HP StorageWorks
MSL6000 series tape library user guide

MSL6000 series tape library user guide

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About this guide

This guide provides information about:

- Becoming familiar with library components.
- Installing the library.
- Configuring the library.
- Operating the front panel.
- Using the remote management interface.
- Performing maintenance procedures.
- Troubleshooting the library.

Related documentation

In addition to this guide, please refer to other documents for this product:

- *HP StorageWorks MSL Series Pass-Through Mechanism Reference Guide*
- *HP StorageWorks Network Storage Router User Guide*

These and other HP documents can be found on an HP web site: http://www.docs.hp.com.

Document conventions and symbols

Document conventions

Convention	Element
Medium blue text: Figure 1	Cross-reference links and e-mail addresses
Medium blue, underlined text (http://www.hp.com)	Web site addresses
Bold font	• Key names • Text typed into a GUI element, such as into a box • GUI elements that are clicked or selected, such as menu and list items, buttons, and check boxes
Italics font	Text emphasis
`Monospace font`	• File and directory names • System output • Code • Text typed at the command-line
`Monospace, italic font`	• Code variables • Command-line variables
`Monospace, bold font`	Emphasis of file and directory names, system output, code, and text typed at the command-line

⚠ **WARNING!**   Indicates that failure to follow directions could result in bodily harm or death.

△ **CAUTION:**   Indicates that failure to follow directions could result in damage to equipment or data.

IMPORTANT: Provides clarifying information or specific instructions.

NOTE: Provides additional information.

TIP: Provides helpful hints and shortcuts.

HP technical support

Telephone numbers for worldwide technical support are listed on the HP web site: http://www.hp.com/support/.

Collect the following information before calling:

- Technical support registration number (if applicable)
- Product serial numbers
- Product model names and numbers
- Applicable error messages
- Operating system type and revision level
- Detailed, specific questions

For continuous quality improvement, calls may be recorded or monitored.

HP strongly recommends that customers sign-up online using the Subscriber's choice web site at http://www.hp.com/go/e-updates.

- Subscribing to this service provides you with e-mail updates on the latest product enhancements, newest versions of drivers, and firmware documentation updates as well as instant access to numerous other product resources.
- After signing-up, you can quickly locate your products by selecting **Business support,** and then **Storage** under Product Category.

HP-authorized reseller

For the name of your nearest HP-authorized reseller:

- In the United States, call 1-800-345-1518.
- Elsewhere, visit http://www.hp.com and click **Contact HP** to find locations and telephone numbers.

Helpful web sites

For product information, see the following web sites:

- http://www.hp.com
- http://www.hp.com/go/storage
- http://www.hp.com/support/
- http://www.docs.hp.com
- http://www.hp.com/go/ebs

1 Introduction

Designed for backup operations with high-end networks and high-performance servers, the HP StorageWorks MSL 6000 Series tape libraries are the next generation performers in high-volume backup and archival service. The libraries also feature high availability, maximum storage density, and easy serviceability.

The library SCSI interface-to-host system supports Low Voltage Differential (LVD). The tape drives and the robotics control functions each use separate SCSI connections and SCSI ID addresses. Library SCSI I/O is provided through two VHDCI-series, 68-pin, Micro-D SCSI connectors located at the rear of the unit on each tape drive. Robotics SCSI I/O is provided through two VHDCI-series, 68-pin, Micro-D SCSI connectors located on the library controller board.

The remainder of this chapter describes the major components of the library, including:

- Models, page 15
- Accessories, page 16
- Tape Drives, page 16
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- Power Supplies, page 22
- Robotics, page 23
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- Factory-Defined Accessory PCI Slots, page 25
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Models

The MSL Series tape library family includes the following models:

- Two-drive models:
  - MSL6030
  - MSL6026
- Four-drive models:
  - MSL6060
  - MSL6052

NOTE: MSL6030/MSL6060 libraries operate with Ultrium LTO drive technology; MSL6026/MSL6052 libraries operate with SDLT drive technology.

> **NOTE:** Two-drive models are 8.75 in (22.23 cm) in height, sometimes referred to as 5U. Four-drive models are 17.50 in (44.45 cm) in height, sometimes referred to as 10U.

Any MSL Series tape library can operate as a standalone unit or can be installed in a rack to form a larger integrated multi unit library configuration. MSL6030/MSL6026 libraries contain up to two tape drives, two removable tape cartridge magazines, and robotics capable of random or sequential tape cartridge operation. MSL6060/MSL6052 libraries contain up to four tape drives, four removable tape cartridge magazines, and robotics capable of random tape cartridge operation.

> **NOTE:** Throughout this manual, MSL6030/MSL6026 libraries will be referred to as two-drive models. MSL6060/MSL6052 libraries will be referred to as four-drive models.

Accessories

Contact your authorized service provider or visit the HP website at http://www.hp.com/go/automation for the most current list of accessories that are available for an MSL Series library.

Tape Drives

MSL Series tape libraries support up to four tape drives (see Figure 1). SCSI I/O is accomplished through two VHDCI-series, 68-pin, Micro-D SCSI connectors located at the rear of the library on each tape drive. The drives are numbered beginning with 0: the first tape drive is Drive 0, the second is Drive 1, etc.
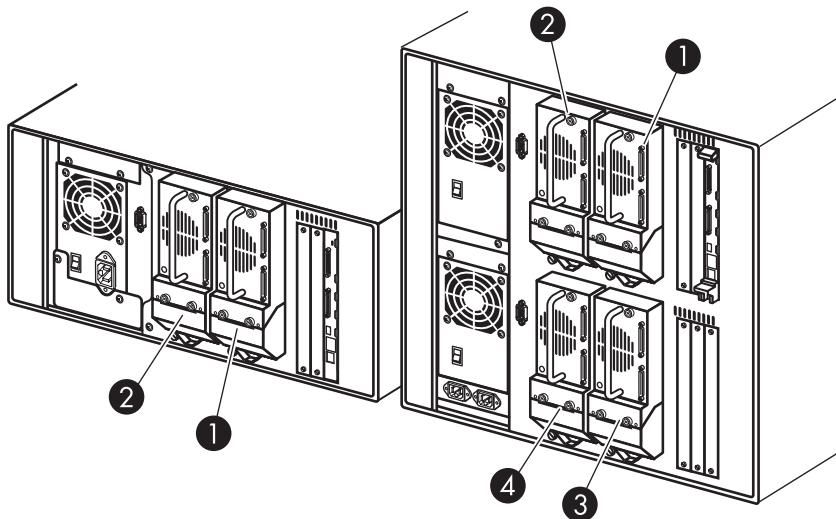
1	Tape Drive 0	**3**	Tape Drive 2
2	Tape Drive 1	**4**	Tape Drive 3

Figure 1 Library tape drive locations

> ⚠ **CAUTION:** It is critical to ensure that the media you use matches the format of your tape drive. Cleaning cartridges and formatted data cartridges are unique for each drive technology. Damage may occur if inappropriate media is used in tape drives.

> 📝 **NOTE:** If using mixed media, ensure your software application supports it.

> 📝 **NOTE:** SDLT 600, Ultrium 1840, Ultrium 960, and Ultrium 460 tape drives do not offer hot-plug capability.

Ultrium Tape Drives

The Ultrium tape drive is a high-performance streaming tape drive that uses Linear Tape-Open (LTO) technology. An Ultrium 460 tape drive is capable of storing up to 200 GB (native) or 400 GB (2:1 compression) of data per cartridge. An Ultrium 960 tape drive is capable of storing up to 400 GB (native) or 800 GB (2:1 compression) of data per cartridge. An Ultrium 1840 tape drive is capable of storing up to 800 GB (native) or 1600 GB (2:1 compression) of data per cartridge. Access the *HP StorageWorks Ultrium Tape Drive User's Guide* from http://www.hp.com/support for more information about its features and capabilities.

Table 2 Ultrium Tape Drive Capacity and Data Transfer Rate

Drive Model	Data Capacity	Sustained Data Transfer Rate
Ultrium 460	200 GB (native)	30 MB/sec (216 GB/hour)
	400 GB (compressed)	60 MB/sec (432 GB/hour)
Ultrium 960	400 GB (native)	80 MB/sec (576 GB/hour)
	800 GB (compressed)	160 MB/sec (1152 GB/hour)
Ultrium 1840	800 GB (native)	120 MB/sec (864 GB/hour)
	1600 GB (compressed)	240 MB/sec (1728 GB/hour)

NOTE: Compressed capacity assumes a 2:1 compression ratio.

Ultrium Tape Cartridges

NOTE: In addition to the information provided in this manual, refer to the documentation provided with your media for more information. Also see "Maintaining Tape Cartridges" on page 92.

CAUTION: HP Ultrium tape drives require special cleaning cartridges and data cartridges formatted specifically for HP Ultrium. To avoid damage to your tape drive, it is critical to use appropriate cleaning cartridges, and properly formatted data cartridges.

Approved media will have the Ultrium format trademark which indicates that the media has passed Ultrium format compliance testing (see Figure 2 for an example of the Ultrium 3 format trademark).

Figure 2 HP Ultrium 960 format trademark

For best results, always use HP branded media. For data and cleaning cartridges for your tape library, see www.hp.com/go/media

CAUTION: Do not bulk erase Ultrium formatted cartridges. This will destroy pre-recorded servo information and make the cartridge unusable.

Make it a practice to visually inspect your tape cartridges when loading or removing them from your tape library. Taking a few minutes to check the condition of your cartridges will lower the risk of repeated failures and help ensure uninterrupted backup.

⚠ **CAUTION:** Always discard damaged tape cartridges. If a defective tape cartridge is loaded into a tape drive, it may in turn damage the drive, potentially requiring drive replacement.

NOTE: For information on labeling tape cartridges, see "Labeling Tape Cartridges" on page 75.

SDLT Tape Drives

NOTE: In addition to the information provided in this manual, refer to the documentation provided with your media for more information. Also see Chapter 7, "Troubleshooting" beginning on page 101.

The SDLT tape drive is a high-capacity, high-performance streaming tape drive that uses Laser Guided Magnetic Recording (LGMR) technology to maximize the amount of data that can be stored on a tape. An SDLT 320 tape drive is capable of storing up to 160 GB (native) or 320 GB (2:1 compression) of data per cartridge. An SDLT 600 tape drive is capable of storing up to 300 GB (native) or 600 GB (2:1 compression) of data per cartridge. Access the *HP StorageWorks SDLT Tape Drive Reference Guide* from http://www.hp.com/support for more information about its features and capabilities.

Table 3 SDLT Tape Drive Capacity and Data Transfer Rate

Drive Model	Data Capacity	Sustained Data Transfer Rate
SDLT 160/320	160 GB (native)	16 MB/sec (115.2 GB/hour)
	320 GB (compressed)	32 MB/sec (230.4 GB/hour)
SDLT 300/600	300 GB (native)	36 MB/sec (259.2 GB/hour)
	600 GB (compressed)	72 MB/sec (518.4 GB/hour)
NOTE: Compressed capacity assumes a 2:1 compression ratio.		

SDLT Tape Cartridges

NOTE: In addition to the information provided in this manual, refer to the documentation provided with your media for more information.

CAUTION: SDLT tape drives require special cleaning cartridges and data cartridges formatted specifically for SDLT. To avoid damage to your tape drive, it is critical to use appropriate cleaning cartridges, and properly formatted data cartridges.

Make it a practice to visually inspect your tape cartridges when loading or removing them from your tape library. Taking a few minutes to check the condition of your cartridges will lower the risk of repeated failures and help ensure uninterrupted backup.

CAUTION: Always discard damaged tape cartridges. If a defective tape cartridge is loaded into a tape drive, it may in turn damage the drive, potentially requiring drive replacement.

NOTE: For information on labeling tape cartridges, see "Labeling Tape Cartridges" on page 75.

Magazines

MSL Series tape libraries contain two or four removable tape cartridge magazines that are accessible through the front doors (see Figure 3).
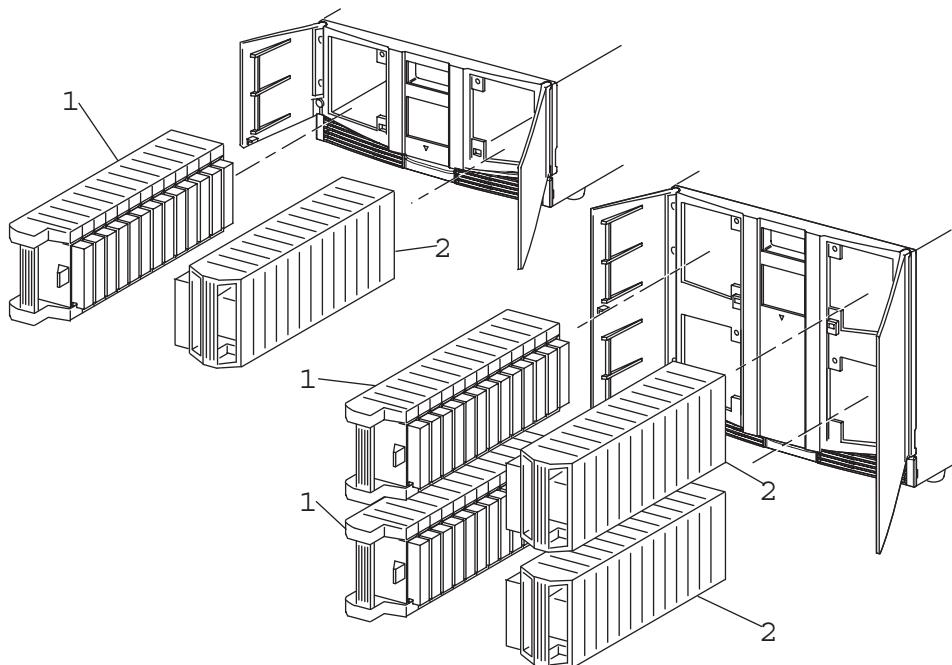
1 Left Magazine(s), with integrated mail slot
2 Right Magazine(s)

Figure 3 Library magazines

Looking from the front of the library, each left tape magazine includes a mail slot, which is accessible when that magazine door is open. When this mail slot pivots forward, you can insert or remove a single tape without having to unlock, remove, and reinventory the magazine. If a full tape cartridge magazine is required, the library can be reconfigured to recognize each mail slot as a standard data slot. The right tape magazine contains fixed cartridge slots (no mail slot feature), so it retains its full capacity at all times.

NOTE: The slots and mail slots are numbered beginning with 0: the first slot is Slot 0, the second is Slot 1, etc. SDLT magazine maximum capacity is 26 slots; LTO magazine maximum capacity is 30 slots.

Power Supplies

MSL Series tape libraries support one or two power supplies depending upon the model (see Figure 4). These auto-ranging power supplies are capable of using any nominal AC voltage between 100 VAC and 240 VAC power, at 50 Hz or 60 Hz.

Power to the library is supplied through AC connectors at the rear panel of each power supply receiver. Library power is normally controlled from the graphical user interface (GUI) touch screen; however, a manual power disconnect switch is located at the rear of each power supply.

⚠ **CAUTION:** The power supply is generally not to be removed by the operator. Hazardous voltage is present in the cavity if the power cord is not removed. If a faulty power supply exists, contact your authorized service provider.

For the four-drive models, two power supplies are supported to provide redundancy for mission critical operations. Both power supplies share the load under normal operating conditions, but if one of the power supplies fails, the remaining power supply assumes the full load (see Figure 4 on page 22). For the two-drive models, only one power supply is supported.
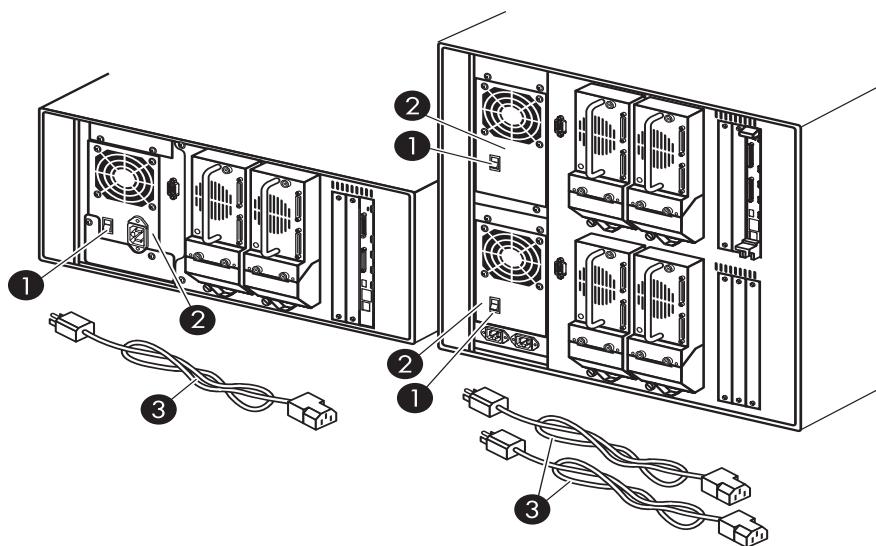
| 1 | Power Switch | 3 | AC Power Cord(s) |
| 2 | Power Supply | | |

Figure 4 Library power supplies

📝 **NOTE:** For the four-drive models, the left AC power receptacle is for the bottom power supply. The right AC power receptacle is for the top power supply.

Robotics

MSL Series tape library robotics consist of a cartridge shuttle, motor hardware, motor drives, and other support electronics (see Figure 5). The four-drive models also contain a vertical axis mechanism that enables the robotics to travel between the upper and lower tape cartridge magazines. These robotics are capable of picking and placing tapes throughout a 180-degree arc that consists of the tape drives, tape cartridge magazines, and an optional Pass-Through Mechanism (PTM).

The cartridge shuttle assembly includes a mounted bar code reader for scanning labeled tape cartridges installed in the magazines and tape drives.

NOTE: Both full bar code reader scan and physical scan are conducted each time the library is initially powered up, or each time a tape magazine is accessed using normal operational modes.

In four-drive models, the robotic-PTM interface is at the lower vertical axis PTM elevator position only.
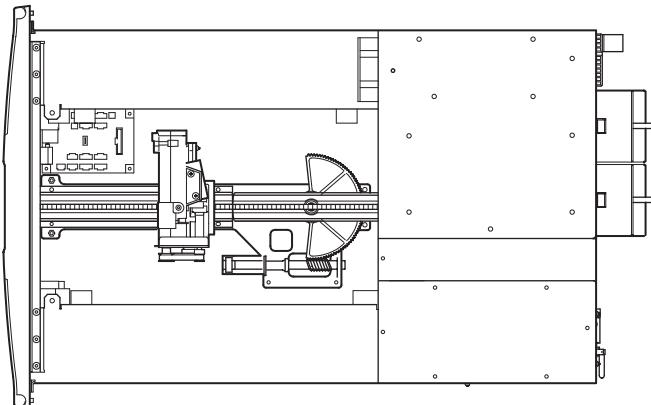
Figure 5 Library robotics (top cover removed)

Library Controller Board

The library controller board contains a single microprocessor and associated logic devices to control all robotics operations and manage overall library functions. The microprocessor enables the SCSI interface between the library and the host system.

The library controller board is installed in a card cage at the rear of the library. In four-drive models, the library controller board can be serviced with a #1 Phillips screwdriver (see Figure 6). If a replacement controller board is needed, contact your authorized service provider. Step-by-step

procedures will be included with the replacement. In two-drive models, the library controller board cannot be removed.
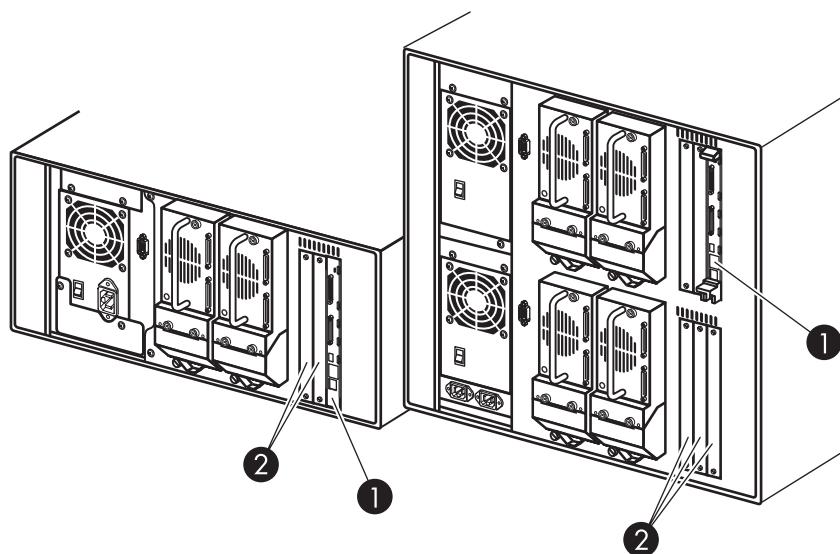
1   Library Controller Board
2   Factory-Defined Accessory PCI Slots (up to 5)

Figure 6 Library controller board

📝 **NOTE:**   The library controller board is not removable in two-drive libraries.

NOTE: For MSL Series libraries, the library controller board must be installed in the right-hand slot of the card cage area (upper card cage area for the four-drive models). The remaining slots on the library do not support the connections that are required for the library controller board to operate correctly.
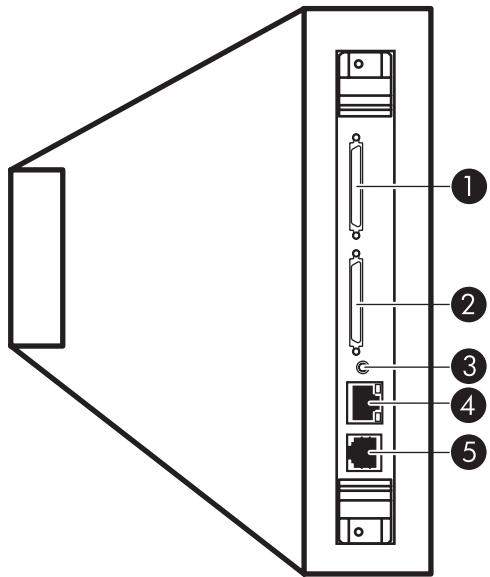
1	SCSI VHDCI connector	4	Ethernet RJ-45 connector
2	SCSI VHDCI connector	5	Serial RS232 connector
3	Mode toggle switch		

Figure 7 Library controller board connections

NOTE: The mode toggle switch is not active.

Factory-Defined Accessory PCI Slots

MSL Series tape libraries contain one or two rear-access card cages, and one or two 32-bit, 33-MHz Compact PCI backplanes (see Figure 8). These backplanes contain the plug-in connectors for a library controller board, and up to five optional HP-defined PCI add-in cards.

CAUTION: Use of non-HP qualified PCI option cards can damage your MSL Series library and will void product warranty. Follow all operating instructions shipped with the optional card upgrade kit.

NOTE: The library controller board must be installed in the right slot of the card cage area (upper card cage area for the four-drive models).
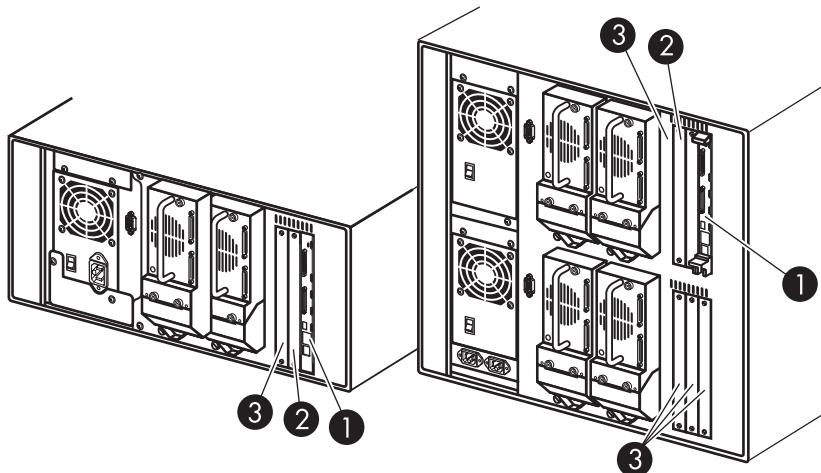
1	Library Controller Board	**3**	Factory-Defined Accessory PCI Slots (up to 5)
2	Optional Embedded Fibre Channel Board		

Figure 8 Library card cages

Embedded Network Storage Router (Optional)

Some library models ship with an optional embedded Network Storage Router in the slot next to the library controller board.

This board provides bidirectional connectivity in a Fibre Channel Switched Fabric supporting Fibre Channel and SCSI devices. See "Optional Fibre Channel Card" on page 167 for additional information on configuring and using the optional Fibre Channel board.

Front Panel Indicators

The library front panel indicators consist of the following:

- Viewing window—Lets you visually check the internal operations of the library.
- GUI touch screen—Manually operated to set up and configure the library.
- Library status LED—Displays the library operational status of the library.

1 Viewing Window
2 GUI Touch Screen
3 Library Status LED
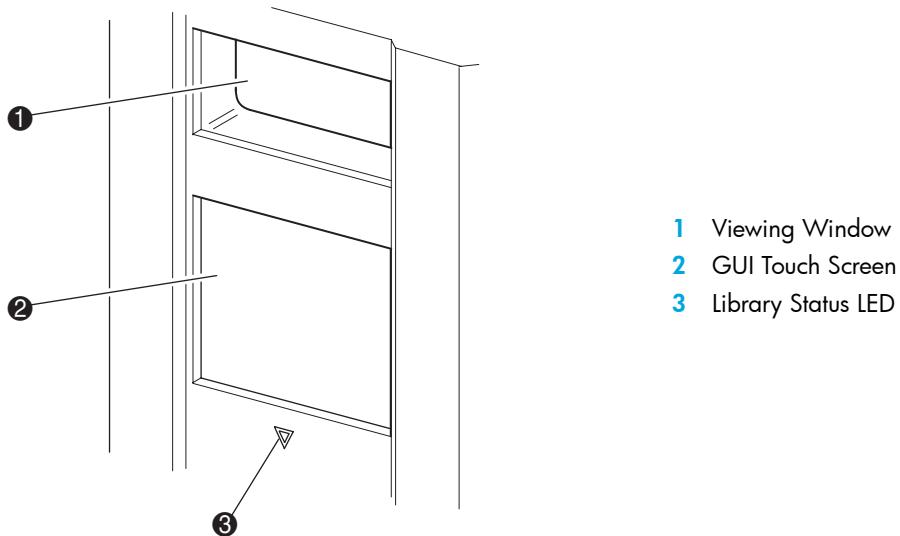
Figure 9 Library front panel

Multi Unit Library Systems

MSL Series tape libraries can be stacked in a scalable combination with additional two-drive and four-drive models to form a multi unit library configuration. Through use of a rear-mounted Pass-Through Mechanism (PTM), all libraries in a multi unit library configuration can operate together as a single virtual library system. Stacked libraries are interconnected through their rear panel Ethernet connections to a supplied LAN hub that mounts to the rack enclosure. The LAN hub also provides a wide area network (WAN) connector when libraries are combined in their maximum stacked height.

A maximum of four four-drive models or eight two-drive models can be connected together in this manner. Any combination of libraries, not exceeding 40 Units (40U) in total stacked height, can also be used. A multi unit library configuration appears as a single library to the host computer system and application software. For multi unit applications, the top library becomes the master unit and all other libraries are slave units.

⚠ **WARNING!**   The PTM continues to function each time a slave library is physically removed from the rack enclosure configuration during normal library operation. Refer to the *HP StorageWorks MSL Series Pass-Through Mechanism Reference Guide* for detailed installation, configuration, and operation information.

The library robotics can pick and place tape cartridges into a movable elevator that encompasses the full length of the PTM. In this manner, individual tapes can be passed up or down between the libraries contained in the multi unit library configuration under the master library control. Robotics

access to the PTM is located at the rear of the library beneath the PTM cover (see Figure 10 on page 28).
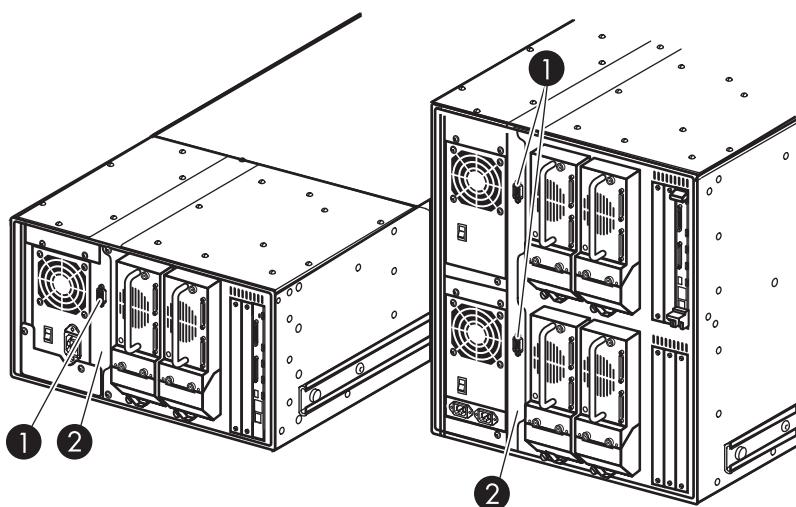
1 PTM Interface Connector

2 PTM Mounting Cover (removal required for PTM installation)

Figure 10 Library PTM mounting location

2 Installation

This chapter explains how to install an HP StorageWorks MSL Series tape library. Sections in this chapter include:

NOTE: Be sure to keep and store all shipping materials from your MSL Series tape library for potential future use.

Converting a Tabletop Model to a Rackmount Model

To make a tabletop library ready for rack enclosure installation:

1. Remove the rubber feet.
2. Remove the cover.
3. Attach the inner rails to the library using the supplied Allen wrench and screws. Tighten the screws until snug.
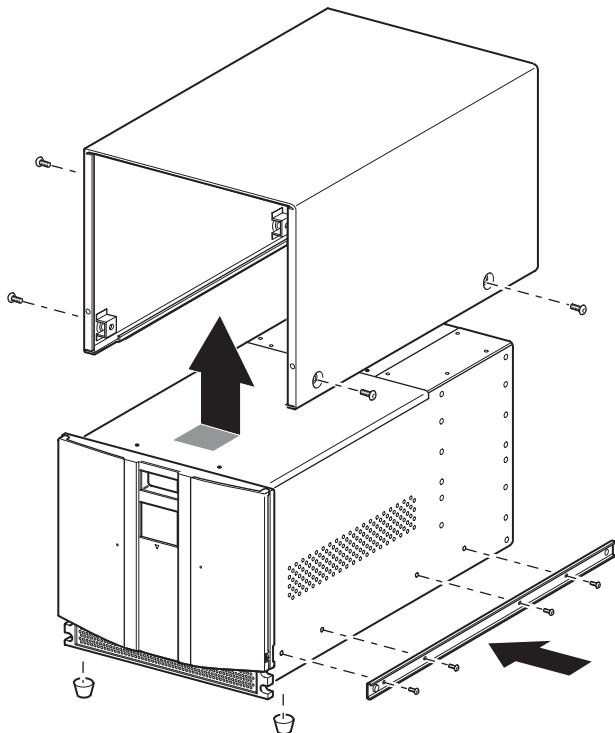
Figure 11 Converting a tabletop model (four-drive model shown)

Setting Up the Rackmount Model

⚠️ **WARNING!** To reduce the risk of personal injury or damage to the equipment, be sure that:
- The leveling jacks are extended to the floor.
- The full weight of the rack rests on the leveling jacks.
- In single rack installations, the stabilizing feet are attached to the rack.
- In multiple rack installations, the racks are coupled.
- Only one rack component is extended at any time. A rack may become unstable if more than one rack component is extended for any reason.

