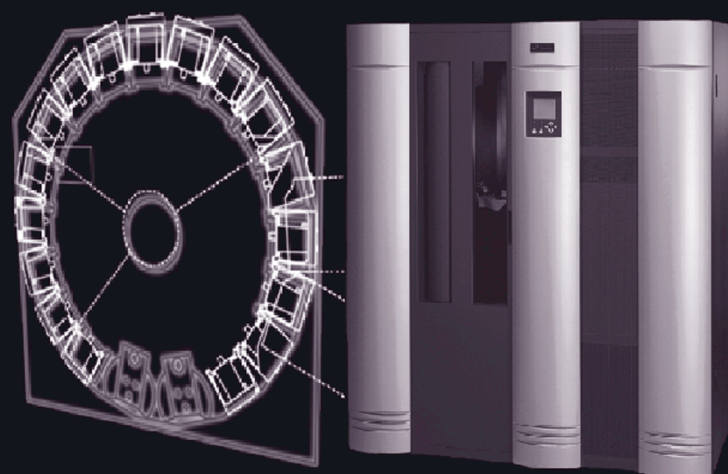**STORAGETEK**

L700e Tape Library and L700 Pass-Thru Port

Installation Manual

L700e Tape Library and L700-Pass-Thru Port

Installation Manual

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This edition contains 298 pages. See for the revision history and summary of changes made to this publication.

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Summary of Changes

EC	Date	Edition	Description
53897	August 1999	First	Initial Release
111809	October 2002	Fourteenth	Refer to this and previous editions for a description of the changes.
111827	February 2003	Fifteenth	**Title page:** Revised Proprietary Information Statement (see page ii).

Title page: Revised Proprietary Information Statement (see page ii).

Added Export Destination Statement (see page ii).

Throughout: Revised all footers to state "Proprietary Information."

Chapter 1: Added that Hewlett Packard LTO Gen2 drives are now available (see "Drive Types" on page 1-4, "Tape Drive Features" on page 1-14, and "Gen2 SCSI Drives" on page 2-24).

Added that IBM LTO Gen2 SCSI and Gen2 Fibre Channel drives are now available (see "Drive Types" on page 1-4, "Tape Drive Features" on page 1-14, and "Gen2 Ultrium Fibre Channel Drives" on page 2-25).

Revised library optional features table (see Table 1-4 on page 1-10):

- library Fibre Channel operation (changed from feature LV03 to LV04)
- removed redundant AC power option for Europe (feature EPWR)

Revised the model and feature codes for StorageTek optional library interfaces (see Table 1-5 on page 1-11 through Table 1-7 on page 1-13).

EC	Date	Edition	Description
111827	February 2003	Fifteenth	**Chapter 6:** Revised information regarding the top cell in the reserved area (see "Reserved Cell Descriptions" on page 6-12).
			Revised cartridge and cartridge label ordering information (see "Ordering Tape Cartridges/ Labels" on page 6-8).
			Appendix C: Added explanation of statistics offered in L-Series Lib Admin (see "Library Statistics" on page C-4).
			Reader Comment Form: Revised address (see last page).

Contents

Figures

Tables

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Preface

The L700e frame replaces the earlier L700 frame. The L700e frame has the capability for attachment of a pass-thru port (PTP) between two L700e frames. This manual describes how to install an L700e tape library, its associated tape drives, and the PTP.

This manual is intended for StorageTek employees and authorized third party service representatives.

■ Organization

This manual has six chapters and three appendixes:

Chapter 1	"General Information" provides an overview of the L700e tape library models and features. It shows the location of major system components. It also lists physical, environmental, and power requirements for the library.
Chapter 2	"Installing the Library and Drives" describes the procedures for unpacking and installing the library and tape drives.
Chapter 3	"Installing the L700-PTP" explains how to connect two libraries with a pass-thru port.
Chapter 4	"Installing Cables" describes how to connect the library and tape drives to the client system.
Chapter 5	"Configuring the Library" describes how to configure the library and tape drives for operation with the client.
Chapter 6	"Testing the Library" describes the various cartridges for the drives and procedures to test the library and tape drives before placing them online.
Appendix A	"Library Elements and Diagrams" provides diagrams of all cartridge locations within the tape library, an illustration of the MPC/MPCL logic card, and block diagrams of the library.
Appendix B	"SNMP" provides information regarding Simplified Network Management Protocol.
Appendix C	"StorageTek L-Series Library Admin" supplies the information needed to install and configure the StorageTek L-Series Library Admin tool.
Glossary	The Glossary defines relevant terms and acronyms.
Index	The Index assists in locating information in this manual.

■ Alert Messages

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

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

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

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

■ Conventions

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

Item	Example	Description of Convention
Buttons	MENU	Font and capitalization follows label on product
Commands	Mode Select	Initial cap
Document titles	*System Assurance Guide*	Italic font
Emphasis	*not* or *must*	Italic font
File names	`fsc.txt`	Monospace font
Hypertext links	Figure 2-1 on page 2-5	Blue (prints black in hardcopy publications)
Indicators	*Open*	Font and capitalization follows label on product
Jumper names	TERMPWR	All uppercase
Keyboard keys	<Y> <Enter> or <Ctrl+Alt+Delete>	Font and capitalization follows label on product; enclosed within angle brackets
Menu names	Configuration Menu	Capitalization follows label on product
Parameters and variables	Device = *xx*	Italic font

Item	Example	Description of Convention
Path names	`c:/mydirectory`	Monospace font
Port or connector names	SER1	Font and capitalization follows label on product; otherwise, all uppercase
Positions for circuit breakers, jumpers, and switches	ON	Font and capitalization follows label on product; otherwise, all uppercase
Screen text (including screen captures, screen messages, and user input)	`downloading`	Monospace font
Switch names	**Power**	Font and capitalization follows label on product
URLs	http://www.storagetek.com	Blue (prints black in hardcopy publications)

■ Related Publications

Publications relating to the L700e Tape Library are listed below.

L700/L700e Tape Library Documentation	Part Number
L700e Tape Library General Information Manual	MT 4011
L700e Tape Library Illustrated Parts Catalog	95847
L700e Tape Library Operator's Guide	95845
L700e SCSI Reference Manual	95869
L700/L700e Tape Library Service Manual	95846
L180/L700e Tape Library Ordering and Configuration Guide	MT 5112

Tape Drive Documentation	Part Number
DLT 7000 Tape Drive Product Manual	313134501
DLT 8000 Tape Drive Product Manual	DLT part: 81-60118-02
Hewlett Packard Ultrium Tape Drive Manual	100089901 - CD included with drive
IBM® Ultrium Tape Drive Manual	CD included with drive
Open Systems Tape Drives Information Manual	MT 9120
Seagate Ultrium Tape Drive Product Manual	100089801 -CD included with drive

Tape Drive Documentation	Part Number
Super DLT 220 Product Manual	Quantum part: 81-80000-01
T9840 Tape Drive User's Reference Manual	95739
T9940 Tape Drive Operator's Guide	95989
T9x40 Tape Drive Installation Manual	95879
T9x40 Tape Drive Service Reference Manual	95740

Publications regarding ACSLS software:

ACSLS Publications	Part Number
Automated Cartridge System Library Software: System Administrator's Guide	112194201
Some ACSLS, Solaris, and AIX documentation may also be obtained at the following Internet website: http://www.storagetek.com/products/software/acsls/index.htm	

Publications regarding the APC (AC Uninterruptable Power Source):

APC Power Supply Information	Part Number
L180/700 UPS Reference Manual	96047
APC Uninterruptible Power Supply manuals and online information.	Available from APC or see www.apc.com

Publications regarding StorageTek software products:

StorageTek Software Products
A list of StorageTek software products can be found online at: http://www.storagetek.com/prodserv/products/software/

Publications regarding other topics:

Other Publications	Part Number
American National Standard Dictionary for Information Processing Systems	ANSI X3/TR-1-82
Code for Information Interchange	ANSI X3.4-1977
Fibre Optics User's Guide	9433
Magnetic Tape Labels and File Structure for Information Interchange	ANSI X3.27-1978
Recorded Magnetic Tape and Cartridge for Information Interchange	ANSI X3B5/87-009
SCSI-2	ANSI X3T9.2/86-009
SCSI-3 Parallel Interface (SPI)	ANSI X3T9.2/91-010R7
Small System Computer Interface	ISO 9316:1989

■ Additional Information

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

StorageTek's External Web Site

StorageTek's external Web site provides marketing, product, event, corporate, and service information. In addition, the external Web site serves as an entry point to the Customer Resource Center (CRC) and to the e-Partner site. 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. StorageTek employees may enter the CRC through PowerPort.

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

e-Partners Site

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

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

Global Services Support Tools

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Documents on CD

Documents on CD (3106600xx) is a compact disc that contains portable document format (PDF) files of StorageTek's tape, library, OPENstorage disk, and StorageNet publications. Contact your local Customer Services Logistics Depot to order this CD and to get onto the distribution list for this CD. The *Documents on CD* is only for StorageTek employees.

Hardcopy Publications

You may order paper copies of publications listed on the CRC or included on the *Documents on CD*.

Service publications have *numeric* part numbers. To order paper copies of service publications, contact your local Customer Services Logistics Depot.

Marketing publications have *alphanumeric* part numbers. To order paper copies of marketing publications, do one of the following:

• Visit StorageTek's PowerPort and select alphabetical listings under "L" or select `Online Forms`. Then search for Literature Distribution. Follow the instructions on the Literature Distribution Web page.

• Send e-mail to DistrL@louisville.stortek.com.

■ Comments and Suggestions

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http://sts.stortek.com/sts/nid/nidrcf.htm

A Reader's Comment Form at the back of this publication lets you communicate suggestions or requests for change. StorageTek encourages and appreciates reader feedback.

Safety, Fiber Optic, and ESD

This section covers topics that are *essential* to your safety when operating the library. Please read these instructions carefully.

■ Safety Precautions

WARNING:
***Potential injury:* On-the-job safety is important; therefore, observe the following safety precautions while you are engaging in any maintenance activity. Failing to follow these precautions could result in serious injury.**

Remove all conductive jewelry, such as watches and rings, before you service powered-on equipment.

- Avoid electrical shock. Be careful when you work near power connectors and supplies.

- Power-off the equipment that is being serviced before you remove a field replaceable unit (FRU) or other component. Remember that dangerous voltages could still be present in some areas even though power is off.

- Ground all test equipment and power tools.

- Lift objects properly; read the information in "Lifting Techniques" (see below).

- Do not remove, cut, or relocate any floor tiles indiscriminately. Before you manipulate floor tiles, be sure that you understand the customer's environment and receive the customer's approval. Remember, each situation is different.

- Enforce good housekeeping practices in the equipment area to help prevent fire and accidents.

Note: Important things to investigate and to be aware of include the use of Halon® gas, under-the-floor smoke detectors, and cables to other equipment installed nearby.

Lifting Techniques

Lifting, regardless of how much or how little, can create serious back stress. If you follow these guidelines, you can reduce the risk of back injury:

- Do not twist your body to pick up something or to put it down. Twisting puts extreme pressure on your back, especially when you lift or carry objects. Instead of twisting, make the task two separate moves; first lift, and then use your feet to turn your body.

- Plan the lift: first examine the object and then determine how it will be lifted and where it will be placed.

- Choose the appropriate lifting technique. Examine the weight, size, location, frequency, and direction of the lift. Plan to avoid awkward postures, and determine if material-handling aids are needed.

- Place your feet shoulder-width apart, and place one foot a little behind the other. Keep your back straight because even light loads can significantly increase pressure on your spine when you lean forward.

- Whenever you can, grip the load with your whole hand, and use two hands.

- Carry objects at elbow height and close to your body. The farther away you hold an object, the more force it puts on your lower back.

- Lift with your legs instead of your back. Leg muscles are some of the strongest in the body. When you squat and lift with your legs, you can lift more weight safely.

- Alternate lifting tasks with tasks that are less stressful to the same muscles. This technique ensures that your muscles have some recovery time.

Shoulder, Elbow, Wrist, and Hand Safety

Follow these guidelines to minimize the possibility of injury to your shoulders, elbows, wrists, and hands.

- Work within your safety zone—the area between shoulder level and knuckle level of your lowered hands. You face less chance of injury when you work or lift in this area.

- Keep your elbows bent to keep loads close to your body and to decrease the amount of force necessary to do the job. If you use this posture, you will put less weight and pressure on your shoulder.

- Be sure to keep your wrists straight. Avoid bending, extending, or twisting your wrists for long periods of time.

- Do not use a pinch grip to lift large or heavy loads because the way you lift also can affect the tendons in your hand. When you grasp an object between your thumb and fingers, you put a lot of tension on hand and wrist tendons. Use both hands—use one for a while, and then use the other—to give them rest.

CAUTION:
***Potential injury:* On-the-job safety is important; therefore, observe the following safety precautions while you are engaging in any maintenance activity. Failing to follow these precautions could result in serious injury.**

- Remove all conductive jewelry, such as watches and rings, before you service powered-on equipment.

- Avoid electrical shock. Be careful when you work near power connectors and supplies.

- Power-off the equipment that is being serviced before you remove a field replaceable unit (FRU) or other component. Remember that dangerous voltages could still be present in some areas even though power is off.

- Ground all test equipment and power tools.

- Lift objects properly; read the information in "Fiber Optic Safety" (below).

- Do not remove, cut, or relocate any floor tiles indiscriminately. Before you manipulate floor tiles, be sure that you understand the customer's environment and receive the customer's approval. Remember, each situation is different.

- Important things to investigate and to be aware of include the use of Halon® gas, under-the-floor smoke detectors, and cables to other equipment installed nearby.

- Enforce good housekeeping practices in the equipment area to help prevent fire and accidents.

■ 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.

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-installed 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.**

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

CAUTION:
Potential equipment damage: **Do not exceed the maximum allowable weight (136 kg [300 lb]) and U-height (17U) for equipment in the rack area of this library.**

• 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-installed equipment has an adequate power source.

  Note: If you remove power from the library by using the library's power switch, the rack-installed 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 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 any equipment that you install 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.

• 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.

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.**

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- **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 (136 kg [300 lb]) and U-height (17U) for equipment in the rack area of this library.**

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- 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.

■ Electrostatic Discharge (ESD) Damage Prevention

Anyone who handles ESD-sensitive components must be aware of the damage that ESD can cause to electronic components and must take the proper precautions to prevent it. Also, anyone who performs maintenance on StorageTek equipment must complete an ESD-basics course.

CAUTION:
***Potential damage to equipment:* Handle ESD-sensitive components *only* under ESD-protected conditions. To meet this requirement, always use the Field Service Grounding Kit (PN 4711) and always follow these ESD precautions and procedures when you are servicing StorageTek equipment or handling ESD-sensitive components.**

ESD Precautions

Always take the following general precautions when you work with ESD-sensitive components:

- Wear ESD protection whenever you install, remove, maintain, or repair StorageTek equipment.

- Keep ESD-sensitive printed-circuit components in their ESD-protective packages until you have taken all ESD-preventive steps and you are ready to install the component.

- Do not allow anyone to touch or handle an unprotected ESD-sensitive component unless that person has taken all ESD precautions.

- Reinstall all equipment covers and close all equipment doors after you have completed the work.

- If the grounding-kit work surface has been exposed to temperatures above 66ºC (150ºF) or below 4.5ºC (40ºF), acclimate the work surface to room temperature before you unroll it.

- Immediately place any component that you have removed into an ESD-protective package.

- Keep the grounding-kit work surface clean.

  Note: To clean the work surface, use a mild detergent and water, and make sure that the surface is completely dry before you use it.

- Periodically check the electrical resistance of the ground cord and the wrist-strap coil cord.

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> **Note:** The ground cord should measure less than 1.2 MΩ, and the coil cord should measure between 0.8 and 1.2 MΩ Repair or replace the cords if they no longer meet these requirements.

ESD-Protection Procedure

Remember that each customer environment is different. Address all the customer's concerns before you work on any equipment.

Prepare the Work Area

1. Before you service the equipment, unfold the grounding-kit work surface completely and place it on a convenient surface.

2. Attach one end of the ground cord to the work surface; secure the snap fastener.

   > **Note:** You will attach the free end in a later step.

3. Slip on an ESD wrist strap. Make sure that the strap is comfortable and makes contact with the entire circumference of your wrist.

4. Snap one end of the coil cord to the wrist band.

Access the Equipment

5. Carefully open the doors to the equipment or remove the covers from the equipment. Do not touch any internal components.

   CAUTION:
   Be sure that you are properly grounded before you touch any internal components.

6. Attach the free end of the coil cord to the most appropriate place:

   a. If you are working on components from a small piece of equipment, attach the free end of the coil cord to the grounding-kit work surface. In addition, be sure that you touch an unpainted metal surface on the equipment before you touch an internal component.

   b. If you are working on components from a large piece of equipment, attach the free end of the coil cord to a grounding jack or to an unpainted metal surface inside the equipment.

Replace Components

7. Remove the defective component and place it on the work surface.

8. Remove the replacement component from its ESD-protective package, and install the component in the equipment.

9. Place the defective component in the ESD-protective package.

Clean Up

10. Disconnect the ground cords from the equipment.

11. Reinstall all equipment covers and close all equipment doors.

12. Disconnect the coil cord from your wrist, and, if necessary, disconnect the ground cord from the work surface.

13. Properly store the work surface and the other Field Service Grounding Kit items.

■ L700e Door Interlock

A safety interlock (located behind the left front door) is provided on the tape library. When the left front door is opened, the interlock immediately generates a servo power interrupt (SPI) that disables all tape library motors. This prevents motors from operating while the library door is open.

When two libraries are connected by a PTP, opening the left front door of either library will automatically suspend pass-thru operations. Operations inside the library with the open door will also stop, while the other library's operation will continue.

■ L700e Servo Power Interrupt

An additional safety feature is the MPC/MPCL card generated servo power interrupt. If a library motor is determined to be out-of-range by the MPC/MPCL card, the processor card will generate a SPI to turn off drive voltage to the faulty motor. This prevents a servo runaway condition until the cause of the problem can be determined.

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General Information

<div style="text-align: right;">1</div>

This chapter provides an overview of the L700e tape library models and features. It shows the location of major system components. It also lists physical, environmental, and power requirements for the library.

Throughout this manual, the library is referred to as one unit. With the introduction of the pass-thru port, however, capacities for cartridges and drives will effectively double when two libraries are connected with the pass-thru port.

■ Overview

The L700e tape library is a fully automated tape cartridge storage and retrieval subsystem. Depending on model and features selected, one L700e can store from 156 to 678 tape data cartridges. With an L700-PTP (pass-thru port) installed between two libraries, both libraries can share from 300 to 1,344 cartridges. The total numbers do not include cartridges in the cartridge access port (CAP) or the reserved cells.

Library Operation Types

The L700e can operate on the following interfaces:

* SCSI High Voltage Differential (HVD)
* SCSI Low Voltage Differential (LVD)—requires the addition of MPV and MPW cards for MPC cards only; new MPCL cards, however, can operate as native LVD/ SE by moving the jumper at J16.
* Single-ended SCSI.
* Fibre Channel with the addition of MPU/MPU2[1] and MPV cards

CAUTION:
System fault: **For *either* HVD or LVD operation, the server must have a corresponding (matching) host bus adapter.**

Drives and media can be intermixed.

The exchange rate for moving tapes from cell to cell is 450 exchanges per hour.

Installing one library should take about two hours, plus the time to install each drive and the optional expansion frame. If an L700-PTP is installed, you must estimate at least twice this time, plus approximately two hours for leveling and installation of the PTP.

1.The MPU card supports 1 GB operation; the MPU2 supports 2 BG, but requires 3.02 or later firmware.

The available size configurations are shown in Figure 1-1 and Table 1-1 on page 1-3 lists the corresponding capacity variations. Capacity variations depend upon the theta stop positions (shown in Figure 1-1).

Figure 1-1. Library Size Configurations (C65133)

C65133
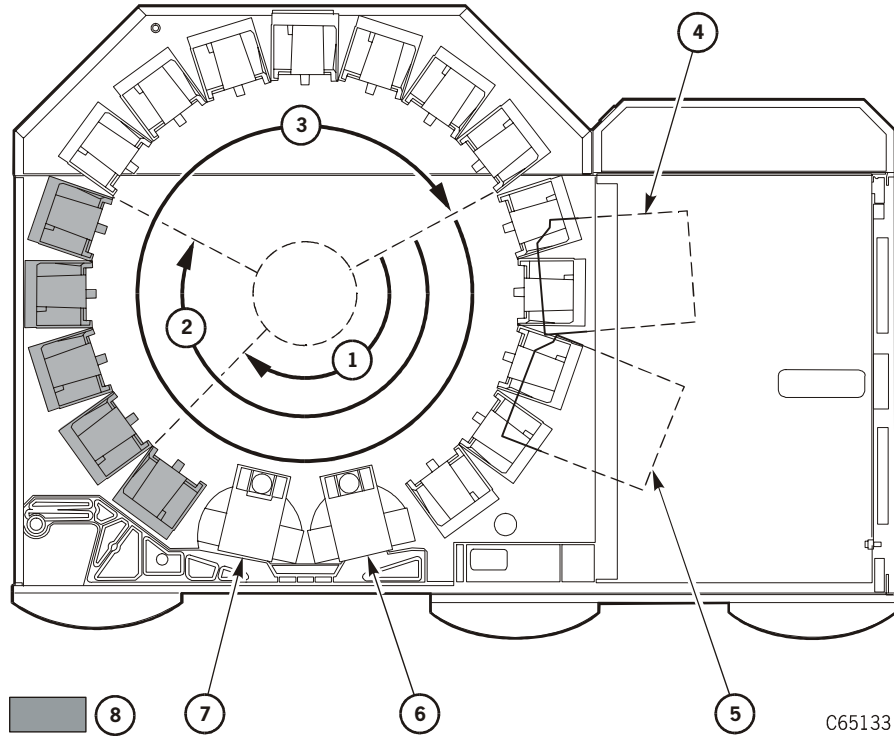
1. 1/3 capacity (partial access to Panel 2)
2. 2/3 capacity (entire access to Panel 2)
3. Full capacity (with optional expansion frame)
4. Drive Column 0

5. Drive Column 1 (optional)
6. CAP B (optional)
7. CAP A
8. Panel 2

A basic library consists of:

- A library that stores 156 to 678 tape data cartridges.

- One to 20 Digital Linear Tape (DLT) drives only, one to 20 Ultrium Tape drives only, one to twelve T9x40 drives only, one to twelve T9x40 drives plus one to two DLT or Ultrium drives, or a mixture of drives. The possible combinations of drives are shown in Table 1-2 on page 1-5.

- The smallest configuration consists of one library and one tape drive.

The largest configuration consists of two libraries, one PTP, and 40 tape drives.

Table 1-1. Library Capacity Variations per Single Library

Expansion Frame	2nd Drive Column	Drives Installed (Maximum)	Panel 2 Access	Total Data Cartridge Cells[1]	Reserved Cells[2]	Total User Cells
Yes (Full)	No	10 DLT/SDLT/Ultrium, or 6 T9x40 + 1 DLT/SDLT/Ultrium	Entire	678	12	690
	Yes	20 DLT/SDLT/Ultrium, or 12 T9x40 + 2 DLT/SDLT/Ultrium	Entire	618	12	630
No (2/3)	No	10 DLT/SDLT/Ultrium, or 6 T9x40 + 1 DLT/SDLT/Ultrium	Entire	384	12	396
	Yes	20 DLT/SDLT/Ultrium or 12 T9x40 + 2 DLT/SDLT/Ultrium	Entire	324	12	336
No (1/3)	No	10 DLT/SDLT/Ultrium or 6 T9x40 + 1 DLT/SDLT/Ultrium	Partial	216	12	228
	Yes	20 DLT/SDLT/Ultrium or 12 T9x40 + 2 DLT/SDLT/Ultrium	Partial	l56	12	168

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

The figures will be doubled (minus 12 cells for the PTP array) for libraries sharing a PTP.

[2] The reserved cells are composed of one swap cell and 11 cleaning and/or diagnostic cartridge slots. They are shown in Figure 6-5 on page 6-12.

MPC and MPCL Cards

The controller card for the library is either the MPC or MPCL card.

The original MPC card has recently been re-designed and is designated the "MPCL." The MPCL will be installed on all new L180/700e frames starting the fourth quarter of 2002. The MPCL card provides a native LVD interface, replacing the optional MPW card that is currently used on MPC cards.

The MPCL, while set at the factory for High Voltage Differential (HVD) operation, can be modified to operate on a Low Voltage Differential (LVD) interface by simply moving the jumper located at J16 on the card from the default position (HVD) to the LVD/SE position (see "Library Single-Ended Operation" on page 2-41 and Figure 2-24 on page 2-43).

Note: The MPCL card cannot operate with any firmware level below 3.02.

MPC card spares will be available indefinitely. You should replace an MPC card with an MPC card and replace MPCL cards with MPCL cards. The Feature LV02, conversion bill number 101368 (installation of the card cage, MPV backplane, and MPW logic card attached to the MPC card) to operate a library containing an MPC card on an LVD interface, will continue to be offered.

Drive Types

The following drives may be installed within the L700e:

- T9x40 – HVD SCSI or Fibre Channel
- T9840B – HVD SCSI, Fibre Channel, or ESCON[1]
- DLT 7000 or DLT 8000 – HVD SCSI only
- The SDLT 320 model—Backward Read Compatibility (BRC – ability to read previously written tapes on DLTIV media)
- IBM Gen1 Ultrium – Native LVD, Fibre Channel or, with a converter card, HVD
- IBM Gen2 Fibre Channel drives[2]
- Hewlett Packard Ultrium drives:
  - Gen1—Native LVD or, with a converter card, HVD
  - Gen2[3]—Native LVD only
- Seagate Ultrium – LVD or HVD (determined by model number)

1.The StorageTek T9840B drive is available for ESCON operation; library firmware must be version 3.01 or later. Host operating systems requirements are listed in "ESCON" on page 1-24.
2.The Gen2 IBM Fibre Channel drive requires Firmware Version 3.04.
3.The Gen2 HP Ultrium drive support is available with Firmware Version 3.03.

Table 1-2. Drive Combinations (per drive column)

T9x40	DLT/SDLT or Ultrium
0	10
1	8
2	7
3	5
4	4
5	2
6	1

CAUTION:
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 "Medium Error/Calibration Error (03/8000)" if a read command is issued and, as with most tape drives, will write over any data present on the tape if a write command is issued at load point.

CAUTION:
Possible data loss: **StorageTek does not advise mixing SDLT 220 and SDLT 320 drives in the same library. An SDLT 220 will overwrite data on an SDLT 320-written tape.**

Figure 1-2. Library with Expansion Frame (C65055)

C65055
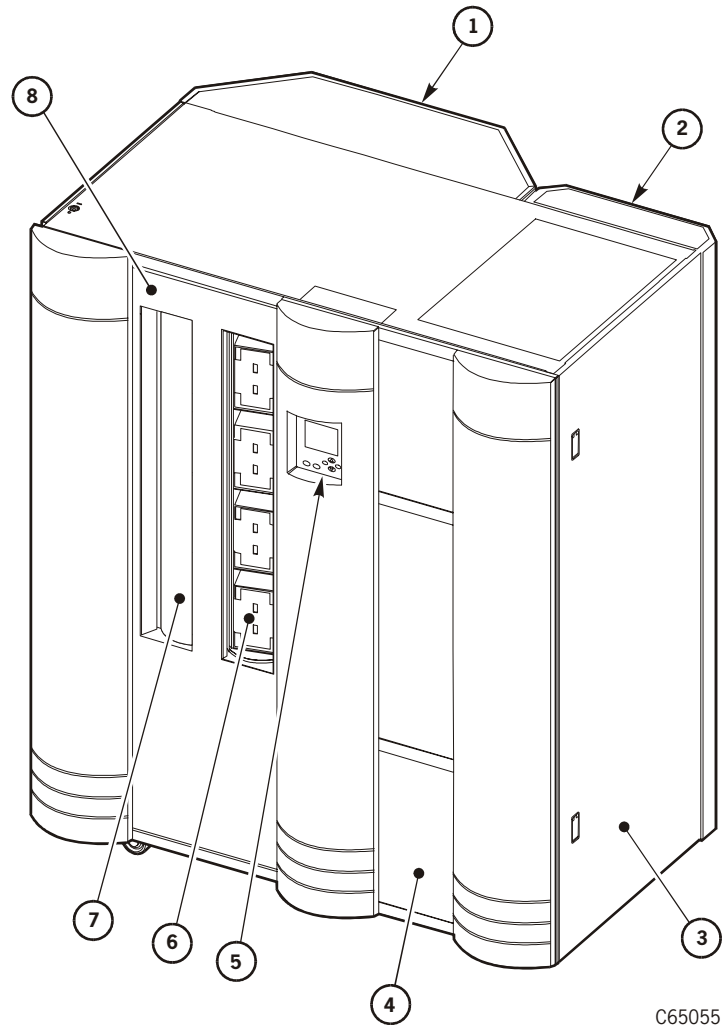
1. Expansion frame (optional)
2. Rear door
3. Drive access door
4. Right front access door
5. Operator panel
6. Optional CAP B (shown open)
7. Standard CAP A (shown closed)
8. Left front access door

■ Client Direct Operation

For client direct connections, a SCSI or Fibre Channel client is connected directly to the library and drives. The drives may share the same bus as the library (termed "on bus") or operate on a separate bus (termed "off bus").

The SCSI connection from the client to the library and/or drives is a SCSI Type-3 68-pin cable. This cable may be a unique channel or it may be daisy-chained to a shared data bus with the library or one or more drives.

A Multi-initiator Small Computer System Interface (SCSI) is the data interface currently available for the library and T9x40 drives.

A Fibre Channel interface is available as an option.

SCSI-to-Fibre Channel conversion and Native Fibre Channel will be available as future options.

■ Client Indirect Operation

For client indirect connections to the library, a Unix-based server or a RISC System/6000 (using the Advanced Interactive Executive [AIX] operating system) connects between the client and the library.

An example of an indirect connection would be:

- The library is connected to a Unix-based server.

- The server is then connected to an Ethernet LAN network.

- A cable is then run from the Ethernet LAN to the client.

Note: If the customer is using Automated Cartridge System Library Software (ACSLS), its level must be Version 5.3.2 or higher. If a PTP is installed, the ACSLS version must be 6.0.1 or higher.

The connection from the server to the library is a SCSI Type-3 68-pin cable. The server may have its own control-side path or may be daisy-chained to a shared data bus with one or more drives.

A multi-initiator Small Computer System Interface (SCSI) is the data interface currently available for DLT, SDLT, Ultrium, and T9x40 drives.

A Fibre Channel interface is available as an option.

SCSI-to-Fibre Channel conversion and Native Fibre will be available as future options

■ Operator and Communication Interfaces

Operator and communication interfaces for the library are:

- An operator panel that communicates library status, configuration, diagnostic sequences, and fault symptom code information. The operator panel provides buttons for running diagnostic tests and for examining the 20 most recent library events. Event information also contains errors that include fault symptom codes (FSCs) to help you determine what component has failed.

- A CSE port (Command Line Interface–CLI) that allows diagnostic tests, clearing of the FSC log, and the path for downloading firmware through a Hyperterminal session (See "CLI Port - Hyperteminal Method" on page 5-49. This interface is through an RJ45 connection, 38,400 baud.

- An Ethernet Web-based service port for:

  - Machine configuration (using the optional "StorageTek L-Series Library Admin"). Netscape® and Microsoft® Explorer are supported browsers.
  - Monitoring status information using SNMP (see Appendix B, "SNMP.").

■ Standard Features

The following features are standard with all L700e libraries:

- An internal 13U (0.57 m [22.75 in.] high x 0.48 m [19 in.] wide x 0.71 m [28 in.] deep) rack space, located behind the right, front door (customer must supply power).

- 20-cartridge CAP

- Front and rear viewing windows

- Space for 10 DLT/SDLT, 10 Ultrium, six T9X40 tape drives, or six T9x40 drives and one DLT/SDLT or Ultrium drive, or a mixture of these drives (see Table 1-2 on page 1-5 for mixed drive types)

Library initialization and full audit of all tapes requires a maximum of five minutes to complete.

■ Models

The L700e tape library is available in three models; each model can contain one or two drive columns.

Table 1-3. Library Models

Model	Drive Columns	Description*
L700-e70	1	678 data cartridge cells, expansion frame, entire Panel 2 and Panel 3 access
	2	618 data cartridge cells, expansion frame, entire Panel 2 and Panel 3 access
L700-e40	1	384 data cartridge cells, no expansion frame, entire Panel 2 access
	2	324 data cartridge cells, no expansion frame, entire Panel 2 access
L700-e30	1	216 data cartridge cells, no expansion frame, partial Panel 2 access
	2	156 data cartridge cells, no expansion frame, partial Panel 2 access

Note: Cartridge cell numbers do not include cells in the CAP or the reserved area. The cell numbers will be approximately doubled for libraries connected with a PTP.

■ Optional Library Features

Optional features and conversion bills for the L700e tape library are listed in .

Note: Power cables must be ordered. See .

Table 1-4. Library Optional Features and Conversion Bills

Feature/Model	Conversion Bill	Description
0PDU		No additional power distribution unit
1PDU	61699	Optional power distribution unit (PDU)
RMPS	61701	Second (backup) DC power supply
2NDT	61697	Second drive column
CC40	61705	Second 20-cell CAP
DFAN[1.]	101323	Rack-mounted cooling (Domestic - 115 VAC)
DPWR	101410	Redundant AC power option (Domestic rack mounted UPS and switch – 115 VAC)—DFAN feature must also be ordered.
EFAN	101324	Rack-mounted cooling (International – 240 VAC)
EXDR	61707	Expansion frame (294 cartridge slots)
	61703	For libraries using firmware lower than version 3.02: Compact PCI bus expansion (MPV card) and 1 GB Fibre Channel card (MPU card – SC connectors)
IFC2	101672	For libraries using firmware version 3.02 or later: Compact PCI bus expansion (MPV card) and 2 GB Fibre Channel card (MPU2 card – LC connectors)
		2 GB Fibre Channel card (MPU2 card) only: requires MPC/MPCL card at firmware version 3.02 or later and MPV card.
JFAN*	101323	Rack-mounted cooling (Japan only – 90 VAC)
L700-PTP		Pass-thru port connecting two L700e libraries; allows up to two cartridges to be passed between the libraries at a time.
LV02	101368	Low Voltage Differential (LVD) operation for libraries with *MPC card only* (MPW and MPV logic cards)
LV04	101662	LVD kit, with cable and terminator, for LVD/SE operation with *MPCL cards only.*

Table 1-4. Library Optional Features and Conversion Bills (Continued)

Feature/Model	Conversion Bill	Description
Upgrade from L700-e30 to L700-e40 model	61978	Access to all cells on Panel 2

Note: * This feature must be ordered when UPS and switch feature (DPWR) is ordered. The following power cable is included with this feature: part 10083242, 2.3 m (7.5 ft), NEMA 5-15. If your machine serial number is 0001—5676, you must order the replacement door, Field Bill 101327.

■ Pass-thru Port (L700-PTP)

The optional pass-thru port (PTP) allows the transfer of up to two cartridges at a time between two libraries. The library containing the cartridge to be passed is referred to as the "source" library; the library to which the cartridge is passed is referred to as the "destination" library.

The PTP satisfies the operating system's mount request by transferring cartridges— from a library that has all drives allocated to jobs—to the other library that has an idle drive.

The PTP can only be installed between any two L700e models.

■ 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 L700e library is Model HRZNLSA, Feature code LS4X. Configuration and operation instructions are outlined in Appendix C.

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. See Table 1-5.

Table 1-5. StorageTek L-Series Library Admin Model/Feature Code

Description	Model	Required Feature	Quantity
StorageTek L-Series Library Admin for L700/700e	HRZNLSA	CDRM	N/A
		LS4X (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 1-6.

Table 1-6. StorageTek Framework Library Monitor Model/Feature Codes

Description	Model	Required Feature	Quantity
StorageTek Framework Library Monitor	HRZN001	CDRM	N/A
		FS4X (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. It is also required for PTP operation. See Table 1-7.

Table 1-7. StorageTek Library Manager Model/Feature Codes

Product	Model	Feature	Quantity
StorageTek Library Manager	HRZN003	CDRM	N/A
		FS4X (1 per tape library)	
The features below correspond to the customer's platform.			
		WN2K (Windows 2000)	
		NT100 (Windows NT)	
		SLRS (Solaris)	
		LBAT (Library Attach)	

Note: Library Attach is required for PTP operation and for Windows NT/2000 platforms. ISVs use this product as the NT/2000 Client Software Component to interface with ACSLS, Library Manager, and Library Station.

Table 1-8. 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
PTP operation			X*

Note: Version 2.0 or higher required.

■ Tape Drive Features

Supported drives and their feature numbers are listed in Table 1-9.

Table 1-9. Drive Features

Drive	Model Number	Feature Code	Interface	Drive Tray
DLT 7000	977E–001	2010	Single-ended	TX40
DLT 7000	977E–001	2012	HVD	TX40
DLT 8000	9788–001	2012	HVD	TX40
SDLT 220	SDLT-BR1	BRHV	HVD	TX40
SDLT 220	SDLT-BR1	BRLV	LVD/SE	TX40
SDLT 320	SDLT-321	BRHV	HVD	TX40
SDLT 320	SDLT-321	BRLV	LVD/SE	TX40
Gen1 HP Ultrium - HVD	TLTOP01[1]	HPHV	HVD[2]	[3]
Gen1 HP Ultrium - LVD	TLTOP01[1]	HPLV	LVD/SE	
Gen1 IBM Ultrium - HVD	TLTOP01[1]	IBHV	HVD[2]	[3]
Gen1 IBM Ultrium - LVD	TLTOP01[1]	IBLV	LVD/SE	
Gen1 IBM Ultrium - Fibre Channel	TLTOP01[1]	IBFC	Fibre Channel	
Gen1 Seagate Ultrium - HVD	TLTOP01[1]	SGHV	HVD	
Gen1 Seagate Ultrium - LVD	TLTOP01[1]	SGLV	LVD/SE	
Gen2[3] HP Ultrium - LVD	LTO2001[4]	HPLV	LVD/SE	[3]
IBM Gen2 Ultrium - Fibre Channel	LTO2001[4]	IBFC	Fibre Channel	[3]

Table 1-9. Drive Features (Continued)

Drive	Model Number	Feature Code	Interface	Drive Tray
T9x40	5	5	HVD	TX40
T9x40	5	5	Fibre Channel	TX40
T9840B	5	5	ESCON[6]	TX40

Note:

1. The TLTOP01 product design choices are: STK0, HEWY, HTCH, SUN0, and NEC0.

2. For HVD operation, the drive tray may contain a converter card.

3. Drive tray will be determined by drive type availability.

4. Gen2 Ultrium drives:

    a. For SCSI operation, are LVD interface only; HP model requires library firmware 3.03 or later

    b. For Fibre Channel operation, require library firmware 3.04 or later

    c. Product design choices are STK0 and SUN0.

5. For T9x40 feature numbers, consult the *T9x40 Tape Drive System Assurance Guide*, part MT5003

6. For ESCON operation, library firmware must be edition 3.01 or later.

■ 13U Rack Area

The internal 13U rack area (behind the right front door) may be used by customers for additional equipment. Refer to "Rack Safety and Precautions" on page xxx.

CAUTION:
Heat within rack area: **Cooling considerations should be made based upon the power dissipation within the rack space, as well as the external library room ambient conditions. Cooling must be provided for moderate power dissipation within the rack space.**

Additional cooling, as described below, is recommended for high power dissipation components such as multiprocessor servers or disk arrays.

Rack Cooling

A cooling unit is *required* if you are installing the American Power Conversion (APC) redundant AC power option.

Depending on the type and amount of other equipment in the rack area, a cooling unit may also be required. The charts below offer guidelines for the customer's site.

Figure 1-3. Cooling Recommendations, Rated to 35 Degrees C

Fifteenth Edition
StorageTek Proprietary
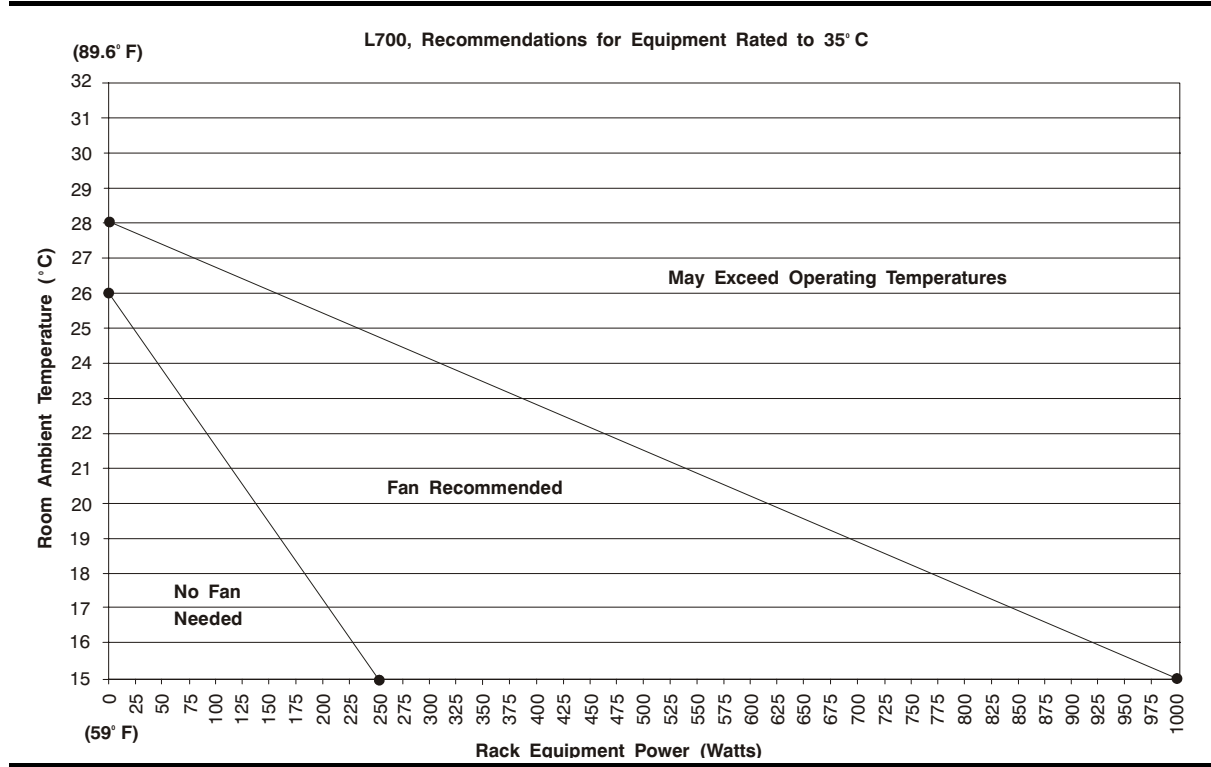
Figure 1-4. Cooling Recommendations, Rated to 40 Degrees C
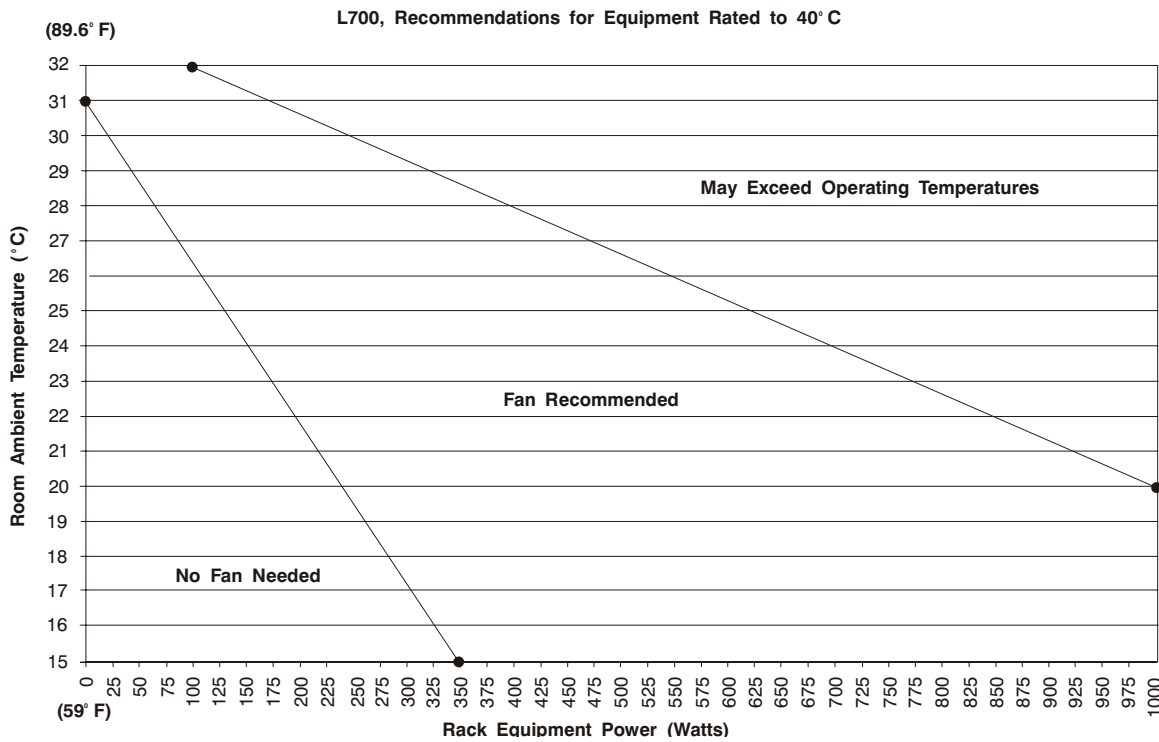
To install the rack cooling unit, follow the directions enclosed with the appropriate conversion bill listed below. The rack cooling unit is shown in Figure 1-5 on page 1-18.

Note: A separate power cable is included with the cooling unit. See Table 1-4 on page 1-10.

Table 1-10. Rack Cooling Conversion Bills

Conversion Bill	Description
101323	Domestic fan, rack cooling area
101323	Japan fan, rack cooling area
101324	International fan, rack cooling area

StorageTek Proprietary

Figure 1-5. Optional Rack Cooling Fan (C65322)

C65352
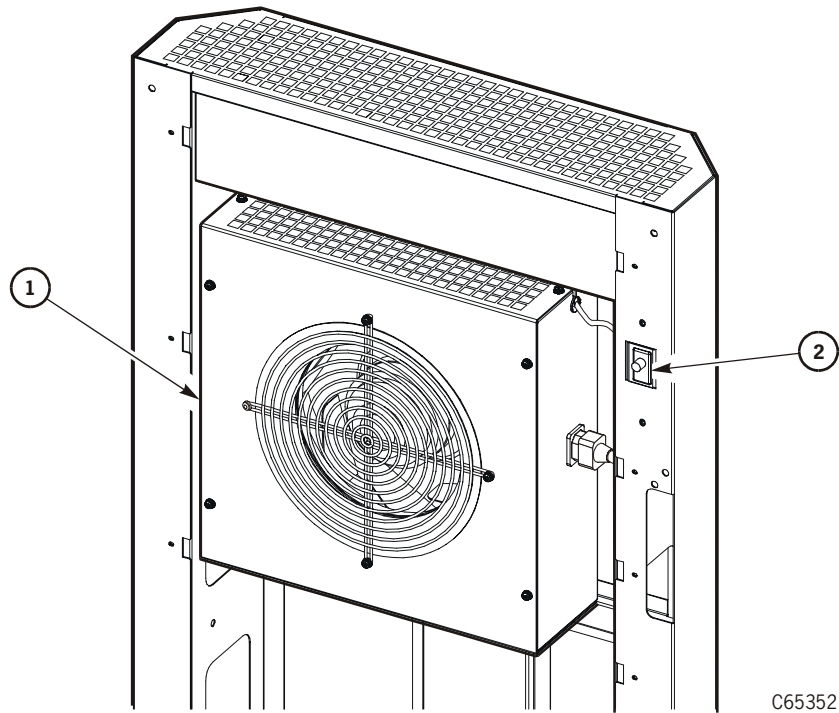
1. Cooling fan
2. Fan switch (fan deactivated when door is opened)

Redundant AC Power Option

The redundant AC power option (shown in Figure 1-6) consists of two batteries, a power monitor switch, power outlet strip, and Web-based monitoring software. If this system is being installed into the library, you must also install the cooling feature mentioned above.

Figure 1-6. Redundant AC Power Option (C65351)
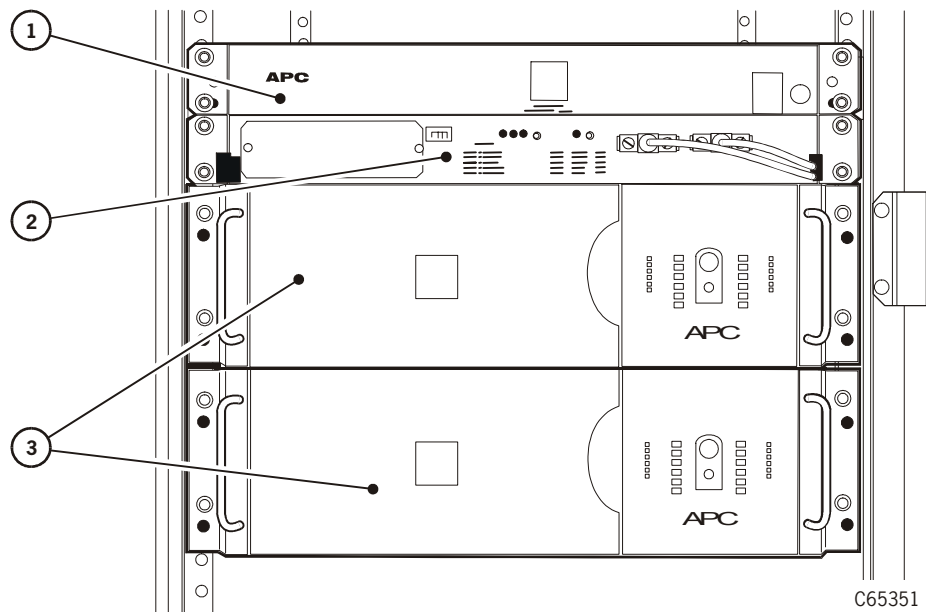
1. Power outlets
2. Power monitor switch
3. UPS with backup batteries

Instructions for installing the redundant AC power option are enclosed with the conversion bill listed below.

Table 1-11. Redundant AC Power Option Conversion Bills

Conversion Bill	Description
101410	Domestic rack mounted APC bundle. (See note 1.)
101411	International rack mounted APC bundle. (See note 2.)

Note:

1. This bundle includes L5-30 (locking, 120 VAC, 30 A) plugs. The customer must provide two L5-30R receptacles.

2. This bundle includes Hubbell 316P6W plugs. The customer must provide two Hubbell 316R6W receptacles.

Matrix Switch

This switch uses Matrix to emulate the operator panels of the T9840B drives. If you are installing the Maintenance Switch for Matrix application with T9840B drives, ferrite beads must be installed on the Ethernet cables at the switch and at each drive. Refer to the *T9x40 Tape Drive Installation Manual*, part 95879, for specific instructions.

■ SCSI HVD or LVD Considerations

With the advent of Ultrium tape drives, customers now have choices for the type of SCSI interface on which to operate: High Voltage Differential (HVD) or Low Voltage Differential (LVD).

As shown in Table 1-12 on page 1-21, the HVD interface allows longer cable lengths, but throughput is lower than LVD; the LVD interface restricts cable lengths, but provides faster throughput.

As a service representative you must understand these cabling requirements as well as:

- How LVD Ultrium drives are different internally from HVD Ultrium drives
- How the library (that is, the control path) is converted to LVD operation
- The Host Bus Adapter (HBA) requirements
- The consequences for mixing SCSI types on a bus.

SCSI Cable Restrictions

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

Refer to "SCSI High Voltage Differential Connectors" on page 4-2 for more information about SCSI cables and SCSI adapters for both *control* and *data* paths.

