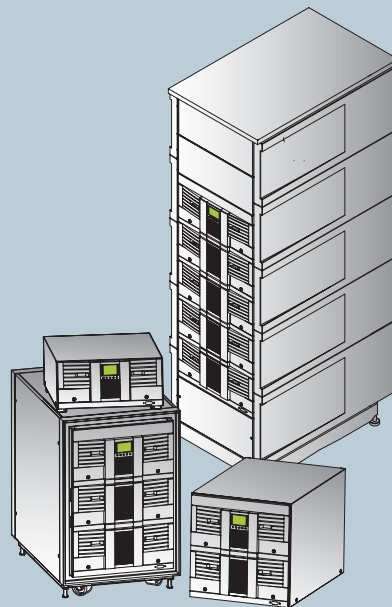


hp surestore tape library

2/20, 4/40,
6/60, 8/80, and
10/100 series

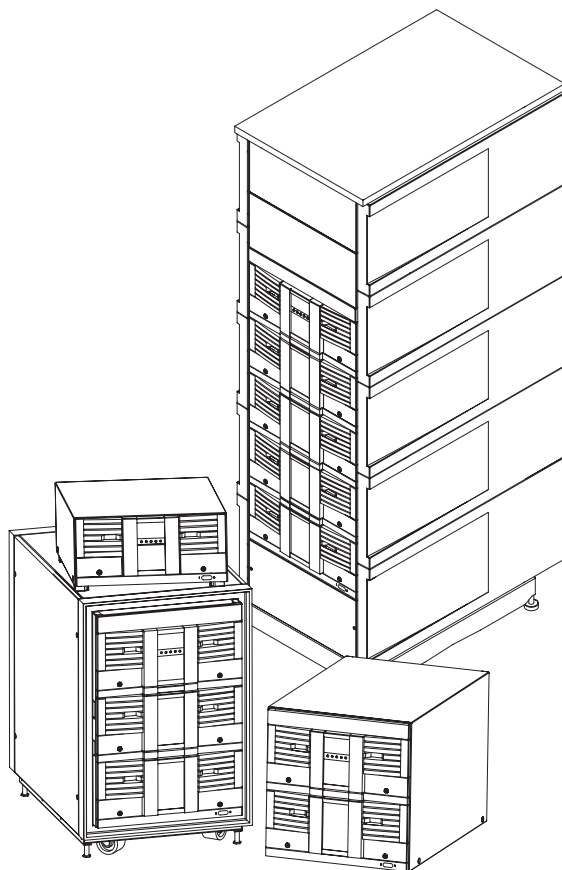


user's guide



hp surestore tape library user guide

2/20, 4/40,
6/60, 8/80, and
10/100 series



Product Number: C9521-90002

Edition 5

June 2002

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Notice

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Typographical Conventions and Terms

Bold:	Menu choices and screens on the library.
[Bold]:	Soft keys to press on the library.
Computer:	Host and SCSI commands.
<i>Emphasis:</i>	Draws attention to items within text.

This table format indicates the menus you need to enter on the library front panel:

Main Menu -> Operations -> Mailslot Access

Note	Notes explain significant concepts or operating instructions.
-------------	---

Caution	Cautions call attention to an operating procedure or practice that could damage the product if not correctly performed. Do not proceed until you understand and meet these required conditions.
----------------	---

WARNING	Warnings call attention to a procedure or practice that could result in personal injury if not correctly performed. Do not proceed until you fully understand and meet the required conditions.
----------------	---

In This Manual

Chapter 1	Installing the Library: Describes how to install, rackmount, connect, and power on the library.
Chapter 2	Operating the Library: Describes the front panel menu structure, menu trees, and drive and tape operations.
Chapter 3	Library Administration: Describes configuration options, diagnostic tests, and retrieving information about the library.
Chapter 4	Troubleshooting and Diagnostics: Describes how to troubleshoot library problems, resolve error conditions, and use HP diagnostic tools.
Chapter 5	Replacing Parts and Upgrading Firmware: Describes how to replace library components and upgrade library and drive firmware.
Appendix A	Technical specifications: Describes environmental, library, physical, SCSI cable, and Fibre Channel cable specifications.
Appendix B	Customer Support: Includes support information for the library.
Appendix C	Error Code Reference: Includes hard error codes for the library and suggestions for recovery.

