StorageTek®

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95895

REVISION
P

L180
TAPE LIBRARY

OPERATOR'S GUIDE

PRODUCT TYPE
HARDWARE

L180
Tape Library

Operator's Guide

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Revision P (March 2006)
This edition contains 214 pages. See "Summary of Changes" on page iii for the revision history and summary of changes made to this publication.

Summary of Changes

EC	Date	Edition	Description
111222	November 1999	First	Initial release.
111426	March 2000	Second	Refer to this edition for a description of the changes.
111569	November 2000	Third	Refer to this edition for a description of the changes.
111640	April 2001	Fourth	Refer to this edition for a description of the changes.
111680	September 2001	Fifth	Refer to this edition for a description of the changes.
111721	March 2002	Sixth	Refer to this edition for a description of the changes.
111752	May 2002	Seventh	Refer to this edition for a description of the changes.
111810	December 2002	Eighth	Refer to this edition for a description of the changes.
111829	February 2003	Ninth	Refer to this edition for a description of the changes.
111893	April 2004	Tenth	Refer to this edition for a description of the changes.
111949	January 2005	Eleventh	Refer to this edition for a description of the changes.
111983	June 2005	N	Refer to this edition for a description of the changes.
129919	March 2006	P	**Preface** Added T10000 manuals to Tape Drive Documentation in "Related Publications." **Chapter 1** Revised "Tape Drives" and Table 1-2 to add T10000 information. **Chapter 3** Revised first paragraph in "Drive Entries" to add "library" before "configuration." Revised "Cleaning Cartridge Requirements," Figure 3-1, and Table 3-2, to add T10000 information. **Chapter 4** Added Figure 4-6, "Loading a Cartridge into a T10000 Drive," Figure 4-19, "Unloading a Cartridge from a T10000 Drive" to add T10000 information. Revised Table 4-7 to add T10000 information.

EC	Date	Edition	Description
	March 2006	P (Continued)	**Appendix A** Revised "Colored Cartridge Specifications," Table A-5 through Table A-7, and "T9x40 and T10000 Cartridge Environmental Specifications" to add T10000 information. Added Figure A-4, "Applying Cartridge Labels to T10000 Cartridges," Figure A-9, "Setting the T10000 Write-protect Switch," and Figure A-14 to add T10000 information.

Contents

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Preface

This guide describes how to operate the StorageTek L180 Tape Library (also referred to in this guide as the L180 library, tape library, or simply just library). Most of the information pertains to library hardware, refer to your appropriate tape drive or software documentation for specific information about the drives or client software commands and console messages.

This guide is intended primarily for data center operators who operate the tape library. System programmers, computer system administrators, and service representatives might also find the information in this guide useful.

Organization

The organization of this guide is:

Chapter 1 "General Information" describes the library hardware. This chapter also describes the library's two operating modes and its Auto Clean feature.

Chapter 2 "Controls and Indicators" shows the locations of the power switch and operator panel and describes the functions of the buttons, indicators, and display screens.

Chapter 3 "Configuration" describes how to power on and configure the library and drives through the operator panel. A configuration record form is provided at the end of the chapter.

Chapter 4 "Library Operation" contains a list of procedures for operating the library.

Chapter 5 "StorageTek Service" describes how to contact Customer Support Services for assistance if the library has a hardware or software problem.

Appendix A "Cartridge Tape Information" describes how to prepare, inspect, store, clean, and repair cartridges. It also lists criteria that colored cartridges must meet to be used in the tape library.

Appendix B "StorageTek L-Series Library Admin" lists counters and composite information.

Glossary "Glossary" defines new or special library terms and abbreviations used in this guide.

Index "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 the reader of conditions that might result in damage to hardware, corruption of data, corruption of application software. A caution always precedes the information to which it pertains.

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

Mensajes de alerta

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

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

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

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

Conventions

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

Item	Example	Description of Convention
Buttons	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 hardcopy publications)
Indicators	*Open*	Text and capitalization follow label on product
Jumper names	TERMPWR	All uppercase
Keyboard keys	<Y> <Enter> or <Ctrl+Alt+Delete>	Enclosed within angle brackets
Menu names	Configuration Menu	Text and capitalization follow label on product
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.storagetek.com	Blue (prints black in hardcopy publications)

Related Publications

You can find additional information in the following publications:

APC Power Supply Publications	Part Number
L180 and L700 Tape Library Uninterruptible Power Supply Reference Manual	96047
Uninterruptible Power Supply online information	Go to www.apc.com

Tape Drive Documentation	Part Number
T9840 Tape Drive User's Reference Manual	95739
T10000 Tape Drive Operator's Guide	96174
T10000 Tape Drive System Assurance Guide	TM0002
T10000 Tape Drive Installation Manual	96173
T10000 Tape Drive Service Manual	96175
DLT™7000 Tape Drive Product Manual	Quantum 81-60000-0x
DLT™8000 Tape Drive Product Manual	Quantum 81-60118-0x
SDLT 220 and SDLT 320 Product Manual	CD included with drive
SDLT 600 Product Manual	CD included with drive
Hewlett Packard Ultrium Tape Drive Manual	CD included with drive
International Business Machines (IBM) Ultrium Tape Drive Manual	CD included with drive
Certance Ultrium Tape Drive Product Manual	CD included with drive

Additional Information

StorageTek offers several methods for you to obtain additional information.

StorageTek's External Web Site

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

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

Customer Resource Center

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

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

Partners Site

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

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

Hardcopy Publications

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

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Safety

Please read and observe the following safety topics for this product.

L180 Door Interlock

A safety interlock for the tape library is located behind the front door. When this door is opened, the interlock immediately disables all tape library motors.

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.

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 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 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. 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.

WARNING:
The use of controls or adjustment or perfomrance of procedures other than those specified herein might result in hazardous radiation exposure.

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 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. StorageTek recommends 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.

Rack Safety and Precautions

WARNING:
Possible personal injury:

- **More than one person might be required to install equipment into the library's rack or to remove equipment from the library's rack.**
- **Personnel should take adequate precautions when they are moving a library that contains rack-mounted equipment. The weight of some rack equipment might alter the height of the library's center of gravity. This condition might cause the library to tip during a move.**

CAUTION:
Potential equipment damage: **Do not exceed the maximum allowable weight (77.1 kg [170 lb]) and U-height (6U) for equipment in the rack area of this library.**

Observe the following safety and handling precautions when you are installing equipment into the library's rack:

- Ensure that the equipment has UL listing (listing by Underwriters' Laboratories), CSA certification (certification by the Canadian Standards Association), and CE compliance (compliance with the European Council's directives and standards).
- Understand that the library does not supply power to the rack area. So ensure that the rack-mounted equipment has an adequate power source.

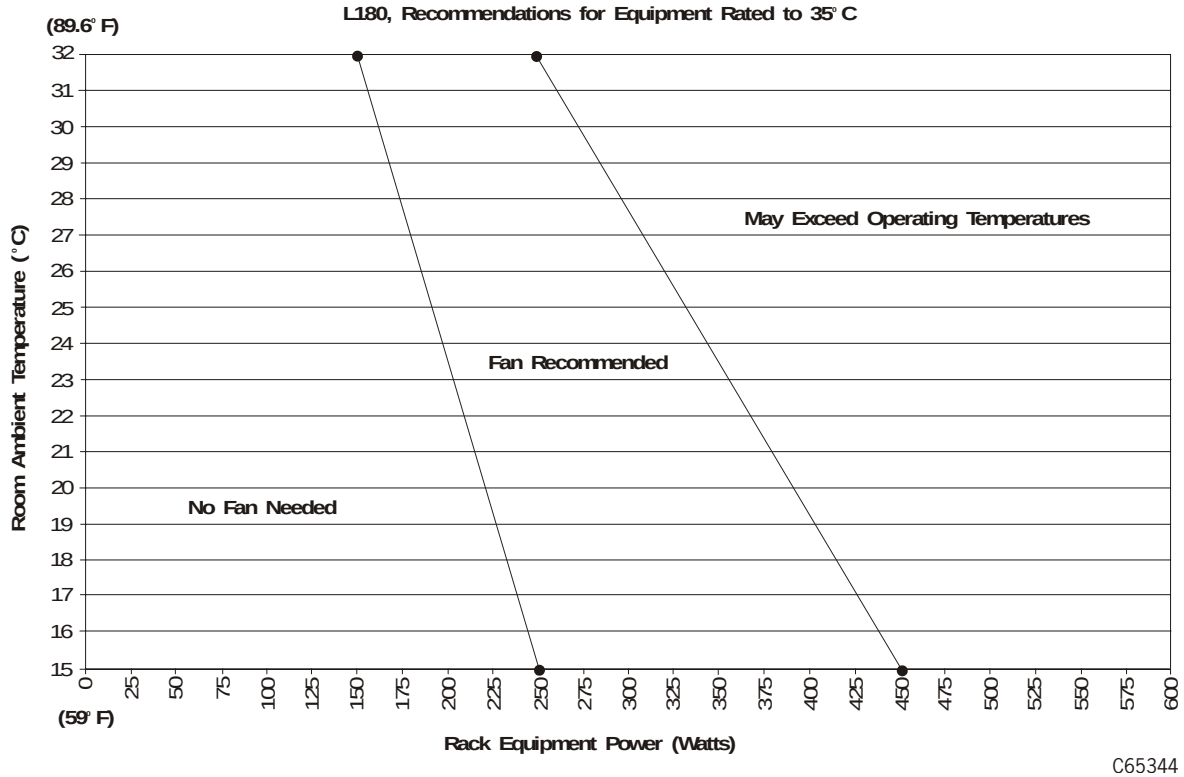
  Note: If you remove power from the library by using the library's power switch, the rack-mounted equipment will remain powered on.

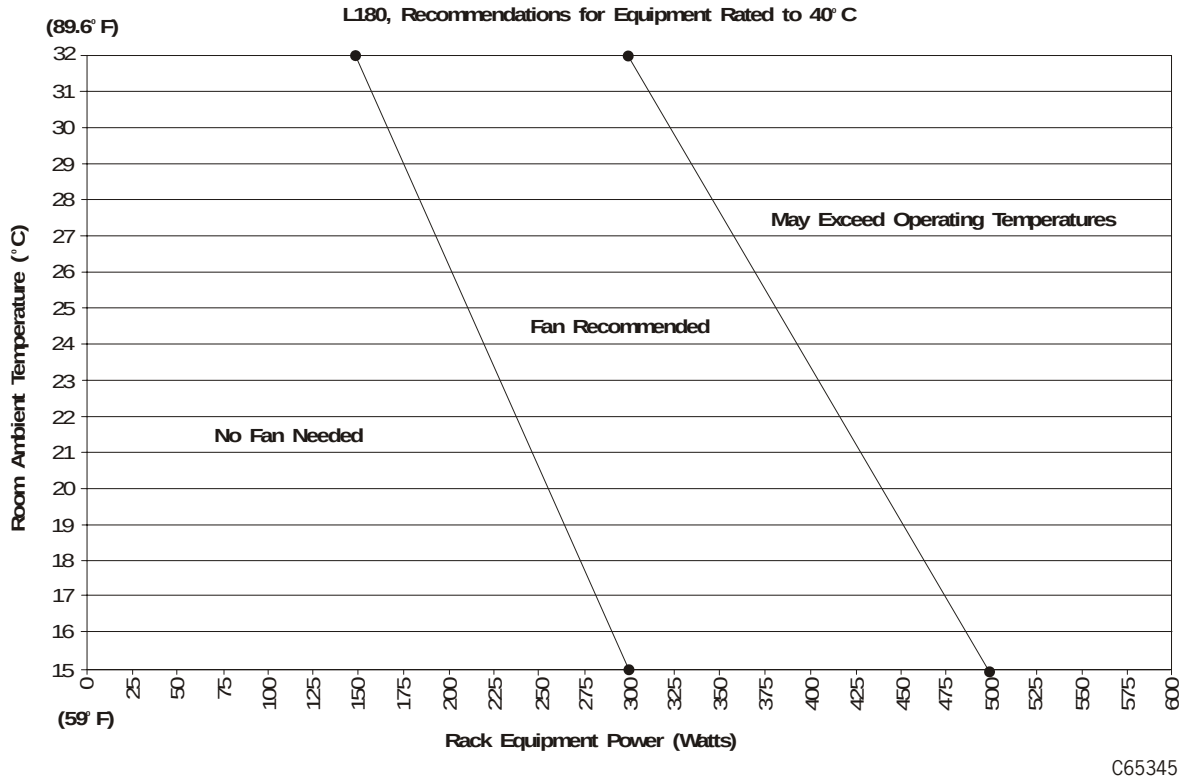
- Follow the manufacturer's guidelines to position, to support, and to fasten the equipment in the rack.
- Locate the equipment so that it does not block or hinder any ventilation openings in the library's rack area. For example, do not block library or drive exhaust areas, the electronic module exhaust area, perforated metal, or other similar ventilation.
- Locate the equipment so that the library's doors adequately clear the equipment when you close them.
- Install the equipment from the bottom of the rack to the top of the rack; StorageTek recommends that you place the heaviest items near the bottom of the rack.

- Ensure that the equipment in the rack does not create an overcurrent condition, whether 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 equipment is connected directly to the branch circuit or to a power distribution strip.
- Ensure that any equipment that you place within the rack is adequately cooled. The library's internal ambient temperature should not exceed the recommended operating temperature.

  Base cooling considerations upon the power dissipation within the rack space as well as upon the ambient room conditions that are external to the library. You must provide cooling for moderate power dissipation within the rack space.

  Note: The following figures outline some temperature recommendations:


L180, Recommendations for Equipment Rated to 35° C
(89.6° F)
Room Ambient Temperature (°C)
May Exceed Operating Temperatures
Fan Recommended
No Fan Needed
(59° F)
Rack Equipment Power (Watts)
C65344


L180, Recommendations for Equipment Rated to 40° C
(89.6° F)
Room Ambient Temperature (°C)
May Exceed Operating Temperatures
Fan Recommended
No Fan Needed
(59° F)
Rack Equipment Power (Watts)
C65345

Seguridad

Lea detenidamente y aténgase a las siguientes normas de seguridad del producto.

Bloqueo de puerta L180

El bloqueo de seguridad de la biblioteca de cintas está situado detrás de la puerta delantera. Al abrirse la puerta, el bloqueo desactivará inmediatamente todos los motores de la biblioteca de cintas.

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.

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 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 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 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).

ADVERTENCIA:
El uso de mandos, ajustes o procedimientos distintos de los aquí especificados puede conllevar un riesgo de exposición a radiaciones.

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 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. StorageTek recomienda que el radio de curvatura de un cable no sea inferior a 20 veces el diámetro del cable.
- No tire de los cables: colóquelos con cuidado en su posición.

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

Seguridad y precauciones del bastidor

ADVERTENCIA:
Posibilidad de lesiones físicas:

- **Es necesaria más de una persona para instalar o desinstalar equipos en y del bastidor de la biblioteca.**
- **Al mover una biblioteca que contenga equipos montados en bastidor, deberán adoptarse las precauciones adecuadas. El peso de algunos equipos del bastidor pueden modificar la altura del centro de gravedad de la biblioteca. Esta situación puede provocar que la biblioteca se vuelque durante un traslado.**

PRECAUCIÓN:
Daños potenciales al equipo: **Evite superar el peso (77,1 kg [170 lb]) y altura (6U) máximos admisibles para equipos del área de bastidor de la biblioteca.**

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

- Asegúrese de que el equipo disponga de homologaciones UL (Underwriters' Laboratories), CSA (certificado de la Canadian Standards Association) y CE (compatibilidad con las directivas y normas de la Unión Europea).
- Debe entenderse que la biblioteca no proporciona alimentación eléctrica al área del bastidor. Por ello, asegúrese de que el equipo montado en el bastidor disponga de una fuente de alimentación adecuada.

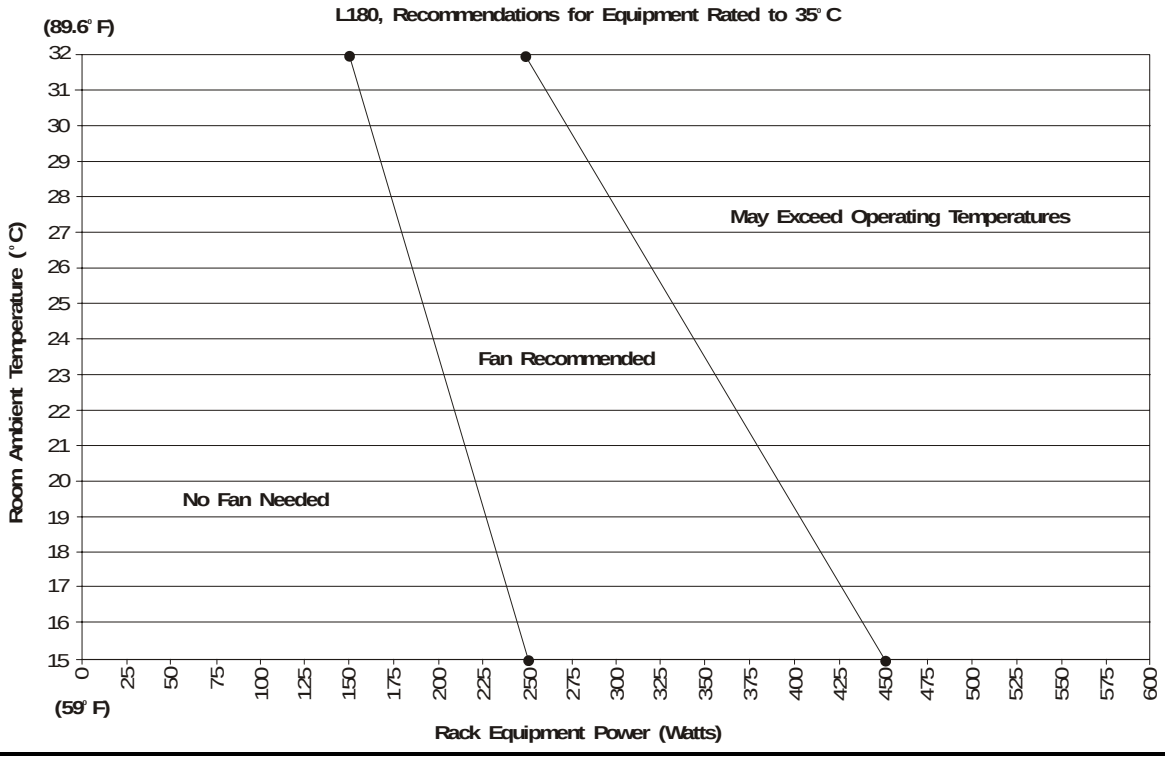
  Nota: Si desconecta la alimentación eléctrica de la biblioteca accionando el interruptor de encendido de ésta, el equipo montado en el bastidor seguirá conectado a la alimentación eléctrica.

- Siga las directrices del fabricante para colocar, sostener y fijar el equipo en el mismo.

- Sitúe el equipo de tal modo que no bloquee ni obstaculice ningún orificio de ventilación del área del bastidor de la biblioteca. Por ejemplo, no bloquee las áreas de escape de la biblioteca o de la unidad, el área de escape del módulo electrónico, orificios perforados en el metal ni medios de ventilación similares.
- Sitúe el equipo de tal manera que las puertas de la biblioteca no lo toquen al cerrarlas.
- Instale el equipo en el bastidor desde abajo hacia arriba. StorageTek recomienda instalar los componentes más pesados en la parte inferior del bastidor.
- Asegúrese de que el equipo del bastidor no crea 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.
- Asegúrese de que cualquier equipo instalado dentro del bastidor disponga de la ventilación adecuada. La temperatura ambiente en el interior del bastidor no debe ser superior a la temperatura de servicio recomendada.

  Para la refrigeración de la base deben tomarse en consideración tanto la disipación eléctrica dentro del espacio del bastidor como las condiciones ambientales externas de la biblioteca. Dentro del espacio del bastidor debe ajustarse la refrigeración para una disipación eléctrica moderada.

  Nota: A continuación presentamos algunas recomendaciones relativas a la temperatura:


L180, Recommendations for Equipment Rated to 35° C
(89.6° F)
Room Ambient Temperature (°C)
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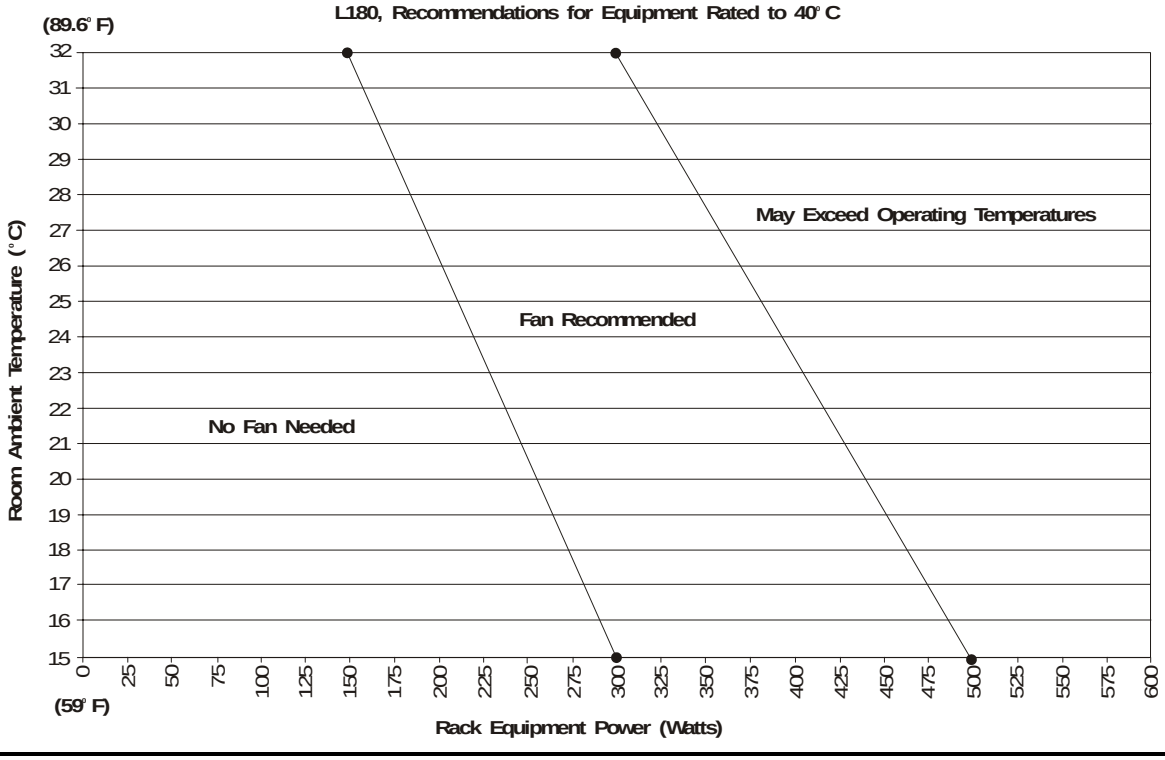
May Exceed Operating Temperatures
Fan Recommended
No Fan Needed
0
25
50
75
100
125
150
175
200
225
250
275
300
325
350
375
400
425
450
475
500
525
550
575
600
(59° F)
Rack Equipment Power (Watts)


L180, Recommendations for Equipment Rated to 40° C
(89.6° F)
Room Ambient Temperature (°C)
32
31
30
29
28
27
26
25
24
23
22
21
20
19
18
17
16
15
May Exceed Operating Temperatures
Fan Recommended
No Fan Needed
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25
50
75
100
125
150
175
200
225
250
275
300
325
350
375
400
425
450
475
500
525
550
575
600
(59° F)
Rack Equipment Power (Watts)

Notices

The following are compliance, warning, and internal code license 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 StorageTek will void the warranty. In addition, changes or modifications to this equipment might cause it to create harmful interference.

United States FCC Compliance Statement

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

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

CISPR 22 and EN55022 Warning

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

Japanese Compliance Statement

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

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

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

Taiwan Warning Label Statement

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

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

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

Internal Code License Statement

The following is the Internal Code License Agreement from 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 in paragraph 7 below), nonexclusive license to use each copy of the Internal Code (or any replacement provided by StorageTek or your authorized StorageTek distributor or reseller) which license authorizes you, the end user, to execute the Internal Code solely to enable the specific unit of Equipment for which the copy of Internal Code is provided to perform its data storage and retrieval functions in accordance with StorageTek's (or its licensor's) official published specifications.

4. Your license is limited to the use of the Internal Code as set forth in paragraph 3 above. You may not use the Internal Code for any other purpose. You may not, for example, do any of the following:

   (i) access, copy, display, print, adapt, alter, modify, patch, prepare Derivative works of, transfer, or distribute (electronically or otherwise) or otherwise use the Internal Code;

   (ii) reverse assemble, decode, translate, decompile, or otherwise reverse engineer the Internal Code (except as decompilation may be expressly permitted under applicable European law solely for the purpose of gaining information that will allow

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

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

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

5. Nothing in the license set forth in paragraph 3 above or in this entire Notice shall convey, in any manner, to you any license to or title to or other right to use any Maintenance code, or any copy of such Maintenance Code. Maintenance Code and StorageTek's service tools and manuals may be kept at your premises, or they may be supplied with a unit of Equipment sent to you and/or included on the same media as Internal Code, but they are to be used only by StorageTek's customer service personnel or those of an entity licensed by StorageTek, all rights in and to such Maintenance Code, service tools and manuals being reserved by StorageTek or its licensors. You agree that you shall not use or attempt to use the Maintenance Code or permit any other third party to use and access such Maintenance Code.

6. You, the end user, agree to take all appropriate steps to ensure that all of your obligations set forth in this Notice, particularly in paragraphs 4 and 5, are extended to any third party having access to the Equipment.

7. You may transfer possession of the Internal Code to another party only with the transfer of the Equipment on which its use is authorized, and your license to use the Internal Code is discontinued when you are no longer an owner or a rightful possessor of the Equipment. You must give such transferee all copies of the Internal Code for the transferred Equipment that are in your possession, along with a copy of all provisions of this Notice. Any such transfer by you is automatically (without further action on the part of either party) expressly subject to all the terms and conditions of this Notice passing in full to the party to whom such Equipment is transferred, and such transferee accepts the provisions of this license by initial use of the Internal Code. You cannot pass to the transferee of the Equipment any greater rights than granted under this Notice, and shall hold StorageTek harmless from any claim to the contrary by your transferee or its successors or assigns. In addition, the terms and conditions of this Notice apply to any copies of Internal Code now in your possession or use or which you hereafter acquire from either StorageTek or another party.

8. You acknowledge that copies of both Internal Code and Maintenance Code may be installed on the Equipment before shipment or included with the Equipment and other material shipped to you, all for the convenience of StorageTek's service personnel or service providers licensed by StorageTek, and that during the warranty period, if any, associated with the Equipment, and during periods in which the Equipment is covered under a maintenance contract with StorageTek or service providers licensed by StorageTek, both Internal Code and Maintenance Code may reside and be executed in or used in connection with such Equipment, and you agree that no rights to Maintenance Code are conferred upon you by such facts. StorageTek or the licensed service provider may keep Maintenance Code and service tools and manuals on your premises but they are to be used only by StorageTek's customer service personnel or those of service providers licensed by StorageTek. You further agree that upon (i) any termination of such warranty period or maintenance contract period; or (ii) transfer of possession of the Equipment to another party, StorageTek and its authorized service providers shall have the right with respect to the affected Equipment to remove all service tools and manuals and to remove or disable all Maintenance Code and/or replace Microcode which includes both Internal Code and Maintenance Code with Microcode that consists only of Internal Code.

General Information

1

This chapter describes the components of the L180 Tape Library.

The library is the hardware component in an automated cartridge system. More specifically, the library is a robotic system that stores, moves, mounts, and dismounts tape cartridges that are used for data read or write operations. Figure 1-1 on page 1-2 through Figure 1-5 on page 1-8 show the library's major components, and are described in the following pages.

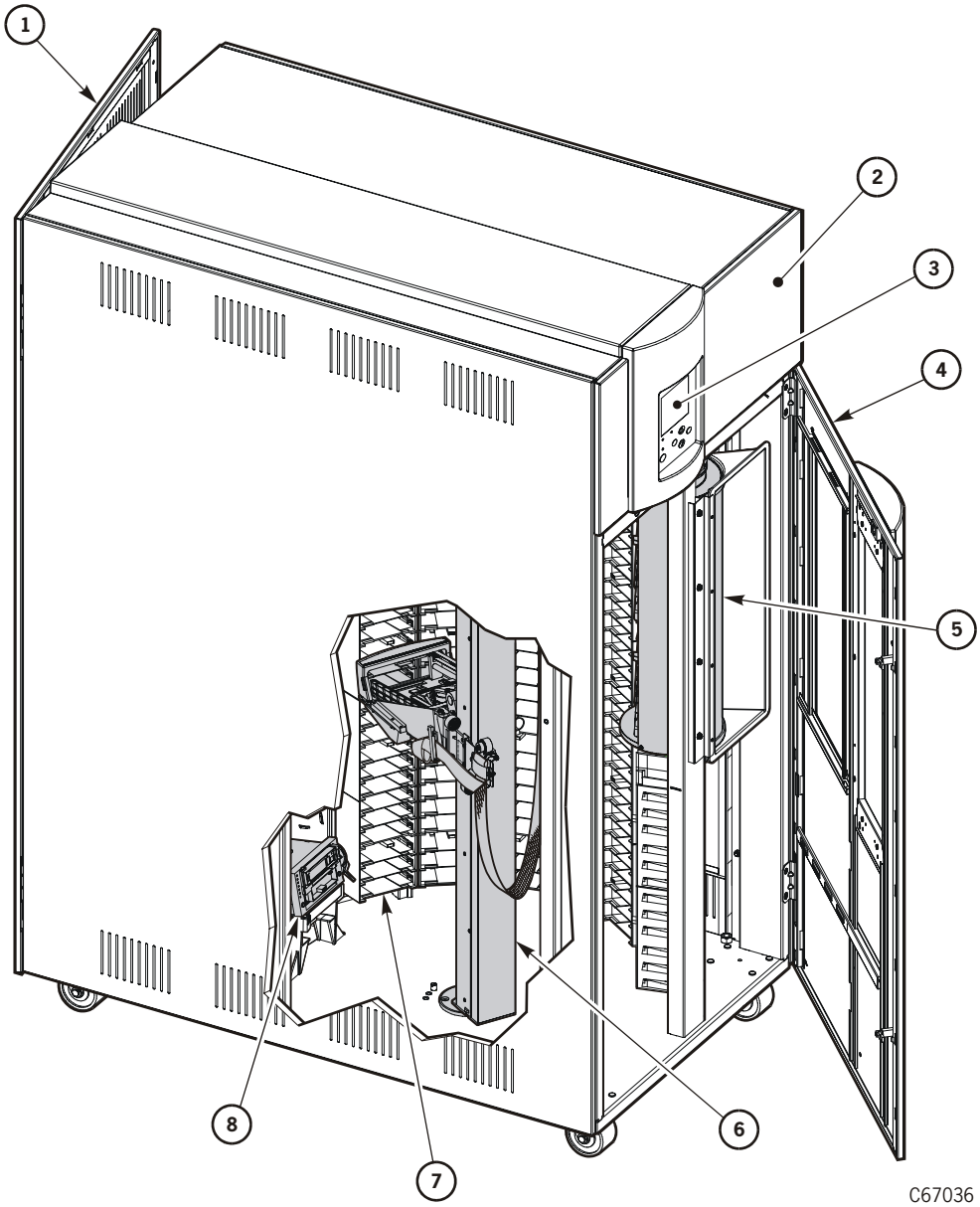
Note: Refer to your tape drive and software documentation for specific information about the tape drives, interfaces, and client software.

Tape Library Components

See Figure 1-1 on page 1-2 for the location of the major components in the library, which include:

- A robot that mounts and dismounts cartridges
- Storage cells (or arrays) for holding from 84 up to 174 data cartridges
- A cartridge access port (CAP) that holds two removable magazines with up to 10 cartridges
- Tape drives that perform read and write operations. See "Tape Drives" on page 1-10.
- Rack space that allows you to install additional equipment such as hubs and switches for network attachments
- Operator panel that provides controls and indicators for the library and a 10-character display for messages (see Chapter 2 for more information)
- Electronic module that controls the robot operations and interfaces to the host operating systems (not shown, located behind the rear door)
- Power systems that include both AC and DC power supplies (not shown, located behind the rear door)

Figure 1-1. L180 Tape Library Major Components (C67036)



1. Rear door
2. Rack door
3. Operator panel
4. Front door
5. Cartridge access port (CAP)
6. Robotics
7. Arrays
8. Drives

Robot

The robot moves cartridges between storage cells, between cells and tape drives, and between the CAP and cells. The robot consists of the Z column assembly (vertical motion), the theta mechanism (lateral motion), and the hand-camera assembly. Figure 1-2 on page 1-4 shows the robotic components.

The Z column assembly contains a Z column and Z carriage. The Z column attaches to the floor and ceiling of the tape library. The Z column can rotate almost 250 degrees to enable access to all the cells in the tape library.

The hand-camera assembly, which is attached to the Z carriage, grasps and releases cartridges. The Z carriage moves the hand up and down the Z column to storage cells, drives, or the CAP.

The camera, which is on the hand, is active only during a library audit. An audit occurs when you:

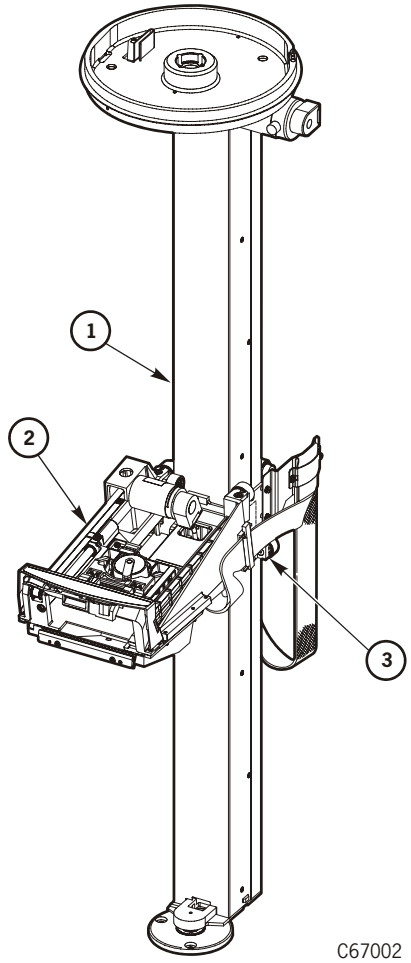
- Power-on the tape library.
- Open and close the left access library door.
- Make a request at the customer server console to audit the tape library.

During an audit, the camera reads the location and volume serial number (VOLSER) of each cartridge in the storage cells and reserved cells. Since this information is stored in the library's memory, the library does not rely on the camera to read cartridge locations or VOLSERs during mount and dismount operations.

The storage of audit data within the library has two implications for operation:

- Each time an audit occurs, you must use the system console to request a host update. This procedure adds the library audit information to the host memory.
- If you manually exchange a cartridge from a drive for one in storage, the host memory will continue to apply the VOLSER and location information from the first cartridge to the second cartridge. This might cause an error.

Figure 1-2. Robot Components (C67002)



1. Z column (also called the Z tube)
2. Hand-camera assembly
3. Z carriage

Hand-Camera Assembly

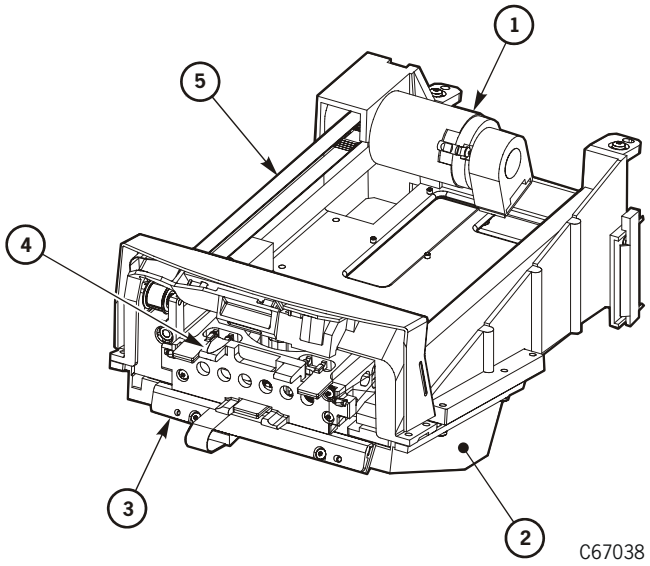
Figure 1-3 shows the hand-camera assembly which consists of a gripper, a motor-driven drive belt for gripper extension, and a bar code scanner card and camera (enclosed in a case under the hand components).

The camera reads the volume serial numbers (VOLSERs) from the cartridge labels during an audit and as you enter cartridges through the CAP. During an audit, the library matches each VOLSER with a specific cell location. These locations are stored in memory on the MPC/MPCL card. Because the library always stores a cartridge in the same location, it does not use the camera during normal robotic operations.

During the library's initialization, the hand checks its extension in the space below the calibration label (at the bottom of the drive column).

Note: Cartridges left in drives will not be audited. However, volume information is retained for a cartridge that a library mounted to a drive.

Figure 1-3. Hand-Camera Assembly (C67038)



1. Motor
2. Camera housing
3. LED card
4. Gripper
5. Drive belt

Storage Cells

Host software locates cartridges by panel, column, row, and cell. The library contains storage cells for 84, 140, and 174 data cartridges, excluding the CAP cells and reserved cells. The library capacity (total number of cells) was determined at the time the library was ordered or upgraded.