Library SCSI Operation

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

LVD operation for the libraries with MPC cards requires an MPW card (Conversion bill 101368). Libraries with the MPCL card do not require the conversion bill since the MPCL can operate as native LVD/SE.

For LVD operation on the library interface, the library *must* be the last device on the SCSI bus and *must* use a single, shielded cable (part 3136668xx) with feed-through terminator attached.

Table 1-12 lists additional restrictions for SCSI connections.

Table 1-12. SCSI Cable Restrictions

Application	Length Restriction
Single-Ended (Library only)	Stub length: 0.1 m (4 in.) 5 to 10 Mb data transfer rate: 3 m (10 ft) 1 to 5 Mb data transfer rate: 6 m (20 ft)
High Voltage Differential	Stub length: 0.2 m (10 in.) 1 to 10 Mb data transfer rate: 25 m (82 ft)
Low Voltage Differential	Stub length: 0.1 m (3.9 in.) 108 GB data transfer rate: 12 m (39.37 ft)

Drive SCSI Operation

Native operation for both IBM and Hewlett Packard Ultrium tape drives is the LVD interface. To operate either drive as HVD, converter cards must be installed on the drive trays. There is no converter card for HVD operation on Seagate drives; their model number dictates the type of operation.

When installing an Ultrium drive in the library, you must match the cable types and terminators with the bus type. Cables for either LVD or HVD configurations are listed in Table 4-7 on page 4-7; terminators are listed in "Direct Connection" on page 4-10.

Precautions

Table 1-13 on page 1-22 lists potential equipment damage or bus-disabling situations that may arise if the SCSI types are intermixed.

CAUTION:
***Potential equipment damage:* The single-ended, LVD, and HVD alternatives are not compatible and cannot be mixed on the same bus.**

Table 1-13. SCSI Device/Bus Types: Precautions

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

HBA Requirements

CAUTION:
Mismatching SCSI operation types: **The HBA in the customer's server must match the library's SCSI bus type.**

The table below lists the different types of SCSI operation requirements.

Table 1-14. HVD and LVD Modifications

Low Voltage Differential	High Voltage Differential
Library *with MPC card* – MPW card attached to MPV card[1]	Library *with MPC card*– None
Library *with MPCL card* – None	Library *with MPCL card* – Jumper at J16
IBM Ultrium – None[2.]	HP Ultrium – converter card[2.]
HP Ultrium – None[2.]	HP Ultrium – converter card[2.]
Seagate Ultrium – Set by model number[2.]	Seagate Ultrium – Set by model number[2.]
Host Server – LVD Host Bus Adapter	Host Server – HVD Host Bus Adapter

Note: 1. See Table 1-4 on page 1-10 for library feature number.

2. See Table 1-9 on page 1-14 for drive feature number.

■ Fibre Channel

Fibre Channel operation also requires certain considerations that must be taken into account for proper operation. Cable information and operation topologies are explained in the sections below.

Fibre Channel Cable Considerations

Table 1-15 lists the cable and connector specifications that the L700e library supports.

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

Table 1-15. Fibre Channel Cables and Connectors

Distance		FC-0 Code	Cable	Type	Connector
Meters	**Feet**				
2–300	6.5–985	100-M6-SN-I	62.5 µm Multimode	Shortwave laser without OFC	Keyed Duplex SC
2–500	6.5–1640	100-M5-SN-I	50 µm Multimode	Shortwave laser without OFC	Keyed Duplex SC

Fibre Channel Topologies

The L700e supports the following topologies with a single N_Port (N=Node) attachment:

• Arbitrated Loop—private loop
• Arbitrated Loop—public loop

The Arbitrated Loop provides:

• Multiple connections for devices that share a single loop

• Only point-to-point connections between an initiator and target during communications

The library supports both public and private loop configurations (see the following sections).

In a Fibre Channel arbitrated loop, as with the SCSI protocol, devices must arbitrate and win the connection before *bus* communications can begin. After a device is powered on and initialized on the loop, it must arbitrate and win to be able to communicate with other *devices* on the loop.

Private Arbitrated Loop

If the arbitrated loop is not attached to a Fibre Channel fabric, it is a private loop. A private arbitrated loop can connect up to 126 N-type ports. On this loop:

- Only point-to-point communication is possible between one initiator and one target at any time. (Other links on the loop act as repeaters.)

- Both initiator and target of the communication must reside within the same loop.

While the library supports this Fibre Channel topology, StorageTek does not recommend it. Its best implementation includes a Fibre Channel hub.

Public Arbitrated Loop

If the Fibre Channel arbitrated loop contains at least one F-type (F=Fabric) port—that is, is attached to a Fibre Channel fabric—it is a public loop. A public loop can contain up to 126 N-type ports and one F-type port. If the fabric connects to another arbitrated loop, then an initiator on one public loop might be able to communicate with a target on another.

■ ESCON

ESCON operation with the T9840B drive 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 6.0.1 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.

■ Robotic Components

The library contains a robot, arrays of cells for storing cartridges, tape drives, and a CAP for importing cartridges into or exporting cartridges from the library.

Client commands activate the robot. The library translates the client command into servo commands to direct each motor within the library.

The robot contains three major components:

1. Theta motor (controls lateral movement)

2. Z column motor (controls vertical movement)

3. Hand-Camera (controls cartridge movement to and from cells, drives, and CAP)

These components are shown in Figure 1-7 on page 1-26. A detailed figure of the hand-camera assembly is shown in Figure 1-8 on page 1-27.

The robot moves cartridges from the storage cells by rotating the Z column, moving the hand-camera assembly up and down the Z column, and reaching into a storage cell to grip a tape cartridge.

The robot stores tape cartridges in cell arrays that hold six tape cartridges per array.

The robot also transfers cartridges to/from the CAP and PTP.

The cell arrays are stacked in columns; the columns are arranged in a circle around the robot.

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Figure 1-7. Robotic Components (C65066)
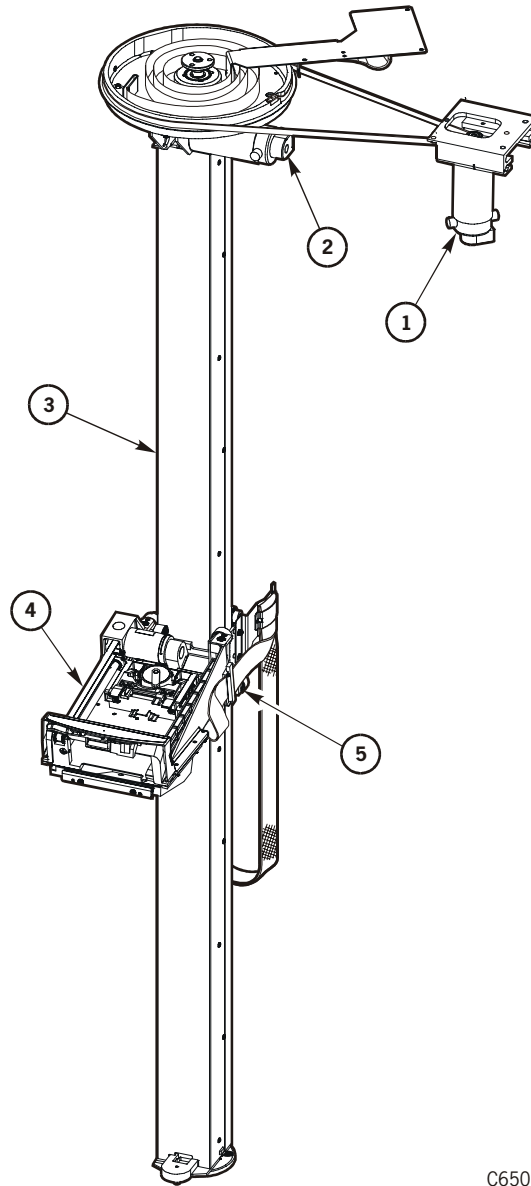
C65056

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

■ Hand-Camera Assembly

The hand-camera assembly (see the figure below) consists of a gripper, a motor-driven drive belt for gripper extension, and a bar code scanner (LED) card and camera (enclosed in a case under the hand components).

The camera reads the volume serial numbers (VOLSERs) of tapes during an audit and when cartridges are imported into the CAP. For mount and dismount activities, the camera is not used since the VOLSERs and positions of all tapes are kept in the memory of the MPC/MPCL card.

During machine initialization, the hand extension is checked below the calibration label (at the bottom of the standard Drive Column 0).

Note: Cartridges left in tape drives will not be audited. However, volume information is retained for drives loaded by the library.

Figure 1-8. Hand-Camera Assembly (C65057)
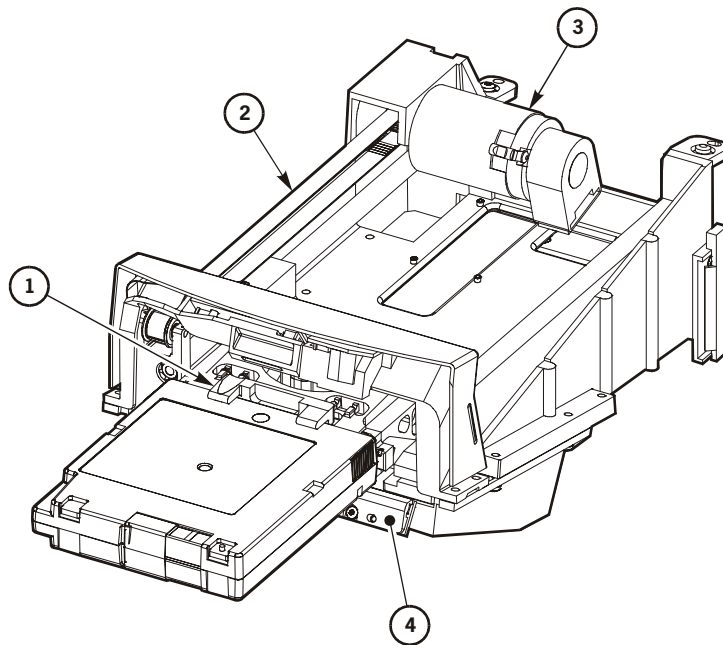
C65057

1. Gripper
2. Drive belt
3. Motor
4. LED (MPL) card

■ Library Electronic Components

The major electronic components of the library are shown in Figure 1-9 and Figure 1-10 on page 1-29. These components are behind the right front door of the library.

Figure 1-9. Library Electronic Components (1 of 2) (C65151)
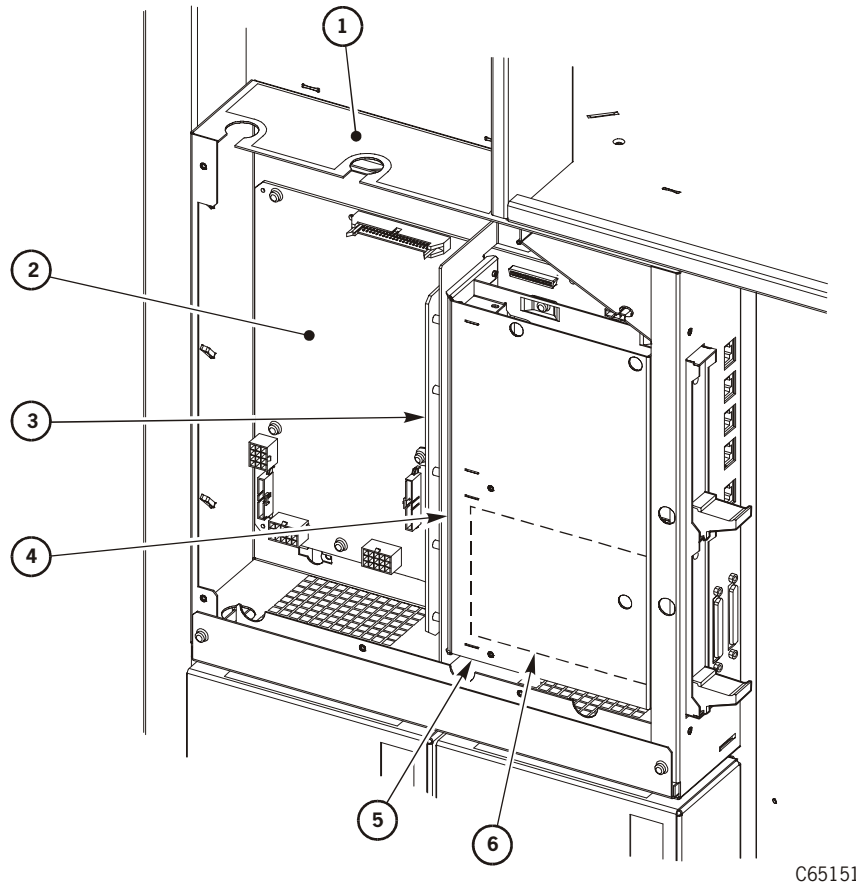
C65151

1. Electronics module frame
2. MPC/MPCL card
3. MPM (multiplexor card for second drive column)
4. MPV card (not required for LVD/SE operation on MPCL card)
5. Compact PCI (CPCI) module
6. MPU (fiber expansion) or MPW (LVD SCSI) card (not required for LVD/SE operation on MPCL card)

Figure 1-10. Library Electronic Components (2 of 2) (C65058)
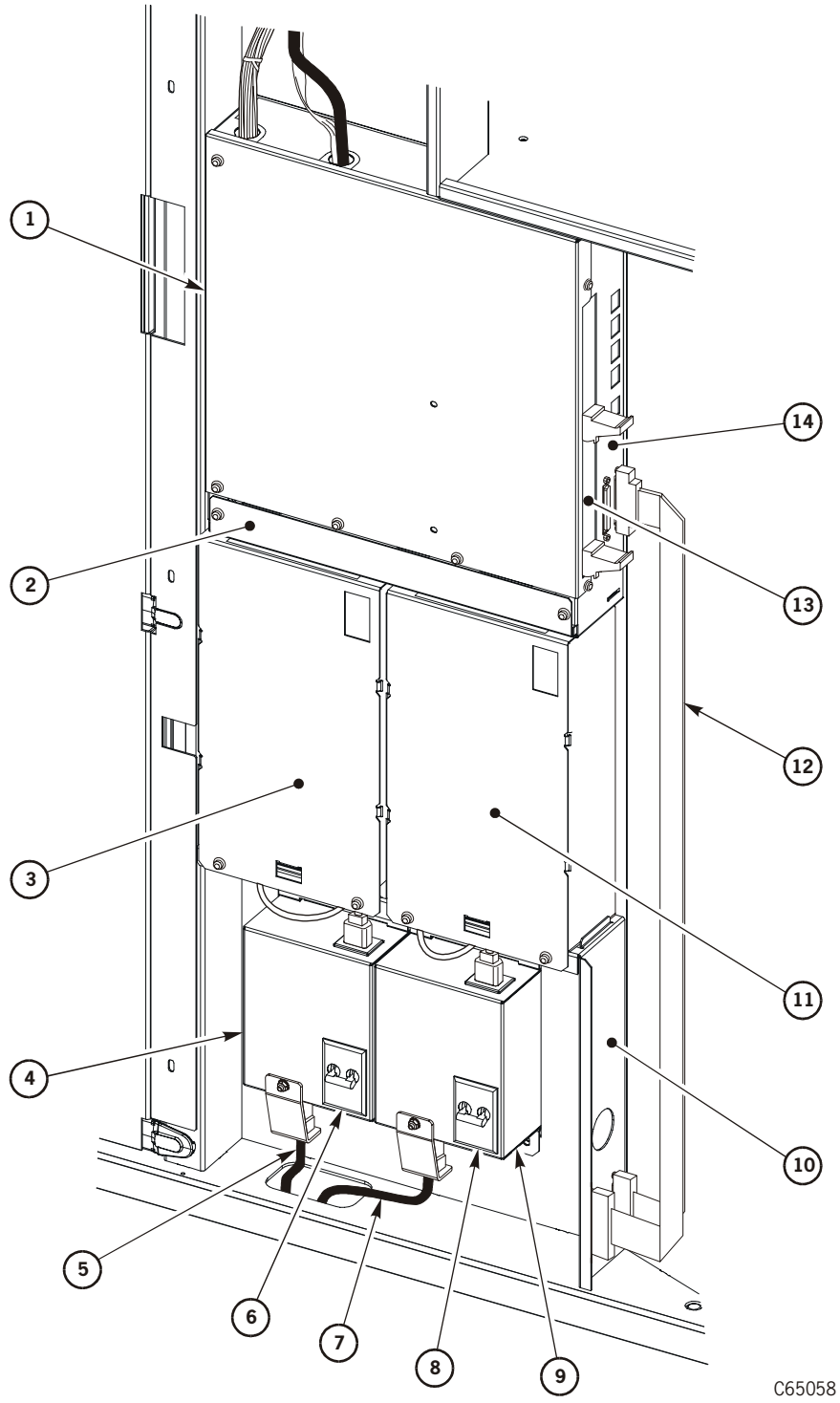
C65058

Figure 1-10. Library Electronic Components (2 of 2) (Continued) (C65058)

1. MPC/MPCL and associated logic cards
2. Fan tray assembly
3. Standard DC power supply
4. Standard AC power distribution unit (PDU)
5. AC power cables
6. Standard PDU circuit breaker
7. Optional second power cable
8. Optional second PDU circuit breaker
9. Optional AC PDU
10. Bulkhead
11. Optional second DC power supply
12. Library-to-client SCSI control cables (shown in HVD position)
13. MPU (Fibre Channel), MPW (LVD SCSI for MPC card), or LVD/SE SCSI (for MPCL card)
14. MPC/MPCL card

■ Library Power System

The library power system consists of:

- One or two AC power distribution units (PDUs) that:

    - Operate within a line voltage of 90 to 265 VAC, 50 or 60 Hz
    - Distribute AC voltage to the drives
    - Are protected from overcurrent by circuit breakers

    Note: When installing your drives in a library that has two AC PDUs, attach each PDU to a separate branch circuit. Be sure that you have referred to "Site Power Considerations" on page 1-31 to establish the site power requirements.

- One or two DC power supplies that provide voltage to the library

The library may also contain an optional uninterruptable power source (UPS) that:

- provides fully redundant power to the library and drives in the event of a power failure
- supplies conditioning power to prevent surges, spikes, and brownouts

The UPS controls all the above through an intelligent switch. The feature includes two battery packs, a power strip, and the rack-mounted switch. The optional conversion bills are listed in Table 1-11 on page 1-19. The applicable cooling modification must be installed if this feature is used (see "Rack Cooling" on page 1-16)

There are many possible power configurations available for the library and drives. These are explained in "Library Power Configurations" on page 4-15.

DC Power Supplies

If your library has two DC power supplies, both supplies will power the library during normal operation. If a fault is detected in one supply, the second DC power supply will assume control and post the error to the FSC log.

Power Specifications

Library power specifications are listed in Table 1-16.

Table 1-16. Library Power Specifications

Power cable	**U.S./Canada:** 100 to 127 VAC UL/CSA power cable **International:** 200 to 240 VAC HAR power cable
Input voltage ranges	100 to 127 VAC / 200 to 240 VAC
Input current	Library: 1.0 A at 120 VAC (0.5 A at 240 VAC) DLT 7000—DLT 8000: Refer to DLT manuals. T9x40: Refer to T9x40 manuals. Ultrium: Refer to specific manufacturer's manual.
Power configuration	**U.S./Canada:** Single-phase 100 VAC, 50 to 60 Hz, 15 A Service, 3 wire **International:** Single-phase 200 to 240 VAC, 50 to 60 Hz, 10 A Service, 3 wire
Power consumption	Library only: 120 W DLT 7000—DLT 8000: Refer to DLT manuals. T9x40: Refer to T9x40 manuals. Ultrium: Refer to specific manufacturer's manual.
Maximum heat output	Library only: 410 Btu/hr DLT 7000—DLT 8000: Refer to DLT manuals. T9x40: Refer to T9x40 manuals. Ultrium: Refer to specific manufacturer's manual.

Site Power Considerations

Table 1-17 on page 1-32 lists the maximum number of tape drives that may be installed on a single AC circuit. Please note the differences between the Power Factor Correction (PFC) and non-PFC drive configuration.

The maximum configuration of drives with non-PFC supplies requires two AC circuits.

Table 1-17. Maximum Number of Drives on Single AC Circuit

Voltage	120 VAC [1.]				220 VAC [1.]			
Current Capacity	15 A		20 A		10 or 15 A (International)		15 A or 20 A	
Phase	Single Phase		Single Phase		Single Phase		Two Phase	
Power Cord Rating [2.]	15 A		15 A or 20 A		10 or 15 A (International)		15 A	
Plug Style	Non-locking	Locking[3.]	Non-locking	Locking[3.]	Non-locking	Locking[3.]	Non-locking	Locking[3.]
	Maximum Number of Drives				Maximum Number of Drives			
T9x40/	12	12	12	12	9	12	9	12
DLT w/ non-PFC	10	10	10	13	5	16	5	20
DLT w/ PFC [4.]	16	16	20	20	20	20	20	20
Ultrium	16	16	20	20	20	20	20	20

Notes: [1.] Numbers in this table include library robotics requirements. It is recommended that site power be sized to accommodate expansion to the maximum number of tape drives.

[2.] Two power cords are required if over 10 DLT/Ultrium or six T9x40 drives are installed.

[3.] Use locking plugs for non-power factor corrected (non-PFC) DLTs mixed with T9x40s or PFC DLTs.

[4.] PFC power supplies have less leakage current and lower peak current demand on the AC input. PFC supplies are currently not available.

Use Table 1-17 to determine:

- The number of customer drives
- Whether the drives require locking or non-locking plugs

Note: All new DLT power supplies ship with the PFC power supply (85 W).

- If more than 10 DLT, 10 Ultrium, or six T9x40 drives must be installed (two power cables required)
- The AC circuit the customer will supply

When your determination is made, select power cables from "Power Cable Part Numbers" on page 1-33.

Power Cable Part Numbers

The customer must order the power cable and supply the correct receptacle.

Power cables for the tape library are listed in Table 1-18.

Table 1-18. L700e Power Cables

Input Voltage	Country	If the Library Contains...		
		Only T9x40 drives, newer DLT Drives, Ultrium Drives, or a mixture of T9x40/ and newer drives	Older DLT Drives, (with non-PFC power supplies)	Optional Redundant AC power option
100–127 VAC 15 A	U.S./Canada	Nema 5–15P 10083634	Nema 5–15P 10083634	The customer must provide two L5-30R receptacles.
	Japan	JIS 8303 10083649	JIS 8303 10083649	
200–240 VAC 10 or 15 A	Australia	AS 3112 10083650	Locking[1.] IEC 60309 10083635	The customer must provide two Hubbell 316R6W receptacles.
	Europe[2.]	CEE 7/7 10083646	Locking IEC 60309 10083635	
	Italy	CEI.23 10083651	Locking IEC 60309 10083635	
	South Africa	BS 546 or BS 1363 10083655	Locking IEC 60309 10083635	
	South Korea	KS 8305 10083656	Locking IEC 60309 10083635	
	United Kingdom	BS 1363 10083653	Locking[1.] IEC 60309 10083635	

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Table 1-18. L700e Power Cables (Continued)

Input Voltage	Country	If the Library Contains...		
		Only T9x40 drives, newer DLT Drives, Ultrium Drives, or a mixture of T9x40/ and newer drives	Older DLT Drives, (with non-PFC power supplies)	Optional Redundant AC power option
200–240 VAC 10 or 15 A	U.S./ Canada	NEMA 6–15 10083644	Locking IEC 60309 410573502 *or* NEMA L6– 15P 10083645	The customer must provide two Hubbell 316R6W receptacles.

Notes: [1.] Use locking plugs for DLTs or DLTs mixed with T9x40s.

[2.] Europe includes Germany, Norway, Sweden, Denmark, Finland, the Netherlands, Belgium, France, and Switzerland.

■ Physical Specifications

The physical dimensions of the tape library are shown below. Table 1-19 on page 1-36 lists the variable weight specifications for the tape library.

Figure 1-11. Physical Dimensions—General (C65059)
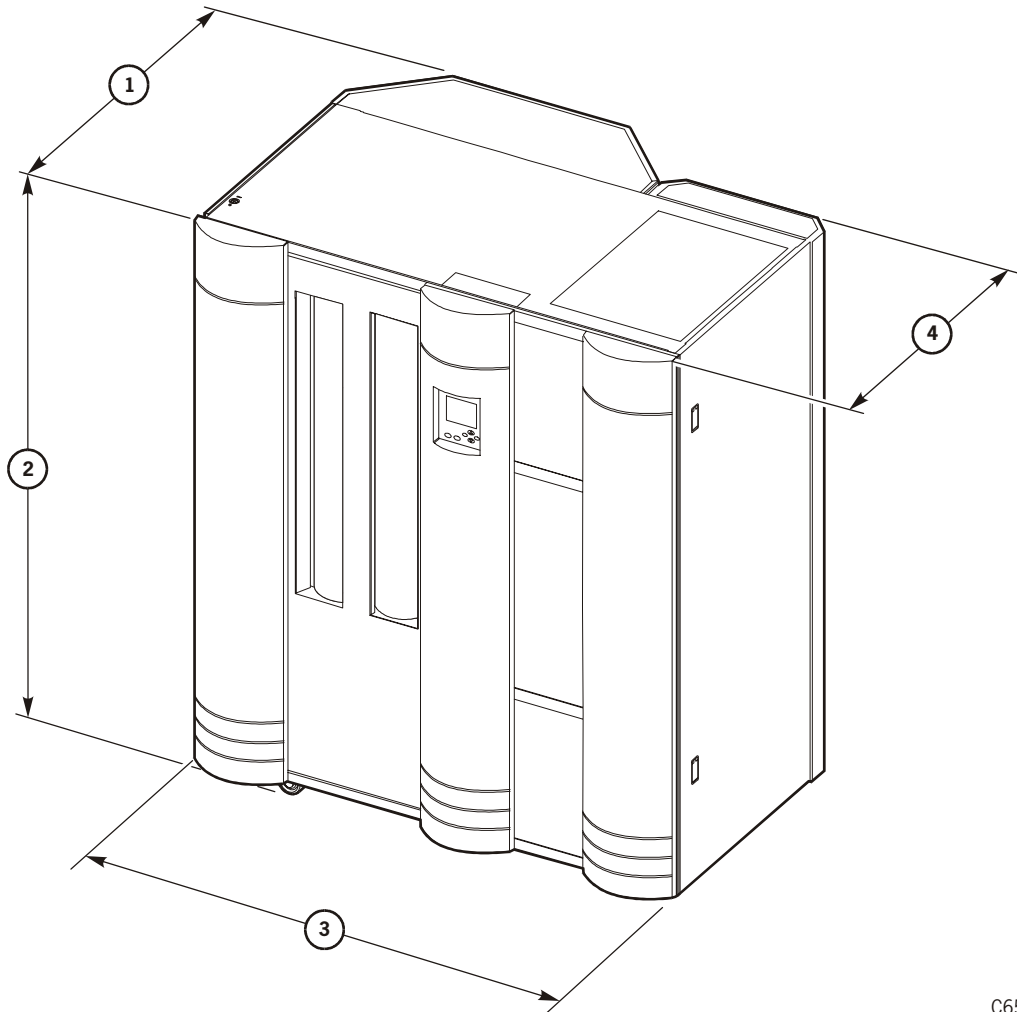
C65059

1. Depth with expansion frame: 1.12 m (44 in.)
2. Height: 1.8 m (72 in.)
3. Width with covers: 1.6 m (62 in.)
4. Depth without expansion frame: 1 m (37.5 in.)

   Total weight (approximate) of the library with covers: 345 kg (761 lbs)

Note: Add 150 mm (6 in.) for top clearance and 100 mm (4 in.) on sides for cooling.

Table 1-19. L700e Weight Variations

L700-E40	No Drives	10 DLT or Ultrium Drives	20 DLT or Ultrium Drives	12 T9x40 Drives
Weight w/ covers	345 kg (761 lbs)	398 kg (941 lbs)	451 kg (995 lbs)	408 kg (901 lbs)
Shipping weight	503 kg (1109 lbs)	See drive manual	See drive manual	See drive manual
Weight (w/ expansion frame)	413 kg (911 lbs)	466 kg (1,027 lbs)	519 kg (1,144 lbs)	476 kg (1,049 lbs)
Weight (w/ expansion frame and tapes)	504 kg (1,111 lbs)	579 kg (1,227 lbs)	610 kg (1,344 lbs)	567kg (1,249 lbs)
Pass-thru Port	Weight with covers: 43 kg (92 lbs) Shipping weight: 97.5 kg (215 lbs)			

■ Environmental Specifications

Table 1-20 lists the environmental consideration for the tape library.

Table 1-20. Library Environmental Specifications

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

Installing the Library and Drives

2

This chapter contains the procedures for unpacking and installing the library and drives. Special installation considerations are included where applicable.

■ Hardware Installation Checklist

Table 2-1 summarizes the steps required to install the library. *Make sure all steps are completed in the sequence listed.*

Table 2-1. Hardware Installation Checklist

* If applicable

■ Required Tools

Tools you will need to install the library and its associated tape drives are:

- 3/4-inch wrench (STK tool crib part WR08), adjustable wrench (STK tool crib part WR11), or socket wrench

- Phillips screwdriver

- Torx set

- 3/16-inch nut driver

- 5/16-inch nut driver

- Diagonal cutters or knife

- Laptop personal computer

    - RJ45 cable (part 4108289xx)—included in shipping kit

    - RJ45—DB9 adapter (part 10410823, included in shipping kit) or
      CSE DOS Diagnostic cable—part 24100134

Additional tools you will need to install the expansion frame are:

- Adjustable wrench
- Flat blade screwdriver
- Flashlight

An additional tool you might need for the Pass-thru Port (PTP) installation is a small step ladder.

■ Preparing the Library Location (Standard)

Be sure to allow enough space for the library; plan the signal and power cable routing and provide enough space to open all doors.

Note: For installations involving a PTP, see .

Provide 150 mm (6 in.) above the library and 100 mm (4 in.) on the sides for cooling clearances.

Figure 2-1. Cable Access Locations (C65387)
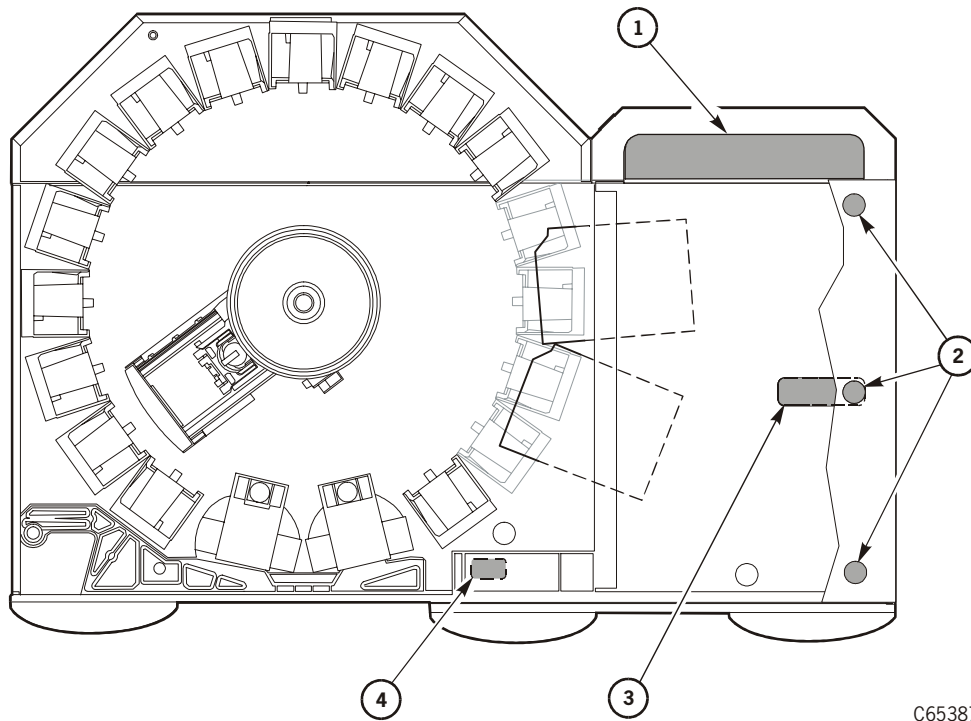
C65387

1. Tape drive signal cables
2. Cables to/from 13U cabinet area
3. Power cable

Note: Safety agency standards require that your power receptacle is located within 2.8 m (9.2 ft) of the tape library. The power receptacle must also be easily accessible.

In sites where the power cable is directly wired to a power source, the facility must have a readily accessible disconnect device incorporated in the fixed wiring (15 A).

Remarque : Les normes des organismes de sécurité requièrent que votre prise
courant soit située à moins de 2,8 m de la bibliothèque. La prise de cou
doit être d'accès aisé.

Sur les sites où le câble d'alimentation est directement connecté à une
source d'alimentation, un système de déconnexion facile d'accès doit ê
intégré au câblage fixe (15 A).

Hinweis: Gemäß den geltenden sicherheitsrechtlichen Vorschriften darf die
Netzsteckdose maximal 2,8 m von der Library entfernt sein. Außerdem
die Steckdose gut zugänglich sein.

Wenn das Netzkabel fest an die Stromquelle angeschlossen ist, muß si
der Festverdrahtung eine gut zugängliche Unterbrechungseinrichtung
befinden (15 A).

Wskazówka: Przepisy BHP wymagają, aby skrzynka zasilania znajdowała się
odległości 2,8 m od biblioteki. Do skrzynki zasilania musi być łatwy d
W miejscach, gdzie kabel zasilania jest bezpośrednio podłączony do źr
prądu, w układzie zasilania zamontowanym na stałe musi być wbudow
urządzenie pozwalające na łatwe odłączenie źródła prądu (15 A).

Figure 2-2. Service Area Requirements (C65061)

C65061
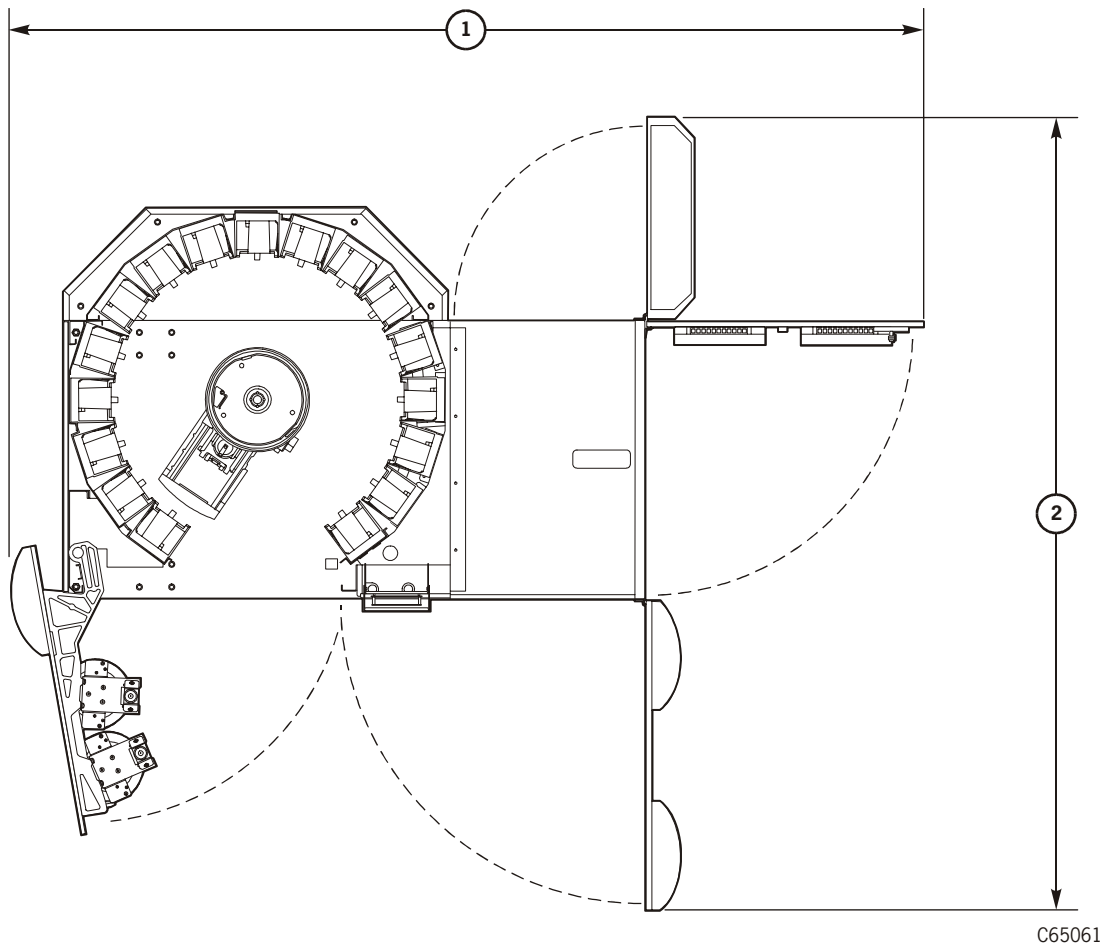
1. Access door and right side door open: 2.3 m (7.6 ft)
2. Rear door and right front door open: 2.1 m (6.9 ft)

Note: If your installation requires a Pass-thru Port, see Figure 3-3 on page 3-5.

StorageTek Proprietary

■ Preparing the Library Location (Seismic Areas)

For sites in areas of seismic activity, the customer may wish to permanently fix the library position for added stability. The wheel assemblies must be removed and the wheel mounting studs used to permanently fix the library's position. Refer to Figure 2-3 for locations of the wheel mounting studs.

CAUTION:
Bodily injury/equipment damage: **A licensed seismic engineer must be consulted to verify seismic zone exposures and adequate site preparation.**

Figure 2-3. Library Floor—Wheel Stud Locations (C65275)
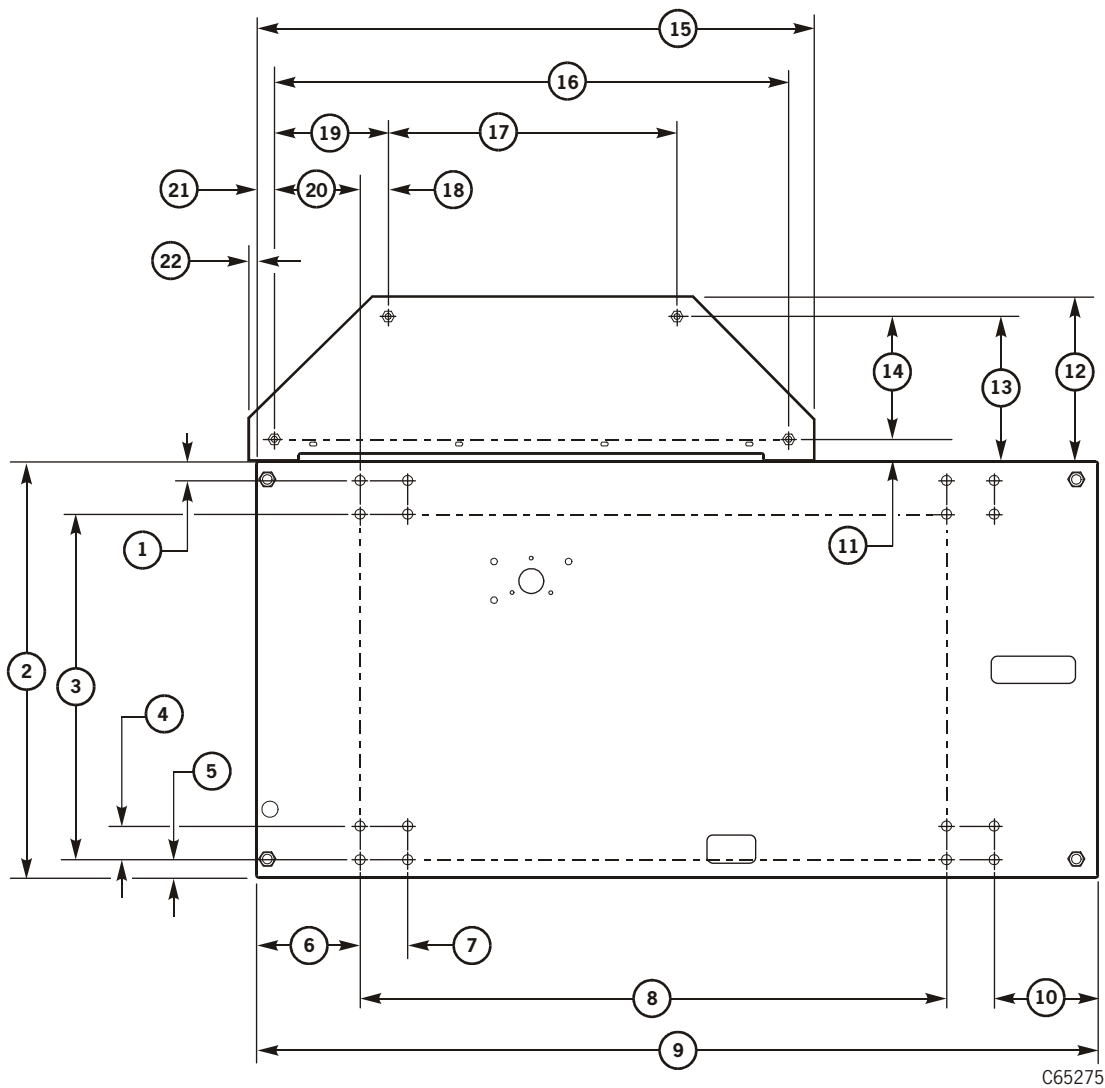
C65275

Figure 2-3. Library Floor—Wheel Stud Locations (Continued) (C65275)

1. 31.28 mm (1.25 in.)	12. 297.4 mm (11.7 in.)
2. 736.6 mm (29 in.)	13. 260.4 mm (10.25 in.)
3. 612.8 mm (24.1 in.)	14. 222.25 mm (8.75 in.)
4. 60.3 mm (2.4 in.)	15. 1.0 m (39.5 in.)
5. 31.8 mm (1.3 in.)	16. 0.93 m (36.5 in.)
6. 186.5 mm (7.3 in.)	17. 520.7 mm (20.5 in.)
7. 85.7 mm (3.4 in.)	18. 47.27 mm (1.86 in.)
8. 1.07 m (42 in.)	19. 203.2 mm (8.0 in.)
9. 1.5 m (60 in.)	20. 155.9 mm (6.14 in.)
10. 186.6 mm (7.3 in.)	21. 30.73 mm (1.21 in.)
11. 38.1 mm (1.5 in.)	22. 15.75 mm (0.62 in.)

CAUTION:
***Frame damage:* Do *not* attempt to use the holes for the shipping bolts to permanently fix the library's position. The frame may bend.**

Be sure that the considerations below are followed:

1. Cooling clearances must be provided: 150 mm (6 in.) above the library, 114.3 mm (4.5 in.) below the library, and 100 mm (4 in.) on the sides.

2. Allow service area access: 2.3 m (7.6 ft) wide by 2.1 m (6.9 ft) deep (reference Figure 2-2 on page 2-5).

3. Plan for any unique cable paths that may be needed.

■ Unpacking the Library

You will need a diagonal cutters or knife to cut the shipping straps.

Refer to Figure 2-4 on page 2-8 and:

1. Remove and retain the shipping bill.

CAUTION:
***Personal Injury:* Be sure no one is near the shipping straps when you are ready to cut them. The straps are under tension and could strike someone when cut loose.**

2. While holding the shipping ramp against the library box covers, carefully cut the three wrapping straps on the exterior of the packaging.

3. Remove the ramp and corrugated box covers.

4. Remove the shipping bag (not shown).

Figure 2-4. Unpacking the Library (C65062)
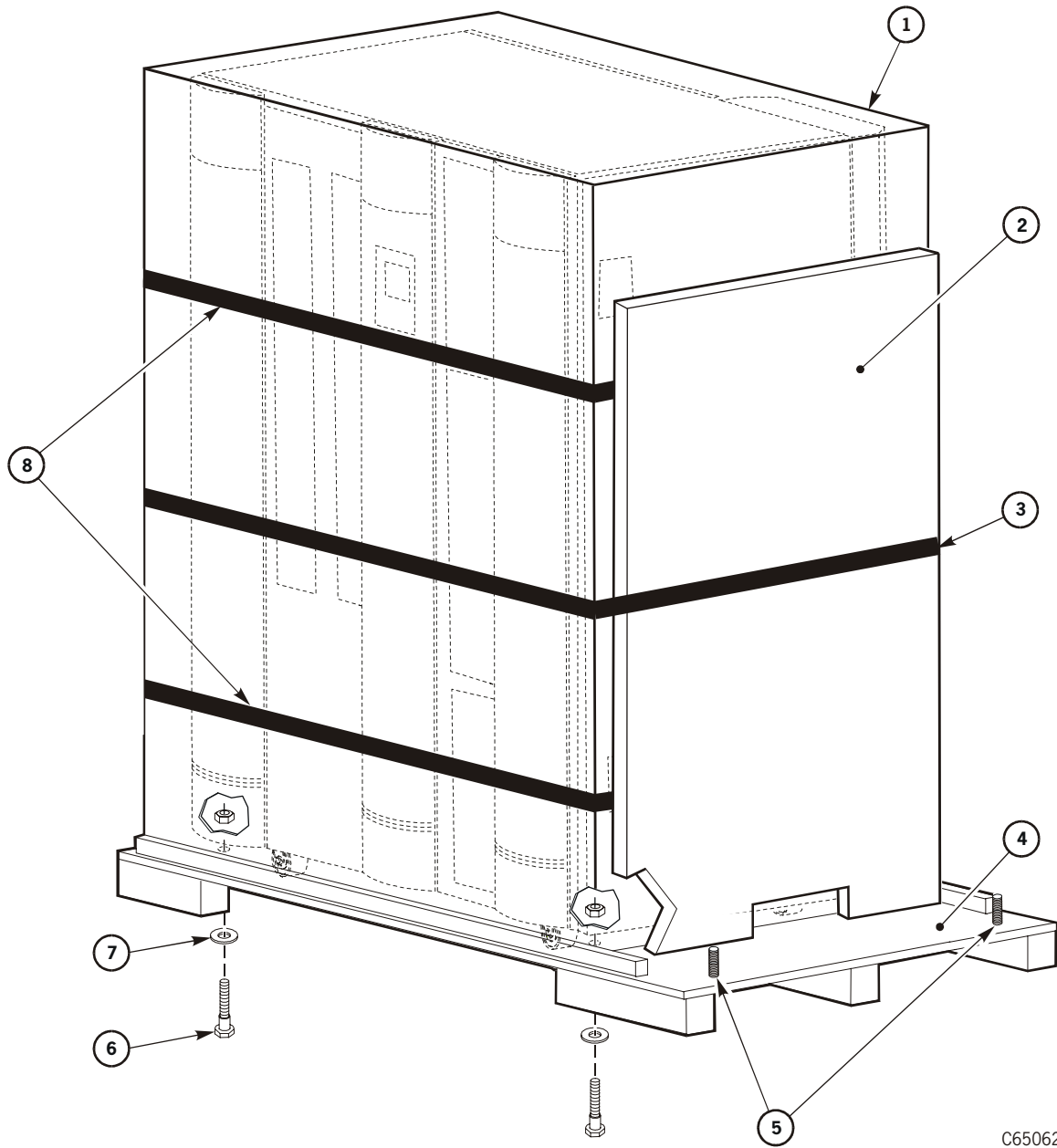
C65062

1. Ramp
2. Inner shipping box
3. Shipping box and ramp strap
4. Shipping pallet
5. Ramp posts
6. 3/4-inch mounting bolts (4)
7. Washers (4)
8. Shipping box straps

■ Removing the Library from the Pallet

Note: Some shipping agreements require the shipper to remove the library from its shipping pallet. If this is the case, you may skip this section.

If you must remove the library from its pallet, perform the following procedure:

WARNING:
Heavy load. **At least two people are required to remove the library from its shipping pallet.**

AVERTISSEMENT :
CHARGE LOURDE. **Deux personnes au moins sont requises pour retire bibliothèque de sa palette de transport.**

VORSICHT:
HOHES GEWICHT. **Um die Library von der Lieferpalette zu heben, benötigen Sie mindestens einen Helfer.**

OSTRZEŻENIE:
DUŻA WAGA. **Co najmniej dwie osoby powinny wyjmować bibliotekę z palety wysyłkowej.**

1. Using a 3/4-inch (or adjustable) wrench or socket, remove the four 3/4-inch bolts that secure the library to the pallet.

2. Remove the four wood blocks positioned near the bolts.

3. Position the ramp by aligning the holes of the ramp with the two posts on the pallet, as shown in Figure 2-4 on page 2-8.

4. Seat the ramp securely upon the two posts.

5. With people on both sides of the library, carefully guide the library down the ramp.

6. Remove the ramp and pallet from your work area. You may re-use or dispose of the shipping materials according to your local policies.

■ Moving the Library

Use two people to move the library to its installation position. If the library fits through the data center doors, proceed to "Positioning the Library" on page 2-12.

If the library does *not* fit through the building doors, refer to Figure 2-5 while following the applicable procedures below.

Figure 2-5. Physical Dimensions–Detailed (C65028)
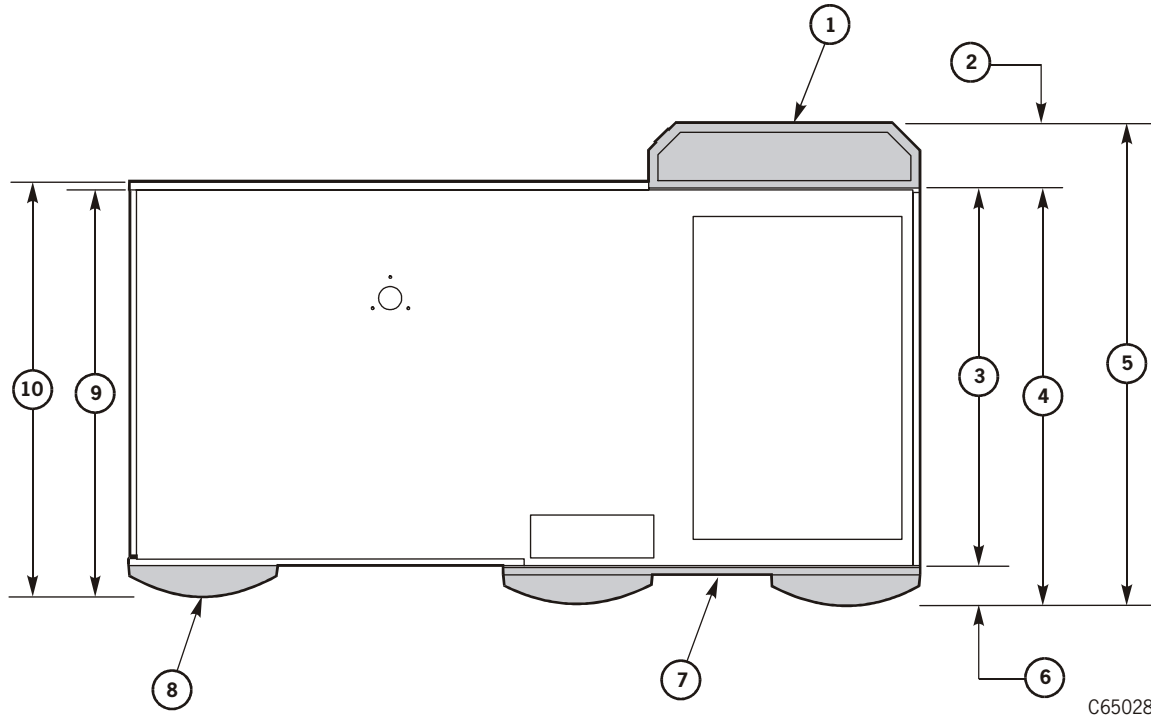
C65028

1. Rear door
2. Rear door - depth = 114 mm (4.5in.)
3. Frame - depth = 737 mm (29 in.)
4. Rear door and rear wall panel removed - depth = 826 mm (32.5 in.)
5. Rear door and front facade - depth = 953 mm (37.5 in.)
6. Front facade - depth = 89 mm (3.5 in.)
7. Right front access door with facades - depth = 89 mm (3.5 in.)
8. Left front access door with facade - depth = 76 mm (3 in.)
9. Left front access door with facade, rear panel removed - depth = 800 mm (31.5 in.)
10. Left front access door with facade, rear panel attached - depth = 826 mm (32.5 in.)