Glossary

Glossary: Includes technical terms used in this manual.

Revision History

Edition 1	June 1999: C7200-90000 Initial release.
Edition 2	April 2000: C7200-90011 Updated Fibre Channel, remote management card, and front panel information.
Edition 3	December 2000: C9521-90000 Added the reader comment sheet and references to the <i>HP Tape Library & Autoloader Drive Manual</i> . Updated the troubleshooting procedures, technical specifications, Fibre Channel configuration, remote management card features, mailslot options, and front panel information.
Edition 4	December 2001: C9190-90000 Revised the format to include HP's branding standards. Added an illustration of the accessory kit, modified the model description to reference slot capacity, and added more information on Support Packs and the HP Library & Tape Tools diagnostic tool. Deleted the Fibre Channel overview appendix and added additional replacement procedures for the cosmetics and power supply.
Edition 5	June 2002: C9521-90002 Added information for the 8/80 and 10/100 series tape libraries, drives and media, front panel magazine access, and library error codes.

Updates

For the most current version of this manual, and other information regarding your tape library, visit the HP Customer Care website:

<http://www.hp.com/go/support>

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Installing the Library

1

Chapter Overview

This chapter describes the following:

- **Identifying Product Components** on page 12
- **Choosing a Location** on page 14
- **Installing the 2/20, 4/40 & 6/60 Series Libraries into a Rack** on page 17
- **Preparing the Host for Installation** on page 31
- **Connecting and Powering on the Library** on page 32
- **Verifying the Host Configuration** on page 50
- **Getting Started** on page 53
- **Moving or Shipping the Library** on page 54

Identifying Product Components

The components listed in **Table 1** may be supplied with the library, depending on the library configuration.

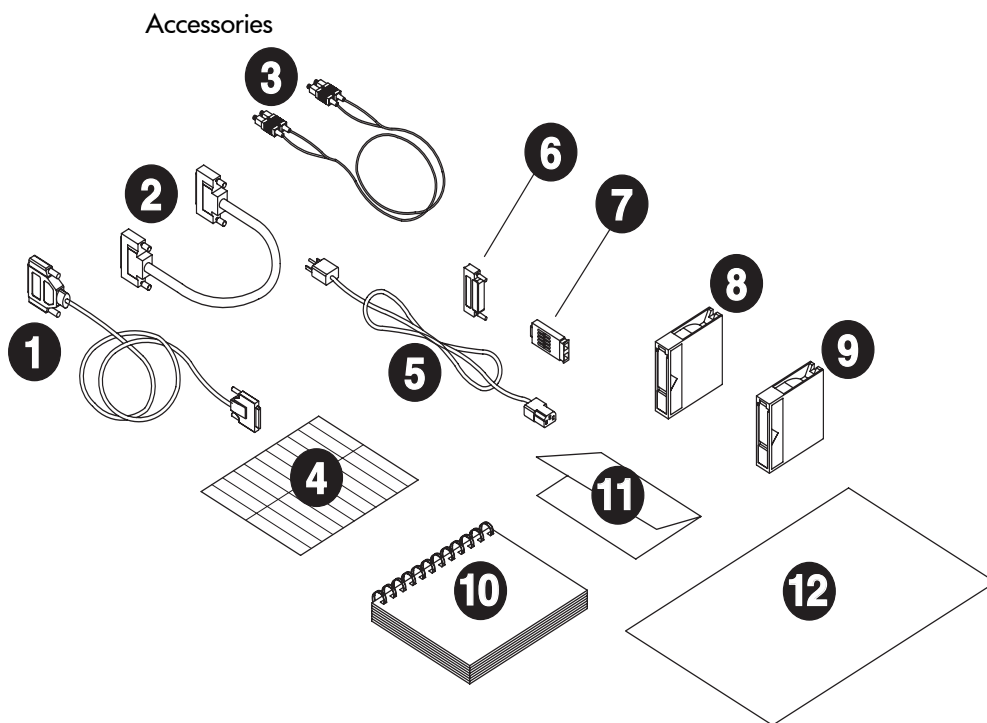
Note	Visit http://www.hp.com/go/support for additional information on the HP Library & Tape Tools diagnostic utility, backup software compatibility information, accessories, and upgrade kits.
-------------	--