Setting up the rackmount model requires a template, rack enclosure slide rails, and two people or a mechanical lift to physically install the library in a rack enclosure.

To set up the rackmount model:

1. Use the template that shipped with the library to mark the location of the mounting hardware on the mounting rails of the rack enclosure (see Figure 12). The black dots along the sides of the template indicate the top of a U.
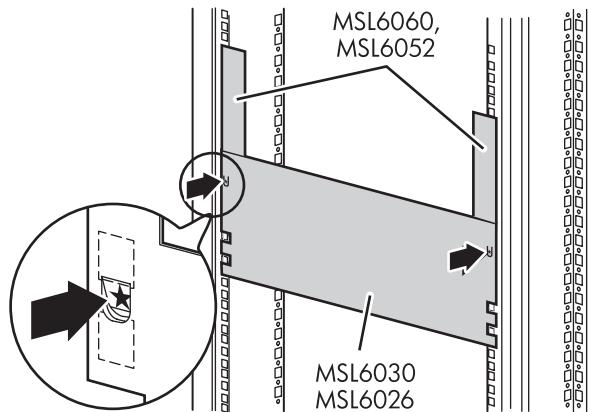
Figure 12 Library template (10000 rack enclosure shown)

In the figure: MSL6060, MSL6052; MSL6030 MSL6026

> **NOTE:** For HP rack system/e and AlphaServer H9A rack enclosures, refer to the appropriate rack rail adapter kit.

2. Remove the template and then attach the rails using the supplied fasteners (see Figure 12). The front rail brackets are threaded to directly accept screws. The rear brackets are not threaded and require cage/clip nuts in the rack enclosure rear vertical rails.

> **NOTE:** Refer to the *Compaq Rack Products Reference Guide* for detailed cage nut installation instructions on 10000 racks.

> **NOTE:** Fully tighten the front rail screws. Leave the rear rail screws "finger tight" to prevent binding when mounting the library.

   a. Fully extend the slide rails ❶ on both sides of the rack enclosure until they lock.
   b. Slide the inner guide rail ❷ as far as possible to the front of the rail assembly.
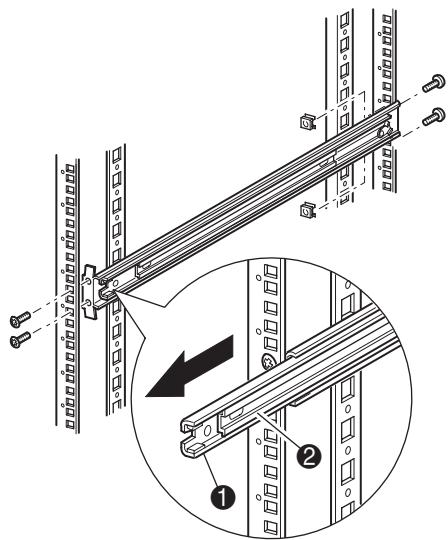
Figure 13 Installing the rails

3. Install the two slide-on clip nuts (previously marked using the template, two holes above the top bracket screw holes) on each of the front rack enclosure vertical rails (Figure 13).

⚠ **WARNING!** Two people should perform the next step. Make certain, when the library is fully extended, that a force of 20% of the rack enclosure's weight, but not more than 57 pounds (26 kg), applied in any direction other than upwards, does not cause the rack enclosure to overbalance.

⚠ **CAUTION:** The library is heavier toward the tape drive end (rear).

4. Using two people, lift the library and visually align the inner and intermediate slide rails.
5. Carefully insert the library's inner slide rails ❸ into the extended intermediate slide rails ❷ (see Figure 14).
6. Slide the library into the rack enclosure until the rail locks are engaged.

⚠ **WARNING!** A rack enclosure might become unstable if more than one library is extended for any reason. Extend only one library at a time.

7. Push in on the rail locks to release the library and slide the library completely into the rack enclosure.
8. Fully tighten the rear rail screws.
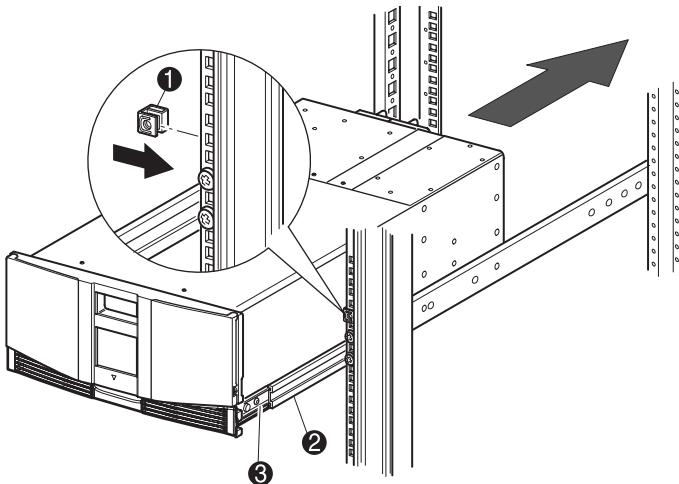
Figure 14 Installing the library (two-drive model shown)

9. Remove the tape to open the doors for installation.

10. Remove and discard the pull-tabs used to block the latch mechanism.

> **NOTE:** Do not close the doors. You must have access to the retaining screws to complete the installation. (If necessary, see Chapter 4, "Operation" on page 49 for information on how to manually open the library doors.)

11. With the doors open, secure the front panel to the rack enclosure using the retaining screws (see Figure 15).

12. Close the doors. You can now cable the library.
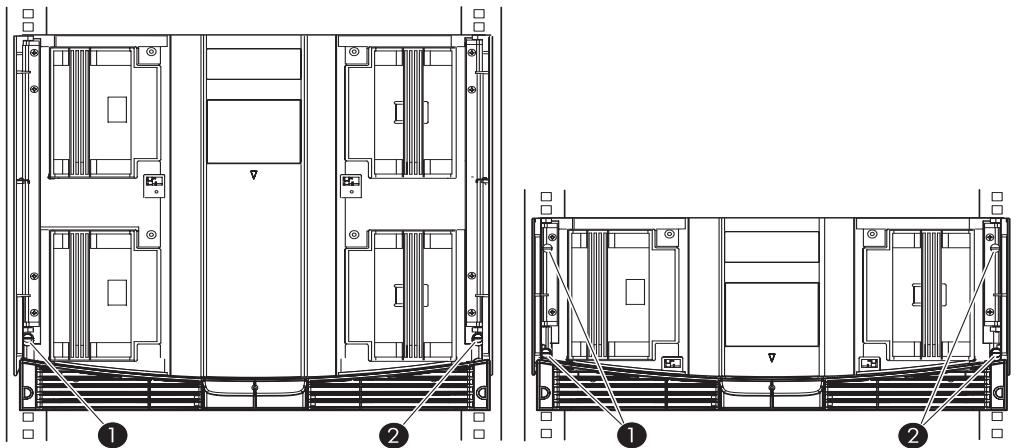
1   Left Retaining Screw
2   Right Retaining Screw

Figure 15 Securing the library

NOTE: Two-drive libraries require four retaining screws; four-drive libraries require two retaining screws.

Converting a Rackmount Model to a Tabletop Model

Converting to a tabletop model requires a tabletop conversion kit and two people or a mechanical lift to physically install the library into the tabletop base.

To make a two-drive library ready for tabletop use:

1. Position the tabletop base at the desired installation location.
2. Lift the library and place it on the base.
3. Place the top cover over the library and slide the locking tabs into the slots in the base.
4. Slide the cover forward into place.
5. Tighten the two thumb screws at the back of the library to lock the two parts together.
6. Tighten the four rack mount fasteners at the front of the library to secure it in the case.
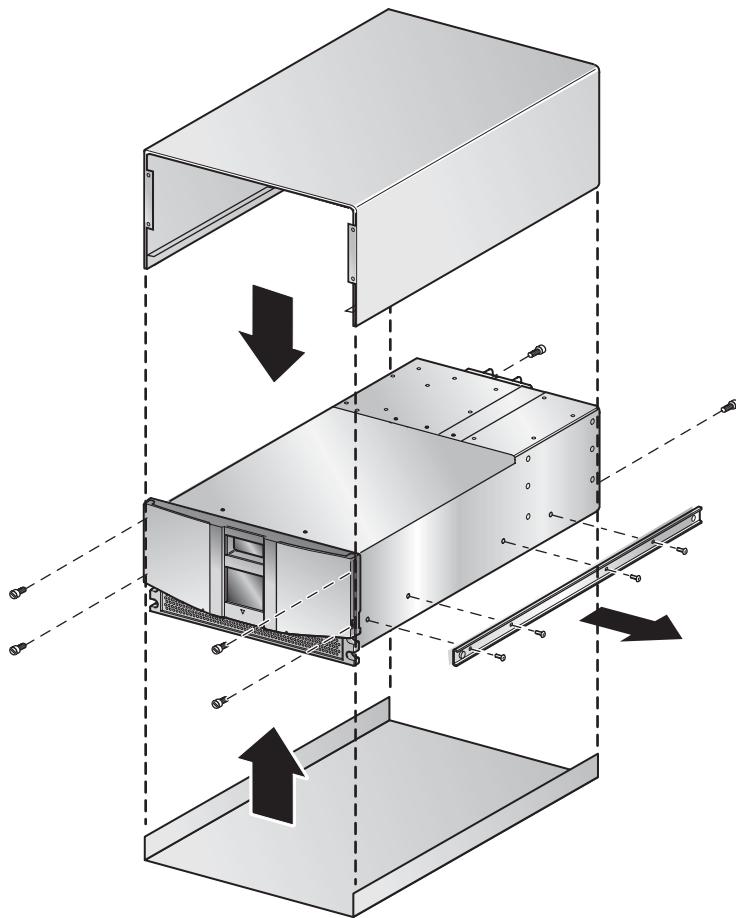
Figure 16 Converting a rackmount model (two-drive model shown)

Applying Power to the Library

To apply power to the library (see Figure 17):

1. Connect each supplied power cord ❶ to each power supply receptacle.

📝 **NOTE:** For four-drive models only, the left-hand AC power receptacle is for the bottom power supply. The right-hand AC receptacle is for the top power supply.

2. Toggle each power switch ❷ on.

NOTE: You can remove the appliqué from the GUI touch screen by catching one corner and carefully lifting it.

3. Wait for power to come on and graphical user interface (GUI) touch screen ❸ to activate the display.
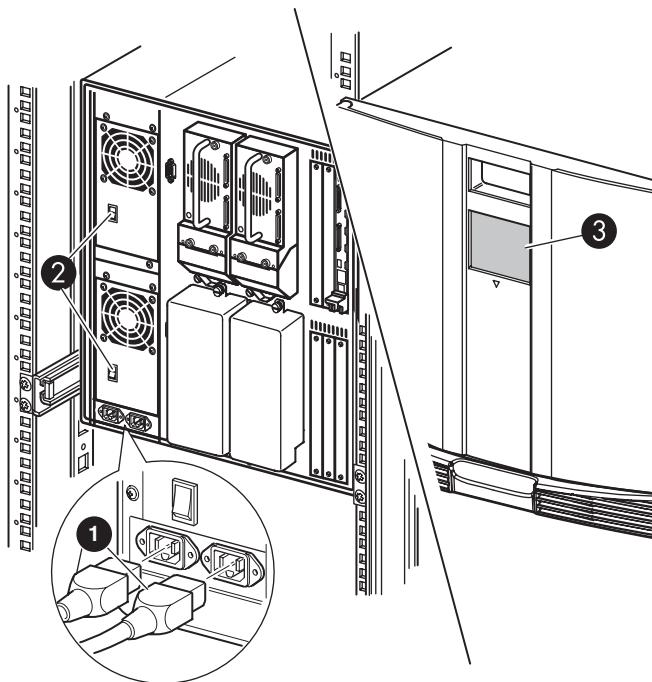
Figure 17 Applying power to the library (four-drive rackmounted library shown)

Cabling for SCSI Configurations

This section describes supported SCSI cable configurations for the library.

The following SCSI configurations are detailed in this section:

- Two tape drives, dual host system (MSL6030/MSL6026)
- Four tape drives, dual host system (MSL6060/MSL6052)

NOTE: MSL Series libraries support SCSI cable configuration for one to four hosts and one to four tape drives. Contact your authorized reseller for a list of supported configurations.

NOTE: Host cables are not supplied with the MSL Series library.

See Appendix D, "Configuration Examples" beginning on page 165 for a complete listing of potential configurations.

Supported SCSI Cables

> **NOTE:** For optimum performance, a maximum of one tape drive per SCSI bus is recommended for Ultrium 460, Ultrium 960, and Ultrium 1840 tape drives.

Each of the tape drives and the library controller constitute an independent SCSI target. When any two or more devices are connected to the same SCSI bus, each separate SCSI device must be assigned a unique SCSI ID. For information on assigning SCSI IDs, see Chapter 3, "Library Configuration" on page 39.

> **NOTE:** SCSI IDs are set at the factory. If you want to change any of the firmware defaults, you can do so using the GUI touch screen.

To connect a library to a host system, the host system must have at least one Wide LVD controller and the appropriate driver software.

Two Tape Drives, Dual Host System

Figure 18 shows a typical SCSI cable configuration for a library with two tape drives installed using a dual host system.
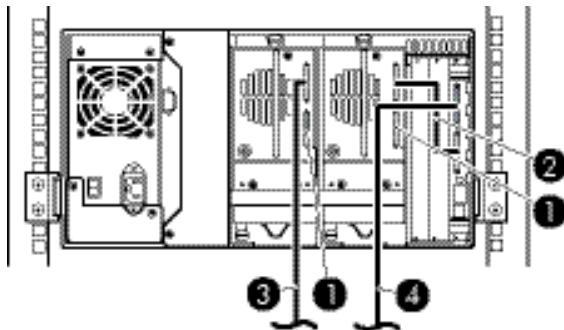
1	SCSI Terminator	3	Host cable (Bus 1, to host system)
2	0.5 m cable (to library controller card)	4	Host cable (Bus 0, to host system)

Figure 18 MSL6030/MSL6026 library SCSI cable configuration (two tape drives, dual host system)

Four Tape Drives, Dual Host System

Figure 19 shows a typical SCSI cable configuration for a library with four tape drives installed using a dual host system.
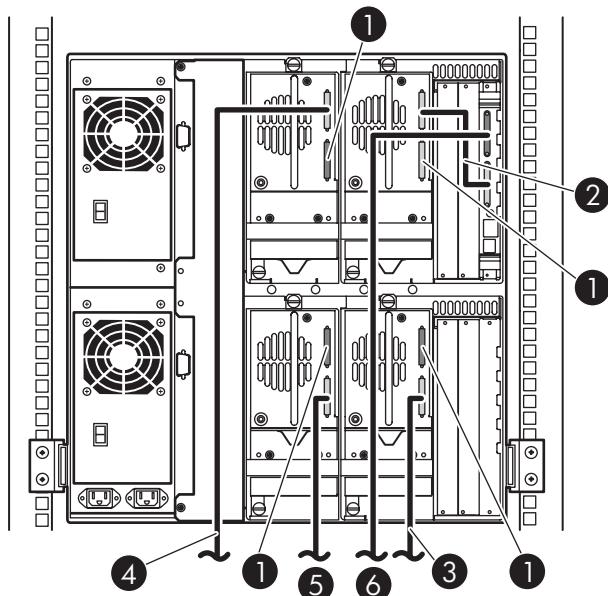
1	SCSI Terminator	**4**	Host cable (Bus 3, to host system)
2	0.5 m cable (to library controller card)	**5**	Host cable (Bus 2, to host system)
3	Host cable (Bus 1, to host system)	**6**	Host cable (Bus 0, to host system)

Figure 19 MSL6060/MSL6052 library SCSI cable configuration (four tape drives, dual host system)

NOTE: Daisy-chaining Ultrium 1840, 960 and 460 drives is not recommended due to degraded performance.

CAUTION: Use the 19.8-inch (0.5m) cable ❷ to connect the tape drive and the library controller board.

3 Library Configuration

This chapter explains how to configure an HP StorageWorks MSL Series tape library for normal operation. Sections in this chapter include:

- Changing Default Configuration Settings, page 39
- Setting a SCSI ID, page 39
- Setting Up a Reserved Slot, page 41
- Configuring the Network Settings, page 47

Changing Default Configuration Settings

For most applications, you do not have to change the default settings; however, if you do need to change a configuration setting, use the procedures provided in the following sections. If you are uncertain whether you need to change a setting, contact your authorized service provider.

Configuration settings that might need to be changed include:

- Setting a SCSI ID, page 39
- Setting Up a Reserved Slot, page 41t
- Configuring the Network Settings, page 47

Change configuration settings using the graphical user interface (GUI) touch screen. For a complete description of how the GUI touch screen works, see Chapter 4, "Operation" on page 49.

Setting a SCSI ID

Each tape drive installed in the library requires a unique SCSI ID. The information provided in this section shows you how to set a SCSI ID.

To set a SCSI ID:

1. Turn the library on and wait until the Power-On Self Test (POST) concludes and the **Status** screen is displayed.
2. Select the **Menu** option.
3. Select **SCSI** in the **Edit Options** area to display the following screen.

Figure 20 SCSI option selection screen (two-drive model shown)

📝 **NOTE:** You can move to the next sequential SCSI options screen by touching the ▼.

For example, to set the Drive 0 Bus ID to 3:

a. Select the box next to the text "Drive 0 Bus ID:." The resulting screen (see Figure 21) displays the current Drive 0 Bus ID along with the new value that you request.
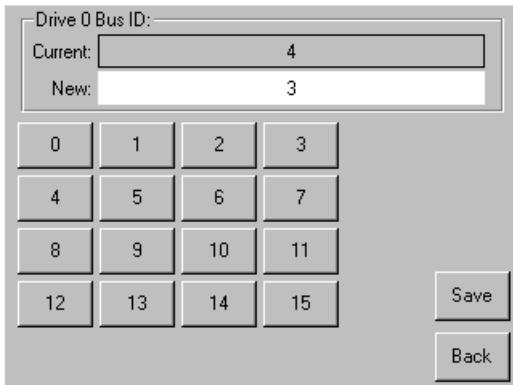
Figure 21 Drive 0 bus ID screen

b. Touch the block that contains the number 3. This places your request into the **New** data field.

c. Touch the **Save** option to confirm your request. A confirmation screen is displayed (see Figure 22).

Figure 22 SCSI ID confirmation screen

    d. Touch **OK** to confirm. A new SCSI ID now appears in the Drive 0 Bus ID data field (see Figure 23).
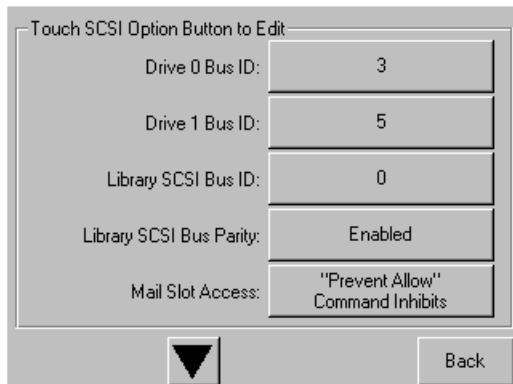
Figure 23 Drive 0 bus ID data field screen (two-drive model shown)

4. Repeat this procedure to set any remaining SCSI IDs.

IMPORTANT: Do not set duplicate IDs, all SCSI IDs must be unique.

5. Touch the **Back** button repeatedly to return to the **Main** menu screen.

Setting Up a Reserved Slot

Use this option to designate one or more tape cartridge data storage slots as a cleaning slot, or to reduce the number of storage elements visible to the application software (for licensing reasons).

NOTE: Reserved slots may be incompatible with some application software.

Reserved Slot Numbering

Standard tape cartridge slots are numbered from the front of the magazine to the rear (see Figure 24 through Figure 27). If you reserve one slot, it becomes Cleaning Slot #0 in the last slot of the last magazine. Additional reserved slots continue in this front-to-rear pattern.

1	Cleaning Slot #2	3	Cleaning Slot #0
2	Cleaning Slot #1	4	Mail Slot (Left Magazine Only, If Configured)
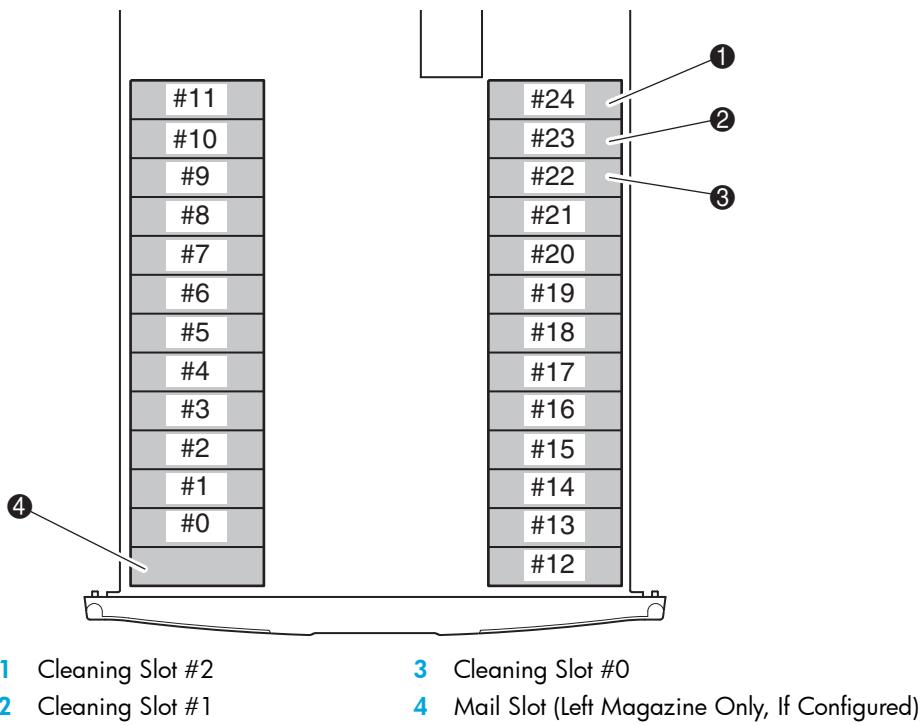
Figure 24 Reserved slot locations, SDLT
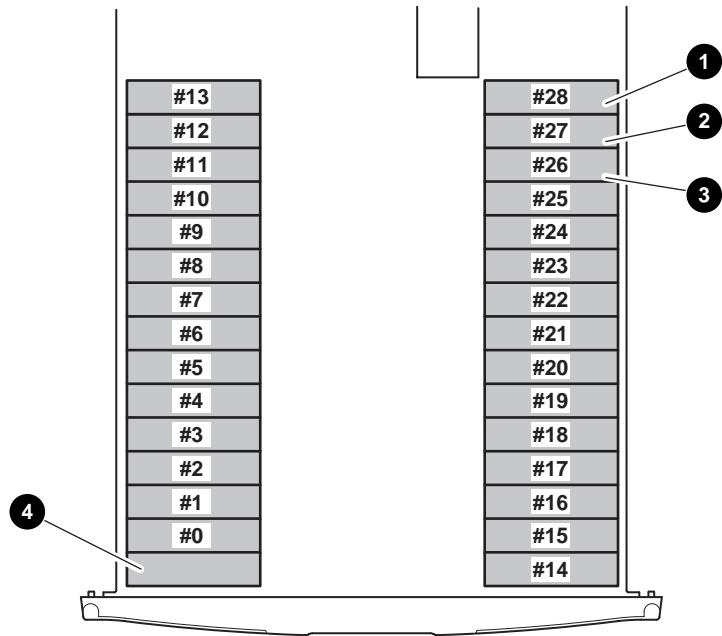
| 1 | Cleaning Slot #2 | 3 | Cleaning Slot #0 |
| 2 | Cleaning Slot #1 | 4 | Mail Slot (Left Magazine Only, If Configured) |

Figure 25 Reserved slot locations, Ultrium (MSL6030)
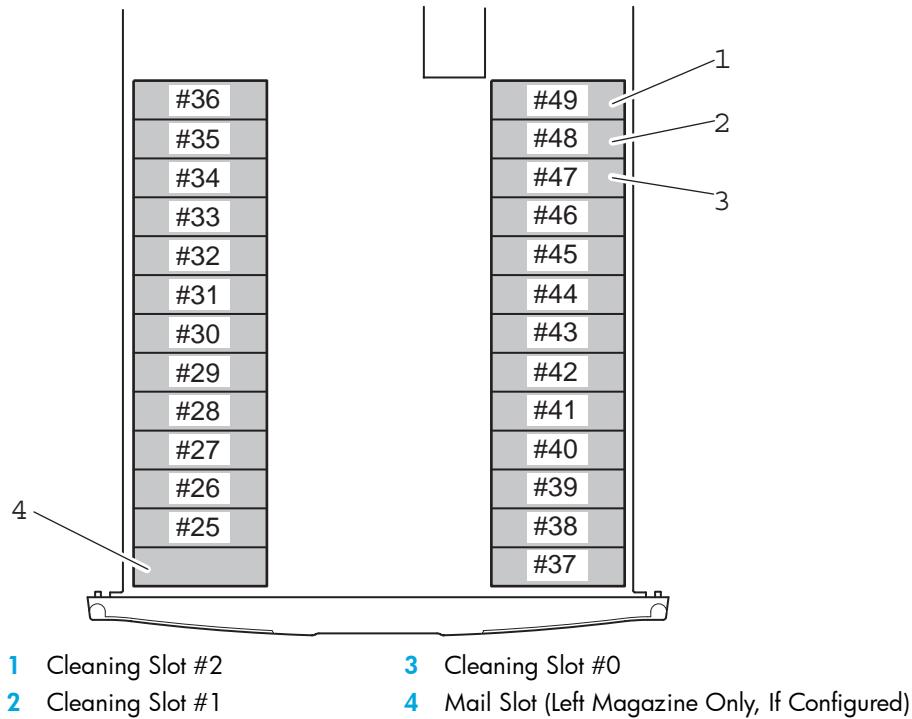
Figure 26 Reserved slot locations, lower module, SDLT
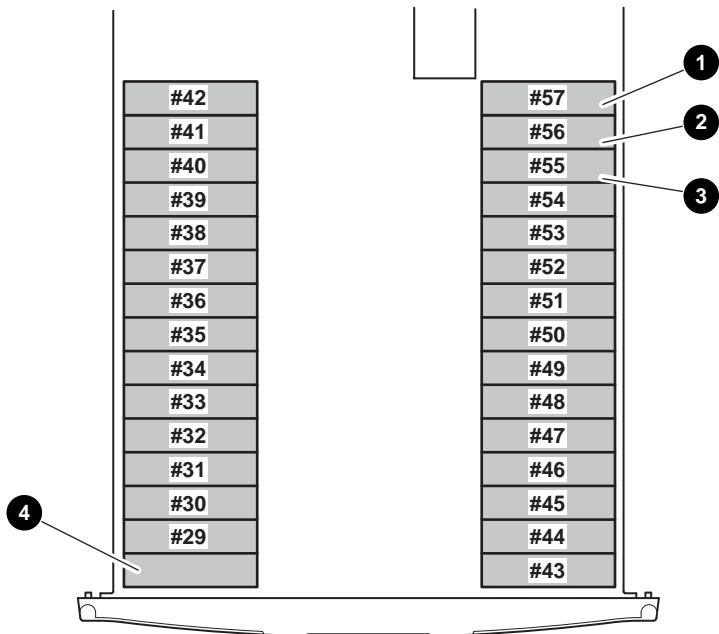
1 Cleaning Slot #2	**3** Cleaning Slot #0
2 Cleaning Slot #1	**4** Mail Slot (Left Magazine Only, If Configured)

1	Cleaning Slot #2	**3**	Cleaning Slot #0
2	Cleaning Slot #1	**4**	Mail Slot (Left Magazine Only, If Configured)

Figure 27 Reserved slot locations, lower module, Ultrium (MSL6060)

To reserve a slot:

1. On the **Menu** screen, touch the **Library** option in the **Edit Options** area.
2. On the **Library** options screen, press the ▼ to scroll to the screen that contains the **Total Reserved Slots** option (see Figure 28).
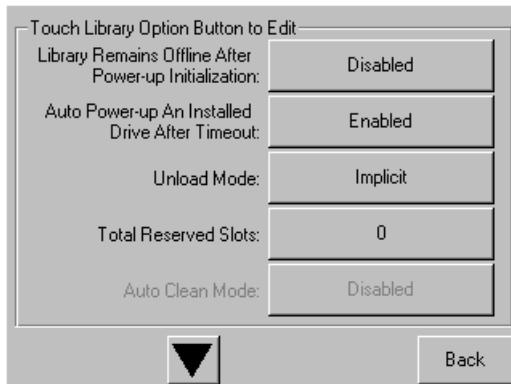
Figure 28 Total reserved slots screen

3. Press the associated box next to the **Total Reserved Slots** option (see Figure 29).

Figure 29 Reserved slots numeric keypad screen

4. Enter the number of slots to reserve and then press **Save** to confirm your change. On the resulting confirmation screen (see Figure 30), press **OK** to save.

Figure 30 Total reserved slots confirmation screen

5. Press the **Back** button repeatedly to return to the **Main** menu screen.

📝 **NOTE:** Your choice takes effect the next time you boot the library.

📝 **NOTE:** Changes to this option may require reconfiguring the software application in order to accommodate the change in storage slots.