Removing the Rear Door

To remove the rear door to fit the library through a narrow opening:

1. Open the rear door.

2. Detach the lanyard strap by pulling it up off the plastic fastener at the frame.

CAUTION:
***Possible physical injury:* Be careful when removing the door. Follow the procedures in "Lifting Techniques" on page xxvi.**

3. Lift the door straight up off the hinges and place the door aside.

Using a T-25 Torx driver, remove the four screws and four cable guides. If this procedure gives you the required clearance, replace the hardware and covers you removed when the library is moved through all building doors.

If you need more door clearance, follow the next procedure to remove the front facades. Removal of the facade covers and operator panel will reduce the library depth by an additional 89 mm(3.5 in.) at its widest protrusion.

Removing the Front Facades

To remove the front facades of the library:

1. Open the *right* front access door.

2. Detach the lanyard strap by pulling it up off the plastic fastener on the frame.

CAUTION:
***Possible physical injury:* Be careful when removing the door. Follow the procedures in "Lifting Techniques" on page xxvi.**

3. Lift the door straight up off the hinges and place the door aside.

4. Open the shipping kit (see "Removing the Shipping Kit" on page 2-13) and obtain the library door key.

5. Open the *left* front access door.

6. On the *interior* side of the door, locate the T-25 Torx screw that retains the front facade (approximately half way down, near the hinge) and remove the screw.

7. At the front of the left library access door, lift the front facade straight up and place it aside.

Removing the Operator Panel

To remove the operator panel:

1. Disconnect the cable connector at the front of the panel by squeezing and pulling the connector.

2. Use a T-25 Torx driver to remove the two panel screws.

3. Carefully place the operator panel in the recessed tray.

Once the library is placed in its final location, replace the hardware, covers, and operator panel.

Removing the Rear Cover and Door Hinges

If more door clearance, follow the next procedure to remove the rear cover panel and rear door hinges.

1. Obtain a piece of firm cardboard (approximately 1/8 in. thick). Insert the cardboard at the lower right corner of the rear cover panel, between the rear cover and frame. This will release the spring steel retainer.

CAUTION:
Possible physical injury: **Be careful when removing the panel. Follow the procedures in "Lifting Techniques" on page xxvi.**

2. Lift the panel straight up and remove it from its mushroom retainers. You may also remove the mushroom retainers by using a T-30 Torx driver.

3. If you need to remove the hinges that hold the rear door, use a T-20 Torx tool to remove the hinge screws.

4. Once the library is moved through all building doors, replace the hardware and covers you removed.

■ Positioning the Library

To position the library for installation:

1. Carefully roll the library to its installation location.

2. Position the library to allow space for maintenance and operator access. These space requirements are shown in Figure 2-2 on page 2-5.

3. If your installation requires that you have cables routed underneath a raised floor, be sure the floor cutouts are in the correct positions.

■ Removing the Shipping Kit

To remove the library shipping kit:

1. Insert a Phillips screwdriver into each screw on the right, side door latches; and turn each screw counterclockwise to release the latches.

2. Lift both latches up and turn them both counterclockwise to release them and open the right side door.

3. Open the installation kit and remove the library door key (part 310293301) from the kit.

4. Open the right *front* door.

5. Insert the library door key into each key slot in the *left* access door and turn the key counterclockwise.

6. Open the left library door.

■ Securing the Library Position (Standard)

To secure the library position:

1. Apply the four wheel chocks (part 4048) from the shipping kit to the four wheels of the library.

2. Make sure the library does not move from its floor position.

■ Securing the Library Position (Seismic Areas)

CAUTION:
***Bodily injury/equipment damage:* A licensed seismic engineer must be consulted to verify building codes and installation criteria.**

For those customers wishing to permanently fix the library's position:

1. Move the library into position and line up the wheel assembly mounting studs with their designated positions above the floor or platform.

2. Secure the library into position. Thread size for attachment bolts are 5/16-18 inch UNC. The current torque used for the existing bolts is 100 in.-lb. (11.3 Nm).

■ Unpacking the Library Interior

To unpack the interior portion of the library:

1. Locate and remove the Z column shipping pin (shown in Figure 2-6).

2. Locate and remove the theta shipping pin (shown in Figure 2-7 on page 2-15).

Figure 2-6. Z Column Shipping Pin (C65063)

C65063

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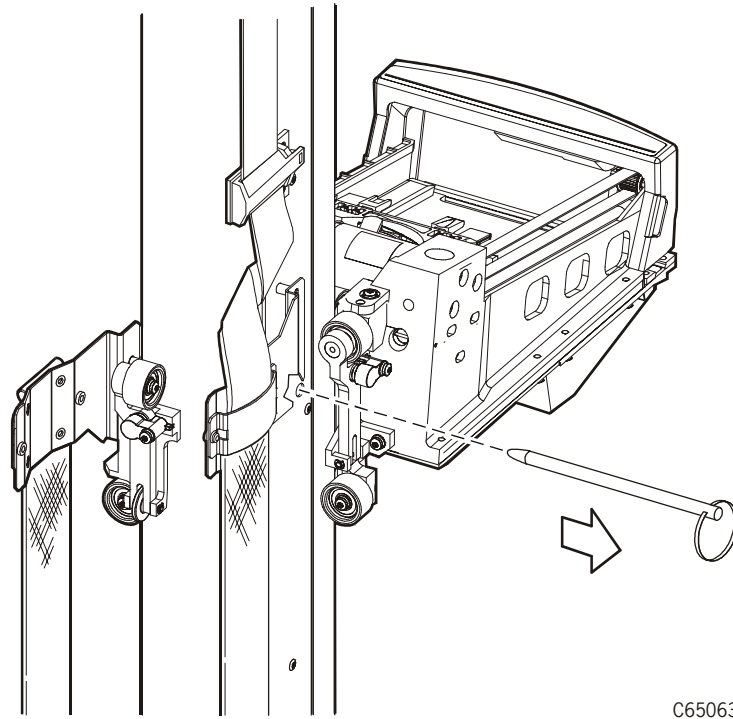
Figure 2-7. Theta Shipping Pin (C65102)

C65102
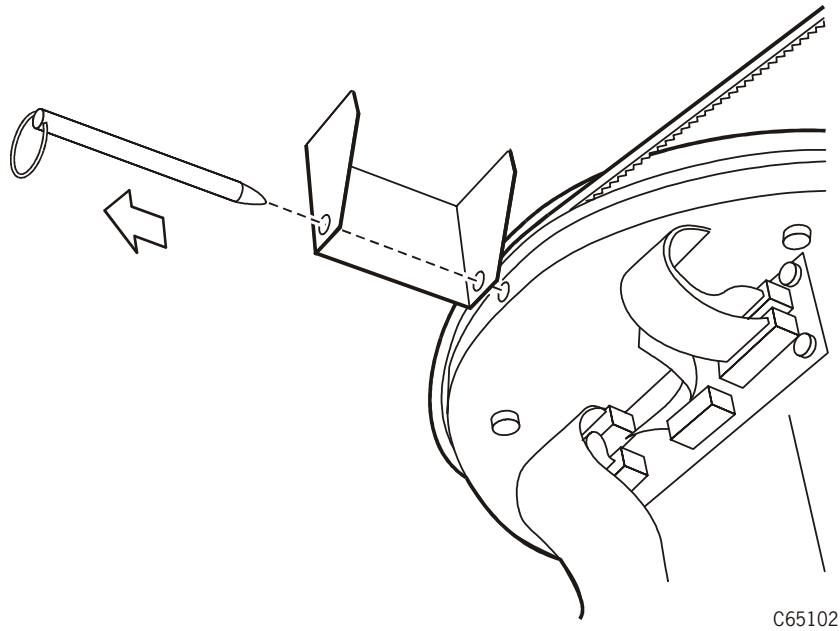
3. Retain the shipping pins. They are required for any maintenance procedures to the Z and theta motors. A suggested storage location is behind the right front door.

CAUTION:
***Hand-Camera Damage:* Move the Z column and the Z carriage at the two points shown in the following two figures. Excessive force will damage the hand and its attaching hardware.**

4. Move the Z column (as shown in Figure 2-8 on page 2-16) to access the hand assembly.

Figure 2-8. Z Column Movement (C65064)

C65064
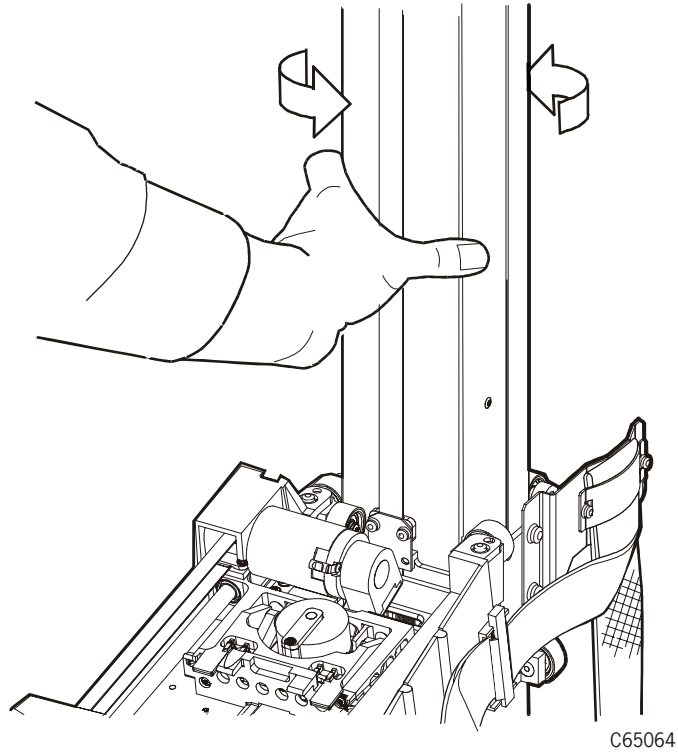
5. Raise the hand assembly to waist level as shown in Figure 2-9 on page 2-17. Remove and discard the foam packing material from inside the hand assembly.

Note: Make sure that the hand is left in the fully retracted position.

Figure 2-9. Moving the Z Carriage (C65065)
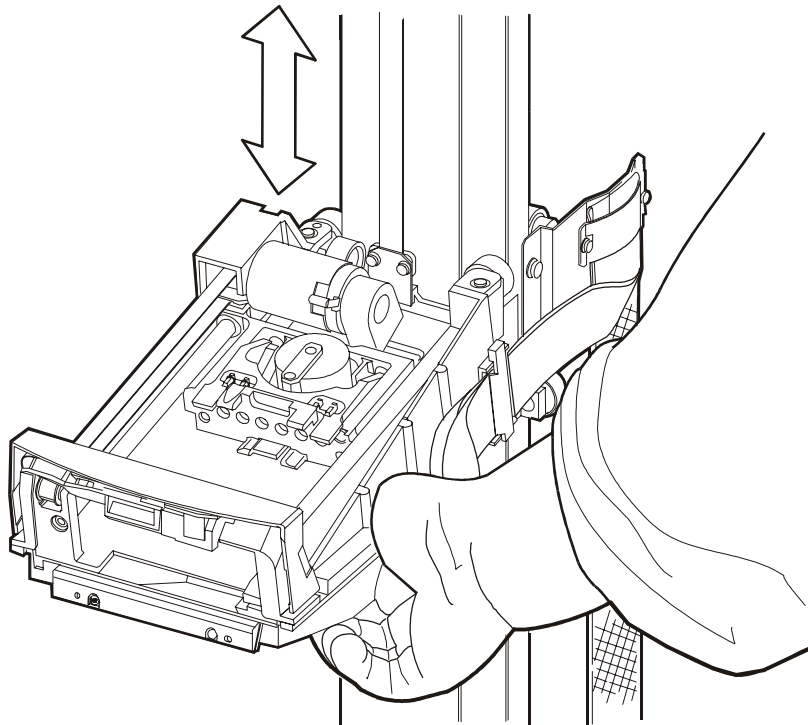
C65065

◼ Installing the Expansion Frame

The frame adds 294 cartridge storage locations to the library. The installation procedure should take about two hours to complete.

If your library requires an expansion frame, follow the procedure below. If no expansion frame installation is required, proceed to "Installing Tape Drives" on page 2-23.

To prepare the library for the expansion frame:

1. Use a flat blade screwdriver to remove any theta stop from positions "1" or "3." (shown in Figure 2-10 on page 2-18). Only one theta stop should remain—the theta stop in position "2" (full capacity).

Note: The library automatically configures for 1/3, 2/3, or full capacity when the library is powered on and the firmware is loaded. If the theta stops are not in the correct position for your library model, an error will occur.

Figure 2-10. Theta Stops—Standalone Library (C65122)

C65122
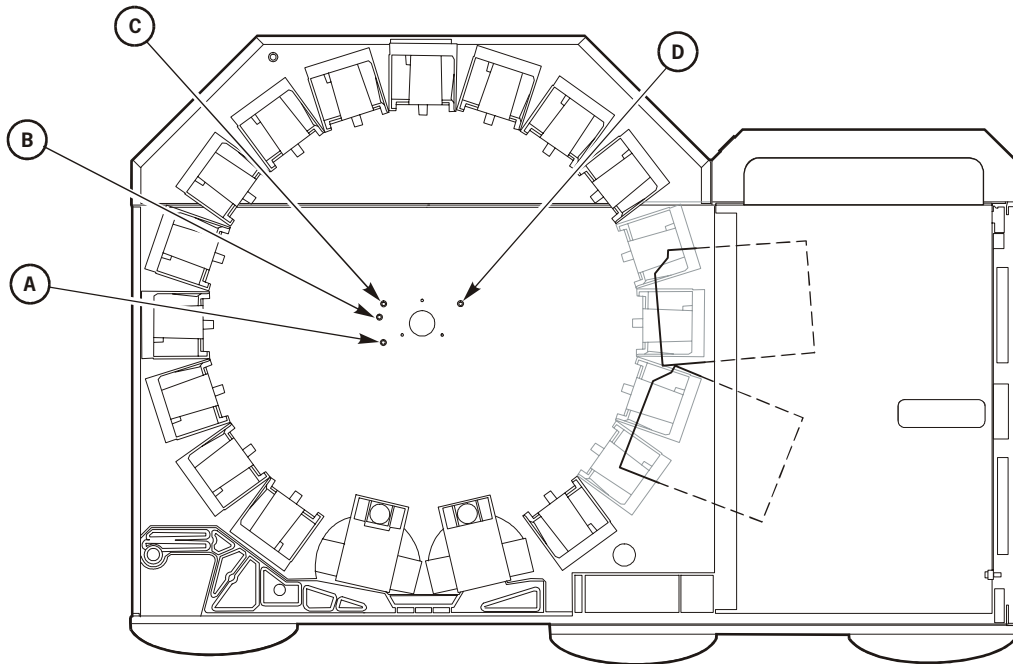
1. Stop A plus stop D = 1/3 capacity
2. Stop B plus stop D = 1/3 capacity *with PTP* (see "Theta Stop Position for 1/3 Capacity" on page 3-2)
3. Stop C plus stop D = 2/3 capacity position
4. Stop C alone = full capacity

CAUTION:
Heavy load: **Two or more people are required to remove the expansion frame from its shipping package and install the expansion frame.**

AVERTISSEMENT :
CHARGE LOURDE. **Deux personnes au moins sont requises pour retire panneau de la bibliothèque et installer le cadre d'extension.**

VORSICHT:
HOHES GEWICHT. **Um die Abdeckung der Library zu öffnen und den Erweiterungsrahmen einzubauen, benötigen Sie mindestens einen Helfe**

OSTRZEŻENIE:
DUŻA WAGA. **Co najmniej dwie osoby powinny wyjmować panel biblioteki i instalować zespół rozszerzenia biblioteki.**

2. Using a Torx T-30 bit, remove the six mushroom attachments from the rear of the library frame by turning them counterclockwise.

CAUTION:
***Possible head injury.* Note the position of the theta lock bracket mounted on the top inside surface of the library. Be careful not to hit your head on the bracket.**

3. Position the robot hand at the top of the Z column and facing the tape drives

    Decals on the library wall show panel and column locations. Viewed from the right, rear of the library, locate the tape arrays at *Panel 2, Column 4.* These arrays must be removed to allow you access to the mounting holes for the expansion frame. To remove the arrays:

    a. You might need a flashlight for this step. Refer to Figure 2-11 on page 2-20 and insert a flat blade screwdriver into the position shown.

    b. Gently pry up on the array lock and pull back on the bottom of the assembly to remove it. Place the array lock aside.

    c. Lift up and pull out the top array.

    d. Continue removing the arrays until you have clear access to the mounting holes. Place all arrays clear of your work area.

4. Move the robotic hand to gain access to theta stop 3 (refer to Figure 2-10 on page 2-18). Remove theta stop number 3.

5. Refer to Figure 2-10 on page 2-18. If theta stop number 1 is present, remove this stop also. The only theta stop that should remain is stop number 2.

6. Refer to Figure 2-12 on page 2-21 while unpacking the expansion frame and its attachment screws from the shipping package. Lay the expansion frame on its back.

7. Measure the distance from the floor of the room to the inside floor of the library.

8. Adjust the four leveling bolts on the expansion frame (measured from the inside floor of the expansion frame to the bottom of the leveling bolt) to approximate the distance measured in the previous step.

CAUTION:
***Component Damage:* Be careful not to bend the leveling bolts in the following step.**

9. Raise the expansion frame and position it up against the library frame opening.

10. Refer to Figure 2-13 on page 2-22. Note the two alignment pins at the top and bottom of the frame. Move the frame closely to the rear of the library.

Figure 2-11. Array Lock Removal and Replacement (C65148)
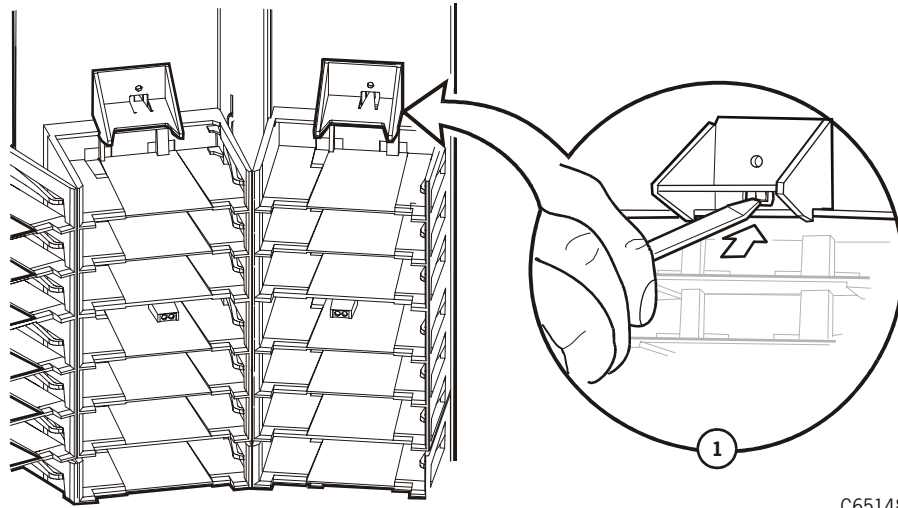
C65148

1.   Insert screwdriver as shown

11. Using an adjustable wrench, adjust the legs of the expansion frame until the pins on the expansion unit align with the holes in the library wall:

   a.   Align the bottom pin on the expansion frame first

   b.   Align the top pin on the expansion frame next

12. When aligned, push the frame to mate with the alignment holes in the library wall.

13. From the interior of the library, thread the six 1/4-20 x 1/2-inch screws (supplied in the expansion frame kit) through the library wall and into the expansion frame. Using a T-30 Torx driver, tighten the screws.

14. Replace the arrays and array lock at Panel 2, Column 4.

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Figure 2-12. Expansion Frame—Unpacking (C65031)
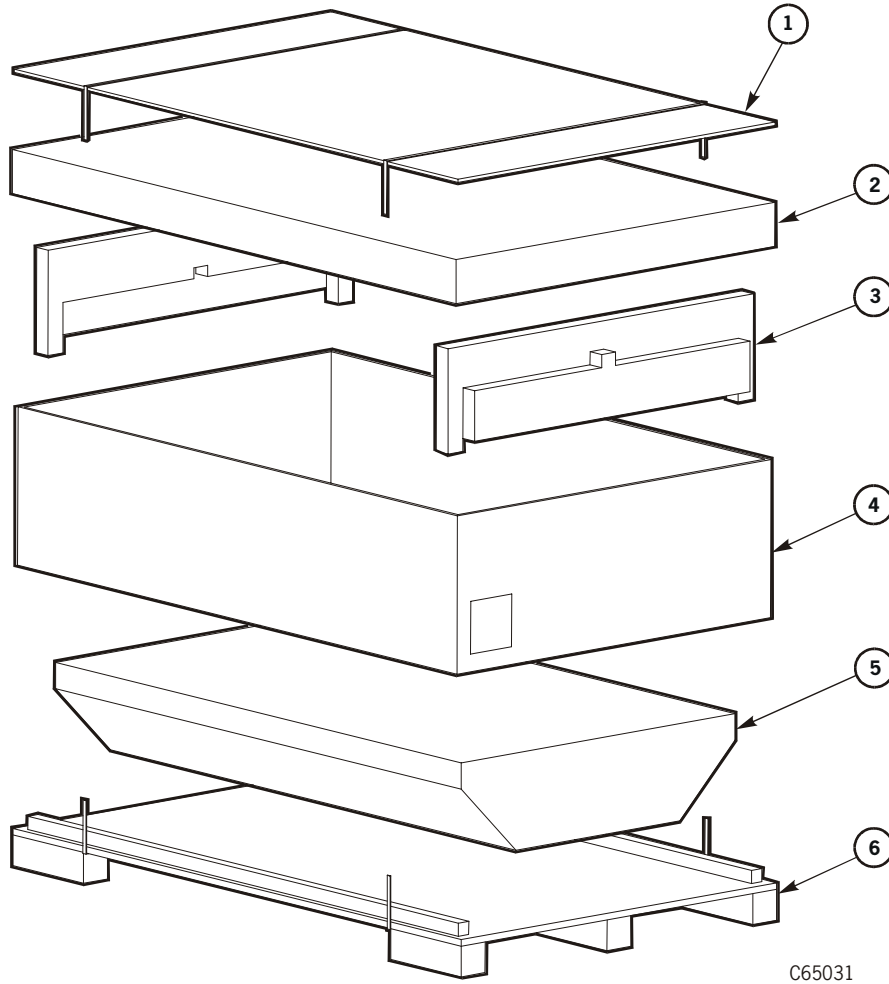
C65031

1. Plywood top
2. Foam cover
3. Side packing (2)
4. Cardboard frame
5. Expansion door
6. Pallet

Figure 2-13. Attaching the Expansion Frame (C65098)
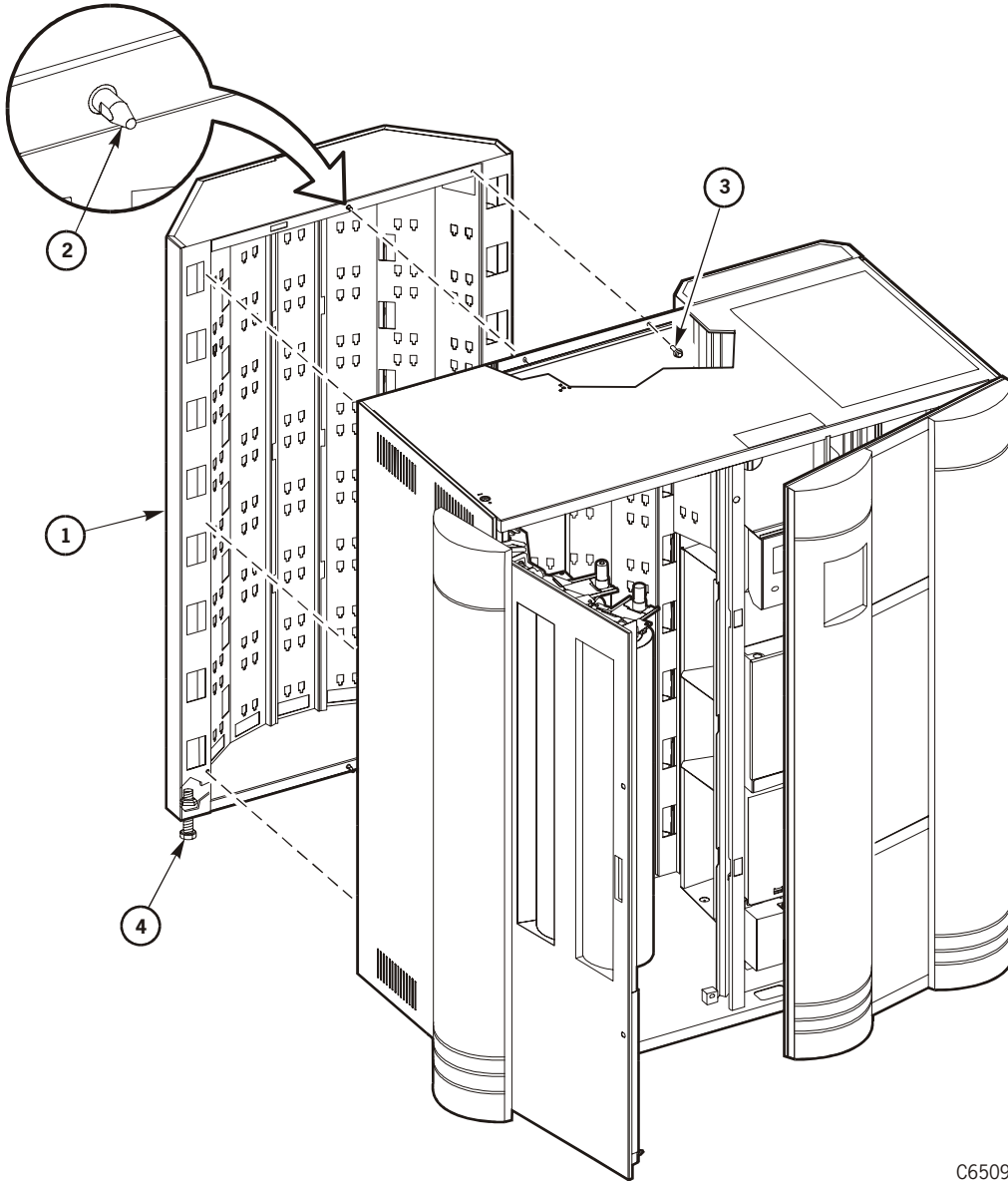
C65098

1. Expansion frame
2. Alignment pin (2)
3. Mounting screws (6)
4. Leveling bolt (4)

■ Installing Tape Drives

Tape drives are shipped individually. Due to the size differences of the DLT, Ultrium, and T9x40 drives, there are a variety of ways of installing the drives.

Note: If you plan to install other drives in the future, you should initially install drives in the *top* slots and work down since drive numbers are assigned numbers from the top-to-bottom (0–x).

If the initial drives are installed from the bottom slots and up, any additional drive installation will cause the entire column of drives to be re-numbered from the top to the bottom. This will involve extra work from the system viewpoint.

CAUTION:
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 "Medium Error/Calibration Error (03/8000)" if a read command is issued and, as with most tape drives, will write over any data present on the tape if a write command is issued at load point.

General Physical Considerations

Refer to Figure 2-14 on page 2-26 and the following explanation for the physical location rules for installing drives.

1. The first callout in Figure 2-14 on page 2-26 shows that the uppermost drive slot in the drive column can only be a DLT or Ultrium drive.

2. The second callout depicts the size ratio of the T9x40 drives to the DLT or Ultrium drives. In size, two T9x40 drives fit in the same space as three DLT or Ultrium drives.

CAUTION:
T9x40/ Drive Target Errors: **Before installing T9x40 drives, be sure to refer to "T9x40 Considerations" on page 2-26.**

3. The third callout shows this ratio again: three DLT or Ultrium drives fit into the same space as two T9x40 drives.

4. The fourth callout depicts a mixture of T9x40 and DLT or Ultrium drives.

CAUTION:
Possible connector damage: **Before installing any drive, be sure to check the mating connector in the drive tower. The connector must move freely or damage could occur when sliding in the drive tray.**

You may also install six T9x40 drives plus one DLT or Ultrium drive in a column, where the DLT or Ultrium drive occupies the top drive slot. Table 2-2 lists the available combinations for one drive column.

Table 2-2. Drive Combinations (per drive column)

T9x40	SDLT/DLT or Ultrium
0	10
1	8
2	7
3	5
4	4
5	2
6	1

Drive positions and their internal library-to-drive numbers are automatically configured during initialization. *You must, however, configure their SCSI IDs and "on bus" or "off bus" status.* The configuration procedure is explained in Chapter 5, "Configuring the Library."

Gen2 SCSI Drives

Support for Hewlett Packard Gen2 Ultrium (LTO) SCSI drives is provided with library firmware version 3.03 and later

Gen2 drive/tape specifics include:

1. Use of standard Ultrium cartridges

2. Ability to read/write to Gen1 tape media

3. For SCSI operation, Gen2 drives are only available with an LVD interface

4. A new model code for Gen2 drives—LTO2001 and new feature code—HPLV

5. Cartridge memory remains the same (4 KB) for Gen2 tapes

6. Cartridge Media ID for Gen2 drives is "L2" (200 GB)

.The major improvements seen with the Gen2 drives are:

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

Gen2 Ultrium Fibre Channel Drives

Support for IBM Gen2 Ultrium Fibre Channel drives is provided with firmware version 3.04 and later.

Gen2 Fibre Channel specifics include:

1. Use of standard Ultrium cartridges

2. Ability to read/write to Gen1 tape media

3. A new model code for Gen2 drives—LTO2001 and new feature code—IBFC

4. Cartridge Media ID for Gen2 drives is "L2" (200 GB)

.The major improvements seen with the Gen2 drives are:

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

Figure 2-14. Tape Drive Installation Rules (C65107)
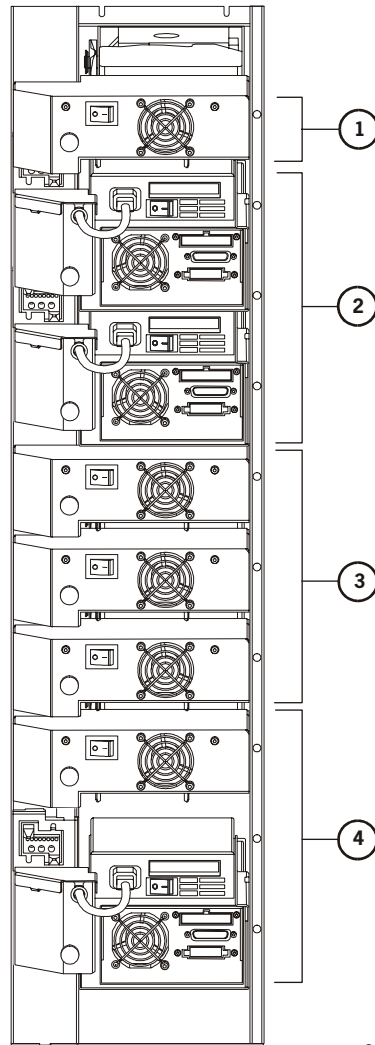
C65107

Note: T9x40-to-DLT (Ultrium) drive space ratios are shown. This does not imply that you must install drives according to this illustration.

1. DLT or Ultrium drive *only*
2. Two T9x40 drives: space equivalent to three DLT or Ultrium drives
3. Three DLT or Ultrium drives: space equivalent to two T9x40 drives
4. Mixed T9x40 and DLT drives (shown) or three DLT or Ultrium drives or two T9x40 drives

T9x40 Considerations

Prior to a change in the T9x40 power supplies, it was physically impossible to install one of these drives in a wrong location. With their new power supplies, however, it is possible to install them into an incorrect slot.

Be sure that T9x40 drives are installed in a correct slot, as shown in Figure 2-15 on page 2-27.

Figure 2-15. T9x40 Drive Locations (C65413)
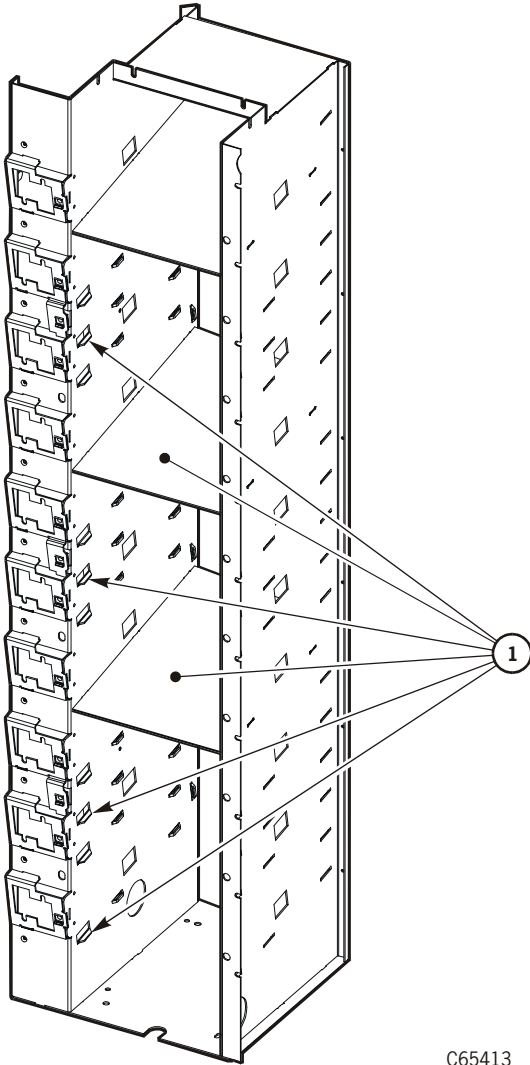
C65413

1. Tab and shelf locations for T9x40 drives

Installing DLT Drives

For DLT drives, follow the procedure below to unpack and install the drives.

DLT tape drives are shipped with the following, non-selectable configurations:

- DLT 7000 (manufacturer's model number)
- DLT 8000 (manufacturer's model number)
- SCSI HVD, single-ended, or LVD/SE operation (set at factory)

Refer to Figure 2-16 and make sure the labels on the drive match the drive type and operation required.

Figure 2-16. DLT Labels (C65115)
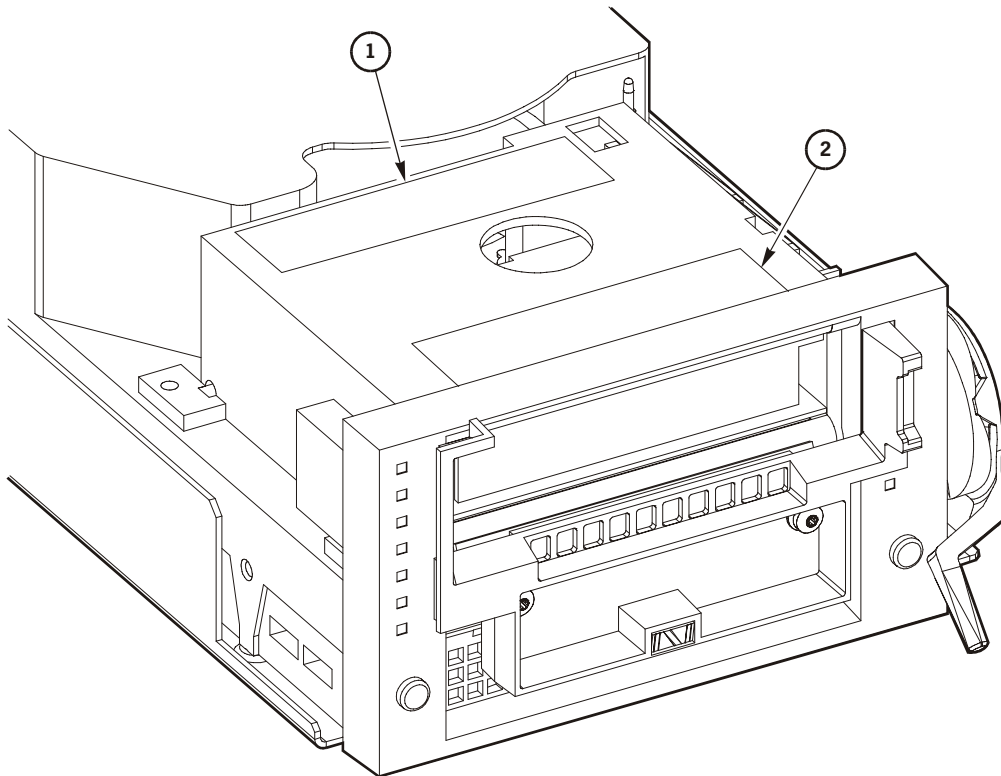
C65115

1. Manufacturer's model number label
2. Single-ended or Differential label (and drive serial number)

Refer to Figure 2-17 on page 2-30 for the following procedure.

CAUTION:
***DLT equipment damage*: Do not move the load latch of a tape drive by hand until told to do so in later instructions.**

1. Open the drive access section of the library (at the right side, as viewed from the front of the library) by lifting up on the two latches. Turn the latches counterclockwise and open the side door.

2. Open the drive package.

3. Remove the packing material.

4. Refer to Figure 2-17 on page 2-30 while checking the side of the DLT drive for the terminating power jumper selection.

CAUTION:
***Loss of data or degradation of performance*: StorageTek recommends supplying terminating power (TERMPWR) from devices attached at both ends of the SCSI bus. Industry standards advise that no more than three devices provide terminating power to the bus.**

Improper termination will cause I/O and read/write errors.

5. Verify whether TERMPWR for DLT drives is on or off (enabled or disabled) for each tape drive. If needed, move the jumper to match your requirement.

   a. TERMPWR On: Install the jumper on the pins shown in the following figure.

   b. TERMPWR Off: Remove the strap on the pins shown in the following figure. You can store the strap by placing it on one pin only.

6. Carefully place each drive near the rear slots at the right side of the library.

Note: Check with the customer for a maintenance agreement on tape drives. If the drives are returned for repair, have the customer retain one shipping box (with packing material) in case a drive must be sent back to the factory.

Figure 2-17. Terminating Power Jumper—DLT Drive (C65116)
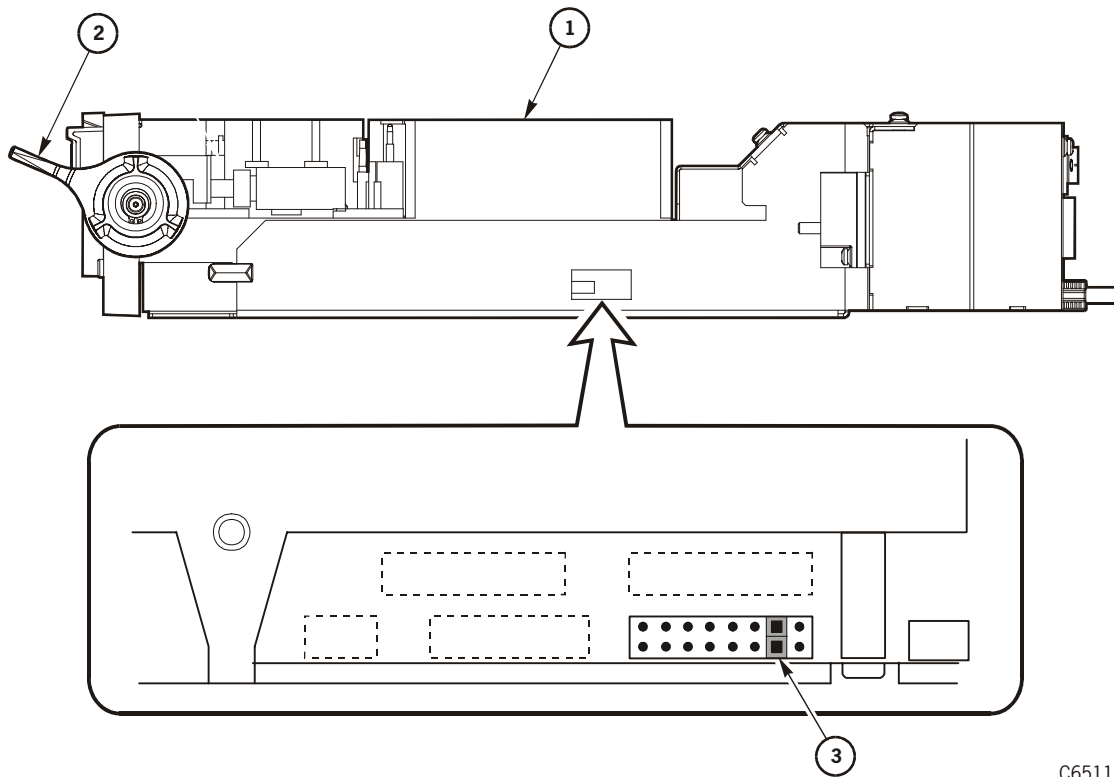
C65116

1. DLT drive
2. Load latch
3. TERMPWR jumper (shown enabled)

7. Look inside the drive column area and determine the slot to use for each drive. Following the lifting procedures described in "Lifting Techniques" on page xxvi, firmly grasp the drive at the rear with one hand and place the other hand under the drive mounting plate.

8. Carefully guide the drive into its slot. Push it in as far as it will go and firmly seat the drive.

CAUTION:
***Component Damage:* In the following step, do not overtighten the thumbscrew.**

9. Refer to Figure 2-18 on page 2-31 and turn the thumbscrew clockwise until it is secure.

Figure 2-18. Tape Drives—Rear View (C65124)

C65124
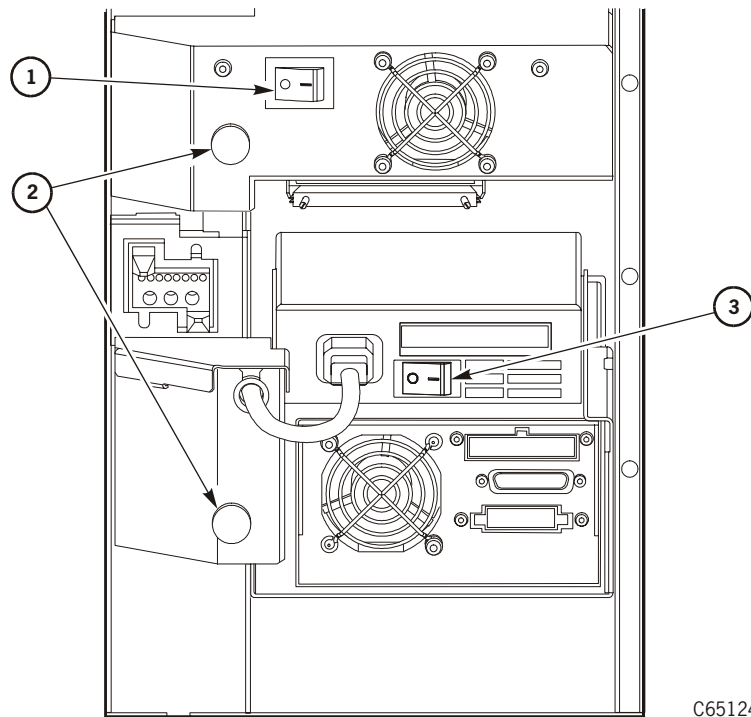
1. DLT or Ultrium power switch
2. Thumbscrews
3. T9x40 power switch*

Note: Some older T9840A models do not have a power switch.

Installing SDLT Drives

1. Open the drive access section of the library (at the right side, as viewed from the front of the library) by lifting up on the two latches. Turn the latches counterclockwise and open the side door.

2. Open the drive package.

3. Remove the packing material.

4. Refer to while checking the rear of the drive for the terminating power jumper selections.

CAUTION:
Loss of data or degradation of performance: StorageTek recommends supplying terminating power (TERMPWR) from devices attached at both ends of the SCSI bus. Industry standards advise that no more than three devices provide terminating power to the bus.

Improper termination will cause I/O and read/write errors.

5. Carefully place each drive near the rear slots at the right side of the library.

6. The SDLT drive may operate on either an HVD or LVD interface. If the library is also to run on the same LVD bus, you must:

   a. for MPC cards, install the library CPCI interface kit with an MPW card attached, Conversion bill 101368

   b. for MPCL cards, move the jumper at J16 to the LVD/SE position

Note: Check with the customer for a maintenance agreement on tape drives. If the drives are returned for repair, have the customer retain one shipping box (with packing material) in case a drive must be sent back to the factory.

Figure 2-19. Terminating Power—SDLT Drive (C65186)

1. SDLT Drive
2. Terminating power jumper (shown enabled)

Installing Ultrium Drives—General

Ultrium drives supported for library operation are manufactured by:

- IBM[1]
- Hewlett Packard[2]
- Seagate.

1.IBM Gen1—Native LVD, Fibre Channel or, with a converter card, HVD. **Gen2 Fibre Channel requires Firmware Version 3.04 or later.**
2.HP Gen1—Native LVD or, with a converter card, HVD. Gen2 SCSI requires Firmware Version 3.03 or later.

Native operation for IBM and HP Ultrium tape drives is through an LVD interface. However, these drives can be adapted to operate on an HVD interface with the use of converter cards.

Note: Remember that if the library is also to run on the same LVD bus, you must:

    a.   for MPC cards, install the library CPCI interface kit with an MPW card attached, Conversion bill 101368

    b.   for MPCL cards, move the jumper at J16 to the LVD/SE position.

Seagate drives will operate on either LVD or HVD interfaces, determined by the drive's part number (no adapter card required).

Note: Figure 2-20 illustrates how to determine if the Ultrium drive is setup for HVD operation. IBM and HP drives with converter cards are labeled as such; you must remove the top cover to reveal the converter cards for IBM and HP drives.

Figure 2-20. Ultrium Drives for HVD Operation (C65310)

HP   IBM   SEAGATE
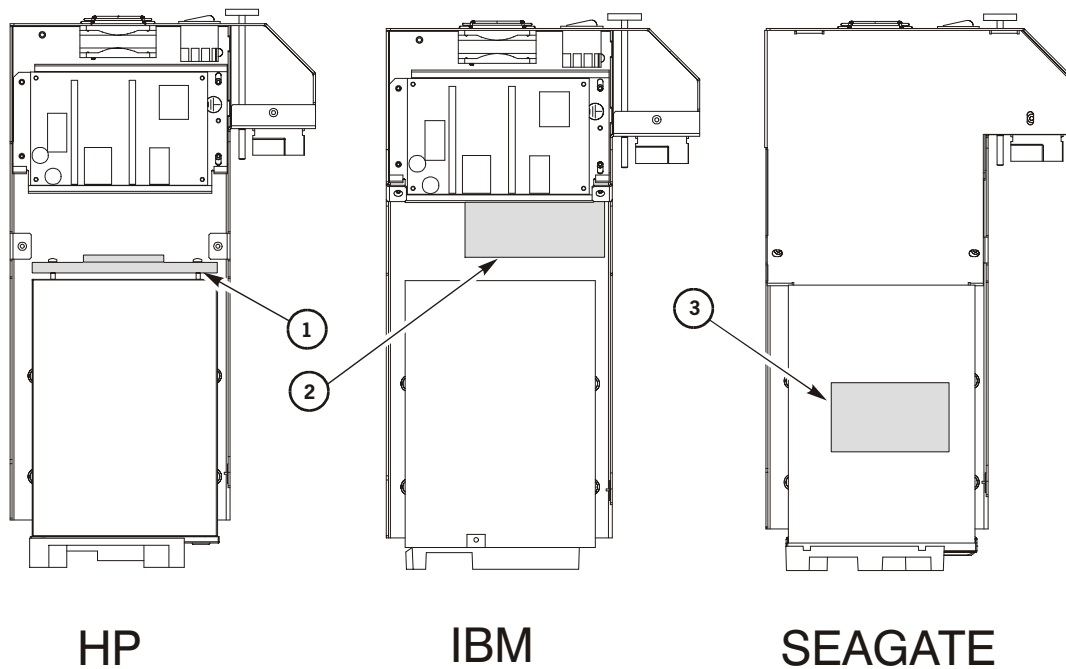
C65310

1.   Converter card
2.   Converter card
3.   Seagate product label

Installing IBM Ultrium Drives

1. Open the drive access section of the library (at the right side, as viewed from the front of the library) by lifting up on the two latches. Turn the latches counterclockwise and open the side door.

2. Open the drive package.

3. Remove the packing material.

4. Refer to Figure 2-21 on page 2-35 while checking the rear of the IBM Ultrium drive for the terminating power jumper selections.

CAUTION:
***Loss of data or degradation of performance*: StorageTek recommends supplying terminating power (TERMPWR) from devices attached at both ends of the SCSI bus. Industry standards advise that no more than three devices provide terminating power to the bus.**

Improper termination will cause I/O and read/write errors.

Remove the top cover and verify whether TERMPWR for the IBM Ultrium drive is on or off (enabled or disabled) for each tape drive. If needed, move the jumper to match your requirement.

a. TERMPWR On: This is the standard setting, shown in Figure 2-17 on page 2-30. Unless required, leave the jumper attached.

b. TERMPWR Off: Remove the first jumper - counting from left to right - from the two pins shown in Figure 2-17 on page 2-30.

CAUTION:
***Configuration problem:* Do not remove any jumpers except for terminating power (if required). The drive's SCSI address must be set as 15 (the four jumpers, counting from the right to the left).**

5. Carefully place each drive near the rear slots at the right side of the library.

Note: Check with the customer for a maintenance agreement on tape drives. If the drives are returned for repair, have the customer retain one shipping box (with packing material) in case a drive must be sent back to the factory.

Figure 2-21. Terminating Power—Seagate and IBM Ultrium Drives (C65311)

C65311
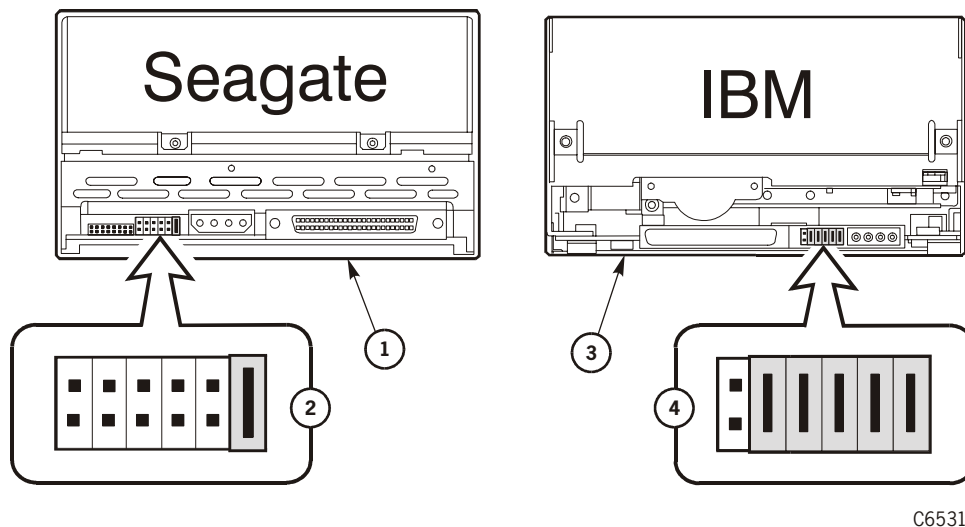
1. Seagate drive—shown with terminating power ON
2. IBM drive—shown with terminating power ON (The four jumpers - counting from right to left - are address jumpers that must be in place for library operation. Terminating power is the fifth jumper - counting from right to left)

Note: HP drive not shown. Terminating power is always ON and can not be changed.

6. Look inside the drive column area and determine the slot to use for each drive. Following the lifting procedures described in "Lifting Techniques" on page xxvi, firmly grasp the drive at the rear with one hand and place the other hand under the drive mounting plate.