Table 1 **Accessories**

Callout Number	Component	Description
1	SCSI interface cable(s)	Four-meter SCSI cable(s) with 68-pin high-density connectors.
2	SCSI jumper cable(s)	68-pin VHD (Very High Density) cable that connects the library controller or Fibre Channel controller to a drive.
3	Fibre Channel cable(s)	Optical short-wave cable (16 meters) that connects the Fibre Channel controller to the host, hub, or switch (<i>for Fibre Channel configurations</i>).
4	Label kit	Bar code labels for data and cleaning cartridges, and reordering information.
5	Power cord(s)	Localized power cord(s).
6	SCSI terminator(s)	68-pin high-density SCSI terminator (HVDS or LVDS) to terminate the SCSI chain.
7	Fibre Channel GBIC	Connects the Fibre Channel cable to the host, hub, or switch when necessary.
8	Data cartridge	Data cartridge included for data backup.
9	Cleaning cartridge	Cleaning cartridge used when cleaning a drive.
10	User's Guide	Printed English user's guide describing installation, operations, and troubleshooting information.

Table 1 **Accessories**

Callout Number	Component	Description
11	Regulatory Insert	Contains safety and regulatory information.
12	Quick setup poster	Overview of installation and configuration procedures.
N/A	Miscellaneous information	May include data sheets, upgrade information, product information, and additional promotions.

Figure 1**Note**

Your cables may look different from those in **Figure 1**. Cable types vary depending on library model.

Choosing a Location

Choose a location that meets the criteria listed in **Table 2**. For additional specifications, refer to **Technical Specifications** on page 181.

Table 2 **Location Criteria**

Room temperature	10-35° C (50-95° F)										
Power source	<ul style="list-style-type: none">■ AC power voltage: 100-127 V or 200-240 V■ Line frequency: 50-60 Hz■ A dedicated circuit is required. <p>Caution: <i>The AC power cord is the library's main AC disconnect device and must be easily accessible at all times.</i></p>										
LAN connection	Locate the library near a LAN connection for connecting the RMC (remote management card).										
Library power consumption	<table><tr><td>2/20 series</td><td>Max: 200W</td></tr><tr><td>4/40 series</td><td>Max: 375W</td></tr><tr><td>6/60 series</td><td>Max: 560W</td></tr><tr><td>8/80 series</td><td>Max: 725W</td></tr><tr><td>10/100 series</td><td>Max: 1,200W</td></tr></table>	2/20 series	Max: 200W	4/40 series	Max: 375W	6/60 series	Max: 560W	8/80 series	Max: 725W	10/100 series	Max: 1,200W
2/20 series	Max: 200W										
4/40 series	Max: 375W										
6/60 series	Max: 560W										
8/80 series	Max: 725W										
10/100 series	Max: 1,200W										
Air quality	Minimal sources of particulate contamination. Avoid areas near frequently used doors and walkways, stacks of supplies that collect dust, and smoke-filled rooms. Caution: <i>Excessive dust and debris can damage tapes and tape drives.</i>										
Humidity	20-80% RH										

Table 2

Location Criteria

Clearance	<p><i>2/20, 4/40, and 6/60 series stand-alone configurations — located on or below a table:</i></p> <p>Back: 56 cm (22 in) for cooling and service.</p> <p>Front: 86 cm (34 in) for operator access.</p> <p>Sides: 56 cm (22 in) for removal of the external cover.</p>
	<p><i>2/20, 4/40, and 6/60 series rackmounted configurations:</i></p> <p>Back: 61 cm (24 in) minimum to allow adequate room for service access.</p> <p>Front: 86 cm (34 in) for operator access.</p> <p>Sides: 56 cm (22 in) minimum</p> <p>Height: For ease of use and optimum safety, the top of the library should be mounted approximately 120 cm (48 in) above the floor.</p>
	<p><i>8/80 and 10/100 series tape libraries</i></p> <p>Back: 56 cm (22 in) minimum</p> <p>Front: 191 cm (75 in) minimum</p> <p>Sides: 5 cm (2 in) minimum</p>
Floor rating	<p><i>For 8/80 and 10/100 series tape libraries only.</i></p> <p>A fully loaded library can weigh up to 325 kg (715 lbs). Each caster supports up to 96 kg (213 lbs). To support the weight exerted on the floor by the casters, the floor rating must meet or exceed 1,694 kg per square meter (347 lbs per square foot).</p>
Tip rating	<p><i>For 8/80 and 10/100 series libraries only.</i></p> <p>Do not tip the library more than 10°. Ensure that the location for the library has a level surface.</p>