Configuring the Network Settings

The library automatically obtains an IP address from a DHCP server when the library is powered up. The library also supports user-specified fixed addresses through the front panel. To set a fixed address:

1. On the **Menu** screen, touch **Network** in the **Edit Options** area.
2. The IP Address Determination screen appears (see Figure 31).
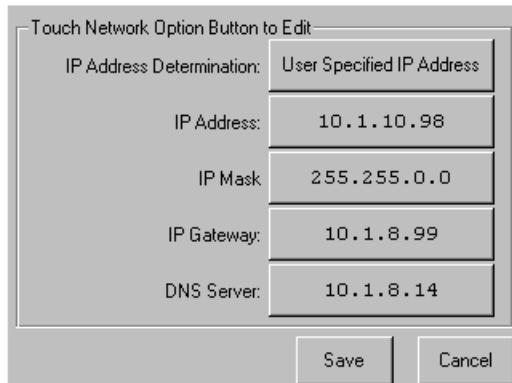
Figure 31 IP address determination screen

3. Touch the **IP Address Determination** option (see Figure 31) and then the **User Specified IP Address** option (see Figure 32).
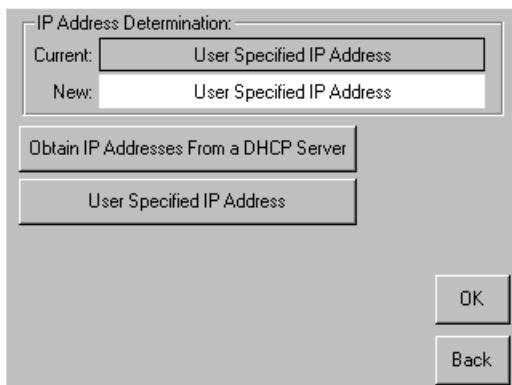
Figure 32 User-specified IP address screen

4. Touch **OK** to confirm your selection.
5. Touch each **IP Address** option and then use the keypad to enter each IP address (see Figure 33).
6. Save and confirm your selections.

Touch Network Option Button to Edit

IP Address Determination:	User Specified IP Address
IP Address:	10.1.10.98
IP Mask	255.255.0.0
IP Gateway:	10.1.8.99
DNS Server:	10.1.8.14

Save   Cancel
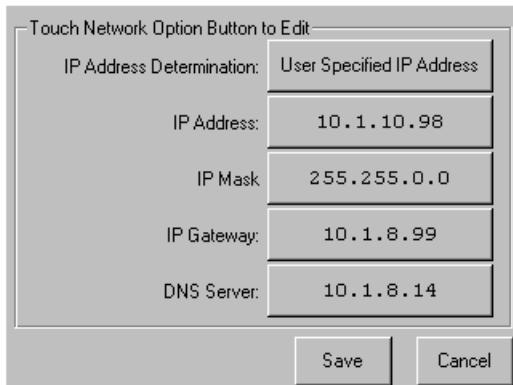
Figure 33 Fixed IP address screen

7. Press the **Back** button repeatedly to return to the **Main** menu screen.

📝 **NOTE:**   You must reboot the library for settings to take effect.

---

4 Operation

This chapter describes how to operate an HP StorageWorks MSL Series tape library. Sections in this chapter include the following:

- Front Panel, page 49
- Library Display Screens and Options, page 53
- Menu Selections, page 60
- Inserting and Removing Tape Cartridges, page 72

Front Panel

The front panel of the library includes the following (see Figure 34):

- Magazine doors (left- and right-hand)
- Graphical user interface (GUI) touch screen
- Library status LED
- Viewing window
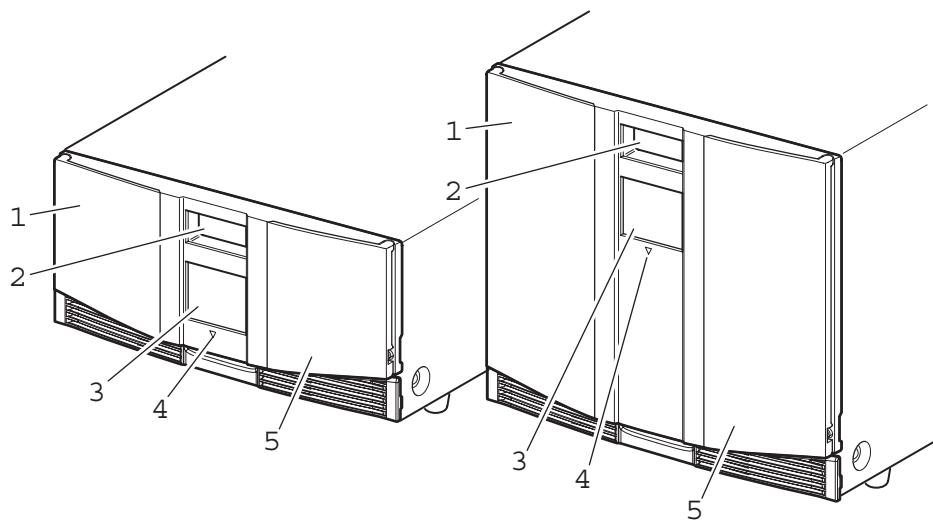
1	Left-hand Magazine Door	4	Library Status LED
2	Viewing Window	5	Right-hand Magazine Door
3	GUI Touch Screen		

Figure 34 Library front panel

Magazine Doors

The magazine doors have both an electrical release (via the GUI touch screen) and a manual release. It is always recommended that you open the magazine doors using the GUI touch screen. However, if the GUI touch screen fails, or if the magazines need to be accessed when power is off,

you can manually open the magazine doors by pushing a small metal pin or paper clip into the mechanical releases (see Figure 35).

⚠ **CAUTION:** The magazine doors must **only** be opened manually in an emergency. Failure to follow normal procedures can cause data loss and equipment damage.

📝 **NOTE:** The library may not perform a complete inventory each time a magazine is manually removed and then replaced using the emergency release.
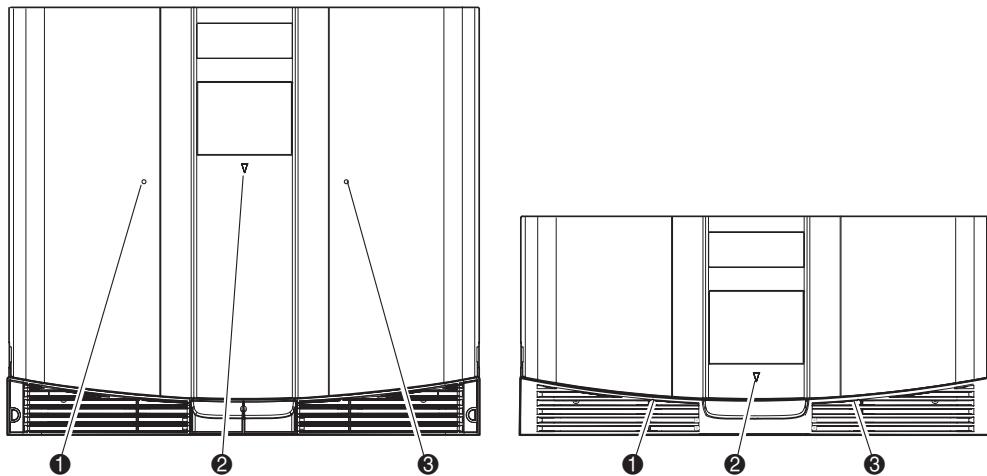
1	Left-hand Magazine Door Release	3	Right-hand Magazine Door Release
2	Library Status LED		

Figure 35 Magazine door mechanical releases (emergency access)

Indicators

The library front panel indicators consist of a GUI touch screen and a library status LED (see Figure 36 and Table 4).

1 GUI Touch Screen
2 Library Status LED
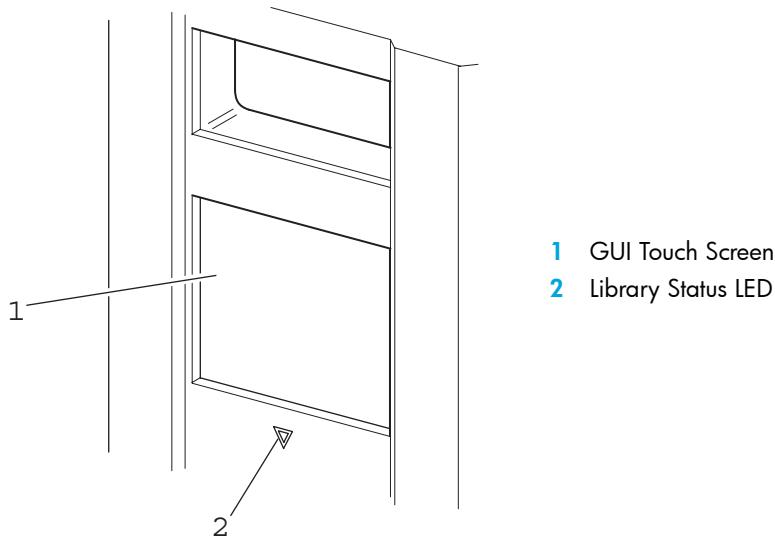
Figure 36 Library indicators

Table 4 Library Status LED

Indicator	Description
Solid green	The library is operating correctly under normal conditions.
Flashing green	The library is operating correctly; however, a change is being made on the GUI touch screen that interrupts the current library operation (off-line).
Solid amber	The library is in a fault state as detailed by the error message on the GUI touch screen.

Front Panel and Media Security Locks

The following security features are available to help you avoid accidental interruption of library operation.

GUI Touch Screen

The GUI touch screen offers three levels of security (see Figure 37):

- User Level 1—allows access to the mail slot(s).
- User Level 2—allows magazine access, mail slot access, SCSI options, diagnostics, and lets you move media.

- Service—allows access to the administrative menu that lets you view/edit library and SCSI options.

NOTE: The library ships with a default service password of 5566.
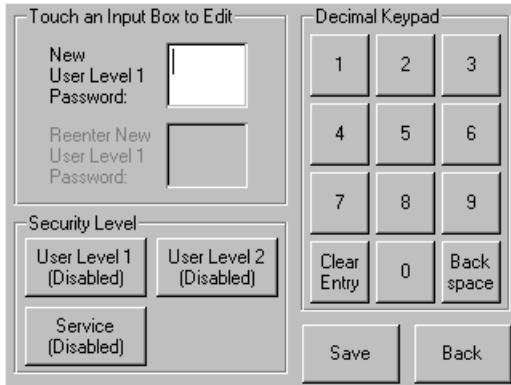
Figure 37 Password levels

Each password is represented by four decimal digits that are stored in NVRAM in a range of 0001 to 9999.

NOTE: 0000 is used to disable password verification for each level.

Enabling a password at a lower level re-enables disabled higher levels to that value. As a result, prior to accessing any higher level operation, you are prompted first to enter the new higher level password.

You can also use a higher level password to gain access to a lower level operation. For example, use the Service password to access the Move Media operation. Using the Service password to access the Menu option also gives full access (without validating) to the Service operations.

NOTE: To restore passwords if forgotten, use Set User Defaults on the Maintenance screen of the GUI. Note that any configuration that was previously set will be lost. If necessary, record all configuration settings before resetting the password.

CAUTION: Do not use **Set Factory Defaults** or library damage may occur.

Host System

Media can also be reserved by software running on the host. The library provides no GUI touch screen override for this command. Usually, exiting the host software restores media access. In the event of host failure, you can restore media access by cycling the library power.

Library Display Screens and Options

The library GUI touch screen displays graphics and text characters in the form of easy-to-understand messages. Graphics and text messages, along with their functions, are described in this section.

Initialization Screen

When power is first applied to the library, a series of Power-On Self Test (POST) diagnostics are performed. After the POST completes, the following initialization screen appears during the library inventory and scalability configuration.

Figure 38 Initialization screen

Library Status Screen

After the POST executes successfully and the library initialization completes (approximately 45 seconds), the following library **Status** screen appears (see Figure 39):

1 Technical Support Information (HP logo)
2 LCD Contrast Controls (reset and power-up)
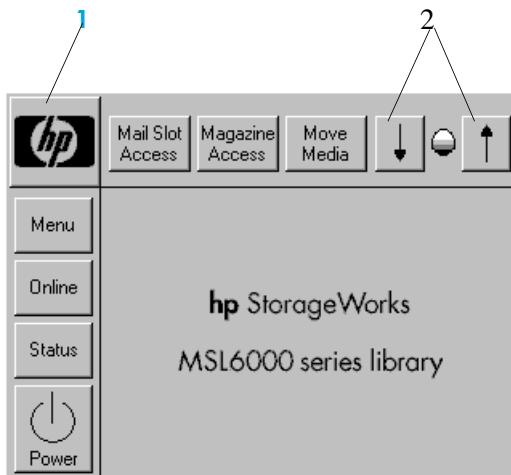
Figure 39 Library status screen (two-drive model shown)

The library **Status** screen lets you select the following options:

- Mail Slot Access
- Magazine Access
- Move Media
- LCD Contrast Controls
- Menu
- Online/Offline
- Status
- Power

Technical Support Information

Selecting this option via the HP logo displays HP-specific technical support assistance information, including the HP StorageWorks and the HP technical support websites (see Figure 40).

Figure 40 Technical support information screen

Mail Slot Access (Left-hand Magazines Only)

Select this option to display the **Mail Slot Access** screen (Figure 41). This option provides access to a mail slot while the library remains powered up. Note that a mail slot is reserved for the first tape cartridge slot in a left-hand magazine, and can be password protected or fully disabled. If the mail slot is disabled, this menu button is absent. On four-drive models, solenoids restrict access to the selected mail slots.
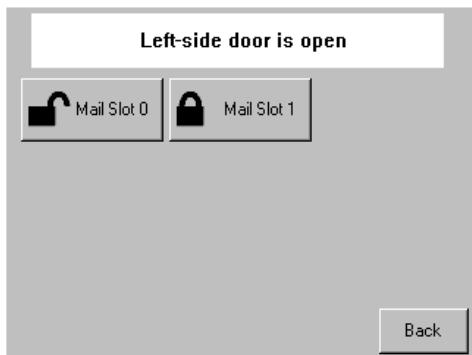
Figure 41 Mail slot access screen (four-drive model shown)

Magazine Access

Select this option to display the **Magazine Access** screen (Figure 42). For two-drive models, this option lets you gain access to the left or right-hand magazine doors separately, or both magazine doors for tape cartridge placement or removal. For four-drive models, this option provides access to the upper-left, lower-left, or right-hand magazines separately, or both magazine doors for tape cartridge placement or removal.

Figure 42 Magazine access screen (two-drive model shown)

Move Media

Select this option to display the **Move Media** screen (see Figure 43). The **Move Media** option lets you remove a cartridge from a tape drive, a data slot in any magazine, or a mail slot in a left-hand magazine. This option also lets you load and unload tape cartridges from the installed tape drives.

See the section on "Replacing a Cleaning Cartridge in a Reserved Slot" on page 96 for detailed removal information.

CAUTION: To reduce the risk of drive damage, use SDLT and Ultrium cleaning cartridges only in their respective drive types.

⚠ **CAUTION:** Remove media from all drives and slots prior to library transport.
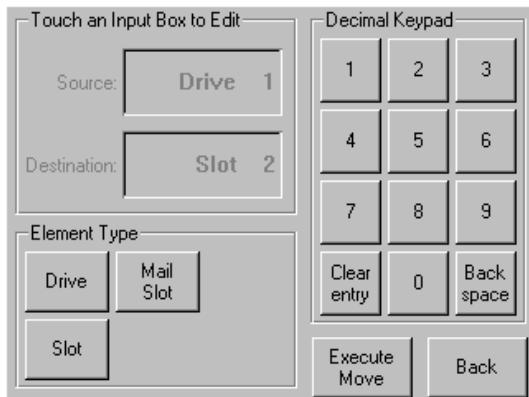
Figure 43 Move media screen (two-drive model shown)

GUI Contrast Controls

Select these options to increase or decrease the contrast of the GUI display (see Figure 39). Incremental steps are set by adjusting the GUI contrast controls from the library **Status** screen. Incremental steps can range from 0 to 31 depending on your preference. These settings are volatile and are restored to default values upon reboot or power cycling.

Power

Select this option to initiate a library power-down operation. After a successful power-down, a confirmation message appears (see Figure 44).

📝 **NOTE:** After you power-down the library, you must power it back up through the GUI display.

📝 **NOTE:** The library moves the shuttle assembly to the parked position before powering down. This position is a prerequisite for any library transport.

Figure 44 Power-down confirmation message screen

Status

Select this option to display the information **Status** screen (Figure 45). From this screen, touch a magazine icon to display detailed information about the cartridges in that magazine. Touch a drive icon to view drive ID information, cleaning information, tape cartridge information, and drive status.
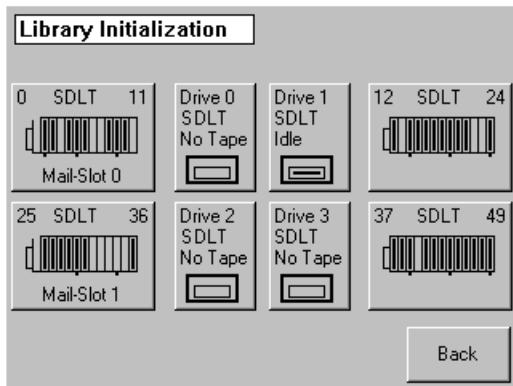
Figure 45 Status screen (four-drive model shown)

Cartridge Map

Selecting this option provides you with a layout of the slots and cartridges that are currently being used in the library. Bar code labels are displayed if enabled and in use.
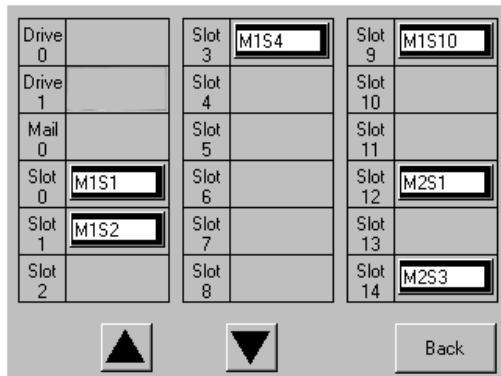
Figure 46 Cartridge map screen (two-drive model shown)

Online

Selecting this option places the library online or offline.

📝 **NOTE:** The library automatically comes online after a power-up initialization. You can use this option to place the library offline.

Menu

Selecting this option lets you view, configure, and use the library (Figure 47). The **Menu** option displays three distinct areas:

• View System Data
• Utilities
• Edit Options
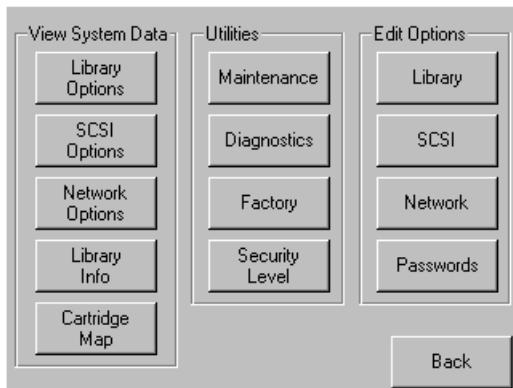
Figure 47 Menu screen

Menu Selections

This section describes the three **Menu** areas:

- View System Data
- Edit Options
- Utilities

View System Data Area

The **View System Data** area lets you select the following screens:

- Library Options
- SCSI Options
- Network Options
- Library Info
- Cartridge Map

Library Options

Selecting this option lets you view the library settings. These settings are defined from the **Library** option in the **Edit Options** area (see Figure 48 on page 61).

📝 **NOTE:** You can move to the next subsequent **Library Options** screen by selecting the ▼ button.
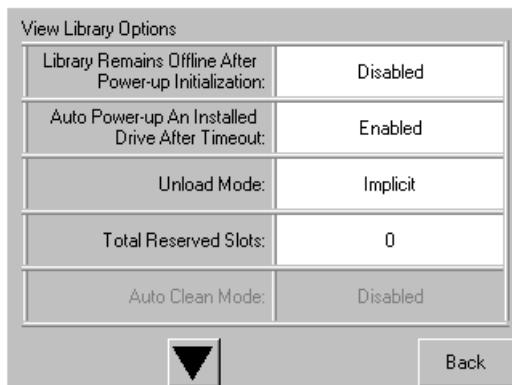
Figure 48 View library options screen

Table 5 lists and describes the available **Library** options.

Table 5 View Library Options

Option	Description
Library Remains Offline After Power-up Initialization	Library does not go online after power-up initialization. You must select the **Online** option from the **Menu** screen on the GUI touch screen. The default is **Disabled**.
Auto Power-Up An Installed Drive After Timeout	Enables a tape drive to be automatically powered up (after a delay), after replacing a tape drive if you do not explicitly power up the tape drive from the GUI touch screen. The default is **Enabled**.
Unload Mode	Lets you determine whether a SCSI MOVE MEDIUM command is interpreted as **Implicit** or **Explicit**. If **Implicit**, the library unloads a tape drive before attempting to move a cartridge from that tape drive. If **Explicit**, the host must issue a SCSI UNLOAD command to a tape drive before each MOVE MEDIUM command that removes a cartridge from that tape drive. The default is **Implicit**.
Total Reserved Slots	Lets you reduce a specified number of slots at the rear of a magazine. Some host software imposes size limits on library magazines for licensing purposes, and does not operate with a library that exceeds the licensed size. The default is **0**.
Auto Clean Mode	Lets you enable an automatic tape drive cleaning cycle. To use this option, you must have reserved a slot for a cleaning cartridge using the Total Reserved Slots option. The default is **Disabled**.

Table 5 View Library Options (continued)

Option	Description
Drive and Slot Numbering	Lets you specify whether SCSI elements in the library displays with either zero based or one based. Note that this only affects the GUI touch screen, not the actual SCSI element addresses. The default is **Zero Based**.
Library Mode	Lets you set the robotics operating mode to **Random**, **Sequential Drv0**, **Sequential Drv n** (two or more drives), or **Sequential Split**. **Sequential Drive n** and **Sequential Split** require two or more drives in the library. Sequential mode is not available with multi-module configurations. The default is **Random**.
Sequential Mode	**Sequential Mode** is locally controlled. Sequential operations begin with any cartridge loaded into Drive 0. The library monitors the drive status, and when the host unloads a cartridge from the drive, it returns the cartridge to the magazine, and then loads the next cartridge in magazine numerical order. This operation continues until all cartridges have been loaded, or until an empty slot is encountered. Two options are available: **Normal** (same as **Library Mode** above) and **Recirculate.** Instead of stopping after the cartridge in the last slot for the drive has been unloaded by the host, **Recirculate** mode continues the operation by loading the first cartridge for the drive. Recirculation will continue until an empty slot is encountered, or the operator unloads the tape using the GUI touch screen.
LCD Contrast Adjust	The LCD contrast controls let you increase or decrease the contrast of the LCD display. The incremental steps are set by adjusting the LCD Contrast Adjust option from the **Library** option. Incremental steps can range from 0 to 31 depending on your preference. The default is **16**.
Mail-Slot Mode	Lets you enable or disable the mail slot(s) in a library. For the two-drive models, the default is **Mail Slot Enabled**. For the four-drive models, the default is **Both Mail Slots Enabled**.
Barcode Label Size	Lets you limit the length of the bar code label. Possible settings are 1 through 8. The default is **8**.
Barcode Label Assignment	Lets you specify the alignment of a bar code label. The options are **Left** or **Right**. When used in conjunction with the **Barcode Label Size** option, this option strips unwanted trailing characters (left alignment) or leading characters (right alignment). The default is **Left Align**.
Barcode Label Check Digit	Lets you specify whether to enable or disable the verification of a check digit character in the bar code label. The default is **Disabled**.

Table 5 View Library Options (continued)

Option	Description
Barcode Reader	Lets you enable or disable the bar code reader retries option. The default is **Retries Enabled**.
Module Configuration	Lets you configure a library for **Standalone, Master,** or **Slave** operation. The default is **Standalone**.
Library Auto Power-On Mode	Lets you enable or disable an automatic library power-on after a power loss without the need to touch the GUI screen. The default is **Enabled**.

SCSI Options

Selecting this option lets you view the settings defined from the **SCSI** option in the **Edit Options** area (see Figure 49).

📝 **NOTE:** You can move to the next sequential **SCSI Options** screen by selecting the ▼. To return to the previous **SCSI Options** screen, select the ▲ or **Back** button to return to the **Menu** screen.
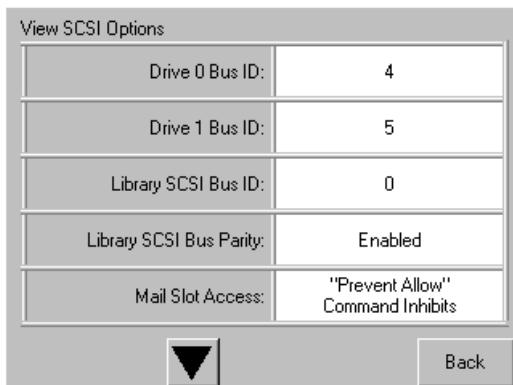
Figure 49 View SCSI options

Table 6 lists and describes the available **SCSI Options** selections. (See "Tape Drives" on page 16 for an illustration of the drive numbering scheme.)

Table 6 View SCSI Options

Option	Description
Drive 0 Bus ID	Lets you set the SCSI addresses of drive 0. The designators Drive 0 (outer tape drive) through Drive n refer to the first through nth drives, counting from right to left starting with the master unit in a scaled Library system. Default is 1.
Drive 1 Bus ID	Lets you set the SCSI addresses of drive 1. The designators Drive 1 (inner tape drive) through Drive n refer to the second through nth drives, counting from right to left starting with the master unit in a scaled Library system. Default is 2.
Drive 2 Bus ID *(four-drive models only)*	Lets you set the SCSI addresses of drive 2. The designators Drive 2 (lower, outer tape drive) through Drive n refer to the third through nth drives, counting from right to left starting with the master unit in a scaled Library system. Default is 3.
Drive 3 Bus ID *(four-drive models only)*	Lets you set the SCSI addresses of drive 3. The designators Drive 3 (lower, inner tape drive) through Drive n refer to the fourth through nth drives, counting from right to left starting with the master unit in a scaled Library system. Default is 4.
Library SCSI Bus ID	Lets you set the SCSI addresses for the library robotics. The default is **0**.
Library SCSI Bus Parity	Lets you enable or disable the library robotics SCSI bus parity checking. The default is **Enabled**.
Mail Slot Access	This option controls access to the mail slot and media removal. **"Prevent Allow" Command Inhibits** allows access to the mail slot via the GUI control panel and allows media removal. **"Prevent Allow" Command Ignored** prevents access to the mail slot and removal of media. This option is used for some backup applications. The default is **"Prevent Allow" Command Inhibits.**
SCSI Mode	Defines the loader as **SCSI-2** or **SCSI-3**. The default is **SCSI-3**.
Unit Attention Reporting	Lets you select reporting of all or only one stacked-unit attention conditions. If set to **Report All**, the unit reports all unit attention conditions in sequence; if set to **Report One**, the unit reports only the highest priority condition. The default is **Report All**.

Table 6   View SCSI Options (continued)

Option	Description
Init Element Status	Lets you specify the library's response to the `SCSI INITIALIZE ELEMENT STATUS` command. The possible settings are **No Inventory, Force Inventory,** and **Force Label Scan**. The default is **Force Inventory**.
Test Unit Ready Reporting	Lets you specify the response to a `TEST UNIT READY` command if the library is in **Sequential Mode**. The possible settings are **Standard** or **Custom**. The default is **Custom**.
Device Capability Page Length	Lets you choose between two lengths of the mode sense/select device capabilities page (SCSI page 1Fh), which are **Short (14 bytes)** and **Long (18 bytes),** to accommodate different SCSI device implementations of this page. The default is **Short (14 bytes)**.
Transport Element Base Address	Lets you set the base address for the robotics mechanism. The default is **0x0**.
Storage Element Base Address	Lets you set the base address for the magazine slots. The default is **0x20**.
Transfer Element Base Address	Lets you set the base address for the tape drives. The default is **0x1E0.**
Import/Export Element Base Address	Lets you set the base address for the mail slot. The default is **0x1C0.**
Product Identification (PID)	Lets you specify the response of the library's robotics to the `SCSI INQUIRY` command in the **Product Identification** field. The default is **MSL6000 Series**.
Vendor Identification (VID)	Lets you specify the response of the library's robotics to the `SCSI INQUIRY` command in the **Vendor Identification** field. The default is **HP.**
Post Recovered Errors	Lets you specify whether or not recovered errors are posted. The default is **Disabled**.

Table 6 View SCSI Options (continued)

Option	Description
TapeAlert Mode	Specifies conditions for logging and reporting the following **Tape Alert** data options. The default is **Unconditionally Generate Recovered Error**. • **Logging Disabled:** Inhibits the logging feature. • **No Exceptions:** The library must not report information exceptions. • **Generate Unit Attention:** Reports information exceptions with a **Unit Attention** sense key and an **ASC/ASCQ** of **5D/00**. • **Conditionally Generate Recovered Error:** Reports information exceptions with a **Recovered Error** sense key and an **ASC/ASCQ** of **5D/00**, if **Recovered Error Reporting** is enabled. • **Unconditionally Generate Recovered Error:** Unconditionally reports information exceptions with a **Recovered Error** sense key and an **ASC/ASCQ** of **5D/00**. • **Generate No Sense:** Reports information exceptions with a **No Sense** sense key and an **ASC/ASCQ** of **5D/00**. • **Report on Unsolicited Request Sense:** Reports information exceptions with a **No Sense** sense key and an **ASC/ASCQ** of **5D/00**, only in response to an unsolicited `REQUEST SENSE` command.
Abort Move Status	Lets you specify the SCSI response while aborting a SCSI command. The possible settings are **Busy** or **Not Ready**. The default is **Not Ready**.
Door Open Response	Lets you specify the SCSI response when a library door is open. The settings are **Ready** or **Not Ready**. The default is **Not Ready**.
Initiate Wide Data Transfer Negotiation	Lets you enable the library to initiate a SCSI synchronous and wide data transfer negotiation with the host. The settings are **Do Not Initiate** or **Initiate**. The default is **Do Not Initiate**.

Table 6   View SCSI Options (continued)

Option	Description
Data Transfer Speed	Lets you set the robot or library SCSI data transfer rate to **Synchronous, 10 MB/sec, Synchronous, 5 MB/sec**, or **Asynchronous Only**. The default is **Synchronous, 10 MB/sec**.
Report Element Type	The default is **Disabled**.
Fast Terminate Sequence	The default is **Disabled**.

Network Options

Selecting this option lets you view the settings defined from the **Network** option in the **Edit Options** area (see Figure 50). Table 7 on page 68 lists and describes the available options.