7. Carefully guide the drive into its slot. Push it in as far as it will go and firmly seat the drive.

CAUTION:
Component Damage: **In the following step, do not overtighten the thumbscrew.**

8. Refer to Figure 2-22 on page 2-36 and turn the thumbscrew clockwise until it is secure.

Figure 2-22. Tape Drives—Rear View (C65124)

C65124
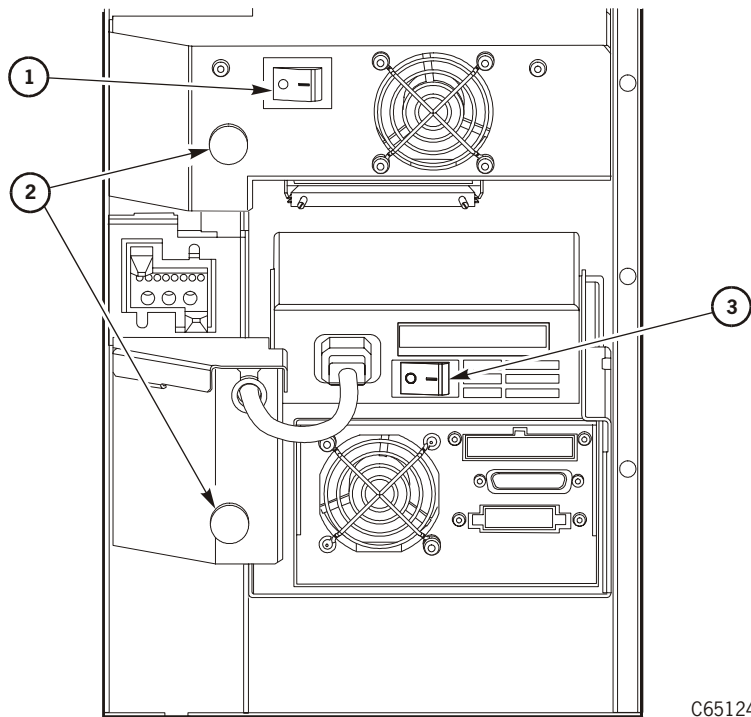
1. DLT or Ultrium drive power switch
2. Thumbscrews
3. T9x40 power switch

Installing Seagate Ultrium Drives

For Seagate Ultrium drives, follow the procedure below to unpack and install the drives.

Seagate Ultrium tape drives are shipped as HVD or LVD according to their part numbers.

Refer to Figure 2-20 on page 2-33 and make sure the labels on the drive match the drive type and operation required.

1. Open the drive access section of the library (at the right side, as viewed from the front of the library) by lifting up on the two latches. Turn the latches counterclockwise and open the side door.

2. Open the drive package.

3. Remove the packing material.

4. Refer to Figure 2-21 on page 2-35 while checking the rear of the Seagate drive for the terminating power jumper selections.
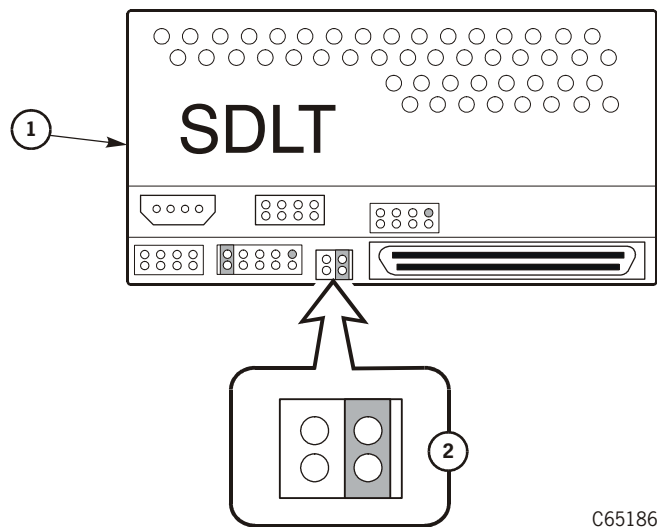
CAUTION:
***Loss of data or degradation of performance*: StorageTek recommends supplying terminating power (TERMPWR) from devices attached at both ends of the SCSI bus. Industry standards advise that no more than three devices provide terminating power to the bus.**

Improper termination will cause I/O and read/write errors.

Verify whether TERMPWR for the Seagate drive is on or off (enabled or disabled) for each tape drive. If needed, move the jumper to match your requirement.

a. TERMPWR On: Install the jumper on the pins shown in Figure 2-21 on page 2-35.

b. TERMPWR Off: Remove the strap on the pins shown in Figure 2-21 on page 2-35.

CAUTION:
***Configuration problem:* Do not set any jumpers except for terminating power. The drive's SCSI address will be set at the library operator panel.**

5. Carefully place each drive near the rear slots at the right side of the library.

Note: Check with the customer for a maintenance agreement on tape drives. If the drives are returned for repair, have the customer retain one shipping box (with packing material) in case a drive must be sent back to the factory.

6. Look inside the drive column area and determine the slot to use for each drive. Following the lifting procedures described in "Lifting Techniques" on page xxvi, firmly grasp the drive at the rear with one hand and place the other hand under the drive mounting plate.

7. Carefully guide the drive into its slot. Push it in as far as it will go and firmly seat the drive.

CAUTION:
***Component Damage:* In the following step, do not overtighten the thumbscrew.**

8. Refer to Figure 2-22 on page 2-36 and turn the thumbscrew clockwise until it is secure.

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Installing Hewlett Packard Ultrium Drives

For Hewlett Packard Ultrium drives, follow the procedure below to unpack and install the drives.

Hewlett Packard Ultrium tape drives may be shipped with a converter card (LVD-to-HVD). This allows you to use the HP drive with a standard HVD host bus adapter. You must remove the top cover of the drive/tray to reveal whether a converter card is installed.

1. Open the drive access section of the library (at the right side, as viewed from the front of the library) by lifting up on the two latches. Turn the latches counterclockwise and open the side door.

2. Open the drive package.

3. Remove the packing material.

CAUTION:
Loss of data or degradation of performance: **StorageTek recommends supplying terminating power (TERMPWR) from devices attached at both ends of the SCSI bus. Industry standards advise that no more than three devices provide terminating power to the bus.**

Improper termination will cause I/O and read/write errors.

4. The HP drive is internally set to supply terminating power (terminating power set to ON). It can *not* be set to OFF.

CAUTION:
Configuration problem: **Do not set any jumpers except for terminating power. The drive's SCSI address will be set at the library operator panel.**

5. Carefully place each drive near the rear slots at the right side of the library.

Note: Check with the customer for a maintenance agreement on tape drives. If the drives are returned for repair, have the customer retain one shipping box (with packing material) in case a drive must be sent back to the factory.

6. Look inside the drive column area and determine the slot to use for each drive. Following the lifting procedures described in , firmly grasp the drive at the rear with one hand and place the other hand under the drive mounting plate.

7. Carefully guide the drive into its slot. Push it in as far as it will go and firmly seat the drive.

CAUTION:
Component Damage: **In the following step, do not overtighten the thumbscrew.**

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8. Refer to Figure 2-22 on page 2-36 and turn the thumbscrew clockwise until it is secure.

Installing SCSI Drive Cable Connectors

The following procedures describe how to install SCSI cable connectors for the drives.

Standard Drive Column 0 Connectors

Note: Drive Column 0 is the standard drive column included in all libraries. It is the column that contains the calibration label at the bottom.

1. Open the right side door.

2. Remove the SCSI "Y" channel cable and mounting jackscrews from the drive shipping box.

3. Thread one of the jackscrews into one end of the connector. Thread it all the way in and then back it off by 1/4-turn.

4. Refer to the figure below and tilt the channel connector (with the jackscrew end at the bottom) into the slot on the interior library bulkhead, next to the desired drive location.

Figure 2-23. SCSI Tape Drive Cable Connectors (C65226)

C65226
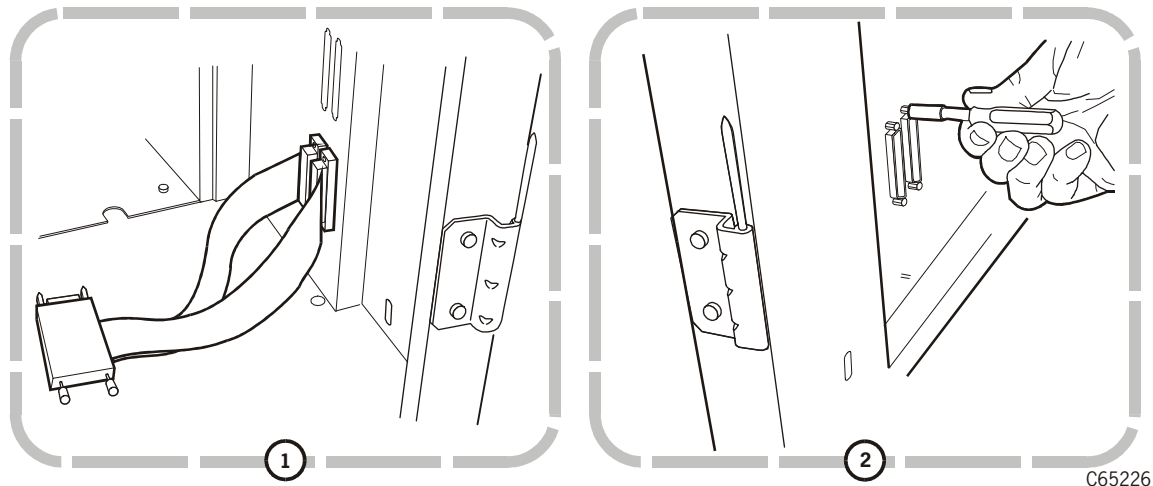
1. Interior bulkhead view
2. Exterior bulkhead view

Note: It is easier to insert the connector if you tilt it away from the interior bulkhead.

5. Go around to the rear of the library, open the rear door and locate the connector at the bulkhead.

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6. Grasp the connector and thread the second jackscrew into the top of the connector.

7. Make sure the connector aligns inside its slot and tighten both jackscrews with a 3/16-inch nutdriver. Do not overtighten.

8. Obtain the SCSI icon/label set (part 313611001) and apply the appropriate icon the bulkhead.

9. Repeat this process for all channel connectors.

Note: Do *not* connect the client cables until the configuration is completed.

10. Open the cable clamp at the bottom right of the drive tray and insert the channel cable.

11. Thread the two screws on the card into the connector mounting. Do not overtighten.

12. When you are finished installing all drives, place the drive power switches to the ON (|) position.

13. If these are the only drives you are installing, proceed to "Operating Options" on page 2-41. Otherwise, continue with the instructions below.

Optional Drive Column 1 Connectors

1. Open the small access door (located on the frame member between the two drive columns) for the column 1 drive connectors by turning the five snap rings counterclockwise.

2. Attach the SCSI "Y" channel cable to the bulkhead as described in steps 6 and 7 of the previous procedure.

3. Insert the drive into its position in the column.

4. Open the cable clamp at the bottom right of the drive tray and insert the channel cable.

5. Thread the two screws on the card into the connector mounting. Do not overtighten.

6. Place the drive power switch to the ON (|) position.

7. Repeat Steps 2 through 6 for each drive in the column.

Note: Do *not* connect the client cables until the configuration is completed.

8. Close and lock the small access door.

9. If these drives complete your installation, go to "Operating Options" below. Otherwise, continue with the instructions below.

Installing T9x40 Drives

Refer to the *T9x40 Tape Drive Installation Manual*, part 95879, for instructions on installing T9840/T9940 drives.

Note: If you are installing the Maintenance Switch for Matrix application with T9840B drives, you must refer to the *T9x40 Tape Drive Installation Manual*, part 95879, for specific instructions.

For Fibre Channel cable routing, refer to "Fiber Cable Routing" on page 4-12.

■ Operating Options

The MPC/MPCL controller card is factory-configured to:

• Supply terminating power from the library
• Operate on a high voltage differential interface

You may change either or both of these options by following the procedures below.

Library Terminating Power Option

The terminating power jumper is set to the ON location (library supplying terminating power) at the factory, but you may change it to the OFF location, allowing only the host to supply terminating power.

Note: In general, terminating power is supplied by devices at the extreme end of a bus.

To change the library terminating power to the OFF position:

1. Remove the six screws and cover from the MPC/MPCL card. The MPC/MPCL card position is shown in Figure 1-10 on page 1-29.

2. Refer to Figure 2-24 on page 2-43 and check the location of the terminating power jumper at the bottom, right of the MPC/MPCL card, J18.

3. Pull out the jumper and place it in the OFF position.

Library Single-Ended Operation

The MPC/MPCL cards are set to high voltage differential operation at the factory. You may change the operation to single-ended (for the MPC card) or low voltage differential/single-ended (for the MPCL card) by changing the jumper (J16) on the respective card.

MPC Card

To change a library containing an MPC card to single-ended operation:

1. Remove the six screws and the cover from the MPC card.

2. Refer to Figure 2-24 on page 2-43 and check the location of the single-ended or differential jumper at J16.

3. Pull out the jumper and place it in the single-ended (SE) position.

4. Refer to Figure 2-25 on page 2-44 and, at the edge connector on the right side of the MPC card, disconnect the cable from the rear (high voltage differential) connector on the MPC card and move it to the front (single-ended) connector.

5. Single-ended operation requires a special terminator, part 10148002.

MPCL Card

To change a library containing an MPCL card to single-ended or low voltage differential operation:

1. Remove the six screws and the cover from the MPCL card.

2. Refer to Figure 2-24 on page 2-43 and check the location of the single-ended or low voltage differential jumper at J16.

3. Pull out the jumper and place it in the low voltage differential/single-ended position.

4. Refer to Figure 2-25 on page 2-44 and, at the edge connector on the right side of the MPCL card, disconnect the cable from the rear (high voltage differential) connector on the MPCL card and move it to the front (low voltage differential/single-ended) connector.

5. For LVD operation, the library must be the last device on the SCSI bus and must use a single, shielded cable (PN 3136668xx) with feed-through terminator.

Figure 2-24. Terminating Power and Operation Jumpers—L700e (C65067)
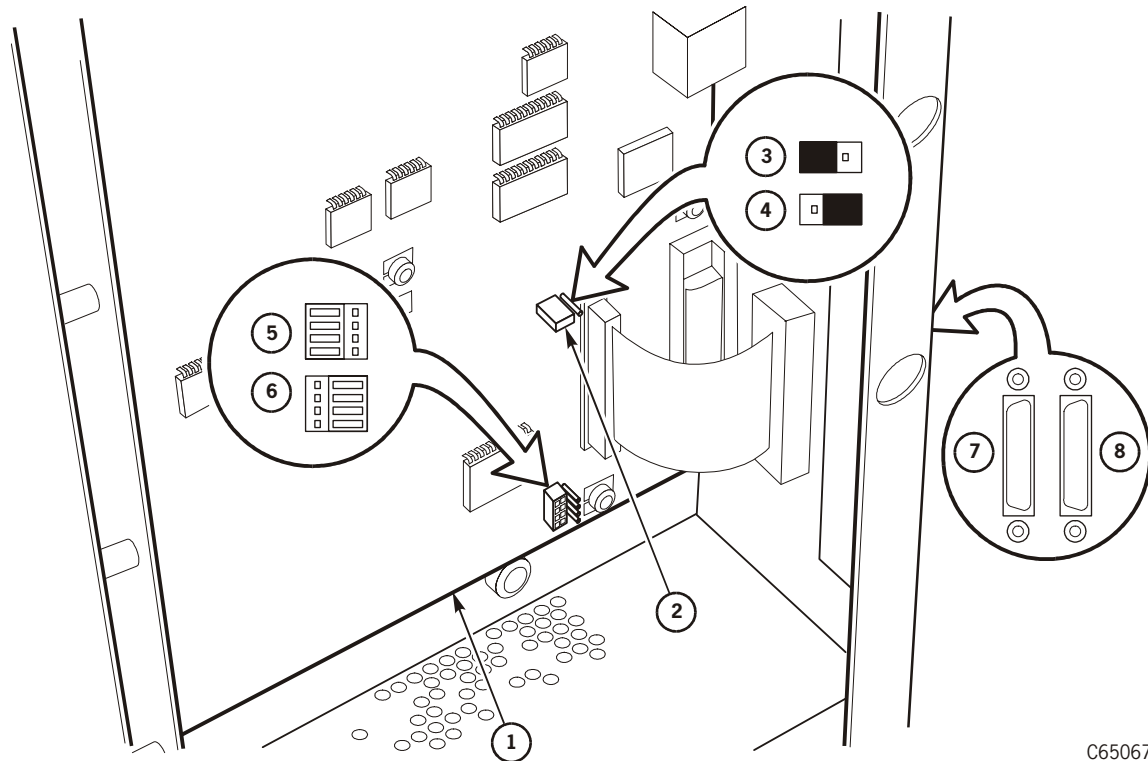
C65067

1. MPC/MPCL card
2. Terminating power jumper (J18)
3. Terminating power ON position
4. Terminating power OFF position
5. SCSI HVD operation setting (J16)
6. SCSI SE operation setting for MPC cards; LVD/SE operation for MPCL cards (J16)
7. SCSI SE or LVD/SE connection (front)
8. HVD connection (rear)

Figure 2-25. Library Control Cable Connections (C65147)
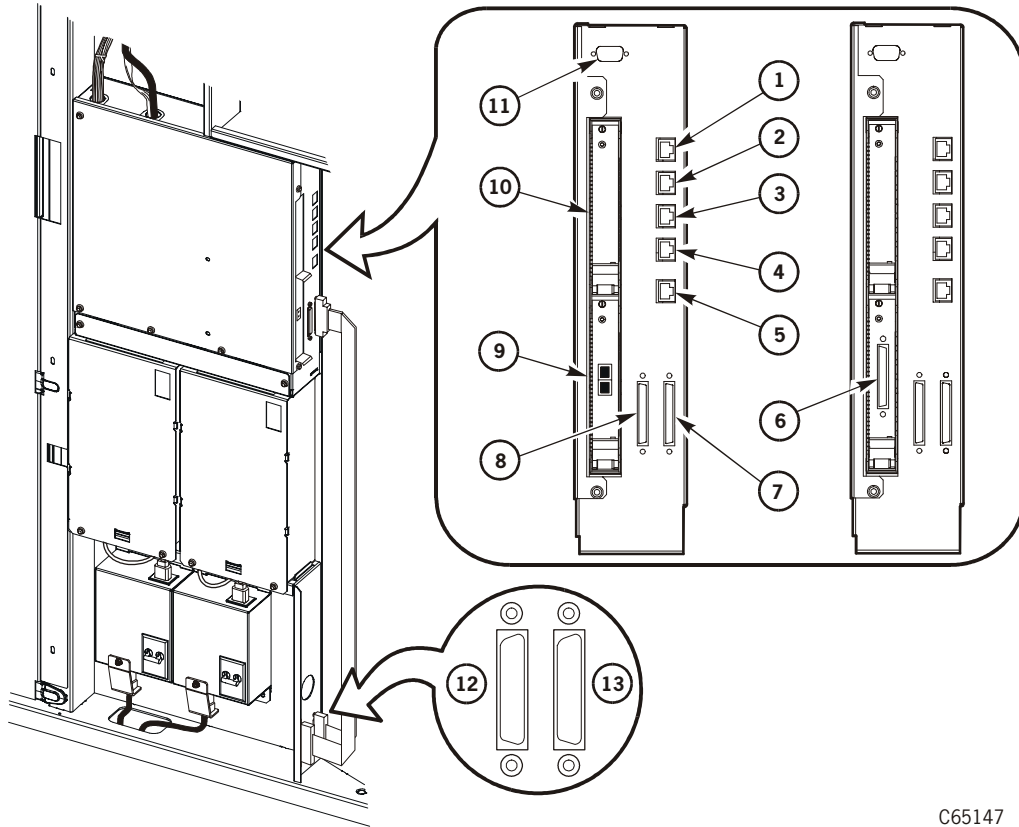
C65147

1. CSE (service): Command line interface (38,400 baud) for firmware 3.0 or later only
2. Test: PTP—serial connection; Pre-3.00 firmware—reserved
3. Ser 1 (serial): Firmware 3.00 and later—unused; Firmware 2.20 and earlier—diagnostic testing
4. Ser 2 (serial)
5. ENET (Ethernet)
6. SCSI, LVD connection (*MPC card with MPV & MPW cards only*)
7. SCSI, HVD connection
8. SCSI, SE connection (*MPC card*) or LVD/SE connection (*MPCL card only*)
9. Slot 0 (fiber expansion card)
10. Slot 1 (expansion card)
11. MPK card (Personality/StorageTek L-Series Library Admin) connector
12. Bulkhead connector
13. Bulkhead connector

■ Installing Features

If your library also requires additional features, follow the directions enclosed with each package to install these on the library.

Installing Fibre Channel Components

Installing Fibre Channel components for T9x40 tape drive and library operation is covered below. Fibre Channel cables are listed in Table 4-8 on page 4-11.

T9x40 Drives

Consult the *T9x40 Tape Drive Installation Manual*, part 95879, for directions on installing and configuring the T9x40 drives.

For Fibre Channel cable routing, refer to "Fiber Cable Routing" on page 4-12.

Library

For library fiber operation, you must install the compact PCI bus (CPCI) component (MPV card) and the fiber card (MPU card). Consult the directions enclosed with the library Fibre Channel feature.

Adapting the Library for LVD Operation

For library LVD operation, consult the directions enclosed with the MPW card conversion bill (101368). Be sure that a matching LVD host bus adapter is installed in the server.

■ Rack Mounted Components

The rack area may contain routers, switches, or hubs for Fibre Channel operation, servers, or an alternate power configuration to supply continuous emergency power to the library and drives.

General Considerations

CAUTION:
***Possible injury or equipment damage:* Be sure that you have referred to "Rack Safety and Precautions" on page xxx before installing rack components.**

Requirements in the rack area of the library.

• The total maximum weight of equipment installed in this location cannot exceed 136 Kg (300 lbs).

- The customer must supply power to these components. Power cable space is provided in the cutout area of the rear door.

- The ventilation openings in the rear of the cabinet must have at least 100 mm (4 in.) clearance for proper air flow.

CAUTION:
Heat within rack area: **Cooling considerations should be made based upon the power dissipation within the rack space, as well as the external library room ambient conditions. Cooling must be provided for moderate power dissipation within the rack space. To aid this cooling, use the conversion bill listed in** **to draw air from the front of the rack space towards the rear door.**

The cooling package conversion bill is sufficient for dissipating up to 1400 W (4777 Btu). The rack area is not recommended for high power dissipation components such as multiprocessor servers or disk arrays.

- The fiber device (bridge, switch, or hub) *must* face the rear of the library to allow proper cable routing to the drives. Cables that exit the fiber device must follow the routing shown in the figure below.

Follow the directions:

- Enclosed with the fiber device for rack mounting the component into the 13U rack area

- Supplied in the *T9x40 Tape Drive Installation Manual*, part 95879, for installing the fiber option on T9x40drives.

Redundant AC Power Option

The Redundant AC power option is manufactured by American Power Conversion (APC). To install this option, follow the directions enclosed with the conversion bill/feature. Retain the documentation on site.

Installing the L700-PTP

3

This chapter describes how to install the L700-Pass-thru Port (PTP). The PTP enables one L700e library to pass a cartridge to another L700e library.

The steps for installing the PTP are:

1. Preparing the Libraries

2. Attaching the PTP Frame and Leveling the Libraries

3. Installing PTP Cables

4. Installing the PTP Assembly

■ Requirements

Hardware and software requirements for PTP operation are outlined below.

Hardware

Hardware requirements for the PTP are:

- Both libraries must be L700e frames.
- The MPC cards in both libraries must be part 308390511 or higher – these cards have higher fuse ratings required for PTP operation. The new MPCL cards also support PTP operation.
- For 1/3 capacity libraries, see Figure 3-1 on page 3-3 for the correct position of the theta stop.
- A SCSI cable must be daisy-chained from one library's bulkhead connector to the other library's bulkhead connector. The minimum cable length is 5 m (16.4 ft).

Note: A small stepladder may also be required to install the PTP.

Firmware

The firmware required for PTP operation is Version 3.00 or higher.

Software

Software requirements for the PTP are either:

- For Unix-based servers, you must use Automated Cartridge System Library Software (ACSLS) version 6.0.1 or higher, with the Special Program Enhancement (SPE) for PTP operation, or

- For Microsoft Windows-based servers, you must use StorageTek Library Manager, version 2.0 or higher.

■ PTP Definitions

The primary function of the PTP is to satisfy a cartridge mount operation when all drives are busy within a library. The PTP passes the required cartridge to the other library, where an idle drive can perform the mount operation.

The following terms are associated with PTP operation:

- **Master:** the library that powers the PTP motor.
- **Standby:** the attached library that has *no* power connections to the PTP motor.
- **Source (or Home) Cell:** the cell containing the cartridge that must be passed
- **Destination:** the location where the cartridge is to be passed (most frequently a tape drive).

■ Preparing the Libraries

To prepare the libraries:

- Determine which library will be the Master and which will be the Standby.
- Determine if your option is a 1/3-capacity with a PTP— if so, you must set the theta stops as shown in .
- Position the libraries.
- Remove the side panels of both libraries using the cover release tool (part 310229501), supplied with the PTP kit.
- Remove two 6-cartridge arrays to allow space for the PTP assembly.

Theta Stop Position for 1/3 Capacity

If a PTP library is to be configured as a 1/3-capacity, you must set the appropriate theta stop position. This position is shown in .

Note: No change to theta stops should be made for the 2/3 or full capacity libraries.

Figure 3-1. Theta Stop Positions—Library with PTP (C65390)

C65390
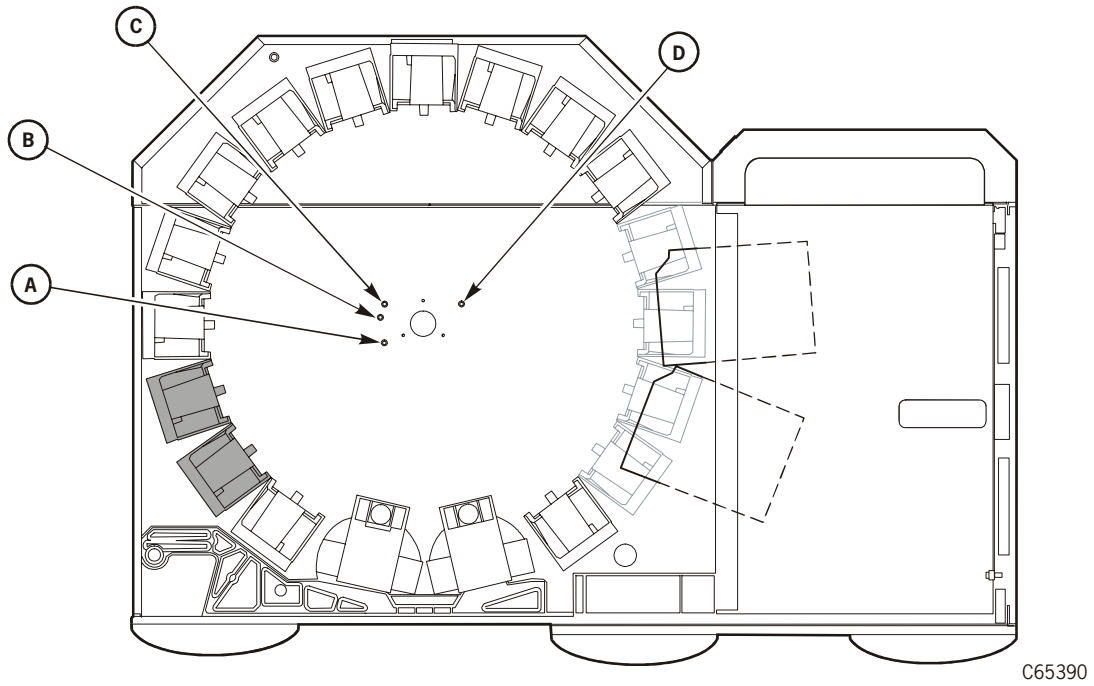
1. Stop A plus stop D = 1/3 capacity
2. Stop B plus stop D = 1/3 capacity with PTP

Note: Columns 1 and 2 on Panel 2 cannot be used with the "1/3 capacity with PTP" option.

3. Stop C plus stop D = 2/3 capacity position
4. Stop C alone = full capacity

Positioning the Libraries

Figure 3-2 illustrates the positions of the libraries for the PTP installation and the cable access positions for both libraries.

Position the libraries as shown below, but leave approximately 1.2 m (4 ft) between the libraries for removal of the side panels and the installation of the PTP.

Figure 3-2. Positioning the Libraries (C65372)
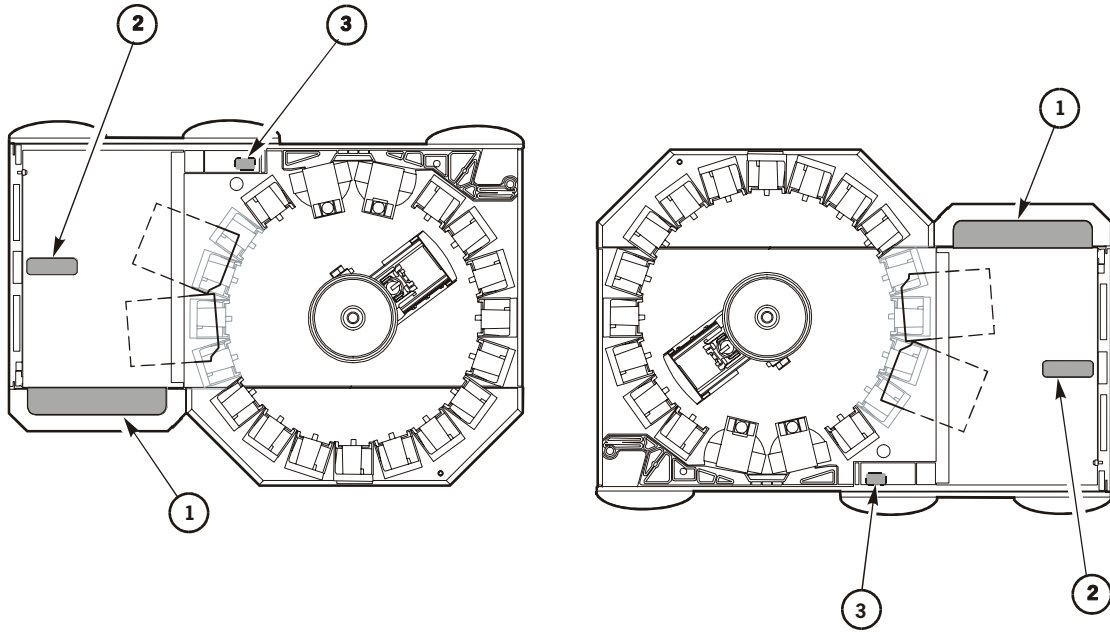
C65372

1. Tape drive signal cables
2. Cables to/from 13U cabinet area
3. Power cable

Allowing Access to Both Libraries

Figure 3-3 illustrates the amount of door clearance that is required when two libraries are joined together by a PTP. Be sure to allow sufficient operator and maintenance access.

Figure 3-3. PTP Access Requirements (C65373)
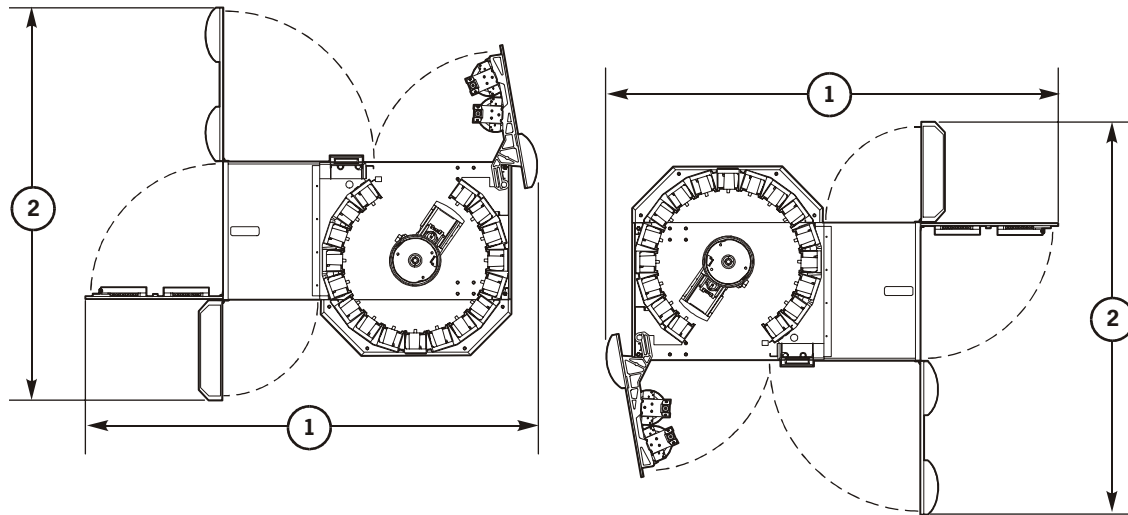
C65373

1. Access door and right side door open: 2.3 m (7.6 ft)—for the PTP configuration, allow 5.8 m (19.2 ft) for the two libraries plus PTP frame.
2. Rear door and right front door open: 2.1 m (6.9 ft)—for the PTP configuration, allow 4.2 m (13.8 ft) for the two libraries

Removing the Library Side Panels

To remove the library side panels:

CAUTION:
Lifting hazard: **Use two people to remove the side panels.**

1. Slide the cover release tool (part 310229501) under the section of the left side panel on the Master library (see Figure 3-4 on page 3-6). The location of the retaining clip can be found by looking for the 38 mm (1.5 in.) gap between the panel and frame.

2. Push up with the tool to release the latch.

3. Pull the panel up and release it from the library.

4. Place the panel aside.

5. Using a Torx T-30 driver, remove the six mushroom fasteners from the library.

6. Repeat steps 1 through 5 for the Standby library panel.

Figure 3-4. Cover Release Locations (C65374)
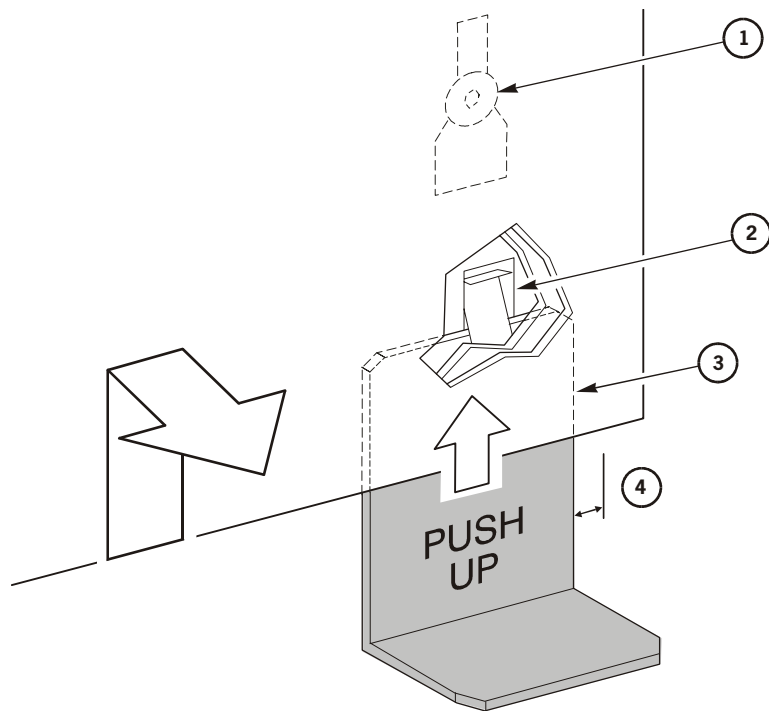
C65374

| 1. Mushroom fastener | 3. Cover release tool |
| 2. Retaining clip | 4. 38 mm (1.5-in.) gap |

Removing the 6-Cartridge Arrays

Once you have removed the left covers from both libraries, you will have access to the 6-cartridge array at the left of each library. These arrays must be removed from both libraries.

To remove the arrays:

1. Open the access door on the first library.

2. Check that there are no cartridges in the cells at Panel 2, Column 3, Rows 0—5.

3. On the top of the library, remove the four T-15 screws that attach the array assembly.

4. Remove the array assembly by pulling upward, then outward.

5. Figure 3-5 on page 3-7 illustrates the removal of the array retainer clip. Remove this clip.

6. Reinstall the array clip above Row 6 as shown in Figure 3-6 on page 3-7.

7. Repeat steps 1 through 6 for the other library.

Figure 3-5. Array Retainer Clip Removal (C65148)
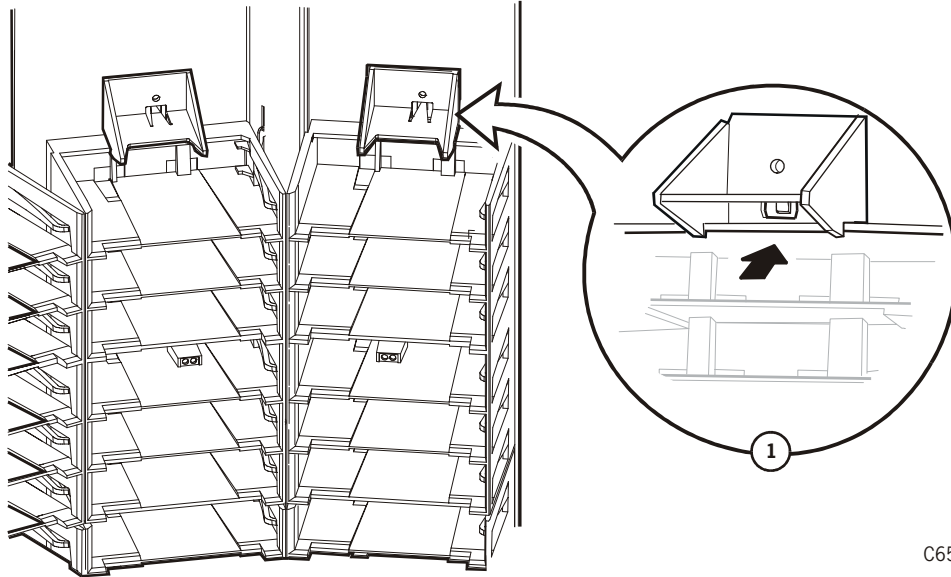
C65376

1. Insert screwdriver tip as shown

Figure 3-6. Array Retainer Clip Insertion (C65377)
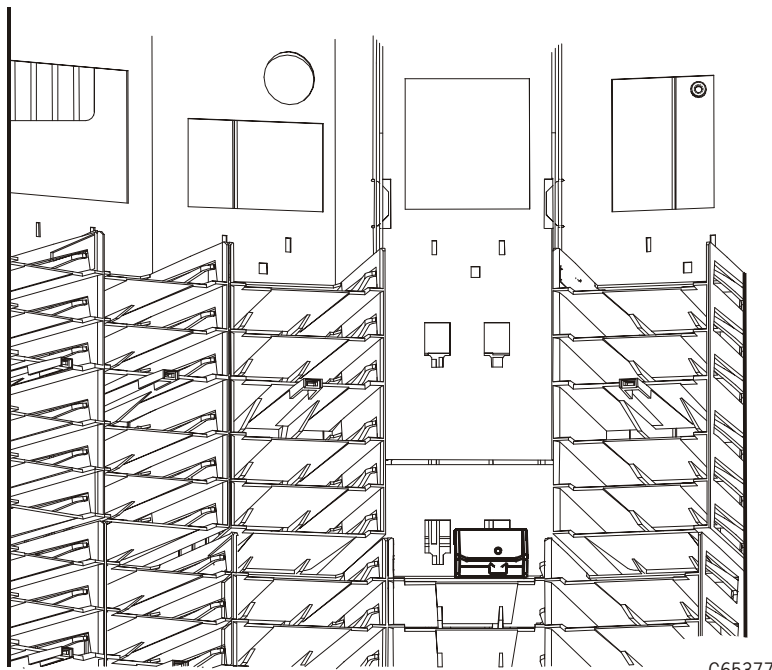
C65377

■ Attaching the PTP Frame and Leveling the Libraries

Attaching the PTP frame and leveling the libraries are done together. References to "right" and "left" in the instructions are in relation to the front of each library.

CAUTION:
Hand or cartridge damage: **You must be sure that the libraries and PTP frame are level or damage to the customer's cartridges or robotic hand can result.**

Be sure that both library walls are parallel to the PTP frame. The PTP frame mounting holes are shown in Figure 3-7 on page 3-9. You must align the mounting screws on both libraries as shown in Figure 3-9 on page 3-11. The sides and top of the libraries and the PTP must be level and aligned.

1. Open the shipping container and remove the PTP assembly.

CAUTION:
Lifting hazard: **Use two people to lift and position the PTP frame.**

2. Remove the PTP frame from the shipping container.

3. Position the PTP frame between the libraries, making sure that, *as you face the access door of the Master library, the MPB logic card enclosure is visible.*

Note: Determine if one library is higher than the other; if so you will first mount the PTP frame to this library.

4. Using the 12 1/4 x 20 (T-30 bit) screws from the PTP kit, *loosely* attach six screws to the side of the higher frame as shown in Figure 3-7 on page 3-9.

Figure 3-7. PTP Frame Mounting Screws (C65375)

C65375
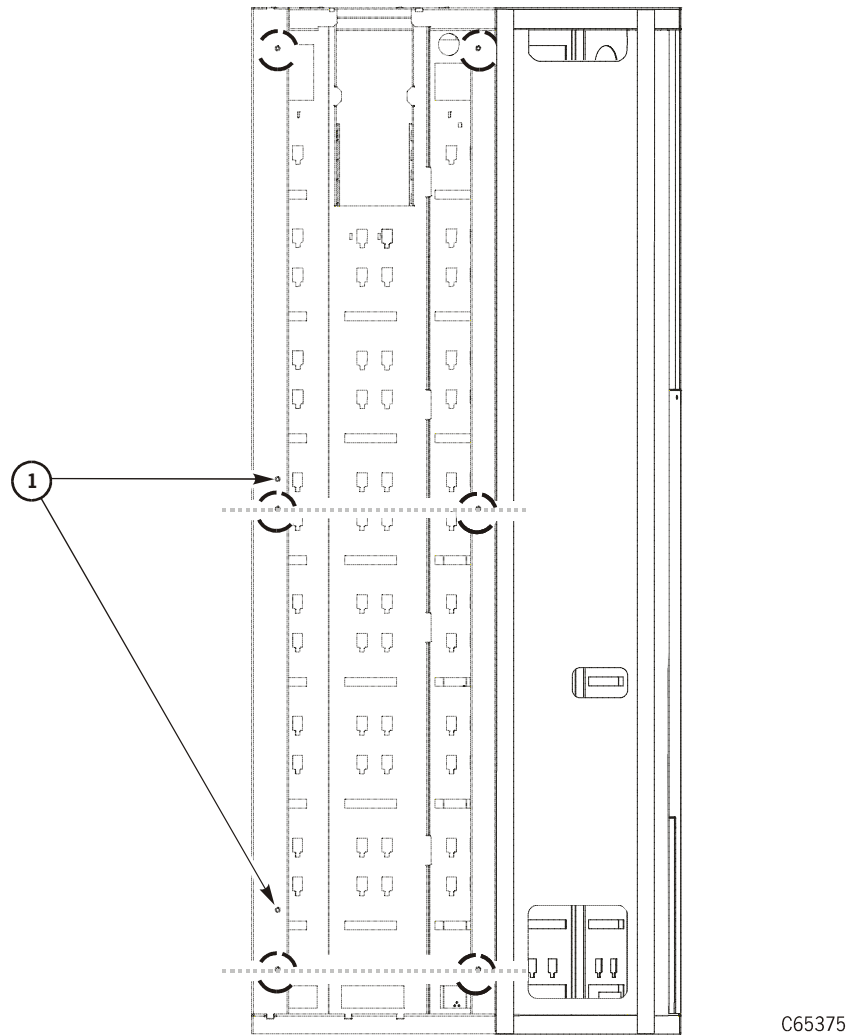
1. Do *not* insert screws at these locations.

CAUTION:
***Cable/Connector damage:* Be careful not to damage the cables or the serial port connectors when routing them through the grommets.**

5. Unwrap the two cable bundles.

   • Master PTP cables are routed from the right side of the PTP frame.
   • Standby cables are routed from the left side (rear) of the PTP frame.

6. From *inside the Master library*, insert the large grommet from the PTP kit through the upper part of the library wall (see Figure 3-8).

7. From *inside the Standby library*, insert the large grommet from the PTP kit through the upper part of the library wall (see Figure 3-8).

Figure 3-8. Library Grommet and Cables (C65379)

C65379
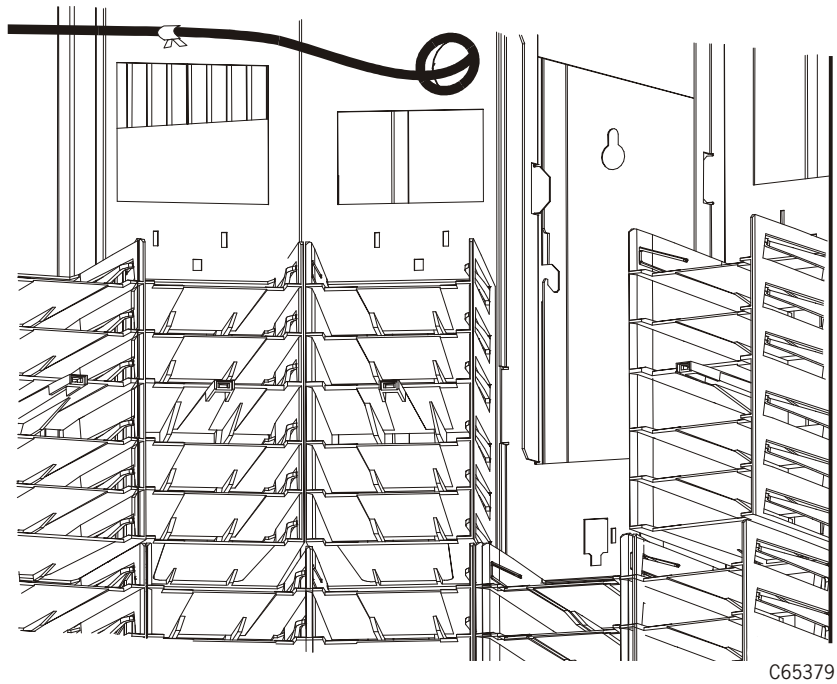
8. Bring the PTP frame up closely to the higher library wall.

9. Carefully route the cables through the library wall grommet.

10. Carefully lift the PTP frame and insert the attachment/alignment holes over the six screws on the side of the higher library.

11. Tighten the six mounting screws.

12. Carefully push the *lower* library up to the PTP frame.

13. Route the cables through the library wall grommet.

14. Install the remaining six T-30 screws into the holes on the side of the lower library.

    Do not tighten these screws until leveling is completed.

15. If necessary, you adjust leveling by using the adjustable floor levelers, part 307505603. If your libraries require the levelers, insert the wheel levelers on the wheels of *both* libraries as shown in Figure 3-9 on page 3-11 and Figure 3-10 on page 3-12.

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Figure 3-9. Leveling the Libraries (1 of 2) (C65378)
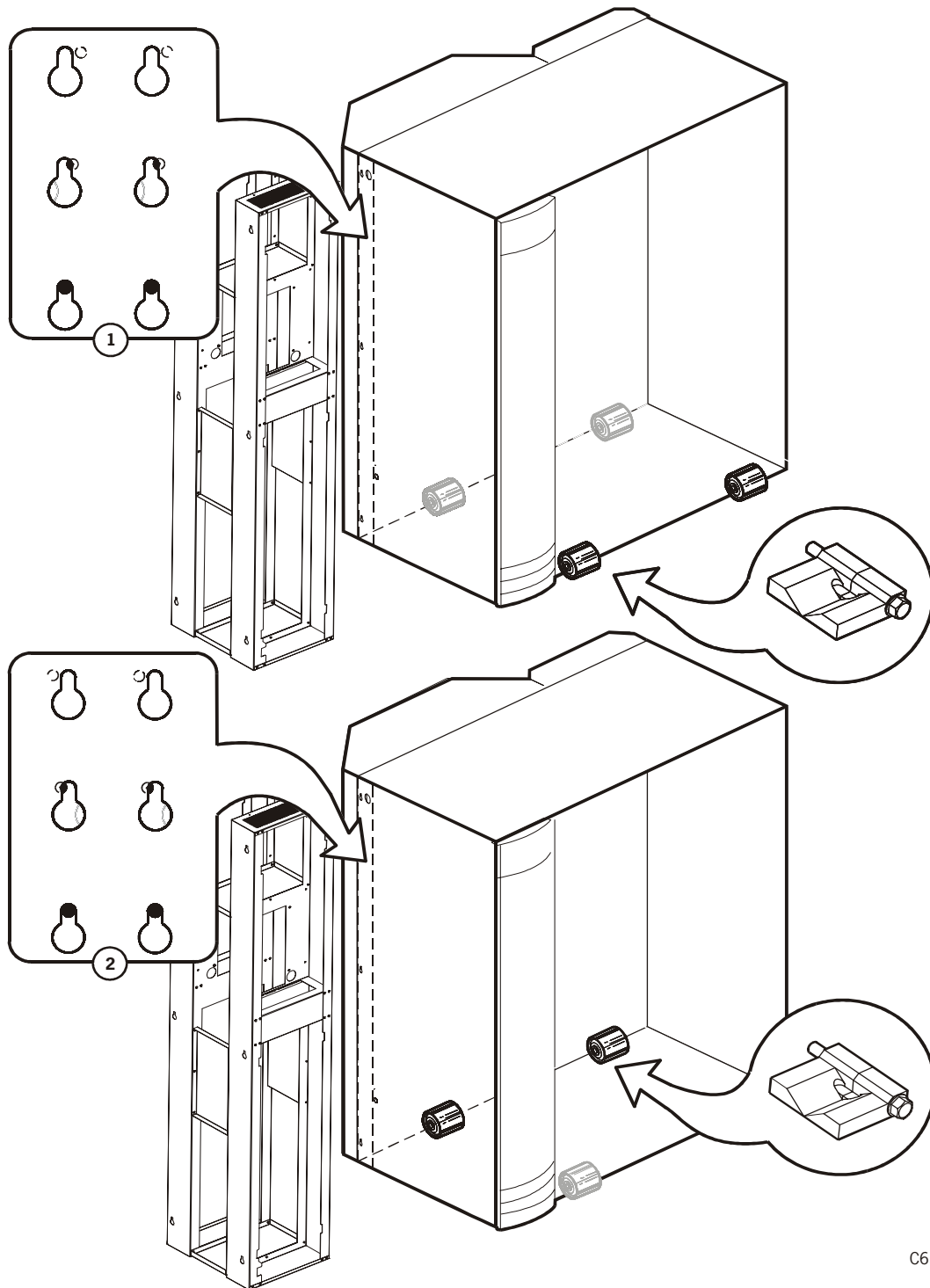
C65378

1. For this alignment hole condition, adjust the two *front* levelers.
2. For this alignment hole condition, adjust the two *rear* levelers.

