# Compaq StorageWorks

MSL5000 Series Library
User Guide

Part Number: 231910-002

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This guide is to be used as step-by-step instructions for installation
and as a reference for operating, troubleshooting, and upgrading.

**COMPAQ**

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# About this Guide

The following sections are covered:

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## Text Conventions

This document uses the conventions in Table 1 to distinguish elements of text.

**Table 1:  Text Conventions**

| Element | Convention | Examples |
|---|---|---|
| • **Named Keys**<br>• **Key Sequences** | **Bold** | **Home, Print Screen, Num Lock, Esc, PgUp**<br>A plus sign (**+**) between two keys means that you should press them simultaneously: **Ctrl+A**, **Ctrl+Home**, **Alt+Ctrl+Del** |
| • Menu Items<br>• Directory Names<br>• Button Names<br>• Dialog Box Names | Initial Caps<br>(for UNIX, AIX, and Solaris directory names, the exact case of every character is displayed). | On the File menu, choose Save.<br>Save the file in the C:\StorageSets\Default directory.<br>(UNIX, AIX, Solaris): Save the file in the /home/newuser/practice directory.<br>To back up files, click the Backup Now button.<br>In the Save As dialog box, choose the drive then the folder. |

**Table 1: Text Conventions (Continued)**

| Element | Convention | Examples |
|---|---|---|
| • User Input and System Responses (Output and Error Messages) <br> • COMMAND NAMES <br> • Drive Names | Initial Caps and `monospace font.` <br><br> `COMMAND NAMES` appear in upper case, unless they are case sensitive (UNIX, AIX, and Solaris command names are case sensitive and will not appear in uppercase). <br><br> Entered `<variables>` are displayed in angle brackets (`<  >`) and all lower case. | User Input and System Responses: <br> • To exit from the program, type `Exit.` <br> • At the prompt, type this command: `SHOW THIS_CONTROLLER` (no variable) <br> • To see your settings, give the command: `SHOW <storagesets> FULL` (with variable) <br> • You will see the `Continue?` message. <br> Command Names <br> • Use `SET THIS_CONTROLLER` to change parameters. <br> • To manage storage, enter `RUN` *`sysmgr.exe`* <br> • (UNIX, AIX, Solaris): To list files, give the `ls` command. <br> • Drive Names: <br>  Navigate to your CD-ROM drive (usually `D:` or `E:`). |
| *filenames* | Unless case sensitive, use *lowercase italics*. If filenames are case-sensitive (UNIX, AIX, Solaris) or are easier to understand with some upper case letters, the exact case of each character is displayed. | To configure storage, edit *storageset.ini*. <br> Changes are stored in *NewSystemConfigurationFile.ini*. <br> (UNIX, AIX, Solaris): Errors are logged to *MixedCaseFile.txt.* |
| Menu Command Sequences | Initial Caps, with a right angle bracket (>) between items. Menu items are displayed as shown on screen. | To compare documents, choose: <br> Tools > Documents > Compare. |
| URLs | Sans serif font. | For update notices, visit: <br> http://www.compaq.com/products/updates |

# Symbols in Text

These symbols may be found in the text of this guide. They have the following meanings.

> **WARNING:  Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or loss of life or damage to equipment.**

> **CAUTION:**  Text set off in this manner indicates that failure to follow directions could result in damage to equipment or loss of information.

**IMPORTANT:**  Text set off in this manner presents clarifying information or specific instructions.

**NOTE:**  Text set off in this manner presents commentary, sidelights, or interesting points of information.

# Symbols on Equipment

> **Any enclosed surface or area of the equipment marked with these symbols indicates the presence of electrical shock hazards. Enclosed area contains no operator serviceable parts.**
>
> **WARNING: To reduce the risk of injury from electrical shock hazards, do not open this enclosure.**

> **Any RJ-45 receptacle marked with these symbols indicates a network interface connection.**
>
> **WARNING: To reduce the risk of electrical shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.**

**Any surface or area of the equipment marked with these symbols indicates the presence of a hot surface or hot component. Contact with this surface could result in injury.**

**WARNING: To reduce the risk of injury from a hot component, allow the surface to cool before touching.**

**Power supplies or systems marked with these symbols indicate the presence of multiple sources of power.**

**WARNING: To reduce the risk of injury from electrical shock, remove all power cords to completely disconnect power from the supplies and systems.**

**Any product or assembly marked with these symbols indicates that the component exceeds the recommended weight for one individual to handle safely.**

**WARNING: To reduce the risk of personal injury or damage to the equipment, observe local occupational health and safety requirements and guidelines for manually handling material.**

# Rack Stability

**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.**
- **Racks are coupled in multiple rack installations.**
- **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.**

# Getting Help

If you still have a question after reading this guide, contact service representatives or visit our website.

## Compaq Technical Support

In North America, call the Compaq technical support at 1-800-OK-COMPAQ. This service is available 24 hours a day, 7 days a week.

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

Outside North America, call Compaq technical support at the nearest location. Telephone numbers for worldwide technical support are listed on the Compaq website: http://www.compaq.com.

Be sure to have the following information available before you call Compaq:

* 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

## Compaq Website

The Compaq website has the latest information on this product as well as the latest drivers. Access the Compaq website at:

http://www.compaq.com/products/storageworks/msl5026/index.html.

# Compaq Authorized Reseller

For the name of your nearest Compaq Authorized Reseller:

* In the United States, call 1-800-345-1518.

* In Canada, call 1-800-263-5868.

* Elsewhere, see the Compaq website for locations and telephone numbers.

# 1

## Introduction

The Compaq *StorageWorks*™ MSL5000 Series Library is a tape library system that combines Digital Linear Tape (DLT) and Super DLT (SDLT) drive technology with advanced robotics. Designed for backup operations with high-end networks and high-performance servers, the library is the next generation performer in high-volume backup and archival service. The library also features high availability, maximum storage density, and easy serviceability.

The library's SCSI interface-to-host system supports Low Voltage Differential (LVD). The tape drives and 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 directly under 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 and accessories
- Tape drives
- Magazines
- Power supply
- Robotics
- Library controller board
- Accessory PCI slots
- Front panel indicators
- Multi-unit library configurations

# Models

The MSL5000 Series Library family includes the following models:

- MSL5026SL

- MSL5026DLX

- MSL5052

Any MSL5000 Series Library can operate as a stand-alone unit or can be installed in a storage cabinet to form a larger integrated multi-unit library configuration. MSL5026 libraries contain up to two tape drives, two removable tape cartridge magazines, and robotics capable of random or sequential tape cartridge operation. MSL5052 libraries contain up to four tape drives, four removable tape cartridge magazines, and robotics capable of random tape cartridge operation.

# Accessories

Contact your Compaq authorized service provider or visit the Compaq website at www.compaq.com for the most current list of accessories that are available for an MSL5000 Series Library.

**IMPORTANT:** Mixing DLT 40/80 tape drives with SDLT 110/220 tape drives should only be done in association with your application software media partitioning guidelines.

# Tape Drives

MSL5000 Series Libraries support up to 4 tape drives (see Figure 1–1). All tape drives are hot-plug capable. SCSI I/O is accomplished through two VHDCI-series, 68-pin, Micro-D SCSI connectors located at the rear of the library directly beneath each tape drive.
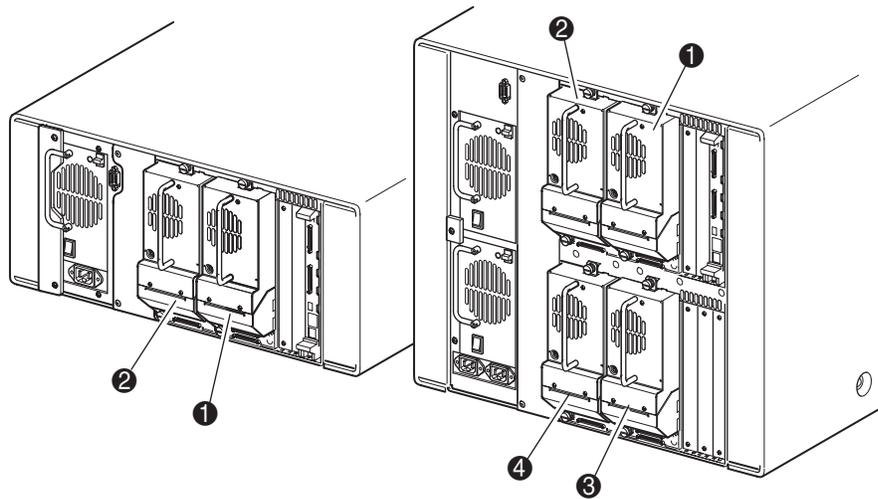


**Figure 1–1: Library tape drive locations**

❶    Tape Drive 0
❷    Tape Drive 1
❸    Tape Drive 2
❹    Tape Drive 3

# Magazines

MSL5000 Series Libraries contain two or four removable tape cartridge magazines that are accessible through the front doors (see Figure 1–2).
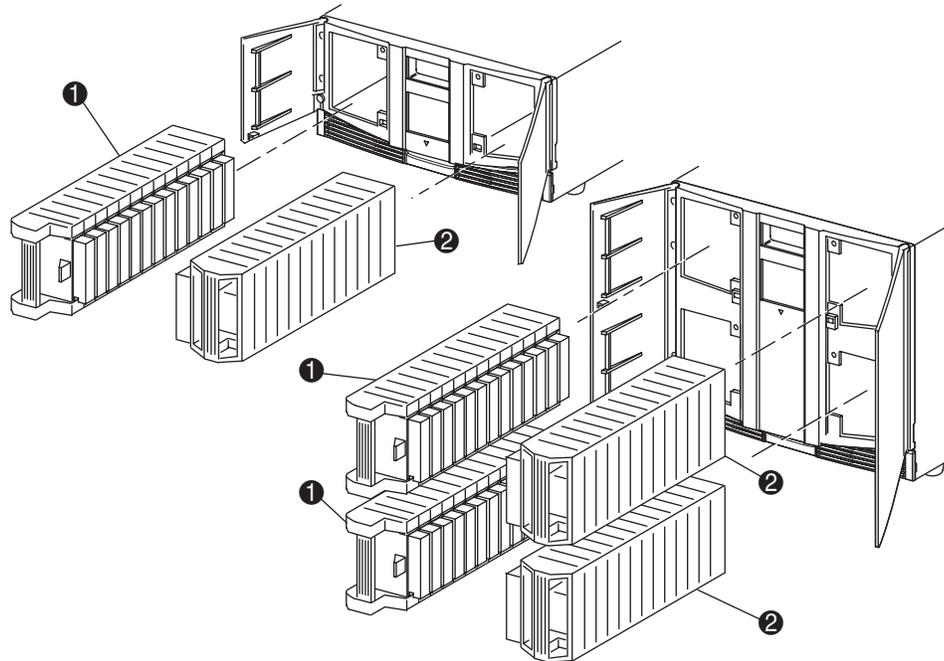


**Figure 1–2:  Library magazines**

❶  Left Magazine(s), with integrated mail slot
❷  Right Magazine(s)

Looking from the front of the library, each left tape magazine includes a mail slot, which is accessible when that magazine's door is open. Pivoting forward, this mail slot feature lets you insert or remove a single tape without having to unlock, remove, and reinventory the magazine. If 13 data slots are required, the library can be reconfigured to recognize each mail slot as a standard data slot. The right tape magazine(s) contain fixed cartridge slots (no mail slot feature), so they retain their full 13-slot data capacity at all times.

# Power Supplies

MSL5000 Series Libraries support one or two power supplies that are accessible from the rear of the unit (see Figure 1–3). 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, and are easily removed without requiring special tools.

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, located at the rear of each power supply is provided.

Power supplies can be easily replaced in maintenance/service mode using a #1 Phillips screwdriver to remove the power supply bracket.

For the MSL5052 library, two power supplies are supported to provide redundancy for mission critical operations. Both power supplies share the load under normal operating conditions, however, if one of the power supplies fail the remaining power supply assumes the full load (see Figure 1-3 on the following page).
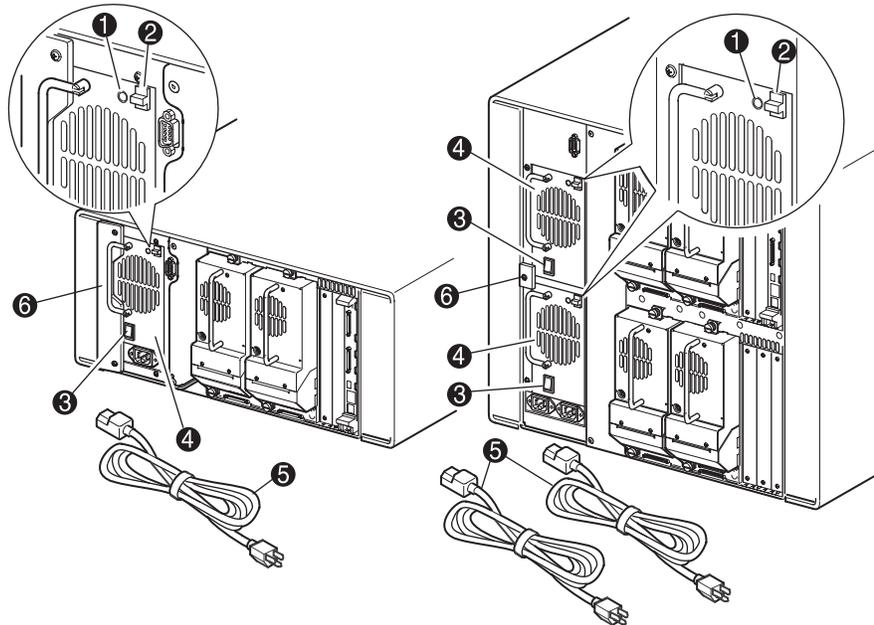
**Figure 1–3:  Library power supplies**

**NOTE:**  For the MSL5052, the left AC power receptacle is for the bottom power supply. The right AC power receptacle is for the top power supply.

❶    Power On LED (lights after touching the front panel display)

❷    Power Supply Release Latch

❸    Power Switch

❹    Power Supply

❺    AC Power Cord(s)

❻    Power supply bracket

# Robotics

MSL5000 Series Library robotics consists of a cartridge shuttle, motor hardware, motor drives, and other support electronics (see Figure 1–4). The MSL5052 library also contains 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 barcode reader for scanning tape cartridges installed in the magazines and tape drives.

**IMPORTANT:** Both full barcode 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 MSL5052 libraries, the robotic-PTM interface is at the lower vertical axis PTM elevator position only.
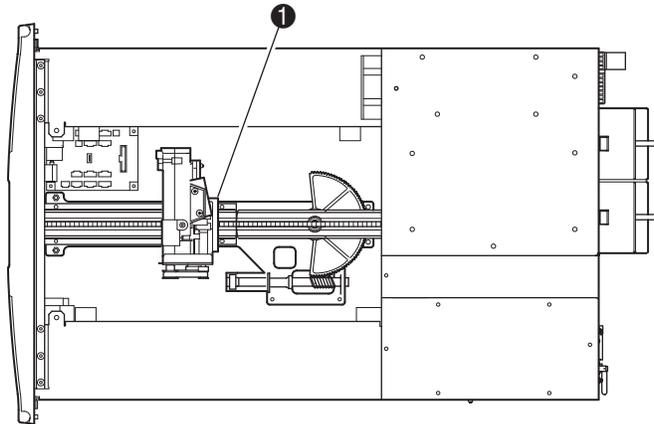


**Figure 1–4: Library robotics (top cover removed, MSL5026 shown)**

❶ Cartridge Shuttle Assembly with Integral Barcode Reader

# 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.

**NOTE:** The SCSI terminator must always be connected to the library controller board for proper operation when configured as standalone or master.

The library controller board is installed in a card cage at the rear of the library and can be serviced with using only a #1 Phillips screwdriver (see Figure 1–5).