> **NOTE:** There are no firmware default settings for networks. Contact your network administrator for specific information on connecting the library to your network.
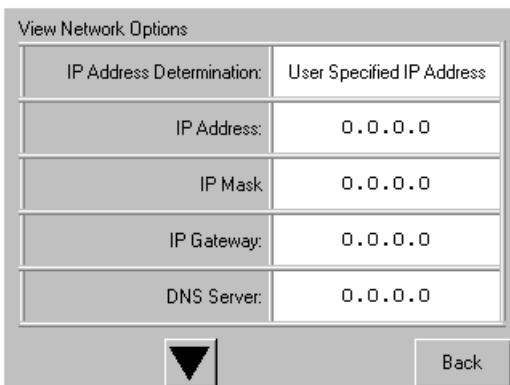
Figure 50 Default view network options screen

> **NOTE:** The IP Address, IP Mask, IP Gateway, and DNS Server become available after selecting **User Specified IP Address** from the **Network** screen under **Edit Options**.

Table 7 View Network Options

Option	Description
IP Address Determination	Lets you obtain an IP address from a DHCP server or set a user specified IP address.
IP Address	Lets you select an IP Address.
IP Mask	Lets you select an IP Mask.
IP Gateway	Lets you select an IP Gateway.
DNS Server	Lets you select a DNS server address.

Library Info

Selecting this option lets you display the **Miscellaneous Library Info** screen (Figure 51). This screen displays the library's firmware revision, the local IP and Ethernet address that is currently in use, the unit serial number, and the library's power-on hours.
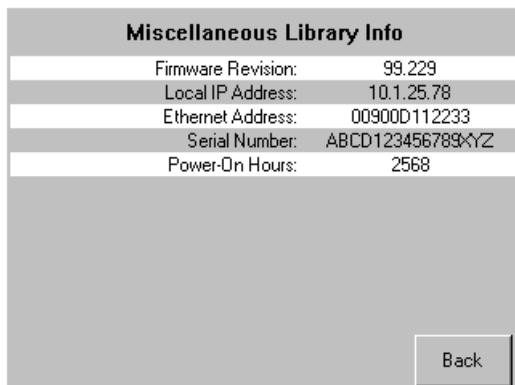
Figure 51 View library info screen

Edit Options Area

The **Edit Options** area lets you select the following screens:

• Library
• SCSI
• Network
• Passwords

Library

Selecting this option lets you define the **Library** options used to configure the library for your specific needs (see Figure 52). Table 5 on page 61 lists and describes the available options.
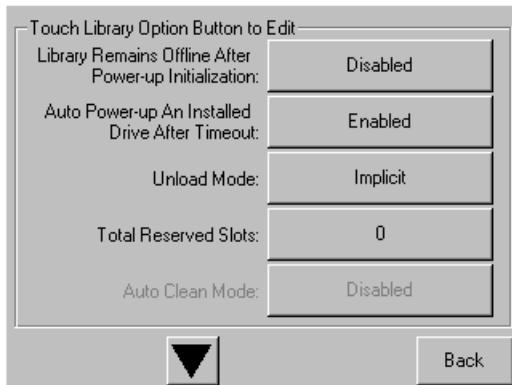
Figure 52 Edit library options screen

SCSI

Selecting this option lets you define the **SCSI** options used to configure the library for your specific needs (see Figure 53). Table 6 on page 64 lists and describes the available options.
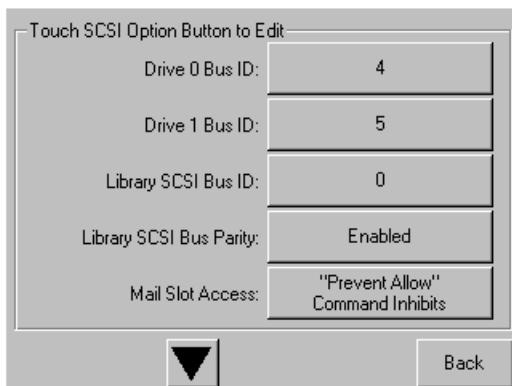
Figure 53 Edit SCSI options screen

Network

Selecting this option lets you define the **Network** options used to configure the library for your specific needs (see Figure 54). Table 7 on page 68 lists and describes the available options.
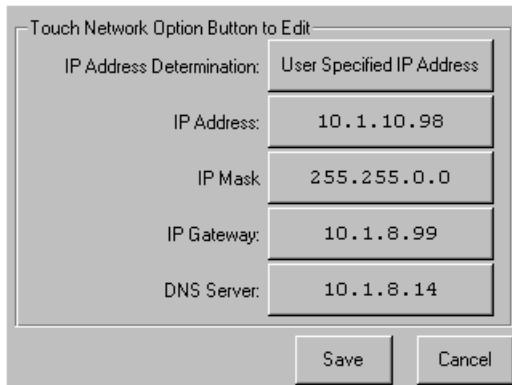
Figure 54 Edit network options screen

Passwords

Selecting this option lets you define the **Password** options used to configure the library for your specific needs (see Figure 55). For information on library security features and password levels, see "Front Panel and Media Security Locks" on page 51.
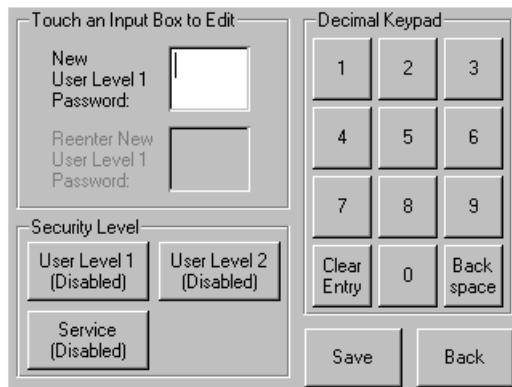
Figure 55 Edit passwords options screen

Utilities Area

The **Utilities** area lets you select the following screens:

- Maintenance
- Diagnostics
- Factory
- Security Level

Maintenance

Selecting this option lets you perform system maintenance on the library (see Figure 56):
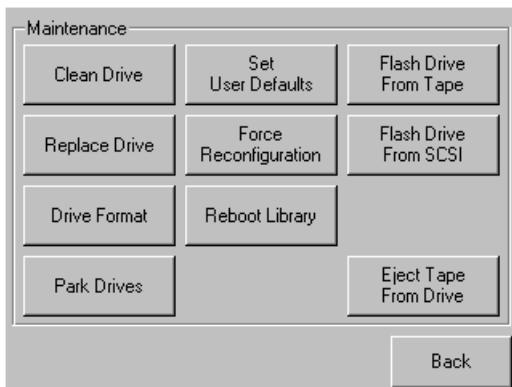
Figure 56 Maintenance screen

The **Maintenance** menu options are described in Chapter 6, "Maintenance" beginning on page 91.

Diagnostics

Selecting this option lets you perform a system calibration on available components (see Figure 57). Available options are dependent on the specified user level.

The **Diagnostics** menu options are described in Chapter 7, "Troubleshooting" beginning on page 101.
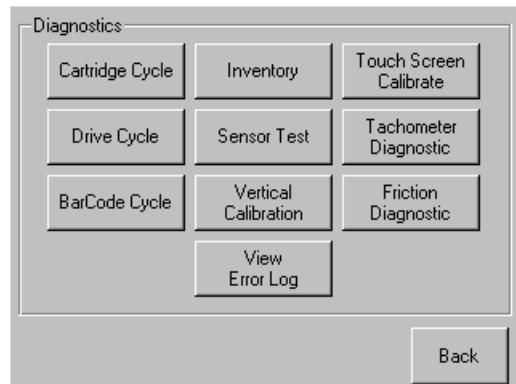
Figure 57 Diagnostics screen (four-drive model shown)

NOTE: The Vertical Calibration button is only available on four-drive models.

Factory

The **Factory** menu options are intended for use by factory personnel only.

CAUTION: Unauthorized use of the **Factory** option could render the library inoperable.

Security Level

Selecting this option lets you select passwords for a security level (see Figure 58).

NOTE: The library ships with a default Service password of **5566**.

NOTE: Setting a value **0000** for a given level disables that level.
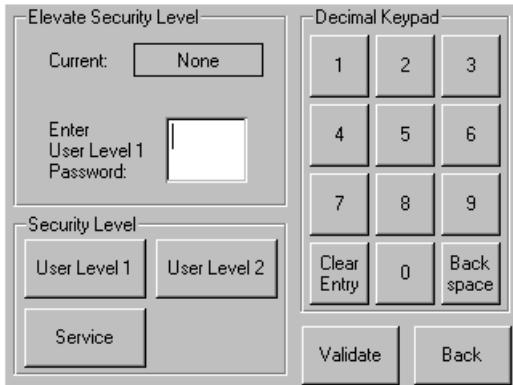
Figure 58 Security level screen

Inserting and Removing Tape Cartridges

Unless you are using the mail slot(s), a tape magazine must be removed from the library to remove or insert tape cartridges. Make sure the slot you want to use is not already reserved for a tape cartridge or cleaning cartridge that is now in a tape drive. The safest way to do this is to unload all tape drives before removing a magazine. You can unload all the tape drives either through your host system software or by using the LOAD/UNLOAD command from the **Library Option** menu.

NOTE: Do not add more tape cartridges to the library than its rated slot capacity.

CAUTION: Ultrium and SDLT tape drives require special cleaning cartridges and data cartridges formatted specifically for the drive technology. To avoid damage to your tape drive, it is critical to use appropriate cleaning cartridges and properly formatted data cartridges. Contact an HP authorized dealer or sales representative for current compatibility and availability.

Removing Magazines

Library magazine removal is a manual operation. Access the magazines using the **Magazine Access** option from the library **Status** screen. This option lets you open the left- or right-hand magazine doors separately, or all magazine doors at the same time. After opening the appropriate magazine door, pull the magazine out from the library chassis (see Figure 59).
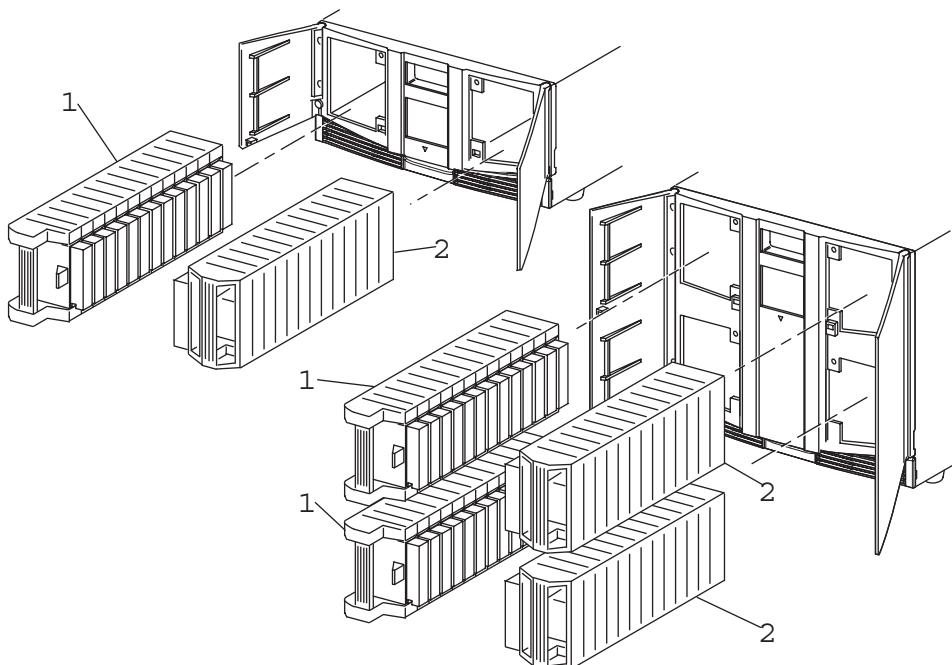
1 Left-hand Magazine(s)
2 Right-hand Magazine(s)

Figure 59 Removing tape cartridge magazines

Inserting Cartridges into a Magazine

A full left-hand magazine is shown in Figure 60. For two-drive models, the lowest numbered tape cartridge slot ❷ is the one closest to the front of the left-hand magazine. For four-drive models, the lowest numbered tape cartridge slot ❷ is the one closest to the front of the upper-left magazine.

1 Tape Cartridge Orientation for Left-hand Magazine

2 Lowest Numbered Tape Cartridge Slot

3 Highest Numbered Tape Cartridge Slot
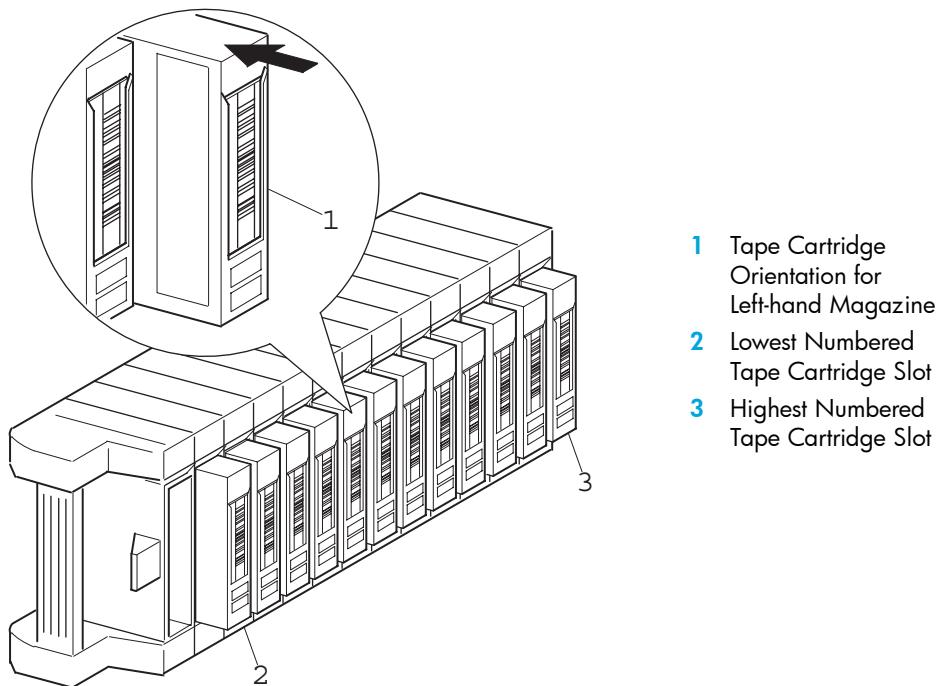
Figure 60 Inserting a tape cartridge (left-hand magazine)

Insert tape cartridges so that the bar code labels are facing outward (see Figure 60).

NOTE: Handle and store tape cartridges in a clean, dust-free environment. Refer to the documentation provided with your tape cartridges for additional information.

Using Mail Slots (Left-hand Magazines Only)

Mail slots are used only with host system software that supports this feature. The mail slot feature lets you insert or remove a single tape without removing the entire magazine. The benefit of using a mail slot is that the magazine does not need to be reinventoried. Access the mail slots using the **Mail Slot Access** option from the library **Status** screen. This option lets you open a left-hand magazine door for mail slot access. After opening a left-hand magazine door, pivot the mail slot forward to insert a tape cartridge (see Figure 61).

NOTE: Mail slots must be enabled (firmware default) using the **Mail Slot Mode** option from the **Edit Library Options** menu. See Table 5 for more information.

NOTE: Disabling a mail slot allows it to be used for an additional data slot, but this may be incompatible with some host software applications.

1 Mail Slot Holder
2 Tape Cartridge
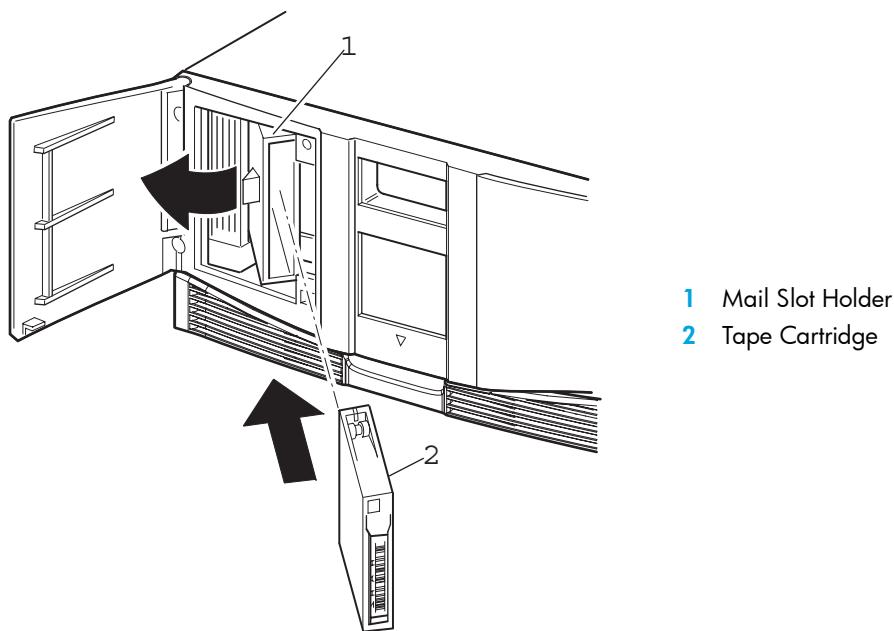
Figure 61 Left-hand magazine mail slot (two-drive model shown)

Labeling Tape Cartridges

Attaching a bar code label to each tape cartridge enables the library and application software to identify the cartridge quickly, thereby speeding up inventory time. Make it a practice to use bar code labels on your tape cartridges. Your host software may need to keep track of the following information and the associated bar code:

- Date of format or initialization
- Tape's media pool
- Data residing on the tape
- Age of the backup
- Errors encountered while using the tape (to determine if the tape is faulty)

⚠ CAUTION: The misuse and misunderstanding of bar code technology can result in backup and restore failures. To ensure that your bar codes meet HP's quality standards, always purchase them from an approved supplier and never print bar code labels yourself. For more information, refer to the order form provided with the library, as well as the *Bar Code Label Requirements, Compatibility and Usage* white paper available from http://www.hp.com/support.

Ultrium Labels

Ultrium tape cartridges have a recessed area located on the face of the cartridge next to the write-protect switch. Use this area for attaching the adhesive-backed bar code label (see Figure 62). Do not apply labels onto the cartridge except in this designated area.

⚠ CAUTION: The bar code label should be applied as shown in Figure 62 with the alphanumeric portion facing the hub side of the tape cartridge. Never apply multiple labels onto a cartridge, as extra labels can cause the cartridge to jam in a tape drive.
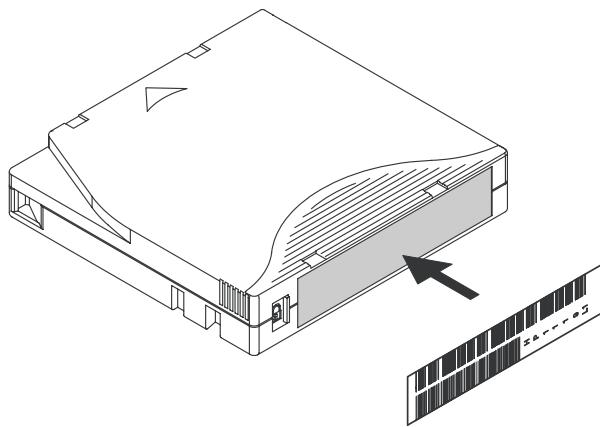
Figure 62 Attaching a bar code label to an Ultrium tape cartridge

To ensure successful operation of your tape library, place the bar code label *entirely* within the recessed area, ensuring that no part of the label is outside of it (see Figure 63).
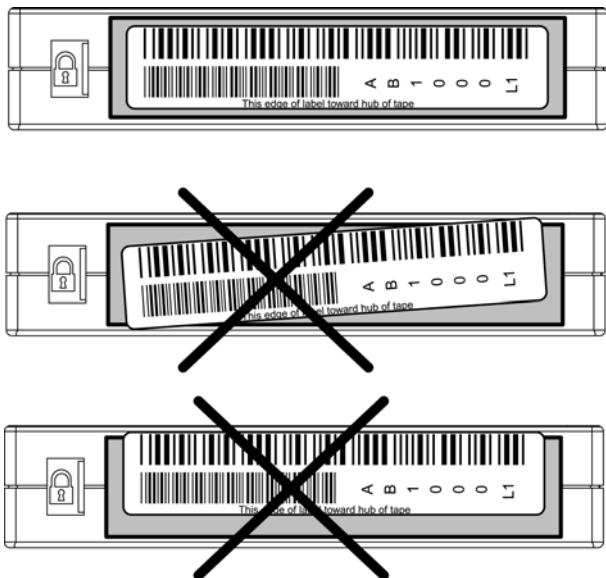
Figure 63 Proper Ultrium bar code label placement

SDLT Labels

SDLT tape cartridges have a front slide slot located on the face of the cartridge next to the write-protect switch (see Figure 64 shows) Use this slot for inserting the bar code label by sliding it into the slot.

⚠ **CAUTION:** Do not apply labels onto the top, bottom, sides, or back of the cartridge as this may cause damage to the tape drive, or interfere with reliable operation.
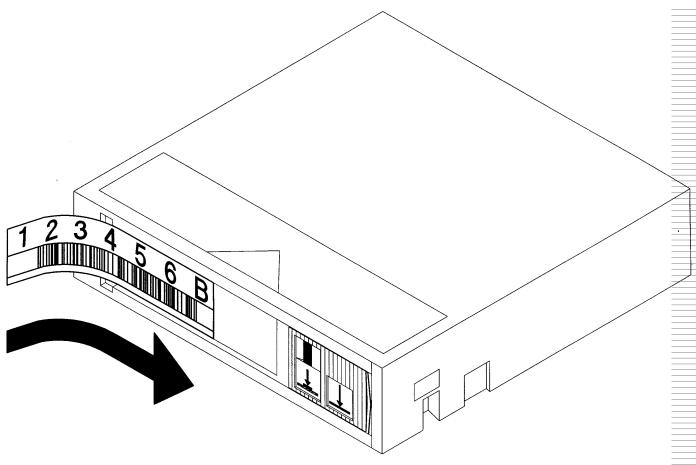
Figure 64 Attaching a bar code label to an SDLT tape cartridge

Media Label Identifiers

Be sure to use the proper bar code labels for your drive technology. Table 8 lists the identifier that is found at the end of 7- or 8-character SDLT and Ultrium bar code labels.

⚠ **CAUTION:** To ensure that your bar codes meet HP's quality standards, always purchase them from an approved supplier and never print bar code labels yourself. For more information, refer to the order form provided with the library, as well as the *Bar Code Label Requirements, Compatibility and Usage* white paper available from http://www.hp.com/support.

Table 8 Media Label Identifiers

Cartridge Type	Density	Label Identifier
SDLT 320	160/320 GB	S or S1
SDLT 600	300/600 GB	S or S2
Ultrium 460	200/400 GB	L2
Ultrium 960	400/800 GB	L3
Ultrium 1840	800/1600 GB	L4

5 Remote Management Interface

Many of the same operations performed from the front panel can also be performed remotely using the Remote Management Interface. Sections in this chapter include:

- Overview, page 79
- Accessing the Remote Management Interface, page 80
- Using Menu Buttons, page 82
- Changing the Remote Management Interface Passwords, page 88

Overview

The Remote Management Interface lets you monitor and control your automated tape library from any terminal connected to your network or via the World Wide Web. The Remote Management Interface hosts a dedicated, protected Internet site that displays a graphical representation of your library.

After establishing a connection to the library, open any Web browser and enter the IP address of the library.

> **NOTE:** Be sure that proxy server settings in your browser are disabled

This internet site can be accessed using either Microsoft Internet Explorer (3.0 or higher) or Netscape (3.0 or higher). The Remote Management Interface shows the overall status of the library at a glance, and presents a control panel for making adjustments and viewing details down to the cartridge level.

To use the Remote Management Interface, you must have the following available:

- A 10 BaseT Ethernet Network
- An available IP address (either Internet or local)
- A host computer with COM port (initial setup and alternative maintenance procedures only)
- A computer with a Web browser installed that has access to your network

Two configurations for the Remote Management Interface are available:

- World Wide Accessible.
- Local Area Network

To configure the Remote Management Interface you must set the IP addresses. (For information on setting IP addresses, see "Configuring the Network Settings" on page 47.)

⚠ **CAUTION:** Some options of the Remote Management Interface take the library offline. This inactive mode can interfere with host-based application software, causing data loss. Ensure that the library is idle before attempting to perform any remote operations that will take the library offline.

Accessing the Remote Management Interface

To access your library remotely, the library must be in the ready mode to establish communications with the Remote Management Interface. If you are unable to access the unit with your browser, verify the library is not being operated locally.

1. Type the IP address in the **Location** field of your Web browser, and press **Enter**.

   The browser connects to the Remote Management Interface and displays a login prompt.

   ### Login to the Remote Management Interface

   ☐ Check to prevent other users from initiating any "Level 2"
   operations with the Library for the duration of your session.
   ☐ Check to disable frames.

   Enter a Password: [_____]

   [Login]

Figure 65 Remote Management Interface login screen

2. Enter your level 1 or level 2 password in the appropriate field and click **Login**.

📝 **NOTE:** The default level 1 password is 1. The default level 2 password is 2. The level 1 password only allows use of passive features, such as viewing library status.

Use the *MSLUtil.exe* diagnostic utility and the serial interface to change the default passwords as described in "Changing the Remote Management Interface Passwords" on page 88.

Figure 66 Remote Management Interface main screen

3. Click on the library to access the **Status** screen (see Figure 67).

- Auto-Refresh | Off | 1 min. | 2 min. | 5 min.
- Inventory Display | Logical | Physical

Idle

Current Library Inventory

| Empty | Empty |
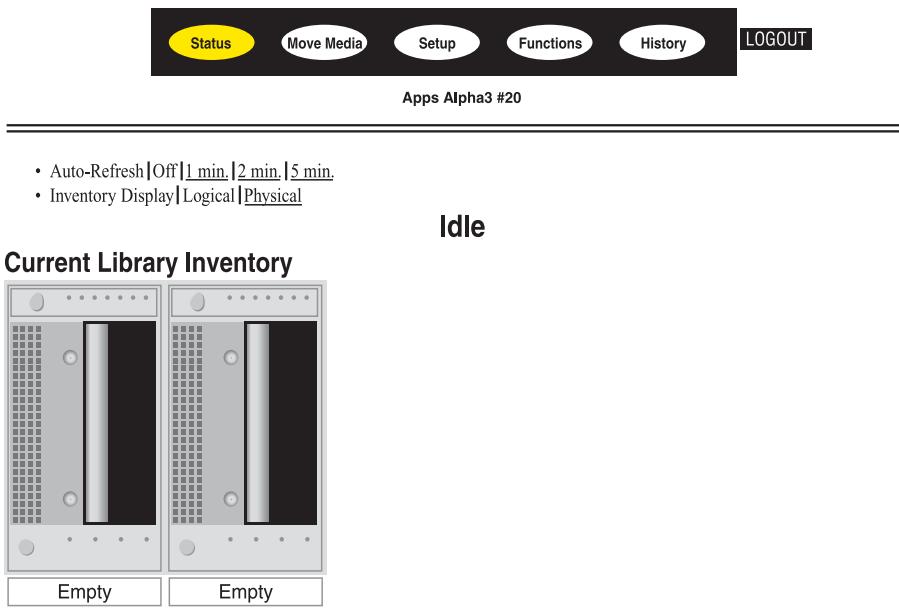
Figure 67 Status screen

Using Menu Buttons

The Remote Management Interface menu buttons include:

- Status, page 82
- Move Media, page 83
- Setup, page 84
- Functions, page 87
- History, page 88

Status

Click the **Status** button to view a display of itemized status information for the library in general, and for each drive. Scroll down to view additional information. You can configure two browser settings from this screen:

- Auto refresh: off /1 min / 2 min / 5 min

  This setting ensures that the status of your library displayed on the browser remains current.
- Inventory Display: Logical / Physical

  This setting enables you to display your library either logically (drives and slots are grouped separately) or physically (drives and slots are grouped by library module), depending on your preference.

Information available from this screen:

- **Library Status**

- **Drive Status** (Summary)
- **Full Drive Status** is available through the **Full Drive Status** button

Move Media

> △ **CAUTION:** Do not move tapes while library application software is running. Fatal software faults may occur.

This button allows you to move a selected cartridge to a target drive or cartridge slot.

Figure 68 Move media screen

1. Specify the source slot and destination.
2. Click **Execute the Move**.

   A screen appears warning you that selecting **Confirm** causes the library to go offline during the move media operation. After the move media operation completes, a completion message appears.

Setup

Click **Setup** for button-and-browser controls that let you set library, SCSI, and drive configuration options, also available on the **Menu > Edit Options** area of the tape library GUI.

| Status | Move Media | Setup | Functions | History | LOGOUT |

Apps Alpha3 #20

Configuration menu	
Library Configuration Set basic library parameters such as random/sequential mode, mail slot mode, auto clean mode	Library Config
Scsi Configuration Set SCSI mode parameters and Tape Alert parameters	Scsi Config
Drive Configuration Set SCSI ID of the drive(s)	Drive Config
Notification Registration Register to receive exception reports via e-mail and/or SNMP traps	Notifications

Figure 69 Setup screen

Library Configuration

Click **Library Config** to set basic library parameters.