Figure 3-10. Leveling the Libraries (2 of 2) (C65389)

C65389
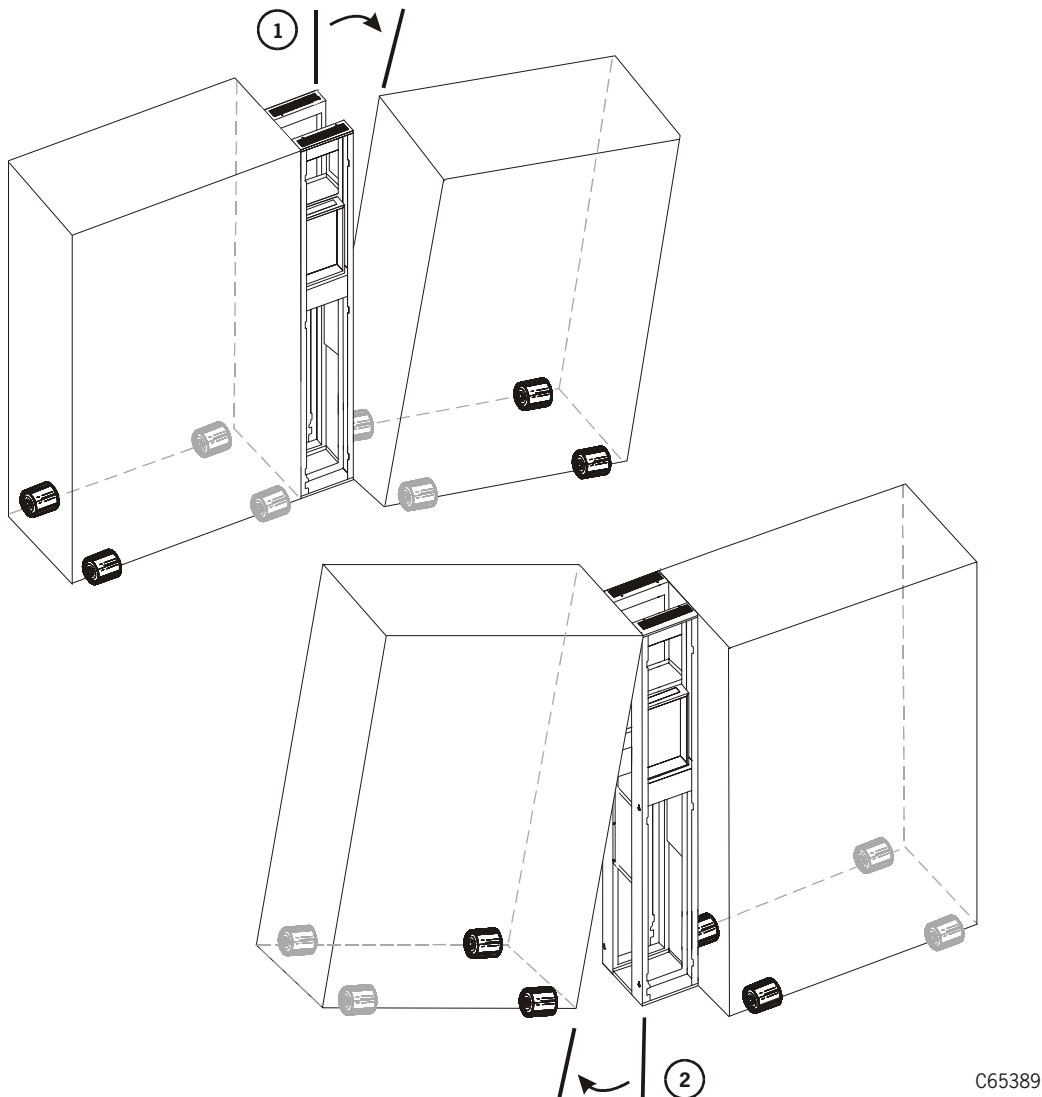
1. For this condition, adjust the two *outboard* levelers.
2. For this condition, adjust the two *inboard* levelers.

16. and illustrate which levelers must be adjusted to correct out-of-level conditions.

    As required, use a 3/4-inch socket wrench to adjust the height of the lower library so that the library attachment screws are at the top of the PTP frame slots on both libraries, as shown in .

    The tops of the library frames and the PTP frame must be within 2.54 mm (0.10 in.).

17. Check that the sides of the PTP frame are correctly aligned with the library walls.

    The sides of the library frames and the PTP frame must be within 1.27 mm (0.01 in.).

18. When both libraries are level (within 2.54 mm [0.10 in.]) and parallel to the frames (within 1.27 mm [0.05 in.]), secure the PTP frame to the lower library wall.

■ Installing PTP Cables

PTP cables must be routed between both libraries. The power cable originates from the master library; *no* power is supplied from the standby library.

The serial communication cables provide communication between both libraries. The door interlock switches must be replaced in order for each library to detect if the other library's door is open. The final cable routing and tie wrap locations are shown in .

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

Master PTP Cables

The Master PTP cables are routed from the right side of the PTP frame, through the grommets on the right side of the PTP frame.

CAUTION:
Cable/Connector damage: **Be careful not to damage the cables or the serial port connector when routing them through the grommets.**

1. Insert the small grommet from the PTP kit through the right, bottom part of the library door frame.

2. The old door interlock switch must be removed and replaced with the one supplied with the PTP kit. The location of the door interlock switch is shown in .

Figure 3-11. Door Interlock Switch Location (C65381)
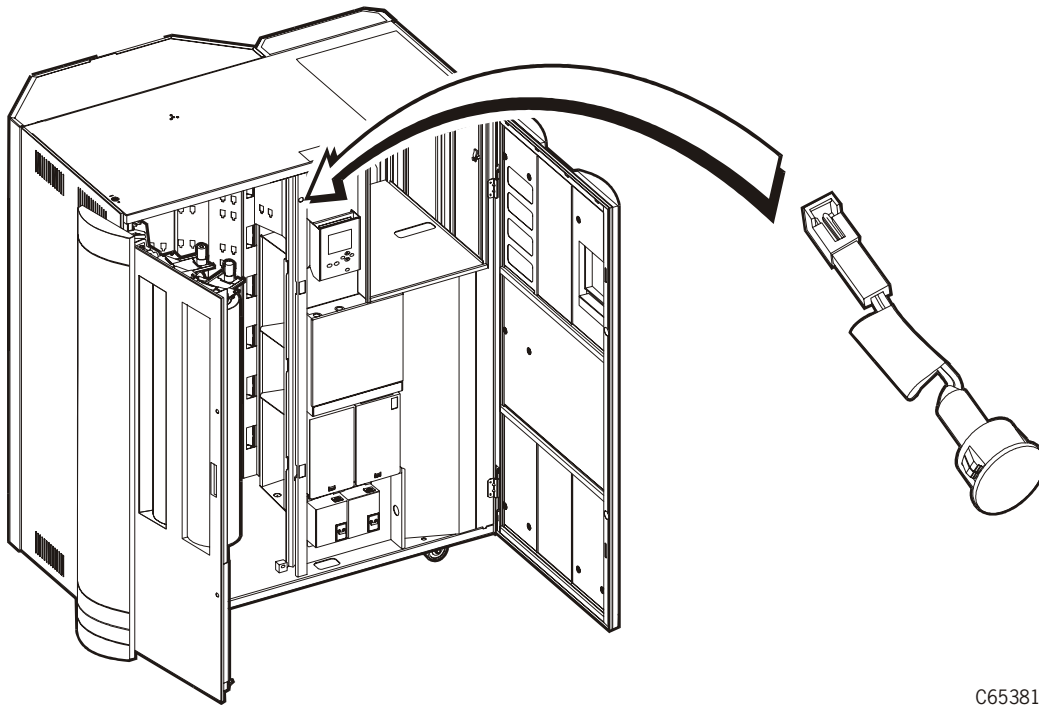
C65381

3. Disconnect the cable to the door interlock switch. switch (see Figure 3-12 on page 3-15).

4. Remove the old door interlock switch (part 3102979xx) by squeezing the clamps and pulling the switch out of its location.

5. Attach the replacement door interlock switch.

6. Reconnect the cable that you removed in step 3.

7. *Loosely* attach three roof tie wraps, as shown in Figure 3-15 on page 3-18—do not tighten.

8. Route the PTP cables through the tiewraps.

9. Connect the second, new PTP cable to the new door interlock switch.

10. The clip for attaching the CSE connector is on the bottom of the connector. Insert the CSE connector *and* the T15 self-tapping, ground screw to the interior, right door frame (see Figure 3-12 on page 3-15).

Figure 3-12. Door Interlock Switch and CSE Port (C65380)

C65380
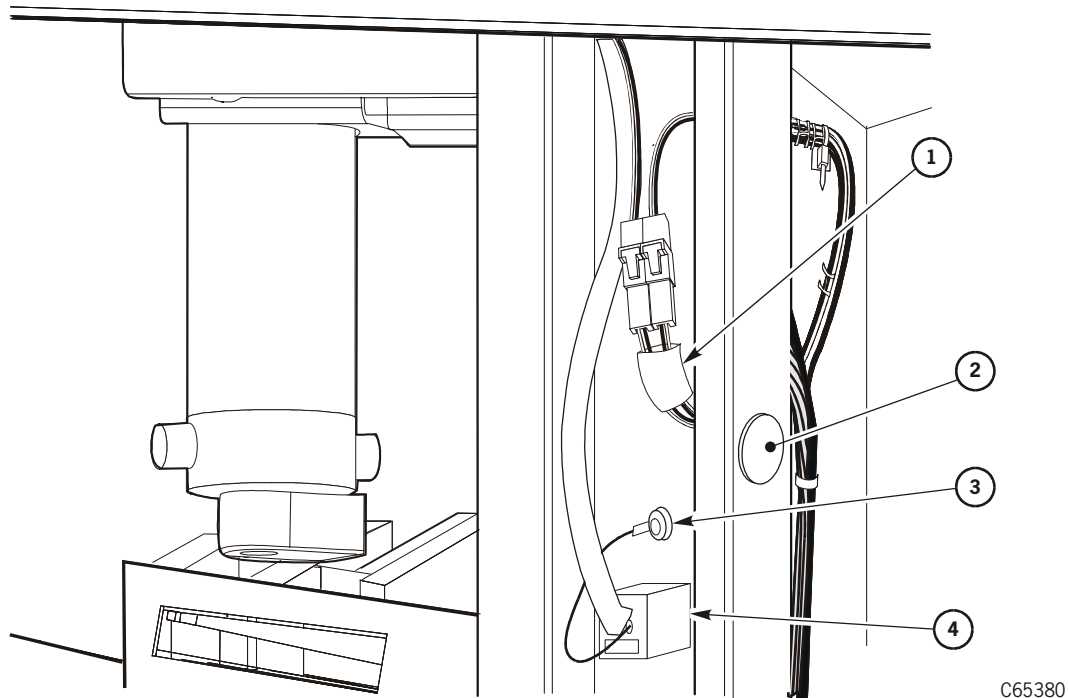
1. Door switch cables
2. Door interlock switch
3. Grounding cable
4. CSE port: used to download firmware into the MPB card *only*. See "Pass-thru Port" on page 5-44.

11. Route the power cable and connector (P283) through the *upper* door frame grommet and behind the library operator panel.

12. Remove the T-15 screws that secure the MPC/MPCL card cover and place the cover aside.

13. Route the PTP power cable through the top left grommet above the MPC/MPCL card.

14. Connect the PTP power cable to P283 (upper left, Figure 3-13 on page 3-16) of the MPC/MPCL card.

15. Reinstall the MPC/MPCL card cover.

Figure 3-13. PTP Power Connection (C65382)
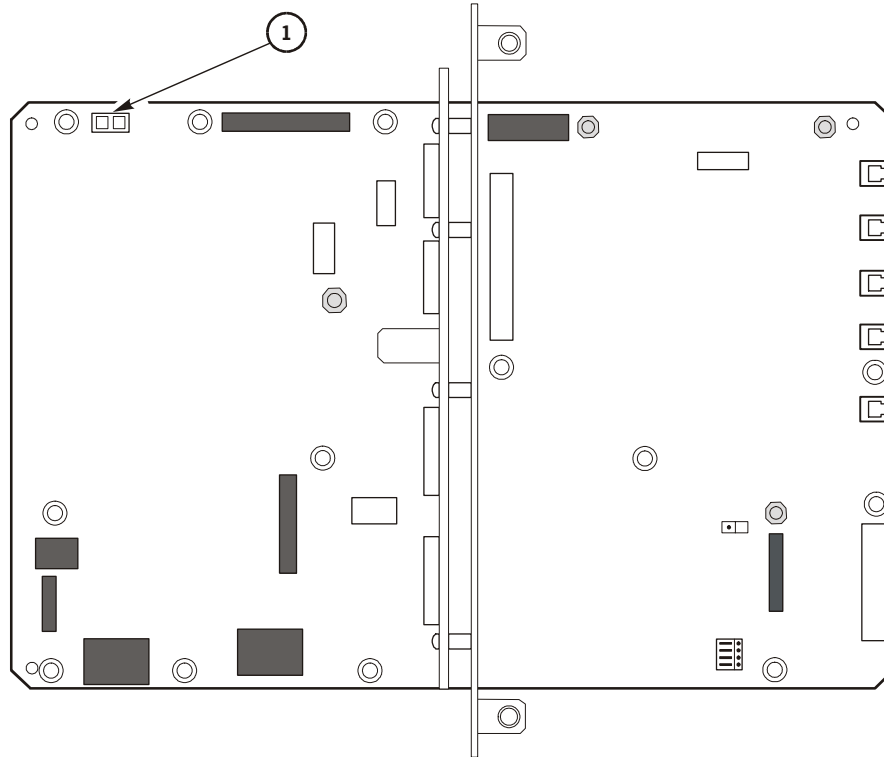
C65382

1. PTP power connection (J283)

16. Route the serial connector through the *lower* grommet on the door frame, behind the power cables, through the grommet, and attach it to the `TEST` jack on the side of the MPC/MPCL card cage, as shown in Figure 3-14.

Figure 3-14. Serial Connector (C65383)
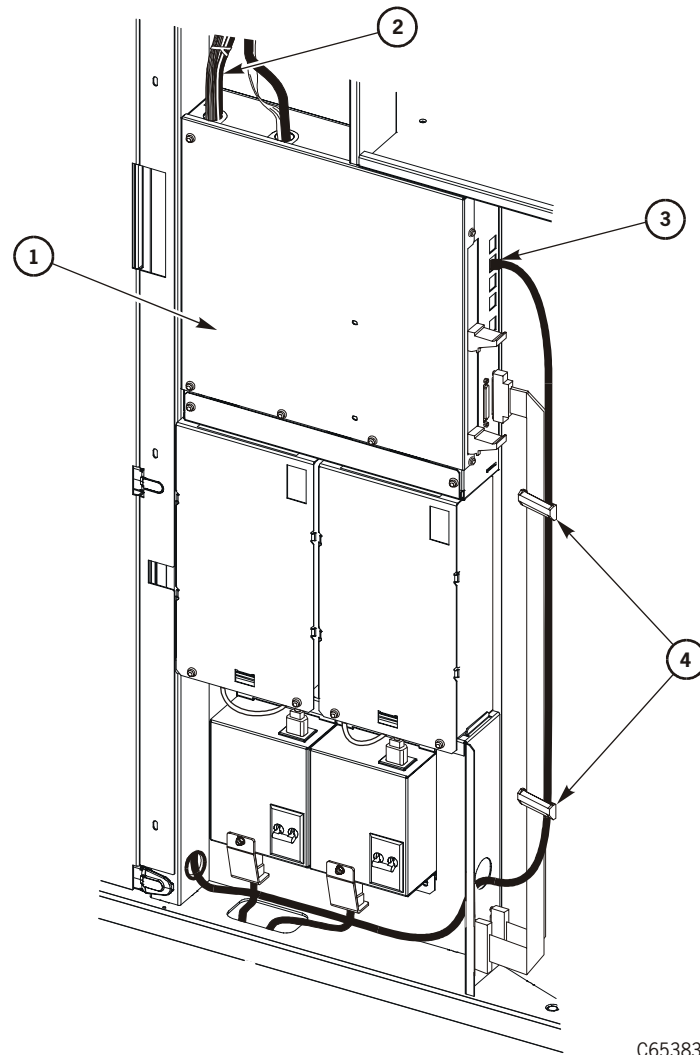
C65383

1. MPC/MPCL card
2. PTP power cable
3. Serial connector (route behind power cables)
4. Existing cable clamps

CAUTION:
Hand/Cartridge damage: **Be sure that all cables are secured away from the robot's path of operation. Check particularly at the upper and lower door frame as well as the ceiling of the library.**

17. Secure this cable within the existing cable clamps.

18. Secure all other Master PTP cables with the 10 supplied tiewraps (refer to Figure 3-15 for locations).

Figure 3-15. Master and Standby Tiewrap Locations (C65386)
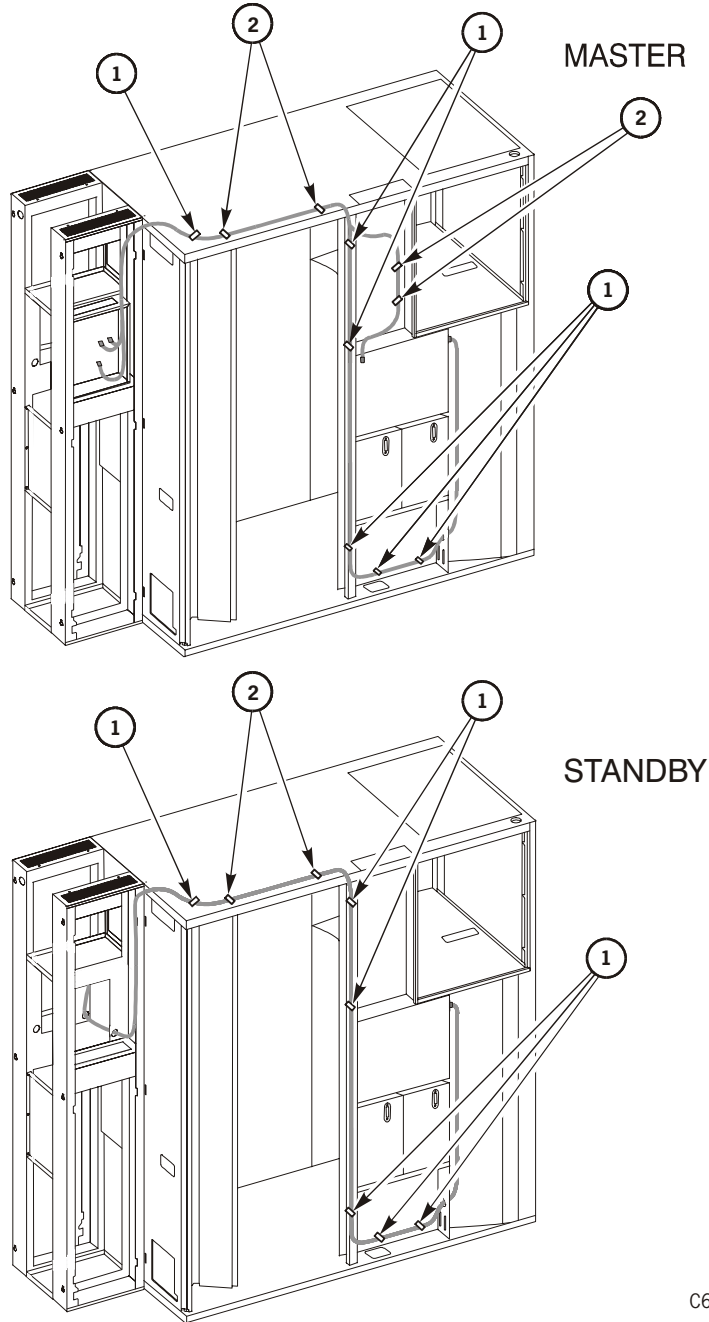
1. Push-mount cable tie
2. Standard cable tie

Standby PTP Cables

1. Disconnect the cable to the old door interlock switch.

2. Remove the old door interlock switch (part 3102979xx) by squeezing the clamps and pulling the switch out of its location.

3. *Loosely* attach three roof tie wraps, as shown in Figure 3-15 on page 3-18—do not tighten.

4. Route the PTP cables through the tiewraps

5. Attach the replacement door interlock switch.

6. Reconnect the cable that you removed in step 1.

7. Connect the second, new PTP cable to the new door interlock switch.

8. Route the serial connector through the *lower* grommet on the door frame, behind the power cables, and attach it to the TEST jack on the side of the MPC/MPCL card cage, as shown in Figure 3-14 on page 3-17.

CAUTION:
***Hand/Cartridge damage:* Be sure that all cables are secured away from the robot's path of operation. Check particularly at the upper and lower door frame as well as the ceiling of the library.**

9. Secure the serial cable within the existing cable clamps.

10. Secure all other PTP cables with the 8 supplied tiewraps as shown in Figure 3-15 on page 3-18.

■ SCSI Cabling

You have two options for SCSI cabling:

• You may daisy-chain the Master and Standby libraries together by routing and connecting a SCSI cable (part 10083680, included in the PTP kit) from one library to the other library. The minimum cable length for daisy chaining is 5 m (16.4 ft).

To install the daisy-chain SCSI cable:

1. Attach one end of the cable to the second connector on the first library's bulkhead; the connectors are shown in Figure 2-25 on page 2-44, callouts number 12 or 13.

2. Route the cable to the second library and connect it to that library's bulkhead connector.

3. Terminate where required.

• Alternately, you may connect each library separately to the host without using the daisy-chain cable configuration.

■ Installing the PTP Assembly

The PTP assembly contains the motor, gears, and belts that move the PTP array from one library to the other.

The motor must be at the Master's side.

Note: It would be helpful to use a two-step folding ladder since the PTP assembly must be lifted up and over the top of the PTP frame.

To install the PTP assembly:

1. Remove the PTP assembly from its shipping container.

2. Remove the packing foam.

CAUTION:
Lifting hazard: **The PTP assembly weighs 8 Kg (18 lbs). Use the lifting procedures in "Lifting Techniques" on page xxvi to position the PTP assembly.**

Equipment damage: **The PTP must be positioned as shown in Figure 3-16 or you will damage the PTP or the library.**

3. While holding the PTP assembly, move the 2-cell array toward the center, as shown in Figure 3-16.

Figure 3-16. PTP assembly (C65388)

C65388
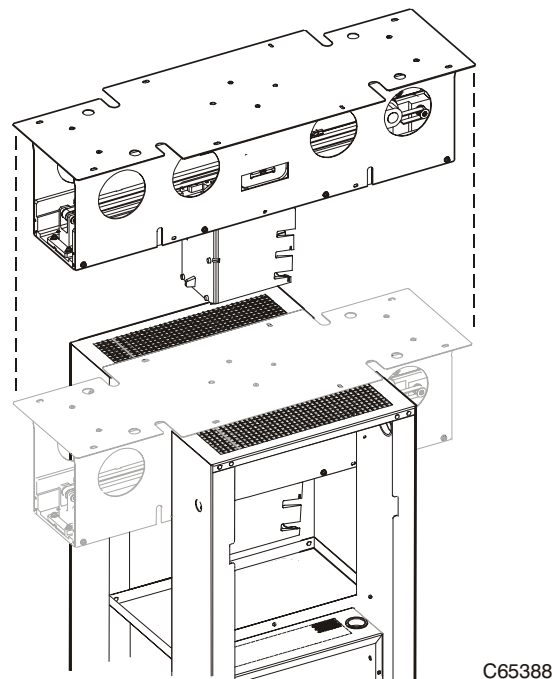
4. Lift the PTP assembly over the top of the PTP frame and *carefully* lower the assembly into the frame.

5. Align the assembly with the eight holes in the library frame.

6. Insert the eight 6 x 32 (T-15) screws provided in the kit and tighten the assembly.

7. Connect the power/signal cable from the PTP frame to the PTP assembly at connector PMJ.

8. Attach the two library frame decorative covers.

9. Attach the two PTP frame decorative covers.

10. Secure the wheels of both libraries.

11. Scrap the following material removed for the PTP installation according to your local policies

   • two library arrays
   • two sheet metal array holders
   • side panels that were removed for the PTP installation

■ PTP Configuration and Testing

For PTP operation, the MPC and MPB cards must operate at firmware edition 3.0 or later. When using the MPCL card, firmware must be at version 3.02 or later. See "Pass-thru Port" on page 5-44.

Once you have loaded firmware, the operator panel will display `L700E` for PTP libraries; `L700` will be displayed for those libraries that do not have a PTP.

You must however, configure each library for its SCSI ID and other operational characteristics, as outlined in Chapter 5, "Configuring the Library."

Testing the PTP is explained in Chapter 6, "Testing the Library."

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Installing Cables

<div style="text-align: right">4</div>

This chapter explains how to connect the following cables to the client system:

- Client-direct 1 (and Client 2, if applicable) library SCSI *control* cables
- Client SCSI *data* cables
- Ethernet cable
- Library power cable

Note: When planning your cable needs, be sure to allow sufficient length to attach drives within the library frame. For example: allow up to 4 m (13 ft) for connecting a cable to the uppermost drive within the cabinet.

■ SCSI HVD Cable Paths

Note: No more than 21 SCSI cables may be connected to the library and its drives.

You may choose to separate the control path (which transfers client commands for library move operations only) and the data path (which transfers data to/from the drives).

Alternately, you may combine both the control and data paths into one, single path. However, consider performance characteristics when determining the number of devices per SCSI path.

The library SCSI control and data path cables must be 68-pin high density (HD) connectors at the library. While single-ended cables may be used, their connectors must be adapted to a 68-pin differential configuration at the library connection.

Refer to Table 4-1 for the daisy chain cables.

Table 4-1. High Voltage Differential Daisy Chain Cables

Length	Description	Part
254 mm (10 in.)	Drive-to-drive[1]	313109302
457 mm (18 in.)	Drive-to-drive[2]	310292001
2.1 m (84 in.)	Library-to-drive	313115701

Notes: [1] For DLT drives in consecutive slot positions.

[2] For T9x40 drives in consecutive slot positions.

■ SCSI High Voltage Differential Connectors

Supported SCSI HVD connectors for the library are shown in Figure 4-1 through Figure 4-5 on page 4-6.

High Density 68-Pin VHDC Cables

For operating systems that support the VHDC (Very High Density Connector) cables at the client SCSI card, the following cables are offered. The smaller, VHDC connector is connected to the client SCSI card.

Figure 4-1. 68-Pin VHDC Connector (C65155)
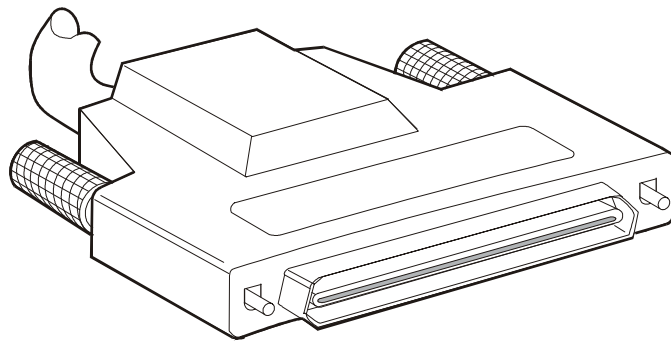
C65155

Table 4-2. 68-Pin Mini-D to 68-Pin VHDCI Connector

68-Pin MD to 68-Pin VHDCI Cable Part Numbers

Length	Above Floor PN	Plenum PN*
3 m (9.8 ft)	10083594	Not available
6 m (19.7 ft)	10083595	Not available
12 m (39.4 ft)	10083596	Not available
15 m (49.2 ft)	10083597	Not available
18 m (59.1 ft)	10083598	Not available

Note: Plenum-rated cables will withstand higher temperatures.

High Density 68-Pin Jackscrew Cables

High-density 68-pin high density jackscrew cables are used for the connections at the library and drives.

Figure 4-2. High Density 68-Pin Jackscrew Cable Connector (C65069)
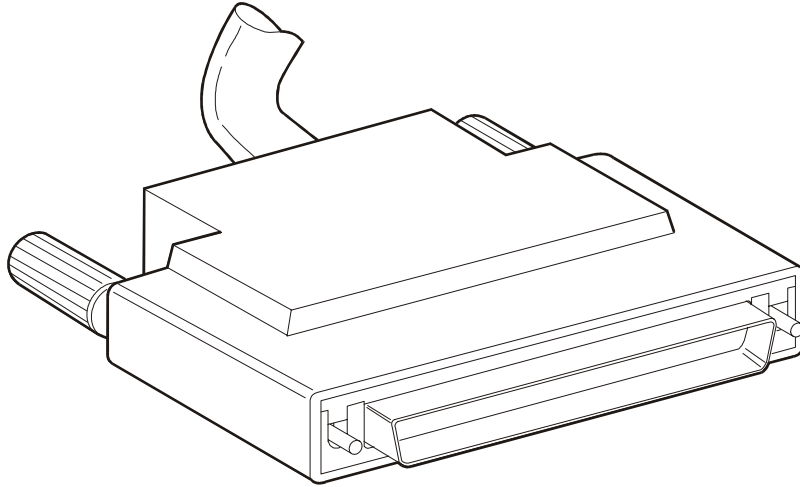
C65069

Table 4-3. 68-Pin High Density Jackscrew Connector

68-Pin High Density Jackscrew Cable Part Numbers		
Length	**Above Floor PN**	**Plenum PN***
3 m (9.8 ft)	10083309	10083313
6 m (19.7 ft)	10083310	10083314
15 m (49.2 ft)	10083311	10083315
20 m (65.6 ft)	10083312	10083316
Note: Plenum rated cables will withstand higher temperatures.		

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Centronics 50-Pin Latch to 68-Pin Jackscrew Cables

When connecting to a RISC System/6000, a BULL DPX/20, or other system that uses a Centronics 50-pin spring latch connector, you must use one of the cables listed in .

Figure 4-3. Centronics 50-pin to 68-Pin Jackscrew Connector (C65070)
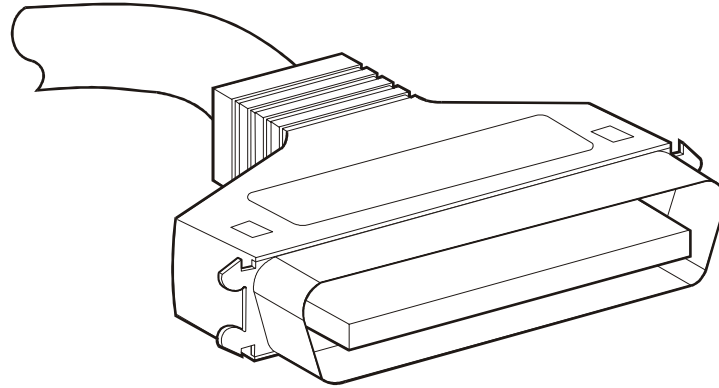
C65070

Table 4-4. Centronics 50-Pin to 68-Pin Jackscrew Cable Part Numbers

Centronics 50-Pin to 68-Pin Jackscrew Cable Part Numbers		
Length	**Above Floor PN**	**Plenum PN***
9 m (29.5 ft)	10083359	10083368
15 m (49 ft)	10083361	10083370
24 m (78.7 ft)	10083364	10083373
Note: Plenum rated cables will withstand higher temperatures.		

68-Pin MD to 68-Pin Mini-Centronics Connector

When connecting to a RISC System/6000 or other system that uses a 68-pin mini-Centronics connector, you must use one of these cables

Figure 4-4. 68-Pin Mini-Centronics Connector (C65292)
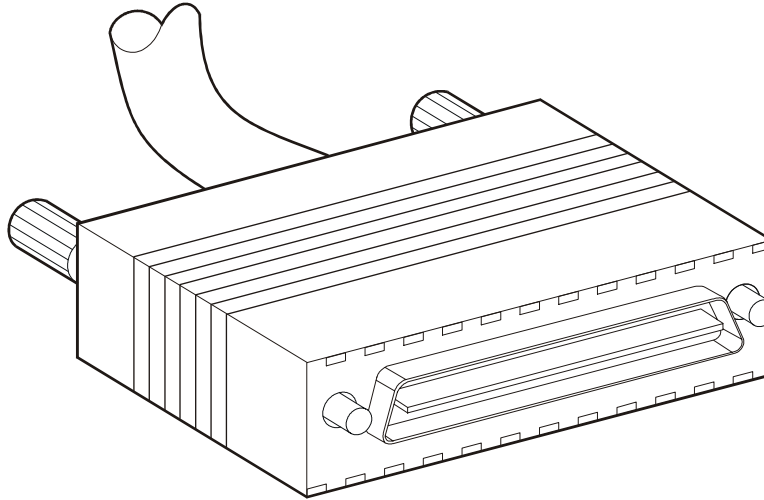
C65292

Table 4-5. 68-Pin Mini-Centronics Cables

68-Pin Mini-Centronics Cable Part Numbers		
Length	**Above Floor PN**	**Plenum PN***
12 m (39.4 ft)	10083388	10083397
Note: Plenum rated cables will withstand higher temperatures.		

Special SCSI Adapter Cables

The cables listed below are used to adapt existing system cables to operate with the library.

Figure 4-5. 50-pin to 68-Pin Latch, Block and Rail Connector (C65071)
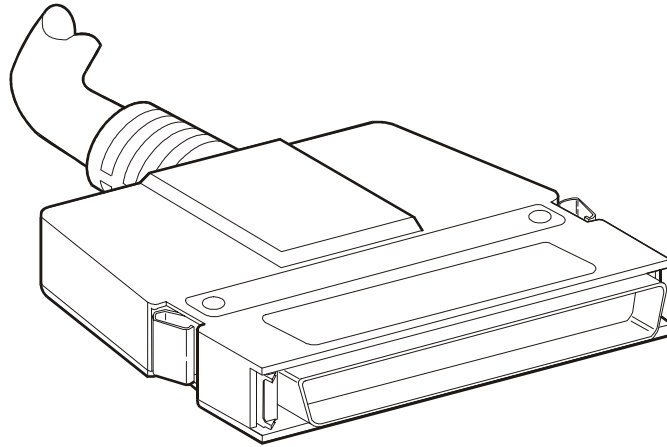
C65071

Table 4-6. Special SCSI Cable Adapters

50-Pin to 68-Pin Latch, Block and Rail Connector Part Number		
Cable Length and Description	**Cable Usage**	**Part Number**
3 m (10 ft): HD 50-68 pin Sun/ SPARC latch, block and rail adapter	Used to adapt the 50-pin HD latch, block and rail to fit a 68-pin connection	10083522

■ SCSI Low Voltage Differential Cables

Supported Universal SCSI (LVD or HVD) cables for the library are listed below.

Note: LVD operation for the libraries with an MPC card requires conversion bill 101368. Libraries with the MPCL card do *not* require the conversion bill.

Correct drive terminators must be used (see "Connection—General", below). Incorrect termination will cause I/O and read/write errors.

The library must be the last device on the SCSI bus and must use a single, shielded cable (PN 3136668xx) with feed-through terminator.

Table 4-7. Universal 68-Pin MD to 68-Pin MD

Length	Part Number
300 mm (11.8 in.) Drive-to-drive	10083675
500 mm (19.7 in.)	10083676
3 m (9.8 ft)	10083679
5 m (16.4 ft)	10083680
10 m (32.8 ft)	10083681

■ SCSI Control Connection

SCSI control connections depend on length requirements, the position of the client in relation to the library, and the type of interface required (single-ended or differential).

Library control cables from the client or server connect to the MPC/MPCL card through the two connectors at the front right bulkhead. One bulkhead connector is for SCSI "in" signals, and the other is for SCSI "out" signals. These two cables/connectors join into one connector at the MPC/MPCL card.

For connection to a Sun SPARC station, refer to "Sun Server Connection— Single-Ended," "Sun Server Connection—High Voltage Differential," or "Sun Server Connection—Low Voltage Differential," for directions that deal with this type of server.

Connection—General

To connect the server or client SCSI *control* cable:

• Bring the SCSI 68-pin cable from the server or client to the connectors on the right front bulkhead.

• Connect the HVD SCSI server or client cable to one of the two connectors on the MPC/MPCL card (Figure 2-25 on page 2-44).

- Connect the LVD SCSI server or client cable to one of the connectors on the MPW card (for the MPC card—see Figure 2-25 on page 2-44) or the LVD/SE connector on the MPCL card.

- If the path *continues* from this point, connect a second cable to the second connector on the bulkhead. Route this cable through the hole in the library floor.

  Continue routing the cable under the frame (toward the rear of the library) and up through the hole provided for the drive cables. Insert the cable into the first drive channel connector (at the bulkhead).

- If the path *terminates*, connect a terminator at the other connector on the bulkhead:

  - part 10148003 for HVD differential SCSI
  - part 10148002 for HVD single-ended SCSI
  - part 10148031 for LVD/SE differential SCSI

- Obtain the SCSI icon/label set (part 313611001) and apply the appropriate icon the bulkhead.

Sun Server Connection— Single-Ended

Single-ended connections to the Sun server are as follows:

Note: It is suggested that this path be reserved for control functions *only.*

- Due to the length restriction of 3.7 m (12 ft), the server must be placed very close to the library.

- The cable for this type of operation is 3 m (10 ft), high density, 68-to-50 pin, part 10083522. This cable fits all standard SPARC and RISC System/6000 single-ended connectors.

No special adapter cards are required for single-ended operation.

The connection at the Sun server is 50-pin.

Sun Server Connection—High Voltage Differential

HVD Differential connections to the Sun server are as follows:

- A differential adapter feature must be ordered for any distance beyond 3.7 m (12 ft):

  - StorageTek part 112167001 for 8-address differential operation.
  - StorageTek part 309457301 for 16-address differential operation.

- The distance from the library to the Sun can be up to 18 m (60 ft).

- The differential mode of operation allows you to connect the drive SCSI paths to this same cable if desired.

The connection at the Sun server is 68-pin.

After the type of operation is determined, connect the Sun server using the procedure described in the paragraph above.

Note: When configuring the library to a Unix-based workstation, it is recommended that you use a dedicated SCSI host bus adapter:

- For wide SCSI adapters, you may assign any target from 0–4 for the library.

- For narrow SCSI adapters, the range of targets is 0–6.

If you choose to use the embedded system bus on the SPARC station, you should select target 6, 5, 2, or 0 for the library, since the remaining targets are reserved for Sun peripherals.

Note: For IBM RISC System/6000 machines, available targets on the embedded system bus are 6, 5, 3, and 2.

Sun Server Connection—Low Voltage Differential

LVD Differential connections to the Sun server are as follows:

- The distance from the library to the server can be up to 12 m (39.37 ft).

- Differential mode of operation allows you to connect the drive SCSI paths to this same cable if desired.

The connection at the Sun server is 68-pin.

After the type of operation is determined, connect the Sun server using the procedure described in the paragraph above.

Note: When configuring the library to a Unix-based workstation, it is recommended that you use a dedicated SCSI host bus adapter:

- For wide SCSI adapters, you may assign any target from 0–4 for the library.

- For narrow SCSI adapters, the range of targets is 0–6.

If you choose to use the embedded system bus on the SPARC station, you should select target 6, 5, 2, or 0 for the library, since the remaining targets are reserved for Sun peripherals.

For IBM RISC System/6000 machines, available targets on the embedded system bus are 6, 5, 3, and 2.

■ SCSI Drive Connections

For SCSI operation, make sure that you comply with the length restrictions for your channel type.

It is very important to label each drive with its server or client address. It is also important to label the cables. These labels provide reliable identification for any future maintenance on the drives.

CAUTION:
System Degradation: **Do not connect SCSI cables to the drives until they are configured for operation.**

Direct Connection

For installations requiring SCSI direct *data* path configurations, for each drive:

1. Open the left rear door.

2. Connect the client data cable to the appropriate connector at the rear library frame for the first drive.

3. Install a terminator on the second drive connector at the rear library frame:

   - part 10148002 (single-ended)
   - part 10148003 (HVD)
   - part 10148031 (LVD/SE)

Daisy Chain Connection

For installations requiring SCSI daisy-chained *data* path configurations:

1. Open the left rear door.

2. Connect the client data cable to the appropriate connector at the rear library frame.

3. Install a short SCSI jumper cable (at the rear of the library frame) from the second connector of the first drive to the next drive connector in the chain.

4. Continue the daisy chain until you reach the last drive on the chain.

5. Install a terminator on the last drive connector on the rear library frame:

   - part 10148002 (single-ended)
   - part 10148003 (differential)
   - part 10048031 (LVD/SE)

■ Fibre Channel Operation

Fiber operation for the library interface requires:

- The optional MPV logic assembly, also referred to as the compact peripheral component interconnect (CPCI) assembly. This card is attached to the MPC/MPCL card.

- The optional MPU card that is inserted into the MPV. This card contains a Class 1 laser required for Fiber optic operation.

Fibre Channel Cables

Part numbers and descriptions for Fibre Channel (SC connector) cables are listed in Table 4-8.

Table 4-8. Fiber Optic Cables: 50 µm Multimode, SC-to-SC Connectors

Description—Plenum-rated*	Part
5 m (16.4 ft)	10800123
20 m (65.6 ft)	10800125
50 m (164 ft)	10800127
100 m (328.1 ft)	10800128
250 m (820.2 ft)	10800129
500 m (1640.4 ft)	10800130

Note: Plenum-rated cables have a higher flammability rating and are used for under-floor applications.

LC connectors are the industry standard for all 2 Gb-capable Fibre Channel devices such as the T9840B tape drive. Table 4-9, Table 4-10 on page 4-12, and Table 4-11 on page 4-12 list the 2 Gb-capable cables and adapter.

Table 4-9. LC-to-SC Cables

Description	Length	Part
Optical Cable, LC to SC Duplex, Riser	10 m (32.8 ft)	10800231
Optical Cable, LC to SC Duplex, Riser	50 m (164 ft)	10800232
Optical Cable, LC to SC Duplex, Riser	100 m (328 ft)	10800233
Optical Cable, LC to SC Duplex, Plenum	10 m (32.8 ft)	10800234
Optical Cable, LC to SC Duplex, Plenum	50 m (164 ft)	10800235
Optical Cable, LC to SC Duplex, Plenum	100 m (328 ft)	10800236

Table 4-10. LC-to-LC Cables

Description	Length	Part
Optical Cable, LC to LC Duplex, Riser	10 m (32.8 ft)	10800221
Optical Cable, LC to LC Duplex, Riser	50 m (164 ft)	10800222
Optical Cable, LC to LC Duplex, Riser	100 m (328 ft)	10800223
Optical Cable, LC to LC Duplex, Plenum	10 m (32.8 ft)	10800224
Optical Cable, LC to LC Duplex, Plenum	50 m (164 ft)	10800225
Optical Cable, LC to LC Duplex, Plenum	100 m (328 ft)	10800226

Table 4-11. LC-to-SC Adapter Kit

Description	Part
LC-to-SC Adapter kit (1 Gb limitation)	312105301

Fibre Channel Connection

After following the directions outlined in "Fiber-optic Cable Installation" on page xxix, connect the client fiber cable to the MPU card, at the lower right of the MPC/MPCL card.

Note: The MPU card must be placed in the lower slot on the MPV card.

Fiber Cable Routing

Note: The L700e frame contains holes above the tape drive area that may be used to route fiber cables that are located above the library.

Follow the instructions in "Fiber-optic Cable Installation" on page xxix and "Fiber-optic Cable Installation" on page xxix. Route fiber cables according to Figure 4-6 on page 4-13.

Figure 4-6. Fiber Cable Positioning (1 of 2) (C65268)
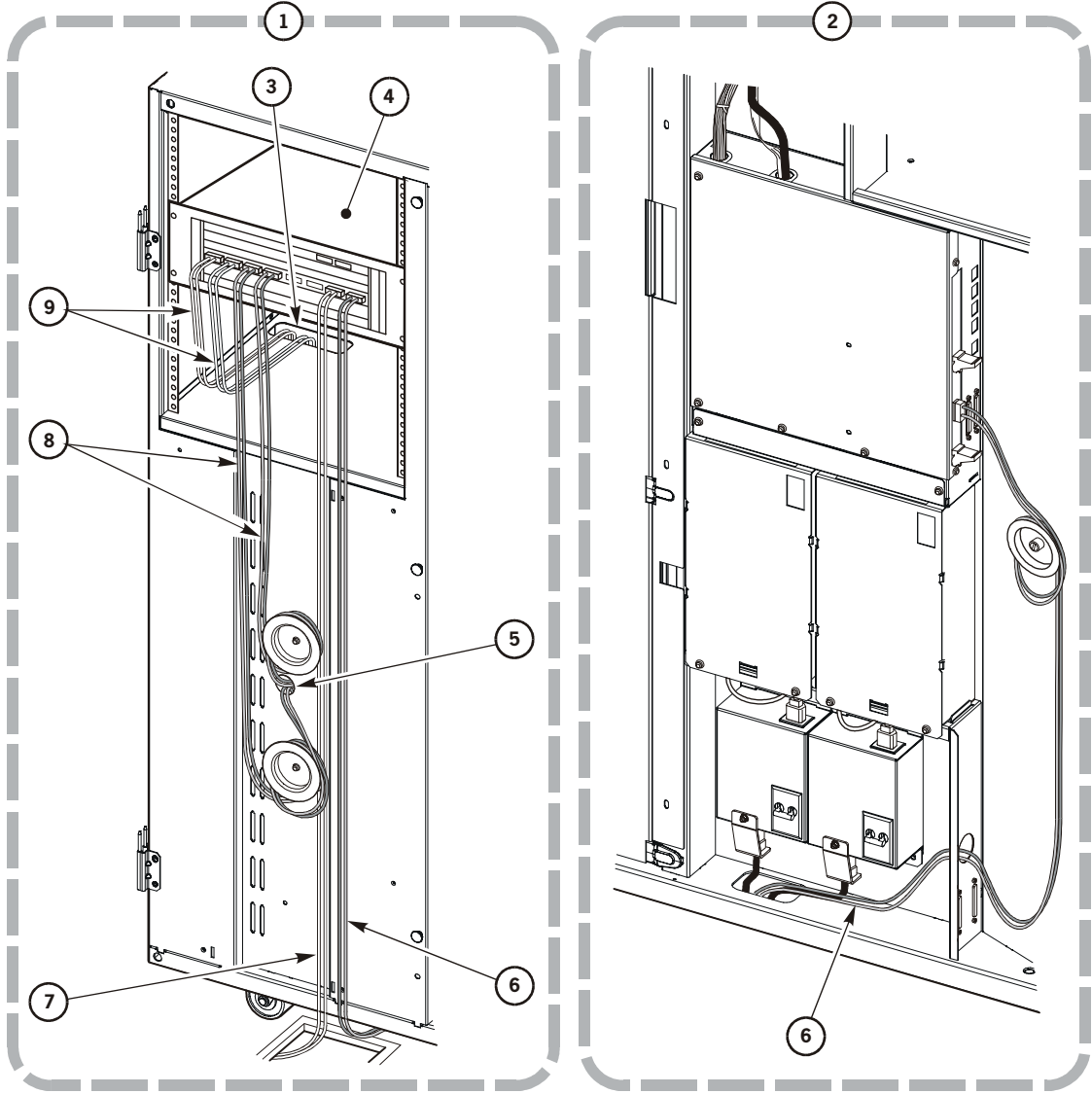
C65268

1. Rear view (Cable access area)
2. Front view (electronics module)
3. Drive Column 1 cable access hole
4. Fiber hub, bridge, or switch
5. Drive Column 0 cable access hole
6. Fiber cable routing to MPU (from client or hub)
7. Fiber cable routing from client
8. Fiber cable routing to Column 0 drives
9. Fiber cable routing to Column 1 drives

Figure 4-7. Fiber Cable Positioning (2 of 2) (C65301)

C65301
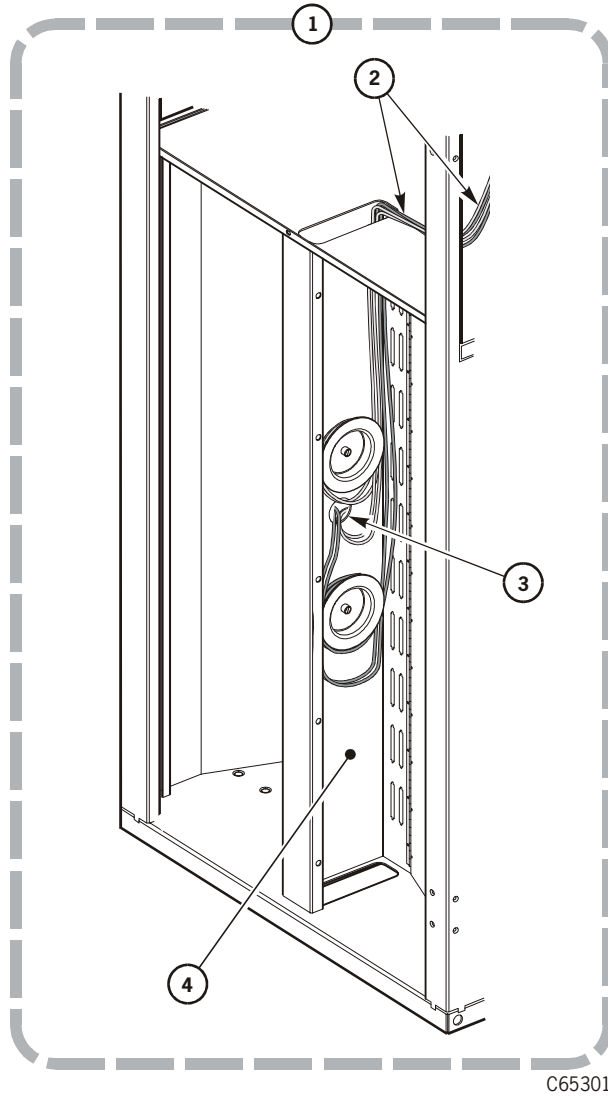
1. View from right access door
2. Fiber cables from hub to second drive column
3. Cable access hole
4. Cable channel (door shown open)

■ Ethernet Cable

If your installation requires an Ethernet connection:

1. Open the right front door and route the Ethernet cable up through the hole in the library floor.

2. Connect the cable to the "Enet" connector on the MPC/MPCL card.

■ Library Power Configurations

Library power configurations are explained below. If your installation contains the APC redundant AC power option, follow the directions enclosed with that option's conversion bill.

> **CAUTION:**
> ***Electrical hazard*: Do not connect the power cable until told to do so in the instructions. Be sure the circuit breakers at the library power supply and for the power outlet are turned off.**

The AC PDUs supply voltage to the drive columns and library DC power supplies. Consider the following requirement and recommendation:

1. No more than 10 DLT/Ultrium drives or six T9x40 drives may be connected to one PDU. If there are two drive columns in the library, you must have two PDUs to distribute voltage to the two drive towers.

2. If you have two PDUs, an additional DC power supply is recommended to provide power redundancy for the library

Note: When installing your drives in a library with two AC PDUs, attach each PDU to a separate branch circuit. Be sure that you have referred to to establish the site power requirements.

Drive Column Power

There are two drive column power cable configurations for the library:

- Single power cable
- Two power cables

To determine the type you have for your machine, check the cables behind the PDU; single power cables will have only one cable, two power cable models will have connectors marked *PWR1* and *PWR2*.

Drive Column—Single Power Cable

The diagram for the single drive column power cables is shown in .

Some power configuration examples for single drive column power cables:

- If you have two drive columns, two PDUs, and a total of six DLT/Ultrium drives, you might place three drives in one column and three drives in the other column. If one AC power circuit should fail, you would still have three operational drives.

- For two client operation, if you have two drive columns, two PDUs, and a total of 12 DLT/Ultrium drives you might place

  - Three drives for Client 1 and three drives for Client 2 in one column

  - Three drives for Client 1 and three drives for Client 2 in the second column

  If one AC power circuit should fail, you would still have three working drives to each client.

Drive Column—Two Power Cables

Newer machines incorporate *two* power cables into each drive column. This enables more power configurations for the customer. The diagram for the two drive column power cables is shown in

Newer models may be configured so that half of the drives in one column are connected to one PDU and the other half are connected to another PDU. An example configuration is shown in .

Connecting Drive Power Cables

If there is *one* drive column power line running from each drive column, the plug for the column is connected at the rear of the PDU.

If there are *two* power lines running from each drive column, the plug labeled *PWR1* denotes the lower half of the drive column; *PWR2* denotes the upper half of the column. You may cross-couple the power plugs at the rear of the PDUs. One example of this configuration is shown below.

Note: It is advisable to label which drives are connected to each PDU.