**IMPORTANT:** For MSL5000 Series Libraries, the library controller board must be installed in the right slot of the card cage area (upper card cage area for the MSL5052). The remaining slots on the MSL5000 Series Libraries do not support the required connections for the library controller board to operate correctly.
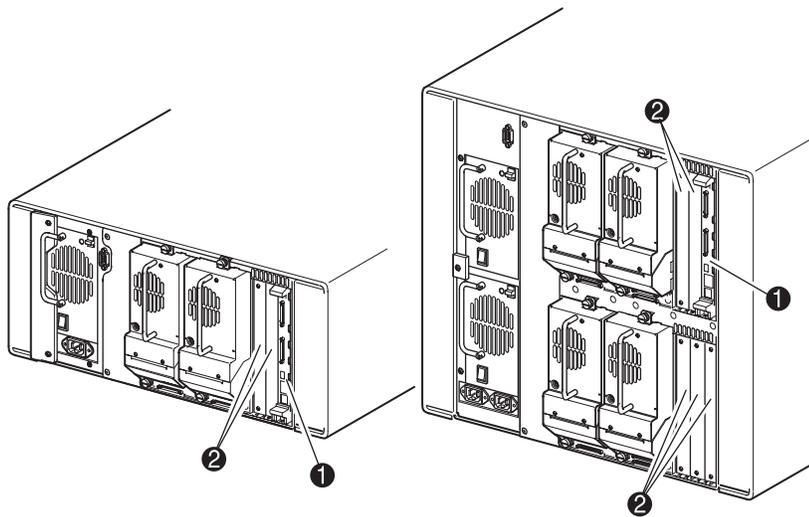


**Figure 1–5:  Library controller board**

❶    Library Controller Board
❷    Factory-Defined Accessory PCI Slots (up to 5)

# Factory-Defined Accessory PCI Slots

MSL5000 Series Libraries contain one or two rear-access card cages and one or two 32-bit, 33-MHz Compact PCI backplanes (see Figure 1–6). These backplanes contain the plug-in connectors for a library controller board and up to five optional Compaq-defined PCI add-in cards.

> ⚠ **CAUTION:** Use of non-Compaq qualified PCI option cards can damage your MSL5000 Series Library and will void product warranty. Follow all installation, configuration, and operating instructions shipped with the option card upgrade kit.

**IMPORTANT:** For MSL5000 Series Libraries only, the library controller board must be installed in the right slot of the card cage area (upper card cage area for the MSL5052).
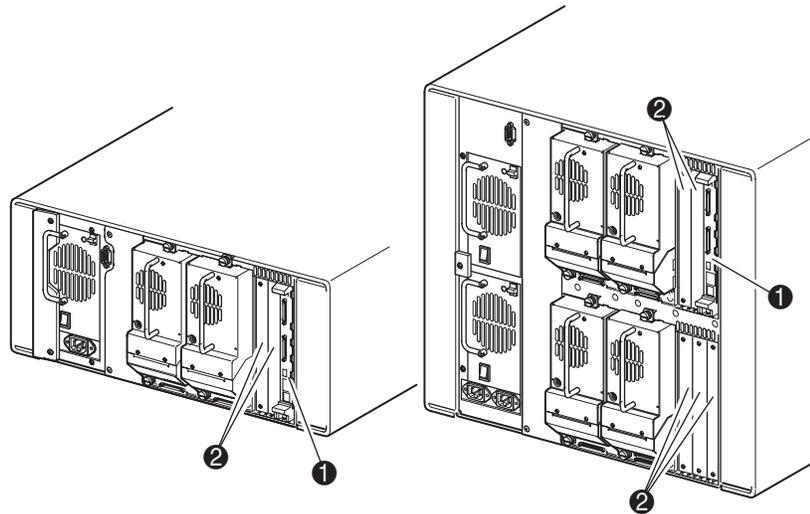


**Figure 1–6:  Library card cages**

❶     Library Controller Board

❷     Factory-Defined Accessory PCI Slots (up to 5)

# Front Panel Indicators

The library front panel indicators consist of the following:

- Viewing window—lets you visually check the library's internal operations.
- GUI touch screen—manually operated to set up and configure the library.
- Library status LED—displays the library's operational status.
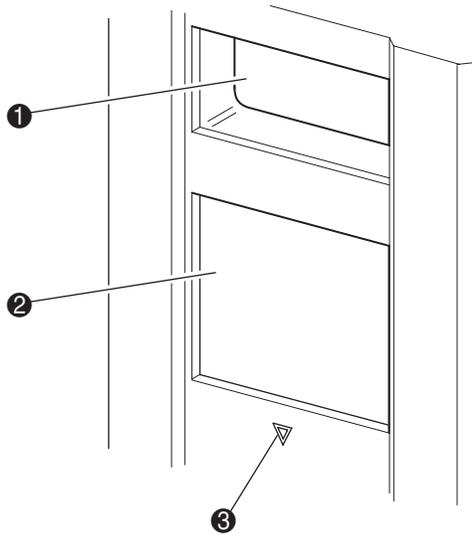


**Figure 1–7: Library front panel**

❶  Viewing Window
❷  GUI Touch Screen
❸  Library Status LED

# Multi-Unit Library Systems

MSL5000 Series libraries can be stacked in a scalable combination with additional MSL5026 and MSL5052 libraries 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 router that mounts to the storage cabinet. The router also provides a Wide Area Network (WAN) connector when libraries are combined in their maximum stacked height.

A maximum of four MSL5052 or seven MSL5026 libraries can be connected together in this manner. Any combination of seven libraries, not exceeding 40 Units (40U) in total stacked height, can also be used. A multi-unit library configuration appears to the host computer system and application software as a single library. 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 storage cabinet configuration during normal library operation. Refer to the *Compaq StorageWorks Pass-Through Mechanism Reference Guide* for detailed installation, configuration, and operation information**.

The library's 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 1–8 on the following page).
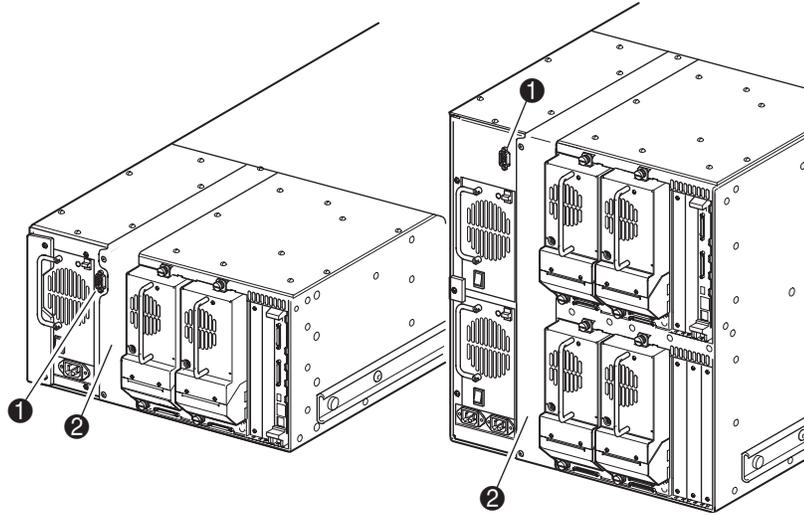
**Figure 1–8:  Library PTM mounting location**

❶   PTM Interface Connector

❷   PTM Mounting Cover (removal required for PTM installation)

# 2

# Installation

This chapter explains how to install a Compaq *StorageWorks* MSL5000 Series Library. Sections in this chapter include:

- Setting up the tabletop model

- Setting up the rackmount model

- Applying power to the library

- SCSI cable configurations

**IMPORTANT:**  Be sure to keep and store all shipping materials from your MSL5000 Series Library.

# Setting up the Tabletop Model

Library tabletop models require no mechanical assembly for mounting (see Figure 2–1). Place the library on a desk, table, or other stable, horizontal surface. Make sure the cooling grills at the front and the fans at the rear of the library are not obstructed. Allow 18 inches (50 cm) of clearance at the front and rear for magazine and hot-plug tape drive access, without the need to reposition the library.

**NOTE:** To reduce tabletop clearance requirements, temporarily move the library forward or rearward to access the hot-plug drive shoes and magazines, respectively.
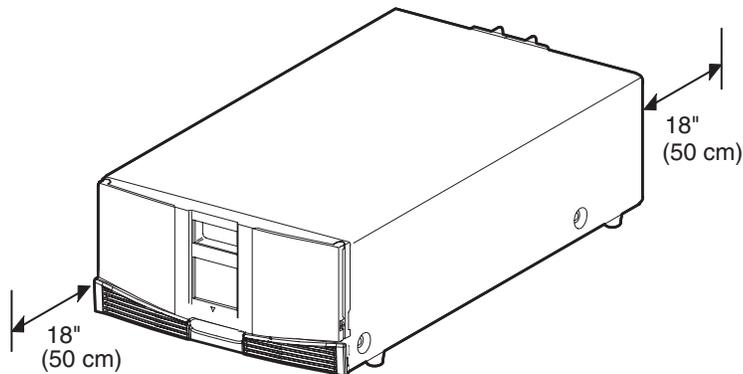


**Figure 2–1: Tabletop model clearances (MSL5026 shown)**

# Setting up the Rackmount Model

Setting up the rackmount model requires a template, storage cabinet slide rails, and a mechanical lift to physically install the library in a storage cabinet.

To setup 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 storage cabinet (see Figure 2–2).
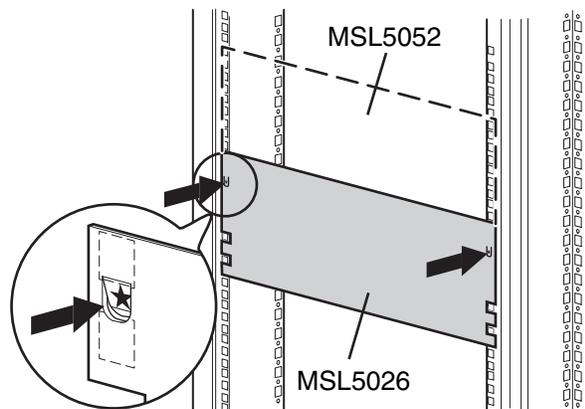


**Figure 2–2: Library template**

**NOTE:** For Compaq Alpha Server H9A Series racks, refer to the instructions included in the Alpha Rack Rail Adapter Kit.

2. Remove the template and then attach the rails using the supplied fasteners (see Figure 2–3). The front rail brackets are threaded to directly accept screws. The rear brackets are not threaded and require cage nuts in the storage cabinet's rear vertical rails.

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

   **IMPORTANT:** 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 storage cabinet until they lock.

   b. Slide the inner guide rail ❷ as far as possible to the front of the rail assembly.
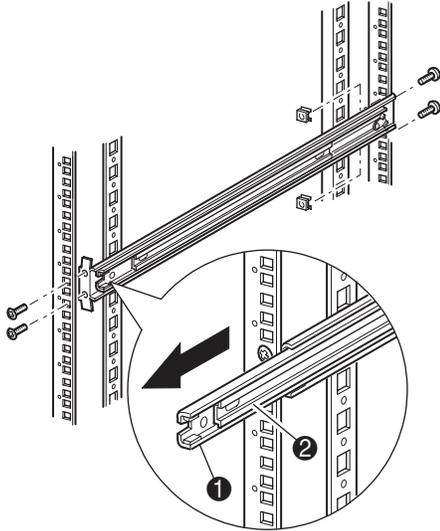


**Figure 2–3: Installing the rails**

3. Install the two slide-on cage nuts ❶, aligned two rack units above the rail bracket screws, on each of the front storage cabinet vertical rails (Figure 2-4).

⚠ **WARNING:  Use a mechanical lift to perform the next step. Make certain, when the library is fully extended, that a force of 20% of the storage cabinet's weight, but not more than 57 pounds (26 kg), applied in any direction other than upwards, does not cause the storage cabinet to overbalance.**

4. Using a mechanical lift, lift the library and visually align the inner and intermediate slide rails.

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

5. Carefully insert the library's inner slide rails ❸ into the extended intermediate slide rails ❷ (see Figure 2–4).

⚠ **WARNING:  A storage cabinet might become unstable if more than one component is extended for any reason. Extend only one component at a time.**

6. Slide the library completely into the storage cabinet until the front panel touches it.

7. Fully tighten the rear rail screws.
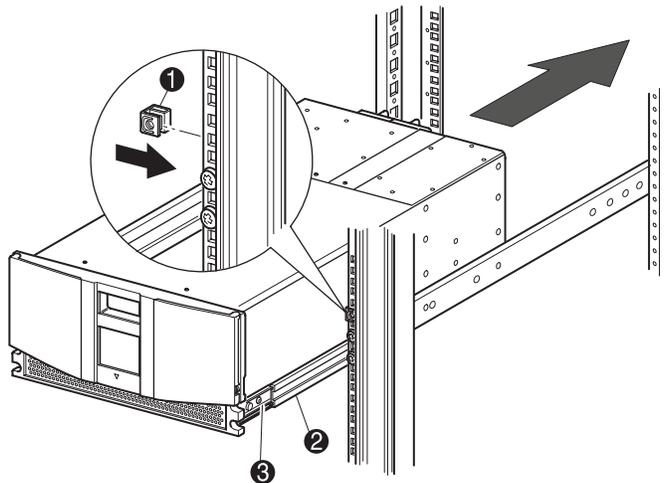


**Figure 2–4:  Installing the library (Model MSL5026 shown)**

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

9. Remove and discard the pull-tabs used to block the latch mechanism. Do not close the doors.

   **NOTE:** If necessary, see chapter 4, "Operation," for information on how to manually open the library doors.

10. With the doors open, secure the front panel to the storage cabinet using the two retaining screws (see Figure 2–5). Close the doors.

You can now cable the library.
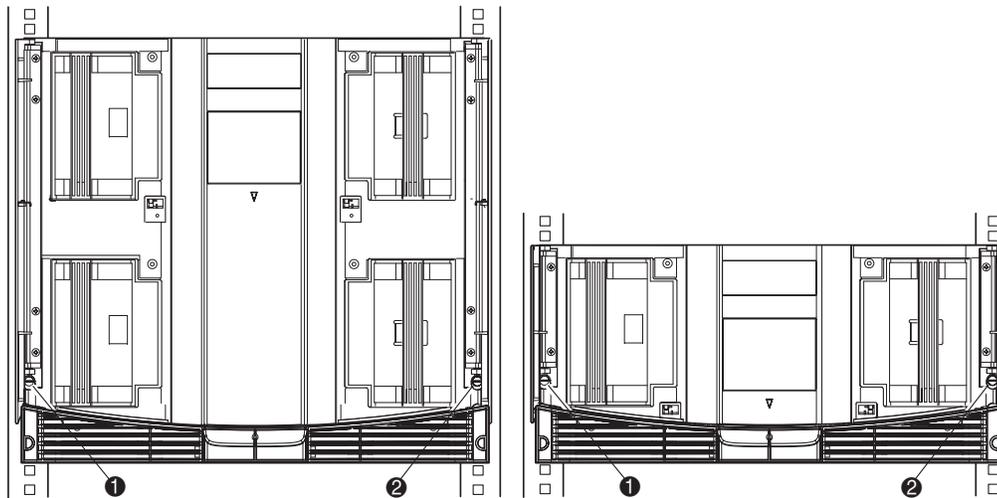


**Figure 2–5: Securing the library**

❶   Left Retaining Screw
❷   Right Retaining Screw

# Applying Power to the Library

To apply power to the library (see Figure 2–6):

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

   **NOTE:** The left AC power receptacle is for the bottom power supply. The right AC receptacle is for the top power supply. (MSL5052 only).

2. Toggle each power switch ❷ on.

3. Press anywhere on the Graphical User Interface (GUI) touch screen ❸ to activate the display and turn the library on.

   **IMPORTANT:** The SCSI terminator must always be connected to the library controller board for proper operation if configured as a master or standalone.

   **NOTE:** Using a piece of tape to lift one corner, carefully remove the appliqué from the GUI touch screen and save for future reference.
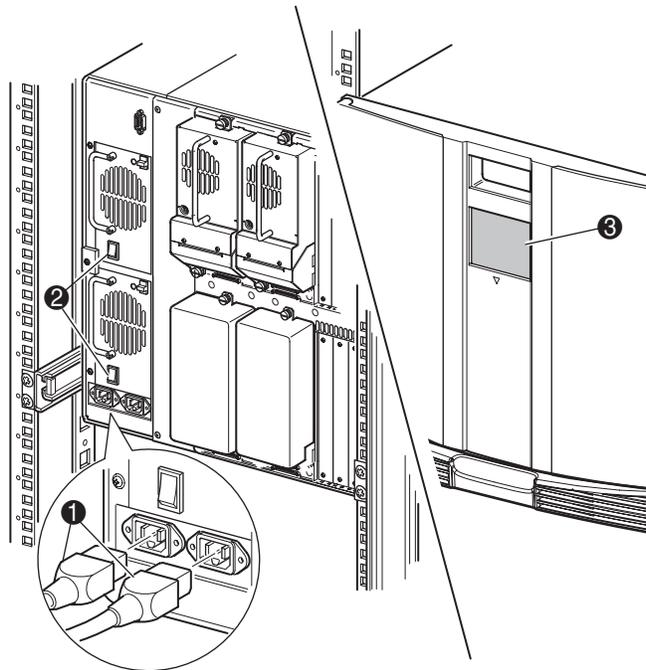


**Figure 2–6:  Applying power to the library (MSL5052 rackmount shown)**

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# SCSI Cable Configurations

This section describes supported SCSI cable configurations for the library.