Figure 70 Library configuration screen

SCSI Configuration

Click **SCSI Config** to SCSI mode and Tape Alert parameters.
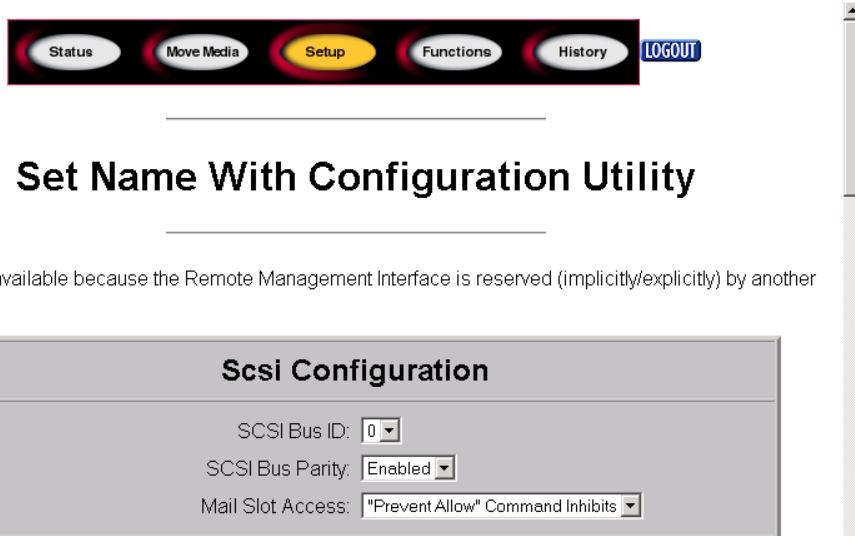
Figure 71 SCSI configuration screen

Drive Configuration

Click **Drive Config** to set the SCSI IDs of the drives.
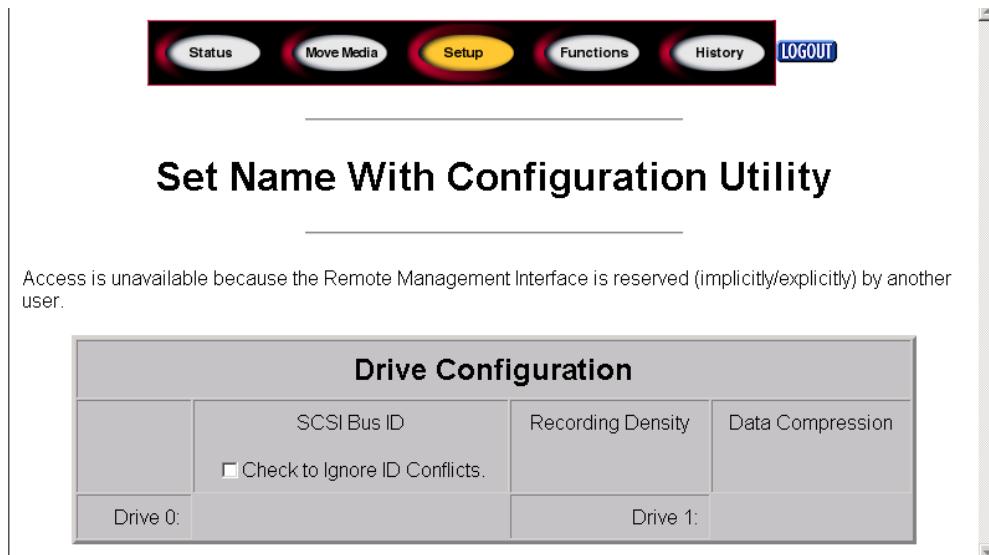
Figure 72 Drive configuration screen

Functions

The **Functions** pages present button-and-browser controls of selectable files.

| Status | Move Media | Setup | Functions | History | LOGOUT |

Apps Alpha3 #20

Perform a Drive Cleaning Operation

Source of Cleaning Tape: [Slot 1 ▼]

Drive(s) to Clean: [Drive 0 ▼]

[Execute the Clean]

Perform a Timed or Free-Running Library Diagnostic

Diagnostic to Run: [Cartridge Cycle ▼]

Time to Run: [1 minute ▼]

[Start the Diagnostic]

Library Flash Operation

Flash Operation: [Flash Library from Remote File ▼]

[Start the Flash]

Figure 73 Functions screen

Four functions are available from this screen:

- Drive cleaning operation
- Timed or Free running library diagnostic
- Library flash operation
- Reset the library

⚠ **CAUTION:** Only perform the drive cleaning operation when the library displays a message informing you that a tape drive needs cleaning. Excessive, unrequested cleaning can damage the tape drives. See "Running a Cleaning Cartridge" on page 93 for additional information.

📝 **NOTE:** See "Updating Firmware" on page 97 for additional information on using the library flash operation in the Remote Management Interface.

History

Click **History** to list files that you can display or download. Scroll down for additional menus.

Figure 74 History screen

When you select a file, a **Save As** window appears, letting you select a network destination for the download. When you select **Display Trace**, the log will display through the browser.

Changing the Remote Management Interface Passwords

The Remote Management Interface is set with two default passwords for level 1 and level 2 access to features. Use the *MSLUtil* diagnostic utility and serial interface to change the default passwords for the Remote Management Interface.

> **NOTE:**   The default passwords cannot be changed in the Remote Management Interface. The default passwords can only be changed by using the *MSLUtil* diagnostic utility and diagnostic cable connection to the computer running the utility.

To change level 1 and/or level 2 passwords:

1. Install the diagnostic utility on a Windows compatible computer using the *MSLUtil* CD supplied with the library.
2. Connect the diagnostic cable from the computer installed with the diagnostic utility to a serial port on the library controller board located at the back of the library.
3. Start *MSLUtil* and select **Connect** from the tool bar.
4. Click **OK** to use the default setting. A communication path is established to the library.

5. Select **Configure** from the tool bar.
6. Select **Set Values** from the menu.
7. Select the **Access** tab in the Configure Library window. The default passwords display for levels 1 and 2.
8. Change the default password(s) to a new password and click **OK**.
9. Click **OK** to confirm the changes.

6 Maintenance

This chapter includes procedures for:

Using the Library Maintenance Menu

You can use the library Maintenance menu to perform system maintenance. Access this menu from the GUI touch screen by selecting **Menu** > **Utilities** > **Maintenance**. Table 9 lists the available options.

Table 9 Maintenance Menu

Option	Description
Clean Drive	Cleans a drive by selecting the drive to be cleaned, and the slot or mailslot where the cleaning cartridge is located.
Replace Drive	Deactivates a drive prior to its removal.
Drive Format	Formats a tape once the density and compression settings have been selected.
Park Drives	Parks all drives prior to transporting the library.
Set User Defaults	Restores the library to its firmware default settings.
Force Reconfiguration	Forces library to reconfigure based on current or new SCSI elements.

Table 9 Maintenance Menu

Option	Description
Reboot Library	Reboots the library.
Flash Drive From Tape	Downloads firmware from a selected tape to a selected drive. NOTE: The firmware update (FUP) tape must be in the mail slot before beginning this operation.
Eject Tape From Drive	Terminates any on-going operations in the selected drive, and attempts to eject the cartridge. NOTE: This function should be used as a last resort to retrieve a cartridge from a drive.

Maintaining Tape Cartridges

NOTE: In addition to the information provided in this section, refer to the documentation provided with your media for more information.

Make it a practice to visually inspect your tape cartridges when loading or removing them from your library. Taking a few minutes to check the condition of your cartridges will lower the risk of operation and drive failures and help ensure uninterrupted backup.

Repeated drive failures may indicate defective tapes. Tapes need to be inspected and replaced if they have been dropped, damaged, or used with a failed drive. To determine if the tapes have been damaged:

• Gently shake the tape cartridge to verify that no internal parts are rattling, indicating that they may be loose.
• Look at the tape cartridge to check for any obvious cracks or other physical damage. Look for broken or missing parts.

CAUTION: Always discard damaged tape cartridges. If a defective tape cartridge is loaded into a tape drive, it may in turn damage the drive potentially requiring drive replacement.

Do *not* use cartridges with:

- Tape or leaders that have been touched with bare fingers, as this may transfer oils to the tape head.
- Labels used on the top, bottom, sides, or back of the cartridge. Use the label slot or recess only.
- More than one label applied, as extra labels can cause the cartridges to jam in the tape drive.

Ultrium Cartridges

⚠ **CAUTION:** Do not bulk erase Ultrium formatted cartridges. This will destroy pre-recorded servo information, and make the cartridges unusable.

SDLT Cartridges

In addition to the general inspection listed on page 92, you can further determine if SDLT tapes have been damaged by doing the following:

- Visually inspect the tape for a broken, unseated, or misaligned tape leader (Figure 75 on page 93).
- Check the leader position by pressing in the door lock to release the cartridge door. While pressing in the door lock, push the tab down to open the door. Be careful not to touch the tape after opening the door. Ensure that the leader is in the correct position (Figure 75 on page 93).

Good   Worn (Do Not Use)
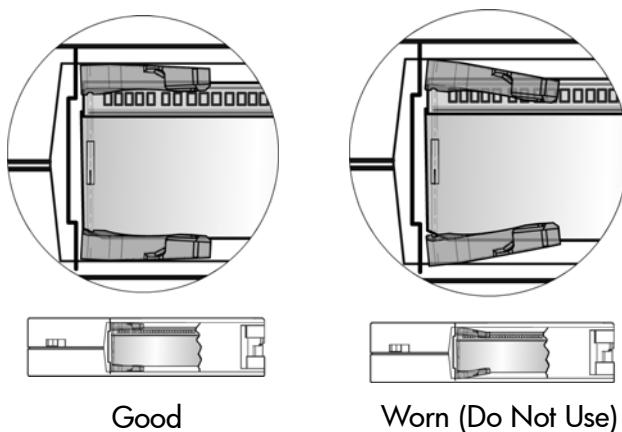
Figure 75 SDLT buckle leaders

Running a Cleaning Cartridge

Use the **Clean Drive** menu option contained in the **Maintenance** submenu of the **Utilities** area on the front panel display to clean tape drives installed in HP StorageWorks MSL Series tape library.

⚠ **CAUTION:** Only perform the **Clean Drive** menu option when the library displays a message informing you that a tape drive needs cleaning. Excessive, unrequested cleaning can damage the tape drives.

⚠ **CAUTION:** Ultrium and SDLT tape drives require special cleaning cartridges and data cartridges formatted specifically for the drive technology. To avoid damage to your tape drive, it is critical to use appropriate cleaning cartridges and properly formatted data cartridges. Contact an HP authorized dealer or sales representative for current compatibility and availability.

📝 **NOTE:** Backup application software must be compatible with the library autoclean feature to avoid robot command conflicts.

📝 **NOTE:** HP does not support preventive autocleaning operation.

Because the cleaning cartridge is abrasive, you should not use it unless the message **"Use Cleaner"** appears on the front panel display. There are three ways to manage the cleaning of the installed tape drives:

- Automatically, by application software.
- Automatically, by enabling **Auto Clean Mode**.
- Manually, by selecting the **Clean Drive** menu option from the **Maintenance** submenu on the front panel display.

Automatically Running a Cleaning Cartridge

You can configure the library so that it automatically runs the cleaning cartridge mode. After a tape drive that needs cleaning completes an unload operation, it sends a cleaning needed message to the library. This activates an automatic cleaning cycle if the cleaning cartridge slot has been reserved, **Auto Clean Mode** has been selected from the **Library Options** menu, and the appropriate cartridge technology is loaded.

To configure the library to use **Auto Clean Mode**, do the following:

1. Reserve a cleaning cartridge slot. (See "Setting Up a Reserved Slot" on page 41 for more information.)
2. Enable **Auto Clean Mode**. (See "Library Display Screens and Options" on page 53 for more information.)

Manually Running a Cleaning Cartridge

A cleaning cartridge can be installed and run from one of three locations:

- The Mail Slot—This location has the advantage of not needing to remove a magazine to use a data cartridge slot, or to reserve a cleaning cartridge slot.
- A Tape Cartridge Slot—This location requires removing a magazine to insert a cleaning cartridge in a tape cartridge slot, and then removing it after cleaning.
- The Cleaning Slot—This location requires reserving the last tape cartridge slot for exclusive use as a cleaning cartridge slot. The advantage with this method is that the cleaning cartridge is stored in the library and is always available for use. It needs to be handled only when it expires and needs to be replaced. (See "Setting Up a Reserved Slot" on page 41 for more information.)

Running a Cleaning Cartridge from a Mail Slot

1. Insert a cleaning cartridge into a Mail Slot (see "Using Mail Slots (Left-hand Magazines Only)" on page 74).
2. Select the **Clean Drive** menu option from the **Maintenance** submenu on the front panel display.
3. Select **Source** and then **Mail Slot** in the **Source Element Type** box.
4. Select **Cleaning**. If the default entry is not the tape drive to be cleaned, press **Drive** in the **Destination Element Type** box to sequence through the available tape drive choices. You can also use the **Decimal Keypad** to enter the tape drive number directly.
5. When the source and destination entries are correct, select **Execute Clean**.
6. When the cleaning cycle completes, the library returns the cleaning cartridge back to a Mail Slot. To remove the cleaning cartridge, select **Mail Slot Access** from the library **Status** screen.

Running a Cleaning Cartridge from a Tape Cartridge Slot

1. Insert a cleaning cartridge into an appropriate tape cartridge slot (Slot 0, for example). (see "Using Mail Slots (Left-hand Magazines Only)" on page 74).
2. Select the **Clean Drive** menu option from the **Maintenance** submenu on the front panel display.
3. Select **Source**. If the default entry is not the slot with the cleaning cartridge, press **Slot** in the **Source Element Type** box to sequence through the available cartridge slots. You can also use the **Decimal Keypad** to enter the slot number directly.
4. Select **Cleaning**. If the default entry is not the tape drive to be cleaned, press **Drive** in the **Destination Element Type** box to sequence through the available tape drive choices. You can also use the **Decimal Keypad** to enter the tape drive number directly.
5. When the source and destination entries are correct, select **Execute Clean**.
6. When the cleaning cycle completes, the library returns the cleaning cartridge back to the tape cartridge slot. To remove the cleaning cartridge, select **Magazine Access** from the library **Status** screen.

Running a Cleaning Cartridge from a Cleaning Slot

1. Reserve a cleaning tape cartridge slot. (See "Setting Up a Reserved Slot" on page 41 for more information.)
2. Install a cleaning cartridge in a reserved slot.

3. Select the **Clean Drive** menu option from the **Maintenance** submenu on the front panel display. Note that the **Source** window defaults to the cleaning slot (**Cln'g Slot 0**).
4. Select **Cleaning**. If the default entry is not the tape drive to be cleaned, press **Drive** in the **Destination Element Type** box to sequence through the available tape drive choices. You can also use the **Decimal Keypad** to enter the tape drive number directly.
5. When the destination entry is correct, select **Execute Clean**.
6. When the cleaning cycle completes, the library returns the cleaning cartridge back to the cleaning cartridge slot (**Cln'g Slot 0**). To remove the cleaning cartridge, select **Magazine Access** from the library **Status** screen.

Replacing a Cleaning Cartridge in a Reserved Slot

A message will appear on the front panel display when the cleaning cartridge has expired. Examine the library **Status** screen to make sure that the cleaning cartridge has been unloaded from the tape drive to the reserved slot. If not, then unload it to the mail slot using the **Move Media** menu option from the library **Status** screen.

📝 **NOTE:** A cleaning cartridge can be removed and replaced by removing a right magazine, or by using a mail slot in a left magazine.

Replacing a Cleaning Cartridge in a Right Magazine

1. Select **Magazine Access** from the library **Status** screen.
2. Remove the appropriate right magazine from the library.
3. Remove the expired cleaning cartridge from the last tape cartridge slot. Mark it as EXPIRED, and properly dispose of it.
4. Place a new cleaning cartridge in the last tape cartridge slot of a right magazine.
5. Replace the appropriate right magazine.

Replacing a Cleaning Cartridge in a Mail Slot

1. Select the **Move Media** menu option from the library **Status** screen.
2. Select **Source** and then press **Cleaning Slot** in the **Source Element Type** box.
3. Select **Destination** and then press **Mail Slot** in the **Destination Element Type** box.
4. Select **Execute Move** to place the cleaning cartridge in a Mail Slot.
5. When the move completes, press the **Back** button to access the default front panel display.
6. Select **Mail Slot Access** from the library **Status** screen, and then remove the expired cleaning cartridge. Mark it as EXPIRED, and properly dispose of it.
7. Place a new cleaning cartridge in a Mail Slot.
8. Select the **Move Media** option from the library **Status** screen.
9. Select **Source** and then press **Mail Slot** in the **Source Element Type box**.
10. Select **Destination** and then press **Cleaning Slot** in the **Destination Element Typ**e box.
11. Select **Execute Move** to put the new cleaning cartridge in a mail slot.

Updating Firmware

> **NOTE:** Before upgrading firmware, be sure to generate a support ticket using HP StorageWorks Library & Tape Tools (see page 98). The resulting information may be helpful to your service provider in resolving potential issues that may have prompted the firmware upgrade.

MSL Series tape libraries can be flashed using HP StorageWorks Library and Tape Tools (L&TT), the Remote Management Interface, or the MSLUtil.exe diagnostic utility and diagnostic cable.

Checking the Firmware Revision

Before downloading new firmware, check your current firmware revisions, and compare them to the latest available revisions at http://www.hp.com/support, or through L&TT. You can check your current firmware revisions from the GUI touch screen. Select **Menu** > **View System Data** > **Library Info**.

Using the Remote Management Interface

To update the firmware using the Remote Management Interface, you need a LAN connection to the library, or an Ethernet connection to the World Wide Web.

1. Login to the Remote Management Interface.

> **NOTE:** See "Accessing the Remote Management Interface" on page 80 for additional information on setting up and using the Remote Management Interface.

2. Click on **Functions**.
3. Scroll down to **Library Flash Operation**.

Library Flash Operation
Flash Operation: Flash Library from Remote File ▾
Flash Library from Remote File
Flash Library from Local File
Start the Flash
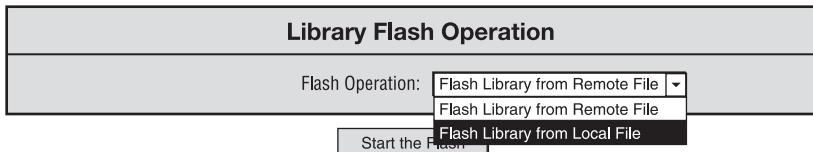
Figure 76 Updating firmware using the Remote Management Interface

4. Select **Flash Library from Remote File** or **Flash Library from Local File** (see Figure 76).

| Status | Move Media | Setup | Functions | History | LOGOUT |

Apps Alpha3 #20

Current local directory is /upload

nextgen_220.bin   4 Mb

Figure 77 Copying firmware using the Remote Management Interface

> **NOTE:**   If you select **Flash Library from Local File**, the *.bin file must be copied from
> ftp://ftp.hp.com/pub/products/storageworks/msl to the /upload directory, which is located on the
> library at the IP Address/upload. The level 1 password may be required to perform this procedure.

You are about to execute
Flash Library from Local File
using the file
nextgen_220.bin

Are you sure you know what you're doing?

Click "Confirm" to proceed with the flash operation. otherwise click "Cancel".

| Confirm | Cancel |
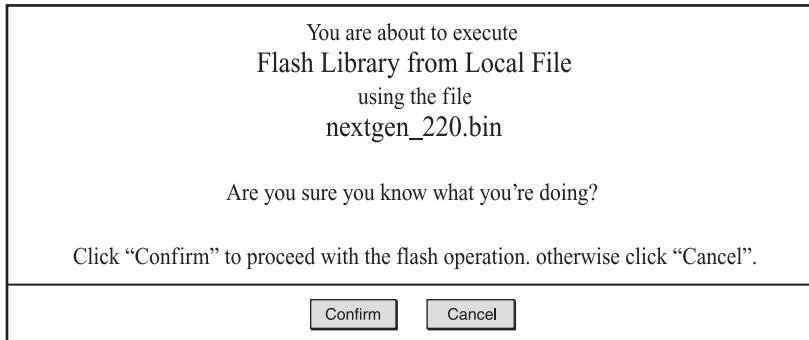
Figure 78 Confirming the Flash operation using the Remote Management Interface

5. Click **Confirm** to start the Flash operation. The library firmware automatically updates.
6. The library will reboot. Verify that the firmware level has been updated successfully by selecting
   the **Library Info** button from the **View System Data** area of the GUI to view the **Firmware
   Revision**.

Using HP StorageWorks Library & Tape Tools

HP StorageWorks Library & Tape Tools may already be installed on your host. If not, you can
download it from http://www.hp.com/support/tapetools.

Online help and instructions are included with the utility.

Using a Serial Connection

To update the firmware using the *MSLUtil.exe* you will need:

• *MSLUtil.exe* and the proper version of firmware, available for download from the HP website at
   http://www.hp.com/support.

- Cable assembly, serial RJ11 to DB9
- PC with available serial port

Firmware Flashing Procedure

1. Install the *MSLUtil.exe* on the PC.
2. Copy the firmware image (**.bin*) into the same directory that the *MSLUtil.exe* was installed.
3. Connect the library diagnostic port to the PC using the supplied cable assembly.
4. Start the *MSLUtil.exe*.
5. Click **Connect**, select the PC serial port that the cable assembly is connected to, and then click **OK**.
6. Click **Download** > **Browse**. Navigate to the directory with the firmware image *.bin.
7. Click **OK**. The library firmware automatically updates.

NOTE: If the flash process does not complete, select a lower baud rate option, available under the **Connect** window, and try again.

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8. The library will reboot. Verify that the firmware level has been updated successfully by selecting the **Library Info** button from the **View System Data** area of the GUI to view the **Firmware Revision**.

7 Troubleshooting

This chapter describes how to identify and resolve the problems that can cause an HP StorageWorks MSL Series tape library to malfunction. Sections in this chapter include:

Identifying Platform Problems

An incorrect installation or configuration can cause platform problems. In this case, the library appears to be operating normally, but no data can be interchanged, or performance is poor. You also might or might not get an error code on the graphical user interface (GUI) touch screen. To identify an error caused by this type of problem, check your installation and configuration setup. See Chapter 2, "Installation" beginning on page 29 for information on how to correctly install and configure the library.

General drive errors usually result from a miscommunication between a library processor and a tape drive processor, drive and tape interaction issues, or a mechanical malfunction within the library. Both platform problems and general tape drive errors display an error message and a Fault Symptom Code (FSC) on the GUI touch screen. Use an FSC to report errors to your authorized service provider, or in some cases, to determine a recovery procedure.

The library depends on several other components to operate correctly. Errors that seem to be caused by the library often are a result of issues on the host, the network cabling, or with the application software. When troubleshooting the library, begin by ruling out these components.

Your application software may need to be reconfigured or, in some cases, reinstalled after you have installed additional drives or slots into the library. Changing the number of magazines, number of reserved slots, or changing between SDLT and Ultrium magazines will also require changes to the software. Some application software may require the purchase of additional add-on components and/or licenses when increasing the number of storage slots or drives. Contact your application software provider for more information, or if newly installed storage slots are drives are not recognized by your application software.

NOTE: The library numbers drives and slots beginning with 0. Your software application may number these items beginning with 1. Be aware of this difference in numbering when troubleshooting the library.

Performing Error Recovery

Figure 79 outlines the recommended steps for error recovery. You should follow this chart in all cases. FSCs are listed in Table 10 on page 103. For general library problems, see "Troubleshooting General Problems" on page 135.

TROUBLESHOOTING AND ERROR RECOVERY

ERROR, FAULT, MALFUNCTION

Determine Suspected Error Type

PLATFORM
No FSC displayed. Normal front panel operation

Cycle the power to the library

Retry

Check configuration

Check software configuration

Call Technical Support

GENERAL DRIVE/LIBRARY
FSC and ERP displayed on GUI touch screen

Follow the ERP on GUI touch screen

Identify the FSC

Follow the suggested ERP

Call Technical Support

CARTRIDGE ERROR
FSC might/might not be displayed
Cartridge will not eject
Normal operation impossible

Figure 79 Troubleshooting flow chart

Fault Symptom Codes (FSCs)

An FSC is accompanied by a descriptive message and instructions for clearing the fault.

> **NOTE:** If an error message appears that is not included in Table 10, write down the fault code number and follow the recovery procedure. If the same error occurs again, contact your authorized service provider. If you did not write down the fault code number, you can retrieve it from the error log.

Table 10 Fault Symptom Codes

FSC	Message	ERP
0306	Novram Update Error (The firmware update failed.)	• Press the **Enter** button to reboot. • Attempt firmware upgrade.
0501	Barcode Not Active Error (The hardware could not detect a bar code reader.)	• Turn off power to the library and inspect connectors and cables.
0901	OS Catastrophic Error	• Press the **Enter** button to reboot.
0902	OS Task Exit Error (TCP/IP data error)	• Cycle power to the library or reboot using the GUI touch screen. • Check the ethernet connections on the router for the master to slave(s) communication.
0A01	Invalid Ethernet (MAC) Address (The library's ethernet (MAC) address stored in the non-volatile configuration is not valid. The last three octets are either 0:0:0, or 255:255:255.)	• Cycle power to the library or reboot using the GUI touch screen. • Check IP address.
0A02	Invalid IP subnet Mask (255.255.255.255) (The ethernet subnet mask stored in the nonvolatile configuration is not valid - 255.255.255)	• Invalid user initiated operation. Set parameters correctly and try again. • Ensure configuration options are set correctly.
0B01	Public Ethernet Open Error (The library could not initialize the public Ethernet interface)	• Make sure a valid Ethernet address has been programmed using the LCD touch display. (Menu -> Maintenance -> Library) • Reboot the library

Table 10 Fault Symptom Codes (continued)

FSC	Message	ERP
0B02	Public Ethernet Set IP Error (The library could not set the IP parameters)	• Make sure a valid Ethernet address has been programmed using the LCD touch display. (Menu -> Maintenance -> Library) • Reboot the library
1001	SCSI Firmware Error (Internal SCSI task processing error. Unexpected state or hardware status.)	• Turn off power to the library and inspect connectors and cables. • Check the SCSI cable connections to make sure they are secured. • Make sure the library controller board has SCSI termination.
1002	SCSI FIFO Empty (The SCSI controller data FIFO is empty but should contain more data bytes.)	• Turn off power to the library and inspect connectors and cables. • Check the SCSI cable connections to make sure they are secured. • Make sure the library controller board has SCSI termination.
1003	SCSI FIFO Error (The SCSI controller data FIFO should be empty but still contains data bytes.)	• Turn off power to the library and inspect connectors and cables. • Check the SCSI cable connections to make sure they are secured. • Make sure the library controller board has SCSI termination.
1004	SCSI Gross Error (The SCSI controller detected a gross error condition. Invalid SCSI bus phase or DMA error.)	• Turn off power to the library and inspect connectors and cables. • Ensure SCSI options are set correctly. • Check the SCSI cable connections to make sure they are secured. • Make sure the library controller board has SCSI termination. • Check host SCSI cable and connections.

Table 10 Fault Symptom Codes (continued)

FSC	Message	ERP
1005	Illegal SCSI Cnt Cmd (Either an invalid command was sent to the SCSI controller, or the controller was not in the correct mode.)	• Turn off power to the library and inspect connectors and cables. • Check that application is certified to work with your library and has up-to-date patches. • Ensure SCSI options are set correctly. • Check the SCSI cable connections to make sure they are secured. • Make sure the library controller board has SCSI termination. • Check host SCSI cable and connections.
1007	SCSI Invalid Element (Internal SCSI task processing error. Invalid element type was detected.)	• Turn off power to the library and inspect connectors and cables. • Check host SCSI cable and connections.
1008	SCSI No Pending Int.	• Turn off power to the library and inspect connectors and cables.
1009	SCSI Invalid Int. (The SCSI controller posted an invalid interrupt status.)	• Turn off power to the library and inspect connectors and cables. • Check host SCSI cable and connections.
100F	SCSI Un-terminated Resets (SCSI Continuous Resets Detected)	• Verify that the library SCSI bus is properly terminated. • Update the Map using the LCD touch display. (Menu -> Maintenance -> Force reconfiguration)
2004	Loader Not Ready (Failed to fetch, stow, scan, move, pass through, or loader detected invalid command and aborted.)	• Cycle power to the library or reboot using the GUI touch screen.
2008	Illegal Move	• Verify the source and destination of the move operation. • Update the Map using the LCD touch display. (Menu -> Maintenance -> Force reconfiguration)
2009	Door Open (status only) (Door is forced open or door sensor failed.)	• Invalid user initiated operation. Select parameters correctly and try again. • Make sure door(s) are closed. • Press the **Enter** button to clear the message.

Table 10 Fault Symptom Codes (continued)

FSC	Message	ERP
200A	Menu Mode	• Take the library out of the Menu Mode via the backspace using the LCD touch display. • Update the Map using the LCD touch display. (Menu -> Maintenance -> Force reconfiguration)
200C	Cart Inaccessible (For an SDLT drive, indicates the tape is not in the unloaded state. For an Ultrium drive, indicates the tape is not ejected. Cartridge in drive is not accessible from changer.)	• Invalid user initiated operation. Select parameters correctly and try again. • Ensure drive is powered on. • Ensure the drive shows good status through the drive status window. • Check the tape cartridge used in the last operation for damage. • Reactivate drive using control panel maintenance menu and reseat drive.
200D	Drive In Error (A general drive error detected by control task)	• Cycle power to the library or reboot using the GUI touch screen. • Ensure the drive shows good status through the drive status window. • Reseat drive.
200E	No Magazine (Cannot move from changer. Element not installed.)	• Press the **Enter** button to clear the message. • Invalid user initiated operation. Select parameters correctly and try again. • Check for magazine. • Replace magazine.
200F	Removal Prevented (Receive medium prevent removal from drive for a fetch.)	• Attempt to unload drive from software. If fails, power off unit, disconnect from SCSI bus, and retry operation. • Invalid host initiated operation. Check that application is certified to work with your library and has up-to-date patches. • Invalid user initiated operation. Select parameters correctly and try again. • Check for firmware tape in drive. • Check for cleaning tape in drive. • Press the **Enter** button to clear the message.

Table 10   Fault Symptom Codes (continued)

FSC	Message	ERP
2010	Ctl. Firmware Error (Internal task processing error. Unexpected event. SMX send or receive error.)	• Cycle power to the library or reboot using the GUI touch screen. • Upgrade firmware if a newer revision exists.
2030	Drive Timeout Error	• Check if the drive shows good status through the drive status window. • Cycle power to the library or reboot using the GUI touch screen. • Reseat drive.
2080	Drive Code Update Command Error (Update code from SCSI or from tape failed.)	• Make sure that the firmware is the correct file for this product. • Check if the drive shows good status through the drive status window. • Cycle power to the library or reboot using the GUI touch screen. • Attempt firmware upgrade again.
2081	Move Command Failure (Move command from or to drive slot failed. Detected by control task.)	• Press the **Enter** button to reboot. • Ensure the drive shows good status through the drive status window. • Cycle power to the library or reboot using the GUI touch screen. • Load/unload a cartridge to the drive to verify.
2090	Open Mail Slot Fault (Door open sensor time-out detected when open door.)	• Press the **Ente**r button to clear the message. • Cycle power to the library or reboot using the GUI touch screen. • Run sensor test. • Make sure door(s) are closed.
2091	Open Left Door Fault (Door open sensor time-out detected when open door.)	• Press the **Ente**r button to clear the message. • Cycle power to the library or reboot using the GUI touch screen. • Run sensor test. • Make sure door(s) are closed.

Table 10 Fault Symptom Codes (continued)

FSC	Message	ERP
2092	Open Right Door Fault (Door open sensor time-out detected when open door.)	• Press the **Ente**r button to clear the message. • Cycle power to the library or reboot using the GUI touch screen. • Run sensor test. • Make sure door(s) are closed.
2093	Open Doors Fault (Door open sensor time-out detected when open door.)	• Press the **Ente**r button to clear the message. • Cycle power to the library or reboot using the GUI touch screen. • Run sensor test. • Make sure door(s) are closed.
2094	Open DLT Handle Fault (Failed to open DLT handle.)	• Press Enter to clear the message. • Cycle power to the library or reboot by using the LCD touch display • Make sure the drive shows good status through the drive status window.
20a0	No IP Address Found (SMC router failed to get an IP address.)	• Press the **Ente**r button to clear the message. • Ensure network configuration options are set correctly. • Cycle power to the library or reboot using the GUI touch screen.
20a1	No IP Address Mode Fault (SMC router failed to detect static or IP address mode.)	• Press the **Ente**r button to clear the message. • Ensure network configuration options are set correctly. • Cycle power to the library or reboot using the GUI touch screen.
20b0	Unknown Exchange For The Async message (Unexpected exchange detected when process messages.)	• Press the **Ente**r button to reboot. • Cycle power to the library or reboot using the GUI touch screen. Wait 30 seconds to power up again.

