you must use a SCSI Type-1- or SCSI Type-2-to-SCSI Type-3 adapter.

Note: If you are connecting the library or drives to an LVD SCSI bus, the cable can be no longer than 12 m (39.4 ft).

Table A-1 lists restrictions for SCSI connections that you must keep in mind.

Table A-1. SCSI Cable Restrictions

Application	Length Restriction
Single-Ended (Library only)	Stub length: 0.1 m (4 in.) 5 to 10 MB data transfer rate: 3 m (10 ft) 1 to 5 MB data transfer rate: 6 m (20 ft)
High Voltage Differential	Stub length: 0.2 m (10 in.) 1 to 10 MB data transfer rate: 25 m (82 ft)
Low Voltage Differential	Stub length: 0.1 m (3.9 in.) 108 GB/ hour data transfer rate: 12 m (39 ft)

Host Bus Adapter Requirements

The host bus adapter (HBA) in host must match the library and drive's SCSI bus type. If the interface to the library is HVD, your host must contain an HVD-compatible HBA; likewise, if the interface to the library is LVD, then the host must contain an LVD-compatible HBA.

Precautions

The single-ended, LVD, and HVD alternatives are not compatible and cannot be mixed on the same SCSI bus. Disabling of the interface or even potential equipment damage might result if the two interfaces are connected to the same bus.

Table A-2 lists the possible issues you may encounter if you mix interfaces on the same bus.

Table A-2. SCSI Device/Bus Types: Issues

If you plug this device type ...	into a Single-Ended (SE) Bus Type ...	into an LVD Bus Type ...	into an HVD Bus Type ...
Single-ended (SE) device	This is a proper connection.	The entire bus will run in SE mode (with all SE restrictions).	The HVD bus will be *disabled*.
LVD device	The LVD device will run in SE mode.	This is a proper connection.	The LVD will be *disabled (potential damage to the device)*.
HVD device	The HVD device will be *disabled*.	The LVD bus and all LVD devices will be *disabled (potential damage to LVD devices)*	This is a proper connection.

Customer Support

B

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 B-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:

Account name _____

Site location number _____

Contact name _____

Telephone number _____

Equipment model number _____

Device address _____

Device serial number (if known) _____

Urgency of problem _____

Fault Symptom Code (FSC) _____

Problem description _____

_____

_____

_____

_____

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

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 replaced in its entirety when it fails.

Customer Resource Center (CRC) StorageTek's Web-based service that provides technical information to customers with Sun and 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 ½-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. (T)

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. (T)

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

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

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

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

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

Mb *See* megabit.

MB *See* megabyte.

Mb/s Megabits per second.

MB/s *See* megabytes per second.

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 (µ) 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. (T)

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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