**NOTE:** MSL5000 Series Libraries support 1 to 4 host and 1 to 4 tape drive SCSI configurations. Contact your Compaq authorized reseller for a list of supported configurations.

The following SCSI configurations are detailed in this section:

- Two tape drives dual host system (MSL5026).

- Four tape drives dual host system (MSL5052).

**NOTE:** Host cables are not supplied with any MSL5000 Series Library.

See Appendix E for additional configuration examples.

# Supported SCSI Cables

**NOTE:** For optimum performance, a maximum of two tape drives per SCSI bus is recommended.

Each of the tape drives in the library 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."

**NOTE:** SCSI IDs are set at the factory. If you want to change any of the factory 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 2–7 shows a typical SCSI cable configuration for a library with two tape drives installed using a dual host system.
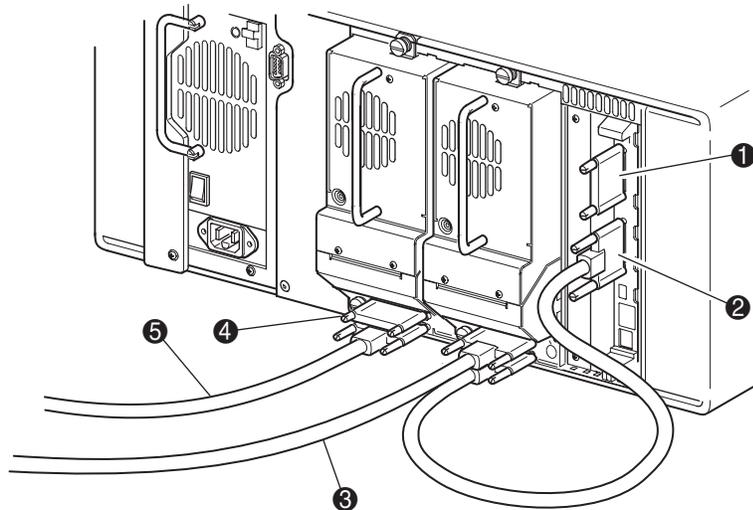


**Figure 2–7: MSL5026 SCSI cable configuration (two tape drives dual host system)**

❶ SCSI Terminator

❷ To Library Controller Board

❸ To Host System

❹ SCSI Terminator

❺ To Host System

# Four Tape Drives Dual Host System

Figure 2–8 shows a typical SCSI cable configuration for a library with four tape drives installed using a dual host system.
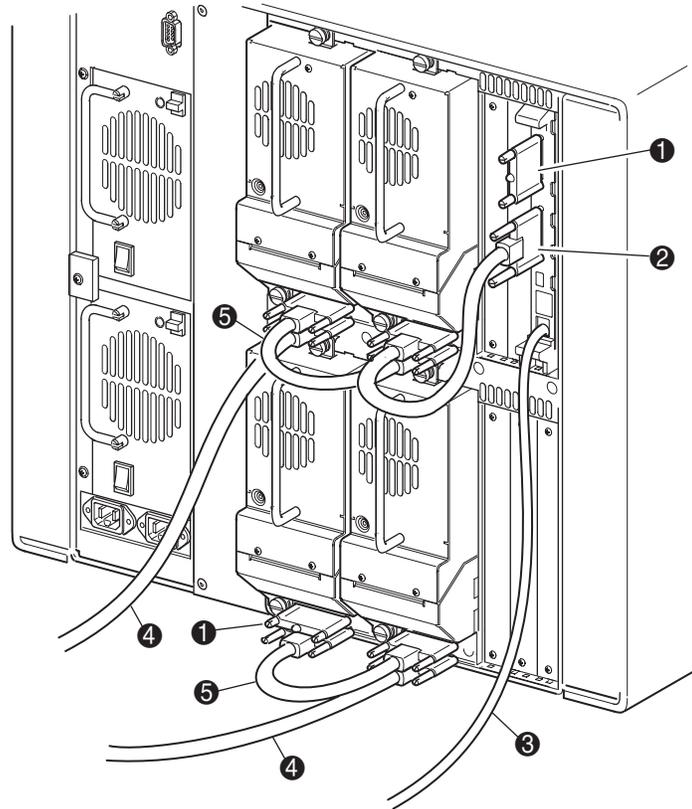


**Figure 2–8:  MSL5052 SCSI cable configuration (four tape drives dual host system)**

**IMPORTANT:**  The short 9.8-inch (0.25 m) jumper cables ❺ are designed for this use only. Stretching either one to reach the library controller board can damage the cable. Use the longer 19.8-inch (0.5 m) cable ❷ to connect the tape drive and the library controller board.

| | | | |
|---|---|---|---|
| ❶ | SCSI Terminator | ❷ | 0.5M jumper cables |
| ❸ | RS232 diagnostic cable (for service only) | ❹ | To Host System |
| ❺ | 0.25M jumper cable | | |

See Appendix E for additional configuration examples.

# 3

## Library Configuration

This chapter explains how to configure a Compaq *StorageWorks* MSL5000 Series Library for normal operation. Sections in this chapter include:

- Factory default configuration settings

- Setting a SCSI ID

- Setting up a reserved slot

- Setting up your network

# Factory Default Configuration Settings

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

Configuration settings that might need to be changed include:

- Setting a SCSI ID
- Setting up a reserved slot
- Setting up a network

You 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."

# 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) completes and the Compaq Status screen appears on the display.

2. Select the Menu option from the Status screen.

3. Enter the appropriate password. See the section on "Front Panel and Media Security Locks" in Chapter 4 for instructions on how to set passwords.

4. Select SCSI in the Edit Options area to display the following screen.



**Figure 3–1: SCSI option selection screen (MSL5026 shown)**

**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.

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

   a. Select the box next to the text "Drive 0 Bus ID:." The Drive 0 Bus ID screen appears on the display (see Figure 3–2). This screen displays the current Drive 0 Bus ID along with the new value that you request.



**Figure 3–2: 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 appears on the display (see Figure 3–3).



**Figure 3–3:  SCSI ID confirmation screen**

d.   Select OK to confirm. A new SCSI ID now appears in the Drive 0 Bus ID data field (see Figure 3–4).
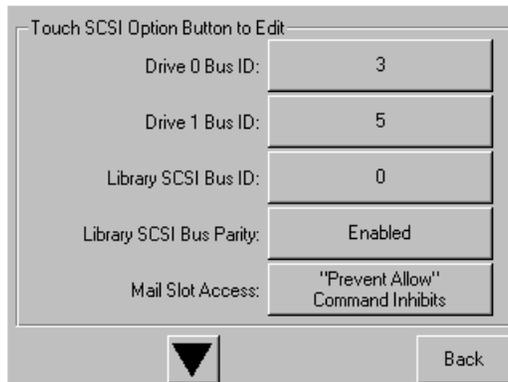


**Figure 3–4:  Drive 0 bus ID data field screen (MSL5026 shown)**

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

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

# Setting Up a Reserved Slot

Use this option to remove some of the tape cartridge slots in the library from use as data storage slots to dedicate one or more tape cartridge slots as a cleaning slot.

**IMPORTANT:** Reserved slots may be incompatible with some application software.

## How Reserved Slots are Numbered

Standard tape cartridge slots are numbered from the front of the magazine to the rear (see Figure 3–5 and Figure 3–6). If you reserve one slot, it becomes Reserved Slot #1 in the last slot of the last magazine. Additional reserved slots continue in this rear-to-front pattern.
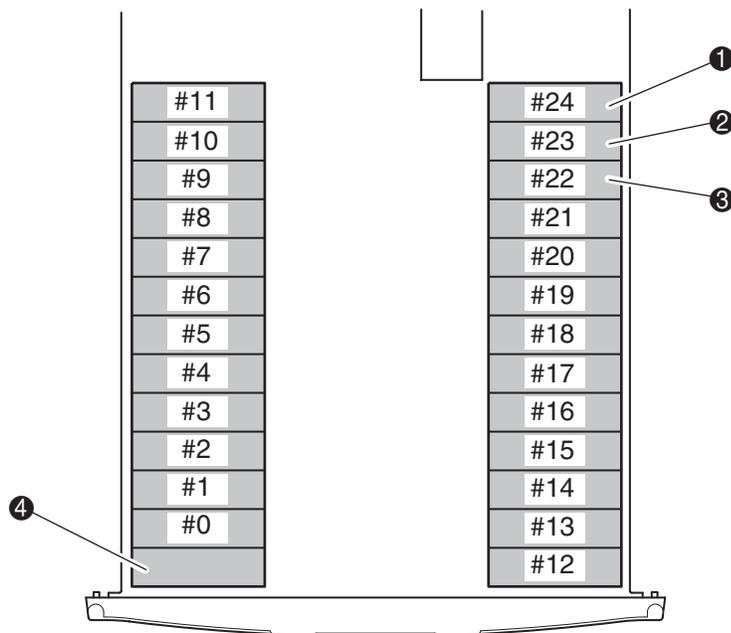


**Figure 3–5: Reserved slot locations (MSL5026)**

❶     Reserved Slot #1
❷     Reserved Slot #2
❸     Reserved Slot #3
❹     Mail Slot (Left Magazine Only)

| | |
|---|---|
| #36 | #49 ❶ |
| #35 | #48 ❷ |
| #34 | #47 ❸ |
| #33 | #46 |
| #32 | #45 |
| #31 | #44 |
| #30 | #43 |
| #29 | #42 |
| #28 | #41 |
| #27 | #40 |
| #26 | #39 |
| #25 | #38 |
| ❹ | #37 |
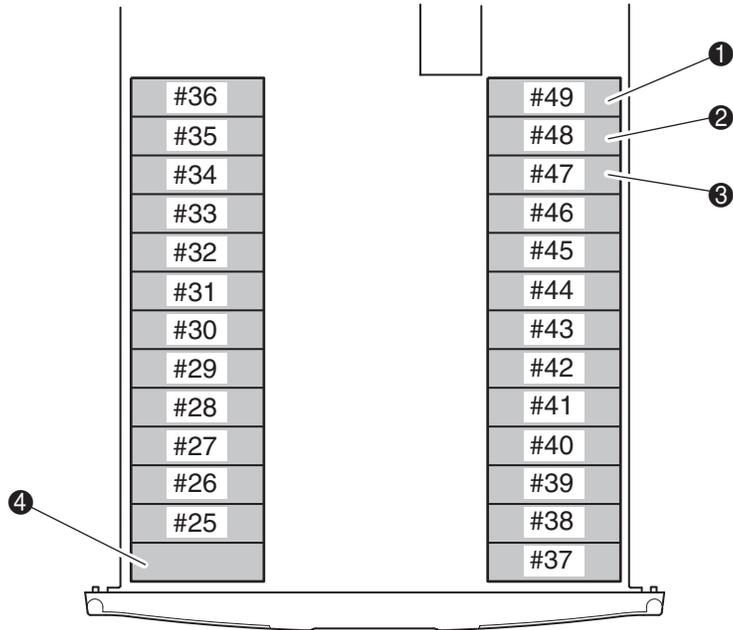
**Figure 3–6:  Reserved slot locations (MSL5052)**

❶   Reserved Slot #1
❷   Reserved Slot #2
❸   Reserved Slot #3
❹   Mail Slot (Left Magazine Only)

To reserve a slot:

1. From the Menu screen, touch the Library option from the Edit Options area.

2. From the Library options screen, press the ▼ to scroll to the screen that contains the Total Reserved Slots option (see Figure 3–7).
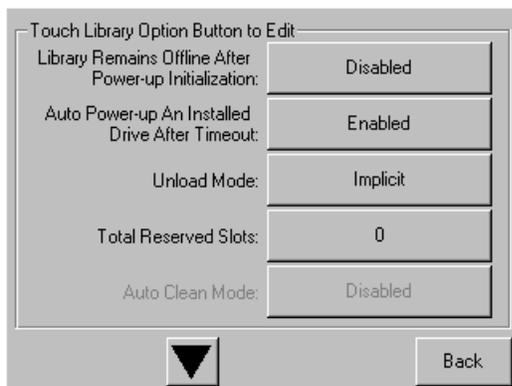


**Figure 3–7:  Total reserved slots screen**

3. Press the associated box next to the Total Reserved Slots option. A numeric keypad appears on the display (see Figure 3–8).
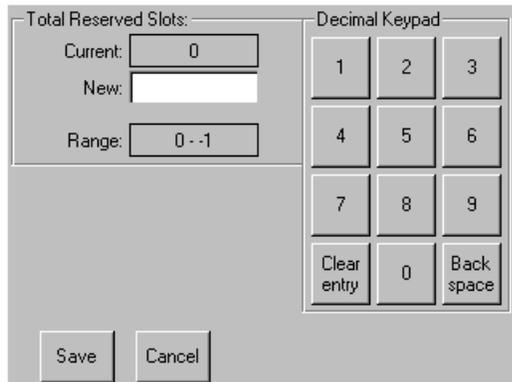


**Figure 3–8:  Reserved slots numeric keypad screen**

4. Enter either 0 or 1 and then press Save to confirm your change. A confirmation screen appears on the display (see Figure 3–9). Press **OK** to save.



**Figure 3–9: Total reserved slots confirmation screen**

5. Press the **Back** button repeatedly to return to the Main menu screen. Your choice takes effect the next time you boot the library.

# Setting Up Your Network

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

1. From the Menu screen, touch Network from the Edit Options area. The IP Address Determination screen appears (see Figure 3–10).



**Figure 3–10: IP address determination screen**

2. Touch the IP Address Determination option (see Figure 3–10) and then the User Specified IP Address option (see Figure 3–11).



**Figure 3–11: User-specified IP address screen**

3. Touch OK to confirm your selection.

4. Touch each IP address option and then use the keypad to enter each IP address (see Figure 3–12).

5. Save and confirm your selections.



**Figure 3–12: Fixed IP address screen**

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

# 4

# Operation

This chapter describes how to operate a Compaq *StorageWorks* MSL5000 Series Library. Sections in this chapter include the following:

- Front panel
- Inserting and removing tape cartridges
- Library display screens and options

# Front Panel

The front panel of the library includes the left and right magazine doors, a Graphical User Interface (GUI) touch screen, a library status LED, and a viewing window (see Figure 4–1).
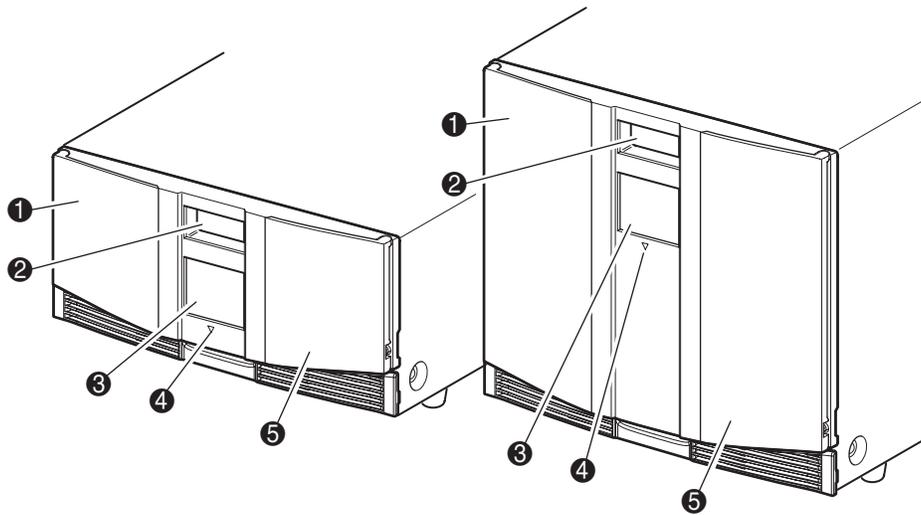


**Figure 4–1: Library front panel**

❶ Left Magazine Door
❷ Viewing Window
❸ GUI Touch Screen
❹ Library Status LED
❺ Right Magazine Door

## 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, should the GUI touch screen fail, you can manually open them by pushing a small metal pin or paper clip into the mechanical releases (see Figure 4–2).