Table 10 Fault Symptom Codes (continued)

FSC	Message	ERP
20c0	Drive In Error (Control failed to set SCSI ID.)	• Press the **Enter** button to clear the message. • Ensure the drive shows good status through the drive status window. • Check SCSI ID settings. • Cycle power to the library or reboot using the GUI touch screen.
20c1	Drive In Error (Control failed on installed drive.)	• Press the **Enter** button to clear the message. • Ensure the drive shows good status through the drive status window. • Check SCSI ID settings. • Check cabling. • Cycle power to the library or reboot using the GUI touch screen.
3000	Motor Fault Condition (One of the robot motors has been disabled and could not be re-enabled.)	• Press the **Ente**r button to reboot. • Cycle power to the library or reboot using the GUI touch screen.
3002	Picker Tach Errors (Picker tachometer errors were detected when checking slots.)	• Press the **Ente**r button to reboot. • Cycle power to the library or reboot using the GUI touch screen.
3005	Pass-thru Tach Errors (Excessive Pass through elevator tach errors.)	• Power down the library using the LCD touch display. • Remove Pass-through and check connections.
3011	Bin Fetch Failure (Loader failed to fetch a cartridge from a bin.)	• Press the **Enter** button to reboot. • Ensure cartridges are fully inserted in the magazine(s). • Ensure that there are no obstructions inside the library (all cartridges are in magazines). • Run the cartridge cycle diagnostic to verify. • Check the tape cartridge used in the last operation for damage.

Table 10   Fault Symptom Codes (continued)

FSC	Message	ERP
3013	Drive Fetch Failure (Loader failed to fetch a cartridge from a drive.)	• Press the **Enter** button to reboot. • Ensure the drive shows good status through the drive status window. • Deactivate the drive using the GUI control panel maintenance menu. • Reseat the drive. • Check cabling. • Load/unload a cartridge to the drive to verify. • Check the tape cartridge used in the last operation for damage. • Run the cartridge cycle diagnostic to verify.
3014	Drive stow Failure Stow to drive failed	• Make sure the drive shows good status through the drive status window. • Try loading then unloading the cartridge via the Move Media option using the LCD touch display.
3015	Drive Timeout Failure (Loader detects unload command time-out.)	• Press the **Enter** button to reboot. • Ensure the drive shows good status through the drive status window. • Deactivate the drive using the GUI control panel maintenance menu. • Reseat the drive. • Check cabling. • Load/unload a cartridge to the drive to verify. • Check the tape cartridge used in the last operation for damage. • Run the cartridge cycle diagnostic to verify.

Table 10   Fault Symptom Codes (continued)

FSC	Message	ERP
3016	Drive Status Failure	• Press the **Enter** button to reboot. • Ensure the drive shows good status through the drive status window. • Deactivate the drive using the GUI control panel maintenance menu. • Reseat the drive. • Check cabling. • Load/unload a cartridge to the drive to verify. • Check the tape cartridge used in the last operation for damage. • Run the cartridge cycle diagnostic to verify.
3017	Drive In Flux Timeout (Time-out waiting for drive to clear the full status.)	• Press the **Enter** button to reboot. • Ensure the drive shows good status through the drive status window. • Deactivate the drive using the GUI control panel maintenance menu. • Reseat the drive. • Check cabling. • Load/unload a cartridge to the drive to verify. • Run the cartridge cycle diagnostic to verify.
3018	Drive Load Retry Failed (SLTO drive fail to load, detected in drive task.)	• Press the **Enter** button to reboot. • Ensure the drive shows good status through the drive status window. • Deactivate the drive using the GUI control panel maintenance menu. • Reseat the drive. • Check cabling. • Load/unload a cartridge to the drive to verify. • Check the tape cartridge used int he last operation for damage. • Run the cartridge cycle diagnostic to verify.

Table 10 Fault Symptom Codes (continued)

FSC	Message	ERP
3019	Drive Open Door Failed	• Press the **Enter** button to reboot. • Ensure the drive shows good status through the drive status window. • Deactivate the drive using the GUI control panel maintenance menu. • Reseat the drive. • Load/unload a cartridge to the drive to verify. • Check the tape cartridge used int he last operation for damage. • Run the cartridge cycle diagnostic to verify.
301A	Drive Close Door Failed	• Press the **Enter** button to reboot. • Ensure the drive shows good status through the drive status window. • Deactivate the drive using the GUI control panel maintenance menu. • Reseat the drive. • Load/unload a cartridge to the drive to verify. • Check the tape cartridge used in the last operation for damage. • Run the cartridge cycle diagnostic to verify.
301B	Drive Communication Error (Intertask send, receive failed.)	• Press the **Enter** button to reboot. • Ensure the drive shows good status through the drive status window. • Deactivate the drive using the GUI control panel maintenance menu. • Reseat the drive. • Check cabling. • Load/unload a cartridge to the drive to verify. • Check the tape cartridge used in the last operation for damage. • Run the cartridge cycle diagnostic to verify.

Table 10 Fault Symptom Codes (continued)

FSC	Message	ERP
301C	Drive Get General Status Fail (Drive communication failed.)	• Press the **Enter** button to reboot. • Ensure the drive shows good status through the drive status window. • Deactivate the drive using the GUI control panel maintenance menu. • Reseat the drive. • Check cabling. • Load/unload a cartridge to the drive to verify. • Check the tape cartridge used in the last operation for damage. • Run the cartridge cycle diagnostic to verify.
301D	Drive Get Status 3 Fail	• Press the **Enter** button to clear the message. • Contact support.
301E	Drive Unload Fail	• Make sure the drive shows good status through the drive status window. • Try unloading then loading the cartridge via the Move Media option using the LCD touch display.
3020	Undefined Config (In loader, unexpected configuration, not a 5U or 10U model. In diagnostics, invalid source or destination.)	• Press the **Enter** button to clear the message. • Contact support.
3030	Orphan Cartridge not stowed (The loader could not successfully stow an orphan cartridge to a bin.)	• Unload magazine, remove a tape, replace the magazine, and retry the operation.
3031	Chassis S/N Mismatch. Previous S/N retained (The serial number scanned from the bar code label does not match the value stored in non-volatile memory.)	• Press the **Enter** button to clear the message. • No action is required. This error is expected when replacing the controller board. If controller board was not replace, then contact support.
3032	Chassis S/N Character count is not correct (A valid serial number bar code label could not b read.)	• Press the **Enter** button to clear the message. • Contact support.

Table 10 Fault Symptom Codes (continued)

FSC	Message	ERP
3033	Chassis S/N did not scan (A valid serial number bar code label could not be read.)	• Press the **Enter** button to clear the message. • Contact support.
3034	Chassis S/N save operation failed (The serial number scanned from the bar code label could not be saved to non-volatile memory.)	• Press the **Enter** button to clear the message. • Contact support.
3035	Drive Unload Prevented (The drive prevented media removal barcode on cartridge in drive could not be read.)	• Remove the cartridge from the library via the Move Media using the LCD touch display. • Inspect/replace the barcode label if necessary.
3040	Motor Firmware Error (The loader task detected an unexpected status and could not recover.)	• Press the **Enter** button to reboot. • Turn off power to the library and inspect connectors and cables.
3041	Loader Received Invalid Command (The loader task received an unexpected command and could not recover.)	• Press the **Enter** button to reboot. • Turn off power to the library and inspect connectors and cables.
3042	Motor Firmware Error (The loader task detected an unexpected status and could not recover.)	• Press the **Enter** button to reboot. • Turn off power to the library and inspect connectors and cables.
3050	Missing Magazine (In diag, no magazine installed for diag to run.)	• Press the **Enter** button to clear the message. • Insert magazine. • Invalid user initiated operation. Set parameters correctly and try again.
3051	No Cartridges In Library (No cartridge available for diag to run.)	• Press the **Enter** button to clear the message. • Insert cartridge. • Invalid user initiated operation. Set parameters correctly and try again.
3052	Too Many Cartridges (Unable to run cartridge or drive cycle because loader is full with cartridges.)	• Press the **Enter** button to clear the message. • Remove a tape from the library. • Invalid user initiated operation. Set parameters correctly and try again.

Table 10 Fault Symptom Codes (continued)

FSC	Message	ERP
3054	Need 1 Drive Minimum (No available drive to run diag.)	• Install or activate a drive. • Press the **Enter** button to clear the message. • Invalid user initiated operation. Set parameters correctly and try again.
3055	Memory Allocation Error (Memory allocation error in diagnostic.)	• Cycle power to the library or reboot by using the LCD touch display. Wait 30 seconds to power up again.
3057	Invalid Magazine Type (Unsupported magazine type detected.)	• Upgrade firmware if a newer revision exists. • Press the **Enter** button to clear the message. • Check magazine type. • Invalid user initiated operation. Set parameters correctly and try again.
3058	Magazine Type Change Not Handled (Unsupported magazine type detected.)	• Upgrade firmware if a newer revision exists. • Press the **Enter** button to clear the message. • Check drive type. • Invalid user initiated operation. Set parameters correctly and try again.
3059	Drive Type Not Supported (Unsupported magazine type detected.)	• Upgrade firmware if a newer revision exists. • Press the **Enter** button to clear the message. • Invalid user initiated operation. Set parameters correctly and try again.
3060	Zone Sequence Error	• Cycle power to the library or reboot by using the LCD touch display. • Update the Map using the LCD touch display. (Menu -> Maintenance -> Force reconfiguration)
3061	Homing Error (Unable to complete Shuttle Homing Algorithm.)	• Cycle power to the library or reboot by using the LCD touch display. • Update the Map using the LCD touch display. (Menu -> Maintenance -> Force reconfiguration)

Table 10   Fault Symptom Codes (continued)

FSC	Message	ERP
305B	Diag Fetch, Drive not loaded (Diag: no cartridge present for fetch.)	• Press the **Enter** button to clear the message. • Load a cartridge in the drive and retry the operation. • Invalid user initiated operation. Set parameters correctly and try again.
305D	Diag Timeout waiting for drive empty, ready (Fetch, time-out waiting for drive unload.)	• Press the **Enter** button to reboot. • Invalid user initiated operation. Set parameters correctly and try again. • Ensure the drive shows good status through the drive status window. • Check the tape cartridge used in the last operation for damage.
305F	Invalid bin number (Invalid bin number detected in diag.)	• Press the **Enter** button to clear the message. • Invalid user initiated operation. Set parameters correctly and try again.
3060	Zone Sequence Error (Robot did not find sensor on power-up.)	• Cycle power to the library or reboot using the GUI touch screen.
3074	Drive 0 Eject Failed (Eject command time-out.)	• Press the **Enter** button to reboot. • Ensure the drive shows good status through the drive status window. • Deactivate the drive using the GUI control panel maintenance menu. • Reseat drive. • Load/unload a cartridge to the drive to verify. • Check the tape cartridge used in the last operation for damage. • Run the cartridge cycle diagnostic to verify.

Table 10 Fault Symptom Codes (continued)

FSC	Message	ERP
3075	Drive 1 Eject Failed (Eject command time-out.)	• Press the **Enter** button to reboot. • Ensure the drive shows good status through the drive status window. • Deactivate the drive using the GUI control panel maintenance menu. • Reseat drive. • Load/unload a cartridge to the drive to verify. • Check the tape cartridge used in the last operation for damage. • Run the cartridge cycle diagnostic to verify.
3076	Drive 2 Eject Failed (Eject command time-out.)	• Press the **Enter** button to reboot. • Ensure the drive shows good status through the drive status window. • Deactivate the drive using the GUI control panel maintenance menu. • Reseat drive. • Load/unload a cartridge to the drive to verify. • Check the tape cartridge used in the last operation for damage. • Run the cartridge cycle diagnostic to verify.
3077	Drive 3 Eject Fail (Eject command time-out.)	• Press the **Enter** button to reboot. • Ensure the drive shows good status through the drive status window. • Deactivate the drive using the GUI control panel maintenance menu. • Reseat drive. • Load/unload a cartridge to the drive to verify. • Check the tape cartridge used in the last operation for damage. • Run the cartridge cycle diagnostic to verify.

Table 10   Fault Symptom Codes (continued)

FSC	Message	ERP
3078	Diag get drive 0 status failed (Failed to get drive status, communication error.)	• Press the **Enter** button to reboot. • Ensure the drive shows good status through the drive status window. • Deactivate the drive using the GUI control panel maintenance menu. • Reseat drive. • Check cabling. • Load/unload a cartridge to the drive to verify. • Check the tape cartridge used in the last operation for damage. • Run the cartridge cycle diagnostic to verify.
3079	Diag get drive 1 status failed (Failed to get drive status, communication error.)	• Press the **Enter** button to reboot. • Ensure the drive shows good status through the drive status window. • Deactivate the drive using the GUI control panel maintenance menu. • Reseat drive. • Check cabling. • Load/unload a cartridge to the drive to verify. • Check the tape cartridge used in the last operation for damage. • Run the cartridge cycle diagnostic to verify.

Table 10   Fault Symptom Codes (continued)

FSC	Message	ERP
307A	Diag get drive 2 status failed (Failed to get drive status, communication error.)	• Press the **Enter** button to reboot. • Ensure the drive shows good status through the drive status window. • Deactivate the drive using the GUI control panel maintenance menu. • Reseat drive. • Check cabling. • Load/unload a cartridge to the drive to verify. • Check the tape cartridge used in the last operation for damage. • Run the cartridge cycle diagnostic to verify.
307B	Diag get drive 3 status failed (Failed to get drive status, communication error.)	• Press the **Enter** button to reboot. • Ensure the drive shows good status through the drive status window. • Deactivate the drive using the GUI control panel maintenance menu. • Reseat drive. • Check cabling. • Load/unload a cartridge to the drive to verify. • Check the tape cartridge used in the last operation for damage. • Run the cartridge cycle diagnostic to verify.
3082	Drive Stow Failed, Media Returned to Source	• Press the **Enter** button to clear the message. • Use only media approved for the drive type. • Invalid user initiated operation. Set parameters correctly and try again.
3083	Drive Stow Failed, Media Remains in Drive	• Press the **Enter** button to clear the message. • Invalid user initiated operation. Set parameters correctly and try again. • Ensure cartridges are in magazines.

Table 10 Fault Symptom Codes (continued)

FSC	Message	ERP
3084	UnSupported Drive For Requested Operation (Unsupported drive type.)	• Make sure the media type used is compatible with the drive. • Press the **Enter** button to clear the message. • Invalid user initiated operation. Set parameters correctly and try again.
308F	No Retry On Fetch/Stow (The loader retried an operation and retries were disabled.)	• Press the **Enter** button to clear the message. • Invalid user initiated operation. Set parameters correctly and try again. • Ensure configuration options are set correctly.
3100	Picker Jammed (The picker jammed during a bin stow operation.)	• Press the **Enter** button to reboot. • Cycle power to the library or reboot using the GUI touch screen. • Ensure that there are no obstructions inside the library (all cartridges are in magazines). • Ensure cartridges are fully inserted in the magazine(s).
3102	Picker Jammed 2 (The picker jammed during a bin stow operation.)	• Press the **Enter** button to reboot. • Cycle power to the library or reboot using the GUI touch screen. • Ensure that there are no obstructions inside the library (all cartridges are in magazines). • Ensure cartridges are fully inserted in the magazine(s).
3103	Picker Jammed 3 (The picker jammed during a bin stow operation.)	• Press the **Enter** button to reboot. • Cycle power to the library or reboot using the GUI touch screen. • Ensure that there are no obstructions inside the library (all cartridges are in magazines). • Ensure cartridges are fully inserted in the magazine(s).

Table 10 Fault Symptom Codes (continued)

FSC	Message	ERP
3104	Picker Jammed 4 (The picker jammed during a bin stow operation.)	• Press the **Enter** button to reboot. • Cycle power to the library or reboot using the GUI touch screen. • Ensure that there are no obstructions inside the library (all cartridges are in magazines). • Ensure cartridges are fully inserted in the magazine(s).
3105	Picker Jammed 5 (The picker jammed during a bin stow operation.)	• Press the **Enter** button to reboot. • Cycle power to the library or reboot using the GUI touch screen. • Ensure that there are no obstructions inside the library (all cartridges are in magazines). • Ensure cartridges are fully inserted in the magazine(s).
3106	Picker Jammed 6 (The picker jammed during a bin stow operation.)	• Press the **Enter** button to reboot. • Cycle power to the library or reboot using the GUI touch screen. • Ensure that there are no obstructions inside the library (all cartridges are in magazines). • Ensure cartridges are fully inserted in the magazine(s).
3107	Picker Jammed 7 (The picker jammed during a pass-through fetch operation.)	• Press the **Enter** button to reboot. • Cycle power to the library or reboot using the GUI touch screen. • Ensure that there are no (all cartridges are in magazines). • Ensure cartridges are fully inserted in the magazine(s). • Check pass-through alignment.

Table 10 Fault Symptom Codes (continued)

FSC	Message	ERP
3108	Picker Jammed 8 (The picker jammed during a pass-through fetch operation.)	• Press the **Enter** button to reboot. • Cycle power to the library or reboot using the GUI touch screen. • Ensure that there are no obstructions inside the library (all cartridges are in magazines). • Ensure cartridges are fully inserted in the magazine(s). • Check pass-through alignment.
3109	Picker Jammed 9	• Press Enter to reboot. • Make sure cartridges are fully inserted into magazines.
310A	Picker Jammed 10	• Press Enter to reboot. • Make sure cartridges are fully inserted into magazines.
310B	Picker Jammed 11 (The picker jammed during a drive fetch operation.)	• Press the **Enter** button to reboot. • Ensure the drive shows good status through the drive status window. • Cycle power to the library or reboot using the GUI touch screen. • Ensure that there are no obstructions inside the library (all cartridges are in magazines). • Ensure cartridges are fully inserted in the magazine(s).
310F	Picker Jammed on Stow (The picker jammed on a stow operation.)	• Press the **Enter** button to reboot. • Ensure the drive shows good status through the drive status window. • Cycle power to the library or reboot using the GUI touch screen. • Ensure that there are no obstructions inside the library (all cartridges are in magazines). • Ensure cartridges are fully inserted in the magazine(s).

Table 10   Fault Symptom Codes (continued)

FSC	Message	ERP
3110	Picker Retries Exceeded	• Cycle power to the library or reboot by using the LCD touch display. • Run cartridge cycle test using the LCD touch display. (Menu -> Maintenance -> Diagnostic options) Note: If the backup application is running, update the application cartridge map.
3111	Picker Retries Exceeded 1 (Picker retries exceeded during a pass-through fetch operation.)	• Press the **Enter** button to reboot. • Cycle power to the library or reboot using the GUI touch screen. • Check pass-through alignment.
3112	Picker Retries Exceeded 2	• Cycle power to the library or reboot by using the LCD touch display. • Run cartridge cycle test using the LCD touch display. (Menu -> Maintenance -> Diagnostic options) Note: If the backup application is running, update the application cartridge map.
3113	Picker Retries Exceeded 3 (Picker retries exceeded during a bin stow operation.)	• Press the **Enter** button to reboot. • Cycle power to the library or reboot using the GUI touch screen. • Ensure that there are no obstructions inside the library (all cartridges are in magazines). • Ensure cartridges are fully inserted in the magazine(s).
3115	Picker Retraction Error (Picker did not retract during a bin check operation.)	• Press the **Enter** button to reboot. • Cycle power to the library or reboot using the GUI touch screen.
3200	Shuttle Jammed (Shuttle could not reach target location.)	• Press the **Enter** button to reboot. • Check pass-through mechanism alignment. • Cycle power to the library or reboot using the GUI touch screen.

Table 10   Fault Symptom Codes (continued)

FSC	Message	ERP
3300	Rotary Jammed (Rotary track could not reach target location.)	• Press the **Enter** button to reboot. • Cycle power to the library or reboot using the GUI touch screen. • Ensure that there are no obstructions inside the library (all cartridges are in magazines). • Ensure cartridges are fully inserted in the magazine(s).
3301	Shuttle on Wrong Side Of The Rotary (Zone indicators show that the shuttle is backwards on the rotary track during power-up initialization.)	• Press the **Enter** button to reboot. • Cycle power to the library or reboot using the GUI touch screen.
3303	Shuttle Not Attached to Cable	• Cycle power to the library or reboot by using the LCD touch display. • Check cable connections.
3400	Pass-through Elevator Jammed (Pass-through shuttle could not reach target location.)	• Press the **Enter** button to reboot. • Cycle power to the library or reboot using the GUI touch screen. • Ensure that there are no obstructions inside the library (all cartridges are in magazines). • Check pass-through alignment.
3500	Vertical Elevator Jammed (Vertical elevator could not reach target location. 10U libraries only).	• Press the **Enter** button to reboot. • Cycle power to the library or reboot using the GUI touch screen. • Ensure that there are no obstructions inside the library (all cartridges are in magazines).
5011	All Slots Empty (There are no cartridges installed in any of the reserved cleaning slots.)	• Press the **Enter** button to clear the message. • Insert cleaning cartridge in reserved cleaning slot. • Invalid user initiated operation. Set parameters correctly and try again.

Table 10 Fault Symptom Codes (continued)

FSC	Message	ERP
5014	Drive Already Loaded (Cleaning operation failed because the drive already has a cartridge inserted.)	• Press the **Enter** button to clear the message. • Invalid user initiated operation. Set parameters correctly and try again. • If the tape in the drive is not in use, unload the drive and retry the cleaning operation.
5015	Expired Clean'g Cart (Cleaning operation failed due to an expired cleaning cartridge.)	• Press the **Enter** button to clear the message. • Remove expired cleaning cartridge from library and discard. Replace with new cleaning cartridge.
5016	Not a Clean'g Cart (Cleaning operation failed because the loaded cartridge is not a cleaning cartridge.)	• Press the **Enter** button to clear the message. • Make sure tape in reserved slot is a cleaning cartridge. • Invalid user initiated operation. Set parameters correctly and try again.
5035	Drive Timeout Error (Cleaning operation failed because the drive timed out.)	• Press the **Enter** button to clear the message. • Invalid user initiated operation. Set parameters correctly and try again. • Ensure the drive shows good status through the drive status window.
503B	Move Command Fail (A front panel move operation failed.)	• Press the **Enter** button to clear the message. • Invalid user initiated operation. Set parameters correctly and try again.
503C	Clean Operation Timeout (Cleaning operation failed because the drive timed out.)	• Press the **Enter** button to clear the message. • Invalid user initiated operation. Set parameters correctly and try again. • Ensure the drive shows good status through the drive status window.

Table 10 Fault Symptom Codes (continued)

FSC	Message	ERP
503D	Drive Status Fail (Cleaning operation failed because the library could not retrieve drive status.)	• Press the **Enter** button to clear the message. • Invalid user initiated operation. Set parameters correctly and try again. • Ensure the drive shows good status through the drive status window.
6001	Inter-Module Unknown Event (Inter-module communication failure.)	• Press Enter to reboot. • Check pass-through connections. • Check network connections to the network router.
6002	Inter-Module no command matching response	• Verify operation and retry. • Update the Map using the LCD touch display. (Menu -> Maintenance -> Force reconfiguration)
6003	Inter-Module command length (Incorrect command length.)	• Verify operation and retry. • Update the Map using the LCD touch display. (Menu -> Maintenance -> Force reconfiguration)
6004	Inter-Module loopback buffer mismatch	• Cycle power to the library or reboot by using the LCD touch display. • Retry operation.
6005	Inter-Module bad data length (Incorrect data length.)	• Verify operation and retry. • Update the Map using the LCD touch display. (Menu -> Maintenance -> Force reconfiguration)
6006	Inter-Module bad packet length (Incorrect packet length.)	• Verify operation and retry. • Update the Map using the LCD touch display. (Menu -> Maintenance -> Force reconfiguration)
6007	Inter-Module failed to allocate TCP buffer	• Power cycle the library. • Check pass-through connections.
6008	Inter-Module pending table full	• Power cycle the library. • Retry the operation.
7001	Command response from unexpected source	• Press the **Enter** button to reboot. • Cycle power to the library or reboot using the GUI touch screen.

Table 10   Fault Symptom Codes (continued)

FSC	Message	ERP
7002	Control command execution failed	• Press the **Enter** button to reboot. • Cycle power to the library or reboot using the GUI touch screen.
7003	Control response not matched to a known command	• Press the **Enter** button to reboot. • Cycle power to the library or reboot using the GUI touch screen.
7004	Loader response not matched to a known command	• Press the **Enter** button to reboot. • Cycle power to the library or reboot using the GUI touch screen.
7005	Drive response not matched to a known command	• Press the **Enter** button to reboot. • Cycle power to the library or reboot using the GUI touch screen.
7006	Flash response not matched to a known command	• Press the **Enter** button to reboot. • Cycle power to the library or reboot using the GUI touch screen.
7007	Drive index on Update Status message was invalid	• Press the **Enter** button to reboot. • Cycle power to the library or reboot using the GUI touch screen. • Ensure the drive shows good status through the drive status window.
7008	The Drive response was not as expected	• Press the **Enter** button to reboot. • Cycle power to the library or reboot using the GUI touch screen. • Ensure the drive shows good status through the drive status window.
7009	The opcode for a WORD message was unknown	• Press the **Enter** button to reboot. • Cycle power to the library or reboot using the GUI touch screen.
700A	The opcode for a DWORD message was unknown	• Press the **Enter** button to reboot. • Cycle power to the library or reboot using the GUI touch screen.
700B	The button causing library to go offline was unknown (A command to take the library off-line was completed successfully, but the GUI button that initiated the action could not be identified.)	• Press the **Enter** button clear the message. • Cycle power to the library or reboot using the GUI touch screen.

Table 10 Fault Symptom Codes (continued)

FSC	Message	ERP
700C	Destination Xchg was Null	• Press the **Enter** button to reboot. • Cycle power to the library or reboot using the GUI touch screen.
700D	Sending of a cmd failed	• Press the **Enter** button to reboot. • Cycle power to the library or reboot using the GUI touch screen.
700E	Deactivating a drive that is not attached (The control task indicates that a request to deactivate a drive failed because the drive is not attached.)	• Press the **Enter** button clear the message. • Cycle power to the library or reboot using the GUI touch screen. • Ensure the drive shows good status through the drive status window. • Reseat the drive. • Check cabling.
700F	Deactivation of a drive failed (The control task indicates that a request to deactivate a drive failed. Reason unknown.)	• Press the **Enter** button clear the message. • Cycle power to the library or reboot using the GUI touch screen. • Ensure the drive shows good status through the drive status window • Reseat the drive. • Check cabling.
7010	Drive removal failed (The drive task indicates that a request to power-down a drive failed. Reason unknown.)	• Press the **Enter** button clear the message. • Cycle power to the library or reboot using the GUI touch screen. • Ensure the drive shows good status through the drive status window.
7012	Drive is Active failed (The drive task indicates that a request to determine if a drive is executing a host command failed. Reason unknown.)	• Press the **Enter** button clear the message. • Cycle power to the library or reboot using the GUI touch screen. • Ensure the drive shows good status through the drive status window.

Table 10 Fault Symptom Codes (continued)

FSC	Message	ERP
7013	Control Com Unidentified (During a hot swap, a command response from the control task could not be associated with any outstanding command.)	• Press the **Enter** button clear the message. • Cycle power to the library or reboot using the GUI touch screen. • Ensure the drive shows good status through the drive status window.
7014	Drive status update failed (The drive task indicates that a request to determine the current state of a drive failed. Reason unknown.)	• Press the **Enter** button clear the message. • Cycle power to the library or reboot using the GUI touch screen. • Ensure the drive shows good status through the drive status window.
7015	Loader command execution failed (The loader task indicates that a command has failed to complete successfully.)	• Press the **Enter** button clear the message. • Cycle power to the library or reboot using the GUI touch screen.
7016	Sequential command execution failed (The sequential task indicates that a command has failed to complete successfully.)	• Press the **Enter** button clear the message. • Cycle power to the library or reboot using the GUI touch screen.
7017	Destination Xchg for msg. was Null (Attempted to send a message to a task, but the argument exchange pointer was NULL.)	• Press the **Enter** button clear the message. • Cycle power to the library or reboot using the GUI touch screen.
7018	Bad src mod in peg msg (A message was received from a remote module, but the module number was out of range.)	• Press the **Enter** button clear the message. • Cycle power to the library or reboot using the GUI touch screen.
7019	Peg message wrapping a Null msg. ptr. (A peg message has a pointer to NULL.)	• Press the **Enter** button clear the message. • Cycle power to the router. • Cycle power to all libraries in a stack, or reboot using the GUI touch screen.
701A	Xchg conversion failed (Attempted to determine the module number containing the task that is returning a command response failed.)	• Press the **Enter** button clear the message. • Cycle power to the library or reboot using the GUI touch screen.

Table 10   Fault Symptom Codes (continued)

FSC	Message	ERP
701B	Invalid L-drive number to convert (Attempted to send a command to a drive, but the logical drive number is out of range.)	• Press the **Enter** button clear the message. • Cycle power to the library or reboot using the GUI touch screen. • Ensure the drive shows good status through the drive status window.
701C	Invalid P-drive number to convert (Attempted to send a command to a drive, but the physical drive number is out of range.)	• Press the **Enter** button clear the message. • Cycle power to the library. • Ensure the drive shows good status through the drive status window.
701D	Invalid mod number to convert (Attempted to send a command to a drive in a remote module, but the module number is out of range.)	• Press the **Enter** button clear the message. • Cycle power to the library or reboot using the GUI touch screen.
701E	Unknown drive type (Attempted to show detailed drive status of a drive whose type is unknown.)	• Press the **Enter** button clear the message. • Cycle power to the library or reboot using the GUI touch screen. • Ensure the drive shows good status through the drive status window.
701F	The SCSI response was not expected (The command response from the SCSI task in a remote module was unexpected.)	• Press the **Enter** button clear the message. • Cycle power to the library or reboot using the GUI touch screen. • Ensure the drive shows good status through the drive status window.
7020	The Flash response was not expected (The command response from the Flash task in a remote module was unexpected.)	• Press the **Enter** button clear the message. • Cycle power to the library or reboot using the GUI touch screen. • Ensure the drive shows good status through the drive status window.