The storage cells (or arrays) are stacked in columns; the columns are arranged in a semicircle around the robot. Each column holds 28 cartridges.

Note: Each array holds six cartridges *but* the top two cells in each column are not available. These are *reserved* cells.

Client software locates cartridges by panel, column, row, and cell (shown in Figure 1-4 on page 1-7 and Figure 1-5 on page 1-8).

Cell Locations

Notes: The following statements apply to cell locations:

- The library uses targets on each cell for robotic calibration after you power on or re-initialize the library.
- Do not place data cartridges in the reserved cells. If you do not want to store diagnostic and/or cleaning tapes in these cells, you must leave them empty.
- The library does not use the drive and CAP locations to store cartridges.
- The robot uses the swap cell (the top-most cell in the reserved cells) to place a cartridge that is left in the hand when a power failure occurs or to perform a swap operation.
- The top-most arrays in each column hold only four data cartridges.

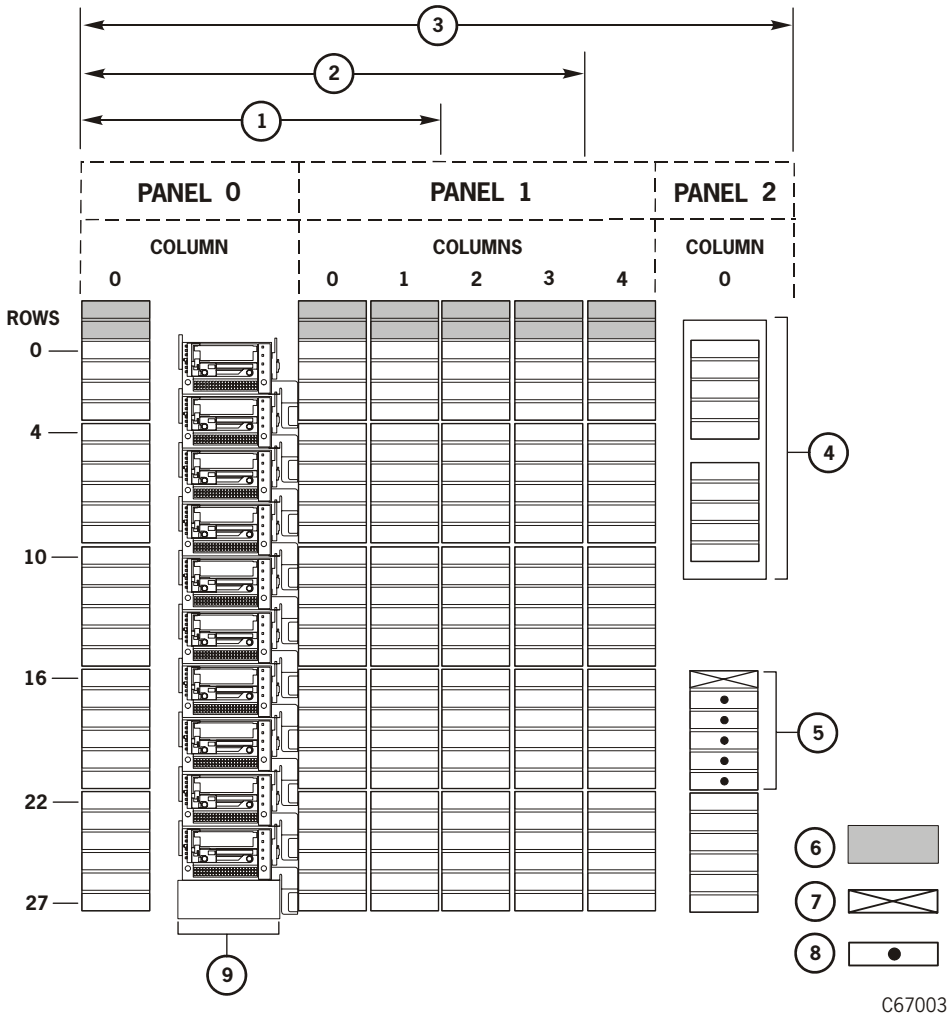
Library Capacity

Table 1-1 lists library storage capacities:

Table 1-1. L180 Library Capacity

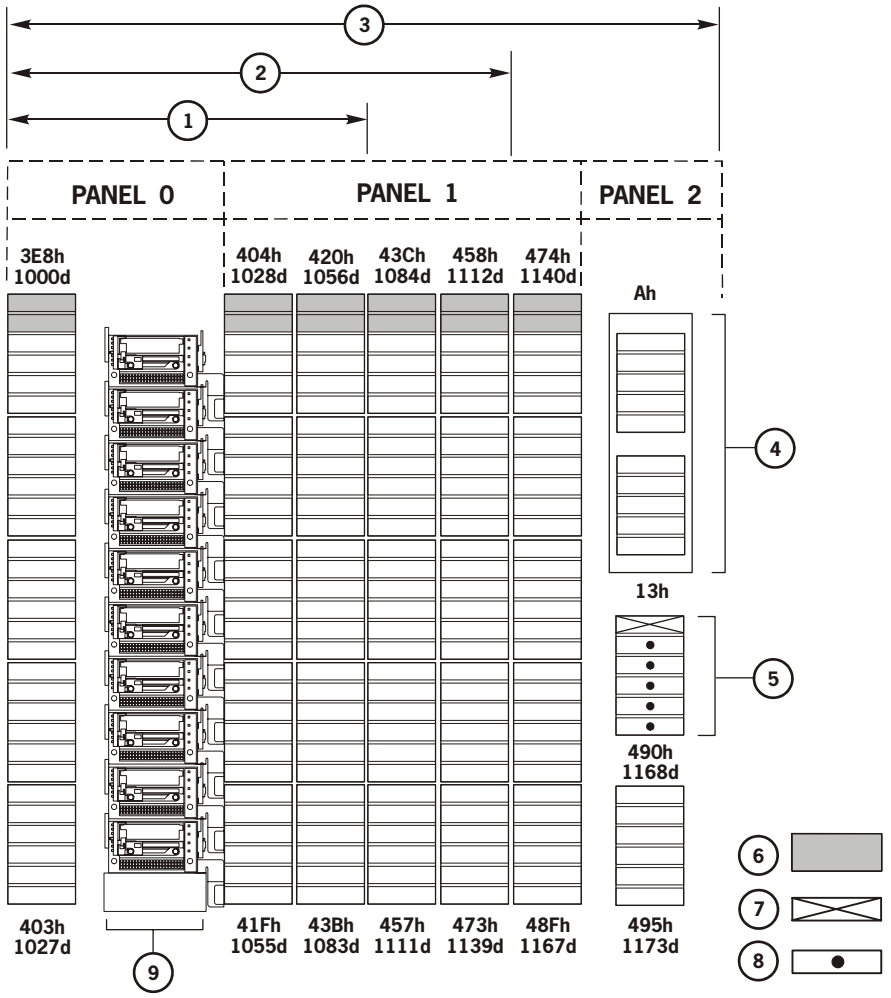
Model	Capacity	Description
L180-80	84	84 data cartridge slots, 6 reserved cartridge slots, one DC power supply, one AC PDU
L180-140	140	140 data cartridge slots, 6 reserved cartridge slots, one DC power supply, one AC PDU
L180-180	174	174 data cartridge slots, 6 reserved cartridge slots, one DC power supply, one AC power distribution unit (PDU)

Figure 1-4. Locating Cartridges—Panels, Cells, Rows (C67003)



1. 84-cartridge-cell configuration
2. 140-cartridge-cell configuration
3. 174-cartridge-cell configuration
4. Cartridge access port (CAP)
5. Reserved cell array
6. Blocked storage cells (no cartridges permitted)
7. Swap cell
8. Cells reserved for cleaning or diagnostic cartridges
9. Drive column (shown with DLT drives installed)

Figure 1-5. Locating Cartridges—Hexadecimal (C67004)



1. 84-cartridge-cell configuration
2. 140-cartridge-cell configuration
3. 174-cartridge-cell configuration
4. Cartridge access port (CAP)
5. Reserved cell array
6. Blocked storage cells (no cartridges permitted)
7. Swap cell
8. Cells reserved for cleaning or diagnostic cartridges
9. Drive column (addressed as Column 0, Panel 0 in some software)

Reserved Cells

The reserved cells, located within the library's left access door, are composed of two types: a single, in-transit cell and diagnostic/cleaning cells. These are described below.

In-transit Cell

In Figure 1-4 on page 1-7, the top cell is reserved for in-transit cartridges and used as a drop-off cell. Do *not* place a cartridge into this cell.

Under the following conditions, it may also be used as a drop-off cell if the robot has a cartridge in the hand/camera assembly and the library loses power:.

- the cartridge cannot be returned to its source cell
- the cartridge cannot be placed into its destination cell
- during such a power-off condition, the cartridge will *never* be placed into a drive

  When power is restored, the robot automatically places this cartridge into the drop-off cell as part of the robotic initialization sequence.

Diagnostic/Cleaning Cells

You may place any type of cleaning or diagnostic cartridge into the other five cells. Alternately, these five cells may be left empty.

Manually loading cleaning cartridges into any of the five cells enables Auto Clean. Alternately, entering cleaning cartridges through the CAP also enables Auto Clean. Cleaning cartridges must match the types of drives installed in the library.
See "Auto Clean" on page 3-17 for more information regarding cleaning cartridges and the Auto Clean feature.

Note: Diagnostic cartridges must be manually placed into the reserved cells.

CAUTION:
Do not insert data tape cartridges into the reserved cells, the client software will not be able to find the cartridges.

Do not place cartridges into the swap cells. Swap cells are reserved tor in-transit cartridges.

Inserting cleaning cartridges into any of the reserved cells and resetting the library enables Auto Clean. Make sure your client software supports the Auto Clean feature.

Cartridge Access Port

The cartridge access port (CAP) shown closed in Figure 1-1 on page 1-2 lets you add cartridges to or remove cartridges from the library without interrupting normal library operations.

The CAP, accessible from the front of the library, holds two cartridge magazines.

A cartridge magazine is designed for easy handling. You can add cartridges to the magazine while leaving it in the CAP by simply lifting up and pulling down on the magazine handle and then adding cartridges. Or you can add cartridges to the magazine by lifting it out, inserting the cells, and placing the magazine back into the CAP.

The magazine's snap-on cartridge retention cover lets you keep cartridges in place when carrying the magazine (see"Magazine Retention Cover" on page 4-20 for information and an example).

For detailed procedures, see

- "Importing Data Cartridges through the CAP" on page 4-16
- "Importing Cleaning Cartridges through the CAP" on page 4-14
- "Exporting Cleaning Cartridges through the CAP" on page 4-13

Tape Drives

As an operator, you might need to:

- Check drive status information; see "Monitoring Status Information" on page 4-6.
- Manually clean a drive, see "Manually Cleaning a Drive" on page 4-21.
- Manually mount a cartridge into a drive or dismount a cartridge from a drive; see "Loading/Unloading Cartridges Manually" on page 4-35.

The library supports the following types of drives:

- T9840A - HVD SCSI or Fibre Channel
- T9840B - HVD SCSI, Fibre Channel, Enterprise Systems Connection (ESCON), or fibre connection (FICON).
  - For ESCON operation; library firmware must be version 3.01 or later. Client Server Component (CSC) software must be version 4.1 or later. Automated Cartridge System Library Software (ACSLS) (Unix-based server) software must be version 6.1.1 or later.
  - For FICON operation; library firmware must be version 3.07 or later. CSC software must be version 5.0 or later. ACSLS (Unix-based server) software must be version 6.1.1 or later.

- T9840C - HVD SCSI, Fibre Channel, ESCON, or FICON.
  - For ESCON operation; library firmware must be version 3.07 or later. CSC software must be version 5.0 or later. ACSLS (Unix-based server) software must be version 6.1.1 or later.
  - For FICON operation; library firmware must be version 3.07 or later. CSC software must be version 6.0 or later. ACSLS (Unix-based server) software must be version 7.0 or later.
- T10000 - Fibre Channel. Requires library firmware version 3.09.
- T9940A - HVD SCSI or Fibre Channel (requires feature 99DR, the extended door)
- T9940B - Fibre Channel only (requires feature 99DR, the extended door)
- DLT 7000, DLT 8000 or Super DLT – HVD SCSI only
- SDLT 320 model – Backward Read Compatibility (BRC – ability to read previously written tapes on DLTIV media)
- SDLT 600 – LVD and Fibre Channel. Reads/writes DLTtape II. Read-only from DLTtape I. Requires Firmware Version 3.08.01 or later
- IBM drives:
  - IBM Ultrium 1 – Native LVD, Fibre Channel or, with a converter card, HVD
  - IBM Ultrium 2 – Fibre Channel. Requires Firmware Version 3.04.
  - IBM Ultrium 3 – Fibre Channel. Requires Firmware Version 3.08.01 or later.
- Hewlett Packard drives:
  - Ultrium 1 – Native LVD or, with a converter card, HVD
  - Ultrium 2 – Native LVD only. Requires Firmware Version 3.03.
  - Ultrium 3 – LVD and Fibre Channel. Reads/writes Ultrium 2 cartridges. Read only from Ultrium 1 cartridges. Requires Firmware Version 3.08.01 or later
- Certance Ultrium – LVD or HVD (determined by model number)

CAUTION:
Possible equipment damage: **The IBM LTO Fibre Channel drive requires FB 101593 to be installed. The field bill includes a new coupler retainer clip, part number 313769501. Without the field bill, the coupler on the back of the drive tray is too close to the bay door, causing the attached external fiber cable to bend sharply when the bay door is closed.**

Possible data loss**: StorageTek does not advise mixing 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 in 7000 mode.**

If a DLT 8000 cartridge is inserted into a DLT 7000 drive, the drive will indicate an error if a read command is issued and will write over any data present on the tape if a write command is issued at load point.

Table 1-2 lists the number of each type of drive when mixing drives.

Table 1-2. Mixed Drive Combinations

T9x40 or T10000	DLT or LTO
0	10
1	8
2	7
3	5
4	4
5	2
6	1

ESCON

ESCON operation is now available for the T9840B drive *only*; it requires certain considerations that must be taken into account for correct operation.

- Library firmware must be version 3.01 or later
- Client Server Component (CSC) software, version 4.1 or later, must be resident within the host's operating system
- ACSLS (Unix-based server) software, version 6.1.1 or later must be resident within the server's operating system.

Cables and configuration are explained in the *T9x40 Tape Drive Installation Manual*, part 95879.

FICON

FICON operation with the T9840B drive requires certain considerations that must be taken into account for correct operation.

- Library firmware must be version 3.07 or later
- Client Server Component (CSC) software, version 5.0 or later, must be resident within the host's operating system
- ACSLS (Unix-based server) software, version 6.1.1 or later must be resident within the server's operating system.

FICON operation with the T9840C drive requires certain considerations that must be taken into account for correct operation.

- Library firmware must be version 3.07 or later
- Client Server Component (CSC) software, version 6.0 or later, must be resident within the host's operating system
- ACSLS (Unix-based server) software, version 7.0 or later must be resident within the server's operating system.

Cables and configuration are explained in the *T9x40 Tape Drive Installation Manual*, part 95879.

Hewlett Packard Ultrium 2 SCSI Drives

Support for Hewlett Packard Ultrium 2 (LTO) SCSI drives is provided with library firmware version 3.03 and later.

Ultrium 2 drive/tape specifics include:

- Uses standard Ultrium 2 cartridges
- Reads/writes to Ultrium 1 tape media
- Interface: LVD only
- Model code: LTO2ML
- Feature code: HPLV
- Cartridge memory: 4 KB
- Cartridge Media ID: "L2" (200 GB)

The major improvements seen with the Ultrium 2 drives are:

- Increased native capacity: 200 GB
- Increased compressed capacity: up to 400 GB
- Data transfer rate of 40–80 MB/sec

Ultrium 3 LVD and Fibre Channel Drives

Support for Hewlett Packard and IBM Ultrium 3 (LTO) drives is provided with library firmware version 3.08.01 and later.

Ultrium 3 drive/tape specifics include:

- Uses standard Ultrium 3 cartridges
- Reads/writes Ultrium 2 and 3 tape media. Read only from Ultrium 1 tape media
- Interfaces: Native LVD SCSI or Fibre Channel
- Model: LTO3001.
- Feature codes:
  - Hewlett Packard: HPLV (LVD) or HPFC (Fibre Channel)
  - IBM: IBFC (Fibre Channel)
- Cartridge memory: 4 KB
- Cartridge Media ID: "L3" (400 GB)

The major improvements seen with the Ultrium 3 drives are:

- Increased native capacity: 400 GB
- Increased compressed capacity: up to 800 GB
- Data transfer rate of 40–160 MB/sec

Optional Interfaces

Several optional interfaces are available for the library. These are described in the next three sections.

StorageTek L-Series Library Admin

The optional Web interface to the L180 library is Model HRZNLSA, Feature code LS3X. Its configuration and operation are outlined in Chapter 3, "Configuration"; Appendix B, "StorageTek L-Series Library Admin".

The StorageTek L-Series Library Admin lets a library's user configure, operate, and monitor the library through a workstation or PC that is running a Netscape or Microsoft browser. The monitor must first be enabled and configured on the library. Installation and configuration instructions appear in the documentation that ships with the StorageTek L-Series Library Admin components.

Table 1-3 lists the model and feature number.

Table 1-3. StorageTek L-Series Library Admin Model/Feature Code

Description	Model	Required Feature	Quantity
StorageTek L-Series Library Admin for L180	HRZNLSA	CDRM	N/A
		LS3X (1 per tape library)	

StorageTek Framework Library Monitor

StorageTek Framework Library Monitor provides monitoring of several SCSI-attached libraries from within a system management framework on standard UNIX and Windows NT systems. It monitors the tape library associated with all data backup, recovery, hierarchal storage management, or vertical application jobs across a SCSI bus.

Its model number is HRZN001, Feature code FS3X. Installation and configuration instructions appear in the documentation that ships with the product.

See Table 1-4 on page 1-15. for the model and feature number.

Table 1-4. StorageTek Framework Library Monitor Model/Feature Codes

Description	Model	Required Feature	Quantity
StorageTek Framework Library Monitor	HRZN001	CDRM	N/A
		FS3X (1 per tape library)	
At least one of the following framework features (corresponding to the framework the customer has installed) must be ordered also:			
		FW01 (CA Unicenter)	
		FW02 (HP OpenView)	
		FW03 (Tivoli NetView)	
		FW04 (Other)*	

Note: The feature FW04 (Other) is for those customers who have their own SNMP application and wish to perform their own SNMP integration with the library's SNMP agent.

StorageTek Library Manager

StorageTek Library Manager (Product HRZN003) provides sharing and common robotics control for SCSI-attached libraries. See Table 1-5.

Table 1-5. StorageTek Library Manager Model/Feature Codes

Product	Model	Feature	Quantity
StorageTek Library Manager	HRZN003	CDRM	N/A
		FS3X (1 per tape library)	
The features below correspond to the customer's platform.			
		WN2K (Windows 2000)	
		NT100 (Windows NT)	
		SLRS (Solaris)	
		LBAT (Library Attach)	

Table 1-6. StorageTek Optional Interfaces—Comparisons

Description	Framework Monitor	L-Series Library Admin	Library Manager
SNMP monitoring from management framework	X		
Launch L-Series Admin from framework	X		
Detailed monitoring and status of individual libraries		X	
Event handling	X	X	X
Library sharing among applications			X
Browser-based GUI		X	
Tape operations: import, export, mount, dismount, and query		X	X
Library management: reporting, state and status, configuration, startup, and shutdown.			X
Note: Version 2.0 or higher required.			

Rack Area

The library has a six unit (U) rack area above the front door where additional equipment can be placed, including:

- Servers
- Fibre Channel components for a storage area network (SAN)
- Uninterruptible power supply (an optional feature)

CAUTION:
***Potential damage to library electronics and drives*: The two perforated sections in the rear of the rack area provide ventilation for the library processor, power supply, and drives. Do not block these sections.**

***Potential equipment damage*: The total maximum weight of equipment installed in this location must not exceed 77.1 kg (170 lb), and the total height must not exceed 6U.**

***Potential equipment damage*: Ensure that any equipment that you place within the rack is adequately cooled. The library's internal ambient temperature should not exceed the recommended operating temperature. Base cooling considerations upon the power dissipation within the rack space as well as upon the ambient room conditions that are external to the library. You must provide cooling for moderate power dissipation within the rack space.**

The rack area is not recommended for high power dissipation components such as multiprocessor servers or disk arrays.

You may use the internal 6U rack area, behind the top front door, for additional equipment. Requirements for this area are:

- An understanding of all the information in "Rack Safety and Precautions" on page xxiv.
- Placement of equipment well away from the perforated ventilation areas in the rack.
- Routing of power cables through the cutouts in the bottom of the library frame.

Power System

The library power system consisting of:

- One or two AC power distribution units (PDUs)
- One or two DC power supplies that provide voltage to the library
- An *optional* uninterruptible power supply

AC Power Distribution Units

Each power distribution unit (PDU):

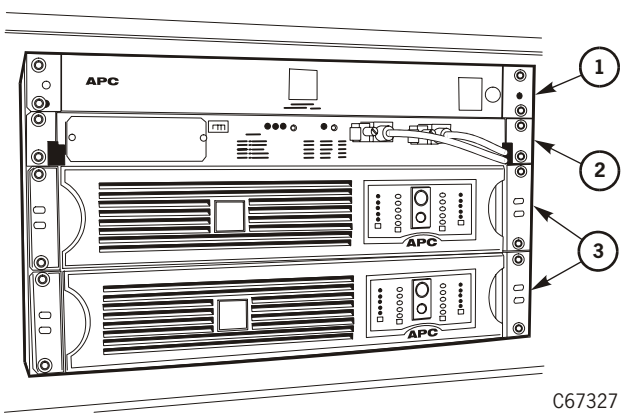
- Operates within 100 to 127 VAC or 200 to 240 VAC at 50/60 Hz
- Distributes AC voltage to a library DC power supply
- Protects the library from overcurrent by circuit breakers

Uninterruptible Power Supply

The uninterruptible power supply (UPS) is an *optional* feature designed to maintain continuous operation in the event of a power disruption. The UPS also eases the effects of blackouts, brownouts, sags and surges in AC power.

The UPS (Figure 1-6) is installed in the rack area of the library and comes with a power strip that allows you to connect up to eight additional components to the UPS. If power fails, the UPS will supply power to the equipment connected to the power strip until the batteries are exhausted.

Figure 1-6. Uninterruptible Power Supply (C67327)



1. Power strip
2. Switch
3. Batteries

Note: Refer to the *L180 and L700 Tape Library Uninterruptible Power Supply Reference Manual* for more information.

Library Safety Features

Safety features are incorporated into the library include:

- An electronic interlock to remove power from the robot if the front door to the library is opened.
- Protective covers in the electronics compartment that cover the logic card, the AC power supply, and the DC power supply to prevent you from coming into contact with hazardous voltages and sensitive electronics.

Library Operating Modes

An operating mode is the manner in which a library and the controlling software interact. A library can operate in either automated mode or manual mode, as described in the following paragraphs.

Automated Mode

Automated mode is the normal operating mode of the library. The controlling software instructs the robot to move cartridges among the storage cells, drives, and CAP without operator intervention. Operator tasks include:

- Monitoring the library operator panel for messages
- Entering a cartridge into the CAP
- Ejecting a cartridge from the CAP
- Replacing a cleaning cartridge
- Cleaning a drive
- Reviewing the FSC log
- Running diagnostic tests
- Powering off the library

Manual Mode

Manual mode occurs when the library is taken offline or experiences a robot malfunction. Operator tasks include:

- Opening the library front door
- Moving the robot
- Locating a cartridge
- Removing a cartridge from the hand
- Mounting a cartridge into a drive
- Dismounting a cartridge from a drive
- Returning the library to online status

Auto Clean Feature

Drives occasionally need to be cleaned to prevent read/write errors.

The Auto Clean feature is enabled when your tape library is initializing and detects cleaning cartridges in the reserved cells. When a drive requires cleaning while Auto Clean is enabled, the robot will receive a software message telling it to retrieve a cleaning cartridge and place it into the drive.

If Auto Clean is not enabled, you must manually import a cleaning cartridge for the drive that requires cleaning. The "Clean Drive" request appears on the operator panel's display.

Refer to "Auto Clean" on page 3-17 for more information and procedures.

Controlling Software

The controlling software (also referred to as client, server, or host software) requests tape read/write operations and robotic move operations. When the library is in automated mode these operations occur without operator intervention. The software determines where the cartridge is located by accessing audit data (sometimes referred to as the catalog) uploaded from the library; the software then allocates which drive receives the cartridge. See "Library Operating Modes" for additional information.

Note: Refer to your software publications for command descriptions.

Controls and Indicators

2

This chapter identifies and describes the functions of the L180 Tape Library operator panel and lists tasks the operator can perform through the panel. Figure 2-1 on page 2-2 shows an example of the operator panel.

Operator Panel

The operator panel is recessed into the library's rack door and contains buttons, indicators, and a graphic display.

The operator panel allows you to:

- Monitor current information about the library's readiness
- Help resolve library problems if an error occurs
- Set library, network, and drive configurations
- Rotate the CAP
- Replace drive cleaning cartridges and set cleaning cartridge warning count
- Run library and drive tests
- Reset (starts an initial program load [IPL] on the library).

Indicators

Three indicators on the operator panel provide basic status information:

- Library Active
- Service Required (note: contact your service provider)
- Open

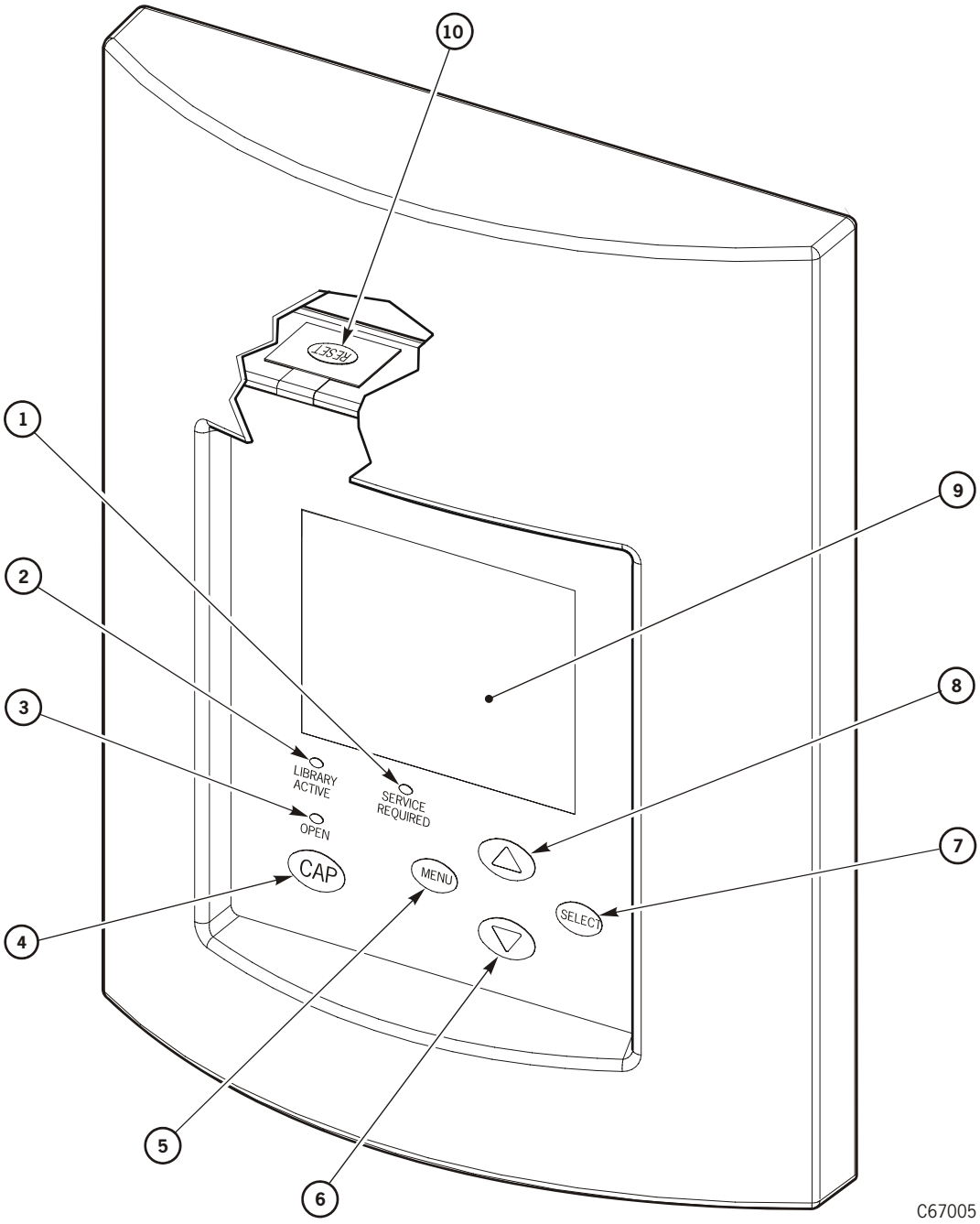
Buttons

Five buttons appear on the operator panel:

- CAP
- MENU
- SELECT
- Up arrow
- Down arrow

The up arrow, down arrow, MENU, and SELECT buttons control only the values that are under operator control. As you scroll down or up a list of selections, the cursor underscores values you can change.

Figure 2-1. Operator Panel Display, Controls, and Indicators (C67005)



1. *Service Required* indicator is steadily red when human intervention is required and flashes if a fan is defective.
2. *Library Active* indicator flashes green when the library is operational.
3. *Open* indicator is steadily amber when the CAP is open for you to enter or remove cartridges.
4. CAP button opens and closes the CAP.
5. MENU button initially places you into the main menu or returns you to a previously selected screen.

Figure 2-1. Operator Panel Display, Controls, and Indicators (Continued) (C67005)

6. Arrow down button moves the cursor down the display screen and decrements a value.
7. SELECT button selects an item on a menu, saves the currently underscored value, and moves the cursor to the next field.
8. Arrow up button moves the cursor up the display screen and increments a value.
9. Graphic display screen shows current information and FSCs and allows input from menus.
10. RESET button resets the library (starts an IPL). To access the RESET button, you must open the rack door.

Display Screens

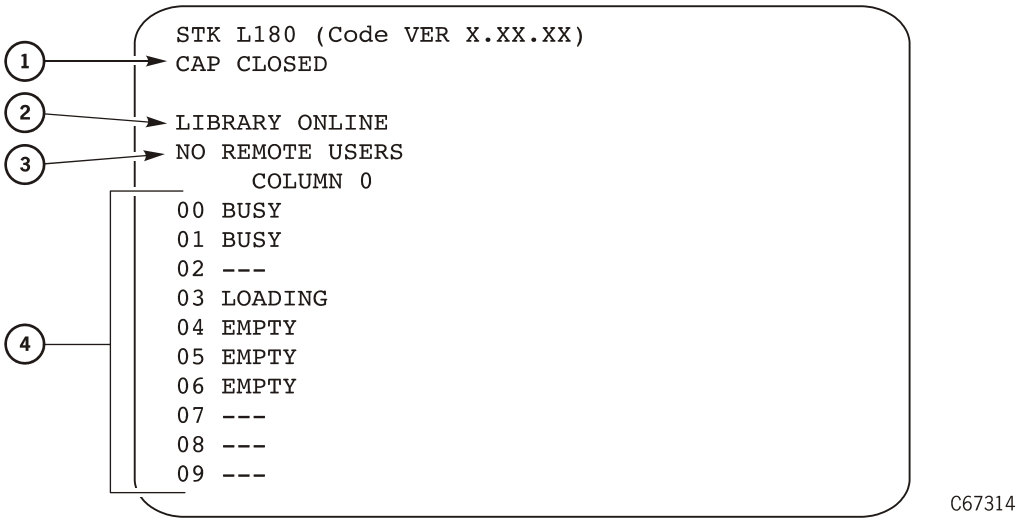
Screens on the operator panel show current information and/or allow input. The following information are examples of these screens.

Initial Status

The Initial Status screen (Figure 2-2 on page 2-4) is the first screen that appears on the operator panel after an IPL. Information includes:

STK L180 Code Version	Version of microcode installed
CAP Closed	Status of the cartridge access port (CAP)
Library Online	Status of the library
Web Enabled	The Web interface is enabled (or remote user's)
Column 0	The status and location of each drive installed in the drive column

Figure 2-2. Initial Status Screen

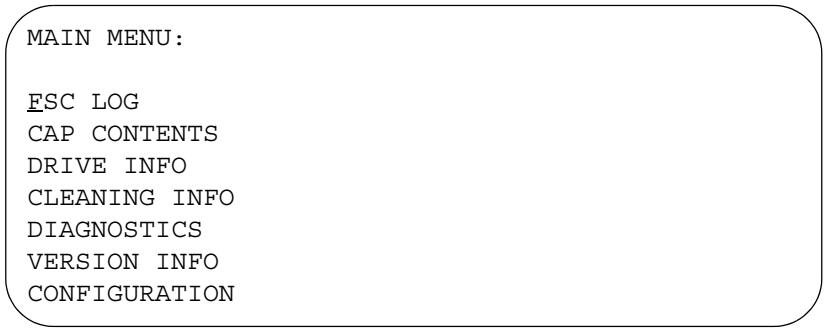


1. CAP status message
2. Library status message
3. Web Enabled indicates a Personality Module is present and Library Admin is enabled
4. Drive status messages

Main Menu

Pressing the MENU button from the Initial Status screen displays the Main Menu (Figure 2-3).

Figure 2-3. Main Menu



FSC Log

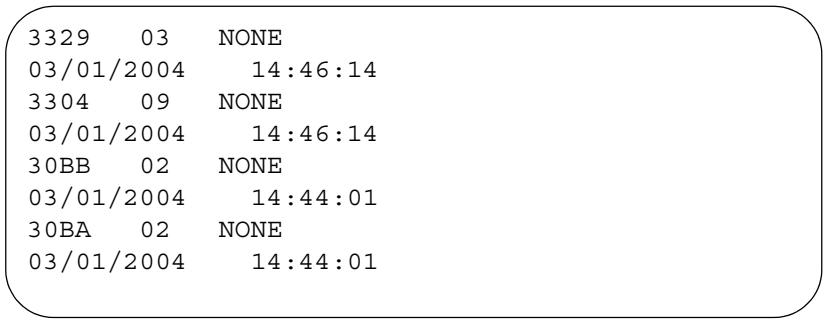
The fault symptom code (FSC) Log (Figure 2-4) displays the last 20 events and includes an FSC, the number of occurrences, and the date and time of the last occurrence.

See "Reviewing FSC Logs" on page 4-22 for more information.

The following statements apply to the FSC Log screen:

- Events listed in the log might not be failures or an error indication.
- FSCs are generated for the both library and tape drives.

Figure 2-4. Example of the FSC Log



CAP Contents

The CAP Contents screen (Figure 2-5) is an information-only screen. This screen displays either the VOLSER of a cartridge or a status message for each slot in a CAP magazine.

See "CAP Magazine Status" on page 4-10 for more information.

Figure 2-5. CAP Status

```
CAP CONTENTS

MAGAZINE 1 CONTENTS
100024
44AF57R
EMPTY
EMPTY
EMPTY
MAGAZINE 2 CONTENTS
EMPTY
EMPTY
EMPTY
EMPTY
EMPTY
```

Version Information

The Version Info Menu (Figure 2-6) is an information-only screen. This displays the version level of the library's microcode, the date the code was completed, and the serial number of the logic card (also referred to as the MPC or MPCL card).

Figure 2-6. Version Information

```
VERSION INFO MENU:

STK L180

CODE VERSION:
   x.xx.xx

CODE BUILT ON:
   May 22 2002  12:38:47

HARDWARE / VERSION
   MPC 00000098
```

Drive Information

The Drive Information Menu (Figure 2-7) is an information-only screen that lists information about the selected drive, such as:

Vendor	The manufacturer of the drive
Type	The drive model
Status	The drive's logical number and status (see "Drive Status" on page 4-9 for a list of status messages)
Serial Number	The serial number assigned by the drive's manufacturer
Interface Type	The type of client-to-drive interface (this example shows a SCSI interface, but a drive with Fibre Channel capability would display `FIBRE I/F`)
Code Version	The firmware version of the drive

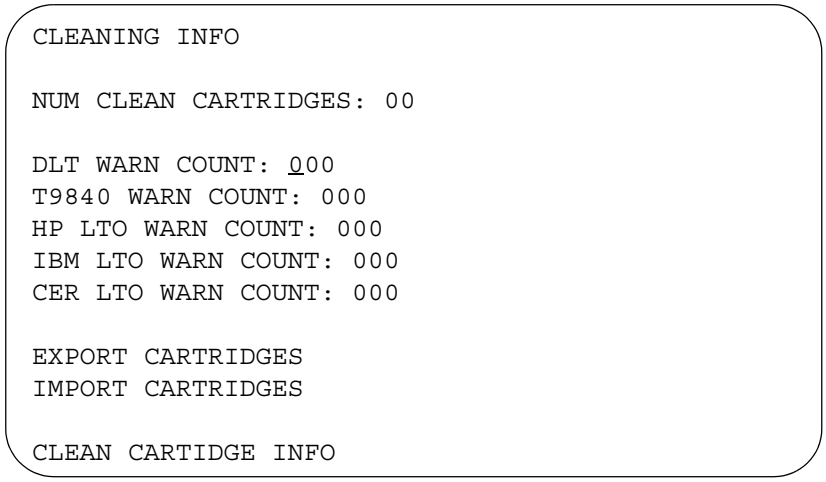
Figure 2-7. Drive Information

```
DRIVE INFORMATION MENU:

VENDOR: QUANT
TYPE: DLT8000
STATUS: 00 EMPTY

SERIAL NUMBER:
 XXXXXXXXXX

INTERFACE TYPE:
 SCSI I/F

CODE VERSION
 50
```

Cleaning Information

The Cleaning Info screen (Figure 2-8) provides information about and control of the library's cleaning cartridges.