> ⚠ **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.
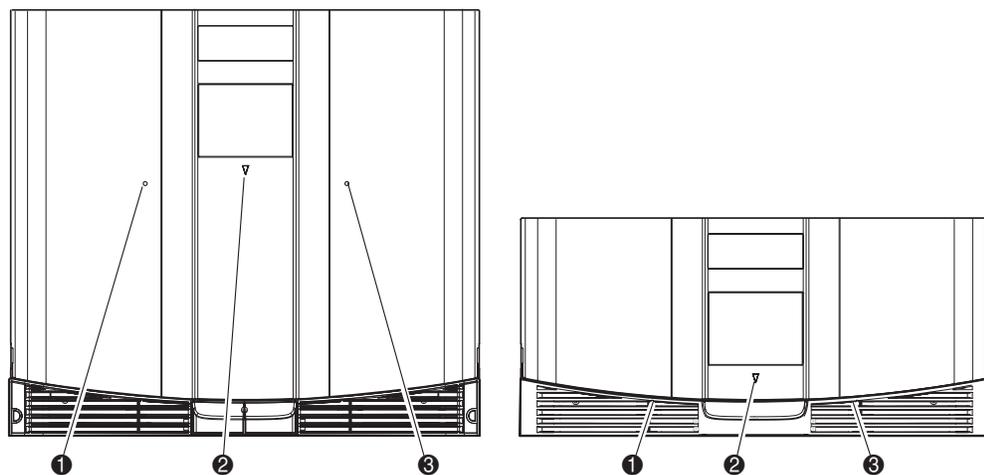


**Figure 4–2: Magazine door mechanical releases (emergency access)**

❶ Left Magazine Door Release
❷ Library Status LED
❸ Right Magazine Door Release

# Indicators

The library front panel indicators consist of a GUI touch screen and a library status LED (see Figure 4–3 and Table 4–1).
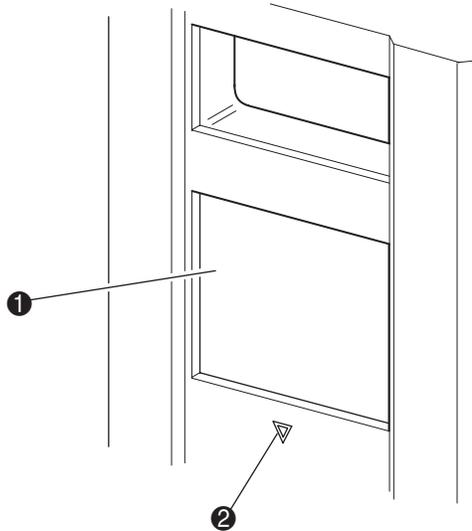
**Figure 4–3: Library indicators**

❶ GUI Touch Screen
❷ Library Status LED

**Table 4–1: 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 four levels of security (see Figure 4–4):

- 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 menu that lets you view/edit library and SCSI options.

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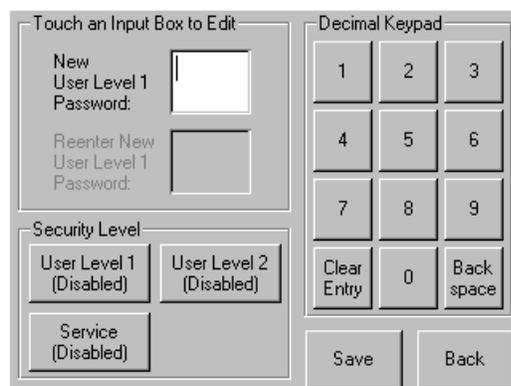


**Figure 4–4: Password levels**

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 using the MSL5000 Utility and diagnostic cable. Note that any configuration that was previously set will be lost.

### Host System

Media can also be locked by software running on the host, using the SCSI ALLOW/PREVENT MEDIUM REMOVAL command. 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. Procedures for locking and unlocking magazine doors and media are described later in this chapter.

## Inserting and Removing Tape Cartridges

Unless you are using the mail slot(s), a tape magazine must be removed from the library in order to remove or insert tape cartridges. Make sure the slot you want to use is not already reserved for a tape 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.

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

# Removing Magazines

Library magazine removal is a manual operation. Access the magazines using the
Magazine Access option from the library Status screen. For the MSL5026, this option
lets you open the left or right magazine doors separately or both magazine doors at the
same time. For the MSL5052, this option lets you open the upper-left, lower-left, or
right magazines separately or both magazine doors at the same time. After opening the
appropriate magazine door, pull the magazine out from the library chassis (see
Figure 4–5).
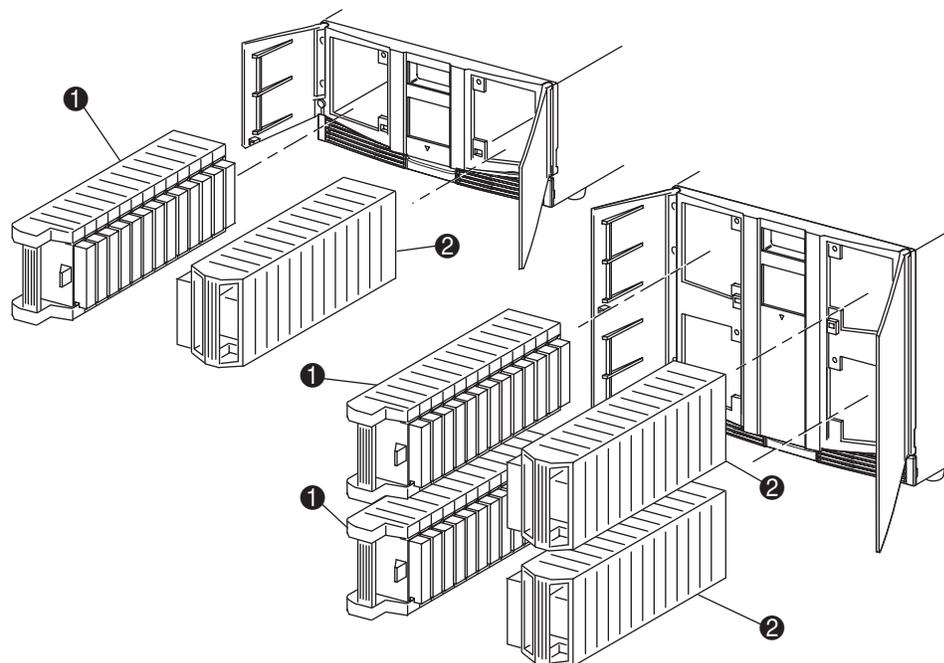
**Figure 4–5:  Removing tape cartridge magazines**

❶    Left Magazine(s)
❷    Right Magazine(s)

## Inserting Cartridges into a Magazine

A full left magazine is shown in Figure 4–6. For the MSL5026, the lowest numbered tape cartridge slot ❷ is the one closest to the front of the magazine. For the MSL5052, the lowest numbered tape cartridge slot ❷ is the one closest to the front of the upper-left magazine.
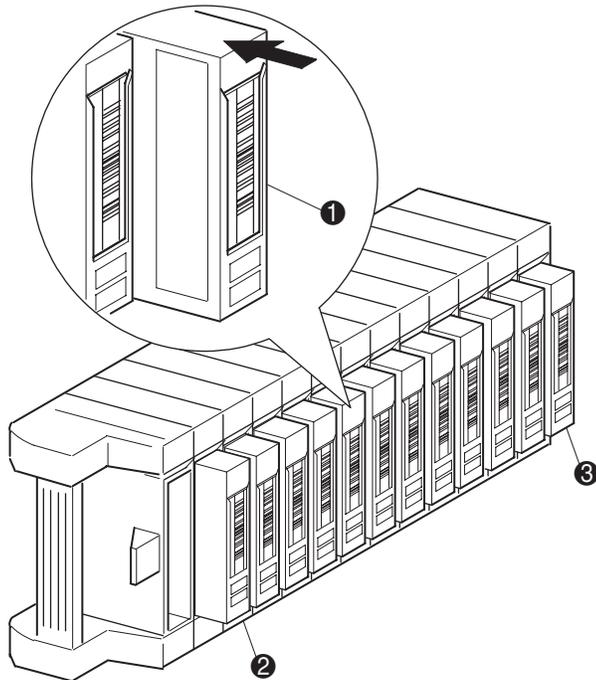


**Figure 4–6:  Left tape magazine with tape cartridges installed**

❶    Tape Cartridge Orientation for Left Magazine
❷    Lowest Numbered Tape Cartridge Slot
❸    Highest Numbered Tape Cartridge Slot

Insert tape cartridges so that the bar code labels are facing outward (see Figure 4–7).

**NOTE:** Handle and store tape cartridges in a clean, dust-free environment.
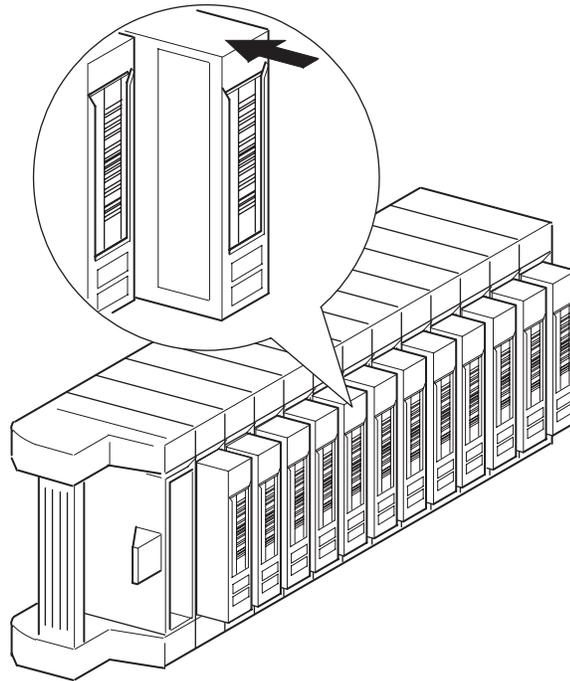


**Figure 4–7: Inserting a tape cartridge (left magazine)**

# Using Mail Slots (Left 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. Access the mail slots using the Mail Slot Access option from the library Status screen. This option lets you open a left magazine door for mail slot access. After opening a left magazine door, pivot the mail slot forward to insert a tape cartridge (see Figure 4–8).

**IMPORTANT:** Mail slots must be enabled (factory default) using the Mail Slot Mode option from the Edit Library Options menu. See Table 4-2 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 applications.
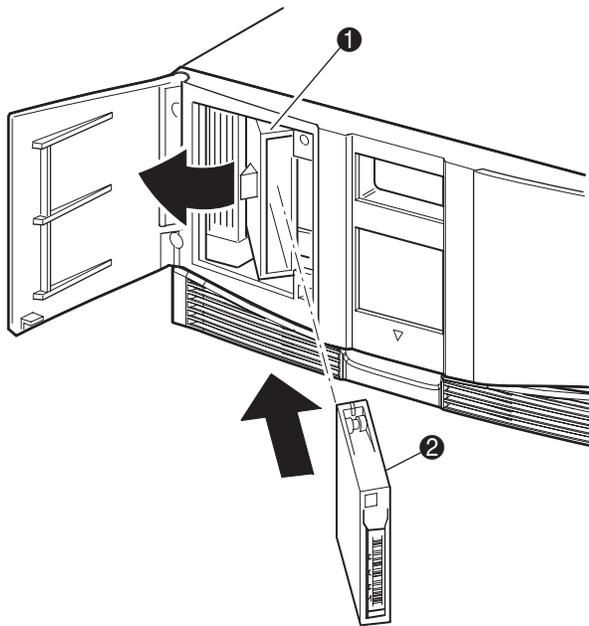


**Figure 4–8:  Left magazine mail slot (MSL5026 shown)**

❶    Mail Slot Holder
❷    Tape Cartridge

## Barcode Labels

Only Compaq barcode labels are supported with the library. To order additional labels, contact your authorized Compaq reseller. Use Compaq Part Number 158398-001.

Figure 4–9 shows you how to attach a barcode label onto a tape cartridge.
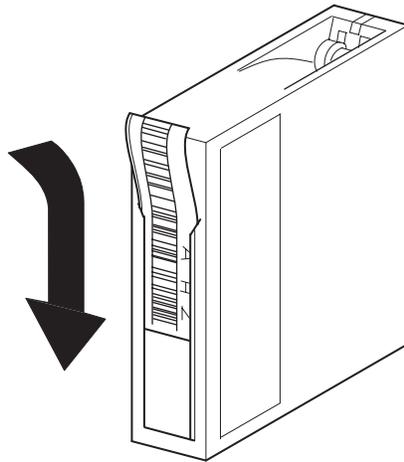


**Figure 4–9: Attaching a barcode label onto a tape cartridge**

# 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 while library inventory and scalability configuration occurs:



**Figure 4–10:  Initialization screen**

## Library Status Screen

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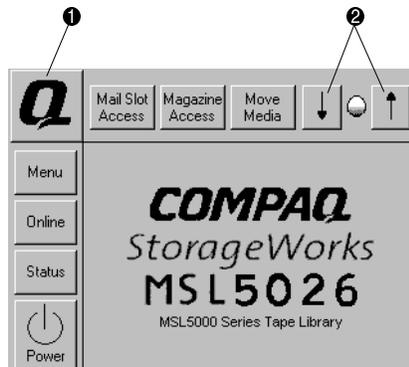


**Figure 4–11:  Library status screen (MSL5026 shown)**

❶    Technical Support Information Option

❷    LCD Contrast Controls (volatile settings)

The library Status screen lets you select the following options:

•    Technical Support Information Option

•    Mail Slot Access

•    Magazine Access

•    Move Media

•    LCD Contrast Controls

•    Power

•    Status Information

•    Online/Offline

•    Menu Access

The remainder of this section describes each of the options that are available from the library Status screen.

## Technical Support Information Option

Selecting this option lets you display Compaq-specific technical support assistance information (see Figure 4–12). If you are having difficulty with a direct connection, instructions on how to contact your local service provider is included, along with a toll-free number to contact Compaq directly. For further assistance, you can also access the Compaq website at www.compaq.com.



**Technical Support Assistance
Contact your Compaq Local Reseller
or Authorized Compaq Service Provider**

**\* Fibre Channel Support:**

Compaq Technical Support
(U.S. & Canada only) 1-800-354-9000
Other Countries refer to the Compaq WEB
Site for a listing of Local Phone Numbers
http://www.compaq.com

**\* Direct Connect Support:**

Compaq Technical Support
1-800-OK-COMPAQ

Back

**Figure 4–12: Technical support information screen**

## Mail Slot Access Option (Left Magazines Only)

Selecting this option lets you display the Mail Slot Access screen (Figure 4–13). This option lets you gain access to a mail slot without powering down the library. Note that a mail slot is reserved for the first tape cartridge slot in a left magazine and can be password protected or fully disabled. If disabled, this menu button is absent. On MSL5052 libraries, solenoids restrict access to the selected mail slots.



**Left-side door is open**

Mail Slot 0 | Mail Slot 1

Back

**Figure 4–13: Mail slot access screen (MSL5052 shown)**

## Magazine Access Option

Selecting this option lets you display the Magazine Access screen (Figure 4–14). For the MSL5026, this option lets you gain access to the left or right magazine doors separately or both magazine doors for tape cartridge placement or removal. For the MSL5052, this option lets you gain access to the upper-left, lower-left, or right magazines separately or both magazine doors for tape cartridge placement or removal. Note that this option can also be password protected.



**Figure 4–14: Magazine access screen (MSL5026 shown)**

## Move Media

Selecting this option lets you display the Move Media screen (see Figure 4–15). 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 magazine. This option also lets you load and unload tape cartridges from the installed tape drives (both DLT and SDLT).

See the section on "Replacing a Cleaning Cartridge in a Reserved Slot" in Chapter 5 for detailed removal information.

> △ **CAUTION:** DLT and SDLT cleaning cartridges must only be used in their respective drive types or drive damage can result.

> △ **CAUTION:** Remove media from all drives and slots prior to library transport.
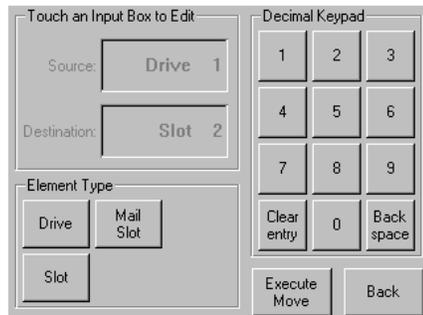
**Figure 4–15:  Move media screen**

## LCD Contrast Controls

Selecting these options let you increase or decrease the contrast of the LCD display
(see Figure 4-11). Incremental steps are set by adjusting the LCD 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

Selecting this option initiates a library power-down operation. After a successful
power down, a confirmation message appears (Figure 4–16).