Table 10   Fault Symptom Codes (continued)

FSC	Message	ERP
7021	SCSI response not matched to a known command (A command response was received from a SCSI task, but the original command opcode could not be determined.)	• Press the **Enter** button clear the message. • Cycle power to the library or reboot using the GUI touch screen. • Ensure the drive shows good status through the drive status window.
7022	Unexpected state after NonVolConfig cmd (After successfully completing a NonVolConfigPut command, the current state of the save operation was unknown.)	• Press the **Enter** button clear the message. • Cycle power to the library or reboot using the GUI touch screen. • Ensure the drive shows good status through the drive status window.
7023	Unexpected state after SCSI mode cmd (After successfully completing a SCSIUpdateMode Parameters command, the current state of the save operation was unknown.)	• Press the **Enter** button clear the message. • Cycle power to the library or reboot using the GUI touch screen. • Ensure the drive shows good status through the drive status window.
7024	Unexpected state after SCSI init cmd (After successfully completing a SCSIInitCommand, the current state of the save operation was unknown.)	• Press the **Enter** button clear the message. • Cycle power to the library or reboot using the GUI touch screen. • Ensure the drive shows good status through the drive status window.
7025	Message is Invalid Map Conversion Parameters (GUI Map Parameters are corrupt or invalid.)	• Update the Map using the LCD touch display. (Menu -> Maintenance -> Force reconfiguration)
8001	Cartridge reject recovery failed	• Press the **Enter** button to reboot. • Ensure the drive shows good status through the drive status window. • Cycle power to the library or reboot using the GUI touch screen. • Check the tape cartridge used in the last operation for damage.

Table 10 Fault Symptom Codes (continued)

FSC	Message	ERP
8002	Drive Fan stalled (The fan in the drive hot-swap shoe is either not installed or has stalled.)	• Press the **Enter** button to clear the message. • Look for a drive with an amber LED (rear of library) to determine which drive has the fan issue. If the drive is not in use, take it off-line to prevent it from overheating. If currently in use, end the operation immediately, and take the drive off-line.
8003	Drive load did not complete (The drive failed to successfully load a tape.)	• Press the **Enter** button to reboot. • Ensure the drive shows good status through the drive status window. • Cycle power to the library or reboot using the GUI touch screen. • Check the tape cartridge used in the last operation for damage.
8004	Invalid drive was installed (One or more installed drives are of a type either unknown or not supported in the current library personality.)	• Press the **Enter** button to clear the message. • Update the firmware if a newer revision exists. • Invalid user initiated operation. Set parameters correctly and try again.
9001	Orphan cartridge recovery failed (The master module could not successfully return an orphan cartridge to a slot location.)	• Make sure there is one empty slot in a magazine in the master module. • Press the **Enter** button to reboot. • Cycle power to the library or reboot using the GUI touch screen. • Check pass-through alignment. • Ensure that there are no obstructions inside the library (all cartridges are in magazines). • Check the tape cartridge used in the last operation for damage.

Table 10 Fault Symptom Codes (continued)

FSC	Message	ERP
9003	Master pass-thru opto failed. (The master module opto sensor was not detected during the power-up Pass-Through module inventory.)	• Press the **Enter** button to reboot. • Run the sensor test, checking appropriate sensor. • Determine if the pass-through may have been plugged or unplugged while power was on to the library. • Reinitialize or power-cycle the master it is connected to. Ensure the pass-through is functioning by observing whether or not the pass-through car moves to either end of the pass-through smoothly.
A001	SMX send error (An attempt to place a message on a task's exchange generated a kernel error.)	• Press the **Enter** button to reboot. • Cycle power to the library or reboot using the GUI touch screen.
A002	SMX receive error (An attempt to receive a message from a task's exchange generated a kernel error.)	• Press the **Enter** button to reboot. • Cycle power to the library or reboot using the GUI touch screen.
A003	Comm free list empty (An attempt to acquire a message from the free pool failed because the pool is empty.)	• Press the **Enter** button to reboot. • Cycle power to the library or reboot using the GUI touch screen.
A004	Invalid comm. put attempt (An attempt to place a message on a task's exchange failed.)	• Press the **Enter** button to reboot. • Cycle power to the library or reboot using the GUI touch screen.
A005	Invalid comm. get attempt (An attempt to receive a message from a task's exchange failed.)	• Press the **Enter** button to reboot. • Cycle power to the library or reboot using the GUI touch screen.
A006	Comm initialization error (The Comm manager could not be initialized at power-up because system is out of memory.)	• Press the **Enter** button to reboot. • Cycle power to the library or reboot using the GUI touch screen.
A007	Put of a NULL comm.	• Press the **Enter** button to reboot. • Cycle power to the library or reboot using the GUI touch screen.

Table 10 Fault Symptom Codes (continued)

FSC	Message	ERP
A008	Msg contains no comm. (A message obtained from the pool did not contain a Comm block.)	• Press the **Enter** button to reboot. • Cycle power to the library or reboot using the GUI touch screen.
A009	Comm return address is unknown (An attempt to return a command response to the originating task failed because the originator could not be determined.)	• Press the **Enter** button to reboot. • Cycle power to the library or reboot using the GUI touch screen.
C001	Gateway initialization failed (WEB TLC was unable to initialize the gateway)	• Check the library IP address • Check network cable connections to the network router.
C002	Gateway Terminate Time-out (WEB TLC times-out when attempting to terminate the gateway.)	• Power-down the library using the LCD touch display.
C010	Error Attempting to exit Menu Mode (WEB TLC experienced an error when exiting the Menu Mode.)	• Power-down the library using the LCD touch display.
D001	No WAN IP Address Tag Found (WEB TLC was unable to find a WAN IP address.)	• Verify the WAN IP address.
D002	WAN port disconnected (WEB TLC did not detect a WAN port.)	• Check the WAN cable connection.
F001	Bad Image CRC (The uploaded firmware image has a bad CRC and is probably corrupted.)	• Press the **Enter** button to clear the message. • Make sure the firmware file is complete and correct. If having difficulty uploading firmware via FTP, telnet, the web management interface, or TSMC, try using HP StorageWorks Library and Tape Tools.
F002	Flash erase sector failed (One of the flash memory sectors could not be programmed.)	• Press the **Enter** button to clear the message.
F003	Flash program sector failed (One of the flash memory sectors could not be erased.)	• Press the **Enter** button to clear the message.

Table 10 Fault Symptom Codes (continued)

FSC	Message	ERP
F004	Bad flash CRC (The firmware image programmed into flash memory has a bad CRC and is probably corrupted.)	• Press the **Enter** button to clear the message. • Make sure the firmware file is complete and correct. If having difficulty uploading firmware via FTP, telnet, the web management interface, or LTT, try using HP StorageWorks Library and Tape Tools (see page 141).
F005	Flash exit error (Internal flash task error.)	• Press the **Enter** button to clear the message.
F006	Incompatible image (The uploaded firmware image is not compatible with the library hardware, and is possibly an older firmware version.)	• Press the **Enter** button to clear the message. • Make sure the firmware file is complete and correct. If having difficulty uploading firmware via FTP, telnet, the web management interface, or LTT, try using HP StorageWorks Library and Tape Tools (see page 141).
F402	Buffer allocation failed (The flash task could not allocate a buffer area to hold the firmware image to be uploaded.)	• Press the **Enter** button to clear the message.

Troubleshooting General Problems

This section includes information on troubleshooting general library problems. For problems that may be related to the host or application software, refer to the host system documentation or the application software instructions, and ensure that the software has the latest patches. If these procedures fail, contact your authorized service provided for further assistance.

△ **CAUTION:** Consult your system administrator before cycling power. Never cycle power when active devices are connected to the SCSI bus or Fibre Channel bus. Cycling power when the SCSI bus or Fibre Channel bus is active can cause data loss or hang the host system.

Table 11 Troubleshooting General Problems

Problem	Solution
Power	
Library will not power on.	• Check all power cord connections. • Make sure that each power switch is on. • Press anywhere on the GUI touch screen to activate the display and turn on the library. • Verify that the LEDs on the back of the library are on and that the fans are turning to ensure the library is receiving power. • Replace the power cord(s). • Contact your authorized service provider.
One of the redundant power supplies is not functioning properly.	• Check the LEDs on the power supplies to identify the one that may be at fault. • Check GUI for FSC code. • Contact your authorized service provider.
No display messages appear on the GUI touch screen.	• Touch the GUI screen to bring out of sleep mode. • Make sure the power cord is connected. • Make sure the power switches are on. • Check that the LEDs on the back of the library are on and the fans are turning. • Cycle power to the library or reboot using the GUI touch screen. • Try to access the library from the Web using the Remote Management Interface (see page 79), or through a host-based diagnostics tool such as HP StorageWorks Library & Tape Tools (see page 98). • Download library firmware (see page 97). • Contact your authorized service provider.
Tape Movement	
An error message appears after inserting the magazine or loading tapes.	• Verify that tapes are inserted correctly in the magazine. • Ensure that you are using the correct tape type for your drive technology. • Contact your authorized service provider.

Table 11 Troubleshooting General Problems (continued)

Problem	Solution
A tape is stuck in a drive.	• Cycle power to the library or reboot using the GUI touch screen, and retry unloading the tape from the library GUI touch screen, the Remote Management Interface, or the host application software. • Ensure the host application software is not reserving the slot or drive. The software needs to cancel the reservation. If necessary, disconnect from the host, power cycle, and unload the drive. • Contact your authorized service provider.
A tape is stuck in the robotics.	• Run a **Vertical Calibration** test from the **Diagnostics** section of the **Utilities** menu. • Cycle power to the library or reboot using the GUI touch screen. • Contact your authorized service provider.
A tape is stuck in a storage slot.	• Using the GUI touch screen, open the appropriate door, and remove the magazine. • Pull the tape out. • Reinsert the magazine. • If the magazine is damaged, contact your authorized service provider.
Robotics are misaligned. Robotics won't get a tape. Tape/drive/robotics are misaligned.	• Run a **Vertical Calibration** test from the **Diagnostics** section of the **Utilities** menu. • Ensure that you are using the correct tape type for your drive technology. • Contact your authorized service provider.
Media	
Cannot load tape into drive.	• Ensure your media and format type matches your drive type.
A new Ultrium data cartridge that is write-enabled is rejected by the drive.	• LTO Cartridge Memory has failed or is damaged. Replace the data cartridge.
A new Ultrium data cartridge that is write-protected is rejected in multiple known good drives.	• LTO Cartridge Memory has failed, and the drive has found no data to recover. Replace the data cartridge.

Table 11 Troubleshooting General Problems (continued)

Problem	Solution
An Ultrium cartridge that has data written to it and is write-protected restores very slowly.	• LTO Cartridge Memory has failed, and the drive cannot use the tape directory information to recover the data. The data can still be recovered, but may take longer than normal. • Contact your authorized support provider for more information.
Cannot write to tape.	• Check the write-protect tab on the tape to assure write-enabled status. • Ensure that the application software does not have the write-protect setting activated. • Check the host device file system access permissions. • Verify that you are using the correct tape type for your drive technology. • Try a new tape. **CAUTION:** During the troubleshooting process, do not put the tape in question into another drive, since damaged tapes can damage drives.
Cannot load the cleaning cartridge.	• Ensure you are using an approved cleaning cartridge for your drive type. • Verify that the reserved cleaning slot is set up correctly and that the cartridge is in the correct slot. The slot numbering may be affected when manually loading a magazine, changing the number of mail slots, or using the default numbering scheme which begins with zero. • Contact your authorized service provider.
Connections	
Changed the drive SCSI ID, but the new ID is not recognized by the host computer.	• Check that all SCSI devices on the same bus have different ID numbers. • Reboot the host. • Check for proper cabling and termination. • Contact your authorized service provider.

Table 11 Troubleshooting General Problems (continued)

Problem	Solution
Host does not detect the library.	• Ensure that the HBA type matches the library type (LVDS or single-ended SCSI) and is properly installed and configured. • Check that the library is terminated and properly cabled. • Check that the SCSI cable length limits have not been exceeded. NOTE: SCSI cable length limits are very short on a Single-Ended bus. • Ensure that the terminator is compatible with the library (LVDS or single-ended SCSI). • Check for SCSI ID conflicts. • Check that the HBA is recognized by the operating system and properly configured. • Check that the application software is compatible with the library, and that it has all necessary patches and updates. • Check that the device is properly installed and configured using HP StorageWorks Library & Tape Tools, available from http://www.hp.com/support/tapetools • Power cycle the library and power down the host. Wait until the library completes its power cycle before powering up the host. • If using Fibre Channel, make sure you power on the devices in the correct order (switch, hub, library, host). • If using Fibre Channel, make sure there is not a zoning issue that is preventing the host from seeing the library. • If using Fibre Channel, make sure that the router sees the library and/or drives. • Contact your authorized service provider.

Table 11 Troubleshooting General Problems (continued)

Problem	Solution
Library Performance	
HP-UX host responds slowly, or crashes after connecting to the library.	• Check the SCSI IDs of all devices on the host busses to ensure there are no conflicts. • Check that the application software does not require SCSI IDs to be in a certain order. • Contact your authorized service provider.
The library is not efficiently backing up data.	• Check the network bandwidth from the target to the host computer. • Check that the library's drives are on their own SCSI bus, and not daisy-chained to another tape drive, hard drive, or other high bandwidth device. • Check that the server and file system have the processing power and memory needed to stream the tape drive. • Ensure that other applications are not taking up bandwidth from the backup server or target workstations. • Ensure the server has a fast enough file system (i.e. RAID). • Ensure that the drive is clean. • Try a new tape. A marginal tape can cause performance problems due to bad spots on the tape, requiring retries. • Ensure that the application software is using fixed-length records (or blocks) to maximize throughput, and has not defaulted to a smaller record size. (64K should be sufficient.) • Ensure that the data is being compressed, however do not turn on both software and hardware compression. (In most cases, hardware compression should be enabled.) • Check the size of the files. Backing up several small files can impact performance.

Using Diagnostic Support Tools

This section describes diagnostic tools available to help troubleshoot and maintain your tape library.

HP StorageWorks Library and Tape Tools

To provide continued service to our customers, HP provides the HP StorageWorks Library and Tape Tools (L&TT) software application. L&TT is a diagnostic tool that is designed to aid in the installation and maintenance of both HP tape devices and tape libraries. L&TT includes several features designed for use by both HP storage customers and trained service personnel. The key features include:

- Diagnostic tools for tape drive and tape automation devices designed for simple troubleshooting and verifying installations.
- Multiple options for retrieving and updating both the latest firmware for library and drives, and the most current version of L&TT.
- Comprehensive reports to assist authorized service providers in troubleshooting.

Frequent firmware image updates are released on the Internet. For optimal performance, HP recommends that you update your system periodically with the latest device firmware.

L&TT is available for download at no cost from the HP website at:
http://www.hp.com/support/tapetools

MSLUtil

The library ships with an RS232 diagnostic cable and a floppy containing the MSLUtil diagnostic utility. After following the recommended steps from the ERP to resolve any issues, use this utility to verify whether error conditions have been corrected. Follow this procedure until the diagnostics software no longer detects an error condition.

Running Library Diagnostic Tests

Use the following procedure to run internal tests of library functions. Table 12 describes these tests.

1. From the library **Status** screen, select **Menu**.
2. Under the **Utilities** area, select **Diagnostics**.
3. Select the test you want to run.

NOTE: Available tests are dependent on the library model and specified user level.

Table 12 Library Diagnostic Tests

Test	Description
Cartridge Cycle	Cycles cartridges continuously and randomly in bins and mail slots, displaying a count of the type of cycle on the control panel. Press the **Start** button to begin the test and the **Stop** button end to end the test.
Drive Cycle	Cycles cartridges continuously and randomly in bins, mail slots, and drives, displaying a count of the type of cycle on the control panel. Press the **Start** button to begin the test and the **Stop** button end to end the test.
Barcode Cycle	Scans all bar codes continuously, listing those read and the number of times a full library scan has been done. Press the **Start** button to begin the test and the **Stop** button end to end the test.
Inventory	Physically scans the entire library to determine which slots and drives contain tapes and reads all barcode labels.
Sensor Test	Tests all the hall effect sensors and lists their status.
Vertical Calibration (available in four-drive models only)	Calibrates the vertical lifters to correct limits. This test is typically used when vertical lifters are replaced.
View Error Log	Allows access to the error log to view posted errors.
Touch Screen Calibrate	Allows resetting of calibration values when the screen brightness is not uniform.
Tachometer Diagnostic	This is a factory only diagnostic used to measure tachometer motor function limits.
Friction Diagnostic	This is a factory only diagnostic used to measure friction in the motors for acceptable limits.

A   Regulatory compliance notices

This appendix contains regulatory notices for the HP StorageWorks MSL Series libraries.

Regulatory compliance identification numbers

For the purpose of regulatory compliance certifications and identification, this product has been assigned a unique regulatory model number. The regulatory model number can be found on the product nameplate label, along with all required approval markings and information. When requesting compliance information for this product, always refer to this regulatory model number. The regulatory model number is not the marketing name or model number of the product.

Product specific information:

Regulatory model number: ED1005

FCC and CISPR classification: Class A

Contains fiber optic transceiver with a Class 1 laser. See Class 1 laser statement.

Federal Communications Commission notice

Part 15 of the Federal Communications Commission (FCC) Rules and Regulations has established Radio Frequency (RF) emission limits to provide an interference-free radio frequency spectrum. Many electronic devices, including computers, generate RF energy incidental to their intended function and are, therefore, covered by these rules. These rules place computers and related peripheral devices into two classes, A and B, depending upon their intended installation. Class A devices are those that may reasonably be expected to be installed in a business or commercial environment. Class B devices are those that may reasonably be expected to be installed in a residential environment (for example, personal computers). The FCC requires devices in both classes to bear a label indicating the interference potential of the device as well as additional operating instructions for the user.

FCC rating label

The FCC rating label on the device shows the classification (A or B) of the equipment. Class B devices have an FCC logo or ID on the label. Class A devices do not have an FCC logo or ID on the label. After you determine the class of the device, refer to the corresponding statement.

Class A equipment

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

Class B equipment

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit that is different from that to which the receiver is connected.
- Consult the dealer or an experienced radio or television technician for help.

Declaration of Conformity for products marked with the FCC logo, United States only.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

For questions regarding this FCC declaration, contact us by mail or telephone:

- Hewlett-Packard Company
  P.O. Box 692000, Mail Stop 510101
  Houston, Texas 77269-2000
- Or call 1-281-514-3333

Modification

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by Hewlett-Packard Company may void the user's authority to operate the equipment.

Cables

When provided, connections to this device must be made with shielded cables with metallic RFI/EMI connector hoods in order to maintain compliance with FCC Rules and Regulations.

Canadian notice (Avis Canadien)

Class A equipment

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la class A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Class B equipment

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la class B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

European Union notice

Products bearing the CE marking comply with the EMC Directive (89/336/EEC) and the Low Voltage Directive (73/23/EEC) issued by the Commission of the European Community.

Compliance with these directives implies conformity to the following European Norms (in parentheses are the equivalent international standards and regulations):

- EN 55022 (CISPR 22)—Electromagnetic Interference
- EN55024 (IEC61000-4-2, 3, 4, 5, 6, 8, 11)—Electromagnetic Immunity
- EN61000-3-2 (IEC61000-3-2)—Power Line Harmonics
- EN61000-3-3 (IEC61000-3-3)—Power Line Flicker
- EN 60950 (IEC60950)—Product Safety

Japanese notices

ご使用になっている装置にVCCIマークが付いていましたら、次の説明文をお読み下さい。

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスB情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。
取扱説明書に従って正しい取り扱いをして下さい。

VCCIマークが付いていない場合には、次の点にご注意下さい。

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

Japanese power cord statement

製品には、同梱された電源コードをお使い下さい。
同梱された電源コードは、他の製品では使用出来ません。

Please use the attached power cord.
The attached power cord is not allowed to use with other product.

Korean notices

Class A equipment

A급 기기 (업무용 정보통신기기)

이 기기는 업무용으로 전자파적합등록을 한 기기이오니
판매자 또는 사용자는 이 점을 주의하시기 바라며, 만약
잘못판매 또는 구입하였을 때에는 가정용으로 교환하시기
바랍니다.

Class B equipment

B급 기기 (가정용 정보통신기기)

이 기기는 가정용으로 전자파적합등록을 한 기기로서
주거지역에서는 물론 모든지역에서 사용할 수 있습니다.

Taiwanese notices

BSMI Class A notice

警告使用者:

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

Taiwan battery recycle statement

Recovery mark: Four-in-one recycling symbol	Recovery text: "Please recycle waste batteries"
	廢電池請回收

Laser compliance notices

This device may contain a laser that is classified as a Class 1 Laser Product in accordance with U.S. FDA regulations and the IEC 60825-1. The product does not emit hazardous laser radiation.

⚠️ **WARNING!** Use of controls or adjustments or performance of procedures other than those specified herein or in the laser product's installation guide may result in hazardous radiation exposure. To reduce the risk of exposure to hazardous radiation:

- Do not try to open the module enclosure. There are no user-serviceable components inside.
- Do not operate controls, make adjustments, or perform procedures to the laser device other than those specified herein.
- Allow only HP Authorized Service technicians to repair the unit.

The Center for Devices and Radiological Health (CDRH) of the U.S. Food and Drug Administration implemented regulations for laser products on August 2, 1976. These regulations apply to laser products manufactured from August 1, 1976. Compliance is mandatory for products marketed in the United States.

Dutch laser notice

⚠ **WAARSCHUWING:** dit apparaat bevat mogelijk een laser die is geclassificeerd als een laserproduct van Klasse 1 overeenkomstig de bepalingen van de Amerikaanse FDA en de richtlijn IEC 60825-1. Dit product geeft geen gevaarlijke laserstraling af.

Als u bedieningselementen gebruikt, instellingen aanpast of procedures uitvoert op een andere manier dan in deze publicatie of in de installatiehandleiding van het laserproduct wordt aangegeven, loopt u het risico te worden blootgesteld aan gevaarlijke straling. Het risico van blootstelling aan gevaarlijke straling beperkt u als volgt:

- Probeer de behuizing van de module niet te openen. U mag zelf geen onderdelen repareren.
- Gebruik voor de laserapparatuur geen andere knoppen of instellingen en voer geen andere aanpassingen of procedures uit dan die in deze handleiding worden beschreven.
- Alleen door HP geautoriseerde technici mogen het apparaat repareren.

French laser notice

⚠ **AVERTISSEMENT :** cet appareil peut être équipé d'un laser classé en tant que Produit laser de classe 1 et conforme à la réglementation de la FDA américaine et à la norme 60825-1 de l'IEC. Ce produit n'émet pas de rayonnement dangereux.

L'utilisation de commandes, de réglages ou de procédures autres que ceux qui sont indiqués ici ou dans le manuel d'installation du produit laser peut exposer l'utilisateur à des rayonnements dangereux. Pour réduire le risque d'exposition à des rayonnements dangereux :

- Ne tentez pas d'ouvrir le boîtier renfermant l'appareil laser. Il ne contient aucune pièce dont la maintenance puisse être effectuée par l'utilisateur.
- Tout contrôle, réglage ou procédure autre que ceux décrits dans ce chapitre ne doivent pas être effectués par l'utilisateur.
- Seuls les Mainteneurs Agréés HP sont habilités à réparer l'appareil laser.

German laser notice

⚠️ **VORSICHT:** Dieses Gerät enthält möglicherweise einen Laser, der nach den US-amerikanischen FDA-Bestimmungen und nach IEC 60825-1 als Laserprodukt der Klasse 1 zertifiziert ist. Gesundheitsschädliche Laserstrahlen werden nicht emittiert.

Die Anleitungen in diesem Dokument müssen befolgt werden. Bei Einstellungen oder Durchführung sonstiger Verfahren, die über die Anleitungen in diesem Dokument bzw. im Installationshandbuch des Lasergeräts hinausgehen, kann es zum Austritt gefährlicher Strahlung kommen. Zur Vermeidung der Freisetzung gefährlicher Strahlungen sind die folgenden Punkte zu beachten:

- Versuchen Sie nicht, die Abdeckung des Lasermoduls zu öffnen. Im Inneren befinden sich keine Komponenten, die vom Benutzer gewartet werden können.
- Benutzen Sie das Lasergerät ausschließlich gemäß den Anleitungen und Hinweisen in diesem Dokument.
- Lassen Sie das Gerät nur von einem HP Servicepartner reparieren.

Italian laser notice

⚠️ **AVVERTENZA:** AVVERTENZA Questo dispositivo può contenere un laser classificato come prodotto laser di Classe 1 in conformità alle normative US FDA e IEC 60825-1. Questo prodotto non emette radiazioni laser pericolose.

L'eventuale esecuzione di comandi, regolazioni o procedure difformi a quanto specificato nella presente documentazione o nella guida di installazione del prodotto può causare l'esposizione a radiazioni nocive. Per ridurre i rischi di esposizione a radiazioni pericolose, attenersi alle seguenti precauzioni:

- Non cercare di aprire il contenitore del modulo. All'interno non vi sono componenti soggetti a manutenzione da parte dell'utente.
- Non eseguire operazioni di controllo, regolazione o di altro genere su un dispositivo laser ad eccezione di quelle specificate da queste istruzioni.
- Affidare gli interventi di riparazione dell'unità esclusivamente ai tecnici dell'Assistenza autorizzata HP.

Japanese laser notice

⚠ 警告：本製品には、US FDA規則およびIEC 60825-1に基づくClass 1レーザー製品が含まれている場合があります。本製品は人体に危険なレーザー光は発しません。

本書およびレーザー製品のインストール ガイドに示されている以外の方法で制御、調整、使用した場合、人体に危険な光線にさらされる場合があります。人体に危険な光線にさらされないため、以下の項目を守ってください。

- モジュール エンクロージャを開けないでください。ユーザーが取り扱えるコンポーネントは含まれていません。
- 本書に示されている以外の方法で、レーザー デバイスを制御、調整、使用しないでください。
- HPの正規サービス技術者のみが本ユニットの修理を許可されています。

Spanish laser notice

⚠ **ADVERTENCIA:** Este dispositivo podría contener un láser clasificado como producto de láser de Clase 1 de acuerdo con la normativa de la FDA de EE.UU. e IEC 60825-1. El producto no emite radiaciones láser peligrosas.

El uso de controles, ajustes o manipulaciones distintos de los especificados aquí o en la guía de instalación del producto de láser puede producir una exposición peligrosa a las radiaciones. Para evitar el riesgo de exposición a radiaciones peligrosas:

- No intente abrir la cubierta del módulo. Dentro no hay componentes que el usuario pueda reparar.
- No realice más operaciones de control, ajustes o manipulaciones en el dispositivo láser que los aquí especificados.
- Sólo permita reparar la unidad a los agentes del servicio técnico autorizado HP.

Recycling notices

Disposal of waste equipment by users in private household in the European Union

This symbol on the product or on its packaging indicates that this product must not be disposed of with your other household waste. Instead, it is your responsibility to dispose of your waste equipment by handing it over to a designated collection point for recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household waste disposal service, or the shop where you purchase the product.

Danish notice

Bortskaffelse af affald fra husstande i den Europæiske Union

Hvis produktet eller dets emballage er forsynet med dette symbol, angiver det, at produktet ikke må bortskaffes med andet almindeligt husholdningsaffald. I stedet er det dit ansvar at bortskaffe kasseret udstyr ved at aflevere det på den kommunale genbrugsstation, der forestår genvinding af kasseret elektrisk og elektronisk udstyr. Den centrale modtagelse og genvinding af kasseret udstyr i forbindelse med bortskaffelsen bidrager til bevarelse af naturlige ressourcer og sikrer, at udstyret genvindes på en måde, der beskytter både mennesker og miljø. Yderligere oplysninger om, hvor du kan aflevere kasseret udstyr til genvinding, kan du få hos kommunen, den lokale genbrugsstation eller i den butik, hvor du købte produktet.

Dutch notice

Verwijdering van afgedankte apparatuur door privé-gebruikers in de Europese Unie

Dit symbool op het product of de verpakking geeft aan dat dit product niet mag worden gedeponeerd bij het normale huishoudelijke afval. U bent zelf verantwoordelijk voor het inleveren van uw afgedankte apparatuur bij een inzamelingspunt voor het recyclen van oude elektrische en elektronische apparatuur. Door uw oude apparatuur apart aan te bieden en te recyclen, kunnen natuurlijke bronnen worden behouden en kan het materiaal worden hergebruikt op een manier waarmee de volksgezondheid en het milieu worden beschermd. Neem contact op met uw gemeente, het afvalinzamelingsbedrijf of de winkel waar u het product hebt gekocht voor meer informatie over inzamelingspunten waar u oude apparatuur kunt aanbieden voor recycling.

Czecholslovakian notice

Likvidace zařízení soukromými domácími uživateli v Evropské unii

Tento symbol na produktu nebo balení označuje výrobek, který nesmí být vyhozen spolu s ostatním domácím odpadem. Povinností uživatele je předat takto označený odpad na předem určené sběrné místo pro recyklaci elektrických a elektronických zařízení. Okamžité třídění a recyklace odpadu pomůže uchovat přírodní prostředí a zajistí takový způsob recyklace, který ochrání zdraví a životní prostředí člověka. Další informace o možnostech odevzdání odpadu k recyklaci získáte na příslušném obecním nebo městském úřadě, od firmy zabývající se sběrem a svozem odpadu nebo v obchodě, kde jste produkt zakoupili.

Estonian notice

Seadmete jäätmete kõrvaldamine eramajapidamistes Euroopa Liidus

See tootel või selle pakendil olev sümbol näitab, et kõnealust toodet ei tohi koos teiste majapidamisjäätmetega kõrvaldada. Teie kohus on oma seadmete jäätmed kõrvaldada, viies need elektri- ja elektroonikaseadmete jäätmete ringlussevõtmiseks selleks ettenähtud kogumispunkti. Seadmete jäätmete eraldi kogumine ja ringlussevõtmine kõrvaldamise ajal aitab kaitsta loodusvarasid ning tagada, et ringlussevõtmine toimub viisil, mis kaitseb inimeste tervist ning keskkonda. Lisateabe saamiseks selle kohta, kuhu oma seadmete jäätmed ringlussevõtmiseks viia, võtke palun ühendust oma kohaliku linnakantselei, majapidamisjäätmete kõrvaldamise teenistuse või kauplusega, kust Te toote ostsite.