Figure 2-8. Cleaning Information



The following information describes the fields in the Cleaning Information screen.

Num Clean Cartridges	The total number of cleaning cartridges located in the reserved cells within the library.
DLT Warn Count	The number times you want the DLT cleaning cartridge to be used before a warning appears.
T9840 Warn Count	The number times you want the T9840 cleaning cartridge to be used before a warning appears.
T10000 Warn Count	The number times you want the T10000 cleaning cartridge to be used before a warning appears.
HP LTO Warn Count **IBM LTO Warn Count** **CER LTO Warn Count** **Universal LTO Warn Count**	The number of times you want the specified Ultrium cleaning cartridge to be used before a warning appears.
Export Clean Cartridges	A procedure for moving cleaning cartridges from the reserved cells to the CAP.
Import Cleaning Cartridges	A procedure for moving cleaning cartridges from the CAP to the reserved cells.
Clean Cartridge Info	A path to an information screen that lists all cleaning cartridges in the library.

The menu lets you change the warning count for each type of cleaning cartridge as well as import cleaning cartridges to the library and export them from the library. This menu also lets you check the number of times a cleaning cartridge has been used.

The warning count should be set lower than the cartridge's recommended usage (or "maximum warning count" displayed on the operator panel); this will allow time for you to obtain a replacement cleaning cartridge. For example, if the maximum warning count equals 20 uses, you may want to set the warning count to 17 (or other, lower number).

Always replace a used cleaning cartridge with a new, unused cleaning cartridge.

If the usage count for a cleaning cartridge has reached its life limit, the `CLEAN CARTRIDGE INFO` screen will display `EXPIRED`. You *must* remove this cartridge from the library. See "Cleaning Cartridge Expiration" on page 3-23 for more details.

See "Cleaning Cartridge Warning Count" on page 3-22 for the procedure to set or change the warning count.

Diagnostics

The Main Diagnostics Menu (Figure 2-9) lets you perform these functions:

- **Drive-related functions:**
  - **Clean Drive:** Enables you to clean tape drives manually
  - **Mount:** Inserts a test cartridge into a drive
  - **Dismount:** Removes a test cartridge from a drive
  - **Run Drive Check:** Determines that the drive is functioning
  - **Mount-Dismount Loop:** Inserts a test cartridge into and removes it from a drive.
- **Get-Put Loop:** Gets a test cartridge and puts it in another location. (You may designate the number of times the library goes through the loop.)
- **Demo Mode:** Simulates library operation

Note: All diagnostic functions except for Clean Drive require the library and associated tape drive to be offline.

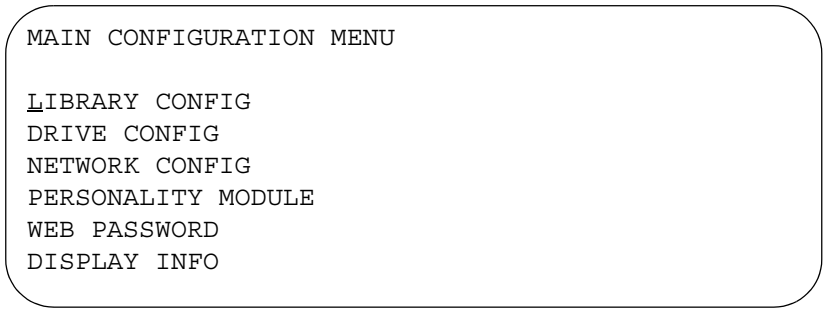
Figure 2-9. Main Diagnostics Menu

```
MAIN DIAGNOSTICS MENU:

DRIVE DIAGNOSTICS
GET/PUT LOOP
DEMO MODE
```

Main Configuration Menu

The Main Configuration Menu (Figure 2-10) routes you to the configuration menus (library, drive, network) and to the panel display controls. This menu also routes you to screens that let you view the library personality and input a password for a web interface product.

Figure 2-10. Main Configuration Menu



Library Configuration

The Lib Config Menu (Figure 2-11 on page 2-11) displays library information and allows you to modify the configuration.

Lib SCSI I/F ID or **Lib Fibre I/F ID**	The library's interface identifier
Fast Load	The Fast Load feature status (on or off)
Media Check	Whether LTO, DLT, and SDLT cartridges are checked for proper orientation during audit (3.08 firmware or higher)
Date	Current date
Time	Current time
Auto Clean	Whether Auto Clean is enabled
User Cells	How many data storage cells the library contains

Figure 2-11. Library Configuration Menu

```
LIB CONFIG MENU:

LIB SCSI I/F ID: 00
FAST LOAD: OFF
MEDIA CHECK: ON
DATE: 03/12/2004
TIME: 08:20

AUTO CLEAN: OFF
USER CELLS: 84
```

Library SCSI Interface Configuration

The Lib SCSI I/F Config Menu (Figure 2-12) lets you view the library's SCSI type (differential or single-ended) and access an edit menu for the library's SCSI ID.

Figure 2-12. Library SCSI Interface Configuration Menu

```
LIB SCSI I/F CONFIG MENU:

LIB SCSI I/F ID: 00

SCSI TYPE: LVD (or HVD)
```

Library Fibre Channel Interface Configuration

The Lib Fibre I/F Config Menu (Figure 2-13) lets you view the library's worldwide ID and Port 0 worldwide ID. This menu also lets you access an edit menu for the library's Port 0 address.

Figure 2-13. Library Fibre Channel Interface Configuration Menu

```
LIB FIBRE I/F CONFIG MENU:

LIBRARY WORLDWIDE ID:
00.00.00.00.00.00.00.00

PORT 0 WORLDWIDE ID:
00.00.00.00.00.00.00.00

PORT 0 CONFIGURATION
```

Drive Configuration

The Drive Configuration Menu (Figure 2-14) lets you modify portions of each SCSI drive's configuration.

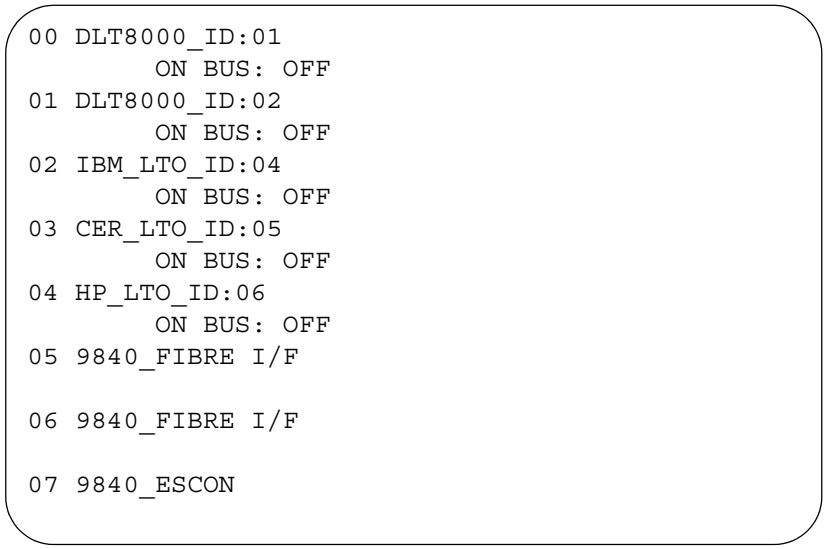
For each drive, the menu displays the drive position, drive type, and, if the drive path is SCSI, the drive's SCSI ID and the drive's SCSI bus relationship with the library. If the drive path is Fibre Channel, the menu displays FIBRE I/F after the drive type.

Sub-menus let you change the SCSI ID and indicate whether the drive is on the same SCSI bus as the library.

These statements apply to this menu:

- The cursor position is saved on all screens that list the library's drives.
- The panel displays 16 lines of data per menu. If you library contains more than seven drives, you must use the down arrow button to scroll to drives 08 and 09.

Figure 2-14. Drive Configuration Menu



Network Configuration

The Network Config Menu (Figure 2-15) lets you modify the library's network configuration and view the library's Ethernet address.

Figure 2-15. Network Configuration Menu

```
NETWORK CONFIG MENU:
LIBRARY NAME:
_

IP ADDRESS:
 000.000.000.000
NETWORK GATEWAY:
 NOT SET
SUBNET MASK:
 000.000.000.000

DNS CONFIGURATION
DWN
SVR PRIMARY
SVR SECONDARY
DHCP: DISABLED

ETHERNET ADDRESS:
00:10:4F:00:05:76
```

Domain Name Service

You must enter the Domain Name Service (DNS) configuration *only* if your Simplified Network Management Protocol (SNMP) agent is set to trap *named* recipients; if SNMP is set for *numbered* recipients, no entries are required.

Dynamic Worldwide Name

The dynamic Worldwide Name (dWWN) feature is generally enabled at installation. You must consult with your service representative and system administrator to enable it.

To correct re-configuration problems within a Fibre Channel network, the 3.02 firmware includes the dWWN enhancement. Previously, Fibre Channel devices contained fixed worldwide names within the network. If a device (for example, a defective tape drive) required replacement, the new device was detected by the network as "unknown" and re-configuration of the network was required.

When enabled, dWWN assigns names to library drive *slots* rather than devices. When a drive is replaced, the new drive receives the same name as the one replaced, thereby eliminating the need for system re-configuration. There are three Worldwide Names reserved for each drive: Node, Port A, and Port B.

Note: This feature also requires corresponding drive code that supports the dynamic Worldwide Name feature. Currently, IBM LTO drive code 27Q1 is the only available supporting microcode.

Microcode for other drives is in process and will be released with the next drive firmware versions.

With firmware version 3.04, you *cannot* mix dWWN-supported and non-dWWN supported drives when the dWWN feature is enabled on the library. In such a case, non-supported drives remain in the "configuring" state on the library operator panel.

Display Information

The Display Info Menu (Figure 2-16) leads to menus that let you adjust the contrast and backlight on the graphic display screen.

Figure 2-16. Display Information Menu

```
DISPLAY INFO MENU:

CONTRAST: 09
  DEFAULT = 16

BACKLIGHT: 128
   DEFAULT = 128

RESTORE DEFAULTS

MENU TO EXIT
```

Personality Module

The Personality Module Info menu (Figure 2-17) lets you *view* the library's personality settings. This feature must be installed by the service representative. The screen below illustrates how you may check the personality module for the library.

Figure 2-17. Personality Module Information (1 of 2)

```
PERSONALITY MODULE INFO:

STATUS:
  PRESENT
TYPE:
  NORMAL
VERSION:
  0
LIBRARY VENDOR ID:
  0
LIBRARY VENDOR NAME:
  STK
LIBRARY PRODUCT NAME:
  L180

          (DOWN FOR MORE INFORMATION)
```

When you use the down arrow, additional information appears (Figure 2-18):

Figure 2-18. Personality Module Information (2 of 2)

```
PERSONALITY MODULE INFO:

LIBRARY ADMIN:
  ENABLED
SCSI VENDOR NAME
  STK
SCSI PRODUCT NAME
  L180
```

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Configuration

3

This chapter describes how to configure the library and drives for operation. Configuration requires you to:

1. Power on (see "Powering-on the Library" on page 4-1) or reset (see "Initializing and IPLing the Library" on page 4-3) the library
2. Enter library and drive configuration information
3. Enable Auto Clean (if desired) by installing cleaning cartridges
4. Place the library online (if necessary)
5. Send a client command to load library audit information into client memory

After power-on, the library automatically verifies and loads some configuration values, such as drive locations, Auto Clean status, capacity, and drive types. Before the library is fully operational, however, someone must enter the remaining configuration values.

Typically, your service representative will configure your library during installation, during firmware upgrade, or after drives are added. If you must change the library's configuration, you may enter the values through the operator panel.

Note: You may need to consult with your systems administrator for some information.

Entering Configuration Data

After the IPL is complete, the status screen will appear on the operator panel. At this point, you must make choices about your library, drives, and network and enter those choices into the library's memory.

Note: You may need to consult with your systems administrator for some information.

You may enter all configuration data through the operator panel. See "Operator Panel Entry" (in the following section) for specific instructions. If you have installed the StorageTek L-Series Library Admin, you also can enter some configuration data through a workstation or a PC that is running a Netscape or Microsoft browser. For more information, access the online help files for the StorageTek L-Series Library Admin.

Operator Panel Entry

Entering configuration data through the operator panel prepares the library for operation. For a detailed description of the operator panel, see "Operator Panel" on page 2-1.

Library Entries

Four entries are required for a library—other entries will vary with your options:

- Library SCSI ID or Fibre Channel Port 0 address
- Drive Fast Load enable/disable
- Date
- Time

Note: The procedures below assume that you will make all entries during one, operator panel entry session. Each item is saved as it is changed, *except* for the library's SCSI ID or Fibre Channel Port 0 address: to save a revised library SCSI ID, you must reset the library by pressing the RESET button.

Setting the Library's SCSI ID

If the control path for the library is SCSI, you must enter the library's SCSI ID at the operator panel. Set the library SCSI ID from the Lib SCSI I/F Config Menu.

Note: The information below explains special circumstances for selecting a SCSI ID (address) for the library:

1. When configuring the library to a Unix-based workstation, StorageTek recommends that you use a dedicated SCSI client host bus adapter (HBA):

   - For wide SCSI adapters, you may assign any address from 0 to 14 for the library.
   - For narrow SCSI adapters, the range of addresses is 0 to 6.

2. If you choose to use the embedded system bus on the SPARC station, select address 6, 5, 2, or 0 for the library; the remaining targets are reserved for Sun peripherals.
3. For IBM RISC System/6000 machines, available addresses on the embedded system bus are 6, 5, 3, and 2.
4. If you use Automated Cartridge System Library Software (ACSLS), its level must be Version 5.3.2 or higher

To set the library's SCSI ID:

1. From the online status screen, press the MENU button.

   The Main Menu will display.

2. Press the down arrow button until the cursor underscores `CONFIGURATION`.

3. Press the SELECT button.

   The Main Configuration Menu will appear and the cursor will line up with `LIBRARY CONFIG`.

4. Press the SELECT button.

   The Lib Config Menu will appear and the cursor will line up with `LIB SCSI I/F`.

5. Press the SELECT button.

   The Lib SCSI I/F Config Menu will appear. (This menu also displays the type of SCSI interface: differential or single-ended.)

6. Press the arrow buttons until the cursor underscores `SCSI ID`.

7. Press the SELECT button.

   The Set Lib SCSI ID Menu will appear.

8. Press the up and down arrow buttons to select the correct ID.

9. Press the SELECT button to save the changes. (You may press the MENU button to abort.)

10. If the library SCSI ID is the only configuration value you wish to set at this time, press the RESET button. If you wish to set other configuration values before you reset the library, continue with the next section.

Setting the Library Fibre Channel Port 0 Address

If the control path for the library is Fibre Channel, you must set the Library's Fibre Channel Port 0 address. The library Fibre Channel Port 0 address locates the library's Port 0 on the Fibre Channel loop. Set the library Fibre Channel Port 0 address from the Lib Fibre I/F Config Menu.

Note: Before you enter a Port 0 address, you must first set the library's Fibre Channel hard address option to *enabled*.

If you configure the library for soft addressing, you are allowing the network's software to configure the Port 0 address. For this addressing approach, you must set the Fibre Channel hard address option to *disabled*.

The default for the hard address option is *disabled*.

Consult with the system administrator before selecting the library's Port 0 addressing option.

Set the library Fibre Channel Port 0 address from the Lib Fibre I/F Config Menu.

To set the library Fibre Channel Port 0 address:

1. From the online status screen, press the MENU button.

   The Main Menu will display.

2. Press the down arrow button until the cursor underscores CONFIGURATION.
3. Press the SELECT button.

   The Main Configuration Menu will appear and the cursor will line up with LIBRARY CONFIG.
4. Press the SELECT button.

   The Lib Config Menu will appear and the cursor will line up with LIB FIBRE I/F CONFIG.
5. Press the SELECT button.

   The Lib Fibre I/F Config Menu will appear and the cursor will line up with PORT 0 CONFIGURATION. This menu also displays the library's worldwide ID (the node ID) and the Port 0 worldwide ID (the port ID). These two IDs are set at the factory and cannot be changed. Each ID is 64 bits and uses the IEEE registered format.
6. Press the SELECT button.

   The Fibre Port 0 Configuration menu will appear.

If you want to allow the network's software set the library Port 0 address, set the hard address option to DISABLED by:

a. Pressing the arrow buttons until the cursor underscores AUTO ADDRESS.
b. Pressing the SELECT button. The Port Hard Address Edit Menu.
c. Pressing the up and down arrow buttons to select DISABLED.
d. Pressing the SELECT button to save the selected option.

Note: The default for the hard address option is DISABLED.

If you want to set the library Port 0 address, you must set the HARD ADDRESS option to ENABLED, enter a port address by:

a. Selecting ADDRESS from the Fibre Port 0 Configuration menu. The Port Address menu will display.
b. Pressing the up and down arrow buttons to select a digit for each field in the three-field address. Permissible addresses are 001 through 125.
c. Pressing the SELECT button to save the address.

7. If the library Fibre Channel Port 0 address is the only configuration value you wish to set at this time, press the RESET button. If you wish to set other configuration values before you reset the library, continue with the next section.

Reviewing Port 0 Worldwide ID

When a library has a Fibre Channel interface, the Port 0 worldwide ID identifies the library's Port 0 (that is, the lower MPU card) on the Fibre Channel system.

The ID is automatically displayed when you access the Fibre Channel Interface Configuration Menu. It cannot be changed.

Reviewing Library Worldwide ID

When a library has a Fibre Channel interface, the library's worldwide ID identifies the library as a node on the Fibre Channel system. The ID is automatically displayed when you access the Fibre Channel Interface Configuration Menu. It cannot be changed.

Enabling/Disabling Fast Load

These two terms are defined as follows:

Fast load on: The robot will mount a tape to a drive and then immediately report the move completed.

Fast load off: The robot will mount a tape to a drive and wait at the drive location until the tape is completely loaded before reporting the move completed.

Note: Some host software does not support the fast load enabled option.

Enable or disable the Fast Load feature from the Lib Config Menu. To set either feature:

1. At the Lib Config Menu screen, press the arrow button until the cursor underscores `FAST LOAD`.
2. Press the SELECT button.

   An editing screen appears.
3. Press the up and down arrow buttons to select either `ON` or `OFF`.
4. Press the SELECT button to save the changes. (You may press the MENU button to abort.)
5. If you have already changed the library's SCSI ID or Port 0 address and are planning to exit the Main Configuration Menu at this time, you must press the RESET button. If you want to set other configuration values, continue with the next section.

   If you have not changed the library's SCSI ID or Port 0 address and are not setting other configuration values, press the MENU button until you exit all menus.

Setting the Date

Set the date and time from the Lib Config Menu:

1. At the Lib Config Menu screen, press the arrow button until the cursor underscores `DATE`.
2. Press the SELECT button.

   An editing screen appears.
3. On the editing screen:

   a. Press the up and down arrow buttons to select a value for each portion (field) of the date.

   b. Press the SELECT button to move right to the next field.

   c. Press the MENU button to move left to the previous field.
4. When the screen displays your desired setting, press the SELECT button from the right-most field to save the changes. You may press the MENU button from the left-most field to abort.
5. If you have already changed the library's SCSI ID or Port 0 address and are planning to exit the Main Configuration Menu at this time, you must press the RESET button. If you wish to set other configuration values, continue with the next section.
6. If you have not changed the library's SCSI ID or Port 0 address and are not setting other configuration values, press the MENU button until you exit all menus.

Setting the Time

Set the time from the Lib Config Menu. FSC log entries correspond to this time setting:

1. At the Lib Config Menu screen, press the arrow button until the cursor underscores `TIME`.
2. Press the SELECT button.

   An editing screen appears.
3. On the editing screen:

   a. Press the up and down arrows to select a value for each portion (field) of the time.

   b. Press the SELECT button to move right to the next field.

   c. Press the MENU button to move left to the previous field.
4. When the screen displays your desired setting, press the SELECT button from the right-most field to save the changes. (You may press the MENU button from the left-most field to abort.)

5. If you have already changed the library's SCSI ID or Port 0 address and are planning to exit the Main Configuration Menu at this time, you must press the RESET button. If you wish to set other configuration values, continue with the next section.

6. If you have not changed the library's SCSI ID or Port 0 address and are not setting other configuration values, press the MENU button until you exit all menus.

Configuring a Personality Module

If you are planning to use the StorageTek L-Series Library Admin, you must install its personality module and other components according to the documentation included in the StorageTek L-Series Library Admin shipping package. You should consult this documentation for instructions on setting required configuration data.

Setting the Web Password

If your library uses the StorageTek L-Series Library Admin, you must set a Web password at the operator panel. For instructions on setting this value, see the documentation that shipped with the StorageTek L-Series Library Admin.

Drive Entries

SCSI Drives Only

Notes: To configure a T9x40 drive:

1. The drive must have firmware version 1.24 or higher. Check the drive's firmware version, by selecting `DRIVE INFO` from the Main Menu.

2. Configuring a T9x40 drive might involve more than setting the drive's SCSI ID and bus status. For information about T9x40 drive configuration options and instructions, refer to the *T9x40 Tape Drive Service Reference Manual*, part 95740.

Two entries complete the library configuration options for each SCSI drive:

- SCSI ID
- Bus status (on or off bus)

Note: On Bus means that the drive is on the same SCSI bus as the library. Off Bus means that the drive is *not* on the same SCSI bus as the library.

Set the drive SCSI IDs and bus status from the drive configuration menu. You can enter both values for each drive at the same time:

1. At the Main Configuration Menu, press an arrow button until the cursor underscores `DRIVE CONFIG`.

2. Press the SELECT button.

   The screen will list all installed drives, and the cursor will align with the first drive on the list.

   An example of the format is:

   ```
   00 DLT7000 ID:__
              ON BUS: ON
   ```

   The first two digits are the drive's logical number (the number that the library has assigned the drive). The tape library sets this number during its automatic configuration sequence (at power-on or reset). It is an internal number *only* and is shown for information *only*.

   Note: The uppermost drive within the column is designated as "0," the next is "1," and so forth.

   Next to the logical number is the drive type (DLT 7000 in this example). To the right of the drive type is the ID or SCSI address. On the next line is the drive's bus status.

   Ultrium drives will display as:

   - IBM LTO for IBM Ultrium drives
   - CER LTO for Certance Ultrium drives
   - HP LTO for Hewlett Packard Ultrium drives

   Drive information might also appear on the menu as:

   - FIBRE I/F if the drive is a Fibre Channel drive
   - `INVALID` if the drive's SCSI ID is an invalid address

3. Press the arrow buttons to scroll to the drive you wish to change and press the SELECT button.

   The Set Drive SCSI ID Menu will appear.

   Note: The operator panel displays only 16 lines per menu. If the library contains more than eight drives, you must use the down arrow button to scroll to drives 09 and above.

4. Press the up and down arrow buttons to change the ID.

5. Press SELECT to save your changes.

   A message screen will appear to indicate that the library is saving the new ID. Then the drive configuration menu will reappear.

Notes: The new SCSI ID for a T9x40 drive might not appear right away.

6. Press the arrow down button to get to the drive's second line of information (the drive's bus status field).

7. Press the SELECT button.

   The Set Drive SCSI Bus Menu will appear.

8. Press the up and down arrow buttons to change the bus status to ON or OFF.
9. Press the SELECT button to save the changes. (You may press the MENU button to abort.)

   The drive configuration screen will reappear.
10. Continue these steps until all drives are configured.
11. If you have already changed the library's SCSI ID or Port 0 address and are planning to exit the Main Configuration Menu at this time, you must press the RESET button. If you wish to set other configuration values, continue with the next section.

    If you have not changed the library's SCSI ID or Port 0 address and are not setting other configuration values, press the MENU button until you exit all menus.

T9x40 Drives

To configure a T9x40 drive:

1. The drive must have firmware version 1.24 or higher. Check the drive's firmware version, by selecting DRIVE INFO from the Main Menu.
2. Configuring a T9x40 drive might involve more than setting the drive's SCSI ID and bus status. For information about T9x40 drive configuration options and instructions, refer to the *T9x40 Tape Drive Service Reference Manual*, part 95740

Ultrium Fibre Channel Drives

You may either set a hard Fibre Channel address of 0 for LTO drives or allow the address to be set automatically, as arbitrated through the Fibre Channel loop. You set up the drive's Fibre Channel address from the Drive Config Menu.

Note: Before you enter an LTOs Fibre Channel address to 0, you must first set the drive's Fibre Channel hard address option to *enabled*.

If you configure the drive for soft addressing, you are allowing the network's software to configure the Port 0 address. For this addressing approach, you must set the Fibre Channel hard address option to *disabled*.

The default for the hard address option is *disabled*.

To set up the Fibre Channel address:

1. At the Main Configuration Menu, press an arrow button until the cursor underscores DRIVE CONFIG.
2. Press the SELECT button.

   The screen will list all installed drives, and the cursor will align with the first drive on the list.

   FIBRE I/F displays if the drive is a Fibre Channel drive.

3. Press the arrow buttons to scroll to the drive you wish to configure and press the SELECT button.

   The screen will allow you to select hard addressing to `enabled` or `disabled`.

4. Press the up and down arrow buttons to line up with your choice. Press SELECT and:

   - if you select `enabled`, the hard address is set to 0
   - if you select `disabled`, the address is arbitrated through the channel.

5. Press the SELECT button to save the changes. (You may press the MENU button to abort.)

6. If you have already changed the library's SCSI ID or Port 0 address and are planning to exit the Main Configuration Menu at this time, you must press the RESET button. If you wish to set other configuration values, continue with the next section.

If you have not changed the library's SCSI ID or Port 0 address and are not setting other configuration values, press the MENU button until you exit all menus.

Network Entries

Use the Network Config Menu to configure the library for your network. Entries set the library's network configuration are:

- Library name
- IP address
- Network gateway
- Subnet mask
- DNS Configuration[1]

Note: You may need to consult with the systems administrator for some information.

You also may view the library's Ethernet address.

Viewing the Ethernet Address

This is a six-byte address, unique to each library. The address is written into the MPC card at the factory and cannot be changed. An example of an Ethernet address is 00:10:4f:00:05:01.

To view the Ethernet address:

1. At the Main Configuration Menu, press the arrow down button to line up the cursor with `NETWORK CONFIG`.

1.You must enter data for the DNS Configuration if your SNMP agent is set to trap named recipients instead of numbered recipients.

2. Press the SELECT button.

   The Network Config Menu will appear and the library's Ethernet address appears at the bottom of the screen.

3. If you have already changed the library's SCSI ID or Port 0 address and are planning to exit the Main Configuration Menu at this time, you must press the RESET button. If you wish to set other configuration values, continue with the next section.

   If you have not changed the library's SCSI ID or Port 0 address and are not setting other configuration values, press the MENU button until you exit all menus.

Setting the Library Name

The system administrator might assign the library a name. The name is mapped to the IP address but does not affect operation. To set the library name:

1. At the Network Config Menu, press an arrow button until the cursor underscores `LIBRARY NAME`.

2. Press the SELECT button. An editing screen appears.

3. On the editing screen:

   a. Use the up and down arrow buttons to select a value for each character (field) in the name.

   b. Use the SELECT button to move right to the next field.

   c. Use the MENU button to move left to the previous field.

Note: Do not enter a library name longer than 30 characters.

4. When the screen displays your desired setting, press the SELECT button twice to save the changes. You may press the MENU button from the left-most field to abort.

5. If you have already changed the library's SCSI ID or Port 0 address and are planning to exit the Main Configuration Menu at this time, you must press the RESET button. If you wish to set other configuration values, continue with the next section.

   If you have not changed the library's SCSI ID or Port 0 address and are not setting other configuration values, press the MENU button until you exit all menus.

Setting the IP Address

The system administrator might assign the library an IP address, which makes the library accessible through a network. This is a four-byte address that must be set with information obtained from the system administrator. The value set identifies the library and makes it accessible through a network.

An example of an IP address entry is 192.0.0.1

Note: To use the StorageTek L-Series Library Admin, you must set the library's IP address at the operator panel.

To set the IP address:

1. At the Network Config Menu, press an arrow button until the cursor underscores `LIBRARY NAME`.
2. Press the SELECT button. An editing screen appears.
3. On the editing screen:
   a. Use the up and down arrow buttons to select a value for each three-digit field in the address.

   Note: Do *not* leave the first field equal to zero (`000`)

   b. Use the SELECT button to move right to the next field.
   c. Use the MENU button to move left to the previous field.
4. When the screen displays your desired setting, press the SELECT button from the right-most field to save the changes. You may press the MENU button from the left-most field to abort.
5. If you have already changed the library's SCSI ID or Port 0 address and are planning to exit the Main Configuration Menu at this time, you must press the RESET button. If you wish to set other configuration values, continue with the next section.

   If you have not changed the library's SCSI ID or Port 0 address and are not setting other configuration values, press the MENU button until you exit all menus.

Setting the Network Gateway Address

A network gateway in a large network allows devices on one subnet to interface with devices on another subnet (see "Setting the Subnet Mask Address" on page 3-14). This four-byte address must be specified by the system administrator.

Note: Entering this address is optional. It sets up the gateway connection between subnets, but it is applicable only when such a connection exists and is necessary for library operation. Consult with your systems administrator for additional information.

To set the network gateway address:

1. At the Network Config Menu, press an arrow button until the cursor underscores `NETWORK GATEWAY.`
2. Press the SELECT button.

   An editing screen appears.
3. On the editing screen:

   a. Press the up and down arrow buttons to select a value for each three-digit field in the address.

   b. Press the SELECT button to move right to the next field.

   c. Press the MENU button to move left to the previous field.
4. Press the SELECT button from the right-most field to when the screen displays your desired setting to save the changes. (You may press the MENU button from the left-most field to abort.)
5. If you have already changed the library's SCSI ID or Port 0 address and are planning to exit the Main Configuration Menu at this time, you must press the RESET button. If you wish to set other configuration values, continue with the next section.

   If you have not changed the library's SCSI ID or Port 0 address and are not setting other configuration values, press the MENU button until you exit all menus.

Setting the Subnet Mask Address

This is a four-byte notation (specified by the system administrator) to resolve routing within your intranet. This address makes the library accessible through a subnet on a large network. An example of a subnet mask entry is 255.255.254.0.

To set the subnet mask address:

1. At the Network Config Menu, press an arrow button until the cursor underscores `SUBNET MASK.`
2. Press the SELECT button. An editing screen appears.
3. On the editing screen:
   a. Press the up and down arrow buttons to select a value for each three-digit field in the address.
   b. Press the SELECT button to move right to the next field.
   c. Press the MENU button to move left to the previous field.
4. Press the SELECT button from the right-most field when the screen displays your desired setting to save the changes. (You may press the MENU button from the left-most field to abort.)
5. If you have already changed the library's SCSI ID or Port 0 address and are planning to exit the Main Configuration Menu at this time, you must press the RESET button. If you wish to set other configuration values, continue with the next section.

   If you have not changed the library's SCSI ID or Port 0 address and are not setting other configuration values, press the MENU button until you exit all menus.

DNS Configuration

Note: You must enter the Domain Name Service (DNS) configuration *only* if your Simplified Network Management Protocol (SNMP) agent is set to trap *named* recipients; if SNMP is set for *numbered* recipients, no entries are required.

The first entry you must make for the DNS Configuration is the Domain Name (DMN) field.

1. Press the arrow button until the cursor underscores `DMN`.
2. Press the SELECT button. An editing screen appears.
3. On the editing screen:
   a. Press the up and down arrow buttons to select a value for each letter in the domain server's name.
   b. Press the SELECT button to move right to the next field.
   c. Press the MENU button to move left to the previous field.

4. Enter the main server's name, being sure to append the suffix.*com* at the end.
5. Press the SELECT button from the right-most field when the screen displays your desired setting to save the changes. (You may press the MENU button from the left-most field to abort.)

The second entry you must make is the primary DNS server's IP address.

1. Press the arrow button until the cursor underscores `SVR Primary`.
2. On the editing screen:
    a. Press the up and down arrow buttons to select a value for each number in the primary domain server's IP address.
    b. Press the SELECT button to move right to the next field.
    c. Press the MENU button to move left to the previous field.Press the SELECT button. An editing screen appears.
3. Press the SELECT button from the right-most field when the screen displays your desired setting to save the changes. (You may press the MENU button from the left-most field to abort.)

The third entry you *may* make is the secondary DNS server's IP address. This assumes that your site has a secondary (or backup) server; if not, this entry is not required.

1. Press the arrow button until the cursor underscores `SVR Secondary`.
2. On the editing screen:
    a. Press the up and down arrow buttons to select a value for each number in the secondary domain server's IP address.
    b. Press the SELECT button to move right to the next field.
    c. Press the MENU button to move left to the previous field.Press the SELECT button. An editing screen appears.
3. Press the SELECT button from the right-most field when the screen displays your desired setting to save the changes. (You may press the MENU button from the left-most field to abort.)

    If you are planning to exit the Main Configuration Menu at this time, you must press the RESET button. If you wish to set other configuration values, continue with the next section.

    If you have not changed the library's DNS configuration and are not setting other configuration values, press the MENU button until you exit all menus.

Dynamic Worldwide Name

Note: This feature is generally enabled at installation time. You must consult with your service representative and system administrator to enable it.

To correct re-configuration problems within a Fibre Channel network, 3.02 firmware includes the dynamic Worldwide Name (dWWN) enhancement. Previously, Fibre Channel devices contained fixed Worldwide names within the network. If a device (for example, a defective tape drive) required replacement, the new device was detected by the network as "unknown" and re-configuration of the network was required.

When enabled, dWWN assigns names to library drive *slots* rather than devices. When a drive is replaced, the new drive receives the same name as the one replaced, thereby eliminating the need for system re-configuration There are three Worldwide Names reserved for each drive: Node, Port A, and Port B.

Note: This feature also requires corresponding drive code that supports the dynamic Worldwide Name feature.

Microcode for other drives is in process and will be released with the next drive firmware versions.

Screen Characteristics

You also can change the operator panel's screen characteristics from the main configuration menu. The screen characteristics are saved in non-volatile memory.

To change the contrast and backlight (or brightness) of the operator panel screens:

1. At the main configuration menu, press an arrow button until the cursor underscores `DISPLAY INFO`.
2. Press the SELECT button. The display information menu will appear.
3. Press the arrow buttons to line up with the desired screen characteristic: `CONTRAST` or `BACKLIGHT`.

   An editing screen will appear.
4. Press the up and down arrow buttons to change the count value.

Note: To reset the screen characteristics to the default values, line up the cursor with `DEFAULT SCREEN CHARACTERISTICS` and press the SELECT button.

5. Press the SELECT button to save the changes. (You may press the MENU button to abort.)

6. If you have already changed the library's SCSI ID and are planning to exit the Main Configuration Menu at this time, you must press the RESET button. If you try to exit the main configuration menu, a message will appear requesting that you reset the library.

   If you have not changed the library's SCSI ID, you may exit the configuration menu to do other tasks.

Auto Clean

You will need to clean the drives occasionally to prevent read and write errors. Enabling the Auto Clean feature allows the library to initiate drive cleaning without your intervention. (A drive is cleaned with a special cleaning cartridge.)

The information below describes the auto cleaning enabled or disabled feature.:

Auto Clean Disabled When a drive requires cleaning, you must enter the compatible cleaning cartridge into the CAP, using the Clean Drive routine. The robot will retrieve the cartridge, mount the tape into the drive, and return the cartridge to the CAP when cleaning is complete. You must then remove the cleaning cartridge from the CAP and manually keep track of its usage.

Auto Clean Enabled When a drive requires cleaning, the robot will retrieve a compatible cleaning cartridge from the reserved cell in the library (these cell locations are shown in "Reserved Cells" on page 1-9) and mount it into the drive. When the cartridge dismounts, the robot will return the cleaning cartridge to its cell location within the library. The library will keep track of usage and post an FSC in the log when the warning threshold has been reached.

Cleaning Cartridge Requirements

Valid cleaning cartridges are those that match the drive types installed in the library. Other requirements are:

- All cleaning cartridges must have a "CLN" in their VOLSER label.
- T9840 cleaning cartridges must also have a "U" on their media ID labels.
- T9940 cleaning cartridges must have a "W" ID label.
- T10000 cleaning cartridges must have a "CT" ID label.
- Ultrium cleaning cartridges must either have labels specific to the drive manufacturer or they must be a universal cleaning cartridges for all Ultrium drives.
  For more label information, see Appendix A, "Cartridge Tape Information."

Cleaning Cartridge Usage

Cleaning cartridges will be used when the drive requires a cleaning. The drive request is sent from the drive to the host—the library does not request a cleaning action.

If there are multiple cleaning cartridges per drive types:

- One cartridge will be used until it reaches its warning count before proceeding to the next cartridge.
- Once all cartridges have reached their warning counts, the library will rotate through the cartridges until each cartridge reaches its expired status.
- Once all cartridges are expired, if a drive requires cleaning, mounts will still occur, but the library operator panel will display an asterisk on the top line and the drive status screen will display "clean needed." The "clean needed" status will remain until a new cleaning cartridge is entered into the library to satisfy the cleaning requirement.