Figure 4-8. Drive Column Power Configuration Example (Two Power Cables) (C65797)
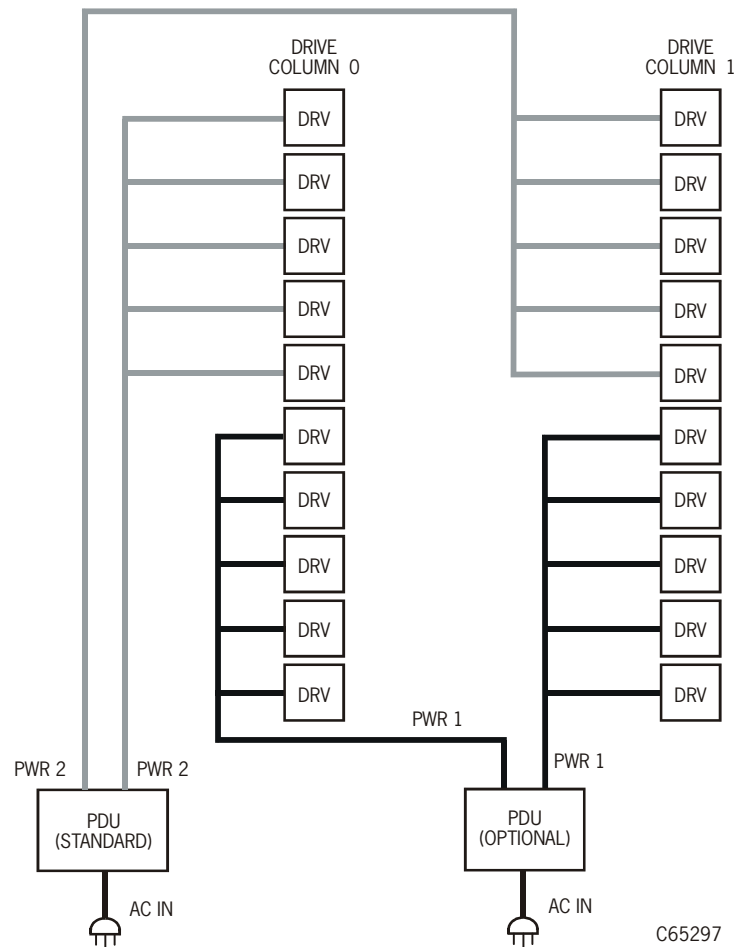
■ Routing the Library Power Cable

To route the power cable, refer to and perform the following:

1. Place the library circuit breaker in the down (OFF) position.

2. Remove the nut that holds the cable strain relief in place (use a 5/16-inch nut driver or remove the Torx bit from your driver). Place the strain relief plate to the side.

3. Insert the female connector through the hole in the library floor. Be sure the power cable is labeled with the customer's circuit breaker number and location.

Note: If your installation requires this cable to be under the floor, carefully pull the cable up through the hole in the floor.

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4. Insert the power cable connector into the bottom of the AC power distribution unit.

5. Replace the strain relief bracket and nut as shown in Figure 4-9 on page 4-19.

Note: Safety agency standards require that your power receptacle is located within 2.8 m (9.2 ft) of the tape library. The power receptacle must also be easily accessible. In sites where the power cable is directly wired to a power source, your facility must have a readily accessible disconnect device incorporated in the fixed wiring (15 A).

Remarque: Conformément aux normes des agences de sécurité, la prise d'alimentation électrique doit être située à moins de 2,8 m de la bibliothèque. La prise d'alimentation doit également être facile d'a Sur les sites où le câble est raccordé directement à une source d'alimentation, un dispositif de déconnexion facile d'accès doit êt incorporé au système de câblage fixe (15 A).

Hinweis: Gemäß den sicherheitsrechtlichen Vorschriften darf die Netzsteckdos maximal 2,8 m von Library entfernt sein. Außerdem muß die Steckdo gut zugänglich sein.
Wenn das Netzkabel fest an eine Stromquelle angeschlossen ist, muß in der Festverdrahtung eine gut zugängliche Unterbrechungseinrichtu befinden (15 A).

Uwaga: Wymogi BHP stanowią, że gniazdo zasilania powinno znajdować się w odległości 2,8 m od biblioteki i że powinno być łatwo dostępne.
W miejscach, gdzie kabel zasilania jest bezpośrednio podłączony do źrc zasilania, w sieć zasilającą należy wmontować łatwo dostępny wyłącznil główny (15 A).

■ Connecting Power

To connect the library power cable to its power source:

1. Label the cable with the library address/location.

2. Connect the male end of the power cable into the wall outlet.

3. Turn ON the circuit breaker for the wall outlet.

4. Lift up (ON) the library circuit breaker.

The library will begin its initial program loading of the embedded firmware.

Refer to Chapter 5, "Configuring the Library" to configure the library and drives.

Figure 4-9. Library Power Cable (C65066)
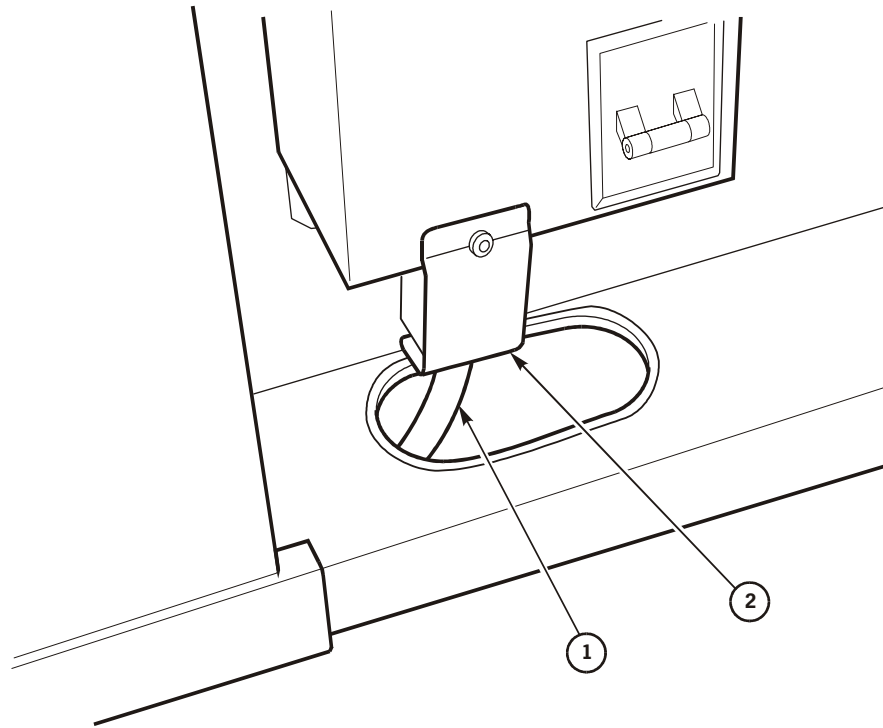
C65066

1. Power cable
2. Strain relief

■ Communication/Service Cables

Three types of connections from a laptop device are available for service representatives:

1. Firmware (*lower than 2.20 only)* connection (SER1 port on the MPC card only—the MPCL card cannot operate with firmware earlier than version 3.02)

2. Full service connection: Firmware 3.00 and later and diagnostic testing connection (CSE port [also known as the Command Line Interface or "CLI" port] on the MPC/MPCL card)

3. MPB (PTP) connection: Firmware 3.00 and later for the MPB only, CSE (CLI port) in door frame of Master library.

Both connections use RJ45 cables (part 4108289xx) and require either a RJ45—DB9 adapter (part 10410823, included in shipping kit) or CSE DOS Diagnostic cable (part 24100134) at the laptop connection.

For either connection, your laptop computer must be set for RS423 or RS232 serial protocol:

- 38,400 baud
- Eight bits
- No parity bit
- One stop bit

Firmware 2.20 and Earlier

To load firmware edition *2.20*, run diagnostic tests from the laptop, or to extract detailed FSC information, connect the RJ45 cable from the laptop to the port labeled *SER1* on the MPC card.

Note: This applies to MPC cards only; MPCL cards must be at version 3.02 or later.

Firmware 3.00 and Later

To load firmware edition *3.00 or later*, run diagnostic tests from the laptop, or to extract detailed FSC information, connect the RJ45 cable from the laptop to the port labeled *CSE* on the MPC/MPCL card.

CAUTION:
System interruption: **When using the CSE port, you may *not* be prompted to ensure that the device is offline.**

Configuring the Library

5

This chapter describes how to configure the library and its associated drives.

Library firmware resides within a Flash PROM chip on the MPC/MPCL controller card When the library is powered-on, it performs the initialization of the robotic components and automatically configures the library size. You must, however, configure the library and drives to enable full initialization, audit, testing, and online capabilities.

■ L700e Capacity Variations

The capacity variations available for the L700e are listed in the tables below. Figure 5-1 on page 5-2 through Figure 5-4 on page 5-5 illustrate these variations.

Refer to Appendix A, "Library Elements and Diagrams" for cell (element) locations.

Table 5-1. Capacity Variations—1 Drive Column

Standalone Library		Single Library with PTP*	
Size	**Capacity**	**Size**	**Capacity**
1/3 (①)	216 cells	1/3 (①)	210 cells
2/3 (②)	384 cells	2/3 (②)	378 cells
Full (③)	678 cells	Full (③)	672 cells

Note: These are the capacities of *each* PTP library; double these numbers for the combined total.

Table 5-2. Capacity Variations—2 Drive Columns

Standalone Library		Single Library with PTP*	
Size	**Capacity**	**Size**	**Capacity**
1/3 (①)	156	1/3 (①)	150
2/3 (②)	324	2/3 (②)	318
Full (③)	618	Full (③)	612

Note: These are the capacities of *each* PTP library; double these numbers for the combined total.

Figure 5-1. Standalone Capacity Diagram—1 Drive Column (C65087)
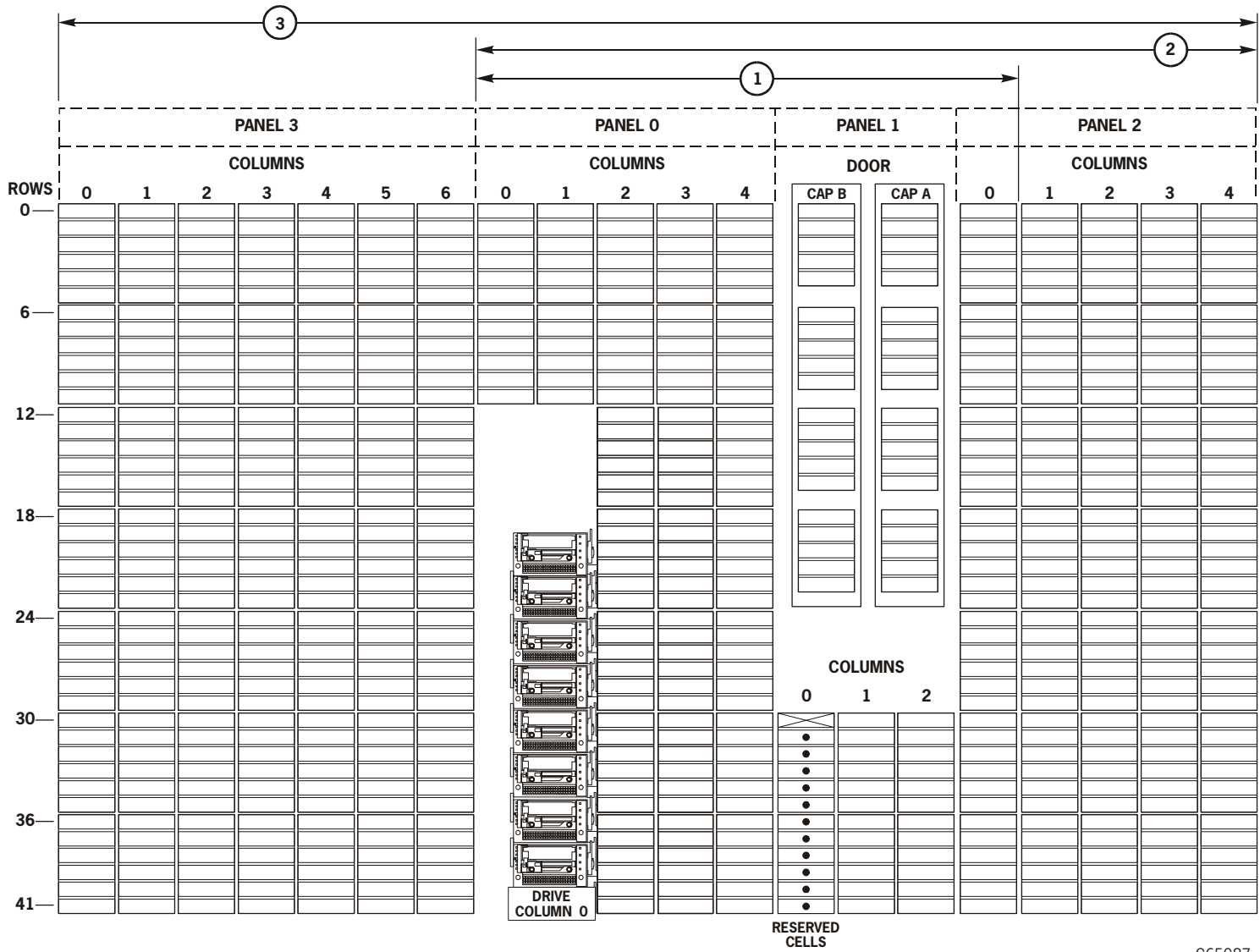
Figure 5-2. Standalone Capacity Diagram—2 Drive Columns (C65088)

L700e Capacity Variations
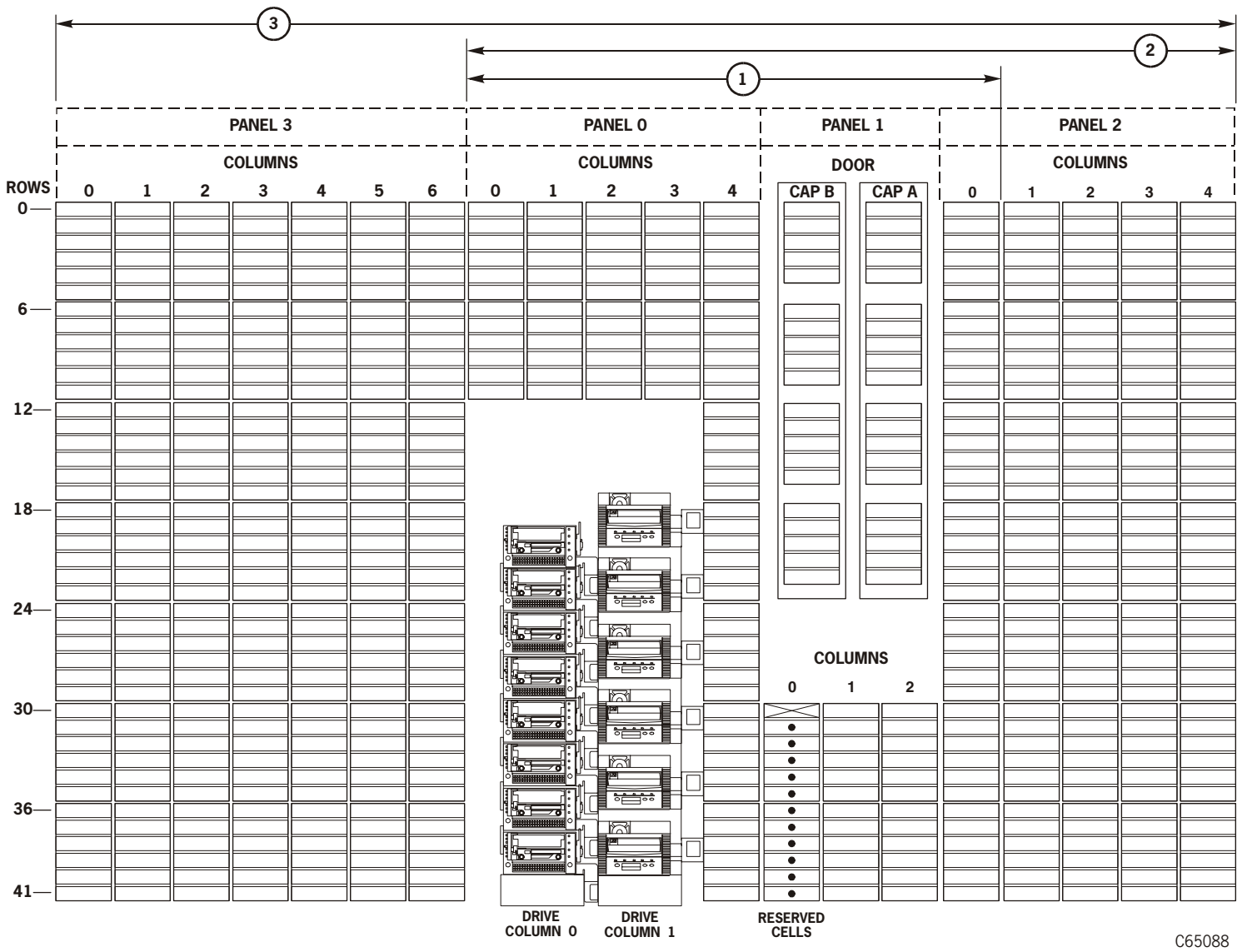
C65088

Figure 5-3. PTP Capacity Diagram—1 Drive Column (C65405)

= PASS-THRU PORT (PTP) [Panel 2, Column 3 numbering begins with the first array cell below the PTP.]

NOTE: Columns 1 and 2 on Panel 2 are unavailable for the 1/3 - size library with the PTP
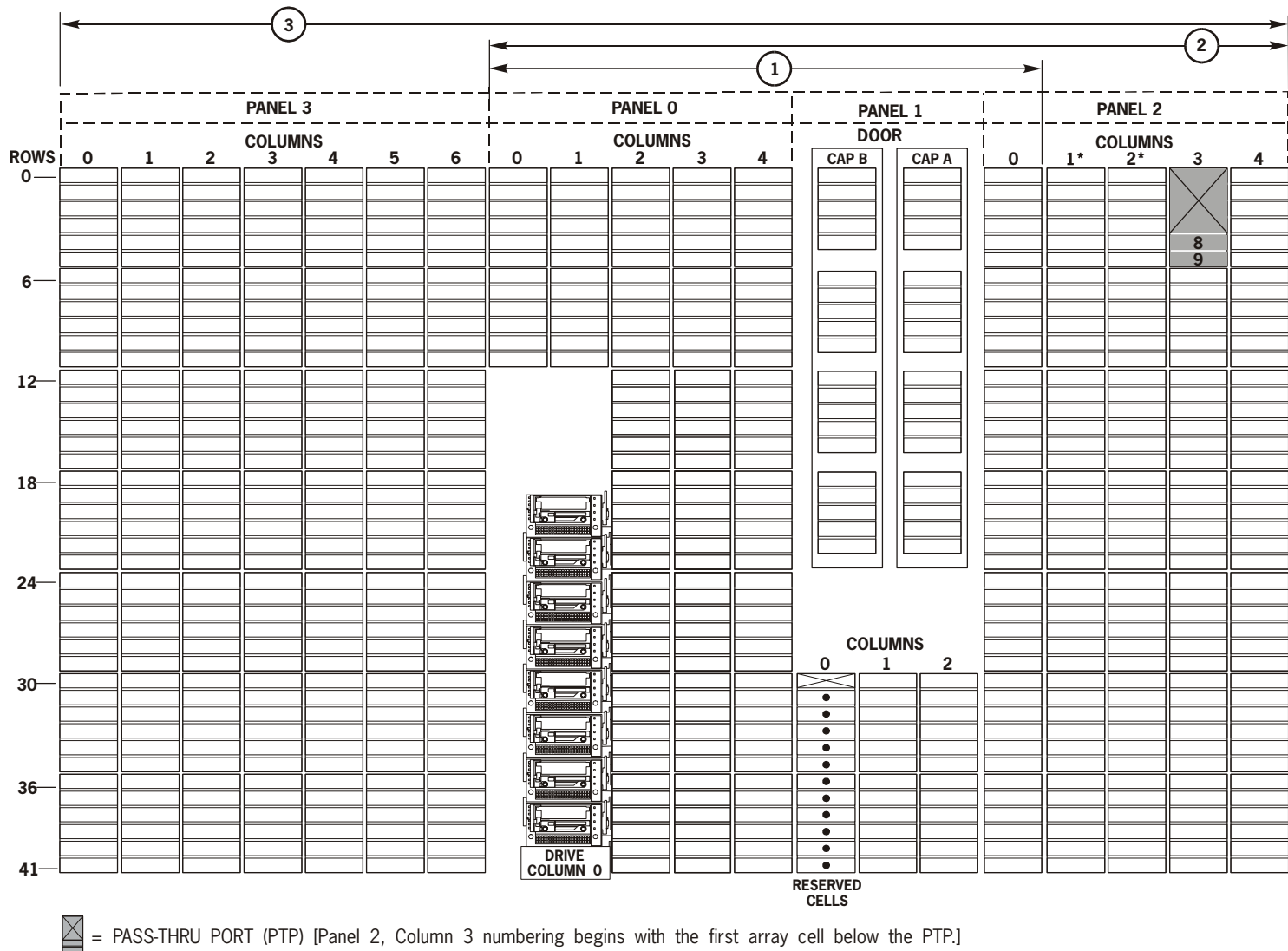
C65405

Figure 5-4. PTP Capacity Diagram—2 Drive Columns (C65406)

L700e Capacity Variations

= PASS-THRU PORT (PTP) [Panel 2, Column 3 numbering begins with the first array cell below the PTP.]
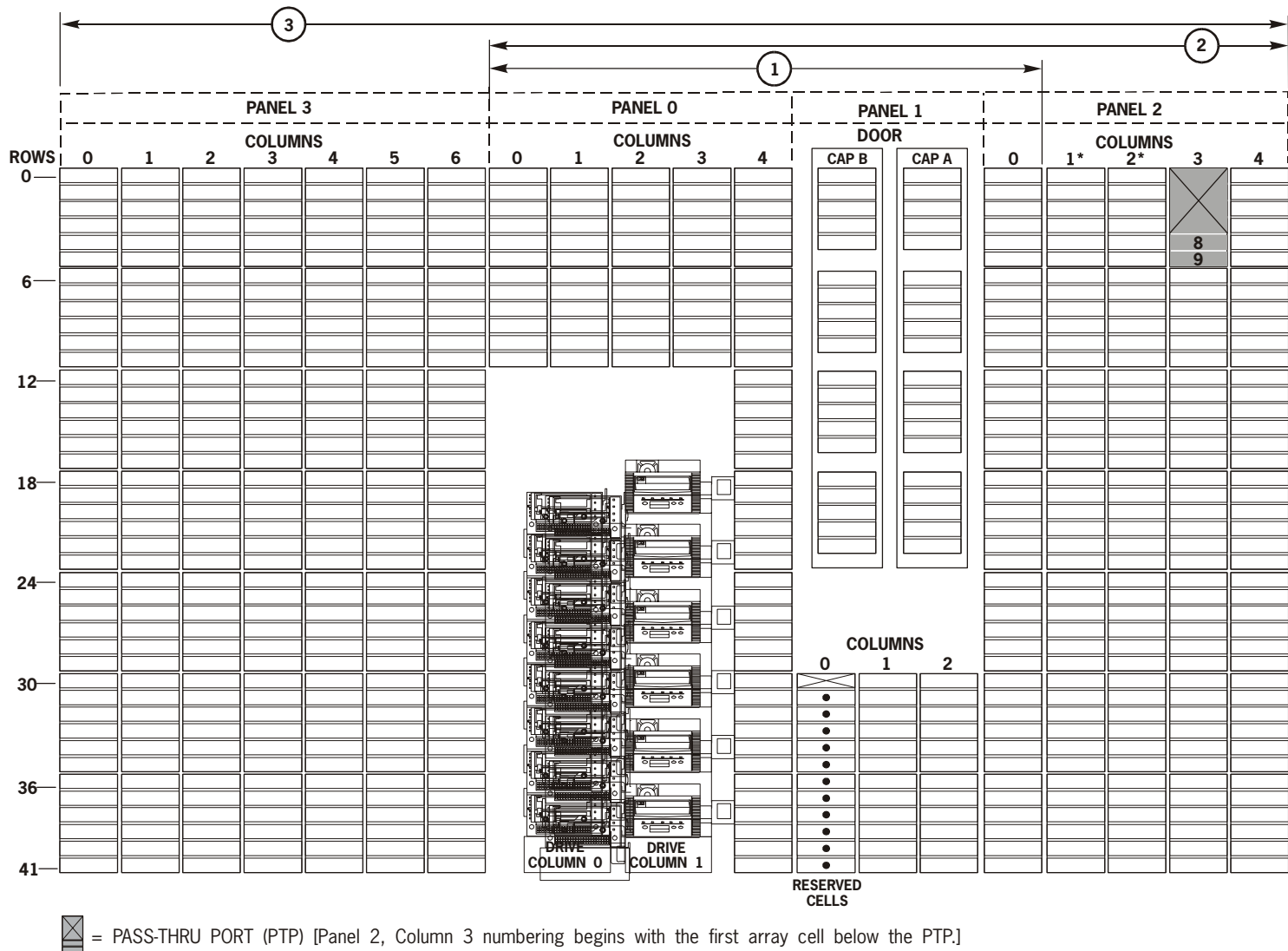
NOTE: Columns 1 and 2 on Panel 2 are unavailable for the 1/3 - size library with the PTP

C65406

■ Operator Panel Entry

You can enter all configuration data through the operator panel. If you have installed the StorageTek L-Series Library Admin, you can also enter some configuration data through a workstation or a PC that is contains a Netscape or Microsoft browser. For more information, access the online help files for the StorageTek L-Series Library Admin.

The following sections describe the operator panel procedure.

■ Operator Panel Navigation

This operator panel function buttons are explained below. Refer to Figure 5-5 on page 5-7 for an illustration of the operator panel. The buttons you will use for configuration are:

- Up arrow—moves the cursor up the display or scrolls up the display

- Down arrow—moves the cursor down the display or scrolls down the display

- SELECT—selects the item in the menu

- MENU—initially places you into the Main Menu screen or, if you are already within a sub-menu, returns you to a previously selected screen

Figure 5-5. Operator Panel (C65047)
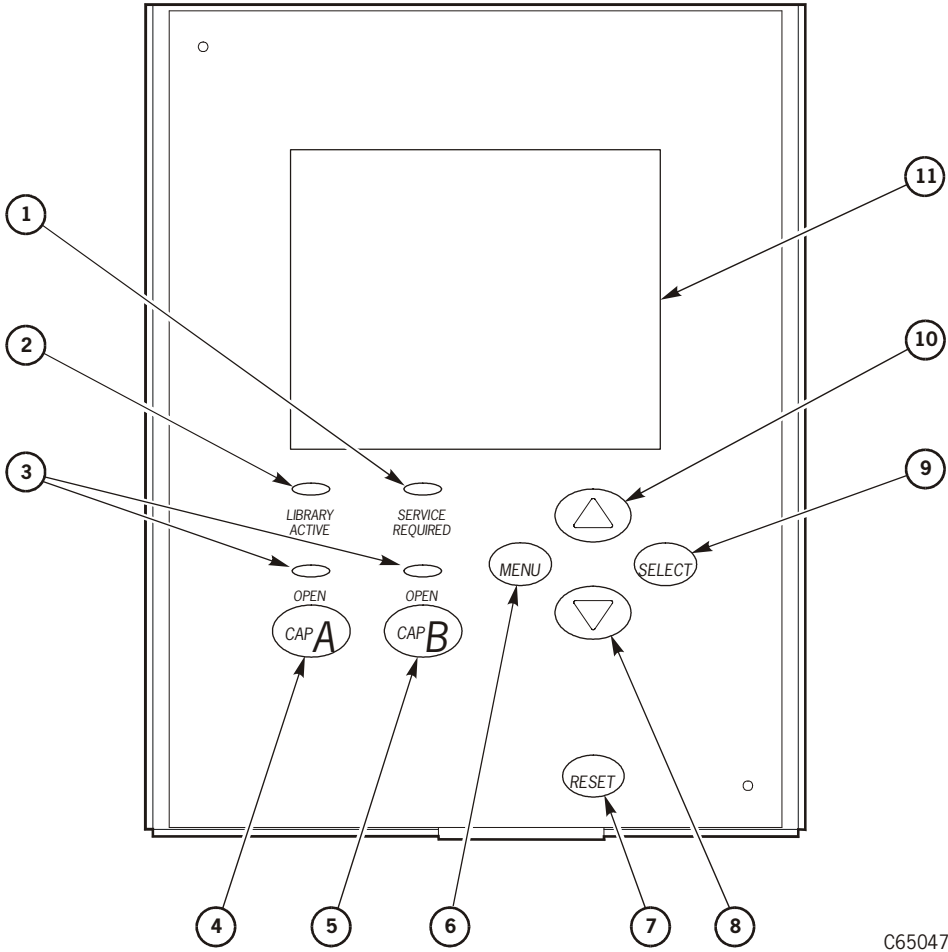
C65047

1. *SERVICE REQUIRED* indicator: Steady = library inoperative, Blinking = fan failure
2. *LIBRARY ACTIVE* indicator
3. *CAP A/B Open* indicator
4. **CAP A** open/close button
5. **CAP B** open/close button
6. **MENU** button
7. **RESET** button
8. Scroll down button
9. **SELECT** button
10. Scroll up button
11. Menu display screen

■ Library Information

Before starting the configuration procedure, read the explanations in this chapter, determine your selections, and write your configuration information into Table 5-3 and Table 5-4 on page 5-9.

CAUTION:
System Degradation: **Make sure that the library and associated drives are offline to the system before starting configuration.**

■ Configuration Selections

Fill in the following two tables with your library and drive configuration options.

Table 5-3. Library/Network Configuration Record

Configuration Option	*Selection*
Auto Clean enabled or disabled	
T9840 cleaning cartridge warning count	
T9940 cleaning cartridge warning count	
DLT cleaning cartridge warning count	
Hewlett Packard Ultrium cleaning cartridge warning count	
IBM Ultrium cleaning cartridge warning count	
Seagate Ultrium cleaning cartridge warning count	
Date	
Ethernet address	Not configurable: pre-set at the factory
Fast Load enabled or disabled	
IP address	
Library capacity	Automatically configured during IPL
Library name	
Library SCSI ID	
Library SCSI type	Automatically configured during IPL
Library Worldwide ID	Not configurable: pre-set at the factory

Table 5-3. Library/Network Configuration Record (Continued)

Network gateway address	
Pass-thru Port	Automatically configured during IPL. Libraries connected with a PTP will display `L700e` on the operator panel.
Port 0 Address (library)	
Port 0 Worldwide ID (library)	Not configurable: pre-set at the factory
Subnet netmask address	
Domain Name Service (DNS)	Configured only if SNMP maps library names to IP addresses.
Dynamic Worldwide Name (dWWN)	Configured to enable dynamic rather than static names
Simplified Network Management Protocol (SNMP)	Configured *after* general configuration is completed; see Appendix B, "SNMP."
Time	
Web password	

Table 5-4. Drive Configuration Selections

Drive #	SCSI or Fiber ID*	On or Off Bus	Drive #	SCSI ID or Fiber ID*	On or Off Bus

Note: You cannot set any configuration data at the operator panel for T9x40 drives running on Fibre Channel.

■ Library Entries

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

1. Library SCSI ID or Fibre Channel Port 0 address

2. Drive Fast Load enable/disable

3. Date

4. 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, 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.

Note: If the customer is using Automated Cartridge System Library Software (ACSLS), its level must be:

Version 5.3.2 or higher for standalone library operation

Version 6.0.1 or higher, with the Special Program Enhancement (SPE) for PTP operation

Version 6.0.1 or higher for T9840B ESCON operation

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 CONFIG`.

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.

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.

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.

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 or 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. Check with the customer for their requirement.

Enable or disable the Fast Load feature from the Lib Config Menu.

To set this 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.

    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.

   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.

Installing a Personality Module

If the customer is 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 you installed 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.

Note: If the password requires resetting, contact Customer Support for the procedure.

■ 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 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.

CAUTION:
System configuration problems: **When adding or replacing a drive, always check and, if necessary, configure the drive's SCSI ID at the library's operator panel.**

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
    *   SGT LTO for Seagate 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.

■ Drive Entries (T9x40)

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

■ Drive Entries (LTO Fibre Channel Only)

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 will be set to 0
   • if you select `disabled`, the address will be 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

Using the Network Config Menu, seven entries can be set for the library's network configuration:

1. Library name

2. IP address

3. Network gateway

4. Subnet mask

5. DNS Configuration[1]

6. Dynamic Worldwide Name

7. SNMP

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/MPCL 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.

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

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 address 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 (0 0 0)

   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 5-22). This four-byte address must be specified by the system administrator.

Note: Entering this address is optional. It serves to indicate 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 the customer's 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.

For more information regarding SNMP, see Appendix B.

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

Dynamic Worldwide Name is a feature added into Version 3.02 firmware.

Background

To correct re-configuration problems within a customer's 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 requires corresponding drive code that supports the dynamic Worldwide Name feature as well. 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.

Enabling dWWN

The dWWN feature (default set to OFF) is enabled through the CLI interface and, once enabled, the library must be IPL'd.

CAUTION:
Changing the dWWN feature must be coordinated with the system administrator. The feature is usually enabled at installation time.

A record of the configuration should be kept; this is not only something that should always be done, but it absolutely essential with the dWWN feature to eliminate system issues in the case of an MPC/MPCL failure.

System problems: **When enabling dWWN, all drives must be at the proper firmware level. If a drive has downlevel firmware, it will remain in the "configuring" state and will be unavailable for host use.**

To enable dWWN:

1. Through the CLI interface, type in

   a. `wwn xxx.xxx.xxx.xxx`
      (where "xxx:xxx:xxx:xxx" equals the 12-digit serial number of the library—located on the agency approval sticker of the library). Be sure that each 3-digit group is separated by a colon.
      and press ENTER.

   b. Type in `wwn enable` and press ENTER.

2. IPL the library.

Implications for an MPC/MPCL Replacement

When replacing the MPC/MPCL cards, however, you must configure dWWN *before* bringing the library and drives online. To do this:

1. Be sure the library and all drives are unavailable to the system.

2. Make sure that any applications that use the library or drives have been suspended.

3. Record all library and drive configuration data so that each field can be set to its proper value.

CAUTION:
***Errors:* You will receive errors if you power-off the drives before powering-off the library.**

4. Power-off the library.

5. Power-off each drive individually.

6. Disconnect the fiber cable from the library's MPU card.

7. Replace the MPC/MPCL card.

CAUTION:
***Errors:* Do *not* power-on the drives until told to do so in these instructions.**

8. Power-on the library *only*.

9. Re-enter the library serial number and re-configure the dWWN feature on the MPC/MPCL card to ON from the CLI interface (as described in "Enabling dWWN" on page 5-24).

10. Enter the identical configuration data for the library that was previously active. (Refer to the data that you previously saved.)

11. Power-on each drive individually.

12. IPL the library.

13. Verify or set configuration data for each drive. (Refer to the data that you previously saved.)

14. Reconnect the fiber cable to the library's MPU card.

15. Have the operator make the library and all drives available to the system.

16. Make sure that all applications that use the library and drives are working correctly.

Implications for Drive Removal/Replacement

The dWWN feature also has implications for drive removal or replacement. Consult the *L700/700e Tape Library and L700-PTP Service Manual*, part 95846, for details.

SNMP - Simple Network Management Protocol

SNMP configuration is performed *after* the library's regular configuration is completed; see Appendix B for procedures.

■ 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.

■ StorageTek L-Series Library Admin Entries (Optional)

The StorageTek L-Series Library Admin is an optional Web-based interface to the library. Its model is HRZN-002, feature code LS4x for the L700e library. If this interface is required, you must enter two values at the operator panel:

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

For instructions on how to make these entries and use the interface to change the library's configuration or monitor library activity, see Appendix C and the documentation included in the StorageTek L-Series Library Admin shipping package.

■ Auto Clean

The information below describes the auto clean enabled or disabled feature.

These two terms are defined as follows:

Auto Clean Disabled: When a drive requires cleaning, the operator 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. The operator 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 Figure 6-5 on page 6-12) 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 MPC/MPCL card 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.
- 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 "Cartridges and Labels" on page 6-1.

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 "Setting the Warning Count" on page 5-31 and "Cleaning Cartridge Expiration" on page 5-32 for more information.

Enabling Auto Clean

There are two ways to enable Auto Clean:

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 Figure 6-5 on page 6-12.

2. Import valid cleaning cartridges into the reserved cell through the CAP (see "Importing Cleaning Cartridges through the CAP" on page 5-30).

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

Manually Installing Cleaning Cartridges

To manually install cleaning cartridges in the reserved cells:

1. Unlock and open the front doors.

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.**

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

3. Place cleaning cartridges into any of the 11 designated cells.

4. Close and lock the front access door.

Note: Once cleaning cartridges are entered, be sure to set the cleaning cartridge warning count. The warning count will generate FSCs into the FSC log to notify you that the cartridge is about to expire. The warning count should never exceed the maximum warning count displayed on the operator panel (shown in the CLEANING INFORMATION Menu).

Importing Cleaning Cartridges through the CAP

A second way to enable Auto Clean is by importing cleaning cartridges from the CAP into the reserved cells.

Note: To import cleaning cartridges using the CLEANING INFORMATION menu, you must be sure that:

- Only cleaning cartridges are entered—*no data cartridges are allowed*
- Cleaning cartridges are entered into CAP A *only*

To import cleaning cartridges through 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 IMPORT CARTRIDGE.

5. Press the **SELECT** button.

CAUTION:
***Possible halt to operation or damage to components.* You must enter the cartridges properly or you could damage the robot or the drive, or cause the library to stop operating. Use only the correct cartridges for the drive types within the library.**

6. Load cartridges into the magazine. You can do this one of two ways:

    a. Pull out and down on the magazine handle; then insert the cartridges

    b. Remove the magazine by lifting it out, insert the cartridges, and then replace the magazine

CAUTION:
***Possible damage to the hand assembly.* Before loading the magazine into the CAP, remove the magazine's retention cover by lifting the side edge.**

7. Enter the cartridges into the magazine so that the cartridges lie flat, with the VOLSER label facing toward you, the customer label facing down, and the reel facing away from you.

8. Return the magazine to its closed position. (If you have used a retention cover on the magazine, remove the cover before replacing the magazine.)

9. Press the **SELECT** button on the operator panel to close the CAP.

    The cleaning cartridges are audited by the robot and their types and VOLSERs are listed on the operator panel. You must now select each cartridge at the operator panel to import it into the library.

10. 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.

11. Press the **SELECT** button to initiate the import.

Note: Once cleaning cartridges are entered, be sure to set the cartridge warning count and life. The warning count will generate FSCs into the FSC log to notify you that the cartridge is about to expire. The warning count should never exceed the maximum warning count displayed on the operator panel (shown in the `CLEANING INFORMATION` Menu).

Setting the Warning Count

After a predetermined count, a cleaning cartridge must be replaced and disposed of at the site.

If Auto Clean is enabled, use the operator panel to set the warning count of a cleaning cartridge.

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).

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

Note: You should periodically check the status of the cleaning cartridges. See "Cleaning Cartridge Usage Count" on page 5-40 for directions.

To set the cleaning cartridge 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.

4. Press an arrow button until the cursor is at the appropriate cleaning cartridge'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 warning count is shown below the current setting.

   The warning count should never exceed the maximum warning count displayed on the operator panel.

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.)

Press the **MENU** button to return to the library status 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 5-40. If the usage count for a cleaning cartridge has exceeded its warning count, the export screen will display `EXPIRED`.

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 L700 (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:

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 EXPORT CARTRIDGE.

5. Press the **SELECT** button.

   The Export Clean Cartridges screen appears, which lists all reserved cell cleaning cartridges by 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

Press the **SELECT** button to start the export.

■ Verifying Configuration

When you have completed all configuration entries, the operator panel will notify you if the entries require you to press the **RESET** button.

When the library becomes ready, go through the configuration screens to verify that all information is complete.

Procedures for monitoring library status information—such as checking the latest firmware additions of the cleaning cartridge usage count, library personality, and StorageTek L-Series Library Admin information—are included in the sections below.

■ Monitoring Status Information

Note: With 3.00.xx firmware and later, an asterisk (*) may appear on the operator panel display; for example, STK L700 (Code 3.02.00)*. This denotes an expired cleaning cartridge. To determine which cartridge has expired, see "Cleaning Cartridge Usage Count" on page 5-40.

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

Figure 5-6. Example Library Status Screen (C65330)
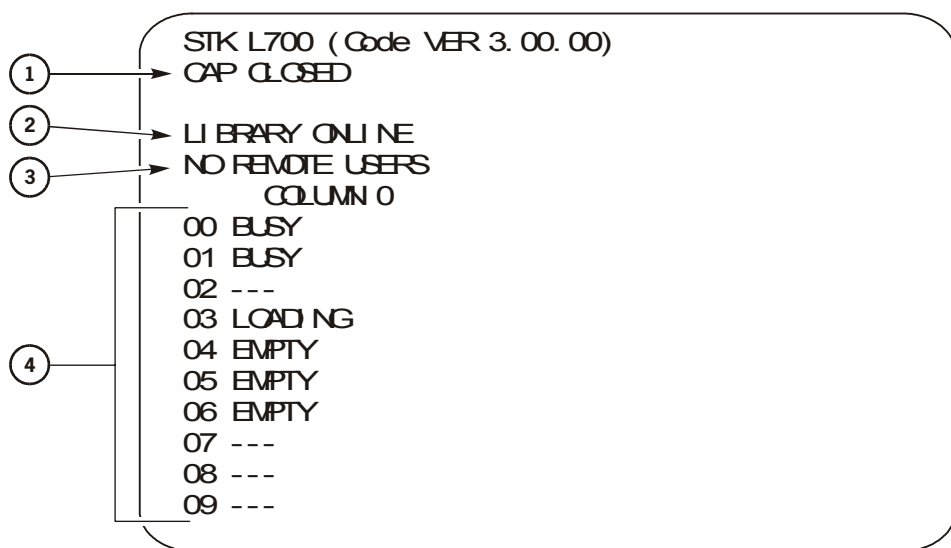
1. CAP status message
2. Library status message
3. Drives status messages
4. Remote users status message

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

CAP Status

The first line of status information on the library status screen displays the condition of the CAP. Table 5-5 on page 5-35 lists the status messages that might appear on this line.

Table 5-5. CAP Status Messages

Status Message	Explanation
OPEN	The CAP door is currently open. (The *Open* indicator also is on.) The customer may insert cartridges or remove the CAP magazines. But they 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 a customer can open the CAP door, the customer must issue a command from the network's system console.
TRANSITION	The CAP door has stalled while attempting to open.
UNKNOWN	The library does not recognize the current state of the CAP door.

Library Status

The library status line on the status screen displays the current state of the library. Table 5-6 explains the status messages that might appear on this line.

Table 5-6. Library Status Messages

Status 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 and take appropriate action.
LIB UNKNOWN STATE	The library does not recognize its current state. You should note the FSC (if the library has issued one) and take appropriate action.

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 5-7 summarizes drive status messages that might appear on the library status screen:

Table 5-7. Drive Status Messages

Status Message	Explanation
INIT REQUIRED	Drive must be initialized.
NOT CONNECTED	Drive is not connected to a SCSI bus.
UNKNOWN DRIVE	The library does not recognize the type of drive in this location.
NOT COMMUNICATE	Drive is not communicating with the client or the drive power is off.
NOT FUNCTIONAL	Drive is not operating properly.
NOT LOADABLE	The robot cannot load a cartridge into this drive.
EMPTY	No cartridge is loaded in this drive.
CARTRIDGE IN	Drive contains a cartridge, but the cartridge is not loaded into the drive.
CLEAN NEEDED	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 robot is dismounting a cartridge from this drive.
LOADED	The robot has loaded a cartridge into this drive.
REWINDING	The cartridge in this drive is being rewound.
BUSY	Drive is performing a read or write operation.
CLEANING	Drive is being cleaned.

Note: The operator panel displays only 16 lines per screen. If the library contains more than eight drives, use the down arrow button to scroll to drives 09 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. Press an arrow button until the cursor lines up with `DRIVE INFO`.

3. Press the **SELECT** button.

   list of all installed drives will appear.

4. Press the arrow buttons until the cursor underscores the desired drive.

5. Press the **SELECT** button. The Drive Information Menu will appear. The screen lists the manufacturer, model, status, serial number, interface type, and firmware version of the selected drive. See Table 5-7 on page 5-36 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. 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 the table below 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 5-8. CAP Magazine Slot Status Messages

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

CAP States

When ejecting or entering cartridges through the CAPs, the following CAP states may be displayed:

Table 5-9. CAP States

State	Explanation
CAP A (B) Open	Specified CAP is open for ejection or entry 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	Specified CAP is in an unknown state. Consult the FSC log.

Library Personality Information

Viewing library personality information lets you determine who library's vendor is 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. Press the **MENU** button to exit the Personality Module Info screen.

The following status messages (in Table 5-10 on page 5-39) might appear on the Personality Module Info screen:

Table 5-10. 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.
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.

Cleaning Cartridge Usage Count

The cleaning cartridge usage count assumes that you have loaded cleaning cartridges into 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.

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 exceeded its warning count, the export screen will display EXPIRED. The customer must remove this cartridge from the library. See "Exporting Cleaning Cartridges through the CAP" on page 5-32.

6. Press the **MENU** button to exit the Clean Cartridges screen.

■ Final Steps

When the library and all drives are configured, the final steps before testing the library are:

- Power off the library.

- Open the right side door.

- Be sure that all drive power switches are in the ON (|) position.

- Power on the library. The initialization sequence (described below) will begin.

■ Initialization Sequence

An IPL occurs when the library powers on or the **RESET** button is pressed. The IPL process consists of functional firmware loading, calibration of the library's robotic mechanisms, and an audit of the cartridges.

The MPC/MPCL card directs the initialization process, which consists of the following:

- Initialization and calibration of robotic mechanisms
- Calibration of the vision system
- Motion testing
- Hand-camera assembly testing
- An audit of tapes within the library
- Drive targeting and check for "in flux" condition on DLT drives
- Audit of reserve cells
- Load handle cycling (for DLT drives)

These steps are explained in the following sections.

Initialize and Calibrate Mechanisms

Robotic mechanism parameters are loaded into processor memory and calibration routines are executed. The initialization process requires a maximum of five minutes. Monitored in this sequence are:

- Reach safe position—the reach mechanism fully retracts and the reach safe sensor *must* be detected before any theta or Z motion is initiated. This prevents possible damage to the hand assembly or a customer tape.

- Z motor calibration—the Z mechanism moves from end-stop to end-stop. The distance and time for this motion is compared against the mechanism parameters within the firmware.

- Theta motor calibration—the theta mechanism moves from theta-stop to theta-stop. The distance and time for this motion is compared against the mechanism parameters within the firmware.

  The library size (1/3, 2/3, and full) is determined during this step.

Vision Calibration

After calibration of the robotic motors, the robot moves to the vision calibration decal (below drive column 0 at Panel 0). Thresholds for the line scan camera are:

- Target—readability and accuracy of the target image for locating array positions

- Bar code—readability and accuracy of bar code information

Note: The camera is operational:

- During initialization

- During audit

- When tapes are entered into a CAP

During normal operation, the camera is turned off and tapes are located by referencing the VOLSER and cell location within the MPC/MPCL card memory.

Hand-Camera Assembly Testing

Calibration and testing of the hand assembly is accomplished near the vision calibration decal. The proximity sensor is aimed at the decal and tested to be "on." The hand is then moved away from the decal and the sensor is tested to be "off."

The gripper mechanism is extended to test for proper opening and closing.

Audit

The next step for initialization is the audit of the library. The audit process requires five minutes.

Audit Definition

An audit is the process of checking each cell within a library. If a cell contains a tape, the camera reads the VOLSER and transfers this data to the MPC/MPCL card. The MPC/MPCL card calculates the robotic position of the hand assembly (by referencing the theta and Z positions) and catalogs the tape location by:

- VOLSER
- SCSI element number or Panel, row, column

If a customer cell is empty, the location is recorded as "cell empty." The reserved cells (explained below) are checked for cleaning cartridges (which will automatically configure the auto clean option) and for diagnostic test cartridges.

When all customer and reserved cell locations are read and cataloged, the library audit is complete.

However, the library audit information must be requested by the host system to update its tape volume database. Once the robot has audited the library, the MPC/MPCL card downloads the information and no further robotic action is involved.

This two-step process—library audit and host update—ensures that both the library and host have current (and identical) listings of the library contents.

Note: Cartridges left in drives will not be audited.

Audit Conditions

An audit begins when:

- You power-on the library
- You open and close the library access door
- A system request to audit the library is entered at the host console

Drive Targeting

In the next step of the initialization process, the robot moves to each drive and calculates the position of the drive's target. This ensures accurate loading of tapes during machine operation. For DLT drives, the load handles are checked for "in flux" conditions. Any handles found to be in flux will be lowered by the MPC/MPCL library controller.

Audit of Reserved Cells

After drive targeting, the robot audits the 12 cells of the reserved area, located below CAP B (for libraries with two CAPs) or below the front viewing window (for libraries with one CAP). This area is explained in "Reserved Cell Descriptions" on page 6-12. If there are no DLT drives within the library, this is the final initialization step.

Load Handling Cycling

If DLT drives are present and they require cycling of the load handles, all handles are raised to the loading position.

■ Updating Firmware

Library firmware is factory-installed on all new machines. It resides within a Flash PROM chip on the MPC/MPCL controller card for the L700e library and within the MPB Pass-thru Port (PTP) controller card for the PTP.

CAUTION:
***Possible component damage:* Updating firmware for libraries connected by a PTP requires a special process. If this process is not followed, you could damage the MPC (MPCL)/MPB cards.**

Pass-thru Port

Carefully read the procedures below and consult the "readme" file that accompanies the firmware before downloading firmware to libraries connected by a PTP. If not followed, you could damage the MPC/MPCL card. Each library monitors the other library's door switch—if one library door is opened during the firmware download, this will cause an interruption to the procedure and cause damage to the MPC/MPCL card.

CAUTION:
Controller card damage: The location of the command line interface (CLI) port has changed with edition 3.00 and later firmware. It is now designated the CSE port (J30) on the MPC/MPCL card.

To load only the MPB firmware, you must use the CLI port (designated as the CSE port) in the Master library's door frame. See Figure 3-12 on page 3-15 if you are unfamiliar with the location of this port.

You can download MPC/MPCL and MPB firmware from the Customer Resource Center (CRC) Web site at http://www.support.storagetek.com/. Click "Tape Storage," then "L700," and finally "Code." Select the file you need based upon:

• Whether you are updating the MPC/MPCL or MPB firmware

• The download procedure you wish to use

Download Methods

There are four methods you can use to download firmware.

1. SCSI Write Buffer command—directions for this method can found on the CRC Web site:

   • Log-in to the CRC
   • Select "Product Information"
   • Select "Current Products"
   • At "Choose a Product Family," scroll down, select "Tape and Tape Automation," and click Next

- Select "L700 Tape Library"
- Select the *L700/180 Tape Libraries Interface Reference Manual*
- Refer to the information in the Write Buffer command (3Bh)

2. SCSI toolbox—consult the SCSI Toolbox manual on the CRC Web site for directions:

- Under Support Tools, click "CS Tools."
- Then "Docs"
- Then "SCSI/Fibre Toolbox User's Guide."

3. StorageTek L-Series Library Admin—refer to the CRC Web site for "StorageTek L-Series Library Admin" purchasing and ordering information.

4. L700e command line interface (CLI) ports for the MPC/MPCL (see Figure A-9 on page A-10 and Table A-1 on page A-10) or MPB cards (see Figure 3-12 on page 3-15).

Methods 1 through 3 allow loading of MPB firmware through the MPC/MPCL card *only.*
Method 4 is the only method that can be used to directly load MPB firmware.

Download File Types

Before using one of the methods described in the section above, determine which firmware file type you wish to download:

- For MPC/MPCL firmware only, use the **mpc**xyyzz.prm file.

- For MPB firmware only, use the **mpb**xyyzz.prm file; this file is loaded through the CSE port (CLI) that is located in the door frame of the Master PTP library. This port is for the MPB card only and firmware editions 3.00 or later.

- For both the MPC/MPCL and MPB cards, use the **mpc**xyyzz**mpb**xyyzz.prm file. This loads the MPC/MPCL firmware first, then the MBP firmware.

Consult Table 5-11 on page 5-46 for your download options.