Finnish notice

Laitteiden hävittäminen kotitalouksissa Euroopan unionin alueella

Jos tuotteessa tai sen pakkauksessa on tämä merkki, tuotetta ei saa hävittää kotitalousjätteiden mukana. Tällöin hävitettävä laite on toimitettava sähkölaitteiden ja elektronisten laitteiden kierrätyspisteeseen. Hävitettävien laitteiden erillinen käsittely ja kierrätys auttavat säästämään luonnonvaroja ja varmistamaan, että laite kierrätetään tavalla, joka estää terveyshaitat ja suojelee luontoa. Lisätietoja paikoista, joihin hävitettävät laitteet voi toimittaa kierrätettäväksi, saa ottamalla yhteyttä jätehuoltoon tai liikkeeseen, josta tuote on ostettu.

French notice

Élimination des appareils mis au rebut par les ménages dans l'Union européenne

Le symbole apposé sur ce produit ou sur son emballage indique que ce produit ne doit pas être jeté avec les déchets ménagers ordinaires. Il est de votre responsabilité de mettre au rebut vos appareils en les déposant dans les centres de collecte publique désignés pour le recyclage des équipements électriques et électroniques. La collecte et le recyclage de vos appareils mis au rebut indépendamment du reste des déchets contribue à la préservation des ressources naturelles et garantit que ces appareils seront recyclés dans le respect de la santé humaine et de l'environnement. Pour obtenir plus d'informations sur les centres de collecte et de recyclage des appareils mis au rebut, veuillez contacter les autorités locales de votre région, l es services de collecte des ordures ménagères ou le magasin dans lequel vous avez acheté ce produit.

German notice

Entsorgung von Altgeräten aus privaten Haushalten in der EU

Das Symbol auf dem Produkt oder seiner Verpackung weist darauf hin, dass das Produkt nicht über den normalen Hausmüll entsorgt werden darf. Benutzer sind verpflichtet, die Altgeräte an einer Rücknahmestelle für Elektro- und Elektronik-Altgeräte abzugeben. Die getrennte Sammlung und ordnungsgemäße Entsorgung Ihrer Altgeräte trägt zur Erhaltung der natürlichen Ressourcen bei und garantiert eine Wiederverwertung, die die Gesundheit des Menschen und die Umwelt schützt. Informationen dazu, wo Sie Rücknahmestellen für Ihre Altgeräte finden, erhalten Sie bei Ihrer Stadtverwaltung, den örtlichen Müllentsorgungsbetrieben oder im Geschäft, in dem Sie das Gerät erworben haben.

Greek notice

Απόρριψη άχρηστου εξοπλισμού από χρήστες σε ιδιωτικά νοικοκυριά στην Ευρωπαϊκή Ένωση

Το σύμβολο αυτό στο προϊόν ή τη συσκευασία του υποδεικνύει ότι το συγκεκριμένο προϊόν δεν πρέπει να διατίθεται μαζί με τα άλλα οικιακά σας απορρίμματα. Αντίθετα, είναι δική σας ευθύνη να απορρίψετε τον άχρηστο εξοπλισμό σας παραδίδοντάς τον σε καθορισμένο σημείο συλλογής για την ανακύκλωση άχρηστου ηλεκτρικού και ηλεκτρονικού εξοπλισμού.

Η ξεχωριστή συλλογή και ανακύκλωση του άχρηστου εξοπλισμού σας κατά την απόρριψη θα συμβάλει στη διατήρηση των φυσικών πόρων και θα διασφαλίσει ότι η ανακύκλωση γίνεται με τρόπο που προστατεύει την ανθρώπινη υγεία και το περιβάλλον. Για περισσότερες πληροφορίες σχετικά με το πού μπορείτε να παραδώσετε τον άχρηστο εξοπλισμό σας για ανακύκλωση, επικοινωνήστε με το αρμόδιο τοπικό γραφείο, την τοπική υπηρεσία διάθεσης οικιακών απορριμμάτων ή το κατάστημα όπου αγοράσατε το προϊόν.

Hungarian notice

Készülékek magánháztartásban történő selejtezése az Európai Unió területén

A készüléken, illetve a készülék csomagolásán látható azonos szimbólum annak jelzésére szolgál, hogy a készülék a selejtezés során az egyéb háztartási hulladéktól eltérő módon kezelendő. A vásárló a hulladékká vált készüléket köteles a kijelölt gyűjtőhelyre szállítani az elektromos és elektronikai készülékek újrahasznosítása céljából. A hulladékká vált készülékek selejtezéskori begyűjtése és újrahasznosítása hozzájárul a természeti erőforrások megőrzéséhez, valamint biztosítja a selejtezett termékek környezetre és emberi egészségre nézve biztonságos feldolgozását. A begyűjtés pontos helyéről bővebb tájékoztatást a lakhelye szerint illetékes önkormányzattól, az illetékes szemételtakarító vállalattól, illetve a terméket elárusító helyen kaphat.

Italian notice

Smaltimento delle apparecchiature da parte di privati nel territorio dell'Unione Europea

Questo simbolo presente sul prodotto o sulla sua confezione indica che il prodotto non può essere smaltito insieme ai rifiuti domestici. È responsabilità dell'utente smaltire le apparecchiature consegnandole presso un punto di raccolta designato al riciclo e allo smaltimento di apparecchiature elettriche ed elettroniche. La raccolta differenziata e il corretto riciclo delle apparecchiature da smaltire permette di proteggere la salute degli individui e l'ecosistema. Per ulteriori informazioni relative ai punti di raccolta delle apparecchiature, contattare l'ente locale per lo smaltimento dei rifiuti, oppure il negozio presso il quale è stato acquistato il prodotto.

Latvian notice

Nolietotu iekārtu iznīcināšanas noteikumi lietotājiem Eiropas Savienības privātajās mājsaimniecībās

Šāds simbols uz izstrādājuma vai uz tā iesaiņojuma norāda, ka šo izstrādājumu nedrīkst izmest kopā ar citiem sadzīves atkritumiem. Jūs atbildat par to, lai nolietotās iekārtas tiktu nodotas speciāli iekārtotos punktos, kas paredzēti izmantoto elektrisko un elektronisko iekārtu savākšanai otrreizējai pārstrādei. Atsevišķa nolietoto iekārtu savākšana un otrreizējā pārstrāde palīdzēs saglabāt dabas resursus un garantēs, ka šīs iekārtas tiks otrreizēji pārstrādātas tādā veidā, lai pasargātu vidi un cilvēku veselību. Lai uzzinātu, kur nolietotās iekārtas var izmest otrreizējai pārstrādei, jāvēršas savas dzīves vietas pašvaldībā, sadzīves atkritumu savākšanas dienestā vai veikalā, kurā izstrādājums tika nopirkts.

Lithuanian notice

Vartotojų iš privačių namų ūkių įrangos atliekų šalinimas Europos Sąjungoje

Šis simbolis ant gaminio arba jo pakuotės rodo, kad šio gaminio šalinti kartu su kitomis namų ūkio atliekomis negalima. Šalintinas įrangos atliekas privalote pristatyti į specialią surinkimo vietą elektros ir elektroninės įrangos atliekoms perdirbti. Atskirai surenkamos ir perdirbamos šalintinos įrangos atliekos padės saugoti gamtinius išteklius ir užtikrinti, kad jos bus perdirbtos tokiu būdu, kuris nekenkia žmonių sveikatai ir aplinkai. Jeigu norite sužinoti daugiau apie tai, kur galima pristatyti perdirbtinas įrangos atliekas, kreipkitės į savo seniūniją, namų ūkio atliekų šalinimo tarnybą arba parduotuvę, kurioje įsigijote gaminį.

Polish notice

**Pozbywanie się zużytego sprzętu przez użytkowników w prywatnych gospodarstwach
domowych w Unii Europejskiej**

Ten symbol na produkcie lub jego opakowaniu oznacza, że produktu nie wolno
wyrzucać do zwykłych pojemników na śmieci. Obowiązkiem użytkownika jest
przekazanie zużytego sprzętu do wyznaczonego punktu zbiórki w celu recyklingu
odpadów powstałych ze sprzętu elektrycznego i elektronicznego. Osobna zbiórka
oraz recykling zużytego sprzętu pomogą w ochronie zasobów naturalnych
i zapewnią ponowne wprowadzenie go do obiegu w sposób chroniący zdrowie człowieka
i środowisko. Aby uzyskać więcej informacji o tym, gdzie można przekazać zużyty sprzęt do
recyklingu, należy się skontaktować z urzędem miasta, zakładem gospodarki odpadami lub
sklepem, w którym zakupiono produkt.

Portuguese notice

Descarte de Lixo Elétrico na Comunidade Européia

Este símbolo encontrado no produto ou na embalagem indica que o produto não
deve ser descartado no lixo doméstico comum. É responsabilidade do cliente
descartar o material usado (lixo elétrico), encaminhando-o para um ponto de
coleta para reciclagem. A coleta e a reciclagem seletivas desse tipo de lixo
ajudarão a conservar as reservas naturais; sendo assim, a reciclagem será feita
de uma forma segura, protegendo o ambiente e a saúde das pessoas. Para obter
mais informações sobre locais que reciclam esse tipo de material, entre em contato com
o escritório da HP em sua cidade, com o serviço de coleta de lixo ou com a loja em que
o produto foi adquirido.

Slovakian notice

Likvidácia vyradených zariadení v domácnostiach v Európskej únii

Symbol na výrobku alebo jeho balení označuje, že daný výrobok sa nesmie likvidovať s domovým odpadom. Povinnosťou spotrebiteľa je odovzdať vyradené zariadenie v zbernom mieste, ktoré je určené na recykláciu vyradených elektrických a elektronických zariadení. Separovaný zber a recyklácia vyradených zariadení prispieva k ochrane prírodných zdrojov a zabezpečuje, že recyklácia sa vykonáva spôsobom chrániacim ľudské zdravie a životné prostredie. Informácie o zberných miestach na recykláciu vyradených zariadení vám poskytne miestne zastupiteľstvo, spoločnosť zabezpečujúca odvoz domového odpadu alebo obchod, v ktorom ste si výrobok zakúpili.

Slovenian notice

Odstranjevanje odslužene opreme uporabnikov v zasebnih gospodinjstvih v Evropski uniji

Ta znak na izdelku ali njegovi embalaži pomeni, da izdelka ne smete odvreči med gospodinjske odpadke. Nasprotno, odsluženo opremo morate predati na zbirališče, pooblaščeno za recikliranje odslužene električne in elektronske opreme. Ločeno zbiranje in recikliranje odslužene opreme prispeva k ohranjanju naravnih virov in zagotavlja recikliranje te opreme na zdravju in okolju neškodljiv način. Za podrobnejše informacije o tem, kam lahko odpeljete odsluženo opremo na recikliranje, se obrnite na pristojni organ, komunalno službo ali trgovino, kjer ste izdelek kupili.

Spanish notice

Eliminación de residuos de equipos eléctricos y electrónicos por parte de usuarios particulares en la Unión Europea

Este símbolo en el producto o en su envase indica que no debe eliminarse junto con los desperdicios generales de la casa. Es responsabilidad del usuario eliminar los residuos de este tipo depositándolos en un "punto limpio" para el reciclado de residuos eléctricos y electrónicos. La recogida y el reciclado selectivos de los residuos de aparatos eléctricos en el momento de su eliminación contribuirá a conservar los recursos naturales y a garantizar el reciclado de estos residuos de forma que se proteja el medio ambiente y la salud. Para obtener más información sobre los puntos de recogida de residuos eléctricos y electrónicos para reciclado, póngase en contacto con su ayuntamiento, con el servicio de eliminación de residuos domésticos o con el establecimiento en el que adquirió el producto.

Swedish notice

Bortskaffande av avfallsprodukter från användare i privathushåll inom Europeiska Unionen

Om den här symbolen visas på produkten eller förpackningen betyder det att produkten inte får slängas på samma ställe som hushållssopor. I stället är det ditt ansvar att bortskaffa avfallet genom att överlämna det till ett uppsamlingsställe avsett för återvinning av avfall från elektriska och elektroniska produkter. Separat insamling och återvinning av avfallet hjälper till att spara på våra naturresurser och gör att avfallet återvinns på ett sätt som skyddar människors hälsa och miljön. Kontakta ditt lokala kommunkontor, din närmsta återvinningsstation för hushållsavfall eller affären där du köpte produkten för att få mer information om var du kan lämna ditt avfall för återvinning.

B   Specifications

This appendix lists the following specifications met by HP StorageWorks MSL Series tape libraries:

- Power, page 159
- Mechanical, page 159
- Environmental (All Models), page 160
- Acoustics, page 161
- Safety and Regulatory, page 161

Power

Table 13   Power Specifications

Description	MSL6030/MSL6026 Specification	MSL6060/MSL6052 Specification
Voltage	100 to 240 VAC, +/- 10%	100 to 240 VAC, +/- 10%
Current	3.0 to 6.0 A	3.0 to 6.0 A
Line frequency operating range	50 to 60 Hz	50 to 60 Hz
Power consumption	180 W (2 tape drives)	300 W (4 tape drives)
Maximum peak power consumption	200 W (2 tape drives)	360 W (4 tape drives)

Mechanical

Table 14   Rackmount Model Mechanical Specifications

Description	MSL6030/MSL6026 Specification	MSL6060/MSL6052 Specification
Height	8.75 inches (22.2 cm), nominal (5U)	17.5 inches (44.4 cm), nominal (10U)
Width	17 inches (43.2 cm)	17 inches (43.2 cm)
Depth	31.5 inches (80 cm)	31.5 inches (80 cm)
Weight	61 pounds (27.7 kg), estimated (with 2 tape drives installed)	123 pounds (55.9 kg), estimated (with 4 tape drives installed)

Environmental (All Models)

Table 15 Operating Environmental Specifications

Description	Specification
Dry bulb temperature	50°F to 95°F (10°C to 35°C)
Temperature gradient	1.8°F/min (1°C/min)
Temperature shock	27°F (15°C) over 2 minutes
Wet bulb temperature	78.8°F (26°C)
Relative humidity (noncondensing)	20% to 80%
Humidity gradient	10%/hr
Altitude	-1000 feet to +10,000 feet (-305 m to 3050 m)

Table 16 Packed or Unpacked Environmental Specifications

Description	Specification
Dry bulb temperature	-40°F to 140°F (-40°C to 60°C)
Temperature gradient	36°F (20°C)/hr (across the range)
Temperature shock	27°F (15°C) (over 2 minutes)
Wet bulb temperature	86°F (30°C)
Relative humidity (noncondensing)	10% to 95%
Humidity gradient	10%/hr
Altitude	-1000 feet to +15,000 feet (-305 m to 4600 m)

Table 17 Transit -- Short Term Environmental Specifications

Description	Specification
Dry bulb temperature	-40°F to 140°F (-40°C to 60°C)
Temperature gradient	36°F (20°C)/hr (across the range)
Temperature shock	27°F (15°C) (over 2 minutes)
Wet bulb temperature	86°F (30°C)
Relative humidity (noncondensing)	5% to 95%
Humidity gradient	10%/hr
Altitude	-1000 feet to +40,000 feet (-305 m to 12,200 m)

Acoustics

Table 18   Acoustic Noise Declared per ISO 9296 and ISO 7779

Sound Power Level $L_{W,Ad}$ B			Sound Pressure Level $L_{p,Am}$ dBA (bystander position)	
Product	Idle	Operate	Idle	Operate
MSL6030/MSL6026 MSL6060/MSL6052	6.4	7.0	48	48

NOTE: Current values for specific configurations are available from HP representatives 1 B = 10 dBA.

Table 19   Schallemissionswerte - Werteangaben nach ISO 9296 und ISO 7779/DIN 27779

Schalleistungspegel $L_{W,Ad}$ B			Schalldruckpege $L_{p,Am}$ dBA (bediener position)	
Gerät	Leerlauf	Betrieb	Leerlauf	Betrieb
MSL6030/MSL6026 MSL6060/MSL6052	6,4	7,0	48	48

NOTE: Aktuelle Werte für spezielle Ausrüstungsstufen sind über die HP Vertretungen erhältlich. 1 B = 10 dBa.

Safety and Regulatory

The library carries the following Regulatory Agency product safety certifications.

Table 20   Regulatory and Product Safety Certifications

Description	Specification
UL Listed Mark	UL 60950-1 (standard for safety of information technology equipment)
TUV GS Mark (Germany)	EN60950-1 (standard for safety of information technology equipment third edition)

Table 20 Regulatory and Product Safety Certifications

Description	Specification
CE Marking (European Union)	Low Voltage Directive, 72/23/EEC, European Union
CUL Mark (Canadian UL)	CAN/CSA 22.2 No. 60950-1 (standard for safety of information technology equipment)
Regulatory Series ID Number	ED 1005, Class A

C Electrostatic Discharge

To prevent damage to the system, be aware of the precautions you need to follow when setting up the system or handling parts. A discharge of static electricity from a finger or other conductor can damage system boards or other static-sensitive devices. This type of damage can reduce the life expectancy of the device.

To prevent electrostatic damage, observe the following precautions:

- Avoid hand contact by transporting and storing products in static-safe containers.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.
- Place parts on a grounded surface before removing them from their containers.
- Avoid touching pins, leads, or circuitry.
- Always be properly grounded when touching a static-sensitive component or assembly.

Grounding Methods

There are several methods for grounding. Use one or more of the following methods when handling or installing electrostatic-sensitive parts:

- Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megohm ± 10 percent resistance in the ground cords. To provide proper ground, wear the strap snug against the skin.
- Use heel straps, toe straps, or boot straps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.
- Use conductive field service tools.
- Use a portable field service kit with a folding static-dissipating work mat.

If you do not have any of the suggested equipment for proper grounding, have an HP authorized service provider install the part.

NOTE: For more information on static electricity, or for assistance with product installation, contact your authorized service provider.

D   Configuration Examples

This appendix illustrates potential SCSI cabling configurations.

NOTE: For a more comprehensive set of SCSI cabling configurations, go to
http://www.hp.com/support.

NOTE: For step-by-step instructions on how to install and configure the library, see "Cabling for
SCSI Configurations" on page 36.

SCSI Cable Configurations

Use the following guidelines when configuring your SCSI cables:

• Use the highest quality SCSI cables.

NOTE: Bus errors caused by excessive length or poor quality cables can significantly degrade
performance and reliability.

• Each of the tape drives in the library, and the library controller constitute a separate SCSI target.
  When any two or more devices are connected to the same SCSI bus, each separate SCSI device
  must be assigned a unique SCSI ID.
• SCSI IDs are set at the factory. Use the GUI touch screen to change any of the factory defaults.
• To connect a library to a host, the host must have at least one Wide LVD controller and the
  appropriate driver software.

NOTE: The Single-Ended SCSI interface has a lower performance than LVD SCSI, and also has
shorter cable requirements.

• For optimal performance, do not attach more than two drives per SCSI bus.

NOTE: One drive per bus is HP's recommended configuration. Two drives per bus is an
acceptable configuration for SDLT 1 and 2.

Configuration Examples

1	SCSI Terminator	**3**	Host cable (Bus 1, to host system)
2	0.5 m cable (to library controller card)	**4**	Host cable (Bus 0, to host system)

Figure 80 MSL6030/MSL6026, 2 hosts/2 drives
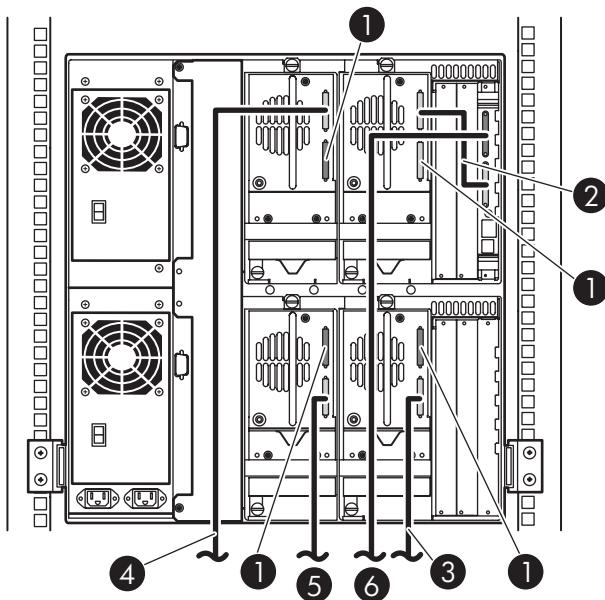
1	SCSI Terminator	**4**	Host cable (Bus 3, to host system)
2	0.5 m cable (to library controller card)	**5**	Host cable (Bus 2, to host system)
3	Host cable (Bus 1, to host system)	**6**	Host cable (Bus 0, to host system)

Figure 81 Single MSL6060/MSL6052, 4 hosts/4 drives

E   Optional Fibre Channel Card

The optional Fibre Channel card enables connectivity between MSL Series tape libraries and Fibre Channel based Storage Area Networks (SANs). This allows the libraries to be attached to a Switched Fabric.

This appendix includes the following sections:

Host Prerequisites

To use Fibre Channel, check the host for the following:

- Fibre Channel backup software, host interface adapters, and associated device drivers.
- Host that acts as an initiator using the Fibre Channel controller to communicate with Fibre Channel SCSI target devices.
- Backup application software with robust error recovery. Fibre Channel is an open system, similar to LAN. Consequently, Fibre Channel is subject to data flow interruptions from power cycling, connections, disconnections, and ESD charges.

NOTE: For a complete list of prerequisites and supported configurations, contact your HP sales representative.

Connectors and Indicators

Figure 82 shows the connectors and indicators for the optional Fibre Channel board.
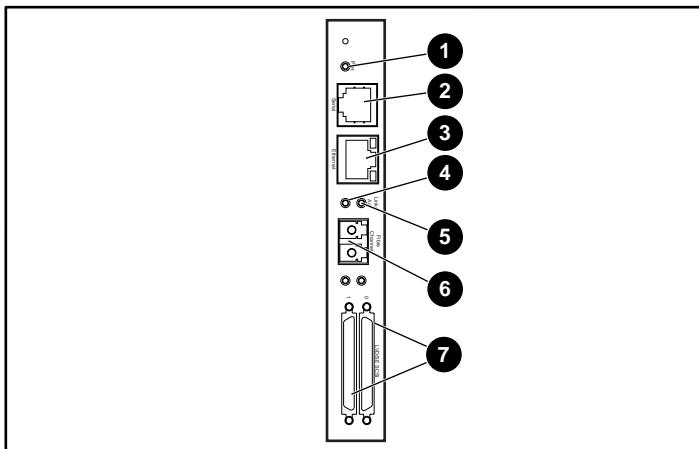
1	Power LED	**5**	Fibre Channel link LED
2	Serial RJ-11 connector	**6**	FC-LC connector
3	Ethernet RJ-45 connector	**7**	SCSI VHDCI connector (2)
4	Fibre Channel activity LED		

Figure 82 Connectors and indicators

NOTE: The Fibre Channel board serial cable is not the same as the library controller board serial cable. The serial pinouts are different for each board, requiring different cables.

IMPORTANT: The Fibre Channel card can be reset by using a paper clip or other sturdy tool to push the reset switch shown above the Power LED in Figure 82.

Power Indicator

The Fibre Channel card has one power LED ❶. LED definitions:

- Green - power has been applied
- Yellow - POST is in process or processor problems present

Serial Port

The Fibre Channel card has one serial port ❷. The serial port can be used to access the Serial/Telnet user interface, which is used to locally manage and configure the Fibre Channel card.

Ethernet Port

The Fibre Channel card has one Ethernet port ❸. LED definitions:

- Activity - there is port activity
- Link - a valid Ethernet link exists

Fibre Channel Port

The Fibre Channel card has one Fibre Channel port ❻. LED definitions:

- Green (ACT) - Fibre Channel port activity ❹
- Green (LINK) - a valid Fibre Channel link exists ❺

SCSI VHDCI Connectors

The Fibre Channel card has two SCSI VHDCI connectors. A green LED indicates activity on the corresponding port.

Configuration

For detailed configuration information, refer to the *HP StorageWorks Network Storage Router User Guide* available on the MSL Series tape library documentation CD, or on the HP website at: http://www.hp.com/support.

Before attempting to configure the Fibre Channel board, a basic understanding of Fibre Channel and SCSI devices is recommended. For information on SCSI standards, refer to publications from X3T10 committee of ANSI (American National Standards Institute). For more information on Fibre Channel standards, refer to publications from the X3T11 committee of ANSI. To purchase approved American National Standards and Technical Reports, contact ANSI at (212)642-4900.

Default Ethernet Settings

The basic factory default values are:

- IP address: http://1.1.1.1/
- Subnet mask: 255.255.255.0
- Gateway address: 0.0.0.0
- User name: root
- Password: password

HP recommends that you change these values from the defaults.

All settings within the configuration are pre-set with default values. These values are set to allow the Fibre Channel card into most HP environments with little or no configuration changes.

After changing the basic default values listed above, carefully consider any additional configuration changes.

After the initial configuration is established, HP recommends backing up the configuration to an external file via the FTP file transfer protocol option. If needed, during a recovery process, this file can be restored back onto the router.

Configuration Examples
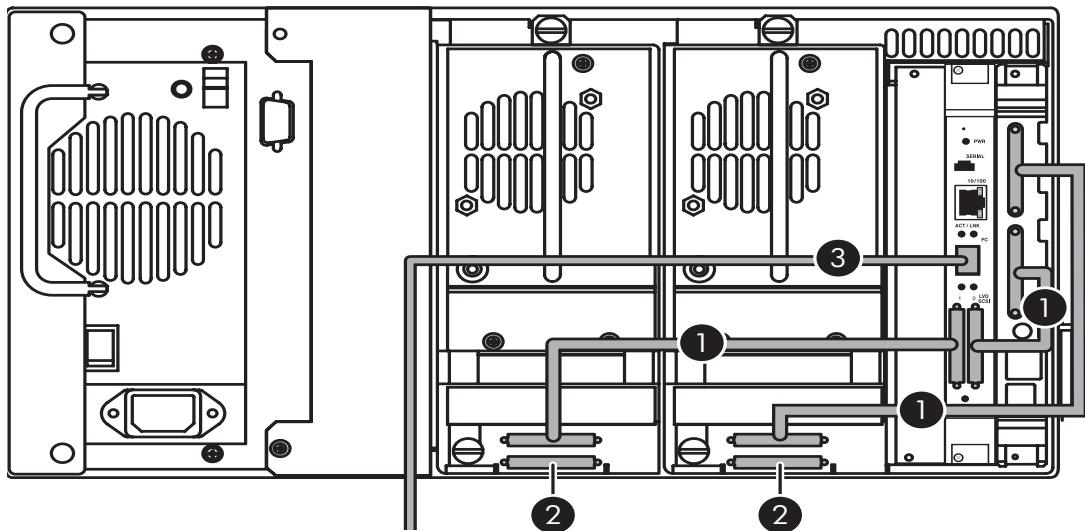
10998

1   SCSI cable

2   Terminator

3   FIbre cable

Figure 83 MSL6030/MSL6026 standalone
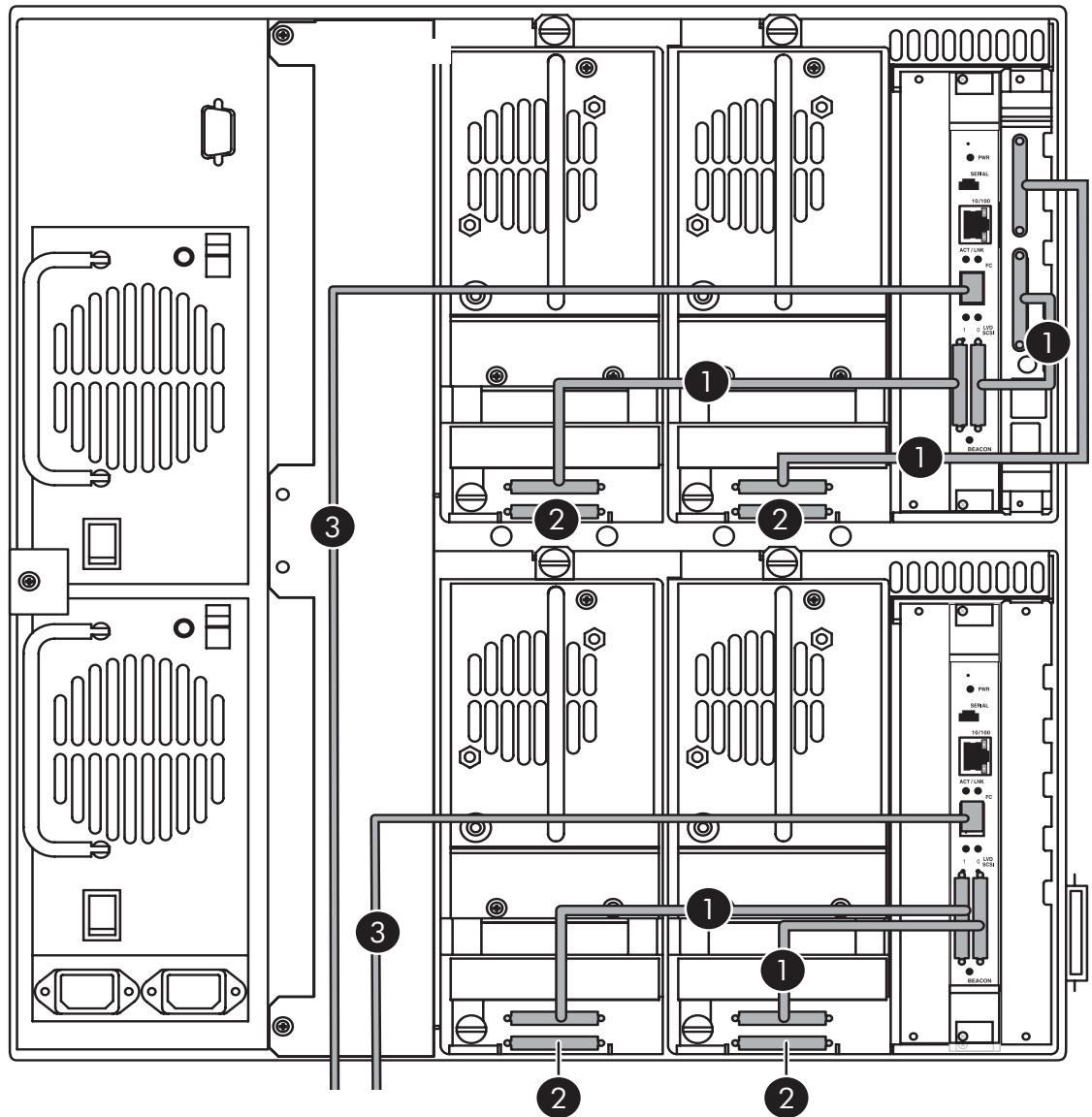
10999

1   SCSI cable
2   Terminator
3   Fibre Cable

Figure 84 MSL6060/MSL6052 standalone

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Tables