See also "Cleaning Cartridge Usage Count" on page 3-23 and "Cleaning Cartridge Expiration" on page 3-23 for more information.

Enabling Auto Clean

There are two ways to enable the Auto Clean feature:

1. Manually load valid cleaning cartridges into any of the 11 cells that are reserved for cleaning and diagnostic cartridges. For the locations of these cells, refer to "Reserved Cells" on page 1-9.
2. Import valid cleaning cartridges through the CAP (see "Importing Cleaning Cartridges through the CAP" on page 3-20). For the location of the reserved cells, see "Reserved Cells" on page 1-9

The Auto Clean feature is automatically enabled if you load even one cleaning cartridge into the reserved cell area and then reset the library.

Manually Installing Cleaning Cartridges

To manually install cleaning cartridges in the reserved cells:

1. Unlock and open the front door (see "Opening the Library Front Door" on page 4-27)
2. Verify that the cleaning cartridges are right side up (the VOLSER numbers should be closest to the top edge and facing outward).

CAUTION:
Potential static electricity damage to electrical components. **Take precautions against electrostatic discharge by touching gray, unpainted metal (such as the library's frame) before reaching into the library. Avoid touching any electrical component.**

WARNING:
Confined space: **While reaching inside the library, take care to avoid bumping your head or catching your clothes on protruding edges.**

ADVERTENCIA:
Espacio limitado: **Al trabajar en el interior de la biblioteca, tenga cuidado de no golpearse la cabeza o de engancharse la ropa en los bordes salientes.**

3. Place cleaning cartridges into any of the 11 designated cells.
4. Close and lock the front access door.

Importing Cleaning Cartridges through the CAP

Follow this procedure to import the cleaning cartridges into the reserved cells in the library using the cartridge access port.

Note: Manually placing a cartridge in one of the reserved cells and initializing the library will automatically enable the Auto Clean feature.

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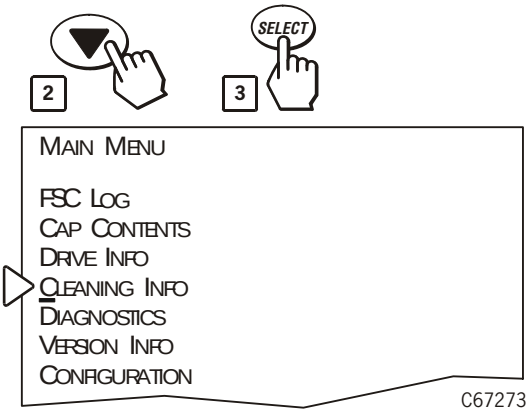
1. Press the MENU button to return the display to the Main Menu.



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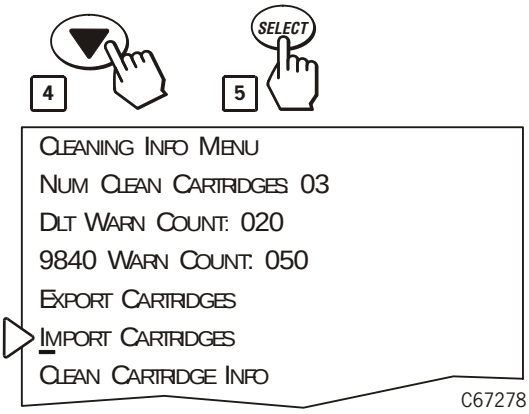
2. Press the arrow buttons until the cursor underscores `CLEANING INFO`.
3. Press the SELECT button. The panel displays the Cleaning Info Menu.



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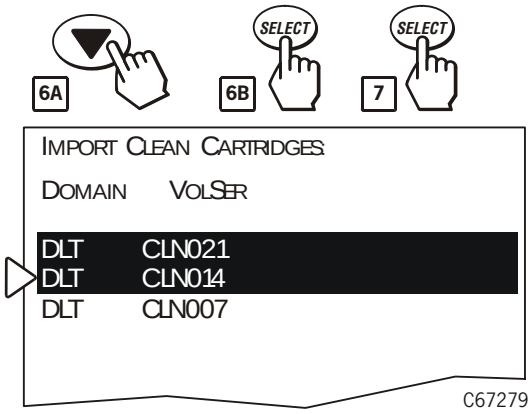
4. Press the arrow buttons until the cursor underscores `IMPORT CARTRIDGES.`
5. Press the SELECT button.

   The Import Clean Cartridges screen appears, which lists all reserved cell cleaning cartridges by domain (or drive type) and VOLSER.



6. Select the cleaning cartridges you want to import by:

   a. Moving the cursor to the desired cartridge entry on the list

   b. Pressing the SELECT button. A selected cleaning cartridge is then highlighted (in reverse video)

   Repeat Steps a and b until you have selected all the cartridges you want to import

Note: There is no undo available on this menu. If you select a cartridge by mistake, you must exit the menu by pressing the MENU button. Then you must start again at Step 4.

7. Press the SELECT button again to initiate the import.

   The panel will display a message to indicate when the import is complete.

8. Press the MENU button to exit the menu.

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Cleaning Cartridge Warning Count

After a predetermined count, a cleaning cartridge must be replaced and disposed of at the site. Keeping the tape drives clean is important for proper operation. You will need to clean the drives occasionally to prevent read/write errors.

The warning count should be set lower than the cartridge's recommended usage (or "maximum warning count" displayed on the operator panel); this will allow time to obtain a replacement cleaning cartridge. For example, if the maximum warning count equals 20 uses, you may want to set the warning count to 17 (or other, lower number).

An explanation of the cleaning cartridge warning count is found in "Cleaning Information" on page 2-8.

If the Auto Clean feature is enabled, use the main menu screen on the operator panel to set the warning threshold.

Note: The Auto Clean feature is automatically enabled if there is at least one cleaning cartridge in the reserved cells and the library is re-initialized by a power-on or by opening and closing the front door.

Check your tape drive's product manual for the recommended use and life of the drive's cleaning cartridge.

To set the warning count:

1. From the online status screen, press the MENU button. The main menu screen will appear.
2. Press the arrow button until the cursor lines up with `CLEANING INFO`.
3. Press the SELECT button.

   The `CLEANING INFO` screen will appear. It displays the number of cleaning cartridges in the reserved area at initialization.
4. Press an arrow button until the cursor is at the appropriate drive's `WARNING COUNT`.
5. Press the SELECT button for your choice.

   An editing screen will appear. The editing screen will display the current setting for the cartridge warning count. The maximum recommended warning count is shown below the current setting.
6. Press the arrow buttons to change the warning count.
7. Press the SELECT button to save the changes. (You may press the MENU button to abort.)
8. Press the MENU button to return to the library status screen.

Cleaning Cartridge Usage Count

The cleaning cartridge usage count displays how many times a cleaning cartridge has been used.

An explanation of the cleaning cartridge usage count is found in "Cleaning Information" on page 2-8.

To check the usage count of all cleaning cartridges (those in the reserved cells and those in the CAP):

1. Press the MENU button to return to the Main Menu.
2. Press the arrow buttons until the cursor underscores `CLEANING INFORMATION`.
3. Press the SELECT button.

   The panel displays the Cleaning Info menu.
4. Press the arrow buttons until the cursor underscores `CLEAN CARTRIDGE INFO.`
5. Press the SELECT button.

   The Clean Cartridges screen appears, listing all installed cleaning cartridges by drive type, VOLSER, and usage count.

   Note: If the usage count for a cleaning cartridge has reached its life limit, the export screen will display `EXPIRED`. You *must* remove this cartridge from the library.
6. Press the MENU button to exit the Clean Cartridges screen.

Cleaning Cartridge Expiration

A cleaning cartridge is determined as expired when the following sequence occurs:

- A drive has requested to be cleaned
- A cleaning cartridge is mounted on the drive
- After the cartridge is dismounted, the drive still requests a cleaning operation

You can determine if there is an expired cleaning cartridge by:

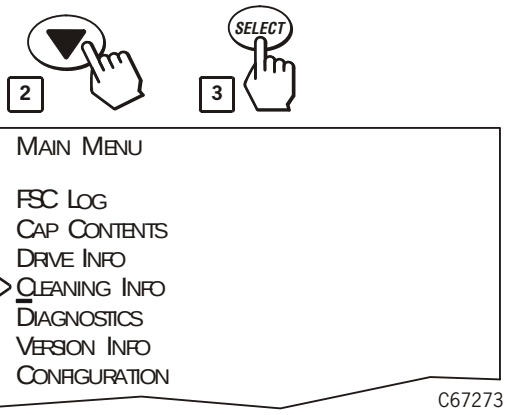
1. Viewing its usage as described in "Cleaning Cartridge Usage Count" on page 3-23
2. Viewing its usage through the StorageTek L-Series Library Admin screen
3. Observing that an asterisk (*) appears on the operator panel display; for example, `STK L180 (Code 3.00.13)*`.

Exporting Cleaning Cartridges through the CAP

When one or more cleaning cartridges have expired, you can export them from the reserved cells to the CAP with this procedure:

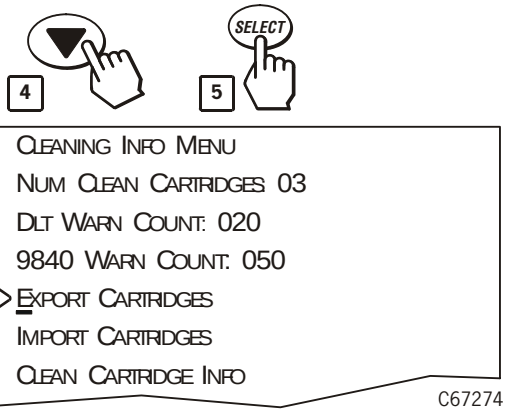
C67272

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



C67273

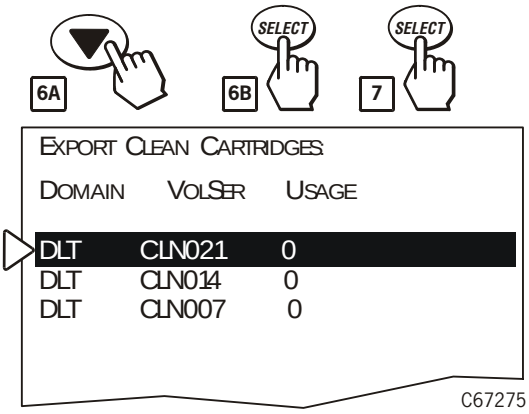
2. Press the arrow buttons until the cursor underscores `CLEANING INFO`.
3. Press the SELECT button. The panel displays the Cleaning Info Menu.



C67274

4. Press the arrow buttons until the cursor underscores `EXPORT CARTRIDGES.`
5. Press the SELECT button.

   The Export Clean Cartridges screen appears, which lists all reserved cell cleaning cartridges by domain (or drive type), VOLSER, and usage count.



6. Select the cleaning cartridges you want to export by:

   a. Moving the cursor to the desired cartridge entry on the list

   b. Pressing the SELECT button. A selected cleaning cartridge is then highlighted (in reverse video)

   Repeat Steps a and b until you have selected all the cartridges you want to export.

Note: There is no undo available on this menu. If you select a cartridge by mistake, you must exit the menu by pressing the MENU button. Then you must start again at Step 4.

7. Press the SELECT button again to initiate the export.

   The panel will display a message to indicate when the export is complete.

C67272

8. Press the MENU button to exit the menu.

StorageTek L-Series Library Admin

The optional Web interface to the L180 library is Model HRZNLSA, Feature code LS3X. Configuration and operation instructions are outlined in Appendix B, "StorageTek L-Series Library Admin".

The StorageTek L-Series Library Admin is an optional Web-based interface to the library. It lets a library's user configure, operate, and monitor the library through a workstation or PC that is running a Netscape or Microsoft browser. If you ordered this interface for your library, your service representative should install it for you.

Before you can use the StorageTek L-Series Library Admin to monitor the library or alter the library's configuration, your service representative must enter two values at the operator panel:

- The library's IP address
- The library's Web password

For instructions on how best to make these entries, see the documentation included in the StorageTek L-Series Library Admin shipping package. Information is also provided in Appendix B, "StorageTek L-Series Library Admin".

For instructions on using the interface to alter the library's configuration or monitor library activity, access the online help files for the StorageTek L-Series Library Admin.

Table 3-1 lists the model and feature number.

Table 3-1. StorageTek L-Series Library Admin Model/Feature Code

Description	Model	Required Feature	Quantity
StorageTek L-Series Library Admin for L180	HRZNLSA	CDRM	N/A
		LS3X (1 per tape library)	

Loading Tapes into the Library

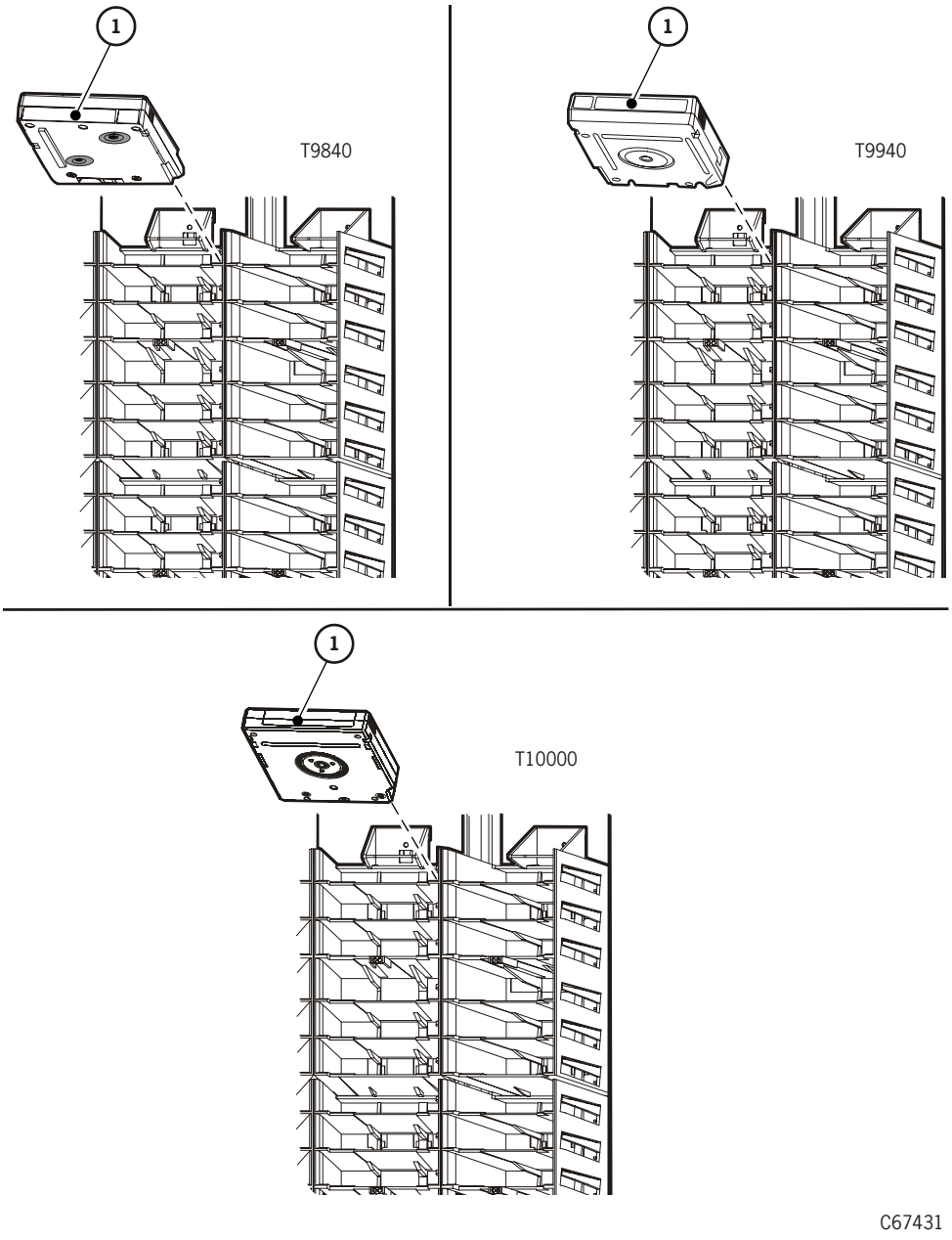
When you are ready to place the library into production, you may load data cartridges inside the library. The most efficient way to load a great quantity of tapes into the library is to manually load them into the cells.

WARNING:
***Confined space:* While working within the library, take care to avoid bumping your head or catching your clothing on protruding edges.**

ADVERTENCIA:
***Espacio limitado:* Al trabajar en el interior de la biblioteca, tenga cuidado de no golpearse la cabeza o de engancharse la ropa en los bordes salientes.**

Figure 3-1 and Figure 3-2 on page 3-29 illustrate how cartridges are placed into cells.

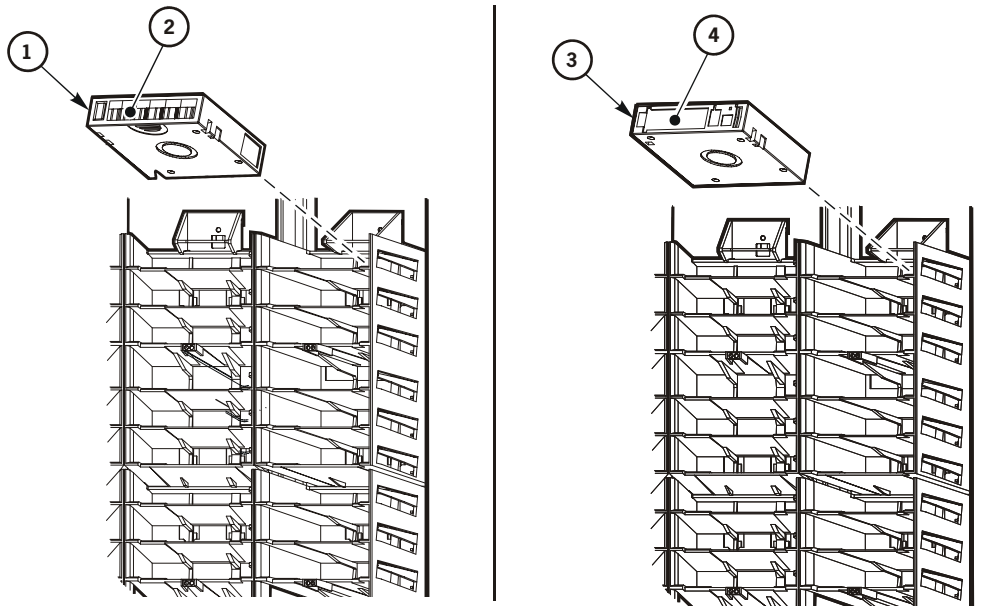
Figure 3-1. Placing Tapes into Storage Cells—T9x40 and T10000 (C67431)



1. Cartridge label

Note: Use only cartridges designed for your type of tape drives.

Figure 3-2. Placing Tapes into Storage Cells—Ultrium, DLT, and SDLT (C65333)



1. Ultrium cartridge
2. Ultrium cartridge label
3. DLT and SDLT cartridge
4. DLT and SDLT cartridge label

You must first unlock and open the main access door. This procedure is explained in "Opening the Library Front Door" on page 4-27.

You may also load cartridges into array cells by using the CAP. While this method is more time-consuming to fully populate the library, the procedure is explained in "Importing Data Cartridges through the CAP" on page 4-16.

After you have loaded all the cartridges, close and lock the main door. The robot will automatically audit the cartridges and their locations within the library.

Placing the Library Online

When you are ready to use the library for production, you must first:

- Enter the system command to place all drives online
- When all drives are online, enter the command to place the library online
- Enter the command to upload the library audit data to the client system memory (see the following paragraphs)

Sending Library Audit Data to the Client

During an initialization, the library audits the location and VOLSER of all cartridges in the storage and reserve cells. The library also performs an audit when:

- You power on the tape library.
- You open and close the front library door.
- You make a request at the server console to audit the tape library.

You must follow every audit with a client command that loads the library audit data (the catalog) into client memory. For instructions on how to send this command, refer to your software and system publications.

Library Configuration Record

Record your library's configuration in the table below.

Table 3-2. Library Configuration Record

L180 Tape Library Configuration Information	
Serial Number:_____	Code Version: _____
Library ID: _____	
Number of Drives Installed: _____	
DLT7000	Single-ended ❑ Differential ❑ On bus ❑ Off bus ❑ Address: __
DLT8000	Single-ended ❑ Differential ❑ On bus ❑ Off bus ❑ Address: __
SDLT	Single-ended ❑ Differential ❑ On bus ❑ Off bus ❑ Address: __
T9x40	Differential ❑ Fiber Channel ❑ On bus ❑ Off bus ❑ Address: __
T10000	Differential ❑ Fiber Channel ❑ On bus ❑ Off bus ❑ Address: __
Ultrium	Single-ended ❑ Differential ❑ HVD ❑ LVD ❑ On bus ❑ Off bus ❑ Address: __
Fast Load: Enabled ❑ Disabled ❑	Auto Clean: Enabled ❑ Disabled ❑

Library Operation

4

This chapter contains the procedures for operating the library in:

- Automated mode (see "Operating in Automated Mode" on page 4-4)
- Manual mode (see "Operating in Manual Mode" on page 4-26)

The library may be powered on or off in either mode.

Note: When the client controls the library, refer to your software publications and enter the command at the console to perform the desired activity. For some activities, you might have to ask your systems administrator for the required information.

Powering-on the Library

Figure 4-1 on page 4-5 shows the location of the library power switch.

The power switch is one or two circuit breakers behind the rear door of the library (left of the drive column). The power switch has two configurations:

- A single circuit breaker on the main power distribution unit (PDU) that controls power to the library and all ten drive positions.
- An optional second circuit breaker (on the optional PDU) that controls power to the top five drive positions and power to the library in case the main electrical circuit loses power. (In this configuration, the main PDU powers the bottom five drive positions as well as the library.)

Note: For redundancy, if your library has two circuit breakers, then the optional PDU should be connected to a separate electrical circuit. This way, if one PDU loses power, the other PDU remains on to provide power to the library.

To apply power to the library and drive column:

1. Open the rear door by pulling on the finger slot.
2. Lift up on the power switch (one or two circuit breakers).
3. Close the rear door.

Failed Media Checking Message

If an upside-down LTO, DLT or SDLT cartridge is found during audit, and the Media Check option on the Library Configuration menu is set to ON, the following message appears on the Operator Panel (3.08 Library firmware or higher.).

```
**************************);
>>> Failed Media Checking <<< );
UPSIDE-DOWN TAPE DETECTED!  );
Location: (see below)
Panel NN, Column NN, Row NN,
Press <SELECT> to DISABLE the
Media Checking option.
```

Locations that may appear are:

- `Storage Cell`
- `CAP (A or B)`
- `Drive`
- `Playground`
- `Pass-thru-Port`
- `In-transit`
- `Unknown Location`

NN is the panel, column, and row number of the upside-down cartridge.

If this message appears, open the rear door and reorient the cartridge(s), then close the rear door.

This message reappears during IPL until all upside-down cartridges are reoriented.

Powering-off the Library

Figure 4-1 on page 4-5 shows the location of the library power switch.

To power off the library:

1. Make sure all jobs are complete.
2. Enter the operating system command to take the library and drives offline.
3. Open the rear door by pulling on the finger slot.
4. Push down on the library power switch (one or two circuit breakers).
5. Close the rear door.

Initializing and IPLing the Library

Powering on the library causes it to initialize components and perform an IPL (initial program load).

During initialization, the library prepares the robot for operation and audits any cartridges in the storage and reserved cells.

During an IPL, the library loads the operating code and automatically verifies some configuration values, such as drive locations and drive types.

You will have to re-IPL (reset) the library when you:

- Are directed to do so by your system administrator or a StorageTek Central Support Services engineer
- Must change the library configuration (for example, when you have to change the library's SCSI ID)

Re-initializing the Library

As an operator, you might need to re-initialize the library when you:

- Manually add cartridges in the library
- Run the library in demo mode
- If a robotic component malfunctions

To re-initialize the library, make sure that all drives are powered-on and perform one of these actions:

- Power-on the library (or power-off and then power-on the library)
- Open and close the library's front door

When you re-initialize the library it:

- Initializes and calibrates robotic mechanisms and the hand-camera assembly
- Audits the tapes within the library (requires approximately **five** minutes)
- Checks drive targeting
- Audits the reserve cells
- Cycles the DLT load handle (for DLT drives)

Before re-initializing the library, perform any necessary manual operation tasks (see "Operating in Manual Mode" on page 4-26).

Re-IPLing the Library

You will have to re-IPL (reset) the library when:

- You are directed to do so by your system administrator or a service representative
- You have to change the library configuration (for example, when you have to change the library's SCSI ID)

To re-IPL the library after it is already powered on, make sure that all the drives are powered on and press the RESET button on the operator panel.

If the Failed Media Checking message appears, see "Failed Media Checking Message" on page 4-2.

Operating in Automated Mode

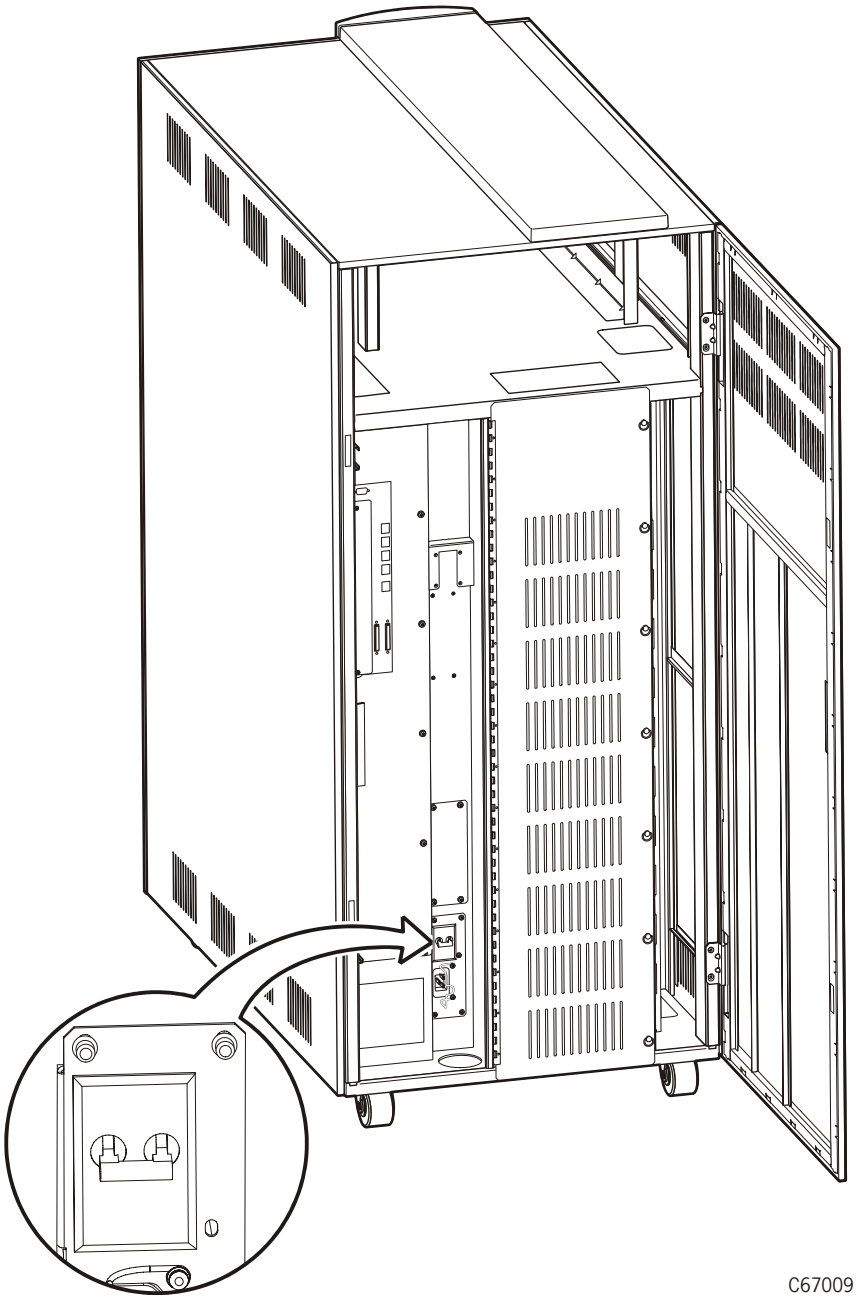
Automated mode is the normal operating mode of the library. When the library is online and the robot is mounting and dismounting cartridges, monitor your operator console and the library operator panel for messages and respond appropriately.

When a tape library is online, you also might need to:

- Monitor the operator panel for status information ("Monitoring Status Information" on page 4-6)
- Export cleaning cartridges ("Exporting Cleaning Cartridges through the CAP" on page 4-13)
- Import cleaning cartridges ("Importing Cleaning Cartridges through the CAP" on page 4-14)
- Import data cartridges into the library through CAP ("Importing Data Cartridges through the CAP" on page 4-16)
- Export data cartridges from the tape library through the CAP ("Exporting Data Cartridges through the CAP" on page 4-21)
- Manually clean a drive ("Manually Cleaning a Drive" on page 4-21)
- Review the FSC log ("Reviewing FSC Logs" on page 4-22)
- Run diagnostic tests ("Running Diagnostic Tests" on page 4-23)

The following text describes how to perform these activities.

Figure 4-1. Library Power Switch Location (C67009)

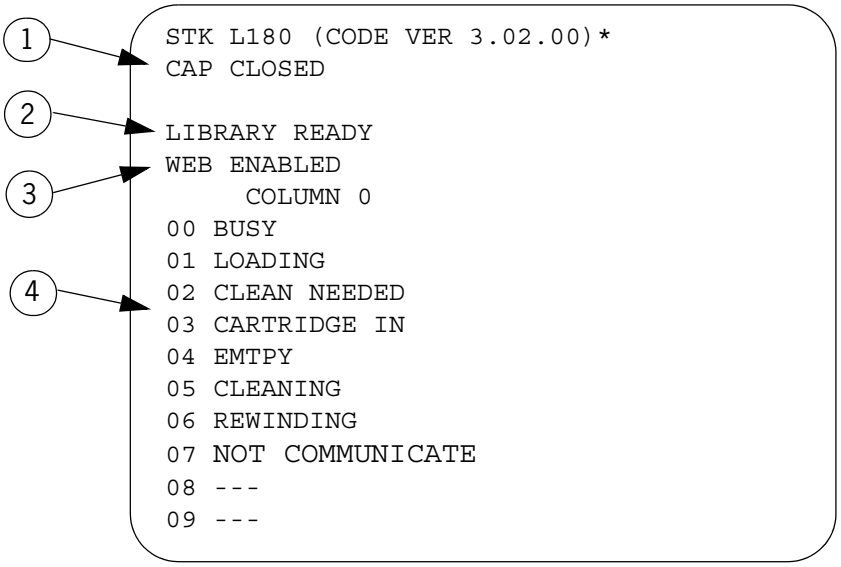


Monitoring Status Information

You can monitor CAP, library, remote user, and drive status information through the library status screen (see Figure 4-2). This is the main screen on the operator panel. It displays after initialization is complete and also when you press the MENU button while viewing the Main Menu.

You also can monitor drive information, CAP magazine status, the cleaning cartridge usage count, and the library's "personality" information through operator panel menus.

Figure 4-2. Example Library Status Screen (C65329)



1. CAP status message
2. Library status message
3. Remote users status message
4. Drives status messages

CAP Status

The first line of status information on the library status screen indicates the condition of the CAP. Table 4-1 explains the messages that might appear on this line.

Table 4-1. CAP Status Messages

Message	Explanation
`OPEN`	The CAP door is currently open. (The *Open* indicator also is on.) You may insert cartridges or remove the CAP magazines. But you cannot view the CAP magazine contents through the operator panel menus.
`CLOSED`	The CAP door is currently closed.
`CLOSED(LOCKED)`	The CAP door is currently closed and locked. Before you can open the CAP door, you must issue a command from your system console.
`TRANSITION`	The CAP door has stalled while attempting to open.
`CAP (A, B, or blank) Closing and Auditing`	The CAP is closing and the library is auditing the cartridges in the CAP (3.08 firmware or higher.).
`CAP (A, B, or blank) Open Row NN Upside-Down`	The library has detected an upside-down LTO, DLT, or SDLT cartridge in the CAP and the CAP has opened. The row location of the upside-down cartridge is identified by NN (3.08 firmware or higher.).
`UNKNOWN`	The library does not recognize the current state of the CAP door.

Library Status

The library status line indicates the current state of the library: Table 4-2 explains the messages that might appear on this line.

Table 4-2. Library Status Messages

Message	Explanation
`LIB MAIN DOOR OPEN`	The library's front door is open. When you close it, the library will reset (initialize).
`LIB INIT REQUIRED`	The library requires initialization. You must press the RESET button.
`LIBRARY NOT READY`	The library is not available to perform operator-requested actions. Some status information might be available through the network interfaces.
`LIBRARY READY`	The library has completed initialization and is ready to perform requested actions.
`LIB MAINTENANCE MODE`	The library is offline because it is performing diagnostic tests.
`INTERVENTION REQUIRED`	The library is experiencing a problem. You should note the FSC (if the library has issued one) and call your service representative.
`LIB UNKNOWN STATE`	The library does not recognize its current state. You should note the FSC (if the library has issued one) and call your service representative.

Remote Users Status

Following the library status line is a message indicating the number of users who are currently accessing the library remotely. Currently, the status message on this line never changes.

Drive Status

Table 4-3 summarizes drive status messages that might appear on the library status screen:

Table 4-3. Drive Status Messages

Message	Explanation
INIT REQUIRED	You must initialize this drive.
NOT CONNECTED	This drive is not connected to a SCSI bus.
UNKNOWN DRIVE	The library does not recognize the type of drive in this location.
NOT COMMUNICATE	This drive is not communicating with the client or the drive power is off.
NOT FUNCTIONAL	This drive is not operating properly.
NOT LOADABLE	The library cannot load a cartridge into this drive.
EMPTY	This drive does not have a tape loaded.
CARTRIDGE IN	The drive contains a cartridge, but the cartridge is not loaded into the drive.
CLEAN NEEDED	This drive requires cleaning.
CLEAN FAILED	The attempt to clean this drive failed.
LOADING	The library is mounting a cartridge to this drive.
REWOUND	The cartridge in this drive has been rewound.
UNLOADING	The library is dismounting a cartridge from this drive.
LOADED	The library has loaded a cartridge into this drive.
REWINDING	The cartridge in this drive is being rewound.
BUSY	This drive is performing a read or write operation.
CLEANING	The drive is being cleaned.

Note: The operator panel displays only 16 lines per screen. If the library contains more than eight drives, you must use the down arrow button to scroll to Drives 08 and above.

Drive Information

To view details about an installed drive, including its serial number and firmware version:

1. Press the MENU button to display the Main Menu.
2. If necessary, press an arrow button until the cursor lines up with `DRIVE INFO`.
3. Press the SELECT button.

   A list of all installed drives will appear.
4. Use the arrow buttons until the cursor underscores the desired drive.
5. Press the SELECT button.

   The Drive Information Menu will appear (see Figure 2-7 on page 2-7). The screen lists the manufacturer, model, status, serial number, interface type, and firmware version of the selected drive. See Table 4-3 on page 4-9 for a list of drive status messages.

CAP Magazine Status

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

1. Press the MENU button to display the Main Menu.
2. If necessary, press an arrow button until the cursor lines up with `CAP STATUS`.
3. Press the SELECT button.

   A blank screen will appear.
4. Press the SELECT button again.

   The CAP Contents menu will appear. The screen lists the VOLSER of each cartridge in an installed magazine or it lists a status message. See Table 4-4 for the status messages that appear on this list.

Note: Each CAP has four magazines, numbered one through four, from the top location to the bottom.

Table 4-4. CAP Magazine Slot Status Messages

Message	Explanation
`EMPTY`	This magazine slot does not contain a cartridge.
`UNKNOWN`	This magazine slot contains a cartridge, but the library has not yet performed the necessary audit to identify the cartridge.
`UNREADABLE`	This magazine slot contains a cartridge, but the camera could not read the cartridge's VOLSER label.

CAP States

When exporting or importing cartridges through the CAPs, the following CAP states may be displayed:

Table 4-5. CAP States

State	Explanation
CAP A (B) Open	Specified CAP is open for exporting or importing of cartridges
CAP A (B) Closed	Specified CAP is closed and locked
CAP A (B) Transition	Specified CAP is stalled during an open or close transition. This message indicates a problem and an error is posted to the FSC log.
CAP A (B) Unknown	The specified CAP is in an unknown state. Consult the FSC logs.

Cleaning Cartridge Usage Count

You should periodically check the usage count of cleaning cartridges in the reserved cells. This ensures that you will have enough time to obtain replacement cartridges for those that will expire soon.

Cartridges in the Reserved Cells

To check the usage count of all cleaning cartridges (those in the reserved cells and those in the CAP):

1. Press the MENU button to return to the Main Menu.
2. Press the arrow buttons until the cursor underscores `CLEANING INFORMATION`.
3. Press the SELECT button.

   The panel displays the Cleaning Info menu (see "Cleaning Information" on page 2-8).
4. Press the arrow buttons until the cursor underscores `CLEAN CARTRIDGE INFO.`
5. Press the SELECT button.

   The Clean Cartridges screen appears, which lists all installed cleaning cartridges by drive type, VOLSER, and usage count.