**IMPORTANT:**  The library moves the shuttle assembly to the parked position before powering
down. This is necessary for any library transport.
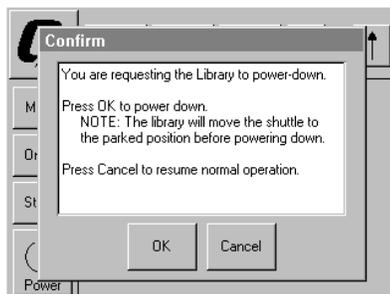


**Figure 4–16:  Power-down confirmation message screen**

## Status

Selecting this option lets you display an information Status screen (Figure 4–17). This screen lets you identify a tape drive type, view physical drive status, drive cleaning information, and tape cartridge inventory information.
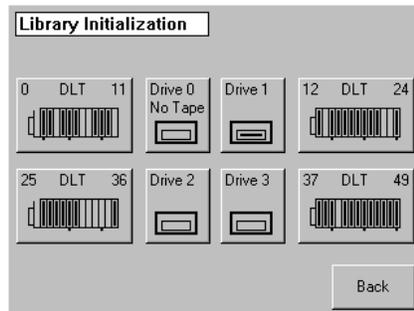


**Figure 4–17: Status screen (MSL5052 shown)**

## Online

Selecting this option lets you place 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 4–18). The Menu option displays three distinct areas:

- View System Data

- Utilities

- Edit Options

For a complete description of these areas, see the section on "Menu Selections" described later in this chapter.
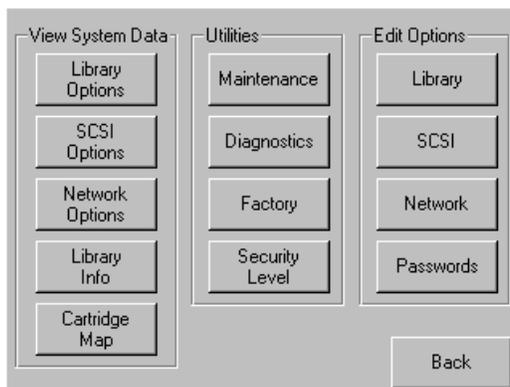


**Figure 4–18:  Menu screen**

# 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 settings defined from the Library option in the Edit Options area (see Figure 4–19).

**NOTE:** You can move to the next subsequent Library Options screen by selecting the ▼. To return to the previous Library Options screen select the ▲ or **Back** button to return to the Menu screen.



| View Library Options | |
|---|---|
| Library Remains Offline After Power-up Initialization: | Disabled |
| Auto Power-up An Installed Drive After Timeout: | Enabled |
| Unload Mode: | Implicit |
| Total Reserved Slots: | 0 |
| Auto Clean Mode: | Unavailable |

**Figure 4–19: View library options screen**

Table 4–2 lists and describes the available Library options.

**Table 4–2: 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 remove from use 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. |
| 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 Drv1, and Sequential Split for the MSL5026. The MSL5052 is not supported in sequential modes. The default is Random (Sequential Mode Unavailable). |

**Table 4–2: View Library Options (Continued)**

| Option | Description |
|---|---|
| Sequential Mode | Selecting a sequential mode (using Library Mode) enables the library robotics to unload a full tape cartridge (or at the end of data), select, load the next tape cartridge from the appropriate magazine, and then automatically continue read/write operations without software intervention. Two options are available: Normal and Recirculate. |
| 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 MSL5026, the default is Mail Slot Enabled. For the MSL5052, 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 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 barcode label. The default is Disabled. |
| Barcode Reader | Lets you enable or disable the barcode 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. |

## SCSI Options

Selecting this option lets you view the settings defined from the SCSI option in the Edit Options area (see Figure 4–20).

**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.
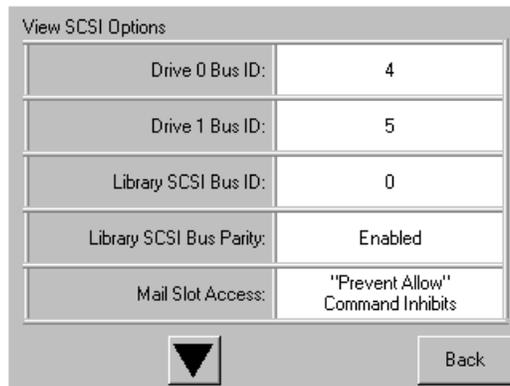


**Figure 4–20: View SCSI options screen**

Table 4–3 lists and describes the available selections.

**Table 4–3: 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 *n*th drives, counting from right to left starting with the master unit in the scaled Library system. |
| 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 *n*th drives, counting from right to left starting with the master unit in the scaled Library system. |
| Drive 2 Bus ID (MSL5052 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 *n*th drives, counting from right to left starting with the master unit in the scaled Library system. |

**Table 4–3: View SCSI Options (Continued)**

| Option | Description |
|---|---|
| Drive 3 Bus ID (MSL5052 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 *n*th drives, counting from right to left starting with the master unit in the scaled Library system. |
| 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 Library SCSI Bus Parity Enabled. |
| Mail Slot Access | "Prevent Allow" Command Inhibits or "Prevent Allow" Command Ignored (used for some backup applications). "Prevent Allow" Command Inhibits is the default. |
| 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 All, the unit reports all unit attention conditions in sequence; if set to One, the unit reports only the highest priority condition. The default is Report All. |
| 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. |

**Table 4–3: View SCSI Options (Continued)**

| Option | Description |
|---|---|
| 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 | Lets you specify the response of the library's robotics to the SCSI INQUIRY command in the Product ID fields. The default is "MSL5000 Series." |
| Vendor Identification | Lets you specify the response of the library's robotics to the SCSI INQUIRY command in the Vendor ID field. The default is "COMPAQ." |
| Post Recovered Errors | The default is Disabled. |
| TapeAlert Mode | Specifies conditions for logging and reporting the following Tape Alert data options. The default is Logging Disabled.<br><br>**Logging Disabled:** Inhibits the logging feature.<br><br>**No Exceptions:** The library must not report information exceptions.<br><br>**Generate Unit Attention:** Reports information exceptions with a Unit Attention sense key and an ASC/ASCQ of 5D/00.<br><br>**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.<br><br>**Unconditionally Generate Recovered Error:** Unconditionally reports information exceptions with a Recovered Error sense key and an ASC/ASCQ of 5D/00.<br><br>**Generate No Sense:** Reports information exceptions with a No Sense sense key and an ASC/ASCQ of 5D/00. |

**Table 4–3: View SCSI Options (Continued)**

| Option | Description |
|---|---|
| | **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. |
| Data Transfer Speed | Lets you set the robot or library SCSI data transfer rate to Synchronous, 10 MB/s, 5 MB/s, or Asynchronous Only. The default is Synchronous, 10 MB/s. |

## Network Options

Selecting this option lets you view the settings defined from the Network option in the Edit Options area (see Figure 4–21). Table 4–4 lists and describes the available options.

**NOTE:** There are no factory default settings for networks. Contact your network administrator for specific information on connecting the library to your network.
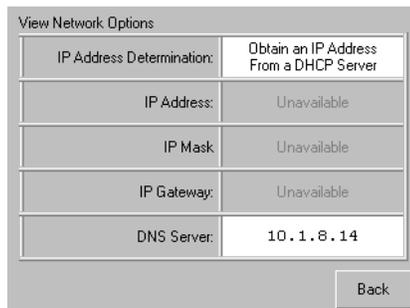


**Figure 4–21: View network options screen**

**Table 4–4: View Network Options**

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

## Library Info

Selecting this option lets you display the Miscellaneous Library Info screen (Figure 4–22). This screen displays the library's firmware revision, local IP and Ethernet address that is currently in use, and the unit serial number.
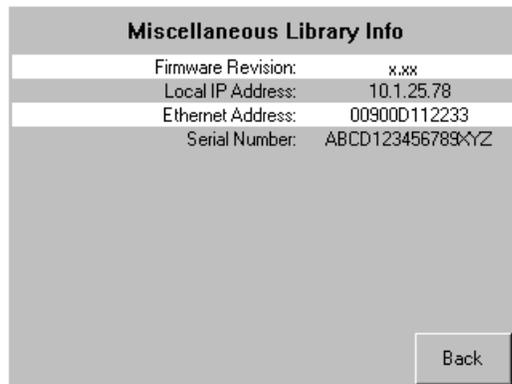


**Figure 4–22: View library info screen**

## Cartridge Map

Selecting this option provides you with a layout of the slots and cartridges that are currently being used in the library. Barcode labels are displayed if enabled and in use.
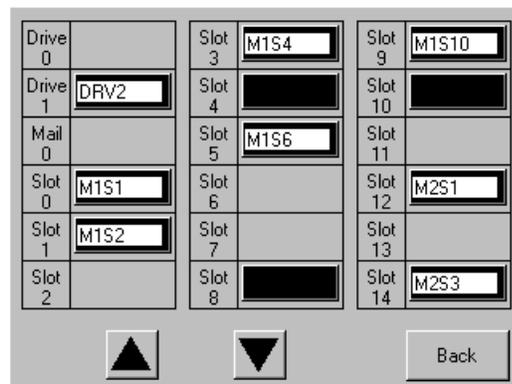


**Figure 4–23: Cartridge map screen**

# 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 4–24). Table 4–2 lists and describes the available options.

**NOTE:** You can move to the subsequent Library screen by selecting the ▼. To return to the previous Library screen select the ▲ or **Back** button to return to the Menu screen.
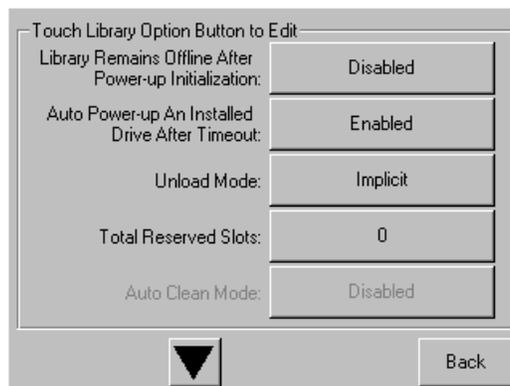


**Figure 4–24: Edit library options screen**

## SCSI

Selecting this option lets you define the SCSI options used to configure the library for your specific needs (see Figure 4–25). Table 4–3 lists and describes the available options.

**NOTE:** You can move to the subsequent SCSI screen by selecting the ▼. To return to the previous SCSI screen select the ▲ or **Back** button to return to the Menu screen.



**Figure 4–25:  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 4–26). Table 4–4 lists and describes the available options.



**Figure 4–26:  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 4–27). See the section on "Front Panel and Media Security Locks" described earlier in this chapter.
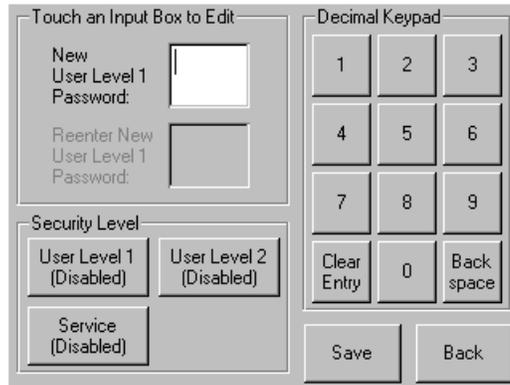


**Figure 4–27: Edit passwords options screen**

## 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, or replace, the following components (see Figure 4–28):

- Clean One Drive

- Clean Both Drives (MSL5026)

- Clean All Drives (MSL5052)

- Replace Drive

- Set User Defaults

- Reboot Module

- Flash Drive From SCSI

- Flash Drive From Tape

- Drive Format

- Force Reconfiguration

The Maintenance menu options, intended for operator use, are described in Chapter 5, "Maintenance." Additional Maintenance menu options used by service technicians are described in the *Compaq StorageWorks MSL5000 Series Library Maintenance and Service Guide*.
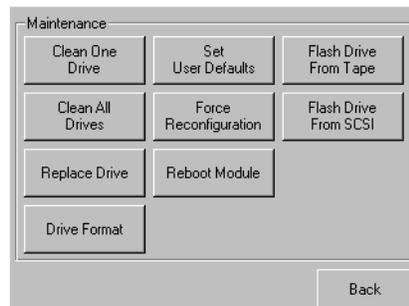


**Figure 4–28: Maintenance screen**

## Diagnostics

Selecting this option lets you perform a system calibration on available components (see Figure 4–29). Available options are dependent on the specified user level.

The Diagnostics menu options, intended for operator use, are described in Chapter 5, "Maintenance." Additional Diagnostics menu options used by service technicians are described in the *Compaq StorageWorks MSL5000 Series Maintenance and Service Guide*.
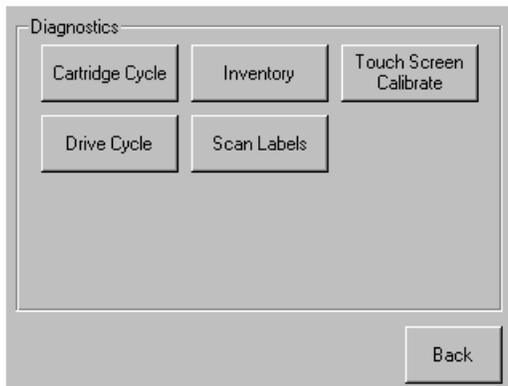


**Figure 4–29: Diagnostics screen**

## Factory

Selecting this option lets you perform factory operations on the following components (see Figure 4–30).

• Passwords

• Clear SRAM Contents

• Set Factory Defaults

• Motor Diag

• View SRAM Contents

The Factory menu options, intended for operator use, are described in Chapter 5, "Maintenance." Additional Factory menu options used by service technicians are described in the *Compaq StorageWorks MSL5000 Series Maintenance and Service Guide*.
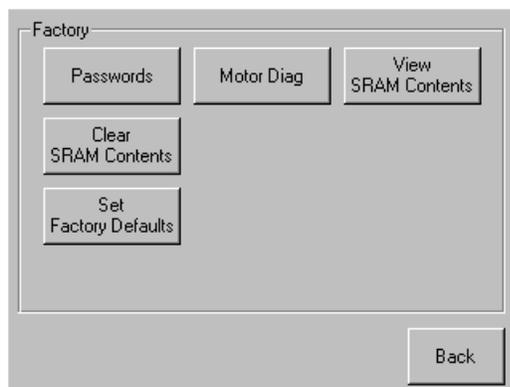


**Figure 4–30:  Factory screen**

## Security Level

Selecting this option lets you select passwords for a security level (see Figure 4–31).

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

**NOTE:** Setting a value 0000 for a given level disables that level.



**Figure 4–31: Security level screen**

# 5

# Maintenance

This chapter describes the Clean One Drive menu option contained in the Maintenance submenu of the Utilities area on the front panel display. You use the Clean One Drive menu option to clean tape drives installed in Compaq *StorageWorks* MSL5000 Series Libraries.

> $\triangle$ **CAUTION:** Only qualified service technicians should perform the remaining menu options contained in the Maintenance submenu.

> $\triangle$ **CAUTION:** Only perform the Clean One 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.

This chapter includes library procedures for:

- Automatically running a cleaning cartridge.

- Manually running a cleaning cartridge.

- Replacing a cleaning cartridge in a reserved slot.

**IMPORTANT:** Backup application software must be compatible with the library autoclean feature to avoid robot command conflicts. Compaq does not support preventive autocleaning operation.

# Running a Cleaning Cartridge

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 One 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 the section on "Setting Up a Reserved Slot" in Chapter 3 for more information.

2. Enable Auto Clean Mode. See the section on "Library Options" in Chapter 4 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 the section on "Setting Up a Reserved Slot" in Chapter 3 for more information.

## Running a Cleaning Cartridge From a Mail Slot

1.  Install a cleaning cartridge into a Mail Slot.

2.  Select the Clean One Drive menu option from the Maintenance submenu on the front panel display.

3.  Select Source and then Mail Slot in the 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. Or, use the Decimal Keypad Backspace and Numeric Keys 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.  Install a cleaning cartridge into an appropriate tape cartridge slot (Slot 0, for example).

2.  Select the Clean One 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 Element Type box to sequence through the available cartridge slots. Or, use the Decimal Keypad Backspace and Numeric Keys 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. Or, use the Decimal Keypad Backspace and Numeric Keys 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 the section on "Setting Up a Reserved Slot" in Chapter 3 for more information.

2. Install a cleaning cartridge in a reserved slot.

3. Select the Clean One 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. Or, use the Decimal Keypad Backspace and Numeric Keys 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

When the cleaning cartridge has been used up, a message appears on the front panel display indicating that 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 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 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 EXPIRED and then 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 EXPIRED and then 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 Type box.

11. Select Execute Move to put the new cleaning cartridge in a mail slot.

# 6

# Troubleshooting

## Introduction

This chapter describes the problems that can cause a Compaq *StorageWorks* MSL5000 Series Library to malfunction, including:

- Platform problems

- General drive errors

- Error recovery

- Fault Symptom Codes (FSCs)

**NOTE:** Each library is supplied with an RS232 diagnostic cable and *MSL5000Util* diagnostic utility (on floppy). Usage is described in the *Compaq StorageWorks MSL5000 Series Library Maintenance and Service Guide.*

# 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. 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," 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 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 service provider, or in some cases, to determine a recovery procedure.