Table 5-11. Firmware Download Options

From Version[1]	To Version			
	MPC 2.xx (Version 1 header)	MPC 3.00 and 3.01 (Version 1 header)	MPC 3.02 or later (Version 2 header)	MPC 3.xx *and* MPB 1.xx file (Version 2 header)
MPC 2.xx	Lib Admin, SCSI, and MPC CLI port using MPC release.prm file	Lib Admin, SCSI, and MPC CLI port using **mpc**xyyzz.prm file[2]	Lib Admin, SCSI, and MPC CLI port using **mpc**xyyzz.prm file	N/A
MPC 3.xx	Lib Admin, SCSI, and MPC CLI port using MPC release.prm file	Lib Admin, SCSI, and MPC CLI port using **mpc**xyyzz.prm file[2]	Lib Admin, SCSI, and MPC/MPCL CLI port using **mpc**xyyzz.prm file[2]	Lib Admin, SCSI, and MPC/MPCL CLI port using **mpc**xyyzz**mpb**xyyzz.prm file[3]

Notes:

1. 2.xx release.prm files used a Level 1 download header. For compatibility, 3.00 and 3.01 firmware use a Level 1 header also. Version 2.xx to 3.02 allow both Version 1 and 2 headers to be loaded into an MPC card. This allows 2.xx firmware to load 3.00 firmware. Version 3.00 or later firmware can accept either a Level 1 or 2 download header.
    Starting with 3.00 and later, a Version 2 header will be used to ensure the correct loading of files into the MPC card. The MPCL card allows only a Version 2 header file to be loaded and thus requires 3.02 or later firmware.

2. Where **mpc** or **mpb** are the card designators and "xyyzz" is the firmware revision: "x" denotes the major revision number, "yy" is the minor revision number, and "zz" is the build number. For example, MPC revision 3.01.24 would be represented as **mpc**30124.prm.

3. An **mpc**xyyzz**mpb**xyyzz.prm file can only be loaded into an L700e library pair joined by a PTP. If a PTP is not present and functional, the download will fail.

Recommended Download Sequences

Since downloading firmware to multiple processor cards in new, the recommendations and cautions are made below.

CAUTION:
***Controller card damage:* Be sure that all activity in both libraries is quiesced before starting either procedure or controller card damage will occur. Do *not* open and close a library's access door during the procedure. Do *not* press the operator panel's RESET button on either library until the operator panel indicates to do so.**

Separate Controller Card Method

One method is to load firmware to the MPB card first, then the Master's MPC/MPCL card, and finally the Standby's MPC/MPCL card.

For two L700e libraries with a PTP installed:

1. Download the MPB firmware first, then the MPC/MPCL firmware:

   a. Load the MPB card firmware (**mpb**xyyzz.prm file) first through the MPB CLI port.

   b. In the *Master* library, load the MPC/MPCL firmware (**mpc**xyyzz.prm file) through the CSE port on the MPC/MPCL card.

Note: Do *not* IPL the Master library at this point.

   c. In the *Standby* library, load the MPC/MPCL firmware (**mpc**xyyzz.prm file) through the CSE port on the MPC/MPCL card.

   d. After firmware loading in both libraries is completed, press RESET on both library operator panels.

Combined Controller Card Method

A second method is to load firmware to the MPB and Master library's MPC/MPCL card first, then load the firmware to the Standby library's MPC/MPCL card.

For two L700e libraries with a PTP installed:

1. Load the Master MPC/MPCL card and the MPB card using the **mpc**xyyzz**mpb**xyyzz.prm file.

2. Load the Standby MPC/MPCL card using the **mpc**xyyzz.prm file.

Firmware Editions

After copying the firmware to your personal computer (PC), you must also have the following to download the firmware to the MPC/MPCL card:

- An RJ45 cable (part 4108289xx)

- An RJ45—DB9 adapter (part 10410823) or CSE DOS Diagnostic cable (part 24100134).

Firmware 2.xx

With 2.xx firmware, there are two ways to download MPC firmware:

Note: The MPCL card must be 3.02 or later.

1. The DOS method—requires approximately 20 minutes.

2. The Hyperterminal method—requires only eight minutes.

The Hyperterminal method is the preferred method since it requires less download time and also because it will be the only method available for many future libraries.

Firmware 3.00 and Later

With firmware edition 3.00 or later, you can *only* use the Hyperterminal method to download firmware to the library.

Download times vary, depending upon which controller card is being upgraded:

*   MPC/MPCL only (**mpc**xyyzz.prm file) requires eight minutes

*   MPB only (**mpb**xyyzz.prm file) requires three minutes

*   MPC/MPCL and MPB (**mpc**xyyzz**mpb**xyyzz.prm file) requires 33 minutes

CLI Port - DOS Method

To download the firmware:

1. Connect the RJ45 serial cable to the CSE port on the MPC/MPCL card.

2. Open a DOS window on your PC.

3. Create a directory on the C drive (`mk dir`).

4. Insert the firmware diskette into the personal computer.

5. Change to the directory on the diskette drive (`cd` directory name).

6. Copy the `flash97.exe` program *and* the firmware file `release.prm` to the directory you created on the C drive (`copy flash.exe c:/`directory name and `copy release.prm c:/`directory name).

7. From the directory on your personal computer, type in:

    `flash97 release.prm`

8. When prompted, enter the port number being used on the personal computer (generally port 1) and press <Enter> (or return).

CAUTION:
Equipment Damage: **Do not attempt to do perform any operations on the personal computer or library until the operator panel displays** `DOWNLOAD COMPLETE`**. Damage to the MPC/MPCL or MPB processor cards may occur if you do not wait for the process to complete.**

9. After several seconds, the personal computer will display and update the number of bytes being sent. The download takes about 20 minutes.

10. The L700e operator panel will display DOWNLOADING.

11. After the personal computer displays FILE TRANSFER COMPLETED SUCCESSFULLY, the operator panel will display DOWNLOAD COMPLETE. *Wait for this sequence to complete.*

12. Activate the firmware by pressing the RESET button on the operator panel.

Note: The fault symptom code (FSC) dictionary is also contained on this firmware diskette. The file name is fsc.txt and, when proper security safeguards are followed, this file may also be copied to a file on your personal computer.

CLI Port - Hyperteminal Method

Note: This method is *only* valid with firmware version 2.20 and later.and the only method for 3.00 and later firmware.

CAUTION:
Controller damage: **To use this method for a single library, the library must be fully initialized and the access door must be closed.**

Controller damage: **To use this method for a PTP library, both libraries must be fully initialized and both access doors must be closed.**

It is best to read through this procedure first before attempting it since there is a *two minute time limit* after step 5.

To download the firmware:

1. Copy the release.prm firmware file to the directory you created on the C drive (copy release.prm or abcxyyzz.prm c:/directory name)

2. Attach your PC to the Command Line Interface (CLI) port:

    *   Labeled CSE on the MPC/MPCL card
    *   Labeled CSE on the door frame of the Master library for the MPB *only*).

3. From your PC:

    a. For older machines, go to Start ➜Programs ➜Accessories ➜Hyperterminal and open a Hyperterminal session.

    b. For WIN2000 machines, go to Start ➜Programs ➜Accessories ➜Communications ➜Hyperterminal and open a Hyperterminal session.

4. Within the file properties, configure the connection as follows:

Table 5-12. Hyperterminal Connection

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

Click on **OK**.

5. In the Hyperterminal window, click on **ENTER**.

    The CLI> prompt will appear.

6. Type in: download and press the Enter key.

    A message will appear stating that you have *two minutes* to begin sending the new firmware version.

7. At the top of the window, find the **TRANSFER** button and point to **SEND FILE**.

    A box will appear, allowing you to browse to the file location of the firmware you copied in step 1.

8. Double click on **release.prm**.

    The SEND FILE box will appear, showing the pathname and the protocol chosen. Protocol should be set to Z-MODEM.

9. Click on **SEND**.

    The status window for the transfer will appear.

CAUTION:
***Equipment Damage:* Do not attempt to perform any operations on the personal computer or libraries until both operator panels display DOWNLOAD COMPLETE. Damage to the MPC/MPCL or MPB processor cards may occur if you do not wait for the process to complete.**

If, for any reason, the download does not complete successfully, ensure that the xon/xoff setting is valid for the current Hyperterminal session, then retry the download immediately. Do *not* reset, power cycle, or open a library access door.

10. *Wait* for the following prompt: `Reboot 'yes'?`

Notes: If you downloaded firmware only to the MPB card, it will reboot automatically and will not prompt you to reboot.

If you downloaded the **mpc**xyyzz**mpb**xyyzz.prm file, the Master library must be reset or power cycled before the MPB firmware is activated.

Respond with `'yes'` to reboot the machine and activate the firmware. (Or you may power cycle or IPL the library to activate the firmware.)

If you do not reboot, power cycle, or IPL the library to activate the new firmware, the old firmware version will remain active. When the next reboot, power cycle, or IPL occurs, the new firmware will become active.

When the reboot is complete, verify that the version is correctly listed on the operator panel.

The fault symptom code (FSC) dictionary is also contained on this firmware diskette. The file name is "`fsc`" and, when proper security safeguards are followed, this file may also be copied to a file on your personal computer.

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Testing the Library

This chapter lists cartridges and labels, describes how to install diagnostic and cleaning cartridges within the library, and explains diagnostic tests that are performed before placing the library online.[1]

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

■ Cartridges and Labels

StorageTek created starter kits to help customers populate their library. Starter kits have pre-labeled cartridges with number ranges that are unique for each kit.

Note: Pre-labeled cartridges are available from StorageTek. For information on ordering these cartridges, see "Ordering Tape Cartridges/Labels" on page 6-8.

StorageTek does *not* supply cartridge labels. For a supplier of labels only, see "Ordering Tape Cartridges/Labels" on page 6-8

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.

The part numbers listed in Table 6-2 on page 6-3 are for CSE internal use only. Customers ordering cartridges or labels must refer to the information in "Ordering Tape Cartridges/Labels" on page 6-8.

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1. For more information regarding Ultrium drives, refer to the *Open Systems Tape Drives Information Manual,* MT 9120.

Cleaning and Diagnostic Cartridge Starter Kits

StorageTek offers cleaning and diagnostic cartridge starter kits that contain one diagnostic and one cleaning cartridge with labels for each drive type; these are listed in Table 6-1.

Table 6-1. Cleaning and Diagnostic Cartridge Starter Kits

Tape Drive	Kit
T9840	313688601
T9940	313688701
DLT	313688001
SDLT 220	313688101 (Diagnostic cartridge only)
HP LTO Ultrium Vertical Labels	313688301
Seagate LTO Ultrium Vertical Labels	313688401
IBM LTO Ultrium Vertical Labels	313688501
Note: The vertical designator refers to the human-readable label alignment.	

Cartridge and Label Part Numbers

StorageTek also offers individual cartridges and labels, along with data cartridge kits for each drive type; see Table 6-2.

Table 6-2. Cartridge and Label Part Numbers

Description	Cartridges[1]	Labels		20 Tape Starter Kit
		Vertical	**Horizontal**	
Data Cartridges:				
DLTtape III	313126102	313126502		
DLTtape IV	313126301	313126702		313711501
Super DLT[2]	100099701	309898101		313689001
LTO Ultrium Fuji	100098901	313672101	313700501	313689201 (vertical)
LTO Ultrium Maxell	100099101			313684001 (horizontal)
Cleaning Cartridges:				
DLT	313126401	313126902		
Super DLT[2]	100098401	313744801		
HP LTO Ultrium	100098801	313671701	313699901	
IBM LTO Ultrium	100099801	313671901	313700001	
Seagate LTO Ultrium	100099201	313672001	313700101	
Diagnostic Cartridges:				
DLT	313126301	313126802		
Super DLT[2]	100099701	313712501		
HP LTO Ultrium	100098901	313672901	313700601	
IBM LTO Ultrium	100098901	313672901	313700601	
Seagate LTO Ultrium	100098901	313672901	313700601	
Note: [1.] For T9x40 cartridges, check drive documentation.				
[2.] All SDLT cartridges require the "s" media ID character				

DLT and SDLT Cartridge Components

Components of the DLT and SDLT cartridges are shown in Figure 6-1.

Figure 6-1. DLT and SDLT Cartridges (C65074)
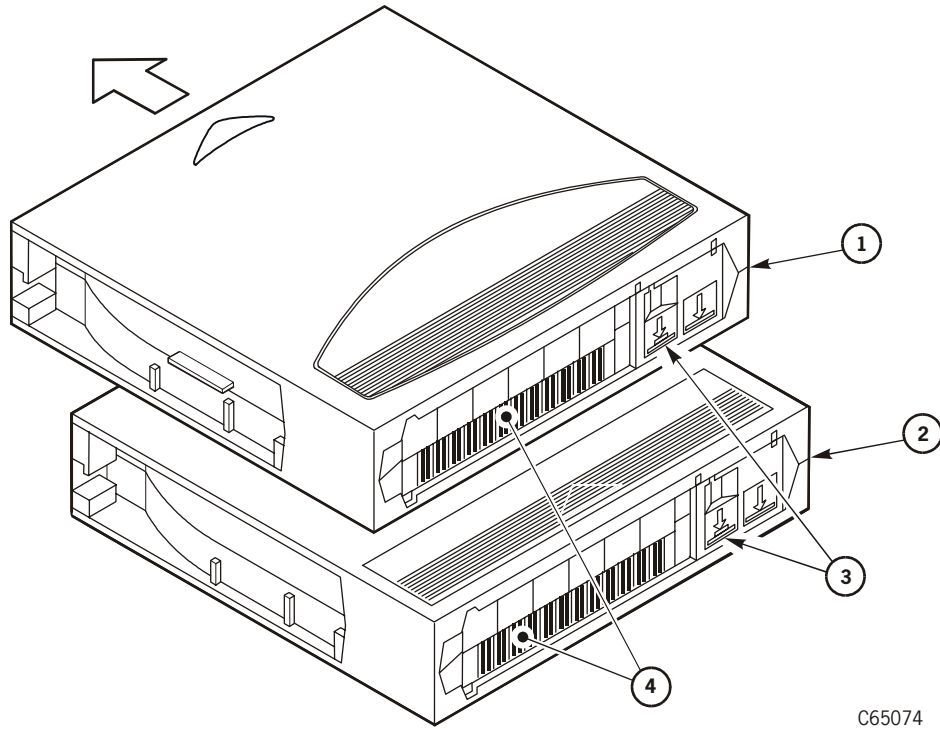
C65074

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

T9840 Information

Components of the T9840 cartridge are shown in Figure 6-2.

Figure 6-2. T9840 Cartridge (C65073)
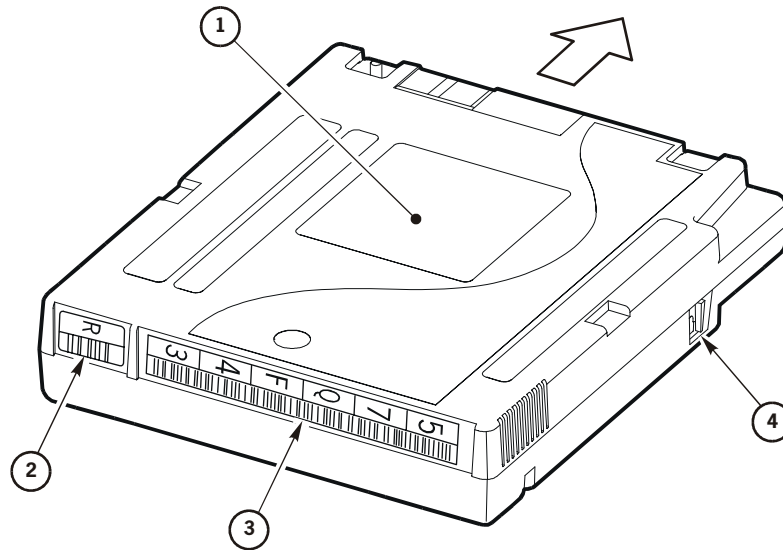
C65073

1. Customer label
2. Media ID label ("R" = data, "U" = cleaning)
3. Volume serial number (VOLSER) label
4. Write-protect switch

T9940 Information

Figure 6-3 illustrates the T9940 tape cartridge available from StorageTek.

Figure 6-3. T9940 Tape Cartridge (C65337)

C65337
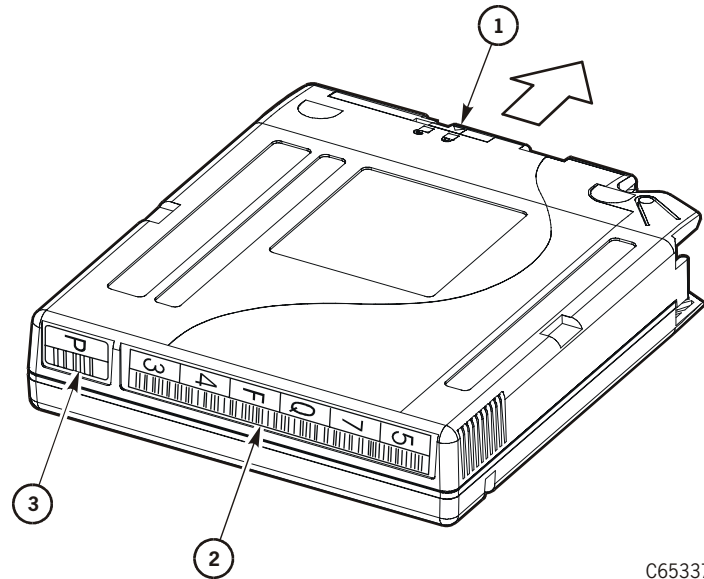
1. Write-protect switch
2. Volume serial number (VOLSER) label
3. Media ID label ("P" = data, "W" = cleaning)

Ultrium Information

Figure 6-4 illustrates an Ultrium data cartridge.

Figure 6-4. Ultrium Cartridge (C65306)
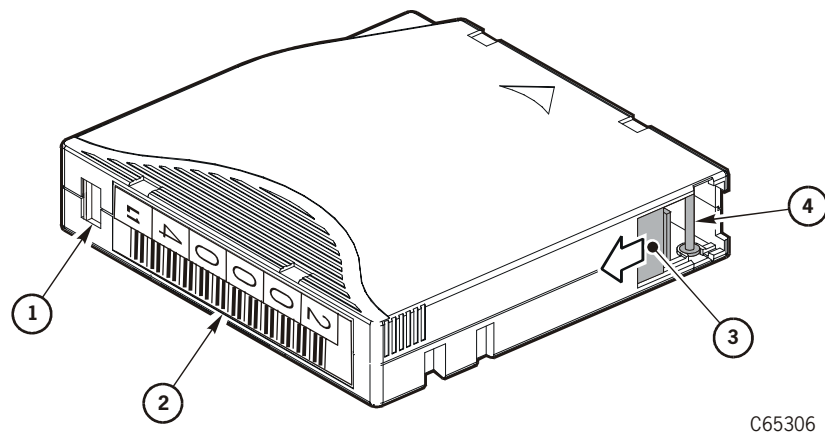
C65306

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

Table 6-3. Ultrium Gen1 Cartridge Codes

Gen1 MEDIA	
Label	**Type of Cartridge**
	Data cartridge
L1	100 GB
LA	50 GB
LB	30 GB
LC	10 GB
	Cleaning
C_1 plus CLN	Cleaning cartridge for Hewlett Packard
C_2 plus CLN	Cleaning cartridge for IBM
C_3 plus CLN	Cleaning cartridge for Seagate
CU	Universal cleaning cartridge for Ultrium drives
	Diagnostic
L plus DG	Diagnostic cartridge (apply a DG label to a blank data cartridge to be used for diagnostic tests)

Table 6-4. Ultrium Gen2 Cartridge Codes

Gen2 MEDIA	
Label	**Type of Cartridge**
	Data cartridge
L2	200 GB
	Cleaning
C_1 plus CLN	Cleaning cartridge for Hewlett Packard
C_2 plus CLN	Cleaning cartridge for IBM
	Diagnostic
L plus DG	Diagnostic cartridge (apply a DG label to a blank data cartridge to be used for diagnostic tests)

StorageTek provides labeled Ultrium cartridges *only*; unlabeled cartridges or sheets of cartridge labels are not supplied. When ordering cartridges, the customer can choose between two human-readable label alignments: horizontal label alignment or vertical alignment.

Ordering Tape Cartridges/Labels

Contact your authorized StorageTek Selling Agent for *labeled cartridges*.

For cartridge *labels*, contact EDP/Colorflex at:

- Phone: 1.888.438.8362 (domestic and international)

- Web site: http://www.colorflex.com
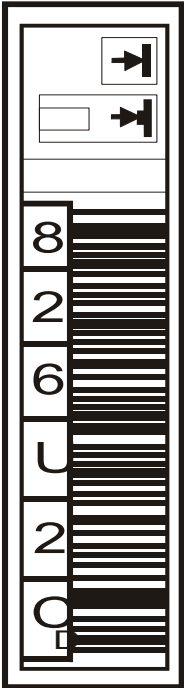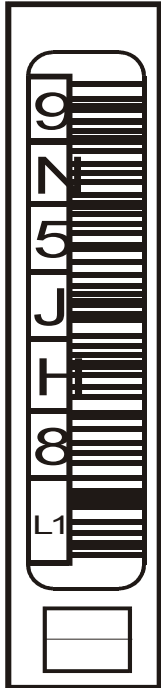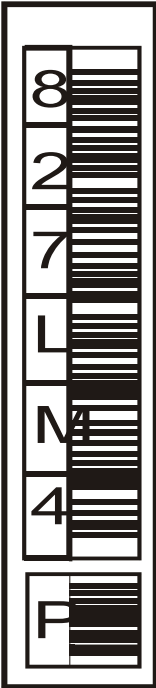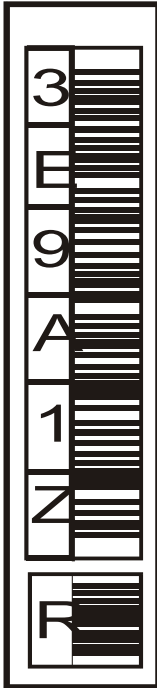
For technical questions, contact StorageTek Sales Support at:

- Phone: 1.800.ask4stk

- E-mail: sales_support@storagetek.com

■ Cartridge Label Examples
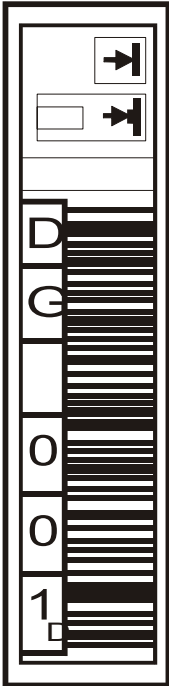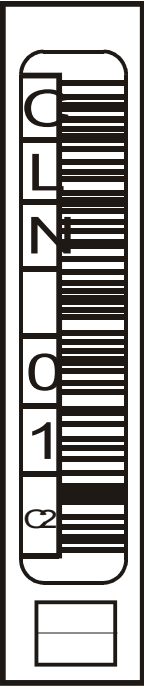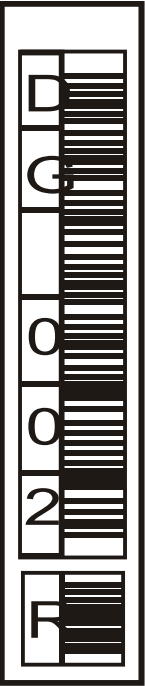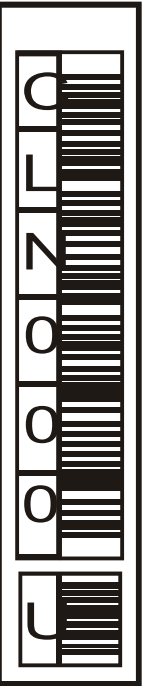
and show examples of the various cartridge labels used by the drives in the library. Be sure the customer uses the proper labels for each drive type.

Table 6-5. Label Examples—Data Cartridges

DLT	LTO Ultrium	T9940	T9840

C65439

Media ID Labels			

The DLTtape Media ID is incorporated into the tape label, and includes:
 	
B = DLT1
C = DLTtape III
D = DLTtape IV
E = DLTtape III-XT
S = Super DLTtape I
	The LTO Media ID is incorporated at the end of the tape label, and includes:
	
	C1 = HP cleaning
	C2 = IBM cleaning
	C3 = Seagate cleaning
	CU = Universal
	L*x* = Data cartridge:
	    L2 = 200 GB (Gen2)
	    L1 = 100 GB
	    LA = 50 GB
	    LB = 30 GB
	    LC = 10 GB
		The Media ID label for the T9940 is at the end of the tape label, and includes:
		
		P = Data
		W = Cleaning
			The Media ID label for the T9840 is at the end of the tape label, and includes:
			
			R = Data
			U = Cleaning

Table 6-6. Label Examples—Cleaning and Diagnostic Cartridges

DLT Diagnostic	LTO Cleaning	T9940 Diagnostic	T9840 Cleaning

C65438

Diagnostic and Cleaning Cartridge Label Identifiers			

DG = Diagnostic
Plus the Media ID label to identify the type of cartridge.
 	
CLN = Cleaning
	The cleaning Media ID labels include:
	
	C1 = **H**P
	C2 = **I**BM
	C3 = **S**eagate
	CU = Universal
		DG = Diagnostic
		Plus the Media ID label:
		  P = Data
		
		CLN = Cleaning plus
		W = Cleaning
			CLN = Cleaning plus
			U = Cleaning
			
			DG = Diagnostic
			Plus the Media ID label:
			  R = Data

■ Installing Diagnostic and Cleaning Cartridges

If you are installing diagnostic and cleaning cartridges, they should be placed within the library prior to initialization.

You will use diagnostic cartridges to run motion and loading tests for cartridge drives.

CAUTION:
System Degradation: **Be sure to check with the customer for the drive cleaning option they want to use. The auto clean option is automatically configured when cleaning cartridges are placed in the reserved area.**

Automatic cleaning activates the robot to load and unload a cleaning cartridge when a drive requires cleaning.

Labeling Cartridges

Figure 6-1 on page 6-4 and Figure 6-2 on page 6-5 show the correct placement of labels for cartridges.

To apply the diagnostic and cleaning labels:

1. Apply labels from the cartridge label packages within the installation kit:

    *   PN 313667301 includes both diagnostic and cleaning cartridge labels for DLT, Super DLT, and Ultrium drives
    *   PN 313667201 for T9840 diagnostic and cleaning cartridge labels

2. Attach a CLN label to all applicable cleaning cartridges.

    *   For Hewlett-Packard Ultrium cleaning cartridges, the prefix is CLNH

    *   For IBM Ultrium cleaning cartridges, the prefix is CLNI

    *   For Seagate Ultrium cleaning cartridges, the prefix is CLNS

3. Attach a DG 000 label to all applicable diagnostic cartridges.

Diagnostic and Cleaning Cartridge Cells

The "Reserved Cells" area (shown Figure 6-5 on page 6-12) is reserved for cleaning and diagnostic cartridges for each drive type. The reserved cells are located below CAP B (for libraries with two CAPs) or below the front viewing window (for libraries with only one CAP).

Figure 6-5. Reserved Cells (C65075)
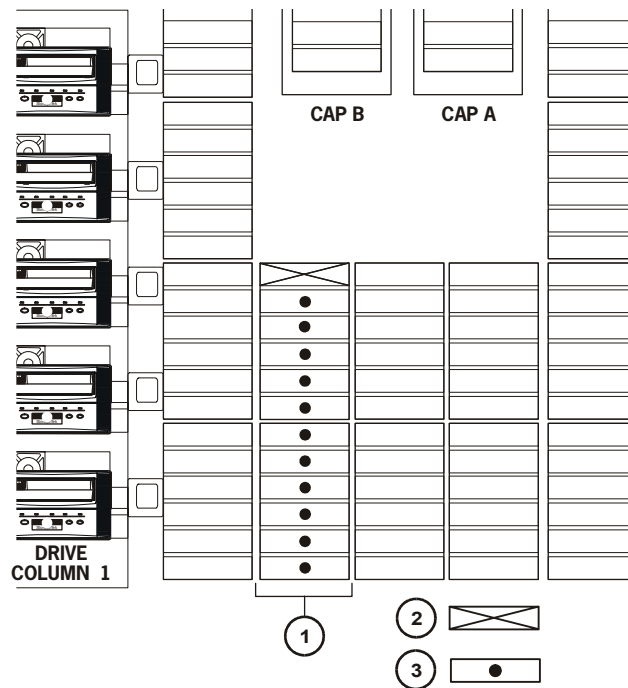
1. Location of reserved cells
2. In-transit cell (Leave empty)
3. Diagnostic/Cleaning cartridges

Reserved Cell Descriptions

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 6-5, the top cell is reserved for in-transit cartridges and used as a drop-off cell. Do *not* place a cartridge into this cell. This cell has two functions:

1. It allows the robot to swap tapes within the library.

2. 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 11 cells. Alternately, these 11 cells may be left empty.

CAUTION:
***System Degradation:* Reserved cells are limited to cleaning and diagnostic cartridges only. Do *not* place data cartridges into the reserved cells.**

Ask the customer if the auto clean option is desired. If host software supports this option, you may place cleaning tapes in the lower 11 cells. When the robot detects cleaning cartridges, the library will automatically configure auto clean.

If auto clean is not desired, do not place cleaning tapes in these cells.

To manually install diagnostic and cleaning cartridges:

Note: Diagnostic cartridges must be manually placed into the reserved cells; cleaning cartridges may either be installed manually or may be imported through the CAP.

1. Open both the right and left front doors of the library.

2. Make sure the top cell is empty.

3. Place cleaning and diagnostic cartridges into any of the other 11 cells in the reserved area. If you are unsure of how to place tapes within cells, refer to .

■ Preparing DLT Drives

There should be no need to check the load handles on DLT drives. As part of the initialization sequence, the load handles of the DLT drives are:

1. Checked for an "in flux" condition (handle requires cycling); if such a condition exists, the MPC/MPCL card will cycle the handles to the "down" position.

2. As the final step in the initialization sequence, the MPC/MPCL card will cycle the handles to the "up" position.

The following procedures describe how you must manually load and unload DLT drives if the drives require manual intervention.

Manually Loading DLT Drives

An operate handle is attached to the front of the drives to permit loading of tapes by the robot.

CAUTION:
***DLT equipment damage:* Do not move the load handle of a drive by hand until power is applied to the drive and the green *OPERATE HANDLE* LED on the drive face is ON (solid, not flashing). The latch is equipped with a breakaway feature to prevent damage. If the latch breaks away, return it to one of the positions shown Figure 6-6 on page 6-15. The procedure below must be followed or damage to the loading mechanism or drive could occur.**

You must wait for the DLT drives to initialize (about 10 seconds) in order to see the *Operate Handle* indicator light up for each drive.

CAUTION:
***DLT equipment damage:* Be sure the drive is operating and the *OPERATE HANDLE* indicator is on before attempting to raise the drive handle. The handle can be raised *only* when the drive is operating and the *OPERATE HANDLE* indicator is constantly on. A safety mechanism protects the drive if it is not in the proper state when the handle is operated. To operate the handle on the DLT drive, the green *OPERATE HANDLE* light on the front of the drive must be constantly on (not flashing).**

At power on, with the handle in the up position, the *OPERATE HANDLE* light will flash. Wait for the *OPERATE HANDLE* light to stay on constantly and then manually lower the drive handle. When the light is constantly on, raise the handle. The drive is now ready to accept a tape.

Insert the tape completely into the drive until it remains in the receiver on its own; lower the handle to start the load operation of the tape.

Manually Unloading DLT Drives

To manually unload a DLT drive, press the Unload button on the drive operator panel. Wait for the green *OPERATE HANDLE* light to be constantly on. When these two conditions are met, you may raise the handle and the tape will eject approximately 10 mm (0.5 in.) from the drive opening.

CAUTION:
***Possible tape damage:* Wait for approximately five seconds before pulling the tape from the drive. Failure to wait for this time period may cause the drive/cartridge leaders to snag or damage one or both of the leaders. If the leaders are snagging, re-insert the cartridge and repeat the preceding procedure.**

Figure 6-6. Manually Loading DLT Drives (C65076)
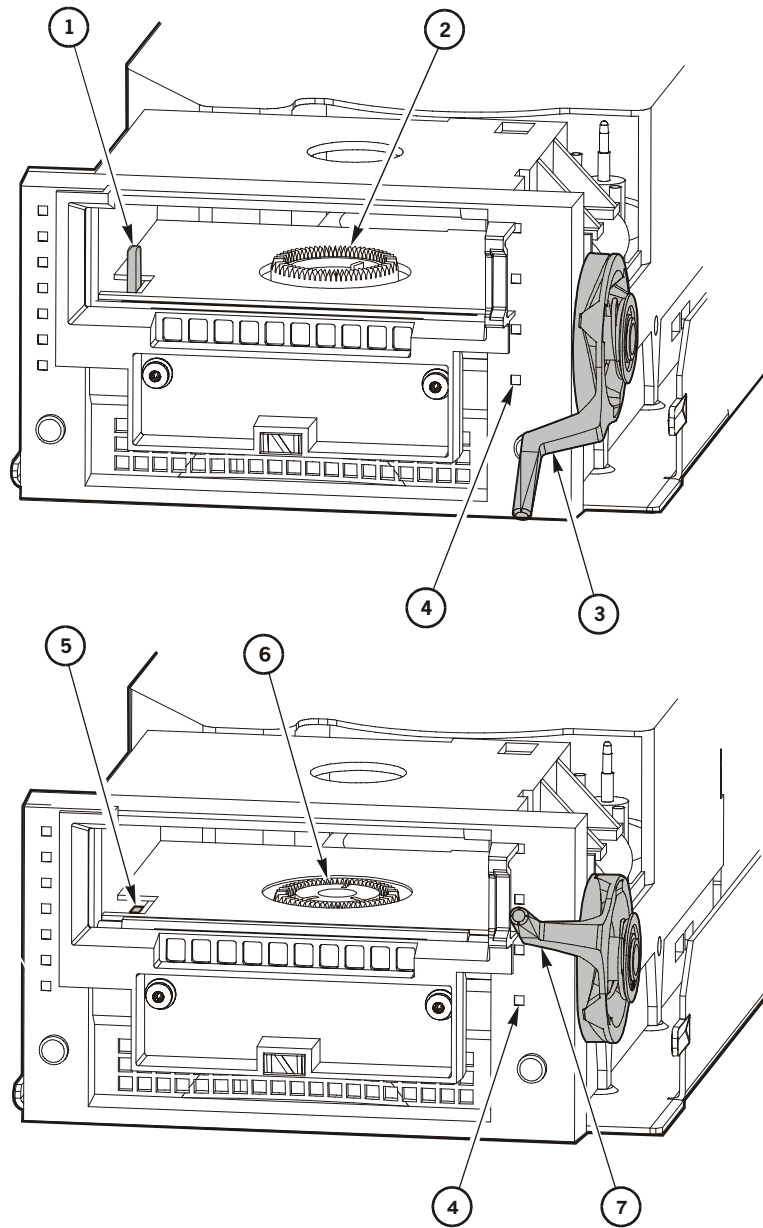
C65076

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

■ Media Statistics Table

With Version 3.02 library firmware, VOLID reporting at load time to T9x40 drives is available. This information will be supplied in the T9x40 drive error log and is *only* available for the StorageTek drives listed in Table 6-7.

The Media Statistics Table is a new feature that allows the Service Engineer to periodically check for media or a drive that is causing operational issues. The table lists cartridge VOLID label, drive serial number, Fault Type (Load, Unload, Media), the number of occurrences, and the date/time stamp of the last occurrence. Due to memory constraints, the table is limited to 30 entries. A new entry in the table is made whenever the VOLID, Drive, or Type differ from entries already in the table. If the identical VOLD, Drive, and Type already exists in the table, the number of occurrences for the matching line item is increased by one.

Statistics are more fully explained in "Library Statistics" on page C-4.

Table 6-7. VOLID Reporting

Drive	Firmware Version
9840A	1.32.102D (or later)
9840B	1.32.3xx (or later)
9940A	1.32.213C (or later)
9940B	1.32.414 (or later)

■ Subsystem Operational Checks

To test library operation before placing the machine online, diagnostic tests should be run. The two diagnostic tests we suggest are the Get-Put and the Mount-Dismount tests.

CAUTION:
System interruption: **If you wish to run tests from a laptop device, you should connect the laptop to the *CSE* port (38,400 baud) on the MPC/ MPCL card.**

Be sure the library is idle and not in use before running tests. The CSE (command line interface) does *not* give a warning that the library will be taken offline.

Get–Put Loop Diagnostic Test

The Get-Put loop diagnostic test validates cell-to-cell move capabilities using a diagnostic cartridge. The robot:

- Retrieves (gets) the diagnostic cartridge from its reserved cell
- Moves the hand and cartridge laterally and vertically
- Places (puts) the cartridge back into the reserved cell

To run the Get-Put diagnostic test:

1. Be sure that the library is offline.

2. Make sure the main access door is closed and the library menu is displayed.

3. Be sure there is a diagnostic cartridge in the reserved area.

4. From the status screen, press the MENU button on the operator panel.

5. Using the down arrow button, move the cursor down until it is next to DIAGNOSTICS.

6. Press SELECT.

   The DIAGNOSTICS screen will appear.

7. Press the down arrow button to move the cursor next to GET-PUT Loop.

8. Press SELECT.

   The GET/PUT option screen will appear. Follow the screen directions to set the number of times you want the test to run.

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.

If an error is encountered, consult the Event log for the FSC listed.

To re-start this test or to begin another test, press MENU to return to the DIAGNOSTICS menu.

Mount-Dismount Loop Diagnostic Test

The Mount-Dismount loop diagnostic test validates the ability of the robot to load a cartridge to and unload a cartridge from a tape drive. The robot:

- Retrieves a diagnostic cartridge
- Loads the tape into a drive

When the drive dismounts the cartridge, the robot:

- Retrieves the cartridge
- Places it back into its reserved cell.

To run the Mount-Dismount diagnostic test:

1. Be sure that both the library *and* target drive are offline.

2. Make sure the main access door is closed and the library menu is displayed.

3. Be sure there is a diagnostic cartridge in the reserved area.

4. From the status screen, press the MENU button.

The main menu will appear.

5. Press the down arrow button to move the cursor down until it is next to `DIAGNOSTICS`.

6. Press the **SELECT** button.

   The `DIAGNOSTICS` screen will appear.

7. Press the down arrow button to move the cursor next to `DRIVE DIAGNOSTICS`.

8. Press **SELECT**.

   The list of available drives will appear.

9. Press the arrow button to move the cursor to the drive you wish to mount.

10. Press the **SELECT** button.

    The list of drive diagnostic tests will appear.

11. Press the arrow button to move the cursor to `MOUNT/DISMOUNT LOOP`.

12. Press **SELECT**.

13. 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.

If an error is encountered, consult the Event log for the FSC listed.

To re-start this test or to begin another test, press **MENU** to return to the `DIAGNOSTICS` menu.

PTP Test

The PTP test simulates a cartridge pass-thru operation between two libraries connected by a pass-thru port.

Note: There are only two PTP cartridge cells: one above and one below the target. The top recess cannot be used as a cartridge slot.

This test:

- Places a diagnostic tape from the source library into the upper PTP cell
- Moves the cartridge to the destination library
- The robot in the destination library removes and then returns the tape to the PTP cell
- The tape is then either returned to the source library (where it is placed into its home cell) or assigned a new cell in the destination library, depending on the software.

To start the PTP test:

1. Be sure that *both* libraries are offline.

2. Make sure that there is no cartridge in either of the PTP cells.

3. Make sure the main access doors are closed and the library menu is displayed.

4. Be sure there is a diagnostic cartridge in the reserved area of the source library.

5. From the status screen, press the **MENU** button.

    The main menu will appear.

6. Press the down arrow button to move the cursor down until it is next to DIAGNOSTICS.

7. Press the **SELECT** button.

    The DIAGNOSTICS screen will appear.

8. Press the down arrow button to move the cursor next to PTP DIAGNOSTICS.

9. Press **SELECT**.

    The operator panel will display NUMBER OF LOOPS = 1

10. If you wish to change the number of loops, press the arrow button. The up arrow will increase the number; the down arrow will decrease the number.

11. Press **SELECT** to start the test (or press **MENU** to stop or exit the test).

12. 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.

If an error is encountered, an FSC will display, indicating the fault.

To re-start this test or to begin another test, press **MENU** to return to the DIAGNOSTICS menu.

Other Diagnostic Tests

You might want to run all diagnostic tests. Descriptions of other tests are given below.

Clean Drive   Mounts and dismounts a specified cleaning cartridge to/from a drive.

Note: This routine does *not* require the library to be offline. Be sure to instruct the operator how to run this routine.

Mount   Mounts a diagnostic cartridge to a selected drive.

Dismount   Dismounts a diagnostic cartridge from a selected drive.

Run Drive Check   Checks whether the drive is functioning. This test applies to DLT 8000 and T9x40 drives only (T9x40 drives must be running firmware level 1.28 or higher).

Mount-Dismount   Mounts and dismounts a diagnostic tape from the selected drive.

Demo Mode   Starts a Get-Put Loop with customer cartridges to simulate machine operation. See the caution below.

CAUTION:
***Audit update required:* When DEMO MODE completes, you must IPL the library to re-audit the library. You must then notify the customer to update the host cartridge database.**

■ Loading Tapes into the Library

When diagnostic tests are completed successfully, the customer may load their production tapes inside the library. The most efficient way to load a great quantity of tapes into the library is to manually load them into the array cells. and illustrate this method.

Figure 6-7. Placing Tapes into Array Cells—T9x40 (C65123)
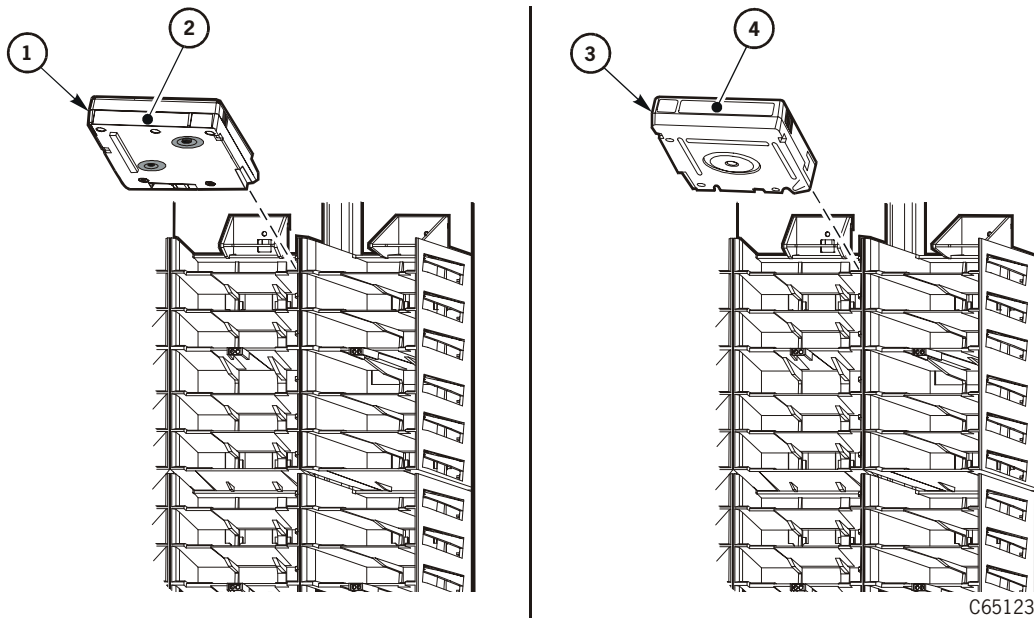
1. T9840 cartridge
2. T9840 cartridge label
3. T9940 cartridge
4. T9940 cartridge label

Fifteenth Edition

Figure 6-8. Placing Tapes into Array Cells—Ultrium and DLT (C65333)
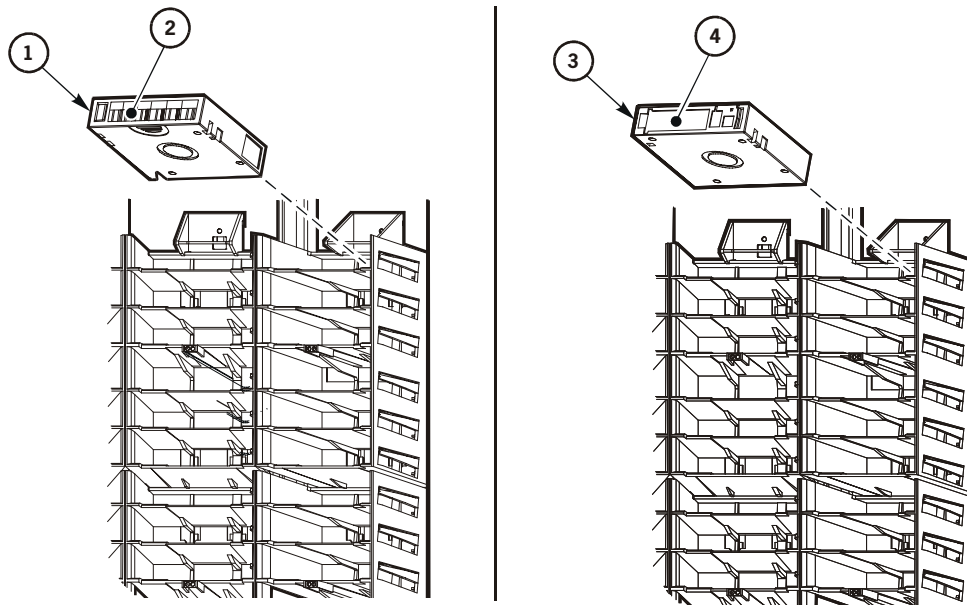
C65333

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

Once they have loaded all their tapes, close and lock the main door. The robot will automatically audit the tapes and their locations within the library.

When they place the library online, they must enter the command to update the host's tape database. The library audit information will then be sent to the host.

Customers may also import tapes through the CAP. The CAP operation is explained in the following section.

■ CAP Operation

Cartridges are imported into and exported from the CAP. Each CAP has four magazines, numbered one through four, from the top location to the bottom. Each cell location in a CAP is assigned an element number (see Figure A-1 on page A-2 through Figure A-4 on page A-5).

To *import* cartridges, you may place the cartridges in any position in the magazine or CAP cell. When the CAP door is closed, the robot will audit all CAP cell locations for cartridges.

For *exporting* cartridges, however, the robot will place the target cartridge into the lowest available element number first. Therefore, an export process within a library that has two

CAPs, for instance, will begin at the optional CAP (CAP B) since it has the lowest element number.

Figure 6-9. Loading the CAP—DLT Tape Cartridge (C65149)

C65149

StorageTek Proprietary
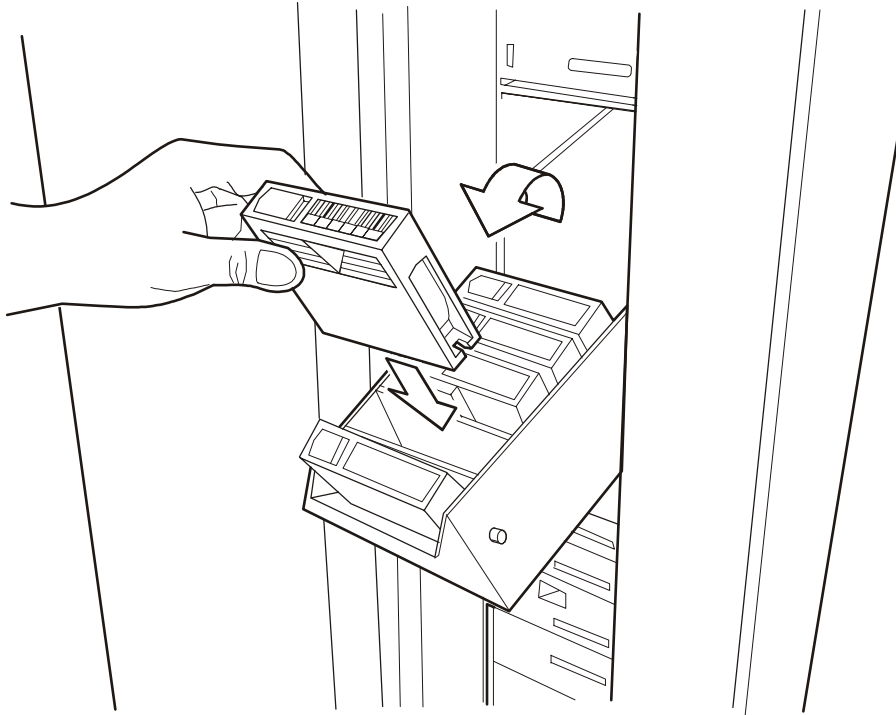
Figure 6-10. Loading the CAP—T9x40 Tape Cartridges (C65150)
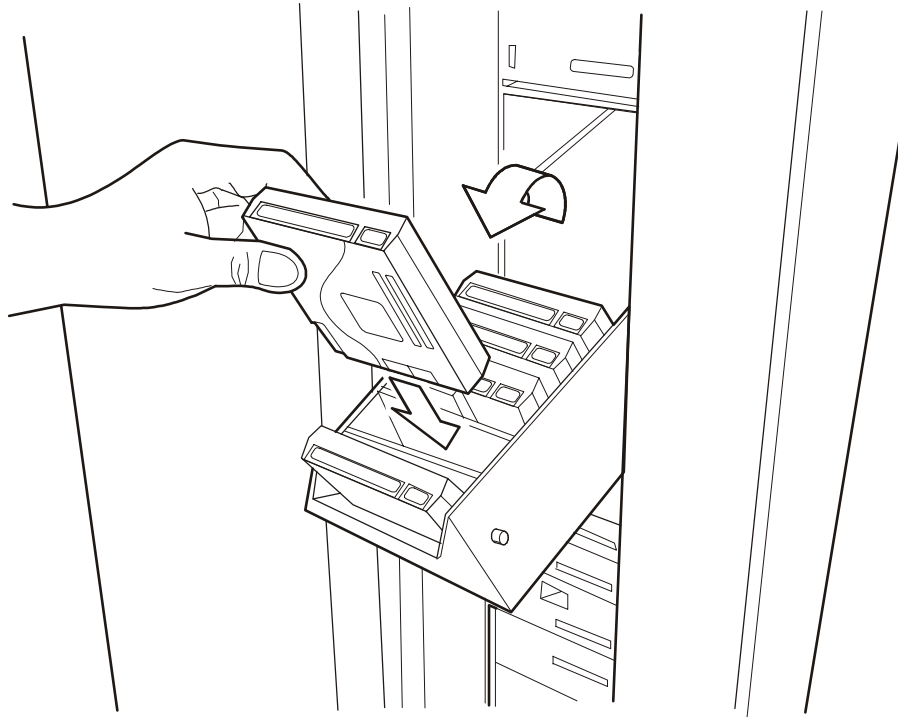
C65150

Figure 6-11. Loading the CAP—Ultrium Tape Cartridges (C65308)

C65308
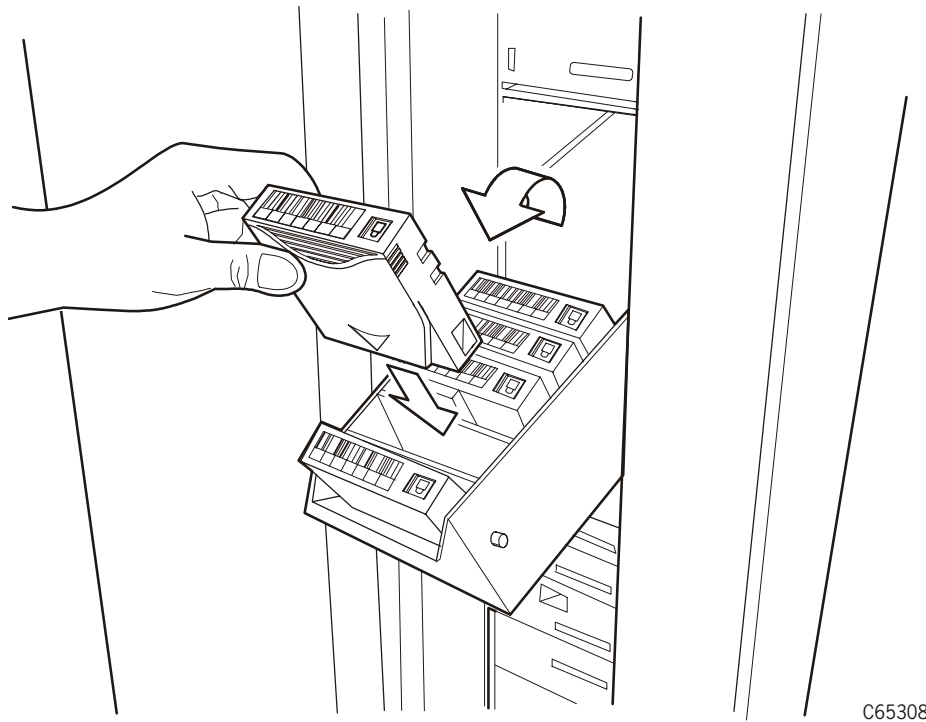
■ Placing the Library Online

When the customer is ready to use their library for production, have the operator enter the system command to place the drives and library online.