   Note: If the usage count for a cleaning cartridge has exceeded its warning count, the export screen will display `EXPIRED`. You must remove this cartridge from the library. To export the expired cartridge, see "Exporting Cleaning Cartridges through the CAP" on page 3-24.
6. Press the MENU button to exit the Clean Cartridges screen.

Library Personality Information

Viewing library personality information lets you determine the library's vendor and whether the personality module for the StorageTek L-Series Library Admin product is present and enabled.

To view the library's personality information:

1. Press the MENU button to return to the Main Menu.
2. Press the arrow buttons until the cursor underscores CONFIGURATION.
3. Press the SELECT button.

   The panel displays the Main Configuration Menu.
4. Press the arrow buttons until the cursor underscores PERSONALITY MODULE.
5. Press the SELECT button.

   The panel displays the Personality Module Info screen.
6. Press the down arrow to view a second screen of information.
7. To exit the Personality Module Info screen, press the MENU button.

The following status messages might appear on the Personality Module Info screen:

Table 4-6. Personality Module Status/Info Screen

Message	Explanation
Status:	
PRESENT	A recognizable personality module is attached to the logic card
NOT PRESENT	No personality module is attached to the logic card
UNKNOWN	No valid vendor information has been loaded into this library
Type: NORMAL	No personality upgrade is currently active; the factory-installed personality and vendor information are in effect
UPGRADE	A personality upgrade is available
USED UPGRADE	A personality upgrade is available, but the upgrade has been previously used
WRITE IN PROGRESS	A personality upgrade is in progress
VERSION:	The version number for the personality module. If a personality module is not present, this is the version of the vendor information.
LIBRARY VENDOR ID:	The identity number for the library vendor

Table 4-6. Personality Module Status/Info Screen (Continued)

Message	Explanation
LIBRARY VENDOR NAME:	The name of the library vendor
LIBRARY PRODUCT NAME:	If TYPE is NORMAL, this is the product name assigned by the library vendor. If TYPE is UPGRADE, this is the name of the product for which the upgrade is valid.
SCSI VENDOR NAME:	The library vendor name reported on the SCSI or Fibre Channel interface
SCSI PRODUCT NAME:	The library product name reported on the SCSI or Fibre Channel interface
Horizon: ENABLED	The personality upgrade for the StorageTek L-Series Library Admin product is available on the installed personality module
DISABLED	The personality upgrade for the StorageTek L-Series Library Admin product is not available

Exporting Cleaning Cartridges through the CAP

Note: This procedure assumes that you have:

- Loaded cleaning cartridges into the reserved cells
- Once the cleaning cartridges are loaded, reset the library.

These two steps enable the Auto Clean function.)

When one or more cleaning cartridges have expired, you can export them from the reserved cells to the CAP. To do export them:

1. Press the MENU button to return to the Main Menu"
2. Press the arrow buttons until the cursor underscores CLEANING INFORMATION.
3. Press the SELECT button.

   The panel displays the Cleaning Info menu (see "Cleaning Information" on page 2-8).
4. Press the arrow buttons until the cursor underscores EXPORT CARTRIDGE.
5. Press the SELECT button.

   The Export Clean Cartridges screen appears, which lists all reserved cell cleaning cartridges by domain (or drive type), VOLSER, and usage count.

6. Select the cleaning cartridges you want to export by:

   a. Moving the cursor to the desired cartridge entry on the list

   b. Pressing the SELECT button.

      A selected cleaning cartridge is then highlighted (in reverse video)

   c. Repeating Steps a and b until you have selected all the cartridges you want to export

7. Press the SELECT button to export the cartridges.

Importing Cleaning Cartridges through the CAP

Note: This procedure assumes that you have:

- Loaded cleaning cartridges into the reserved cells
- Once the cleaning cartridges are loaded, reset the library.

These two steps enable the Auto Clean function.)

When you want import cleaning cartridges through the CAP into the reserved cells:

1. Enter the console command to unlock the CAP.
2. Press the CAP button on the operator panel to open the CAP.

   The *Open* indicator will light.

CAUTION:
Possible halt to operation or damage to components. **You must enter the cartridges properly, or else you might damage the robot or the drive or cause the library to stop operating. Use only cartridges designed for your type of drives.**

3. Load cartridges into the magazine.

   You can do this one of two ways:

   a. Pull out and down on the magazine handle.

   b. Remove the magazine by lifting it out (see Figure 4-3 on page 4-17).

Note: You can use the snap-on retention cartridge cover to keep cartridges in place when carrying the magazine. Remove the clear cover from the back of the magazine by lifting the side edge. To protect the cartridges, place the slots on one edge of the cover into the grooves on the side of the magazine's top panel and snap the other edge into place.

4. Enter the cartridges into the magazine so that they lie flat, with the VOLSER label facing toward you, the customer label facing down, and the reel facing away from you. (See Figure 4-4 on page 4-17 and Figure 4-5 on page 4-18.)

CAUTION:
Possible damage to the hand assembly. **Remove the magazine's retention cover before loading the magazine into the CAP.**

5. Return the magazine to its closed position.
6. Press the CAP button on the operator panel to close the CAP.
7. Press the MENU button to return the display to the Main Menu.
8. Press the arrow buttons until the cursor underscores `CLEANING INFORMATION`.
9. Press the SELECT button.

   The panel displays the Cleaning Info menu (see "Cleaning Information" on page 2-8).
10. Press the arrow buttons until the cursor underscores `IMPORT CARTRIDGE.`
11. Press the SELECT button.

    The Import Clean Cartridges screen appears, which lists all reserved cell cleaning cartridges by domain (or drive type), and VOLSER.
12. Select the cleaning cartridges you want to import by:
    a. Moving the cursor to the desired cartridge entry on the list
    b. Pressing the SELECT button. A selected cleaning cartridge is then highlighted (in reverse video)
    c. Repeating Steps a and b until you have selected all the cartridges you want to import

    Note: *There is no "undo" available on this menu.* If you select a cartridge by mistake, you must exit the menu by pressing the MENU button. Then you must start again at Step 10.
13. Press the SELECT button to import the cartridges.

Importing Data Cartridges through the CAP

To unlock the CAP, open it, and import data cartridges:

1. Enter the console command to unlock the CAP.
2. Press the CAP A or CAP B button on the operator panel to open the CAP.

   The indicator will light.

CAUTION:
Possible halt to operation or damage to components. **You must enter the cartridges properly or you might damage the robot or the drive, or cause the library to stop operating. Use only cartridges designed for your type of drives.**

Refer to Figure 4-4 on page 4-17 and Figure 4-5 on page 4-18 while performing the following steps.

3. Load cartridges into the magazine.

   You can do this one of two ways:

   a. Pull out and down on the magazine handle.

   b. Remove the magazine by lifting it out (see Figure 4-3 on page 4-17).

Note: You can use the snap-on retention cartridge cover to keep cartridges in place when carrying the magazine. Remove the clear cover from the back of the magazine by lifting the side edge. To protect the cartridges, place the slots on one edge of the cover into the grooves on the side of the magazine's top panel and snap the other edge into place.

4. Place the cartridges into the magazine so that they lie flat, with the bar code up and the reel facing away from you.

CAUTION:
Remove the retention cover before loading the magazine into the CAP.

5. Return the magazine to its closed position.
6. Press the CAP A or CAP B button on the operator panel to close the CAP.

Note: StorageTek strongly advises that you do *not* import unlabeled cartridges. Your client software determines what happens when you import 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 hand does not move it. You must remove the cartridge from the CAP.

In this situation, your software might direct the library to stop operating. Some software might prompt you to type in a label number when no VOLSER is read. Typing in a label number might cause a problem later during an audit because the camera still will not be able to read the unreadable VOLSER on the cartridge.

Figure 4-3. Removing the CAP Magazine (C67082)

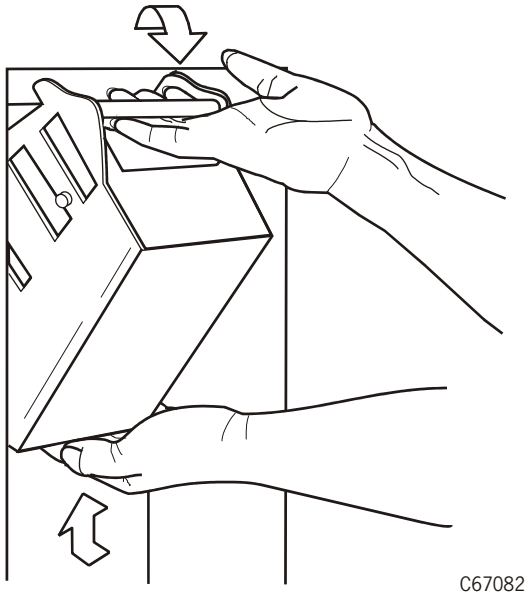


Figure 4-4. Placing DLT/SDLT Cartridges into the CAP Magazine (C65052)

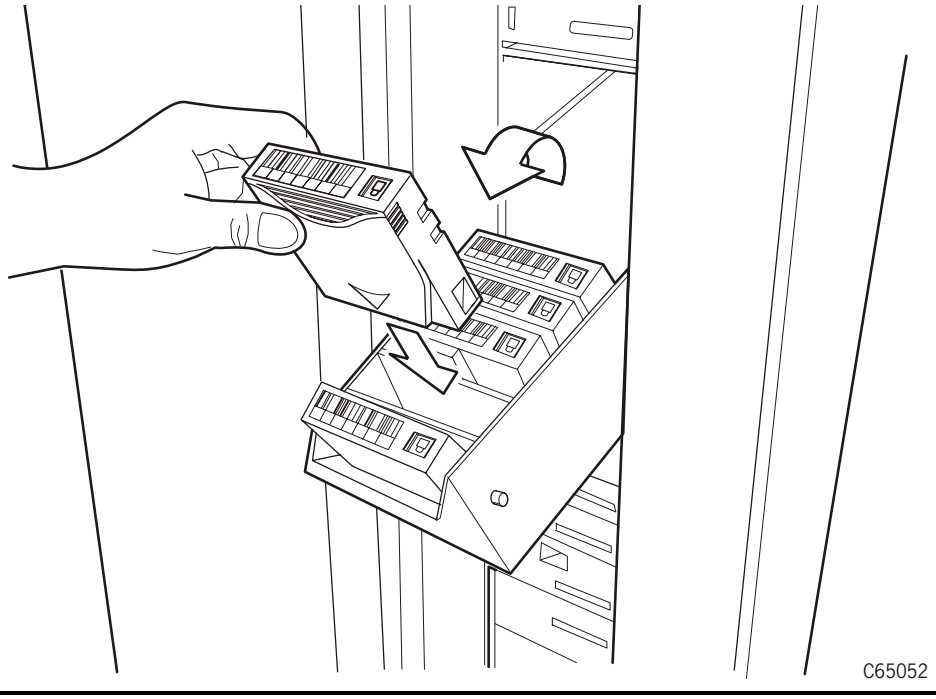


Figure 4-5. Placing T9x40 Cartridges into the CAP Magazine (C65135)

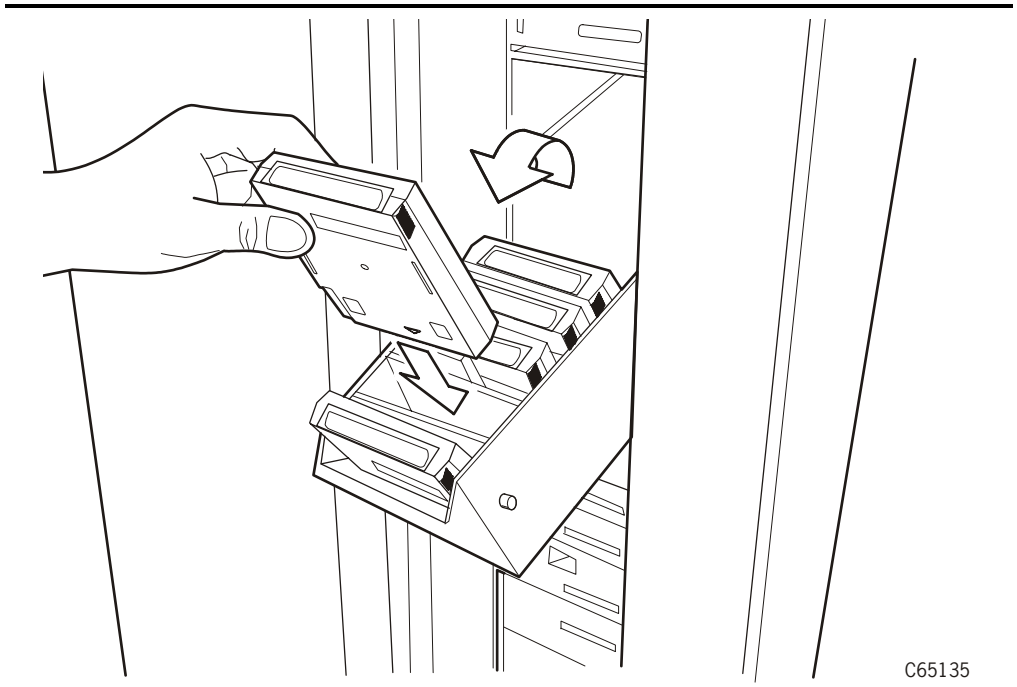


Figure 4-6. Placing T10000 Cartridges into the CAP Magazine (C67437)

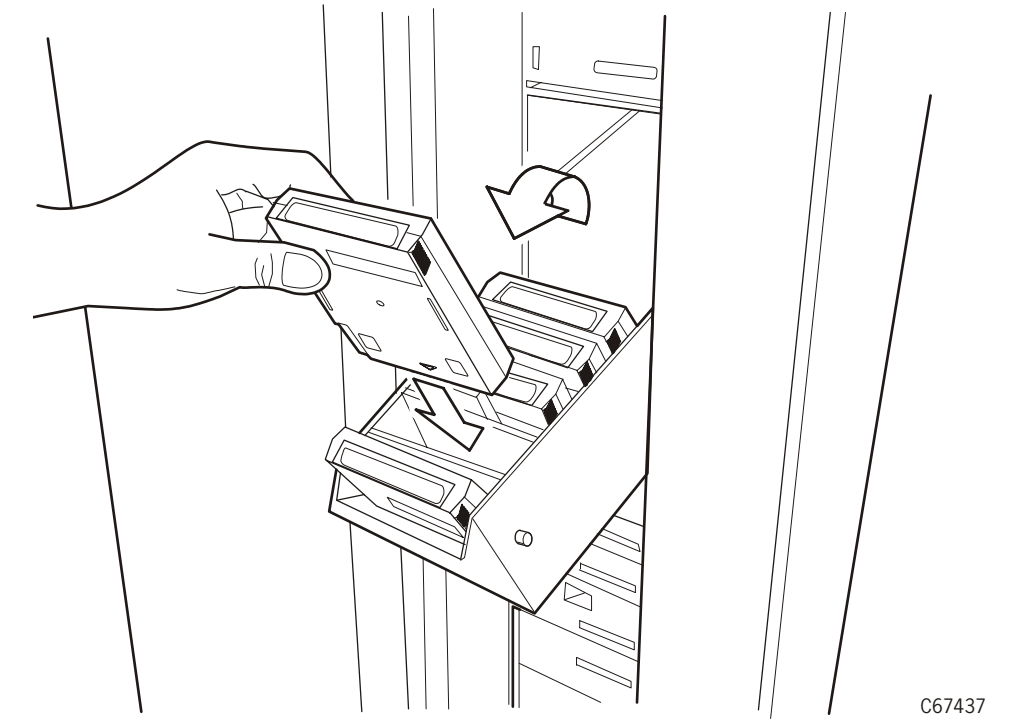
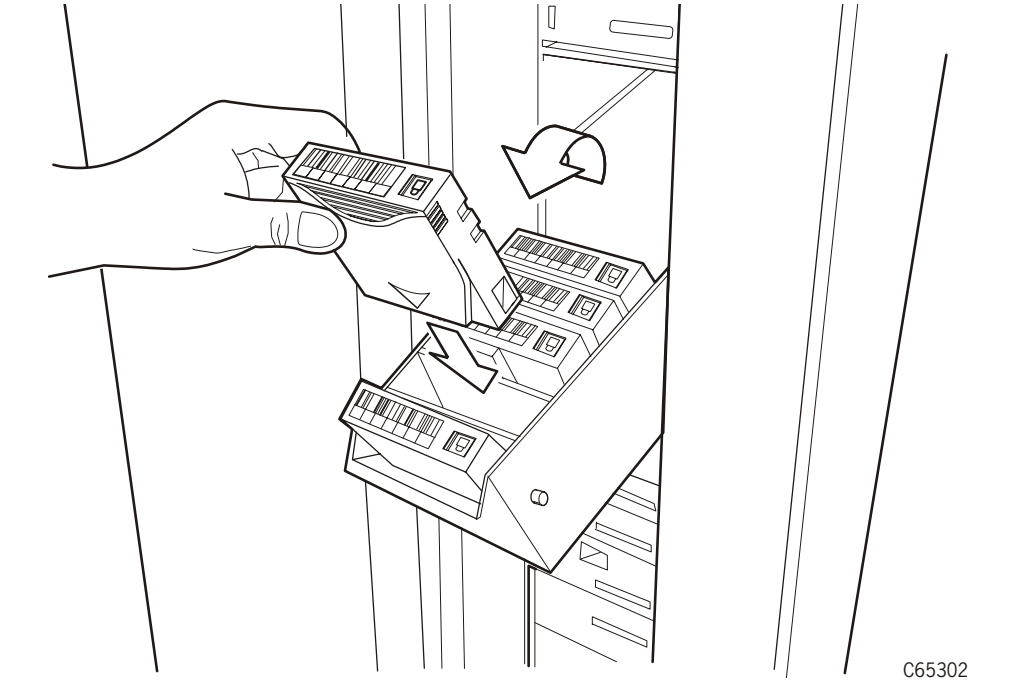


Figure 4-7. Placing Ultrium Cartridges into the CAP Magazine (C65302)



Entering Unlabeled Cartridges

Note: StorageTek strongly advises that you *do not* enter unlabeled cartridges.

The client software determines what happens when you enter a cartridge with a missing or unreadable label. Under ordinary conditions, the camera on the hand audits the CAP and recognizes that a cartridge is present, but the hand does not move it. You must remove the cartridge from the CAP. In this situation, the client software might direct the library to stop operating.

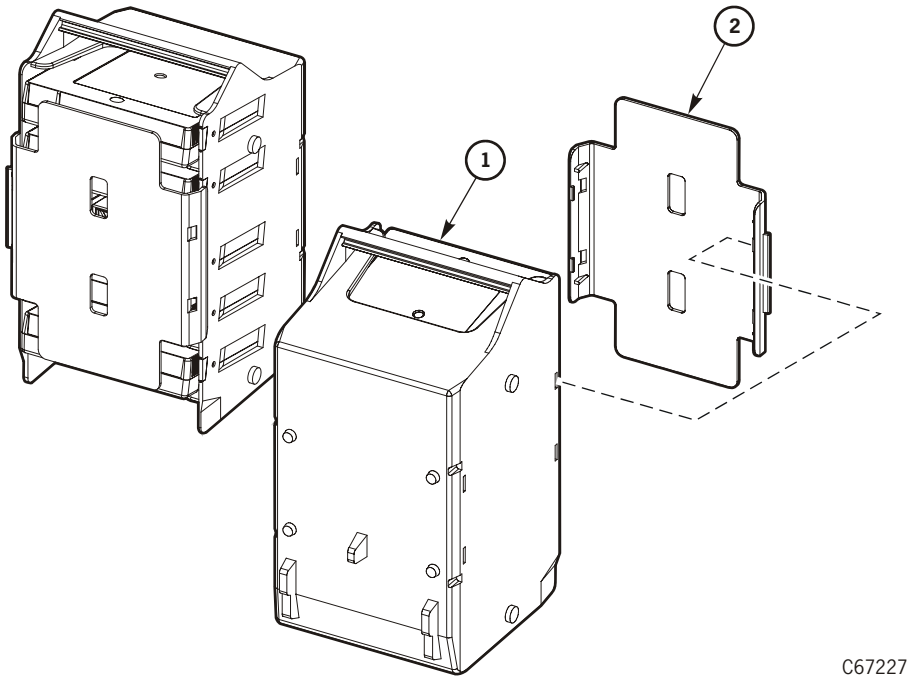
Other software might prompt you to type in a label number when no VOLSER is read. Typing in a label number might cause a problem later during an audit because the camera still will not be able to read the VOLSER on the cartridge.

Magazine Retention Cover

You can use a snap-on retention cartridge cover to keep cartridges in place when carrying the magazine (shown in Figure 4-8).

- To remove the clear cover from the back of the magazine by lifting the side edge. Note: Make sure you remove the cover before placing the magazine into the CAP.
- To protect the cartridges, place the slots on one edge of the cover into the grooves on the side of the magazine's top panel and snap the other edge into place.

Figure 4-8. Attaching/Detaching CAP Magazine Cover (C67227)



1. CAP magazine (in upright position)
2. CAP magazine cover

Exporting Data Cartridges through the CAP

To export data cartridges through the CAPs:

1. At the console, enter the VOLSERs of the cartridges you require.

   The robot will retrieve the cartridges and insert them into the CAP.

2. Enter the console command to open the CAP.

   This will unlock the CAP.

3. Press the CAP A or CAP B button on the operator panel to open the CAP.

4. Remove or pull down the magazine and remove the cartridges and store them *outside* the tape library (refer to "Storage of Cartridges" on page A-28).

5. Repeat these steps until you have removed all the required cartridges.

6. Press the CAP button to close the CAP

7. Refer to your console and your software documentation for further instructions.

Manually Cleaning a Drive

If you have not enabled the Auto Clean function on the library, then the library status screen will display `CLEAN NEEDED` whenever a drive requires cleaning.

To manually clean this drive:

1. Enter the console command to open the CAP.

   This will unlock the CAP.

2. Press the CAP button on the operator panel to open the CAP.

3. Insert the required cleaning cartridge into the CAP.

4. Press the CAP button to close the CAP.

5. Press the MENU button until the Main Menu displays.

6. Press the arrow buttons until the cursor underscores `DIAGNOSTICS`.

7. Press the SELECT button.

   The panel displays the Main Diagnostics Menu (see Figure 2-9 on page 2-9).

8. Press the arrow buttons until the cursor underscores `DRIVE DIAGNOSTICS`.

9. Press the SELECT button.

   The screen will display a list of all installed drives.

10. Use the arrow buttons to highlight the desired drive.

11. Press the SELECT button.

    The Diagnostics for Drive menu appears.

12. Press the arrow buttons until the cursor underscores `CLEAN DRIVE`.

13. Press the SELECT button.

    A message screen will appear to inform you that the drive will be cleaned at the next opportunity.

    When cleaning is completed, the robot will return the cleaning cartridge to the CAP.

    If you want to clean another drive (of the same type), press the MENU button to return to the list of drives, and repeat Steps 10 through 13.

14. When drive cleaning is completed, press the CAP button to open the CAP.

15. Remove the cleaning cartridge and make a record of how many times it has been used.

16. Press the CAP button to close the CAP.

Reviewing FSC Logs

A StorageTek service representative might ask you to review the library's fault symptom code (FSC) log so that you can better analyze library-related problems. The FSC log records significant events and errors that the library has experienced during operation.

To review the FSC log:

1. Press the MENU button until the Main Menu displays.
2. If necessary, press the arrow buttons until the cursor underscores `FSC LOG`.
3. Press the SELECT button.

   The panel displays the FSC logs screen (see "FSC Log" on page 2-5).

4. Use the arrow buttons to scroll through the log.

Here is a sample entry on the FSC logs screen, followed by an explanation of the entries:

```
3329    03    NONE
03/01/2004   14:46:14
```

3329	This four-character code is the FSC.
03	This value indicates the number of times this FSC has occurred.
NONE	This message indicates which, if any, mechanical device was involved.
03/01/2004	These digits indicate the date the FSC occurred. The fields from left to right are month, day, and year.
14:46:14	These digits indicate the time the FSC occurred. The fields from left to right are hour, minutes, and seconds.

Running Diagnostic Tests

Diagnostic tests let you exercise certain aspects of the library's operation. Tests are listed in Table 4-7.

Table 4-7. L180 Library Drive Diagnostic Tests

Test	Description
Clean Drive	This function is not a test. It moves a specified cleaning cartridge from the CAP to a drive and initiates drive cleaning. When cleaning is completed, it will return the cleaning cartridge to the CAP. This routine does *not* require the library to be offline.
Mount	Mounts a diagnostic tape to the selected drive.
Dismount	Dismounts a diagnostic tape from the selected drive.
Run Drive Check	Determines whether the specific drive is functioning. This test applies to DLT 8000, T9x40[1], and T10000[2] drives only.
Mount-Dismount	Mounts and dismounts a diagnostic tape on the selected drive.

1. T9x40 drives must have firmware version 1.28 or higher.
2. T10000 drives must have firmware version 1.27.008, or higher.

CAUTION:
***Potential system problem:* Diagnostic tests should be performed only by trained personnel.**

Before performing the diagnostic tests, be sure that the library and drives are offline.

Running Drive Diagnostic Tests

To run a diagnostic test on a drive:

1. Place the library and drives offline.
2. Press the MENU button until the Main Menu displays.
3. Press the arrow buttons until the cursor underscores `DIAGNOSTICS`.
4. Press the SELECT button.

   The panel displays the Main Diagnostics Menu.
5. Press the arrow buttons until the cursor underscores `DRIVE DIAGNOSTICS`.
6. Press the SELECT button.

   The screen will display a list of installed drives.
7. Use the arrow buttons to highlight the desired drive.

8. Press the SELECT button.

   The Diags for Drive menu appears.

9. Press the arrow buttons until the cursor underscores the desired test. For a description of the available tests, see Table 4-7 on page 4-23.

10. Press the SELECT button.

    If you selected `MOUNT/DISMOUNT LOOP`, an editing screen will appear:

    a. Use the arrow buttons to enter the desired value. (The up arrow button increases the value; the down arrow button decreases the value.)

    b. Press the SELECT button.

11. You will be prompted to confirm that you want the library in Maintenance Mode (offline) before beginning the test (`ARE YOU SURE?`). Confirm this by pressing the SELECT button. (You may press the MENU button to abort.)

12. Wait until the test is completed; the screen will display a message that either the test completed successfully or, if a problem occurred, the screen will display an error message and, in some cases, an FSC code.

Running a Get-Put Loop

During a Get-Put loop, the hand loads and unloads a cartridge from a storage cell. This tests the functionality of the hand assembly.

To run a Get-Put loop:

1. Place the library and drives offline.

2. Press the MENU button until the Main Menu displays.

3. Press the arrow buttons until the cursor underscores `DIAGNOSTICS`.

4. Press the SELECT button.

   The panel displays the Main Diagnostics Menu.

5. Press the arrow buttons until the cursor underscores `GET PUT LOOP`.

6. Press the SELECT button.

   The Get-Put Mode screen will appear.

7. You will be prompted to confirm that you want the library in Maintenance Mode (offline) before beginning the test (`ARE YOU SURE?`). Confirm this by pressing the SELECT button. You may press the MENU button to abort.

8. Wait until the test is completed; the screen will display `TEST COMPLETE` or, if a problem occurred, an FSC code.

Operating in Demo Mode

CAUTION:
Potential for error. **Running the library in Demo Mode causes the data cartridges to be rearranged. After Demo Mode is completed, you must reset the library and enter the client command to upload library audit data to the client.**

With the library in Demo Mode (demonstration mode), the hand takes a data cartridge from a storage cell, moves the cartridge, and places the cartridge back into a different storage cell.

To operate in Demo Mode:

1. Place the library and drives offline.
2. Press the MENU button until the Main Menu displays.
3. Press the arrow buttons until the cursor underscores `DIAGNOSTICS`.
4. Press the SELECT button.

   The panel displays the Main Diagnostics Menu.
5. Press the arrow buttons until the cursor underscores `DEMO MODE`.
6. Press the SELECT button.

   The Demo Mode menu appears.
7. Use the arrow buttons to enter the desired number of loops. The up arrow button increases the value by 100; the down arrow button decreases the value by 100.

   Note: StorageTek does not recommend looping tests excessively.
8. Press the SELECT button.
9. You will be prompted to confirm that you want the library in Maintenance Mode (offline) before beginning the test (`ARE YOU SURE?`). Confirm this by pressing the SELECT button. (You may press the MENU button to abort.)
10. Wait until the test is completes. The screen will display `TEST COMPLETE`. or, if a problem occurred, an FSC code
11. Press the RESET button to reset the library.

Operating in Manual Mode

The following section describes operations you can perform when the tape library is in manual mode. Manual mode occurs when the tape library is not online.

When the library is offline, you might have to:

- Open the front door
- Move the robot (see "Moving the Robot" on page 4-29)
- Locate a cartridge in the storage cells (see "Locating a Cartridge in the Storage Cells" on page 4-32)
- Remove a cartridge from the hand (see "Removing a Cartridge from the Hand" on page 4-33)
- Mount/Dismount a cartridge in a drive ("Loading/Unloading Cartridges Manually" on page 4-35)

Before starting any of these tasks, you must take precautions against electrostatic discharge (ESD).

CAUTION:
Potential static electricity damage to electrical components: **Take precaution against potential ESD damage by touching unpainted metal on the library frame *before* reaching into the library or touching any drives. Avoid touching any electrical components.**

After you have opened a library door:

1. With your finger, touch a gray, unpainted metal surface, such as the library frame just inside the front door.
2. Keep your body movement to a minimum as you touch the drives or library components.

Antistatic wrist straps with clip-on ends are commercially available.

Opening the Library Front Door

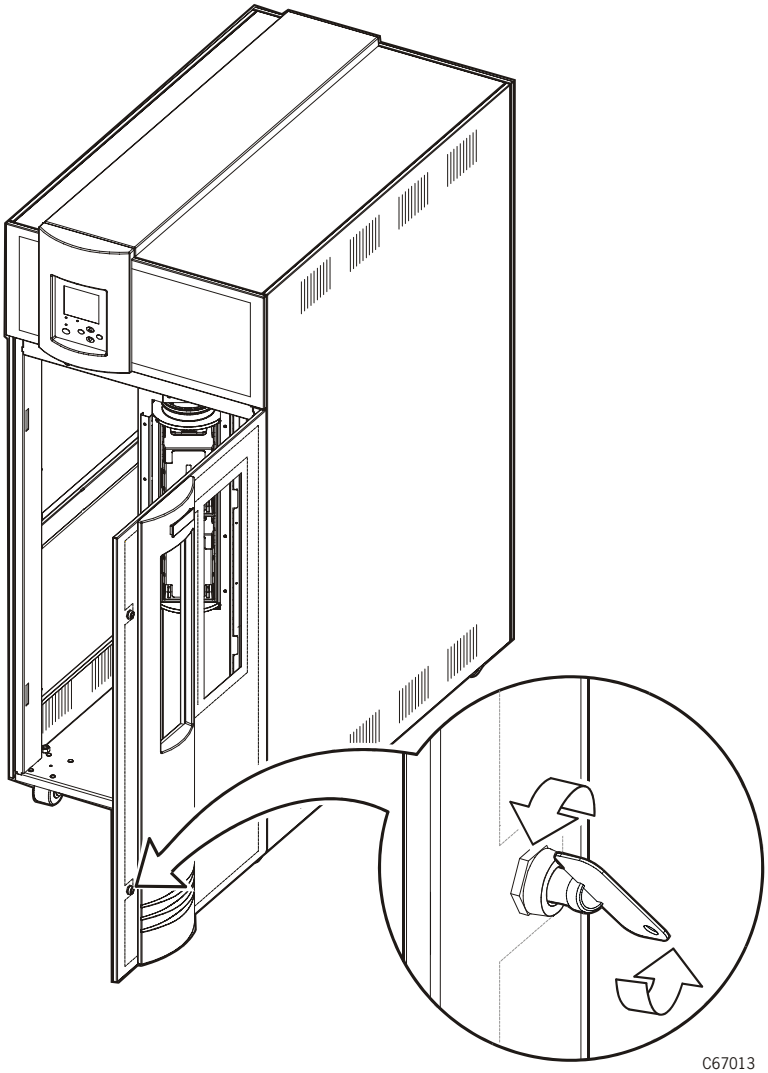
WARNING:
***Confined space*: While reaching inside the library, take care to avoid bumping your head or catching your clothing on protruding edges.**

ADVERTENCIA:
***Espacio limitado*: Al trabajar en el interior de la biblioteca, tenga cuidado de no golpearse la cabeza o de engancharse la ropa en los bordes salientes.**

You must open the front door to perform manual operations.

1. Make sure all jobs have ended and that the library is offline.
2. Open the front door by using a latch key to unlock both latches (Figure 4-9 on page 4-28). Turn the key counterclockwise to unlock.
3. Pull open the door.

Figure 4-9. Opening Front Door (C67013)



Moving the Robot

After you open the tape library doors, you might need to move the robot to make it easier to access the cartridges or the drives.

Read and observe the following caution before you attempt to move any portion of the robot.

CAUTION:
Potential equipment damage: **To prevent damaging the hand or Z carriage, make sure the reach mechanism on the hand is fully retracted before moving any part of the robot. Push the gripper mechanism into the retracted position. If the tape library goes offline due to a power failure, the reach mechanism might be extended into a storage cell or drive. If the robot is rotated when this condition exists, the hand could be damaged.**

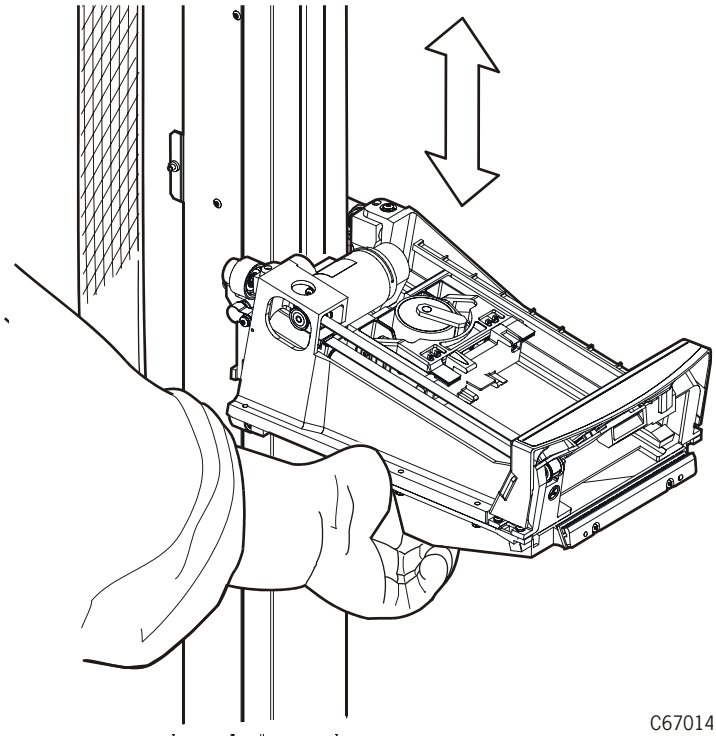
Move the Z column and Z carriage only as shown in Figure 4-10 and Figure 4-11 on page 4-31.

Take precaution against potential ESD damage by touching gray, unpainted metal on the library frame before reaching into the library. Avoid touching any electrical components.

Raising and Lowering the Hand-camera Assembly

If you need to raise or lower the hand, *slowly and carefully* move it by placing your fingers on the hand-camera assembly as shown in Figure 4-10.

Figure 4-10. Raising and Lowering the Hand-camera Assembly (C67014)

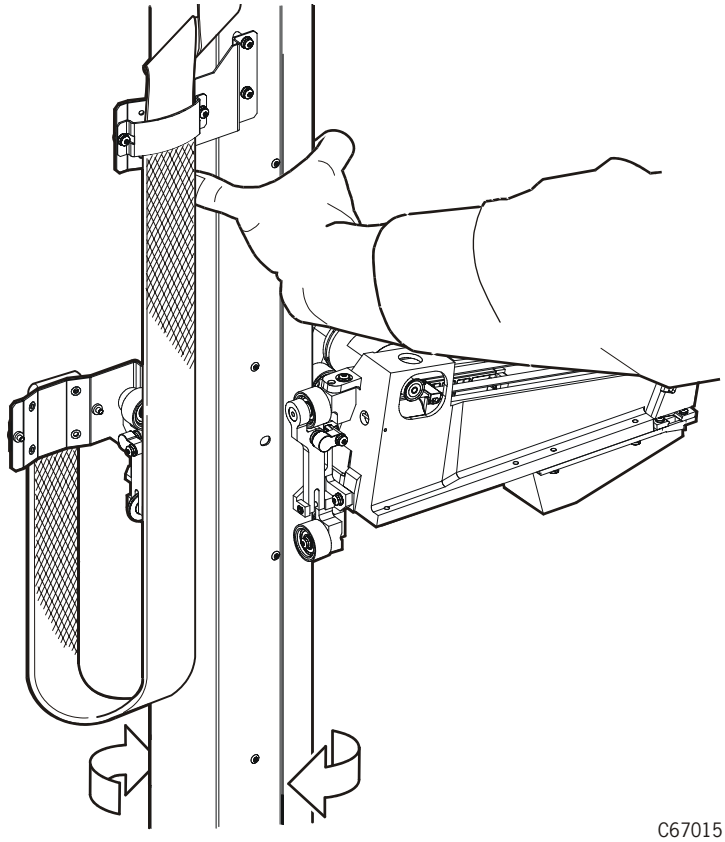


Rotating the Z Column

If you need to rotate the Z column, grasp it and *carefully* rotate it, as shown in Figure 4-11.