Errors that appear to be library and/or drive related may have another root cause. These can include operator error, improper HBA driver, incompatible application software, poor SCSI cabling, unsupported modes, and so on.

# Error Recovery

Figure 6–1 outlines the recommended steps for error recovery. You should follow this chart in all cases.

Error Recovery Procedures (ERPs) are listed in detail in Table 6–1; FSCs are listed in Table 6–2 along with their related ERPs.
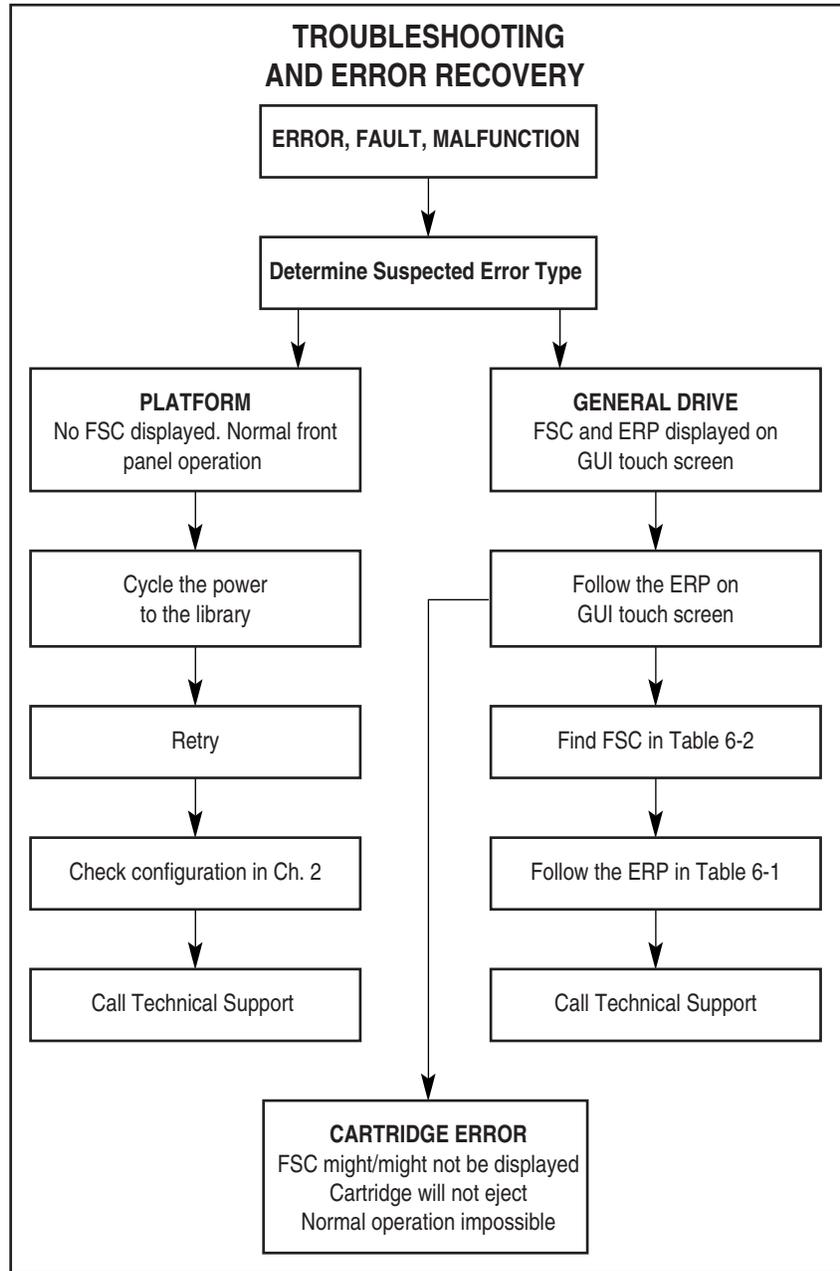
**Figure 6–1:  Troubleshooting flow chart**

# Error Recovery Procedures

Table 6–1 lists ERPs for errors reported on the GUI touch screen of the library. This list includes only those procedures that can be safely performed by an end user. The *Compaq StorageWorks MSL5000 Series Library Maintenance and Service Guide* includes additional procedures that can be performed by a qualified service technician.

**Table 6–1: Error Recovery Procedures**

| ERP Code | Procedure/Description |
|---|---|
| C | Cycle power to the library using the Power option on the GUI touch screen. Wait 30 seconds to power up again. |
| D | Turn off power to the library and inspect connectors and cables. |
| F | Invalid operation. Select parameters correctly and try again. |
| G | Call Technical Support. |

# Fault Symptom Codes (FSCs)

FSCs that appear on the GUI touch screen are described in Chapter 4, "Operation." A descriptive message and instructions for clearing the fault accompany each FSC. If a fault persists, look up the FSC in Table 6–2 to determine the error recovery procedure or to report it to your service provider.

**Table 6–2: Fault Symptom Codes**

| Message | FSC | ERP |
|---|---|---|
| OS Catastrophic Error | 0901 | G |
| OS Task Exit Error | 0902 | G |
| SCSI Firmware Error | 1001 | D,G |
| SCSI FIFO Empty | 1002 | D,G |
| SCSI FIFO Error | 1003 | D,G |
| SCSI Gross Error | 1004 | C,D,G |
| Illegal SCSI Cnt Cmd | 1005 | C,D,G |
| SCSI Message Error | 1006 | D,G |
| SCSI Invalid Element | 1007 | D,G |
| SCSI No Pending Int. | 1008 | D,G |
| SCSI Invalid Int. | 1009 | D,G |
| Illegal Move | 2008 | C,G |
| Door Open (status only) | 2009 | F |
| Menu Mode (status only) | 200A | F |
| Cart Unaccessible | 200C | F |
| Drive In Error | 200D | C,G |
| No Magazine | 200E | F |
| Removal Prevented | 200F | F |
| Ctl. Firmware Error | 2010 | C,G |
| Drive Code Update Command Error | 2080 | C,G |
| Move Command Failure | 2081 | C,G |
| Open Mail Slot Fault | 2090 | C,G |
| Open Left Door Fault | 2091 | C,G |
| Open Right Door Fault | 2092 | C,G |
| Open Doors Fault | 2093 | C,G |

**Table 6–2: Fault Symptom Codes (Continued)**

| Message | FSC | ERP |
|---|---|---|
| Open DLT Handle Fault | 2094 | C,G |
| No IP Address Found | 20a0 | C,G |
| No IP Address Mode Fault | 20a1 | C,G |
| No Gateway Address Found | 20a2 | C,G |
| Unknown Exchange For The Async message | 20b0 | C,G |
| Drive In Error | 20c0 | C,G |
| Drive In Error | 20c1 | C,G |
| Motor Fault Condition | 3000 | C,G |
| Shuttle Tach Errors | 3001 | C,G |
| Picker Tach Errors | 3002 | C,G |
| Rotary Tach Errors | 3003 | C,G |
| Vertical Tach Errors | 3004 | C,G |
| Passthru Tach Errors | 3005 | C,G |
| Excessive Picker Friction Error | 3006 | C,G |
| Bin Fetch Failure | 3011 | C,G |
| Bin Stow Failure | 3012 | C,G |
| Drive Fetch Failure | 3013 | C,G |
| Drive Stow Failure | 3014 | C,G |
| Drive Timeout Failure | 3015 | C,D,G |
| Drive Status Failure | 3016 | C,D,G |
| Drive In Flux Timeout | 3017 | C,D,G |
| Drive Load Retry Failed | 3018 | C,G |
| Drive Open Door Failed | 3019 | C,G |
| Drive Close Door Failed | 301A | C,G |
| Drive Communication Error | 301B | C,D,G |
| Drive Get General Status Fail | 301C | C,D,G |
| Drive Get Status 3 Fail | 301D | C,D,G |
| Undefined Config | 3020 | C,G |
| Orphan Cartridge not flowed | 3030 | C,G |
| Chassis S/N Mismatch. Previous S/N retained | 3031 | G |

**Table 6–2: Fault Symptom Codes (Continued)**

| Message | FSC | ERP |
|---|---|---|
| Chassis S/N Character count is not correct | 3032 | G |
| Chassis S/N did not scan | 3033 | G |
| Chassis S/N save operation failed | 3034 | G |
| Motor Firmware Error | 3040 | C,G |
| Loader Received Invalid Command | 3041 | C,G |
| Motor Firmware Error | 3042 | C,G |
| Missing Magazine | 3050 | F |
| No Cartridges In Library | 3051 | F |
| Too Many Cartridges | 3052 | F |
| Need 3 Cartridges Minimum | 3053 | F |
| Need 1 Drive Minimum | 3054 | F |
| Need 5 Cartridge Minimum | 3056 | F |
| Invalid Magazine Type | 3057 | F |
| Magazine Type Change Not Handled | 3058 | F |
| Zone Sequence Error | 3060 | C,G |
| Drive Eject Fail | 3070 | C,G |
| Drive Eject Fail | 3071 | C,G |
| Drive Eject Fail | 3072 | C,D,G |
| Drive Eject Fail | 3073 | C,D,G |
| Soft Fetch Retry | 3080 | C,D,G |
| Soft Fetch Retry | 3081 | C,D,G |
| Drive Stow Failed, Media Returned to Source | 3082 | F |
| Drive Stow Failed, Media Remains in Drive | 3083 | F |
| UnSupported Drive For Requested Operation | 3084 | F |
| No Retry On Fetch/Stow | 308F | F |
| Picker Jammed | 3100 | C,G |
| Picker Jammed 2 | 3102 | C,G |
| Picker Jammed 3 | 3103 | C,G |
| Picker Jammed 4 | 3104 | C,G |
| Picker Jammed 5 | 3105 | C,G |

**Table 6–2: Fault Symptom Codes (Continued)**

| Message | FSC | ERP |
|---|---|---|
| Picker Jammed 6 | 3106 | C,G |
| Picker Jammed 7 | 3107 | C,G |
| Picker Jammed 8 | 3108 | C,G |
| Picker Jammed 9 | 3109 | C,G |
| Picker Jammed 10 | 310A | C,G |
| Picker Jammed 11 | 310B | C,G |
| Picker Jammed on Stow | 310F | C,G |
| Picker Retries Exceeded | 3110 | C,G |
| Picker Retries Exceeded 1 | 3111 | C,G |
| Picker Retries Exceeded 2 | 3112 | C,G |
| Picker Retries Exceeded 3 | 3113 | C,G |
| Picker Retraction Error | 3115 | C,G |
| Shuttle Jammed | 3200 | C,G |
| Shuttle Jammed | 3201 | C,G |
| Shuttle Jammed | 3202 | C,G |
| Shuttle Jammed | 3203 | C,G |
| Shuttle Jammed | 3204 | C,G |
| Shuttle Jammed | 3205 | C,G |
| Rotary Jammed | 3300 | C,G |
| Shuttle on Wrong Side Of The Rotary | 3301 | C,G |
| Rotary Cannot find Zones | 3302 | C,G |
| Passthrough Elevator Jammed | 3400 | C,G |
| Vertical Elevator Jammed | 3500 | C,G |
| No DLTs Attached | 5010 | F |
| All Slots Empty | 5011 | F |
| DLT Already Loaded | 5014 | F |
| Expired Clean'g Cart | 5015 | F |
| Not a Clean'g Cart | 5016 | F |
| DLT Timeout Error | 5035 | C,D,G |
| Move Command Fail | 503B | F |
| Clean Operation Timeout | 503C | F |

**Table 6–2: Fault Symptom Codes (Continued)**

| Message | FSC | ERP |
|---|---|---|
| Drive Status Fail | 503D | F |
| Command response from unexpected source | 7001 | D,G |
| Control command execution failed | 7002 | D,G |
| Control response not matched to a known command | 7003 | D,G |
| Loader response not matched to a known command | 7004 | D,G |
| Drive response not matched to a known command | 7005 | D,G |
| Flash response not matched to a known command | 7006 | D,G |
| Drive index on Update Status message was invalid | 7007 | C,D,G |
| The Drive response was not expected | 7008 | C,D,G |
| The opcode for a WORD message was unknown | 7009 | C,D,G |
| The opcode for a DWORD message was unknown | 700A | C,D,G |
| The button causing library to go offline was unknown | 700B | C,D,G |
| Destination Xchg was Null | 700C | C,G |
| Sending of a cmd failed | 700D | C,G |
| Deactivating a drive that is not attached | 700E | C,G |
| Deactivation of a drive failed | 700F | C,G |
| Drive removal failed | 7010 | C,G |
| HotPlug statue update failed | 7011 | C,G |
| Drive is Active failed | 7012 | C,G |
| Control Com Unidentified | 7013 | C,G |
| Drive status update failed | 7014 | C,G |
| Loader command execution failed | 7015 | C,G |
| Sequential command execution failed | 7016 | C,G |
| Destination Xchg for msg. was Null | 7017 | C,G |

**Table 6–2: Fault Symptom Codes (Continued)**

| Message | FSC | ERP |
|---|---|---|
| Bad src mod in peg msg | 7018 | C,G |
| Peg message wrapping a Null msg. ptr. | 7019 | C,G |
| Xchg conversion failed | 701A | C,G |
| Invalid L-drive number to convert | 701B | C,G |
| Invalid P-drive number to convert | 701C | C,G |
| Invalid mod number to convert | 701D | C,G |
| Cartridge reject recovery failed | 8001 | C,D,G |
| Drive Fan stalled | 8002 | C,D,G |
| Drive load did not complete | 8003 | C,D,G |
| Invalid drive was installed | 8004 | F |
| Orphan cartridge recovery failed | 9001 | C,D,G |
| Move operation failed | 9002 | C,D,G |
| SMX send error | A001 | C,G |
| SMX receive error | A002 | C,G |
| Comm free list empty | A003 | C,G |
| Invalid comm. put attempt | A004 | C,G |
| Invalid comm. get attempt | A005 | C,G |
| Comm initialization error | A006 | C,G |
| Put of a NULL comm. | A007 | C,G |
| Msg contains no comm. | A008 | C,G |
| Comm return address is unknown | A009 | C,G |

If an error message appears that is not included in Table 6–2, write down the fault code number and follow the recovery procedure. If the same error occurs again, call your Compaq authorized service provider.

# A

## Regulatory Compliance Notices

## 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 (i.e., 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.

The rating label on the device shows which class (A or B) the equipment falls into. Class B devices have an FCC logo or FCC ID on the label. Class A devices do not have an FCC logo or FCC ID on the label. Once the class of the device is determined, refer to the following 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 different from that to which the receiver is connected.

- Consult the dealer or an experienced radio or television technician for help.

## Modifications

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

## Cables

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.

## 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 your product, contact:

Compaq Computer Corporation

P. O. Box 692000, Mail Stop 530113

Houston, Texas 77269-2000

Or, call

1-800- 652-6672 (1-800-OK COMPAQ)

For questions regarding this FCC declaration, contact:

Compaq Computer Corporation

P. O. Box 692000, Mail Stop 510101

Houston, Texas 77269-2000

Or, call

(281) 514-3333

To identify this product, refer to the Part, Series, or Model number found on the product.

# 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 classe 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 classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

# European Union Notice

$\mathsf{C}\mathsf{E}$

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 and if this product has telecommunication functionality, the R&TTE Directive (1999/5/EC).