Refer the customer to the *L700e Tape Library Hardware Operator's Guide*, part 95845, for instructions on operating the library.

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Library Elements and Diagrams

This appendix provides:

- Wall diagrams of the tape library elements for both L700e standalone libraries and L700e libraries joined with a PTP

- An illustration of the MPC/MPCL logic card

- An overall diagram of the library.

Wall diagrams depict the SCSI elements for all cell locations. The locations are noted at the top of the columns in hexadecimal (denoted by the "h" at the end of the number) and decimal.

Drive types and locations will vary with your tape library options. Each drive column displaces 60 cell locations.

Figure A-1. Standalone Tape Library Elements—1 CAP, 1 Drive Column (C65077)

	PANEL 3							PANEL 0					PANEL 1			PANEL 2				
	COLUMNS							COLUMNS					DOOR COLUMNS			COLUMNS				
ROWS	0	1	2	3	4	5	6	0	1	2	3	4	0	1	2	0	1	2	3	4
	568h 1384	592h 1426	5BCh 1468	5E6h 1510	610h 1552	63Ah 1594	664h 1636	3E8h 1000	3F4h 1012	400h 1024	42Ah 1066	454h 1108			Ah 10 CAP A	496h 1174	4C0h 1216	4EAh 1258	514h 1300	53Eh 1342

ROWS: 0, 6, 12, 18, 24, 30, 36, 41

3F3h 1011   3FFh 1023

1Dh 29

47Eh 1150   48Ah 1162

DRIVE COLUMN 0

RESERVED CELLS

| | 591h 1425 | 5BBh 1467 | 5E5h 1509 | 60Fh 1551 | 639h 1593 | 663h 1635 | 68Dh 1677 | 429h 1065 | 453h 1107 | 47Dh 1149 | 489h 1161 | 495h 1173 | 4BFh 1215 | 4E9h 1257 | 513h 1299 | 530h 1341 | 567h 1383 |

C65077

Figure A-2. Standalone Tape Library Elements—1 CAP, 2 Drive Columns (C65078)

	PANEL 3							PANEL 0					PANEL 1			PANEL 2				
	COLUMNS							COLUMNS					DOOR COLUMNS			COLUMNS				
ROWS	0	1	2	3	4	5	6	0	1	2	3	4	0	1	2	0	1	2	3	4
	52Ch 1324	556h 1366	580h 1408	5AAh 1450	5D4h 1492	5FEh 1534	628h 1576	3E8h 1000	3F4h 1012	400h 1024	40Ch 1036	418h 1048		Ah 10 CAP A		45Ah 1114	484h 1156	4AEh 1198	4D8h 1240	502h 1282

ROWS: 0, 6, 12, 18, 24, 30, 36, 41

3F3h 1011   3FFh 1023   40Bh 1035   417h 1047

1Dh 29

442h 1090   44Eh 1102

DRIVE COLUMN 0   DRIVE COLUMN 1

441h 1089   RESERVED CELLS   44Dh 1101   459h 1113

| 555h 1365 | 57Fh 1407 | 5A9h 1449 | 5D3h 1491 | 5FDh 1533 | 627h 1575 | 651h 1617 | | | | | | | | | 483h 1155 | 4ADh 1197 | 4D7h 1239 | 501h 1281 | 52Bh 1323 |

C65078

Figure A-3. Standalone Tape Library Elements—2 CAPs, 1 Drive Column (C65079)

	PANEL 3							PANEL 0					PANEL 1			PANEL 2				
	COLUMNS							COLUMNS					DOOR COLUMNS			COLUMNS				
	0	1	2	3	4	5	6	0	1	2	3	4	0	1	2	0	1	2	3	4
ROWS	568h 1384	592h 1426	5BCh 1468	5E6h 1510	610h 1552	63Ah 1594	664h 1636	3E8h 1000	3F4h 1012	400h 1024	42Ah 1066	454h 1108	Ah 10 CAP B	1Eh 30 CAP A		496h 1174	4C0h 1216	4EAh 1258	514h 1300	53Eh 1342

ROWS

0

6

12 3F3h 1011   3FFh 1023

18

24   1Dh 29   31h 49

30   47Eh 1150   48Ah 1162

36

41

DRIVE COLUMN 0

| 591h 1425 | 5BBh 1467 | 5E5h 1509 | 60Fh 1551 | 639h 1593 | 663h 1635 | 68Dh 1677 | 429h 1065 | 453h 1107 | 47Dh 1149 | RESERVED CELLS | 489h 1161 | 495h 1173 | 4BFh 1215 | 4E9h 1257 | 513h 1299 | 530h 1341 | 567h 1383 |

C65079

Figure A-4. Standalone Tape Library Elements—2 CAPs, 2 Drive Columns (C65080)

	PANEL 3							PANEL 0					PANEL 1			PANEL 2				
	COLUMNS							COLUMNS					DOOR COLUMNS			COLUMNS				
ROWS	0	1	2	3	4	5	6	0	1	2	3	4	0	1	2	0	1	2	3	4
	52Ch 1324	556h 1366	580h 1408	5AAh 1450	5D4h 1492	5FEh 1534	628h 1576	3E8h 1000	3F4h 1012	400h 1024	40Ch 1036	418h 1048	Ah 10 CAP B	1Eh 30 CAP A		45Ah 1114	484h 1156	4AEh 1198	4D8h 1240	502h 1282

Row markers: 0, 6, 12, 18, 24, 30, 36, 41

Panel 0 mid-row labels (row 12):
3F3h 1011, 3FFh 1023, 40Bh 1035, 417h 1047

Panel 1 labels:
1Dh 29, 31h 49
442h 1090, 44Eh 1102

| 555h 1365 | 57Fh 1407 | 5A9h 1449 | 5D3h 1491 | 5FDh 1533 | 627h 1575 | 651h 1617 | DRIVE COLUMN 0 | DRIVE COLUMN 1 | 441h 1089 | RESERVED CELLS | 44Dh 1101 | 459h 1113 | 483h 1155 | 4ADh 1197 | 4D7h 1239 | 501h 1281 | 52Bh 1323 |

C65080

Figure A-5. PTP Tape Library Elements—1 CAP, 1 Drive Column (C65391)

	PANEL 3							PANEL 0					PANEL 1			PANEL 2				
	COLUMNS							COLUMNS					DOOR COLUMNS			COLUMNS				
	0	1	2	3	4	5	6	0	1	2	3	4	0	1	2	0	1	2	3	4
ROWS	562h 1378	58Ch 1420	5B6h 1462	5E0h 1504	60Ah 1546	634h 1588	65Eh 1630	3E8h 1000	3F4h 1012	400h 1024	42Ah 1066	454h 1108		Ah 10 CAP A		496h 1174	4C0h 1216	4EAh 1258	514h 1300	538h 1336

ROWS: 0, 6, 12, 18, 24, 30, 36, 41

8
9

3F3h 1011   3FFh 1023

1Dh 29

47Eh 1150   48Ah 1162

DRIVE COLUMN 0

| 58Bh 1419 | 5B5h 1461 | 5DFh 1503 | 609h 1545 | 633h 1587 | 65Dh 1629 | 687h 1671 | | 429h 1065 | 453h 1107 | 47Dh 1149 | RESERVED CELLS | 489h 1161 | 495h 1173 | 4BFh 1215 | 4E9h 1257 | 513h 1299 | 537h 1335 | 561h 1377 |

⊠ = PASS-THRU PORT (PTP) [Panel 2, Column 3 numbering begins with the first array cell below the PTP.]

C65391

Figure A-6. PTP Tape Library Elements—1 CAP, 2 Drive Columns (C65392)

	PANEL 3							PANEL 0					PANEL 1			PANEL 2				
	COLUMNS							COLUMNS					DOOR COLUMNS			COLUMNS				
ROWS	0	1	2	3	4	5	6	0	1	2	3	4	0	1	2	0	1	2	3	4
	526h 1318	550h 1360	57Ah 1402	5A4h 1444	5CEh 1486	5F8h 1528	622h 1570	3E8h 1000	3F4h 1012	400h 1024	40Ch 1036	418h 1048			Ah 10 CAP A	45Ah 1114	484h 1156	4AEh 1198	4D8h 1240	4FCh 1276

ROWS markings: 0, 6, 12, 18, 24, 30, 36, 41

Panel 2, Column 3 top: PTP (pass-thru port) marked with 8 / 9

Panel 0 row 12 labels: 3F3h 1011, 3FFh 1023, 40Bh 1035, 417h 1047

DRIVE COLUMN 0   DRIVE COLUMN 1

Panel 1: 1Dh 29

442h 1090   44Eh 1102

RESERVED CELLS

Bottom labels:
| 54h 1359 | 579h 1401 | 5A3h 1443 | 5CDh 1485 | 5F7h 1527 | 621h 1569 | 64Bh 1611 | 441h 1089 | RESERVED CELLS | 44Dh 1101 | 459h 1113 | 483h 1155 | 4ADh 1197 | 4D7h 1239 | 4FBh 1275 | 525h 1317 |

⊠ = PASS-THRU PORT (PTP) [Panel 2, Column 3 numbering begins with the first array cell below the PTP.]

C65392

= PASS-THRU PORT (PTP) [Panel 2, Column 3 numbering begins with the first array cell below the PTP.]

C65393

Figure A-8. PTP Tape Library Elements—2 CAPs, 2 Drive Columns (C65394)

Figure A-9. MPC/MPCL Card Diagram (C65068)

C65068

Table A-1. MPC/MPCL Card Connectors

Connector	Function
J283	*PTP power (Unused in standalone library)*
J36	Servo signal lines
J24	Tape Transport Interface (TTI) for Drives 0 to 9
J550	Library personality/StorageTek L-Series Library Admin (MPK card)—as required.
J30 CSE Port RS 423	• Pre-3.00 firmware: Dumb terminal port, used only to load pre-2.00 firmware • *3.00 and later firmware: Command Line Interface (CLI). Laptop connection: 38,400 baud rate. Used for Hyperterminal downloading port for firmware, running diagnostic tests, and examination of FSC log.*
J282 TEST Port RS423	• Pre-3.00 firmware: Engineering use only. • *3.00 and later firmware: Pass-thru port serial connection (Unused in standalone library)*
J33 SER1 Port RS423	• Pre-3.00 firmware: Used for laptop command line interface (CLI) connection: 38,400 baud rate. Used for Hyperterminal downloading port for firmware (editions 2.20 and later), running diagnostic tests, and examination of FSC log. • *3.00 and higher firmware: Engineering use only.*

Table A-1. MPC/MPCL Card Connectors (Continued)

Connector	Function
J32 SER2 Port RS423	Not used.
J15 ENET Port	Ethernet connector (TCP/IP)
J19D	SCSI HVD
J19S	SCSI Single-ended (MPC) or SCSI LVD/SE (MPCL)
J16	Single-ended or differential selection jumpers
J18	Terminating power jumper
J211	Connector for PCI (MPV) expansion card: MPU attaches for fiber (MPC or MPCL); MPW attaches for SCSI LVD (MPC card only)
J28	Operator panel
J241	Tape Transport Interface (TTI) connection to MPM multiplexor card for Drives 10 to 19
J281	Engineering use only
J53	CAP and door
J570	DC power in from second MPF (DC power) supply
J571	DC power in from first MPF (DC power) supply
J551	DC fans
J43	Servo power to robot and hand-camera assembly

Note: If the MPV card (PCI expansion bus) is present, an MPU card might be attached to this card. The MPU card contains a Class 1 laser product that complies with sections 21CFR 1040.10 and 1040.11 of the Food and Drug Administration (FDA) regulations.

Class 1 laser products do not require any special safety precautions.

Figure A-10. Library Block Diagram (Single Drive Column Power Cable) (C65215)

Note: Figure A-10 is representative of earlier machines.

Figure A-11. Library Block Diagram (Two Drive Column Power Cables) (C65296)

Note: Figure A-11 is representative of machines manufactured after April 2000.

C65296

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StorageTek Proprietary

SNMP

<div style="float:right">B</div>

This appendix provides the implementation of the Simple Network Management Protocol (SNMP) for the L700e library.

■ Overview

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

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

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

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

illustrates a simple network block diagram that identifies the locations of the SNMP software application, DNS servers, and Library Admin. This figure also identifies the IP addresses, shows a map of DNS names, and other components involved in that configuration (such as operator panel, Ethernet connections, location of the Management Information Base (MIB), and the MPC/MPCL processor card.

■ Domain Name Service

The Domain Name Service (DNS) ia a service that translates names into IP addresses. Every time you use a domain name, the DNS translates the name into the corresponding IP address. For example, the domain name "library" might translate to an IP address of 129.80.1.4, as shown in .

Figure B-1. SNMP and DNS Network Block Diagram Example (C65443)
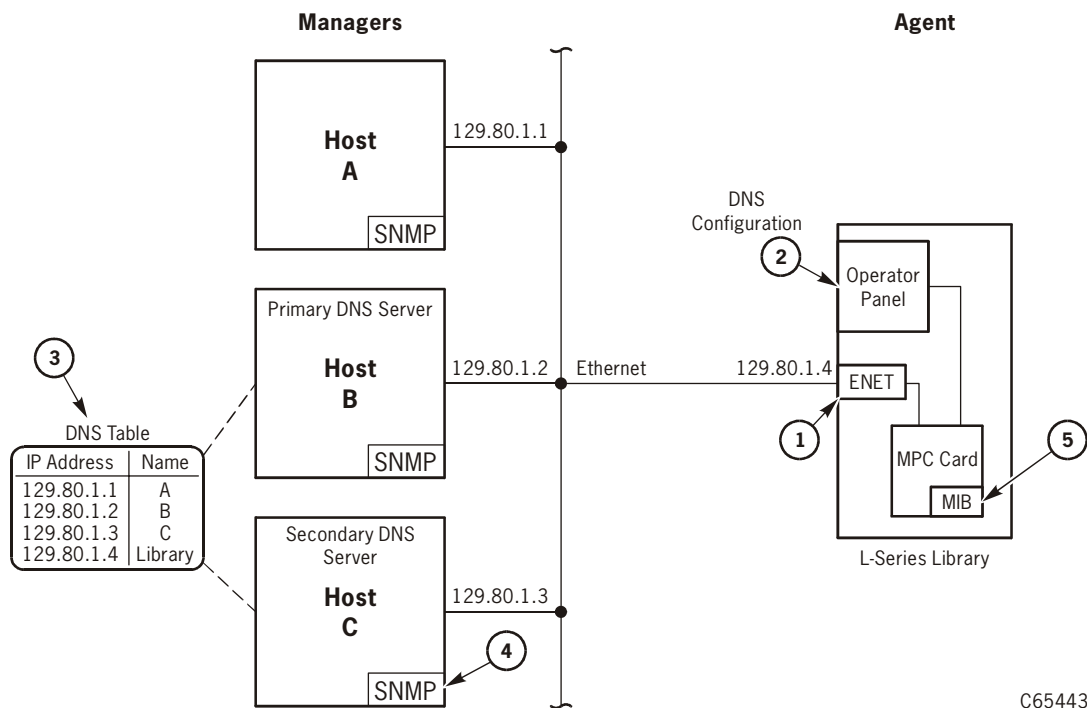
1. Ethernet connection (ENET) for the library.
2. To configure the library to support DNS, see "DNS Configuration" on page 5-22.
   Note: You must enter the Domain Name Service (DNS) configuration *only* if your Simplified Network Management Protocol (SNMP) agent is set to trap *named* recipients; if SNMP is set for *numbered* recipients (by using IP addresses), no entries are required.
3. An example of a table that matches IP addresses to selected DNS names.
4. SNMP software application that implements the role of manager. Some applications include:
   HP Open View
   IBM NetView
   Sun Microsystems SunNet Manager
5. The MIB is stored on the MPC/MPCL card. To view the contents of the MIB database, enter:
   http://*IP.Address/*Lseries.mib or http://*library_name/*Lseries.mib
6. Library Admin is an *optional* feature for the library. It provides the GUI-based monitoring system and is *separate* from the SNMP application. Library Admin provides an easy and convenient way to configure the library SNMP agent using a network configuration panel or screen. Library Admin also provides other beneficial functions and display screens for the library.

■ SNMP Terms

SNMP uses a manager/agent structure, a database, and a small set of commands to exchange information. SNMP terms include:

- **Agent** - A module that resides in a managed device. The agent is responsible for responding to requests from the manager and for sending *traps* to a recipient that inform the systems administrator of potential problems.

- **Community String** - Applications use community strings for access control. The manager includes the community string in its SNMP messages to an agent. The agent consequently can accept or reject the operation.

- **Managed device** - A device that hosts the services of an SNMP agent that provides monitored information and controlled operations using SNMP. L-Series libraries are managed devices.

- **Management Information Base (MIB)** - A collection of information stored in a database that contains configuration and statistical information for a managed device. For L-Series libraries, a copy of the MIB is loaded with microcode and stored on the processor card. See "Management Information Base" on page B-4 for more information about the MIB.

- **Manager** - Provides the communication link between the systems administrator and the managed devices on the network. A manager station or server allows the systems administrator to get information about the device through the MIB and to receive traps from an agent.

- **Recipient** - A location on a manager where the SNMP agent sends traps. This location is defined by the combination of either the IP address or DNS name and the port number. The default recipient port number is 162.

- **Trap** - A message that reports a problem, error, or a significant event that occurred within the device.

■ SNMP Commands

SNMPv1 offers a limited number of commands that follow a simple request/response exchange to communicate between the manager and the agent.

The *manager* issues request such as:

- **Get:** A request for information of a specific variable.
- **GetNext:** A requests for the *next* specific variable.
- **Set:** A request to change the value of a specific variable.

The *agent* responds with:

- **Get-Response:** A response to the manager's Get and GetNext commands.

- **Trap:** An asynchronous message to the recipient about an error or event.

Refer to the SNMP software documentation for additional information.

■ Access Control

Because community strings provide a weak form of access control in SNMPv1, StorageTek's embedded agent will not rely on the so called "private" community string in order to accept changes to the library's configuration.

Using an administrative password provides access control and authorization for Set operations. Consequently StorageTek's embedded agent uses only one community string for both Get and Set operations.

Important:
You must first Set the MIB variable lserLibConfigPassword (1.3.6.1.4.1.1211.1.12.3.2) to the same value as the library password (see Chapter 5, "Configuring the Library" for more information). Then subsequent Set operations are authorized for a specific period of time called the grace period.

Traps however, can be sent to recipients using alternate community strings. Different community strings can be specified while adding entries to the Trap Recipient List (see "Configuration" on page B-6).

■ Management Information Base

The MIB is a viewable document that contains descriptions about the characteristics for a managed device. These characteristics are the functional elements for that device which can be monitored using SNMP software.

To access and view the contents of the MIB using a Web browser, enter the IP Address or DNS library name and Lseries.mib. For example: http://*IP.Address*/ Lseries.mib or http://*library_name*/Lseries.mib.

Note: StorageTek's L-series libraries implement only MIB extensions defined in the LSERIES-TAPE-LIBRARY-MIB under the **private (4)** section as shown in Figure B-2 on page B-5.

Figure B-2 on page B-5 shows the MIB hierarchy as a tree structure where the L-series MIB is located.

Figure B-2. Management Information Base Hierarchy (C65445)

MIB Title = LSERIES-TAPE-LIBRARY-MIB
Object Name = iso.identified-organization.dod.internet.private.enterprise.storagetek.products.lsereis
Equivalent Object Descriptor = 1.3.6.1.4.1.1211.1.12
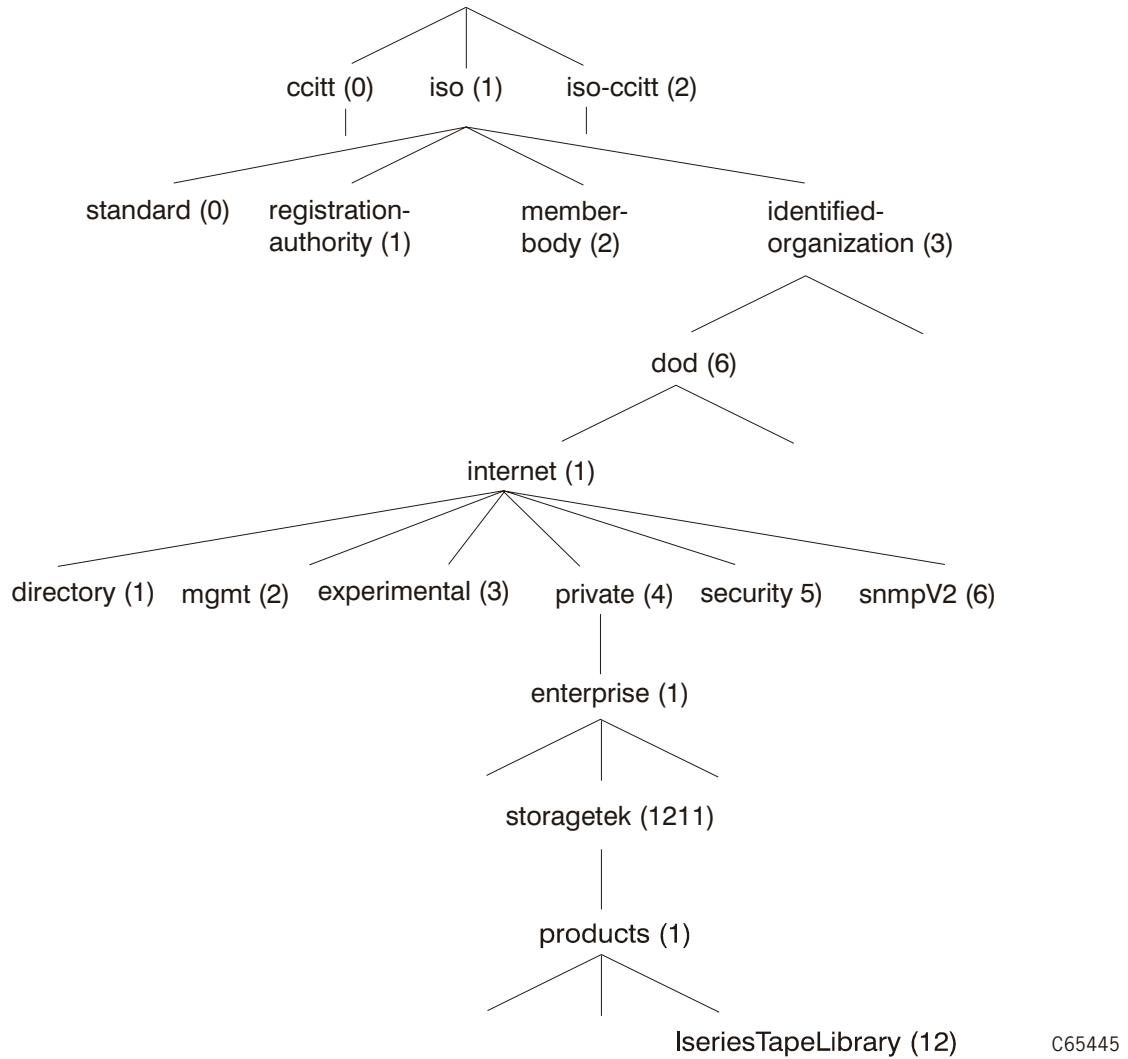
■ Configuration

There are three ways to configure the library to support SNMP:

1. Library Admin, an *optional* feature for the library, but it is not required to support SNMP.

2. The CLI port (command line interface)
   See for examples of the `help` and `help snmp` commands.

3. The SNMP software application—you can also use any SNMP application to change *some* of the agents' settings. You must be MIB-aware, have access to the Lseries.mib, and refer to application documentation for specific information.

Figure B-3. CLI Help and Help SNMP Commands

```
cli> help
help [command]              help on a specific command
diag                        execute diagnostics
download                    download new image to prom
fsc                         manipulate fault symptom codes
network                     manipulate network information
snmp                        manipulate SNMP configuration
time                        view/modify library date & time
password                    reset/modify library admin password


cli> help snmp
snmp view               display SNMP Agent settings
snmp community [string] set Community String/IP address
snmp [enable|disable]   enable of disable SNMP Agent
snmp port [port number] set Agent Listening Port Number
                        (Valid: 161, 1024-65535)
snmp grace [number]     set Write Grace Period Number
                         ( 1-5 minutes )
snmp reset              set SNMP Agent configuration parameters
                        to default values
snmp list               display SNMP Trap Recipient List
snmp add                add a member to the SNMP Trap Recipient List by
                        answering individual prompts for values.
snmp add [ipaddr|name]  add a member to the SNMP Trap Recipient List using
                        some default values
snmp add [ipaddr|name] [host port number]
                        add a member to the SNMP Trap Recipient List
                        using some default values
snmp delete [[ipaddr|name] [host port number]] | all
                        delete all or a selected member of the SNMP
                        Trap Recipient List
                Where valid [host port number] values: (162, 1024-65535)

cli> _
```

The library comes configured with some default settings, listed in Table B-1:

Table B-1. SNMP Default Settings

Setting	Default	Description
Port number	`161`	Valid port IDs are 161, and 1024 to 65535
Community String	`public`	Agent community string. When set to *public*, requests coming from *any* community string will be accepted.
Grace Period	`5 minutes`	1 to 5 minutes Once you enter the password, you have 1–5 minutes to **Set** any values for the agent.
Trap Recipient List	`Empty`	This list supports up to 12 recipients with no duplicate entries.
SNMP (agent)	`Disabled`	Enabled or Disabled

■ Starting SNMP

To start SNMP for the library, you must:

1. Configure the library:

    a. *Enable* the agent

    b. Add recipients to the trap list (if needed)

    c. Make any optional changes to the default settings.

2. *Re-IPL* the library for the changes to take effect.

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StorageTek Proprietary

StorageTek L-Series Library Admin

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 (see Appendix B for more information)

For more information about StorageTek's L-Series Library Admin, visit:

http://stagesupport.storagetek.com/LibraryAdminHelp/LSA.HTM

■ 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/products/plugin

- 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 5-19 for more information.

Referring to Figure C-1 on page C-4:

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 C-1 on page C-4 for an example of the Library Admin for the L180 and L700 Tape Libraries.

Table C-1 outlines the functionality of the Library Admin:

Table C-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 C-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 C-1 on page C-3.

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Figure C-1. Library Admin Screen Example
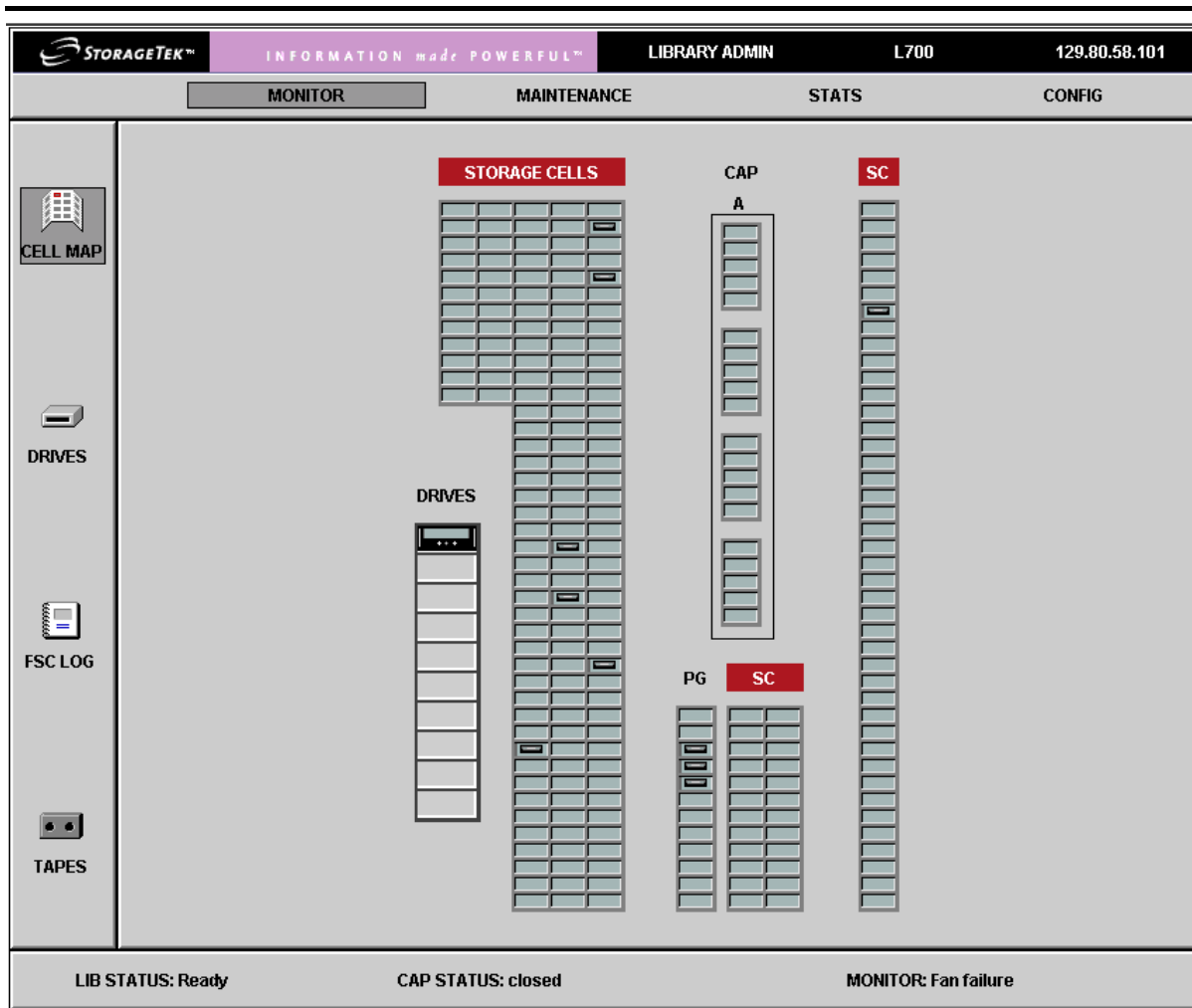
■ Library Statistics

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 C-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 left access door (L700/700e) or access door (L180) 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

Table C-2. 16-Bit Counters (Continued)

Bin	Description
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 C-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 C-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 C-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 C-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 C-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 C-8 on page C-11.

Table C-8. Individual Drive Performance

Bin	Counter	Explanation
General – No Data Transfer*		
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 in this publication.

Some of the definitions are taken from other glossaries. The letters in the parentheses that follow some definitions indicate the source of the definition:

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

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

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

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

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

A

acknowledgement (ack) A message sent by the receiver of a communication, acknowledging its receipt.

Advanced Interactive Executive (AIX) IBM's implementation of the UNIX (trademark of AT&T Bell Laboratories) operating system. The RISC System/6000 system, among others, runs the AIX operating system. (IBM).

American Power Conversion (APC) The supplier for the L700 uninterruptible power source (UPS).

audit 1) 1) An operation to catalog or record the physical location of a cartridge tape in an automated library (2) A process by which a specified volume serial number location in the tape inventory is physically verified.

Automated Cartridge System Library Software (ACSLS) The software within a UNIX-based server that interfaces the server and hosts; it also maintains a list of all tapes within a library storage module.

automatic mode (1) A relationship between a library and all attached hosts. A library operating in automatic mode handles cartridges without operator intervention. This is the normal operating mode of a library that has been placed online to all host central processing units. (2) A relationship between a library and the client. In automated mode, the robot moves the cartridges among the storage cells, CAP, and drives in response to client commands. This is the normal operating mode of a library that is communicating with the client.

B

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

C

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

CAP *See* cartridge access port.

cartridge 1) A storage device that consists of magnetic tape on supply and take-up reels, in a protective housing. (IBM) (2) A container that holds magnetic tape on a supply reel and is inserted into a drive for read and write operations.

In the 9840/T9840, the cartridge has both the supply and take-up reels. In the T9940, the cartridge has only a single supply reel with the take-up mechanism residing in the drive.

cartridge access port (CAP) (1) In a StorageTek library, a mail slot through which an operator feeds tape cartridges into and retrieves tape cartridges from a library. (2) A device in the library that allows an operator to insert or remove cartridges during library operations. (3) A storage device that allows an operator to insert or remove cartridges during automated library operations.

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

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

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

CCITT Consultative Committee for International Telephone and Telegraph.

cell (1) A slot in the library in which a cartridge is stored. (2) The location in which a cartridge is stored in a library. (3) A place in which a cartridge resides in a library. (4) The location in the library in which a cartridge is stored.

command line interface (CLI) For firmware 2.20 and lower—the SER1 port on the MPC card. For firmware 3.00 or later, the CSE port on the MPC/MPCL card. For MPB firmware only, the CSE port on the Master library's door frame.

configuration (config) (1) The manner in which the hardware and software of an information processing system is organized and interconnected. (T) (2) The physical description of a library listing the panel types, cartridge capacity, type of host connection, and number of drives.

customer services engineer (CSE) A service representative who supports and services customer's products.

CSE port A port on the MPC/MPCL card for loading 3.00 or later firmware.

D

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

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

diagnostic tests *See* diagnostic programs.

Direct Memory Access (DMA) An operation in which the electronics bypass the microprocessor and directly access the memory.

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

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

drive (1) A device for moving magnetic tape and controlling its movement. (IBM) (2) A device for moving tape and controlling its movement. (T) (3) A device that moves magnetic tape and includes the mechanisms for reading and writing data on the tape. (3) An electromechanical device that moves magnetic tape and includes the mechanisms for writing and reading data to and from the tape. *See also* tape drive.

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

Dynamic Worldwide Name (dWWN) A feature that applies dynamic names to network devices rather than fixed names. When a dWWN-named device is replaced, it is assigned the same WWN as the one it replaced, preventing re-configuration of the network.

E

electronically erasable programmable read-only memory (EEPROM) A nonvolatile sequential access memory device that can be written onto when a change of contents is required.

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

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 (1) A local area network (LAN) architecture developed by Xerox Corporation. The Ethernet specification served as the basis for the IEEE 802.3 standard, which is one of the most widely implemented LAN standards. (2) A 10 Mb/s baseband local area network that allows multiple stations to access the transmission medium at will without prior coordination, avoids contention by using carrier sense and deference, and resolves contention by using collision detection and transmission. Ethernet uses carrier sense multiple access with collision detection. (IBM) (3) A trademark for a local area network (LAN) protocol. (4) A type of networking technology for local area networks that uses coaxial cable to carry signals between computers at a rate of 10 Mb/s.

Ethernet address A six-byte address that makes a library accessible to a network. *See also* Ethernet, Internet Protocol (IP) address, library name, and subnet mask.

event examination A file, accessible through the operator panel, that contains events that occurred during the functional operation of the tape library.

F

Fabric (1) The Fibre Channel topology similar to a telephone switch in that the initiator of a call to the receiving port simply provides the receiver with the port address, and the fabric routes the transmission to the correct port. A fabric differs from a point-to-point or arbitrated loop topology in that it provides for interconnections between ports without having a point-to-point connection. The fabric also serves as a media-type converter. (2) The hardware that connects workstations and servers to storage devices in a SAN. A fabric enables any-server-to-any-storage device connectivity using a Fibre Channel switch.

Fabric login The process by which a Fibre Channel node establishes a logical connection to a fabric switch.

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

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

fiber-optic cable (1) A jacketed cable of thin strands of glass that carries pulses of light that transmit data for high-speed transmissions over medium to long distances. The cable can be single mode, which carries a single signal from a laser or light-emitting diode light source, or multimode, which carries multiple signals from either light source. (2) A technology that uses glass (or plastic) threads (fibers) to transmit data. A fiber optic cable consists of a bundle of glass threads, each of which is capable of transmitting messages modulated onto light waves. Fiber-optic cables have several advantages over traditional metal cables, such as: greater bandwidth, less susceptible to interference, thinner and lighter than metal cables, and they can

transmit data digitally rather than analogically. (3) A jacketed cable of thin strands of glass that carries pulses of light; these pulses transmit data for high-speed transmissions over medium to long distances. The cable can be single mode, which carries a single signal from a laser or light-emitting diode light source, or multimode, which carries multiple signals from either light source.

Fibre Channel (FC) (1) 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. (2) The standard from the National Committee for Information Technology Standards that defines an ultra high-speed, content-independent, multilevel data transmission interface that supports multiple protocols simultaneously. Fibre Channel supports connectivity to millions of devices over copper and/or fiber-optic physical media and provides the best characteristics of both networks and channels over diverse topologies.

Fibre Channel Arbitrated Loop (FC_AL) (1) An arrangement of Fibre Channel stations such that messages pass from one to the next in a ring. (2) One of three Fibre Channel topologies where 2 to 126 devices interconnect serially in a single-loop circuit.

Fibre Channel protocol The mapping of SCSI-3 commands over a Fibre Channel interface.

firmware An ordered set of instructions and data stored in a way that is functionally independent of main storage; for example, microprograms stored in a ROM. (T) *See also* microcode. (2) *See* microcode.

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

G

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

H

hand-camera assembly (1) A part of the library robot whose function is grasping cartridge tapes and moving them between storage cells and tape drives. The camera reads cartridge volume serial numbers during library audits and normal operation. (2) A part of the library robot whose function is grasping cartridges and moving them among the cartridge access port, the storage cells, and the drives. The camera reads the volume serial number labels during library audits.

Hardware Support Services (HSS). The remote diagnostic center at StorageTek. Hardware support services engineers (HSSEs) can access and test StorageTek equipment and software, through telecommunications lines, from certain remote customer installations. Previously referred to as the remote diagnostic center (RDC) or the Customer Support Remote Center (CSRC).

HBA *See* host bus adapter.

host bus adapter (HBA) (1) A circuit installed in a multi-platform host or device that interfaces between the device and the bus. (2) An I/O adapter that sits between the host and the interface that manages the transfer of information between the host and the device. To minimize the impact on host processor performance, the host bus adapter performs many low-level interface functions automatically or with minimal processor involvement.

hub A Fibre Channel Arbitrated Loop switching device that allows multiple servers and targets, such as storage systems, to connect at a central point. A single hub configuration appears as a single loop.

I

initial program load (IPL) (1) A process that activates a machine reset and loads system programs to prepare a computer system for operation. Processors having diagnostic programs activate these programs at initial program load execution. Devices running firmware usually reload the functional firmware from a diskette or disk drive at initial program load execution. (2) The initialization procedure that causes an operating system to commence operation.

initialization (1) The startup and initial configuration of a device, system, piece of software, or network. (2) The operations required for setting a device to a starting state, before the use of a data medium, or before implementation of a process. (T)

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

Internet Protocol (IP) address (1) A four-byte value that identifies a device and makes it accessible through a network. The format of an IP address is a 32-bit numeric address written as four numbers separated by periods. Each number can be from zero to 255. For example, 129.80.145.23 could be an IP address. *See also* Ethernet address, library name, subnet mask.
(2) A four-byte value that identifies a library and makes it accessible through a network. IP addresses are logically divided into two parts: the network (similar to a telephone area code), and the system on the network (similar to a phone number). *See also* Ethernet address, library name, subnet mask.

in-transit cartridges Cartridges left in the robot hand. The Data Management Software must recover these cartridges to a known location to clear out the software in-transit record.

in-transit record A temporary record written by the host software, noting that a cartridge has been moved from its home cell. After this cartridge returns to its home cell, the record erases.

K

kernel (1) A section of code that handles the multitasking within the library storage module (LSM). It is responsible for intertask communication and is the heart of the operating system for the LSM. (2) The central module of an operating system. It is the part of the operating system that loads first, and it remains in main memory. (3) The essential part of UNIX or other operating systems, responsible for resource allocation, low-level hardware interfaces, and security (4) An essential subset of a programming language, in terms of which other constructs are (or could be) defined. Also known as a core language.

L

lb An abbreviation for pound.

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

Linear Tape-Open (LTO) (1) A technology developed jointly by HP, IBM, and Seagate for new tape storage options. LTO technology is an open format, which means that users have multiple sources of products and media. The open nature of LTO technology also provides a means of enabling compatibility between different vendors' offerings. (2) An open specification for tape storage devices.

M

magazine (1) A container that holds cartridges in the cells provided and is inserted into the CAP. (2) A removable container that holds cartridges and is placed into the cartridge access port (CAP).

machine activated routing switch (MARS) An electronic switching mechanism built by Giltronix

that either the Customer Service Remote Center or the machine can activate to select a port for communications.

manual mode (1) A relationship between a library and all attached hosts. Libraries operating in manual mode are placed offline to and do not communicate with all host central processing units and require human assistance to perform cartridge operations. (2) A relationship between a library and the client. A library operating in manual mode does not communicate with the client and requires human assistance to perform cartridge operations. Manual mode occurs when the robot is unavailable to the client. (3) A library operating mode in which all clients are placed offline and requires human intervention to perform cartridge load and unload operations. (4) A relationship between a library and all attached clients. Tape libraries operating in manual mode have been placed offline to all client CPUs and require human assistance to perform cartridge operations.

master (PTP) The library that powers the pass-thru port.

media format Format of data written on tape (36-track, compressed, and so on).

micro (μ) A prefix that means one one-millionth (10^{-6}).

microcode (1) A code, representing the instruction of an instruction set, that is implemented in a part of storage that is not program-addressable. (IBM) *See also* firmware. (2) The lowest-level of instruction that directly controls a microprocessor. *See also* firmware.

Mode Select command The command used in Fibre Channel that specifies operational parameters and options for a logical unit. The Mode Select command shows the fields to be changed and the default values for these fields.

Mode Sense command The command used in Fibre Channel that returns the current operating modes and parameters of a device to the host. The Mode Sense command also returns the default parameters or information in which fields and bits can be changed using the Mode Select command.

modulator/demodulator (modem) An electronic device that converts computer digital data to analog data for transmission over a telecommunications line (telephone line). At the receiving end, the modem performs the reverse function.

MPC card (1) The central processing unit card for the tape library. (2) The main logic card in the library. (*See* Appendix A, "Library Elements and Diagrams.")

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.

MPF card The DC power supply card for the tape library.

MPK card An EEPROM-based module that holds upgraded library feature data. *See also* personality module.

MPU card The Fibre expansion card for the tape library.

MPV card Acts as the backplane on the CPCI assembly for either the fibre (MPU) interface card (both MPC and MPCL cards) or the LVD (MPW) interface card (MPC only).

MPW card The LVD/SE card (attached to the MPV card) that enables LVD/SE operation for an MPC card only.

Multiple Virtual Storage (MVS) IBM's Multiple Virtual Storage, consisting of MVS/System Product Version 1 and the MVS/370 Data Facility Product operating on a System/370 processor. (IBM)

N

negative acknowledgement (NACK) Used by the recipient of a communication to tell the sender that the data was not accurately received.

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.

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

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

non-maskable interrupt (NMI) An interrupt that cannot be shut off by executing a disable interrupt instruction on the microprocessor. These interrupts are principally reserved for fatal conditions (for example, parity errors, watchdog timer faults).

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 by the host CPU.

online State of being controlled directly by or in direct communication with a computer. Available for functional use.

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

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

P

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

personality Synonymous with the MPK card, which holds library upgrade feature data.

personality module (1) A small piece of hardware, which connects to the library through a DB9 connector. The hardware can contain a small amount of data. StorageTek uses this device to enable features on the library and/or to store "personality" information like the vendor name. (2) A connector key, which connects to the library through a DB9 connector. The personality module stores the library cell capacity information. A module or flash file that causes the operator panel to display a vendor's identification.

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

PRX card The interconnecting card between the MPC/MPCL card and the Z motor/hand logic. Z motor power and tachometer lines connect to this card, along with signal lines to/from the hand.

PRY card The interconnecting card between the MPC/MPCL card and the theta motor/hand logic. Theta motor power and tachometer lines connect to this card, along with signal lines to/from the hand.

Q

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

R

recoverable error Error condition that can be automatically corrected (for example, by initiating a retry operation) and, when corrected, allows continual processing of a job, program, or hardware function.

reinitialize the library To cause the library to

rerun its start-up diagnostic routine and audit. During the start-up diagnostic routine, the library calibrates its motors and vision. The audit loads into the MPC/MPCL card the location and volume serial number of every cartridge in the library. To reinitialize the library, the operator may power it off and power it back on or open and close the main library door.

remote center *See* Hardware Support Services.

request geometry (1) A host software request for the physical configuration of a library storage module. (2) A client software request for the physical configuration of the tape library.

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

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

RISC Reduced Instruction Set Controller technology.

RISC System/6000 An IBM processor that can be used as a server through a network.

robot (1) An electromechanical device that moves cartridge tapes between storage cells and tape drives. (2) An electromechanical device that moves cartridges among the cartridge access ports, the storage cells, and the drives. (3) Electromechanical device for locating and moving cartridges.

S

SCSI-3 The set of SCSI commands used specifically for Fibre Channel. SCSI-3 comes in a Generic Packetized Protocol (SCSI-3 GPP) and Fibre Channel Protocol (SCSI-3 FCP), chosen by SCSI as its primary implementation of SCSI on Fibre Channel. SCSI-3 FCP allows queuing of commands from the initiator at the target, retains the half-duplex nature of the parallel SCSI-2, and permits a single operation, such as a READ command, to operator over a single port pair between an initiator and a target.

SCSI bus (1) The interface connecting peripheral devices to a host operating system. (2) Any parallel, multi-signal, I/O bus that implements some version of the SCSI standard. A wide SCSI bus may connect up to16 initiators and targets. A narrow SCSI bus may connect up to 8 initiators and targets.

SCSI commands The SCSI-3 Fibre Channel Protocol (FCP) commands issued by either the initiator or target in an arbitrated loop topology to perform a specific SCSI task. A direct correspondence exists between the SCSI task and the Fibre Channel exchange. A Fibre Channel exchange can correspond directly to either a single SCSI command or a group of linked SCSI commands.

SCSI device A host adapter or control unit attached to the SCSI bus. *Synonymous with* target.

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

SER1 For pre-3.00 firmware, the port on the MPC/MPCL card used for command line interface—running diagnostic tests, clearing of FSC log—through a laptop at 38,400 baud rate. Unused for post-3.00 firmware.

service required LED When on steadily, the library is inoperative; when blinking, a fan is defective.

servo Device that uses closed-loop feedback to govern physical positioning.

small computer systems interface (SCSI) A type of data or control interface between the tape library/ tape drives and a server or client.

servo power interrupt (SPI) A signal that removes voltage to a motor if overtravel is detected in the motor or a safety condition exists (for example, the main access door to the library storage module is open). When the sensor or switch is made, the drive current to the motor disables and an error posts. The SPI prevents a servo runaway condition for an out-of-range motor; it also prevents motors from starting up while the access door is open.

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

small computer systems interface (SCSI) (1) A local interface operating over a wide range of transfer rates using a common command set for all devices attached to the interface. It connects host computer systems to a variety of peripheral devices. (2) An intelligent input and output bus that provides a standard interface/protocol between operating systems and peripheral devices. (3) A collection of ANSI standards and proposed standards which define I/O buses for connecting storage subsystems or devices to hosts using host bus adapters. *See also* SCSI-2, SCSI-3.

SNMP *See* Simple Network Management Protocol.

standby (PTP) The library attached to a master PTP library and under the control of the master PTP.

stoplock A servo stopped condition, holding the motor in a fixed position by electronically locking onto a tachometer line. Synonyms: Locked-on-a-Line, Detent.

storage cells (1) The slots where cartridge tapes are kept in the library. (2) A location where data cartridges are kept in the library. (3) The locations where cartridges are kept in the library.

StorageTek Framework Library Monitor An optional interface that monitors several SCSI-attached libraries.

StorageTek L-Series Library Admin An optional interface that simulates internet browser operation for the library.

StorageTek Library Monitor Provides sharing and common robotics control for SCSI-attached libraries and PTP operation.

Subnet mask A four-byte notation that resolves routing within a network. (*See* IP address, Ethernet address, and library name.)

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

cartridge.

T

tape drive (1) A device for moving magnetic tape and controlling its movement. (IBM) (2) A device for moving tape and controlling its movement. (T) (3) A device that moves magnetic tape and includes the mechanisms for reading and writing data on the tape. (3) An electromechanical device that moves magnetic tape and includes mechanisms for writing and reading data to and from the tape. *See also* drive.

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

target (1) A SCSI device that performs an input/output operation requested by the initiator. (2) A marker on components in the library storage module used by the robot for calibration during audits.

terminator power (TERMPWR) A SCSI bus signal for device termination networks.

TERMPWR *See* terminator power.

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

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

Transmission Control Protocol/Internet Protocol (1) This is the basic set of communication protocols used on the Internet. (2) A set of communication protocols that supports peer-to-peer connectivity functions for both local and wide area networks. (IBM)

U

Ultra SCSI An enhancement of SCSI that results in doubling the throughput speeds to 20 MB/s for 8-bit SCSI and 40 MB/s for 16-bit SCSI.

Ultra2 SCSI An enhancement of SCSI that results in doubling the throughput speeds to 40 MB/s for 8-bit SCSI and 80 MB/s for 16-bit SCSI. The SCSI specification only recognizes LVD Ultra2 SCSI at this speed with a maximum allowable cable length of 12 m (39 ft).

Ultra3 SCSI A form of SCSI capable of transfers up to 160 MB/s. There is no single ended or high voltage differential Ultra3 SCSI specification. Specifications only define wide, 16-bit, SCSI buses.

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

uninterruptible power supply (1) A power supply that includes a battery to maintain power in the event of a power outage. (2) A buffer between utility power and the load that maintains, uninterrupted or sustained, power during outages.

unrecoverable error Error condition that cannot be automatically corrected and which requires external intervention for possible correction. It causes termination of a job, program, or hardware function.

V

vectored interrupt (VI) An interrupt which directly generates an ID of the cause of the interrupt and places it on the bidirectional bus for the microprocessor to read.

VOLID Volume identification. *See* volume serial number.

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

volume serial number (VOLSER) (1) An alphanumeric label that the host software uses to identify a volume. It attaches to the spine of a cartridge and is both human- and machine-readable. (2) A number in a volume label assigned when a volume is prepared for use in a system. (IBM) (3) A six-character alphanumeric label used to identify a volume.

VOLSER *See* volume serial number.

W

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

watchdog timer A timer which must be refreshed before it expires. If not refreshed, an NMI is generated, indicating that the functional firmware has failed to execute properly.

write-protect (WP) (1) To restrict the writing onto a data set, file, or storage area of a user or program not authorized to do so. (2) To set the switch on a cartridge tape to prevent data from being written on the tape. Reading data is still possible. (3) To set the switch on a cartridge to prevent data from being written on the tape. *See also* file-protect.

Z

Z carriage (1) The assembly that moves the hand vertically up and down the Z-column to the storage cells, the drives, and the cartridge access port in a library storage module or library. (2) The portion of the robot on which the hand rests.

Z column The column which allows the hand mechanism in the tape library to move vertically.

Z motor (1) The mechanism that moves the hand assembly vertically in a library storage module or library. (2) The motor responsible for the vertical movement of the hand assembly in the library.

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M

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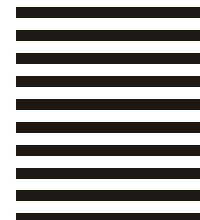
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