The Z column does not rotate a full 360 degrees. If the column meets resistance and stops before reaching the desired position, it has contacted a stopping mechanism. Do *not* force it. Rather, rotate the column in the opposite direction.

Figure 4-11. Rotating the Z Column (C67015)

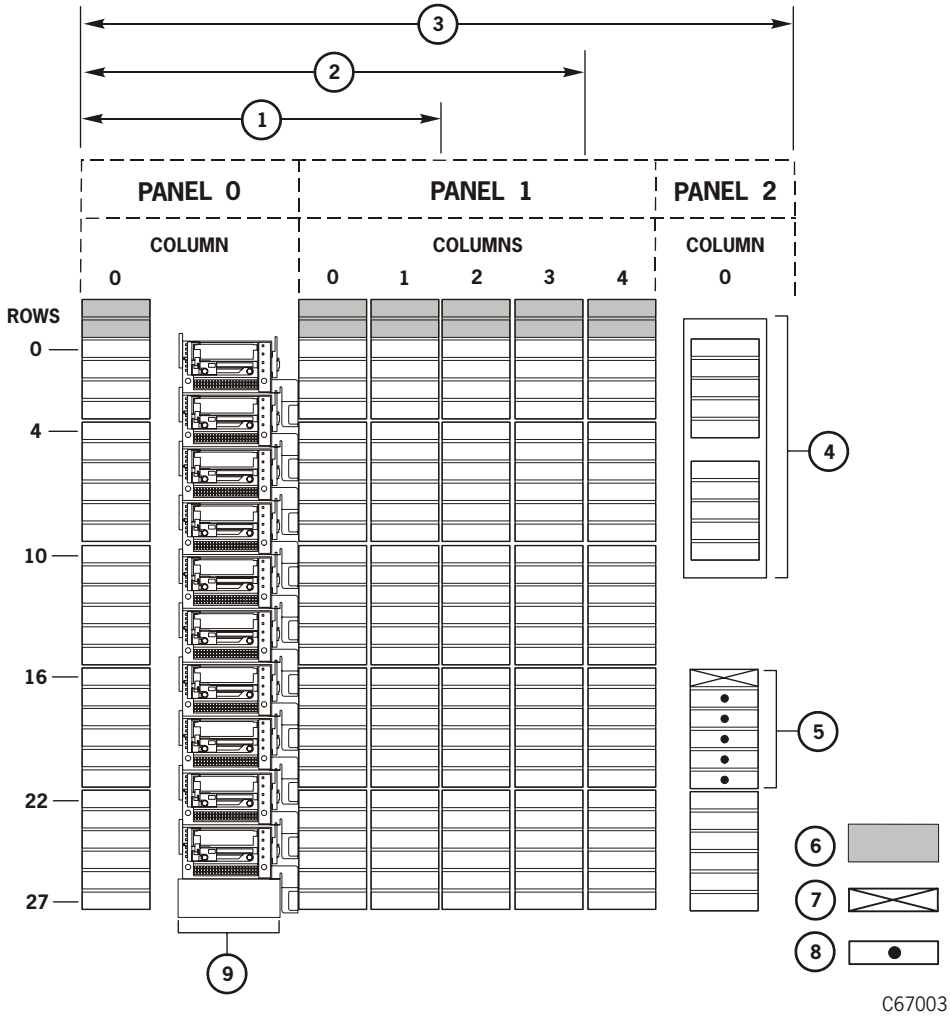


Locating a Cartridge in the Storage Cells

Figure 4-12 show the locations of the panels, rows, and columns for the storage cells. A decal at the top of each column also provides this information. To remove a cartridge from a storage cell:

1. Slide the cartridge out.
2. If a drive has a mount request, manually insert the cartridge into the drive (see "Loading/Unloading Cartridges Manually" on page 4-35).

Figure 4-12. Locating Cartridges (C67003)



1. 84-cartridge-cell configuration
2. 140-cartridge-cell configuration
3. 174-cartridge-cell configuration
4. Cartridge access port (CAP)
5. Reserved cell array
6. Blocked storage cells (no cartridges permitted)
7. Swap cell
8. Reserved cells
9. Drive column (shown with DLT drives installed)

Removing a Cartridge from the Hand

If the library loses power or goes offline, a cartridge might be left in the hand. You can remove it from the hand and manually mount it into a drive for a read/write operation.

CAUTION:
Possible equipment damage: **Follow the procedures described in "Moving the Robot" on page 4-29. Failing to do so could damage the hand.**

Make sure you do not touch any electronic components on the hand assembly. The components could easily be damaged.

To remove a cartridge from the hand:

1. Rotate the Z column; move the hand until it is facing the front door.
2. Push on the back of the reach mechanism (as shown in Figure 4-13) until the gripper is extended to its full position, as shown in Figure 4-14 on page 4-34.

Figure 4-13. Extending the Gripper (C67017)

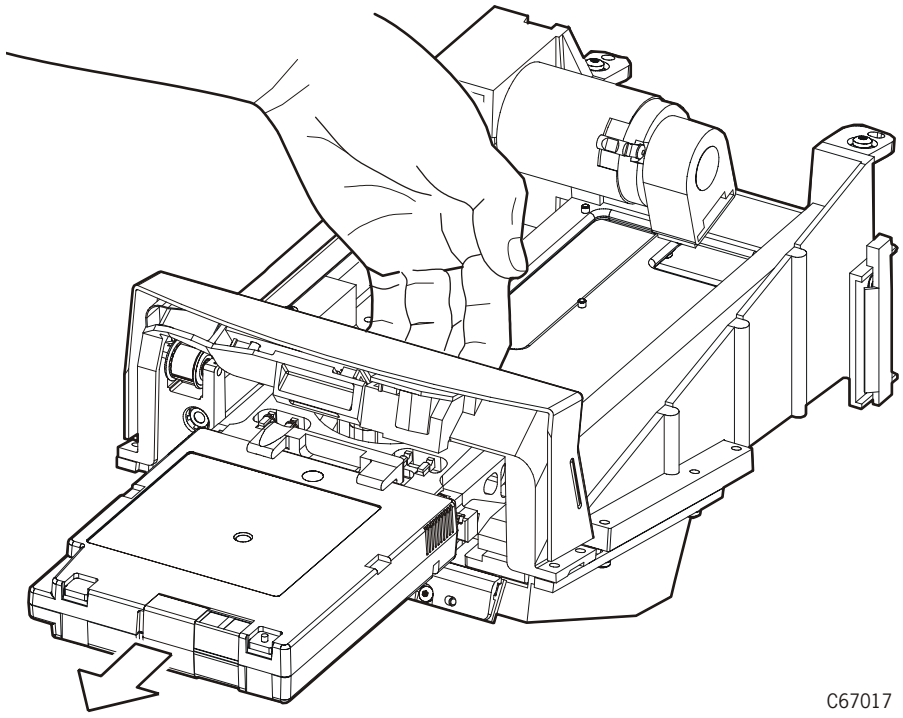
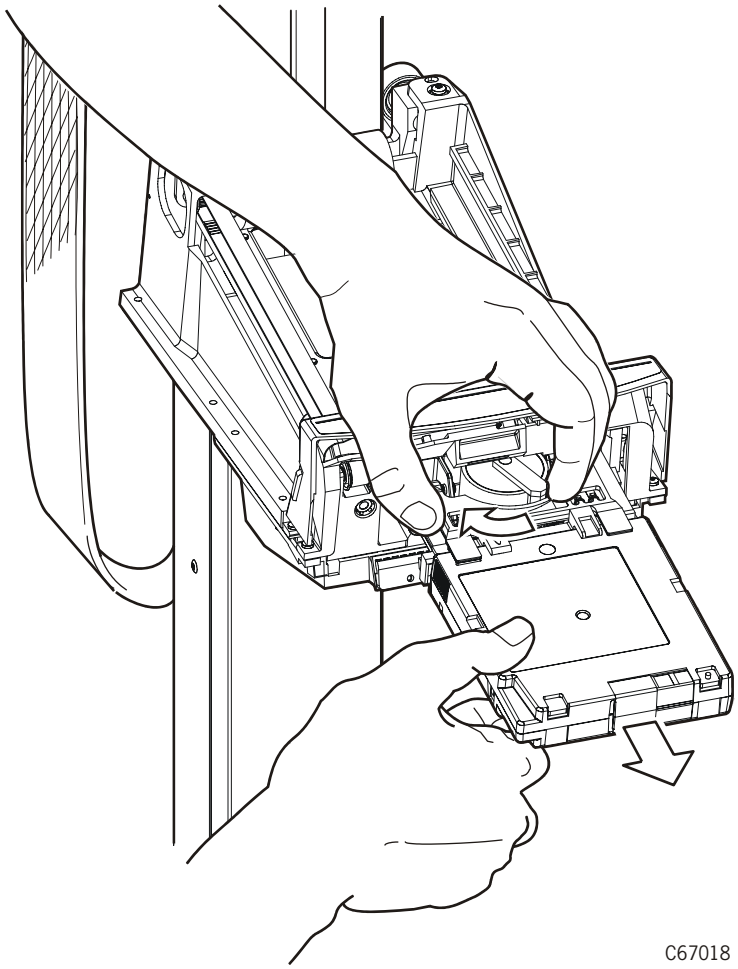


Figure 4-14. Removing a Cartridge from the Hand (C67018)



WARNING:
***Heated components:* If the robot has been active, the solenoid switch might be hot to the touch. Wait for the solenoid to cool before touching it.**

ADVERTENCIA:
***Componentes calientes:* Si el robot ha estado activado, el interruptor del solenoide puede estar caliente al tacto. Espere a que el solenoide se enfría antes de tocarlo.**

3. Hold the solenoid on top of the reach mechanism with one hand and grasp the cartridge with the other. Rotate the solenoid switch clockwise until the cartridge is released from the gripper, as shown in Figure 4-14.

CAUTION:
Potential equipment damage: **Make sure the gripper mechanism is fully retracted. If it is left extended and you turn the robot, the gripper mechanism will strike a storage cell. If it is left extended and the hand is facing the tape library door when it is closed, the door will strike the gripper mechanism.**

4. Push the gripper mechanism back into the hand until the mechanism is fully retracted.

Loading/Unloading Cartridges Manually

When the library is offline, you can—after taking adequate precautions—load a cartridge into a drive or unload a cartridge from a drive. The following pages provide manual load and unload procedures for DLT, Ultrium, T9x40, and T10000 drives.

Note: If you manually load any cartridges into a drive, you should manually unload them from the drive when the drive's operation is finished. Place them into a cell or remove them from the library.

Loading a Cartridge into a Load Handle Drive

Some drives in the library contain load handle mechanisms to assist the drive in loading cartridges. The load lever can be seen on the front of these drives. Follow the directions below to manually load a drive that contains a load handle.

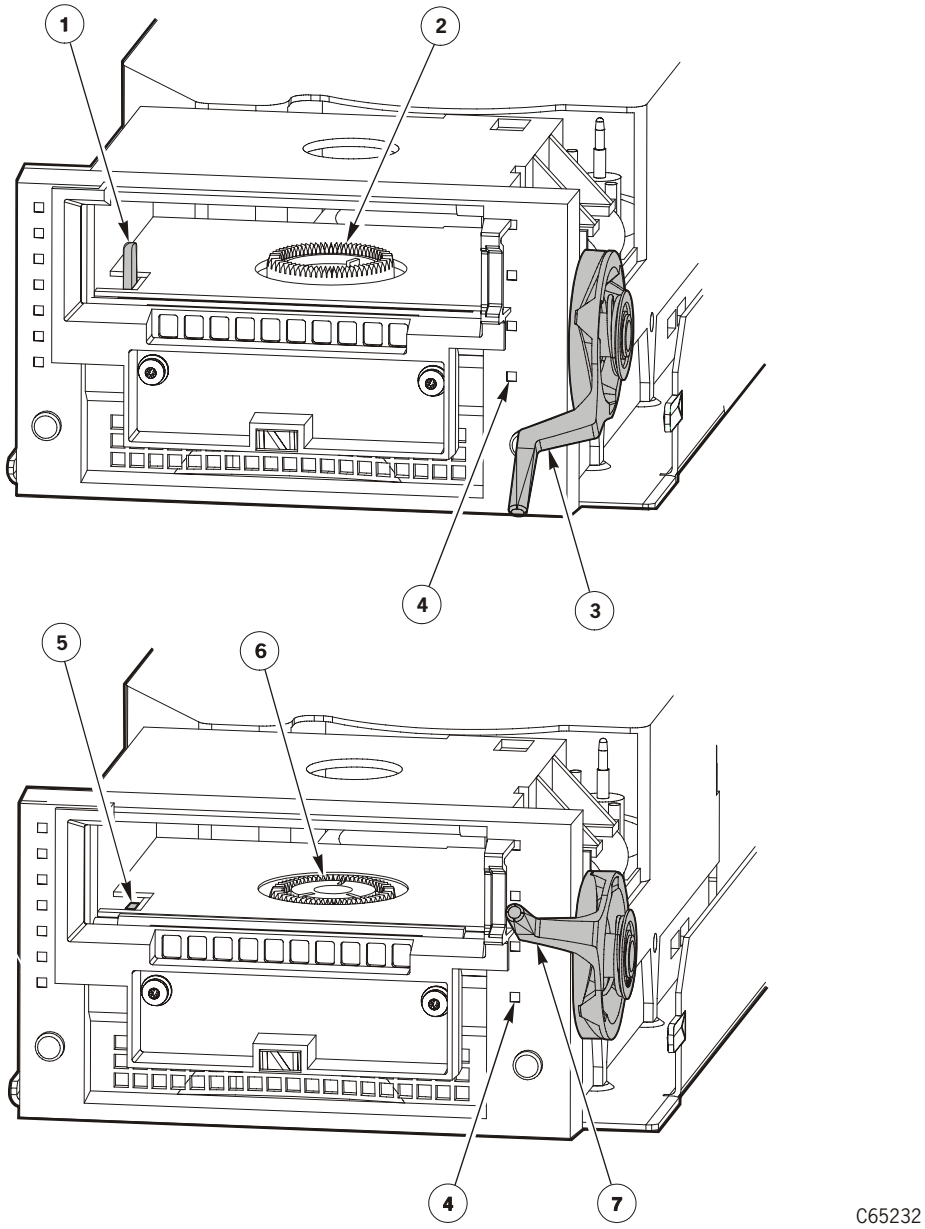
CAUTION:
Potential equipment damage: **Before you load a cartridge into the drive, you must make sure power is on and the *Operate Handle* indicator is steadily on (not flashing).**

To load a cartridge into a load handle drive:

1. Obtain the cartridge VOLSER, location, and drive number from the console.
2. Open the tape library right front door by pulling on the left side of the door.
3. Open the library left front door by using a latch key to unlock both locks. See Figure 4-9 on page 4-28. Turn the key counterclockwise to unlock them, then pull open the door.
4. Locate the cartridge (see "Locating a Cartridge in the Storage Cells" on page 4-32).
5. Make sure the DLT handle is up (see Figure 4-15 on page 4-36) and the *Operate Handle* indicator is steadily on.

   Note: If the handle is in the down position, wait for the *Operate Handle* indicator to remain on steadily before moving it to the up position (see Figure 4-15 on page 4-36). If the *Operate Handle* indicator is flashing while the handle is up, move the handle to the down position and wait for the *Operate Handle* indicator to remain on steadily. Then move the handle to the up position.

Figure 4-15. Drive with Load Handle (C65232)

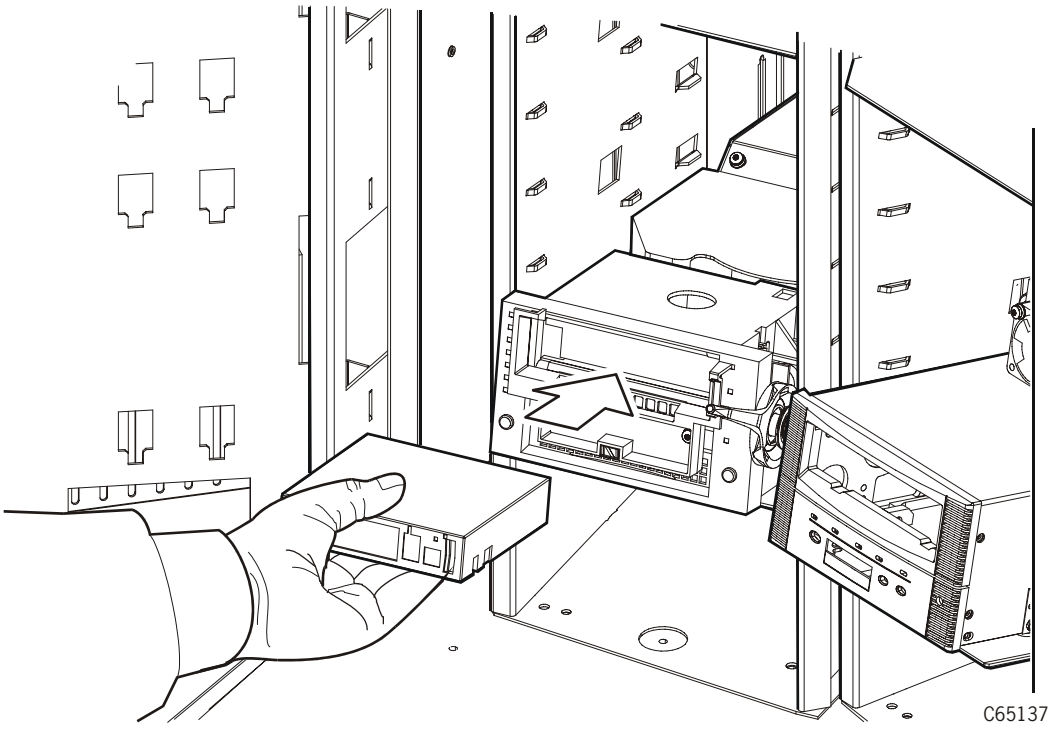


1. Cartridge hook (up)
2. Hub (up)
3. Handle (down)
4. Operate handle indicator
5. Cartridge hook (down)
6. Hub (down)
7. Handle (up)

CAUTION:
Potential equipment damage: **You must insert the cartridge properly or you will damage the drive. Use only DLT cartridges for DLT drives. Make sure the cartridge has a readable VOLSER label.**

6. Hold the cartridge so that the VOLSER label is facing you and the write protect switch is on the right side of the cartridge, as shown in Figure 4-16 on page 4-37.
7. Insert the cartridge into the drive and push the cartridge into the back of the drive until it is firmly seated.
8. Lower the drive handle.

Figure 4-16. Loading a Cartridge into a Load Handle Drive (C65137)



Unloading a Cartridge from a Load Handle Drive

To unload a cartridge from a load handle drive:

1. Obtain the drive number from the console and place the drive offline.
2. Open the tape library right front door by pulling on the left side of the door.
3. Open the library left front door by using a latch key to unlock both locks. See Figure 4-9 on page 4-28. Turn the key counterclockwise to unlock them, then pull open the door.
4. Locate the desired drive.
5. Press the Unload button on the drive.
6. Wait (about 12 seconds) for the *Operate Handle* indicator to remain steadily on.

CAUTION:
***Potential tape or equipment damage:* Wait five seconds before pulling the cartridge out of the drive. Immediately removing the cartridge may damage the cartridge or drive leaders.**

7. Raise the handle. The cartridge will eject about 4 cm (0.5 in.).
8. 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.

9. Store the cartridge *outside* the tape library (refer to "Storage of Cartridges" on page A-28).

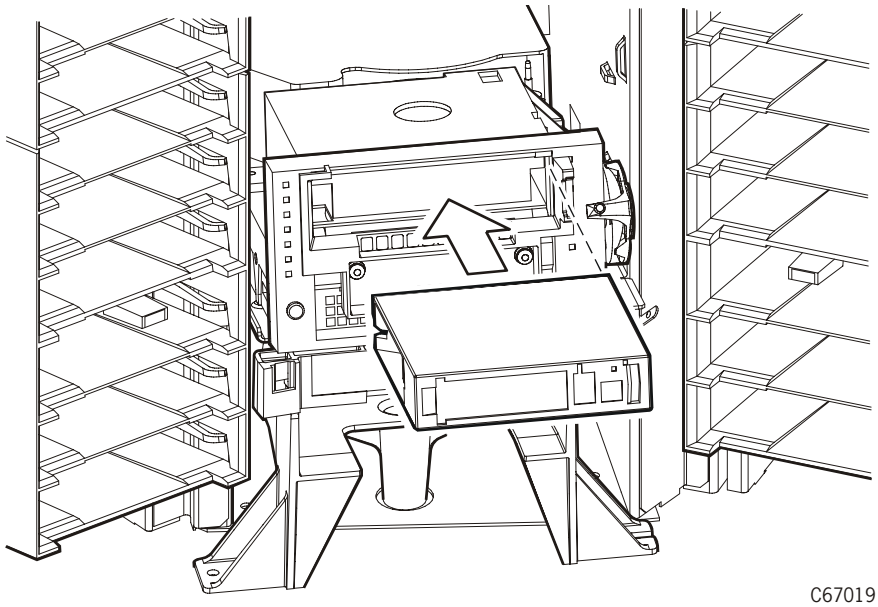
Loading a Cartridge to a DLT Drive

CAUTION:
***Potential equipment damage*: Before you mount a cartridge into the drive, you must make sure power is on, and the *Operate Handle* indicator is steadily lit (not flashing).**

To mount a cartridge to a DLT drive:

1. Obtain the VOLSER, location, and drive number from the server console.
2. Place the drive offline.
3. Open the front door by using the key to unlock both latches.
4. Locate the cartridge (see "Locating a Cartridge in the Storage Cells" on page 4-32).

Figure 4-17. Mounting a Cartridge into the DLT Drive (C67019)



5. Make sure the DLT handle is up and the *Operate Handle* indicator is on.

   Note: If the handle is in the down position, wait for the *Operate Handle* indicator to remain on before moving it to the up position (see Figure 4-15 on page 4-36).

   If the *Operate Handle* indicator is flashing while the handle is up, move the handle to the down position and wait for the *Operate Handle* indicator to stay on. Then move the handle to the up position.

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

6. Hold the cartridge so that the VOLSER label area is facing you and the write protect switch is on the right side of the cartridge, as shown in Figure 4-16.
7. Insert the cartridge into the drive and push the cartridge into the back of the drive until it is firmly seated. If the drive is a DLT7000, you must hold the cartridge in place for three seconds.
8. Lower the drive handle.
9. Place the drive online.

Unloading a Cartridge from a DLT Drive

To dismount a cartridge from a DLT drive:

1. Obtain the drive number from the server console and place the drive offline.
2. Open the front door by using a latch key to unlock both locks.
3. Locate the desired drive.
4. Press the Unload button on the drive.
5. Wait (about 12 seconds) for the *Operate Handle* indicator to remain on.
6. Raise the handle. The cartridge will eject about 12.7 mm (0.5 in.).

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

7. 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.

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

   If you store the cartridge in empty cell, you will have to re-initialize the library (see "Initializing and IPLing the Library" on page 4-3.)

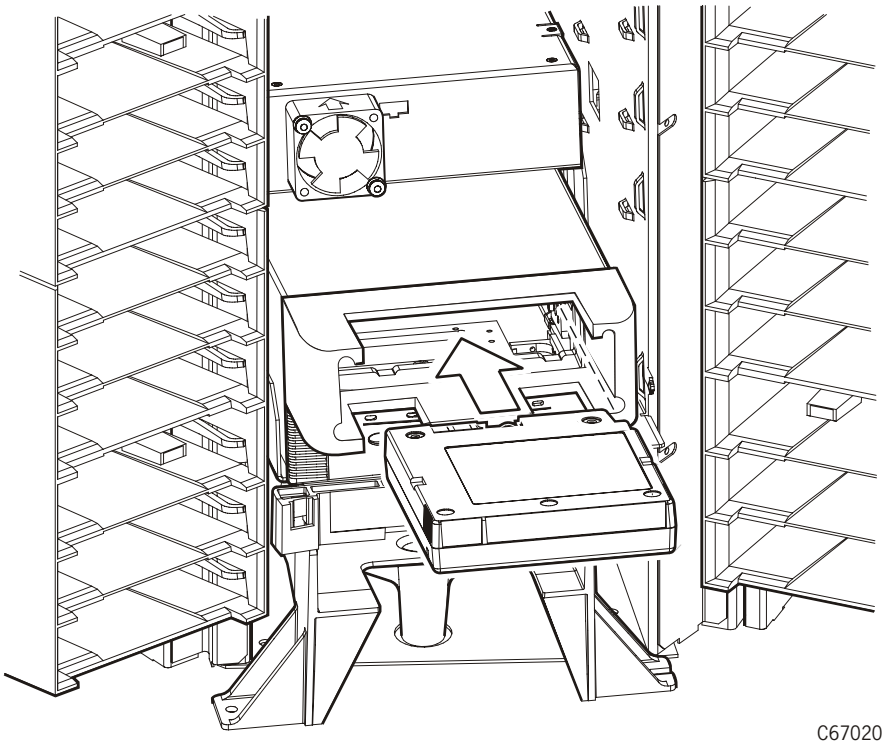
9. Place the drive online.

Loading a Cartridge into a T9x40 Drive

To load a cartridge in a T9x40 drive:

1. Obtain the cartridge VOLSER, location, and drive number from the server console.
2. Open the tape library right front door by pulling on the left side of the door.
3. Open the library left front door by using a latch key to unlock both locks. See Figure 4-9 on page 4-28. Turn the key counterclockwise to unlock them, then pull open the door.
4. Locate the cartridge (see "Locating a Cartridge in the Storage Cells" on page 4-32).
5. Insert the cartridge into the T9x40 drive using the direction shown in Figure 4-18 on page 4-42.
6. Wait for one of the following messages to display on the drive's front panel and take the appropriate action, if necessary:
   - The `Ready F` (File Protected) message displays when a write-protected cartridge loads successfully.
   - The `Ready U` (File Unprotected) message displays when a cartridge that is not write-protected loads successfully.
   - The `Ready A` (VolSafe-enabled) message displays when a write-enabled VolSafe cartridge loads successfully.
   - The `NTReady` message displays when the tape in the cartridge has lost tension. Follow the instructions outlined in the *T9840 Tape Drive User's Reference Manual,* PN 95739, or the *T9940 Tape Drive Operator's Guide*, PN 95989, to correct this condition.
   - The `LOADxxxx` message displays when the cartridge unsuccessfully loads, where the xxxx is a fault symptom code. Follow the instructions outlined in the *T9840 Tape Drive User's Reference Manual,* PN 95739, or the *T9940 Tape Drive Operator's Guide*, PN 95989 to correct this condition.

Figure 4-18. Loading a Cartridge into the T9x40 Drive (C67020)



Note: T9840B drives have purple switches; T9840A drives contain yellow switches.

Unloading a Cartridge from a T9x40 Drive

To unload a cartridge from a T9x40 drive:

1. Make sure that the T9x40 drive is not selected by the client.
2. Obtain the drive number from the server console and place the drive offline.
3. Open the tape library right front door by pulling on the left side of the door.
4. Open the tape library left front door by using a latch key to unlock both locks. See Figure 4-9 on page 4-28. (Turn the key counterclockwise to unlock them, then pull open the door.)
5. Press the Unload switch on the front panel of the drive.

   One of the following conditions can occur:

   - After the tape rewinds, the cartridge ejects from the T9x40 drive. Remove the cartridge from the T9x40 drive.
   - The cartridge fails to eject after the tape rewinds. Refer to the *T9840 Tape Drive User's Reference Manual,* PN 95739, or the *T9940 Tape Drive Operator's Guide*, PN 95989 to correct this condition.
   - If the Unload switch is pressed during a write operation, the T9x40 drive tries to write the remaining data before the cartridge unloads. If the `UnWrxxxx` (Unwritten Data) message displays, where `xxxx` is the fault symptom code, the attempt failed and some data remains unwritten to the tape.

     For more information about recovering from an Unwritten Data condition, refer to the *T9840 Tape Drive User's Reference Manual,* PN 95739 or the *T9940 Tape Drive Operator's Guide*, PN 95989.

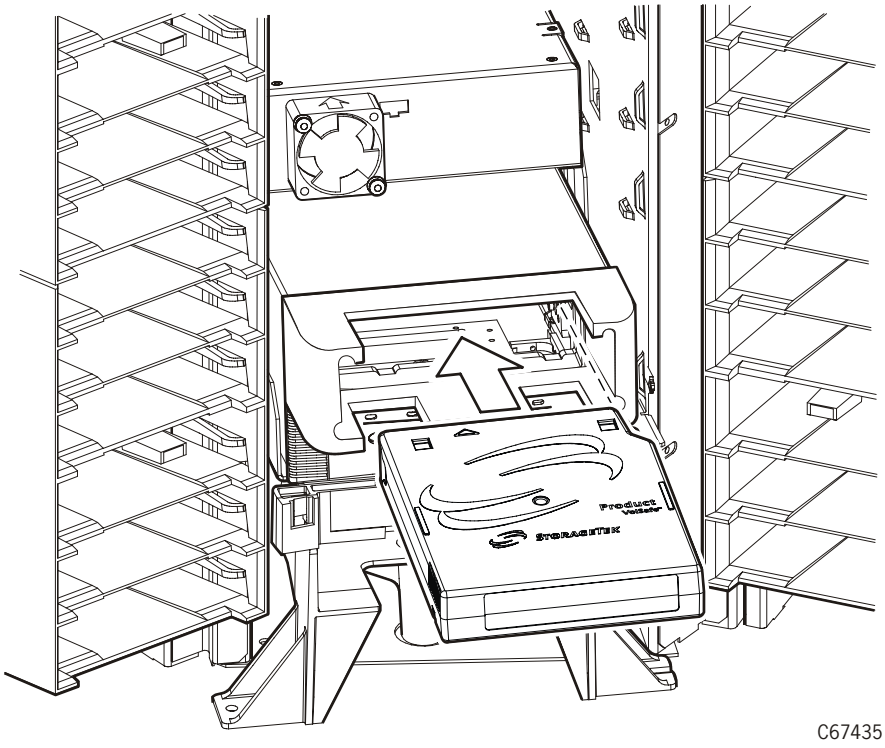
Loading a Cartridge into a T10000 Drive

Note: A T10000 Tape Drive accepts only a T10000 tape cartridge.

1. Look into the front of the tape drive to be sure there are no obstructions.
2. Holding the tape cartridge with the hub side down as shown in Figure 4-19 on page 4-44, carefully insert the cartridge into the tape drive so that the front of the cartridge is flush with the bezel. The bezel immediately moves down and the cartridge loads.

   Note: If a cartridge fails to load, remove the cartridge and open the access door. If the leader is either missing or cracked near the hole at the end, the cartridge is defective. Attempt loading another cartridge.

Figure 4-19. Loading a Cartridge into the T10000 Drive (C67435)



Unloading a Cartridge from a T10000 Drive

1. Use Virtual Operator Panel (VOP) or library software to eject the cartridge. See *Virtual Operator Panel User's Guide*, PN 96179.

CAUTION:
***Tape damage*. Any resistance to the removal of the tape cartridge, beyond minimal friction of the interaction between the tape cartridge case and the elevator assembly, probably indicates that the leader is not fully rewound.**

2. Remove the cartridge when the top of the bezel is flush with the case. Unlike other drives, the cartridge does not pop out of the T10000 drive when ready to unload.

   If you feel resistance, the leader may not be fully rewound. Use the VOP or library software to attempt another load followed by another unload operation. If that fails to correct the situation, contact your StorageTek service representative regarding a potential stuck tape cartridge. Do not forcefully remove a cartridge.

   Note: A T10000 Tape Drive does not "eject" the tape cartridge from the drive as other cartridge tape drives commonly do. Prior to this tape drive, the cartridge was usually pushed part way out of the tape drive when it was unloaded.

Loading a Cartridge into an Ultrium Drive

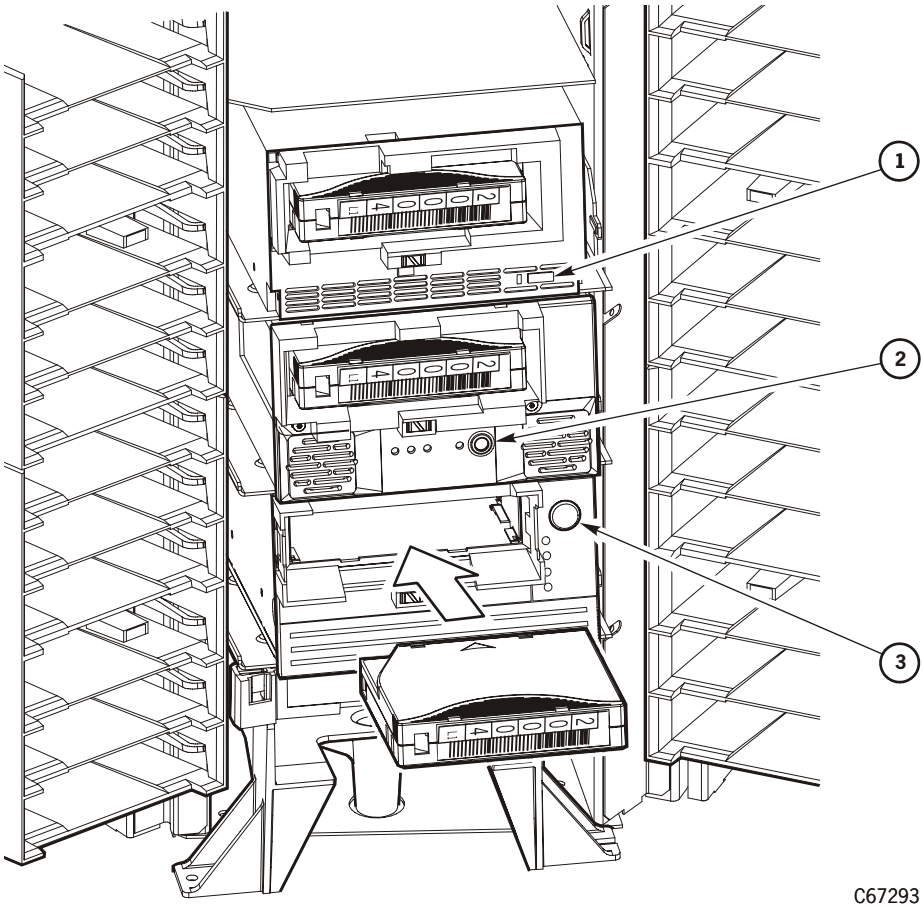
To load a cartridge into a Ultrium drive:

1. Obtain the cartridge VOLSER, location, and drive number from the server console.

CAUTION:
Possible equipment problem: **You must open the library's front door before attempting to manually mount a cartridge to an Ultrium drive. A unique communication between the library and drive prepares the drive for manual operation.**

2. Open the tape library right front door by pulling on the left side of the door.
3. Open the library left front door by using a latch key to unlock both locks. See Figure 4-9 on page 4-28. Turn the key counterclockwise to unlock them, then pull open the door.
4. Locate the cartridge (see "Locating a Cartridge in the Storage Cells" on page 4-32).
5. Insert the cartridge into the Ultrium drive using the direction shown in Figure 4-20.

Figure 4-20. Loading a Cartridge into an Ultrium Drive (C67293)



1. Cartridge dismount button on HP Ultrium drive
2. Cartridge dismount button on Certance Ultrium drive
3. Cartridge dismount button on IBM Ultrium drive

Unloading a Cartridge from an Ultrium Drive

To unload a cartridge from an Ultrium drive:

1. Make sure that the drive is not selected by the client.
2. Obtain the drive number from the server console and place the drive offline.
3. Open the tape library right front door by pulling on the left side of the door.
4. Open the tape library left front door by using a latch key to unlock both locks. See Figure 4-9 on page 4-28. (Turn the key counterclockwise to unlock them, then pull open the door.)
5. Press the Unload button on the front panel of the drive.

   One of the following conditions can occur:

   - After the tape rewinds, the cartridge ejects from the drive. Remove the cartridge from the drive.
   - The cartridge fails to eject after the tape rewinds. Refer to the appropriate manufacturer's manual to correct this condition.

Returning the Library to Online Status

To return the tape library online for automated operations:

1. Refer to your specific drive publications for instructions on making the drives ready. For a DLT drive, make sure the *Operate Handle* light is on and the handle is up.

Note: If you manually load any cartridges, you must manually unload them and store them in a storage cell or remove them from the library.

2. Close and lock the tape library doors. The robot will perform an audit of the cells.
3. Place the tape library online by entering the command at the server operator console.
4. Give the client command to upload the audit data to the client.
5. Refer to your specific software publications for instructions on replacing the cartridges you removed and on inserting the cartridges into the storage cells.

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StorageTek Service

5

This chapter describes what to do if problems occur with the L180 Tape Library. In some cases, you might be able to correct the problem. In other cases, you must contact your service provider to correct the problem.

Notes:

- Refer to Appendix A, "Cartridge Tape Information" when the problem is caused by a cartridge.
- Refer to your drive publications for additional information when the problem is caused by a tape drive.

Most of the time, a fault symptom code (FSC) appears on the library operator panel display. Write down the FSC information and give the information to your service representative or to the staff at Customer Support Services (CSS).

Drive Replacement

If your contract provides for the StorageTek Interactive Maintenance Agreement, you might be able to replace tape drives.

CAUTION:
***Potential equipment damage*: Only trained and certified personnel may replace drives.**

After you are certified, you may order replacement drives. For instructions on how to replace drives, consult the documentation that accompanies the drive.

Contact your StorageTek representative for training information.