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 (IEC 60950) - Product Safety

# Taiwan 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。

# Japanese Notice

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。

# B

## Specifications

This appendix lists the following specifications met by a Compaq *StorageWorks* MSL5000 Series Library:

- Operational performance
- Reliability
- Power
- Mechanical
- Environmental
- Acoustics
- Safety

# Operational Performance

**Table B–1: Operational Performance Specifications**

| Description | MSL5026 Specification | MSL5052 Specification |
|---|---|---|
| Host SCSI interface | LVD/SE | LVD/SE |
| Number of cartridges (2 full magazines) | 26 | 52 |
| Number of drives | 0, 1, or 2 | 0, 1, 2, 3, or 4 |
| Load time | <10 seconds, estimated [1] | <15 seconds, estimated [1] |
| Unload time | <10 seconds, estimated [1] | <15 seconds, estimated [1] |
| Drive compatibility | Compaq DLT 40/80 SDLT 110/220 | Compaq DLT 40/80 (optional) SDLT 110/220 |
| Maximum data capacity (native) | 1.04 TB (DLT 40/80) 2.80 TB (SDLT 110/220) | 2.08 TB (DLT 40/80) 5.72 TB (SDLT 110/220) |
| Maximum transfer rate (native) | 43.2 GB/hr (DLT) 79.2 GB/hr (SDLT 110/220) | 86.4 GB/hr (DLT) 158.4 GB/hr (SDLT 110/220) |

[1]Excluding Pass-Through Mechanism (PTM) access

# Reliability (MSL5026 and MSL5052)

**Table B–2: Reliability Specifications**

| Description | Specification |
|---|---|
| Robotics MTBF | >250,000 hours [1] |
| Robotics MSBF | >2,000,000 cartridge cycles |
| Library MSBF | >10,000 load/unload cycles |
| Design life | 7 years @ 30% duty cycle |
| MTTR | <10 minutes (most FRUs) |

[1]Excluding power supply, tape drives, and cooling fans

# Power

**Table B–3: Power Specifications**

| Description | MSL5026 Specification | MSL5052 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 | 190 W (2 tape drives) | 344 W (4 tape drives) |
| Maximum peak power consumption | 240 W (2 tape drives) | 430 W (4 tape drives) |

# Mechanical

**Table B–4: Mechanical Specifications (Tabletop Model)**

| Description | MSL5026 Specification | MSL5052 Specification |
|---|---|---|
| Height | 9.5 inches (24 cm), nominal (5U) | 18.5 inches (47 cm), nominal (10U) |
| Width | 19 inches (48.3 cm) | 19 inches (48.3 cm) |
| Depth | 31.5 inches (80 cm) | 31.5 inches (80 cm) |
| Weight | 63 pounds (28.6 kg), estimated (with 2 tape drives installed) | 136 pounds (61.8 kg), estimated (with 4 tape drives installed) |

**Table B–5: Mechanical Specifications (Rackmount Model)**

| Description | MSL5026 Specification | MSL5052 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 (MSL5026 and MSL5052)

### Table B–6: Environmental Specifications (Operating)

| Description | Specification |
| --- | --- |
| Dry bulb temperature | 50°F to 104°F (10°C to 40°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 B–7: Environmental Specifications (Packed or Unpacked)

| 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 +10,000 feet (-305 m to 3050 m) |

### Table B–8: Environmental Specifications (Transit - Short Term)

| 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 B–9: 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 |
| MSL5026 Library | 6.4 | 7.0 | 48 | 48 |
| MSL5052 Library | 6.4 | 7.0 | 48 | 48 |

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

**Table B–10:**
**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 |
| MSL5026 Library | 6,4 | 7,0 | 48 | 48 |
| MSL5052 Library | 6.4 | 7.0 | 48 | 48 |

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

# Safety

The library carries the following Regulatory Agency product safety certifications.

**Table B–11: Regulatory Product Safety Certifications**

| Description | Specification |
| --- | --- |
| UL Listed Mark | UL 1950 (standard for safety of information technology equipment) |
| TUV GS Mark (Germany) | EN60950, IEC950 (standard for safety of information technology equipment third edition) |
| CE Marking (European Union) | Low Voltage Directive, 72/23/EEC, European Union |
| CUL Mark (Canadian UL) | CAN/CSA 22.2 No. 950 (standard for safety of information technology equipment) |

# 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 a Compaq authorized reseller install the part.

**NOTE:** For more information on static electricity, or for assistance with product installation, contact your Compaq authorized reseller.

# D

## Removing and Replacing a Tape Drive

This appendix explains how to add a tape drive to a Compaq *StorageWorks* MSL5000 Series Library. See "Introduction" for a list of tape drives supported by the library.

# Instructions

To add a tape drive:

1. Unpack the tape drive and visually inspect it for any damage. If you feel that the tape drive has been damaged, contact Compaq for a replacement.

   **NOTE:** Compaq tape drives are hot-plug capable, so you do not have to turn the library off while removing or installing a tape drive.

2. Remove the blank panel that covers the appropriate tape drive mounting bay (see Figure D–1). Save the blank panel for future use.
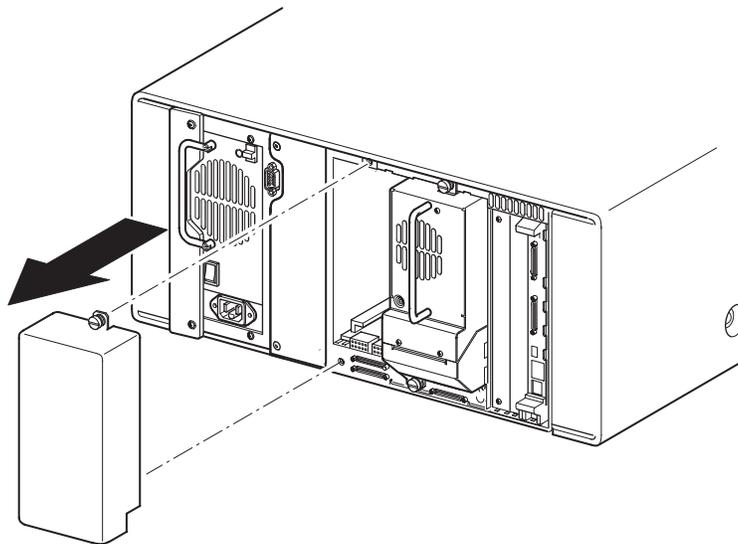


**Figure D–1:  Removing a tape drive mounting bay blank panel (MSL5026 shown)**

3. Slowly insert the tape drive into the mounting bay. Make sure you push the tape drive all the way in so it fully seats in the mating connectors at the rear of the library (see Figure D-2).

---

⚠ **CAUTION:**  When inserting a drive, make sure it goes in straight to ensure proper alignment with the tape drive and library mating connectors. Failure to do so might cause connector damage

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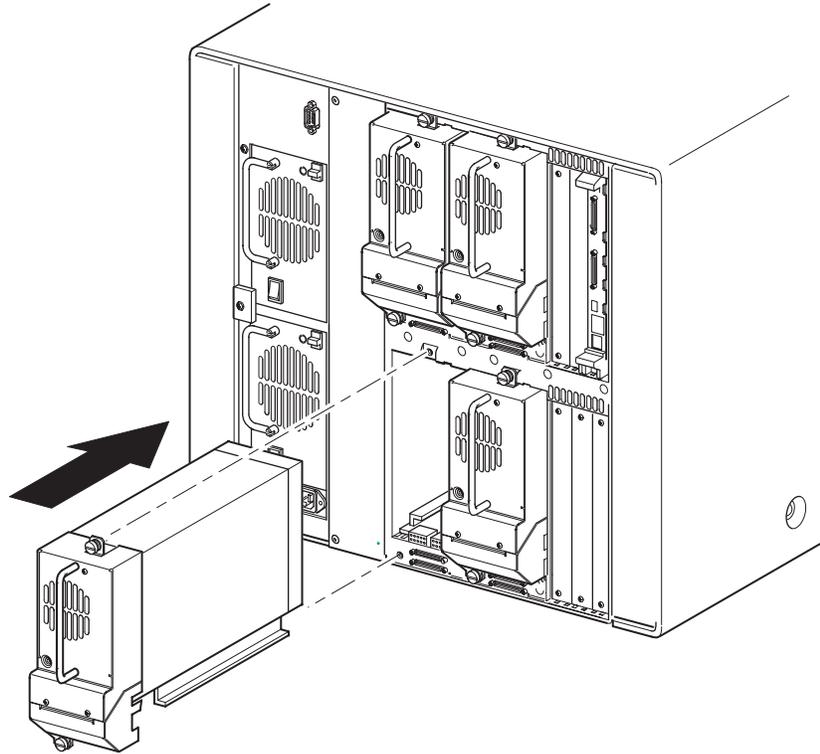
**Figure D–2: Installing a tape drive (MSL5052 shown)**

4. Using a flat-blade screwdriver, secure the tape drive to the library using the two thumbscrews.

5. Configure the tape drive. See "Library Configuration."

# E

## Configuration Examples

## 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/SE controller and the appropriate driver software.

- For best performance, do not attach more than two drives per SCSI bus.

- It is recommended that the robot and corresponding drives on the same bus are attached to host bus 0.

# Configuration Examples
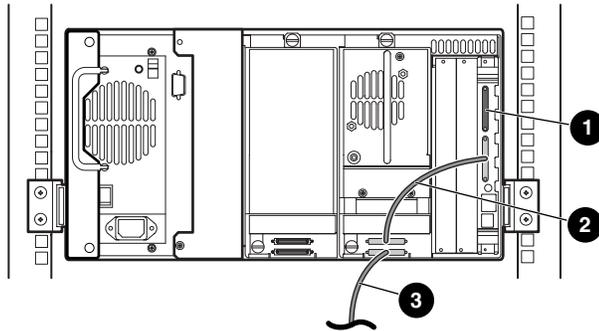


**Figure E–1:  Single MSL5026, 1 host/1 drive**

❶   SCSI Terminator
❷   0.5M cable
❸   Host cable (Bus 0, to host system)
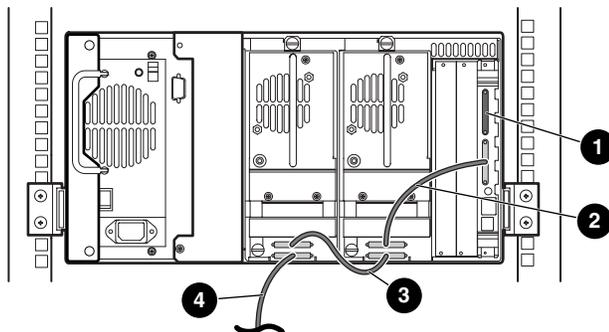


**Figure E–2:  Single MSL5026, 1 host/2 drives**

❶   SCSI Terminator
❷   0.5M cable
❸   0.25M cable
❹   Host cable (Bus 0, to host system)
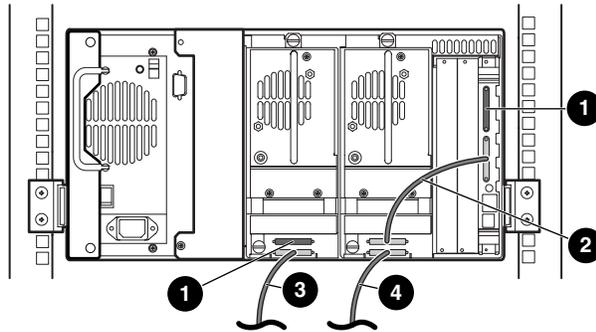
**Figure E–3:  Single MSL5026, 2 hosts/2 drives**

❶   SCSI Terminator

❷   0.5M cable

❸   Host cable (Bus 1, to host system)

❹   Host cable (Bus 0, to host system)
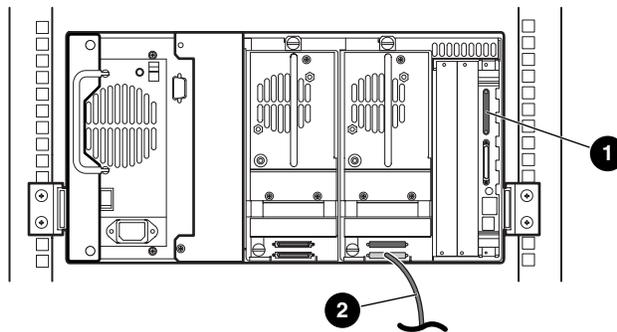


**Figure E–4:  Single MSL5026, 1 host/1 drive, sequential mode**

❶   SCSI Terminator

❷   Host cable (to host system)

Notes:

• There is no SCSI connection to the library controller module.

• There is a terminator installed on the library controller module.
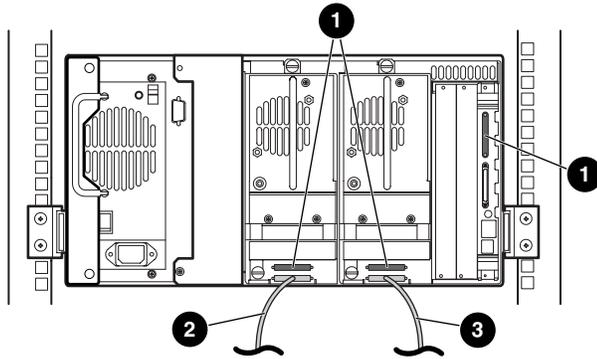
**Figure E–5:  Single MSL5026, 2 hosts/2 drives, split sequential mode**

❶  SCSI Terminator

❷  Host cable (Bus 1, to host system)

❸  Host cable (Bus 0, to host system)

Notes:

- There is no SCSI connection to the library controller module.

- There is a terminator installed on the library controller module.

- This configuration requires a third LVD/SE SCSI terminator. Only two are shipped with the MSL5026 and are attached to each drive.
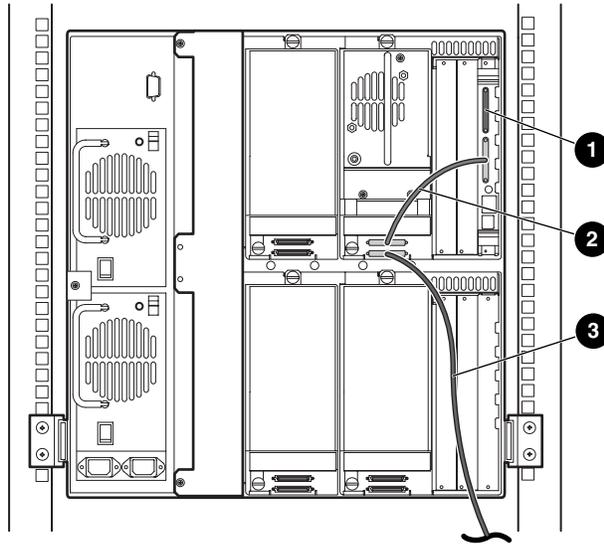
**Figure E–6: Single MSL5052, 1 host/1 drive**

❶  SCSI Terminator

❷  0.5M cable

❸  Host cable (Bus 0, to host system)
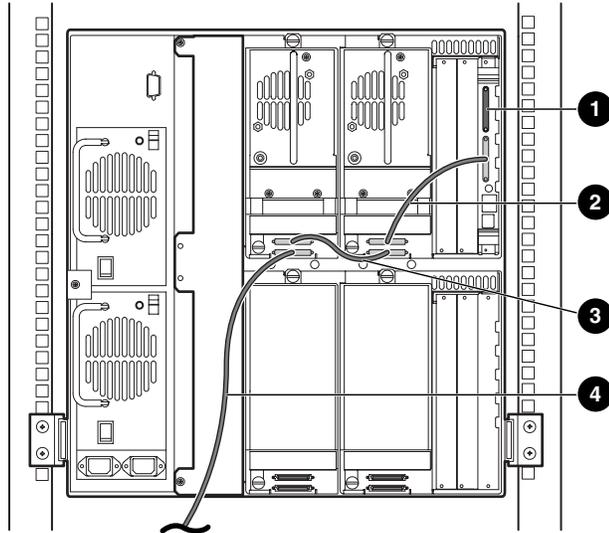
**Figure E–7:  Single MSL5052, 1 host/2 drives**

❶    SCSI Terminator
❷    0.5M cable
❸    0.25M cable
❹    Host cable (Bus 0, to host system)
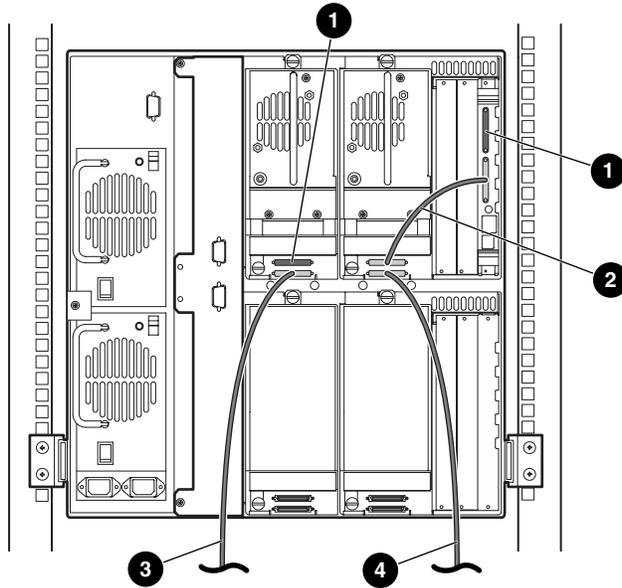
**Figure E–8: Single MSL5052, 2 hosts/2 drives**

❶ SCSI Terminator

❷ 0.5M cable

❸ Host cable (Bus 1, to host system)