Customer Support Services

The Customer Services Support Center (CSSC) is available 24 hours a day, seven days a week, to customers with StorageTek maintenance contracts and to StorageTek employees. You can find additional information about the CSSC on StorageTek's external Web site at:

http://www.support.storagetek.com

Customer Initiated Maintenance

Customer Initiated Maintenance begins with a telephone call from you to the StorageTek CSS. You receive immediate attention from qualified StorageTek personnel, who record problem information and respond with the appropriate level of support.

To contact the CSS about a problem:

1. Use the telephone to call the StorageTek Customer Support Services at:
   - **1-800-525-0369** (from within the United States) or
   - **303-673-4056** (from outside the United States) or
   - See "StorageTek's Worldwide Offices" on page 5-2 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 _____

StorageTek's Worldwide Offices

StorageTek is committed to providing world-class, worldwide service and support including technical experts, innovative tools, and cross-functional solution-based teams.

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

http://www.storagetek.com/about/contact/worldwide_directory.html

International customers should call their local, regional, or country customer support for information about how to place a service call or how to contact their remote centers.

Cartridge Tape Information

A

This appendix describes how to prepare, inspect, store, clean, and repair cartridges. It also lists cartridge specifications.

Note: Do *not* use DATA D3 (helical recording) cartridges or 3480 cartridges in the L700e library.

Cartridge Tapes and Labels

StorageTek created starter kits to help you populate and begin using your library. Starter kits have pre-labeled cartridges with number ranges that are unique for each kit (so multi-media applications will not experience duplicate numbers).

Note: Pre-labeled cartridges are available from StorageTek. For information on ordering these cartridges, see "Ordering Tape Cartridges/Labels" on page A-11.

StorageTek does *not* supply cartridge labels. For a supplier of labels only, see "Ordering Tape Cartridges/Labels" on page A-11

Cleaning and diagnostic kits have one labeled cleaning cartridge and one labeled diagnostic cartridge with a volume serial number of 0 (zero) for each. Extra cleaning and diagnostic labels are sent with each library.

Colored Cartridge Specifications

Colored cartridges are approved only if the measured reflection density is greater than 0.10 for DLT cartridges and 1.50 for T9840 cartridges, as measured by an X-Rite 404G color reflection densitometer. Measurements are:

Band width	ANSI Status T Wideband (380 to 780 nanometers)
Measuring range	Density (0.00 to 2.50) D
Accuracy	± 0.02 D
Repeatability	± 0.01 D
Aperture diameter	3.4 mm

T10000 cartridges are only available in black.

For more information about colored cartridges, contact your StorageTek marketing representative.

Preparing Cartridges

The following pages describe how to prepare a cartridge for use in the tape library.

Handling a Cartridge

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

To handle a cartridge correctly:

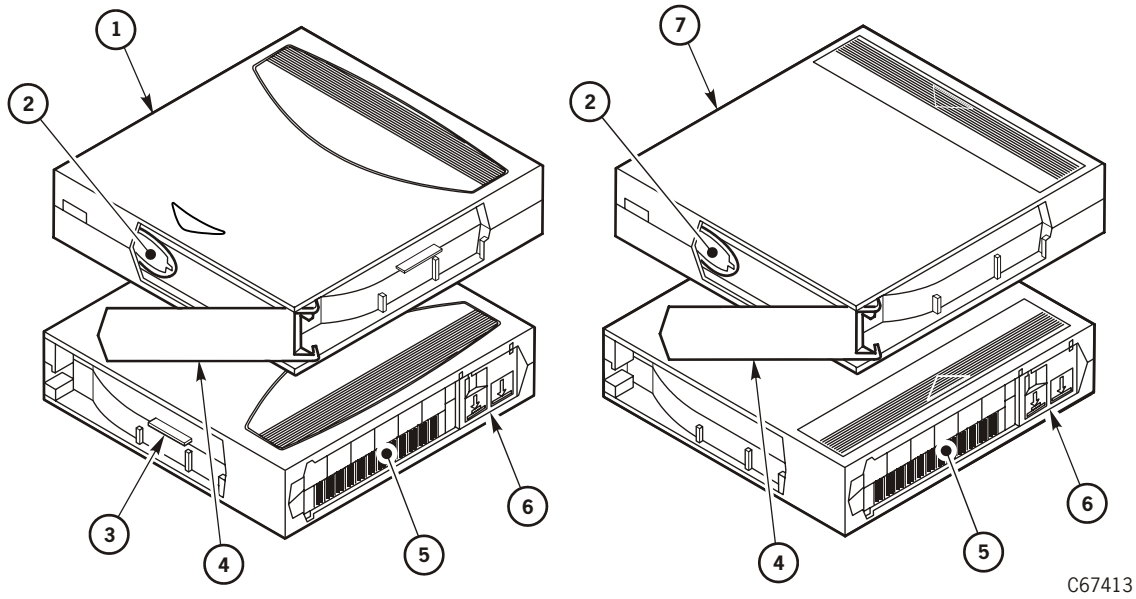
- Make sure the leader block is latched every time you pick up a cartridge.
- Keep cartridges *clean*.
- Inspect a cartridge before each use and *never* put a damaged cartridge into a drive or tape library. Never release a tape leader and pull tape from a cartridge.
- Never open a cartridge.
- Do not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

Inspecting a Cartridge

A defective or dirty cartridge can damage a drive. Always inspect a cartridge before inserting it into a drive or inserting it into a tape library. Refer to Figure A-1 on page A-3 through Figure A-5 on page A-7. Look for:

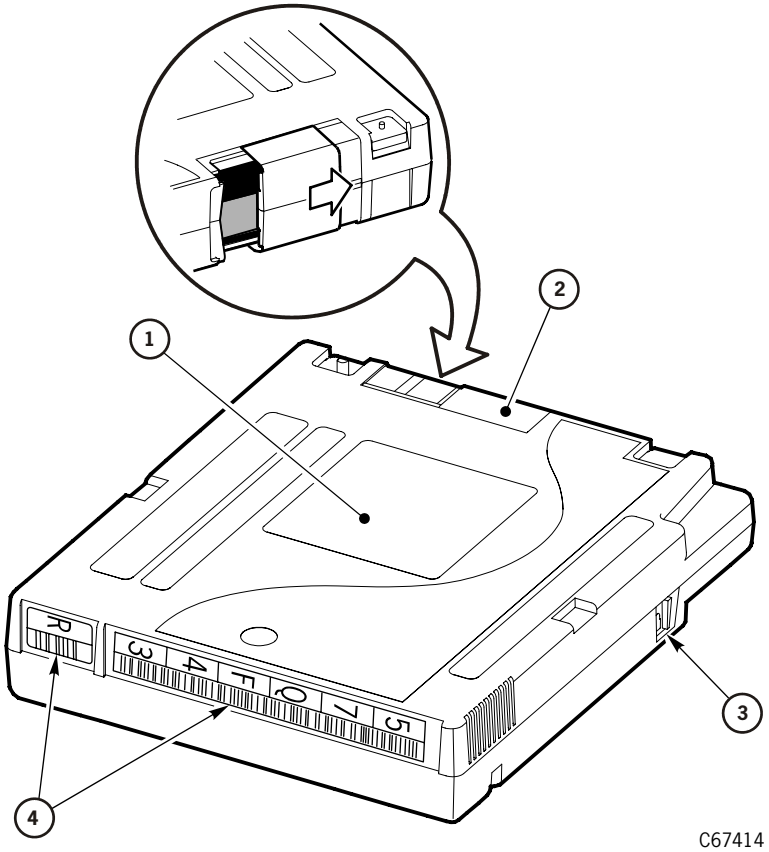
- Cracked or broken cartridge
- Broken leader
- Broken tape access door
- Damaged file-protect selector or write-protect switch
- Liquid in the cartridge
- Labels not firmly attached or extending over the cartridge edge
- Any other obvious damage

Figure A-1. DLT and SDLT Cartridge Components (C67413)



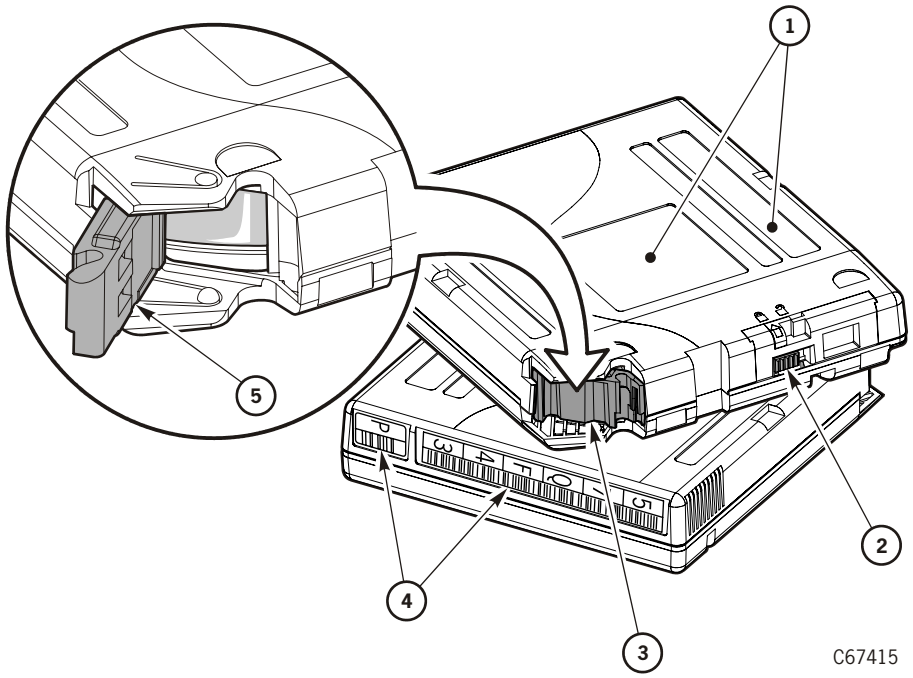
1. SDLT cartridge
2. Tape leader
3. SDLT cartridge identifier tab
4. Access door
5. Volume serial number (VOLSER) label
6. Read/Write-protect switch
7. DLT cartridge

Figure A-2. T9840 Cartridge Components (C67414)



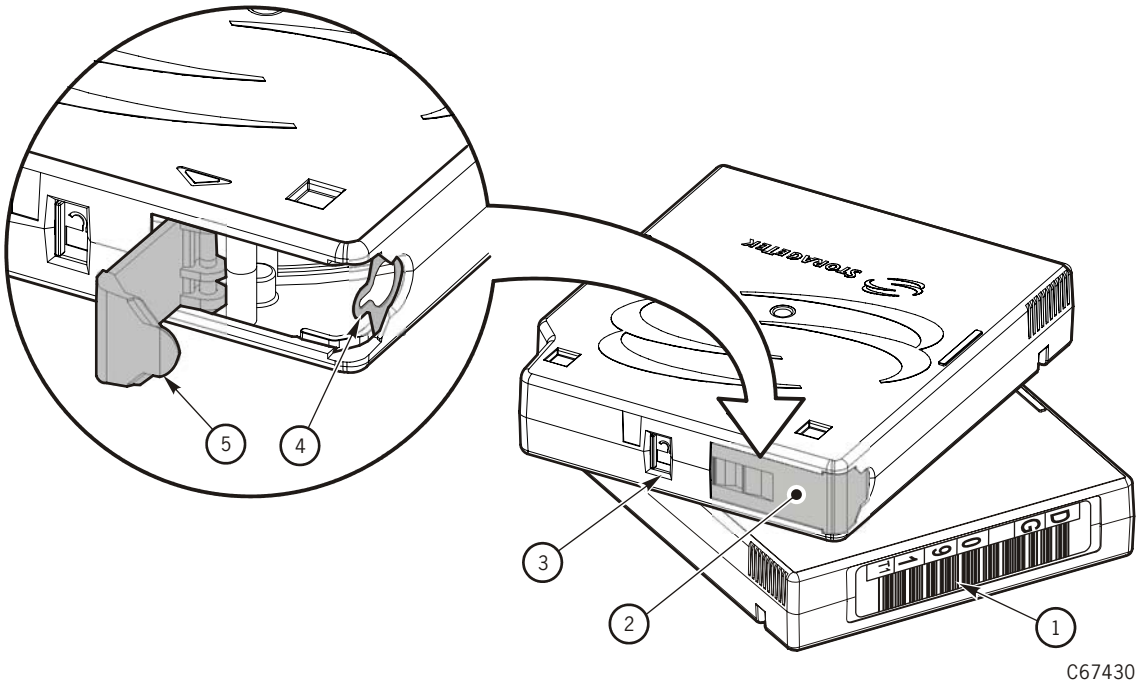
1. Customer label
2. Access door
3. Write-protect switch
4. Volume label and media type labels (Media: “R” = data, “U” = cleaning)

Figure A-3. T9940 Cartridge Components (C65415)



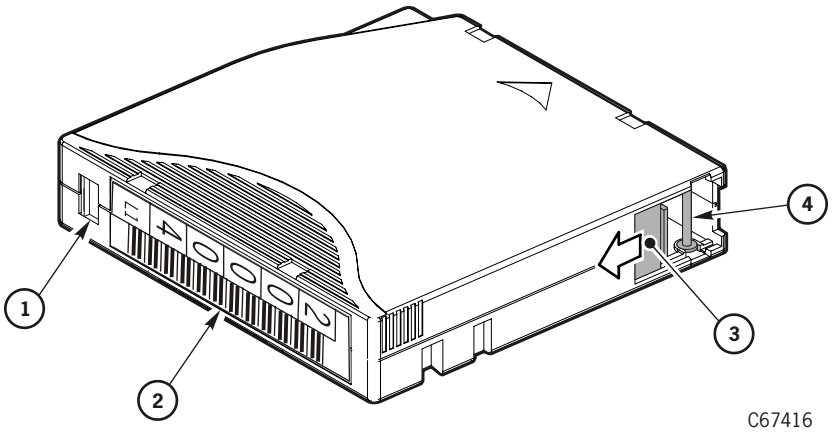
1. Customer and manufacturer's labels
2. Write protect switch
3. Access door (leader block—closed)
4. VOLID and media labels (Media label: "P" = data, "W" = cleaning)
5. Access door (leader block—open)

Figure A-4. T10000 Cartridge Components (C67430)



1. VOLID and media labels (Media label: “T1” = data, “CT” = cleaning
2. Access door (closed)
3. Write protect switch
4. Tape leader
5. Access door (open)

Figure A-5. Ultrium Cartridge Components (C67416)



1. Write-protect switch (Data Cartridge = red, Cleaning Cartridge = gray)
2. Volume serial number (VOLSER)
3. Access door
4. Leader pin

Ultrium cartridge codes are listed in Table A-1 and Table A-2 on page A-9 and Table A-3 on page A-10.

Table A-1. Ultrium 1 Cartridge Codes

Label	Type of Cartridge
	Data cartridge
L1	100 GB
LA	50 GB
LB	30 GB
LC	10 GB
	Cleaning
CU	Universal cleaning cartridge for Ultrium drives
	Diagnostic
L1 plus DG	Diagnostic cartridge (apply a DG label to a blank data cartridge to be used for diagnostic tests)

Ultrium 2 Drives

SCSI (Hewlett Packard)

Support for Hewlett Packard models of Ultrium 2 Ultrium (LTO) SCSI drives is provided with library firmware version 3.03 and later.

Ultrium 2 drive/tape specifics include:

1. Uses standard Ultrium 2 cartridges
2. Reads/writes Ultrium 1 tape media
3. Interface: LVD SCSI
4. Model: LTO2ML
5. Feature code: HPLV
6. Cartridge memory: 4 KB
7. Cartridge Media ID: "L2" (200 GB)

The major improvements seen with the Ultrium 2 drives are:

- Increased native capacity of 200 GB
- Increased compressed capacity of up to 400 GB
- Data transfer rate of 40–80 MB/sec

Fibre Channel (IBM)

Support for IBM Ultrium 2 Fibre Channel drives is provided with firmware version 3.04 and later.

Ultrium 2 Fibre Channel specifics include:

1. Uses standard Ultrium 2 cartridges
2. Reads/writes Ultrium 1 tape media
3. Model: LTO2001
4. Feature code: IBFC
5. Cartridge Media ID: "L2" (200 GB)

.The major improvements seen with the Ultrium 2 drives are:

- Increased native capacity of 200 GB
- Increased compressed capacity of up to 400 GB
- Data transfer rate of 40–80 MB/sec

Table A-2. Ultrium 2 Cartridge Codes

Ultrium 2 Media	
Label	**Type of Cartridge**
	Data cartridge
L2	200 GB
	Cleaning
CU plus CLN	Universal cleaning cartridge for Ultrium drives
	Diagnostic
L2 plus DG	Diagnostic cartridge (apply a DG label to a blank data cartridge to be used for diagnostic tests)

Hewlett Packard Ultrium 3 SCSI and Fibre Channel Drives

Support for Hewlett Packard models of Ultrium 3 (LTO) SCSI drives is provided with library firmware version 3.08.01 and later.

Ultrium 3 drive/tape specifics include:

1. Uses standard Ultrium 3 cartridges
2. Reads/writes Ultrium 2 tape media. Read only from Ultrium 1 (L1-labeled) tape media
3. Interfaces: LVD SCSI or Fibre Channel
4. Mode code: LTO3001
5. Feature codes: HPLV (LVD) and HPFC (Fibre Channel)
6. Cartridge memory 4 KB
7. Cartridge Media ID: “L3” (400 GB)

The major improvements seen with the Ultrium 3 drives are:

- Increased native capacity of 400 GB
- Increased compressed capacity up to 800 GB
- Data transfer rate of 40–160 MB/sec

Table A-3. Ultrium 3 Cartridge Codes

Ultrium 3 Media	
Label	**Type of Cartridge**
	Data cartridge
L3	400 GB
	Cleaning
CU plus CLN	Universal cleaning cartridge for Ultrium drives
	Diagnostic
L3 plus DG	Diagnostic cartridge (apply a DG label to a blank data cartridge to be used for diagnostic tests)

Table A-4. Ultrium Cartridge Models

Description	**Model Number**
Ultrium 1 media cartridge	MEDLTOM
Ultrium 2 media cartridge	MEDLTO2
Ultrium 3 media cartridge	MEDLTO3
Universal cleaning cartridge	MEDCLNT
Required feature code:	
20-count 100 GB data cartridges (LTO1)	1C20
20-count 100 GB data cartridges (LTO2)	2C20
20-count 100 GB data cartridges (LTO3)	20LB
Universal cleaning cartridge	UNCL
EDP Vivid Color Labels	EVLA
Horizontal labels	HLBL
Vertical labels	VLBL

Ordering Tape Cartridges/Labels

Contact your authorized selling agent for 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 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 StorageTek. StorageTek is not responsible for the content of these linked Web sites and does not make any representations regarding the content or accuracy of any content on such Web sites.

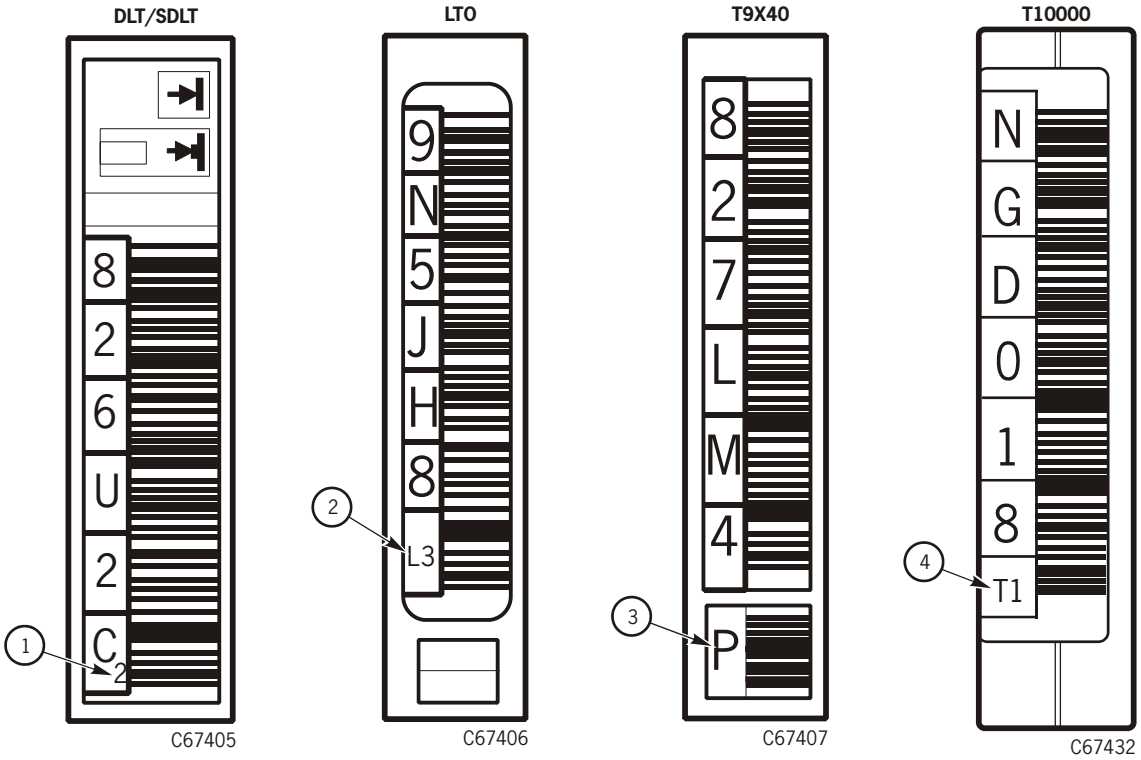
For technical questions, contact the StorageTek Sales Support at:

Telephone: 1.800.ask4stk (1.800.275.4785)
E-mail: sales_support@storagetek.com.

Cartridge Label Examples

Table A-5 through Table A-7 on page A-14 show examples of the various cartridge labels used by the drives in the library. Be sure to use the proper labels for each drive type.

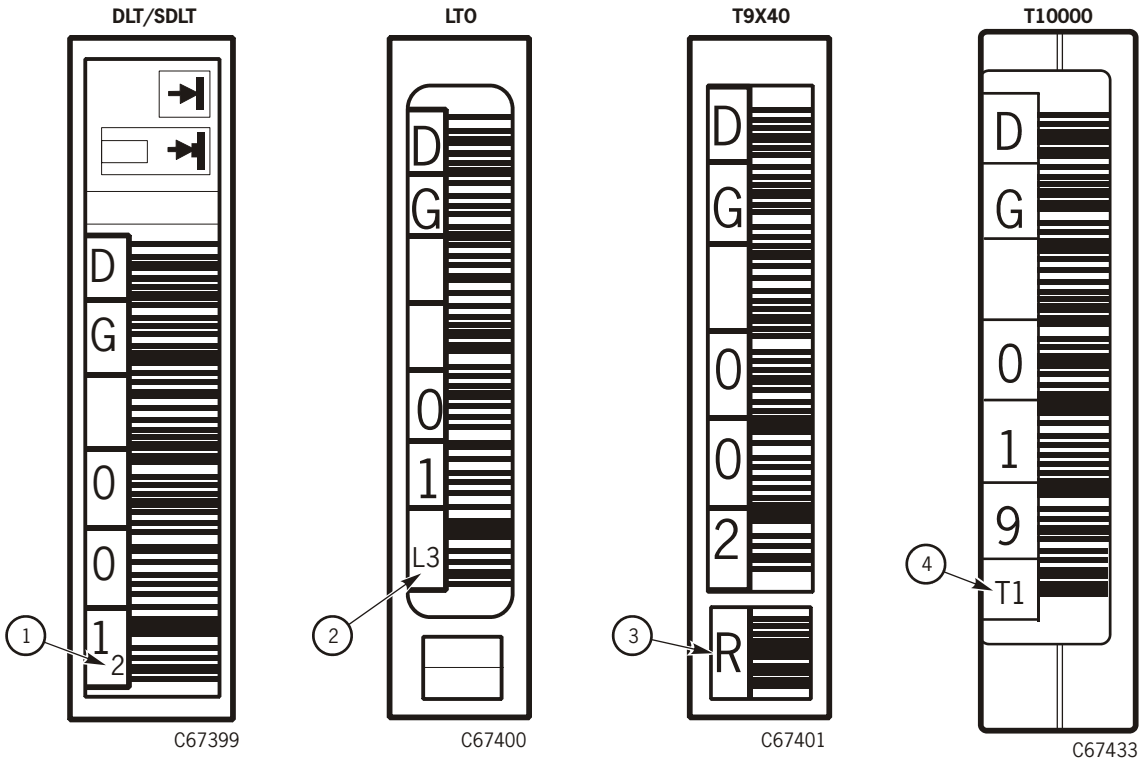
Table A-5. Label Examples—Data Cartridges



Data Cartridge Media ID Labels

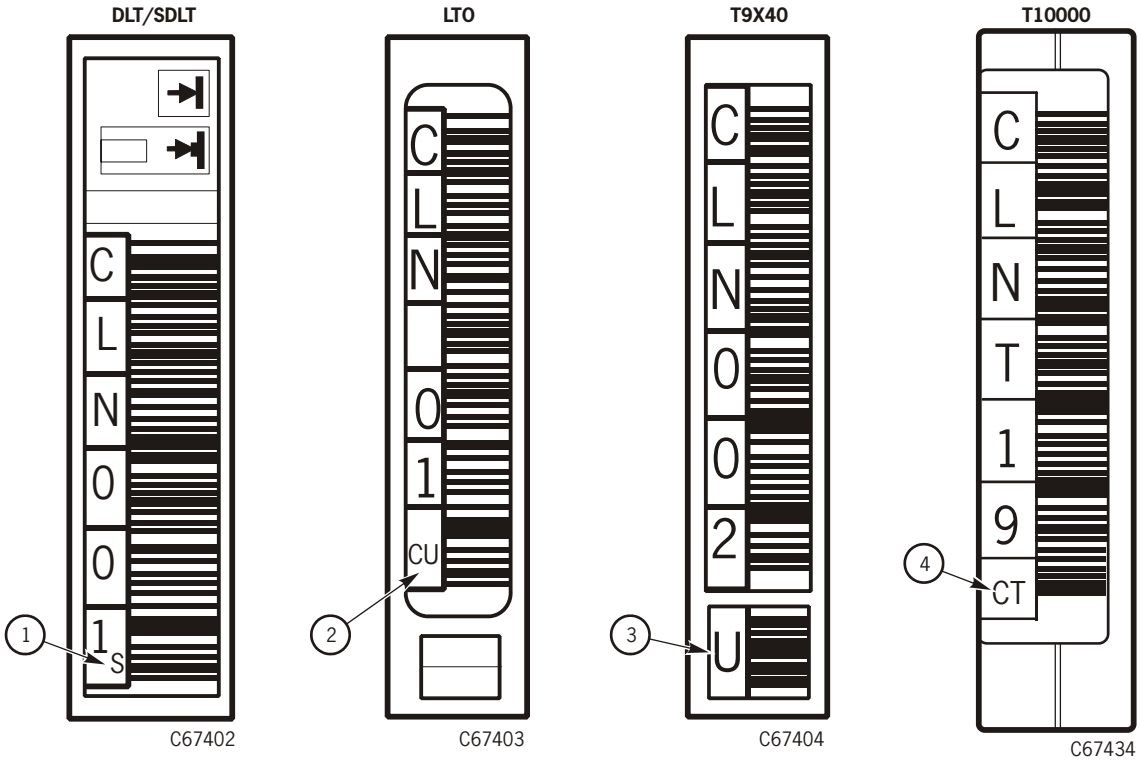
The DLTtape Media ID (1) is incorporated into the tape label, and includes:	The LTO Media ID (2) is incorporated at the end of the tape label, and includes:	The Media ID label (3) for the T9x40 is at the end of the tape label, and includes:	The Media ID label (4) for the T10000 is at the end of the tape label, and includes:
B = DLT1 **C** = DLTtape III **D** = DLTtape IV **E** = DLTtape III-XT **S** = Super DLTtape I **2** = Super DLTtape II (shown)	**L3** = 400GB (shown) **L2** = 200GB **L1** = 100 GB **LA** = 50 GB **LB** = 30 GB **LC** = 10 GB	**P** = 9940 (shown) **R** = 9840	**T1** = T10000 (shown)

Table A-6. Label Examples—Diagnostic Cartridges



Diagnostic Cartridge Media ID Labels			
DG = Diagnostic, plus the media ID label (1) to identify the type of cartridge. **B** = DLT1 **C** = DLTtape III **D** = DLTtape IV **E** = DLTtape III-XT **S** = Super DLTtape I **2** = Super DLTtape II (shown)	**DG** = Diagnostic, plus the Media ID label (2) to identify the type of cartridge: **L3** = 400GB (shown) **L2** = 200GB **L1** = 100 GB **LA** = 50 GB **LB** = 30 GB **LC** = 10 GB	**DG** = Diagnostic, plus the Media ID label (3) to identify the type of cartridge: **P** = T9940 data **R** = T9840 data (shown)	DG = Diagnostic, plus the Media ID label (4) to identify the type of cartridge: T1 = T10000

Table A-7. Label Examples—Cleaning Cartridges



Cleaning Cartridge Media ID Labels			
CLN = Cleaning, plus the media ID label (1) to identify the type of cartridge: **B** = DLT1 **C** = DLTtape III, DLTtape IV, and DLTtape III-XT **S** = Super DLTtape I and Super DLTtape II (shown)	**CLN** = Cleaning, plus the media ID label (2) to identify the type of cartridge: **CU** = Universal (shown)	**CLN** = Cleaning, plus the media ID label (3) to identify the type of cartridge: **U** = T9840 (shown) **W** = T9940	**CLN** = Cleaning, plus the media ID label (4) to identify the type of cartridge: **CT** = T10000

Applying Cartridge Labels to DLT Cartridges

Cartridge labels reflect the cartridge media and usage. The letter located next to the last number in the volume label reflects the media. Cleaning cartridges have "CLN" in the volume label, diagnostic cartridges have "DG" in the volume label.

The kinds of cartridge labels you might need to apply are:

- CompacTape III volume label
- CompacTape IIIXT volume label
- CompacTape IV volume label
- Diagnostic cartridge volume label
- Cleaning cartridge volume label

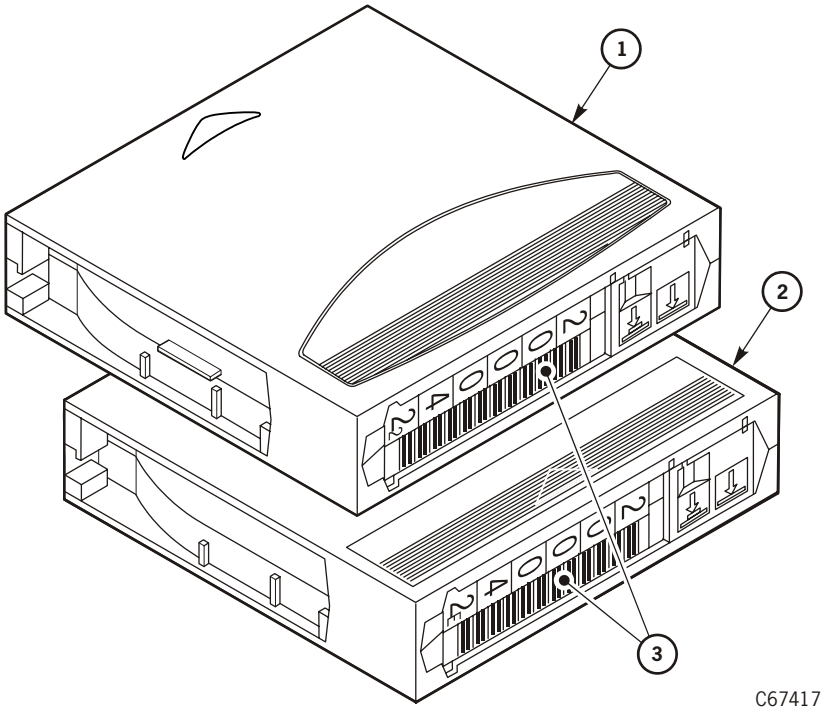
Refer to Figure A-6 and insert the label into the recessed area provided on each cartridge:

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. Refer to "Cartridge Exterior—Cleaning" on page A-28.
3. Locate the label that you require and refer to Figure A-6:
    - CompacTape III has a "C" next to the far left number, bar code down.
    - CompacTape IIIXT has an "E" next to the far left number, bar code down.
    - CompacTape IV has a "D" next to the far left number, bar code down.
    - Diagnostic cartridge has "DG" at the beginning of the volume label.
    - Cleaning cartridge has "CLN" at the beginning of the volume label.
4. Hold the cartridge so the write-protect switch is toward you.
5. Refer to Figure A-6 on page A-16 and slide the label under the slots in the recessed area. If you prefer, peel the backing from the label and then slide it under the slots, pressing it into place.

Notes:

1. Make sure the labels are not placed elsewhere on the cartridge surface.
2. Make sure the edges of the labels do not curl; curling causes the cartridge to stick in the drive loader and the robot will misread the volume label.
3. Use labels that do not leave a residue when removed.
4. Make sure the label contains a volume label and media letter.

Figure A-6. Applying Cartridge Labels to DLT and SDLT Cartridges (C67417)

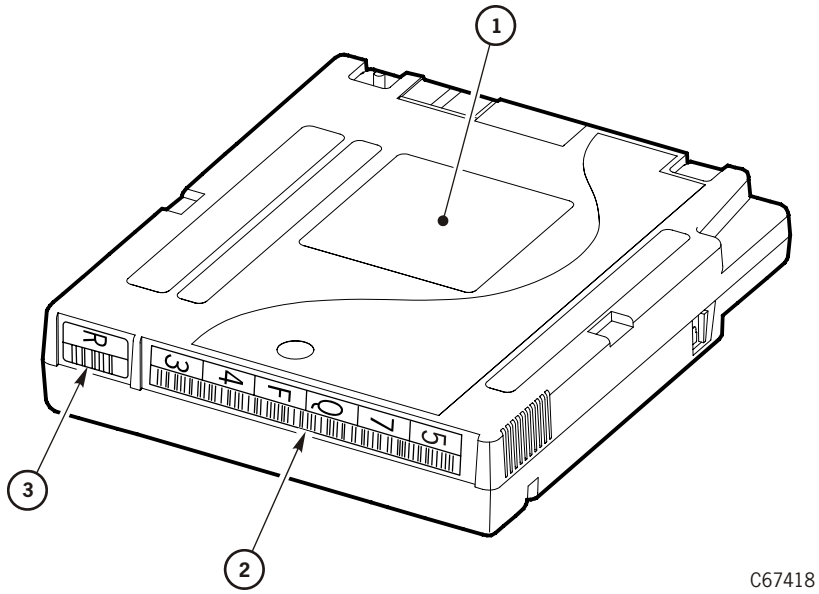


1. SDLT cartridge
2. DLT cartridge
3. Volume labels

Applying Cartridge Labels to T9840 Cartridges

Cartridge labels reflect the cartridge media and usage (Figure A-7). The letter located next to the last number in the volume label reflects the media. Cleaning cartridges have "CLN" in the volume label, diagnostic cartridges have "DG" in the volume label.

Figure A-7. Applying Cartridge Labels to T9840 Cartridges (C67418)

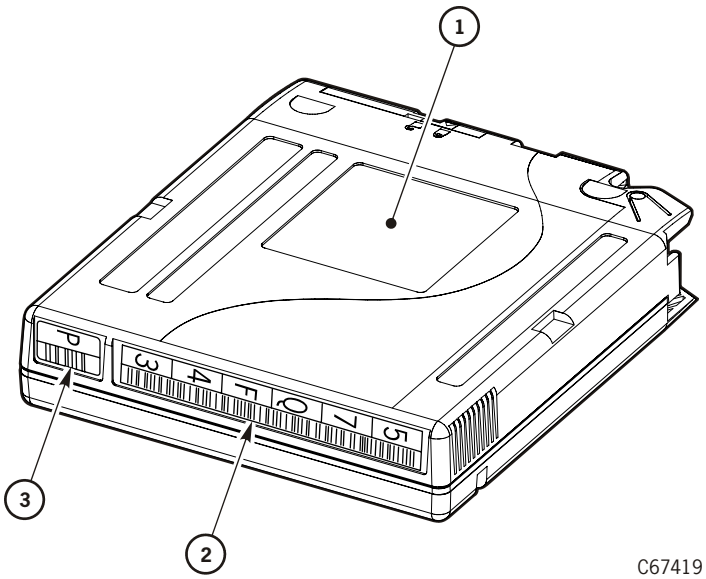


1. Customer label
2. Volume label
3. Media ID label ("R" = data, "U" = cleaning)

Applying Cartridge Labels to T9940 Cartridges

Cartridge labels reflect the cartridge media and usage (Figure A-8). The letter located next to the last number in the volume label reflects the media. Cleaning cartridges have "CLN" in the volume label, diagnostic cartridges have "DG" in the volume label.