❹ Host cable (Bus 0, to host system)
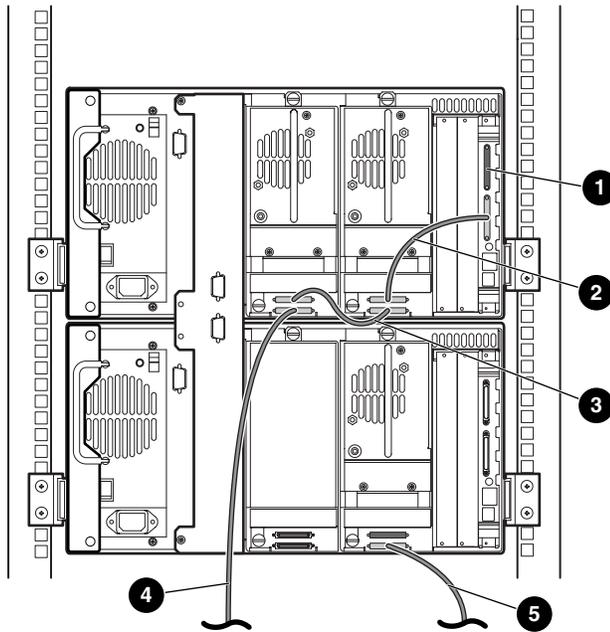
**Figure E–9:  Single MSL5052, 2 hosts/3 drives**

❶   SCSI Terminator

❷   0.5M cable

❸   0.25M cable

❹   Host cable (Bus 0, to host system)

❺   Host cable (Bus 1, to host system)
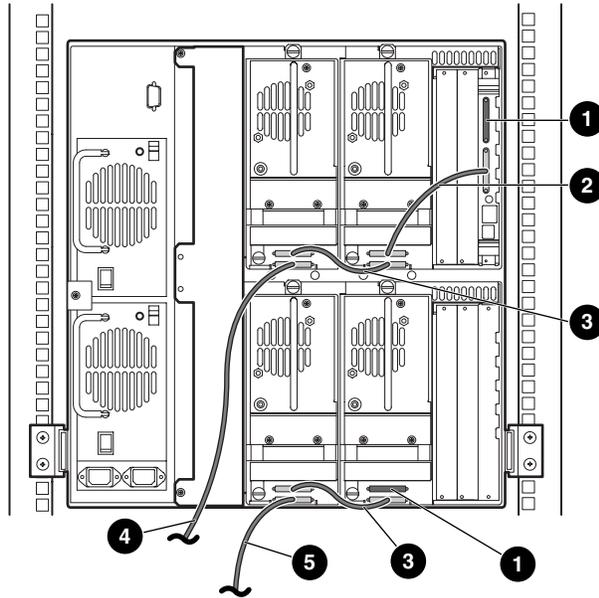
**Figure E–10:  MSL5052, 2 hosts/4 drives**

❶ SCSI Terminator
❷ 0.5M cable
❸ 0.25M cable
❹ Host cable (Bus 0, to host system)
❺ Host cable (Bus 1, to host system)
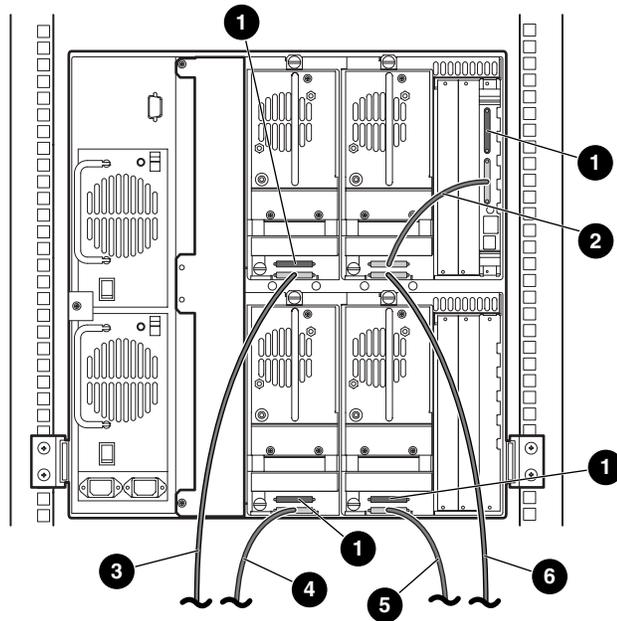
**Figure E–11:  Single MSL5052, 4 hosts/4 drives**

❶   SCSI Terminator

❷   0.5M cable

❸   Host cable (Bus 1, to host system)

❹   Host cable (Bus 3, to host system)

❺   Host cable (Bus 2, to host system)

❻   Host cable (Bus 0, to host system)
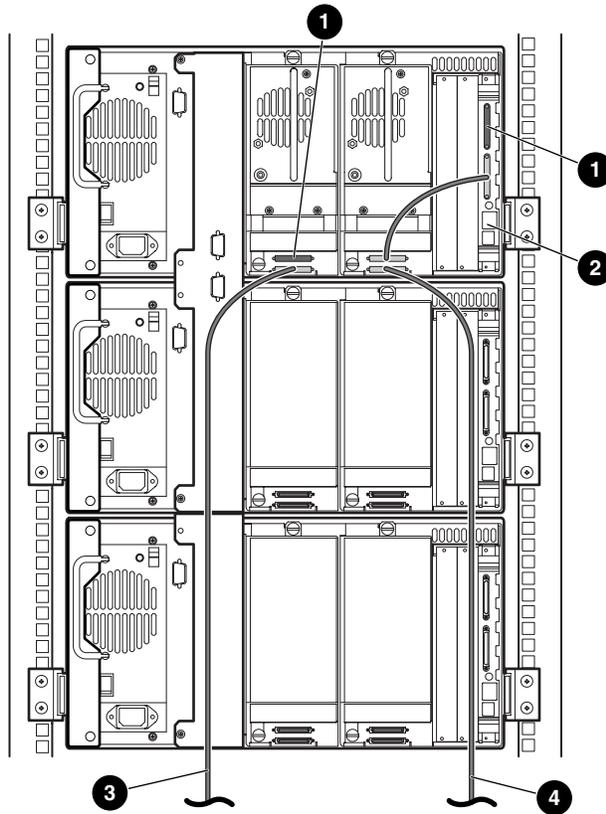
**Figure E–12: MSL5026 Multi-unit, 2 hosts/2 drives in master/no drives in slaves**

❶ SCSI Terminator

❷ 0.5M cable

❸ Host cable (Bus 1, to host system)

❹ Host cable (Bus 0, to host system)
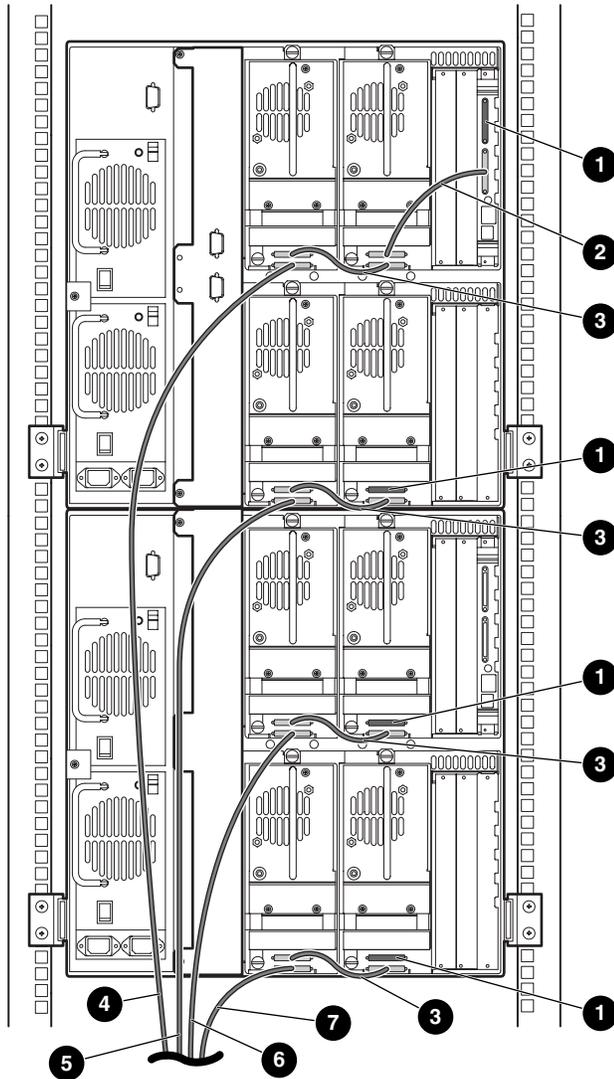
**Figure E–13:  MSL5052 Multi-unit, 4 hosts/8 drives**

❶  SCSI Terminator                                ❷  0.5M cable

❸  0.25M cable                                    ❹  Host cable (Bus 1, to host system)

❺  Host cable (Bus 2, to host system)   ❻  Host cable (Bus 3, to host system)

❼  Host cable (Bus 4, to host system)

# Pass-Through Mechanism Cabling

Use the following guidelines when configuring your PTM:

- All libraries must be powered off.

- Connect motor cable from the master library unit to the PTM base unit.

- Connect one ethernet cable from each library unit in the configuration to the router.

# Configuration Examples
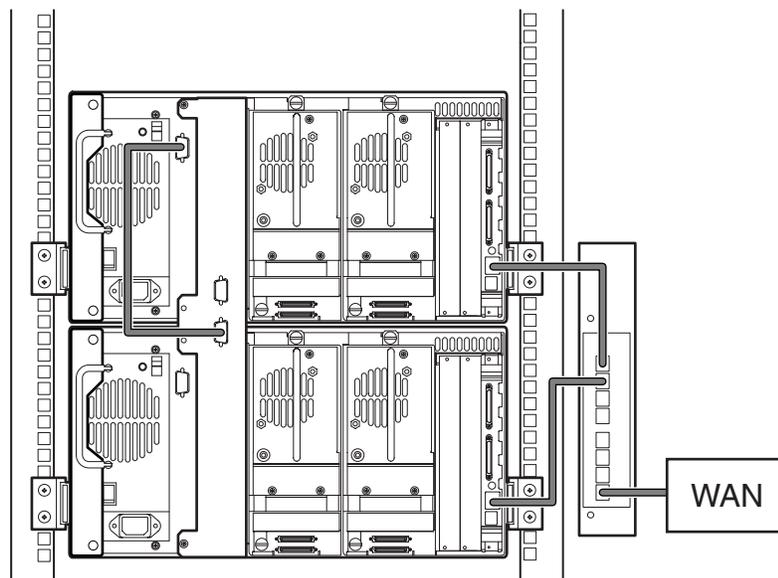


**Figure E–14:  MSL5026 Multi-unit, single master/slave**
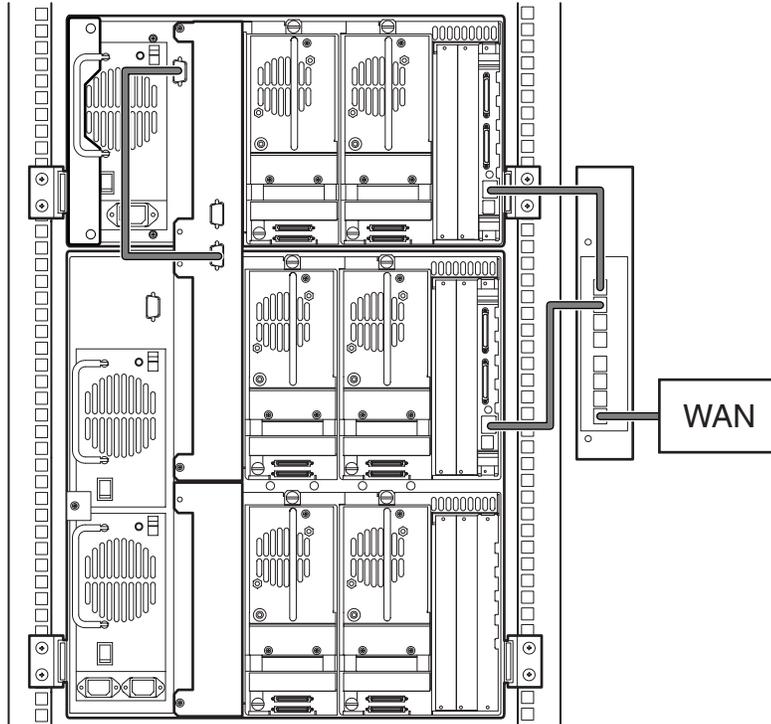
**Figure E–15:  MSL5026 master with MSL5052 slave**
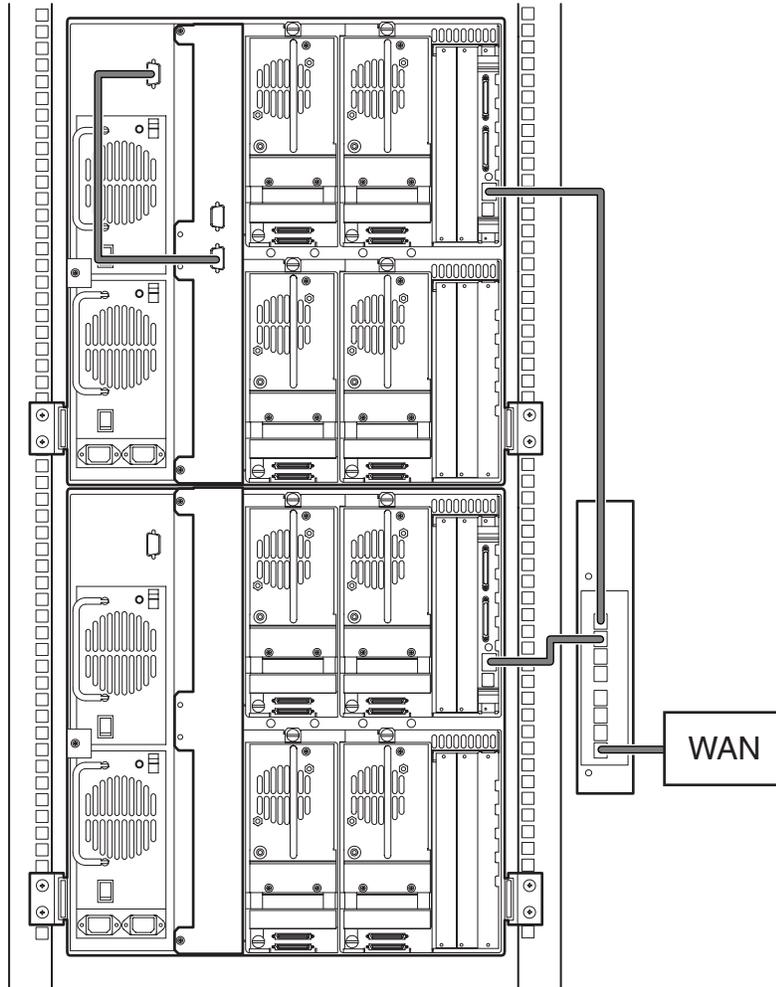
**Figure E–16: MSL5052 Multi-unit, single master/slave**
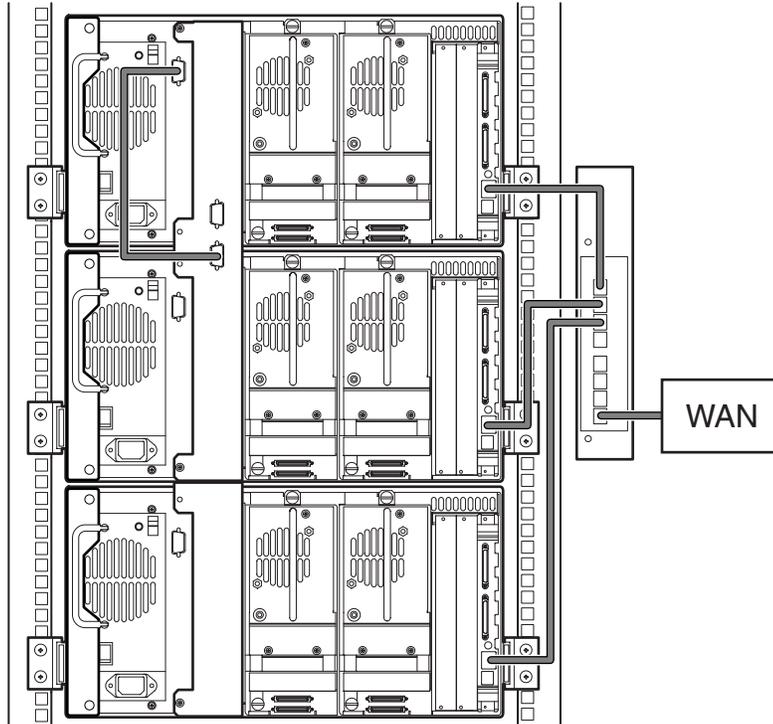
**Figure E–17: MSL5026 Multi-unit, single master/multiple slaves**

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