Figure A-8. Applying Cartridge Labels to T9940 Cartridges (C67419)

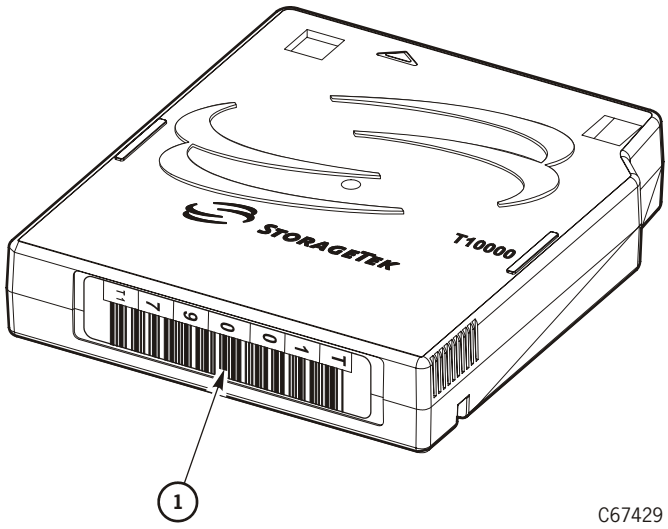


1. Customer label
2. Volume label
3. Media ID label ("P" = data, "W" = cleaning)

Applying Cartridge Labels to T10000 Cartridges

Cartridge labels reflect the cartridge media and usage (Figure A-9). The letter located next to the last number in the volume label reflects the media. Cleaning cartridges have "CLN" in the volume label, diagnostic cartridges have "DG" in the volume label.

Figure A-9. Applying Cartridge Labels to T10000 Cartridges (C65694)

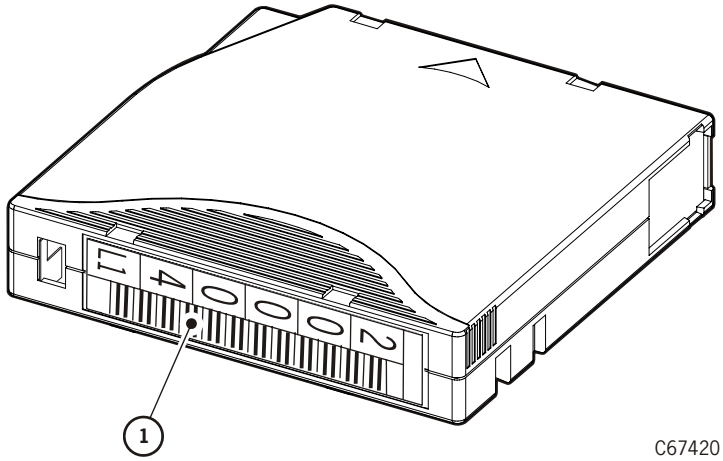


1. VOLSER label with media ID: "P" = data, "W" = cleaning

Applying Cartridge Labels to Ultrium Cartridges

Cartridge labels reflect the cartridge media and usage. The letter located next to the last number in the volume label reflects the media.

Figure A-10. Ultrium Cartridge Label (C65304)



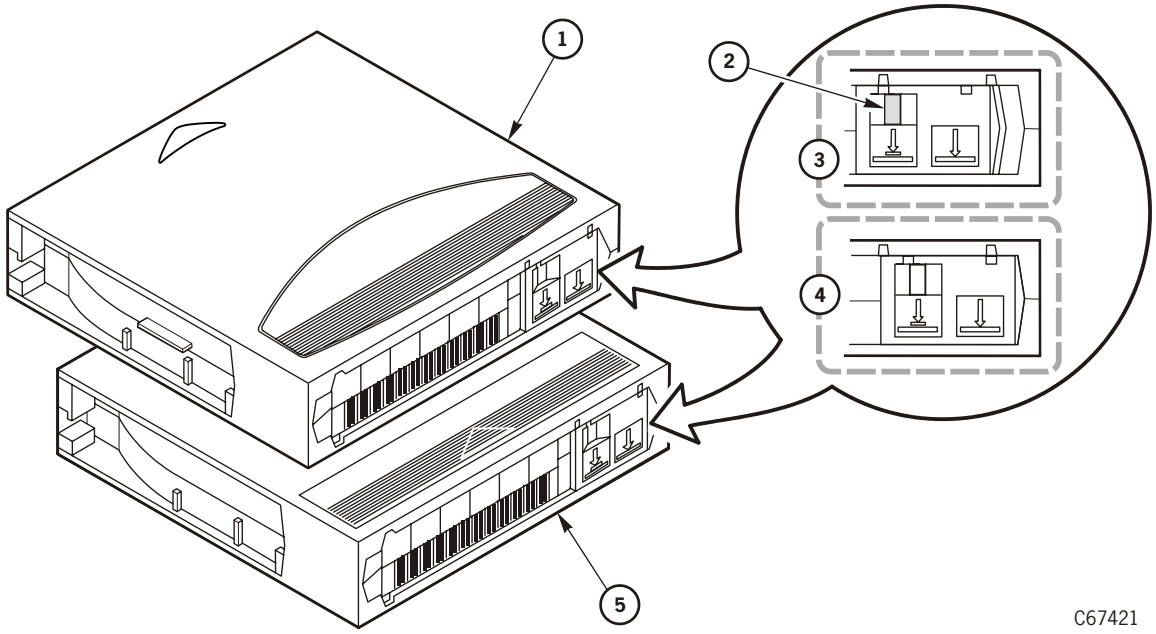
1. Label location:
   - See Table A-1 on page A-7 through Table A-3 on page A-10 for label codes.

Setting the DLT and SDLT Write-protect Switch

As shown in Figure A-11, you can set the write-protect switch so the cartridge is *write-enabled*. 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 tape library.

You can set the write-protect switch so that the cartridge is *read-only* (nothing can be written on the tape). Slide the switch to 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.

Figure A-11. Setting the DLT and SDLT Write-protect Switch (C67421)



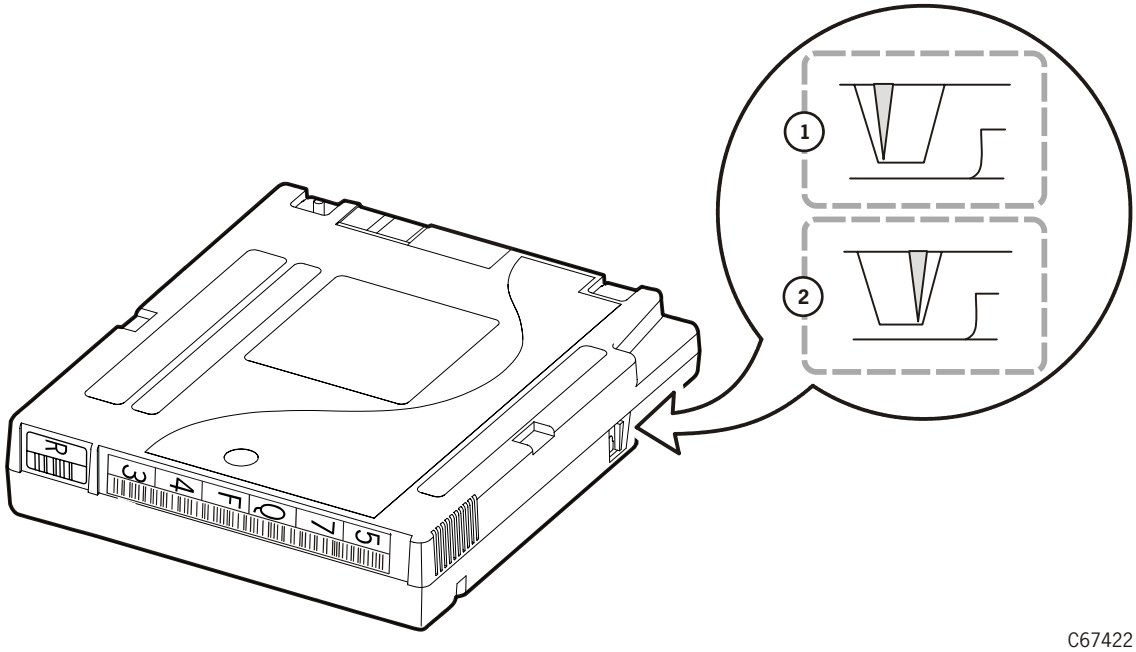
1. SDLT cartridge
2. Orange indicator
3. Write-protect position
4. Write-enabled position
5. DLT cartridge

Setting the T9840 Write-protect Switch

As shown in Figure A-12, you can set the write-protect switch so the cartridge is *write-enabled*. Slide the switch to the left to write-enable the tapes. In this position, the drive can write as well as read data. This setting is recommended when inserting cartridges into the tape library.

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

Figure A-12. Setting the T9840 Write-protect Switch (C67422)



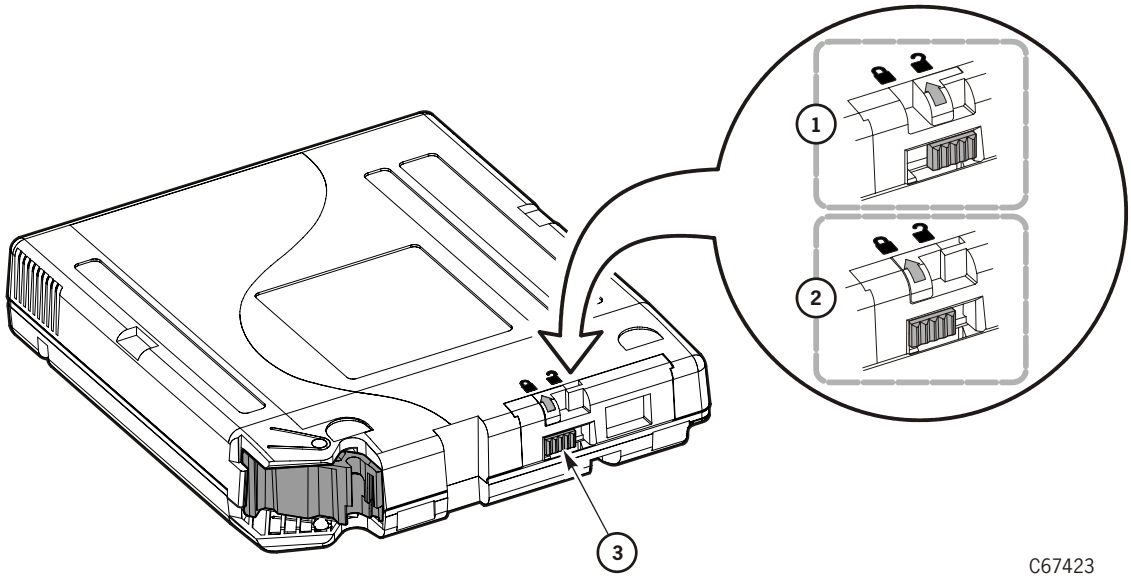
1. Write-enabled position
2. Write-protect position

Setting the T9940 Write-protect Switch

As shown in Figure A-13, you can set the write-protect switch so the cartridge is *write-enabled*. Slide the switch to the right to write-enable the tapes. In this position, the drive can write as well as read data. This setting is recommended when inserting cartridges into the tape library.

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

Figure A-13. Setting the T9940 Write-protect Switch (C67423)



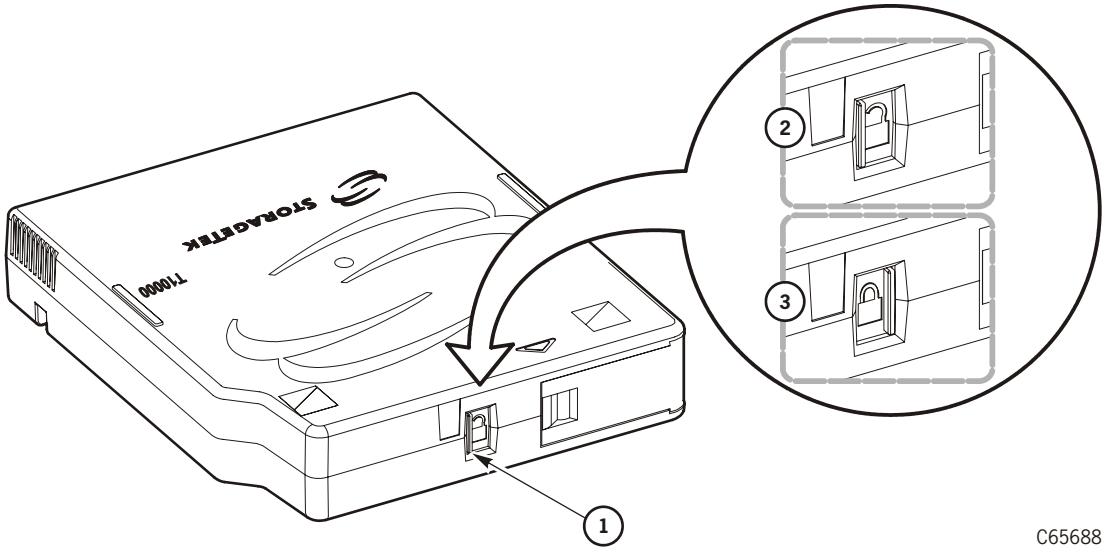
1. Write-enabled position
2. Write-protect position
3. Write-protect switch

Setting the T10000 Write-protect Switch

As shown in Figure A-14, you can set the write-protect switch so the cartridge is *write-enabled*. Slide the switch to the right to write-enable the tapes. In this position, the drive can write as well as read data. This setting is recommended when inserting cartridges into the tape library.

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

Figure A-14. Setting the T10000 Write-protect Switch (C65688)



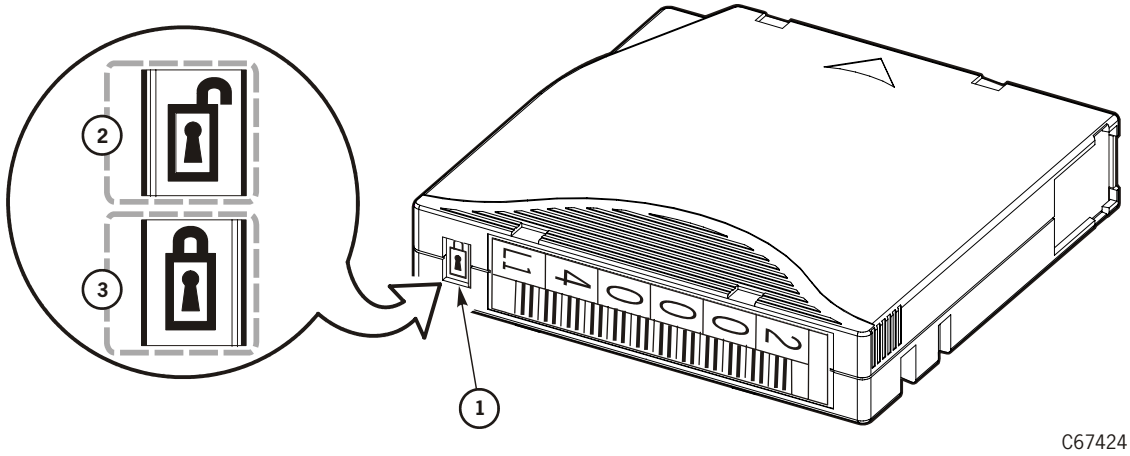
1. Write-protect switch
2. Write-enabled position
3. Write-protect position

Setting the Ultrium Write-protect Switch

As shown in Figure A-15, you can set the write-protect switch so the cartridge is *write-enabled*. Slide the switch to reveal the "open lock" symbol to write-enable the tapes. In this position, the drive can write as well as read data. This setting is recommended when inserting cartridges into the tape library.

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

Figure A-15. Setting the Ultrium Write-protect Switch (C65305)



1. Write-protect switch (Data Cartridge = red, Cleaning Cartridge = gray)
2. Write-enabled
3. Write-protected

Maintaining Cartridges

The following pages list cartridge environmental specifications, describe how to store and clean cartridges, use cleaning cartridges, and repair a detached leader block.

DLT Cartridge Environmental Specifications

The following specifications refer to the operating and storage environments for DLT cartridges.

Table A-8. DLT Cartridge Environmental Specifications

Operating environment	
Temperature	10° to 40°C (50° to 104°F)
Relative humidity	20% to 80% noncondensing
Wet-bulb temperature	25°C (77°F) maximum
CAUTION: ***Potential cartridge damage:* Tape 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. Make sure that the cartridge has no moisture on it.**	
Cartridge storage environment	
Temperature	16° to 32°C (61°to 90°F)
Relative humidity	20% to 80% non condensing
Wet-bulb temperature	26°C (79°F) maximum
Cartridge storage environment for cartridges intended for archiving data for one year or more	
Temperature Relative humidity	18° to 26°C (64° to 79°F) 20% to 60%

For more information on DLT cartridges, visit the Quantum web site at

http://www.quantum.com

T9x40 and T10000 Cartridge Environmental Specifications

Refer to the following manuals for T9840, T9940 and T10000 cartridge environmental specifications:

- *T9840 Tape Drive User's Reference Guide*, part 95739
- *T9940 Tape Drive Operator's Guide*, part 95989
- *T10000 Tape Drive Operator's Guide*, part 96174

Ultrium Cartridge Environmental Specifications

The following specifications refer to the operating and storage environments for Ultrium cartridges.

Table A-9. LTO Ultrium Cartridge Environmental Specifications

Operating environment[1]	
Temperature	10º to 45ºC (50º to 113ºF)
Relative humidity	20% to 80%
Wet-bulb temperature	26ºC (78.8ºF) maximum
Cartridge storage environment (archive)[2]	
Temperature	16º to 25ºC (61º to 77ºF)
Relative humidity	20% to 50%
Wet-bulb temperature	26ºC (78.8ºF) maximum
Cartridge storage environment (non-archive)	
Temperature	16º to 32ºC (61º to 90ºF)
Relative humidity	20% to 80%
Wet-bulb temperature	26ºC (78.8ºF) maximum
Cartridge shipping environment (unrecorded)[3]	
Temperature	-23º to 49ºC (-10º to 120ºF)
Relative humidity	20% to 80%
Wet-bulb temperature	26ºC (78.8ºF) maximum

1. The conditioning time before use is 24 hours.
2. Archival storage is one to 10 years.
3. The shipping environment must not exceed the limit of the storage environment, archive or non-archive, for longer than 10 days.

Storage of Cartridges

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 it has been in its operating environment for at least 24 hours.

Cartridge Exterior—Cleaning

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

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

Use 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.

Repair of a Detached Leader Block

When a tape is damaged, use a backup tape. If a leader block is detached, there is no obvious damage to the cartridge or tape, and you have no backup tape, you may repair the leader block using a repair kit provided by your supplier. You can use the tape once to copy the data onto another tape.

StorageTek L-Series Library Admin

B

StorageTek's L-Series Library Admin is an optional software product that resides internally in the library and is activated by using a Web browser. This product provides a Web-based, graphical user interface (GUI) that enables customers to monitor and perform library operations remotely.

Some of the features of Library Admin include the ability to:

- Get a virtual view of the library's cells
- Load microcode
- Generate useful reports on the library, drives, FSCs, and media
- Obtain valuable statistics on the library, drive, cells, and cleaning cartridge
- View and modify the configuration of the library, drives, and network
- Set the cleaning cartridge threshold
- Enable SNMP and add trap recipients

For more information about StorageTek's L-Series Library Admin, visit:

http://www.storagetek.com/products/product_page59.html

Requirements

Before installing the L-Series Library Admin, verify that the following requirements are met:

- Minimum system requirements:
  - 200MHz processor
  - 64 MB RAM (96 MB preferred).
- Microcode level 2.20.00 and later contains the L-Series Library Admin software.
- Library Personality Module.
- Java™ Plug-in Software 1.4 or later.

  You can download the Java plug-in from:

  http://java.sun.com/j2se/1.4.2/download.html
- Netscape Navigator 4.5 and later *or* Internet Explorer 5.0 and later

Note: After Library Admin is installed, the Web-based GUI with the Java plug-in is intuitive, easy to use, and requires minimal training.

Installation Instructions

Note: When the operator panel displays "Web Enabled," the Personality Module is installed and Library Admin is enabled.

To install the L-Series Library Admin:

1. Make sure the library is powered-on and initialized.
2. Make sure the library network configurations have been completed. See "Network Entries" on page 3-10 for more information.

Referring to Figure B-1 on page B-3:

3. Make sure the Ethernet (Enet) cable is connected.
4. Connect the Personality Module to the DB9 connector.

   Note: The Library Admin software is *disabled* if the Personality Module is not installed.

5. Reset the library (cycle power or open and close the front door).
6. Start the L-Series Library Admin by accessing Netscape or Internet Explorer and entering your library name or IP address at the Address Bar.

See Figure B-1 on page B-3 for an example of the Library Admin for the L180 Tape Library.

Table B-1 outlines the functionality of the Library Admin:

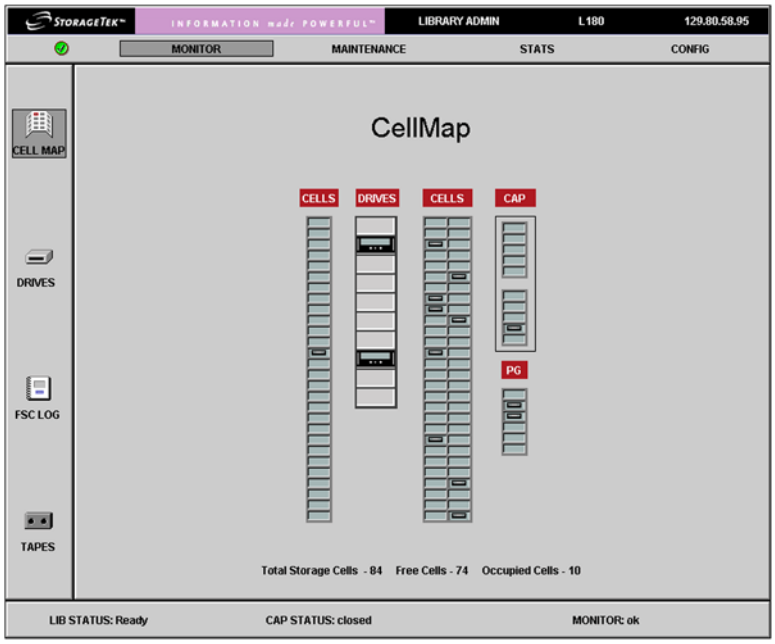
Table B-1. Library Admin Functions

Select Tab…	For Information About...
Monitor	• Cell map • Drive status • FSC log • Tape inventory
Maintenance	• Diagnosing a problem • Performing a code load • Generating reports • Rebooting the library
Statistics	• Library • Drives • Cells • Cleaning cartridge
Configuration	• Library • Drives • Network • Cleaning count threshold

Figure B-1 shows an example of the initial Library Admin Monitor Screen that shows the cell maps for the library.

The top and the left navigation bars allow you to select various functions as described in Table B-1 on page B-2.

Figure B-1. Library Admin Screen Example



Library Statistics

Library statistics are divided into two major categories: counters and composite information. Both categories are explained in the following sections.

Counters

Counters are composed of 8-bit, 16-bit, and 32-bit elements. Each type is explained below.

8-bit Counters

8-bit counters have values from 0 to 2^8 minus 1 (or 255).

Drive Statistics

Drive statistics are composed of the following information, based upon the absolute element location of the drive:

1. PUT Retries: the number of times a PUT operation was retried for the specified location. Generally, two retries will be logged for one failed motion.
2. GET Retries: the number of times a GET operation was retried for the specified location. Generally, two retries will be logged for one failed motion.
3. Mount Count: the number of mount operations to a specified location

Cell Statistics

Cell statistics are composed of the following information, based upon the absolute element location of the cell:

1. PUT Retries: the number of times a PUT operation was retried for the specified location. Generally, two retries will be logged for one failed motion.
2. GET Retries: the number of times a GET operation was retried for the specified location. Generally, two retries will be logged for one failed motion.

16-Bit Counters

16-bit counters have values from 0 to 2^{16} minus 1 (or 65,535).

Table B-2. 16-Bit Counters

Bin	Description
IPL	Number of times the machine was booted. No distinction is made between powering-on or pressing the `RESET` button
Door Open	Number of times the access door has been opened
GET Retries	Number of times a GET operation required a retry operation. A single move will have two retries before failing
GET Failures	Number of times a GET operation failed. For every failed GET operation, there will be two GET retries logged.
PUT Retries	Same as GET retries, but for PUT operations
PUT Failures	Same as GET failures, but for PUT operations
Label Retries	Same as GET retries, but for label reading operations
Label Failures	Same as GET failures, but for label reading operations
Target Retries	Same as GET retries, but for targeting operations
Target Failures	Same as GET retries, but for targeting operations

32-Bit Counters

32-bit counters have values from 0 to 2^{32} minus 1 (or 4,294,967,295).

Table B-3. 32-Bit Counters

Bin	Description
Move Count	Number of successful sets of GET/PUT operations (a single move consists of one GET and one PUT operation)
Mount Count	Same as move count, except that the move here involves mounting/dismounting a tape to/from a drive
Uptime Second Count	Number of time (in seconds) that the machine has been running
Empty Read	Number of times an empty cell was detected
Target Read	Number of successful targeting operations
Label Read	Number of time a cartridge label was read
Label Read 1*	Number of times algorithm 1 read a label
Label Read 2*	Number of times algorithm 2 read a label
Label Read 3*	Number of times algorithm 3 read a label
Label Unread 1*	Number of times algorithm 1 could not read a label
Label Unread 2*	Number of times algorithm 2 could not read a label
Label Unread 3*	Number of times algorithm 3 could not read a label
* Added for the purpose of tracking new vision algorithms supplied with firmware Versions 2.21.00 and later.	

Composite Information

Composite information contains statistics that keep track of *groups of data*, using units of time or some other discrete measurement. Composite information is supplied for Cartridge Access Port (CAP) usage, library–wide drive performance, and individual drive performance.

Cartridge Access Port (CAP) Usage

CAP usage counters are 16-bit. The definitions are supplied below.

PUT Count

The CAP PUT count is the number of times a PUT was executed to a CAP, with bins incrementing when a CAP is opened. This provides an indication of how a CAP is being used. For example, if five PUTs were executed to a CAP, the "5" bin (see bin list below) would increment by one. Counts in the 21+ bin would indicate that the CAP is being used for normal operations, not just export operations.

Table B-4. CAP PUT Count

Bin	PUTs executed between CAP opens
Idle	0
1	1
2	2
3	3
4	4
5	5
6–10	6–10
11–15	11–15
16–20	16–20
21+	21 or more

GET Counts

The CAP GET count is the number of times a GET was executed from a CAP, with bins incrementing when a CAP is opened. This provides an indication of how a CAP is being used. For example, if 10 GETs were executed from a CAP, the "6–10" bin (see bin list below) would increment by one. Counts in the 21+ bin would indicate that the CAP is being used for normal operations, not just import operations.

CAP GET counts are listed in Table B-5 on page B-8.

Table B-5. CAP GET Count

Bin	GETs executed between CAP opens
Idle	0
1	1
2	2
3	3
4	4
5	5
6–10	6–10
11–15	11–15
16–20	16–20
21+	21 or more

Library–Wide Drive Performance

Job rate intervals are set to five and 15 minutes to best understand peak machine usage. These intervals were chosen because such data can generally be applied to thermal behavior of electromechanical components.

As examples, one customer may only require peak machine performance for a time less than five minutes. If so, some electromechanical components may not heat sufficiently to cause short- or long-term reliability issues. On the other hand, another customer may require peak performance for a full 15 minutes or longer. In this case, peak performance indicates that components will reach higher operating temperatures and, therefore, require more costly components.

Note: Drive mount times are included in this statistics; these times vary widely, depending on the drive type. As a result, these statistics cannot be used to determine if a library is meeting its published Exchanges Per Hour (EPH) specification.

Library-wide drive performance counters are 32-bit.

Five Minute Job Rate

This pool of statistics defines the hourly drive job rate the library was given during continuous five minute intervals. For example, if 13 mounts were executed during one five minute interval, the "151–175" usage bin (see below) would increment by one (13 mounts/5 minutes x 60 minutes/hour = 156 mounts per hour). If no mount activity takes place during a five minute interval, the "idle" bin will increment by one.

The five minute job rate statistics are listed in Table B-6 on page B-9.

Table B-6. Library-Wide Performance—Five Minute Job Rate

Bin	Number of mounts within a five minute interval
Idle	0
1–25	1–2
26–50	3–4
51–75	5–6
76–100	7–8
101–125	9–10
126–150	11–12
151–175	13–14
176–200	15–16
201–225	17–18
226–250	19–20
251–300	21–25
301–350	26–29
351–400	30–33
401–450	34–37
451–500	38–41
501–550	42–45
551–600	46–50
611–650	51–54
651–700	55–58
701+	58+

Fifteen Minute Job Rate

This pool of statistics defines the hourly drive job rate the library was given during continuous fifteen minute intervals. For example, if 31 mounts were executed during one fifteen minute interval, the "101–125" usage bin (see below) would increment by one (31 mounts/15 minutes x 60 minutes/hour = 124 mounts per hour). If no mount activity takes place during a five minute interval, the "idle" bin will increment by one.

The fifteen minute job rate statistics are listed in Table B-7 on page B-10.

Table B-7. Fifteen Minute Job Rate

Bin	Number of mounts within a fifteen minute interval
Idle	0
1–25	1
26–50	2–3
51–75	4–5
76–100	6
101–125	7–8
126–150	9–10
151–175	11
176–200	12–13
201–225	14–15
226–250	16
251–300	17–20
301–350	21–23
351–400	24–26
401–450	27–30
451–500	31–33
501–550	34–36
551–600	37–40
601–650	41–43
651–700	44–46
701+	47+

Individual Drive Performance

Performance statistics for individual drives is the third component of composite information. The counters for these statistics are mixed; a listing and an explanation are provided in Table B-8 on page B-11.

Table B-8. Individual Drive Performance

General – No Data Transfer*		
Bin	**Counter**	**Explanation**
Serial Number		Tracking is done by serial number rather than location. This allows for drive positional changes with no loss or inaccurate information. In addition, two extra information slots are allocated above the maximum drive count to allow for temporary swapping of drives.
PUT Retries	8-bit	Number of times a PUT was retried on this drive
GET Retries	8-bit	Number of times a GET was retried on this drive
Mount Count	16-bit	Number of times a mount was executed on this drive
Idle Time	32-bit	How long (in seconds) the drive has not been able to transfer data across the host interface (for example, no cartridge loaded, loading, unloading); this is counting occurrences of time available for data transfer.
Specific – Data Transfer Possible*		
Minimum	16-bit	Cartridge spent less than 30 seconds in a drive (probably a 9840-style drive)
30 sec to 5 minutes	16-bit	Cartridge spent from 30 seconds to 5 minutes in a drive
5 minutes to 10 minutes	16-bit	Cartridge spent from 5 minutes to 10 minutes in a drive
10 minutes to 30 minutes	16-bit	Cartridge spent from 10 minutes to 30 minutes in a drive
30 minutes to 60 minutes	16-bit	Cartridge spent from 30 minutes to 60 minutes in a drive
More than 60 minutes	16-bit	Cartridge spent more than 60 minutes in a drive
* “General” refers to statistics that relate to non-data transfer drive activities; “Specific” excludes loading/unloading activities and counts only the time that data may be transferred to/from the drive.		

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Glossary

This glossary defines abbreviations and new or special terms found in this or other L180 Tape Library manuals.

A

address A character or group of characters that identifies a register, a particular part of storage, or some other data source or destination.

Advanced Interactive Executive (AIX) The operating software for an IBM RISC System/6000.

audit (1) Tape library audit—the part of the library initialization sequence that catalogs all tape cartridge locations. This data is retained in the logic (MPC/MPCL) card memory. (2) client audit—A client request to catalog the tape cartridges of a library by SCSI element or library number, panel, row, column.

Automated Cartridge System Library Software (ACSLS) The software within a UNIX-based server that interfaces the server and clients; it also maintains a list of all cartridges within a library.

automated mode A relationship between a library and all attached clients. The library is powered on and ready to receive operator requests. In automated mode, the robot moves cartridges among storage cells, the CAP, and drives. This is the normal operating mode of a library.

B

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

C

camera A system that reads VOLSER 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 The plastic housing around a cartridge tape. A plastic leader block is attached to the tape for automatic threading when loaded in a transport. The spine of the cartridge contains a VOLSER label listing the volume identification number.

cartridge access port (CAP) An assembly allowing an operator to enter or eject cartridges during automated operations.

cartridge tape Magnetic tape enclosed in a plastic housing.

catalog The inventory of all cartridge storage locations in an L180 library. This inventory is by SCSI element or library number, panel, row, column.

cell In the library, a receptacle that stores a single cartridge.

configuration The physical description of a library, listing the panel types, cartridge capacity, type of client connection, and number of tape drives.

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

Customer Support Services (CSS) StorageTek's customer services organization. Customers with StorageTek maintenance contracts may contact CSS 24 hours a day, seven days a week.

D

diagnostics Tests, accessible through the library operator panel or the Horizon Library Monitor, that allow a user to evaluate the functionality of certain library components while the library is offline.

differential operation A SCSI bus alternative in which the signal from the SCSI chip passes through a set of differential drivers/receivers. This alternative provides better signal quality with less cross-talk and noise but requires more power to drive the signal. The maximum cable length is 25 m (82 ft.). *See* "single-ended operation."

DNS *See* Domain Name Service.

Domain Name Service A service that translates domain names into IP addresses.

drive A device that reads from or writes to a magnetic tape.

drive column Inside the library, a set of hardware shelves with power connections into which drives are installed.

Dynamic Worldwide Name (dWWN) A feature that applies dynamic names to network devices rather than fixed names. When a dWWN-named devices is replaced, it is assigned the same WWN as the one it replaced, preventing re-configuration of the network.

E

Enterprise Systems Connection (ESCON) (1) An IBM-patented set of products and services that provide a dynamically connected environment, over fiber-optic cable, within a mainframe or client server enterprise. (2) A set of IBM products and services that provide a dynamically-connected environment within an enterprise. (IBM).

Ethernet address A six-byte address that makes a library accessible to a network. (*See* "IP address," "library name," "network gateway," and "subnet mask.")

event log *See* "FSC log."

F

fault symptom code (FSC) Error or information code generated by functional or diagnostic software that may directly or indirectly be used to indicate the field replaceable unit (FRU) that is probably causing the error.

Fibre Channel The National Committee for Information Technology Standards standard that defines an ultra high-speed, content-independent, multilevel data transmission interface that supports multiple protocols simultaneously. Fibre

Channel supports connectivity to millions of devices over copper and/or fiber-optic physical media and provides the best characteristics of both networks and channels over diverse topologies.

fibre connection (FICON) An ESA/390 and zSeries computer peripheral interface. The I/O interface uses ES/390 and zSeries FICON protocols (FC-FS and FC-SB-2) over a Fibre Channel serial interface that configures units attached to a FICON-supported Fibre Channel communications fabric.

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

H

hand-camera assembly The robotic element that includes a motor, a gripper for grasping cartridges, and a camera for reading VOLSER labels and targets.

hard address A device address that is directly input into the firmware by the operator or manufacturer.

Horizon L Series Library Monitor An optional software interface that provides internet browser operation for the library. This feature is enabled by the personality module.

HVD High Voltage Differential SCSI.

I

initial program load (IPL) A process that activates a machine reset and loads system programs to prepare a computer system for

operation. Processors having diagnostic programs activate these programs at IPL execution.

initialization A startup-diagnostic routine performed automatically by the library when it is powered on or when the main door is opened and closed. In the L180 library, this routine includes an audit of the cells.

Internet Protocol (IP) address A four-byte value that identifies a library and makes it accessible through a network. (*See* "Ethernet address," "subnet mask," and "library name.")

in-transit cartridges Cartridges that have been moved from their home cell by the robot. The client software must recover these cartridges to a known location to clear out the software in-transit record.

IP address *See* "Internet Protocol (IP) address."

IPL *See* "initial program load (IPL)."

L

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

library name An assigned name that maps to the IP address for a library. (*See* "IP address," "Ethernet address," and "network gateway," and "subnet mask.")

load a cartridge The process by which a drive prepares a cartridge tape for read and write operations.

LTO Linear Tape-Open, an open specification for tape storage devices.

LVD Low-Voltage Differential SCSI.

M

manual mode A relationship between an 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.

media format Format of data written on the cartridge tape (36-track, compressed, etc.)

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

MPC card The main logic card in the library.

MPCL card Replaces the MPC card in new machines manufactured after 9/02. The MPCL card function is identical to the MPC except that it can be jumpered to operate on a native LVD/SE interface; there is no need to install the MPV and MPW cards for LVD operation.

N

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-volatile random-access memory (NVRAM) A section of memory that will retain its information even when power is removed from the equipment.

O

offline Not available for functional use.

online State of being controlled directly by or in direct communication with a computer. Available for functional use.

P

Port 0 address The address by which the library's first (and currently *only*) port will be identified on a Fibre Channel loop.

Q

quiesce Allowing all activity to complete before any new activity is allowed to start.

R

Remote Center The remote diagnostic center at StorageTek headquarters.

RESET button This button will start a initial program load to the library.

RISC System/6000 An IBM processor that may be used to connect several IBM AS/400 processors, acting as their server through a network.

robot Electro-mechanical device for locating and moving cartridges.

S

servo Device that uses closed-loop feedback to govern physical positioning.

Simplified Network Management Protocol A set of protocols for managing complex networks.

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

small computer systems interface (SCSI) A type of data or control interface between the library/ tape drives and client.

SNMP *See* Simplified Network Management Protocol.

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

T

tape drive A device that reads from or writes to a magnetic tape.

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

Tri-Optic label An external label attached to the spine of a cartridge that is both human- and machine-readable. *See also* "volume serial (VOLSER) label."

TTI Tape Transport Interface. A library communication cable with the tape drives.

U

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

V

VOLSER The volume serial identification of a cartridge tape. *See* "volume serial label."

volume A certain portion of data, together with its data carrier, that can be handled conveniently as a unit.

volume serial (VOLSER) label An alphanumeric label used by client software to identify a volume (sometimes used to indicate the contents of a tape).

Y

Y-cable A SCSI 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 column The column (or tube) which allows the hand mechanism in the library to move vertically.

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

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