Table 2**Location Criteria**

Rack location requirements	<p><i>For 8/80 and 10/100 series libraries only.</i></p> <p>Refer to the Rack Systems User's Manual (included with the accessory kit or available at http://www.hp.com/racksolutions) for more information on installing the rack. This information includes: using the anti-tip mechanism, securing the rack to the floor, and weight/space requirements.</p>
----------------------------	--

Installing the 2/20, 4/40 & 6/60 Series Libraries into a Rack

The instructions in this section apply to 2/20, 4/40, and 6/60 series libraries mounted in a standard 19-inch rack with a depth between 24 and 34 inches.

Caution Make sure that the rack and all equipment mounted in the rack have a reliable ground connection.

Verify that the total current of the rack components does not exceed the current rating of the power distribution unit or outlet receptacles.

WARNING Do not move the library without additional help or an appropriately rated lift device. The 2/20 series library weighs 40 kg (87 lb). The 4/40 series library weighs 75 kg (165 lb). The 6/60 series library weighs 104 kg (249 lb).

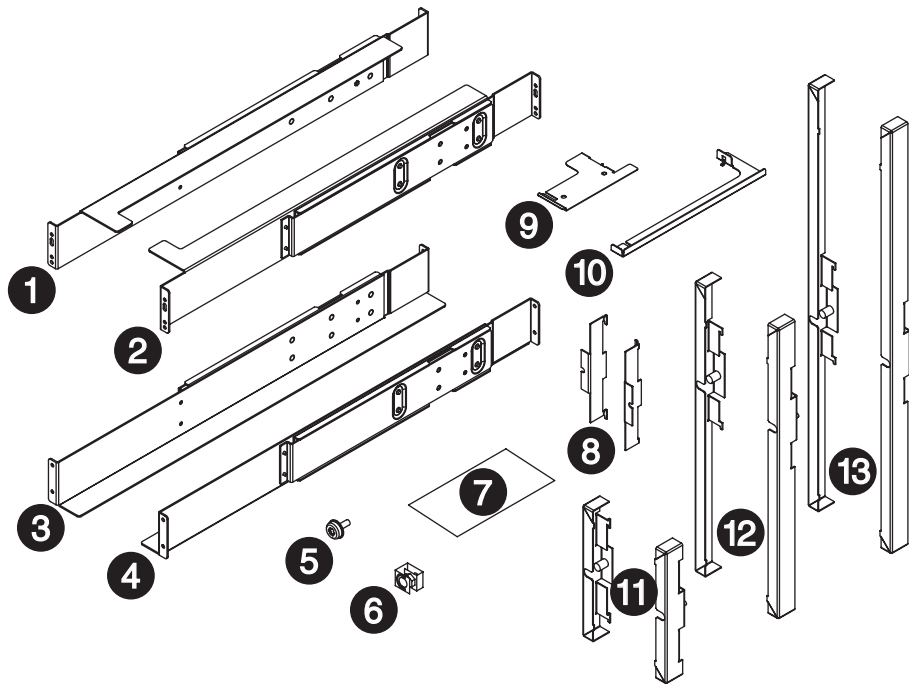
Tools and Parts

Before you begin, ensure that you have the following:

- Phillips #2 screwdriver
- Torx screwdriver with T20 and T25 bits
- 1/2-inch open-end wrench

Figure 2

Rack Kit Parts



1	Upper left rail (1)	8	Flush-mount trim brackets (2)
2	Upper right rail (1)	9	2/20 series stop bracket (1)
3	Lower left rail (1)	10	4/40 and 6/60 series stop bracket (1)
4	Lower right rail (1)	11	2/20 series trim brackets (2)
5	10-32 Screws (20)	12	4/40 series trim brackets (2)
6	10-32 Clip nuts (20)	13	6/60 series trim brackets (2)
7	Clip nut template (3 packaged together, one per model)		

Note

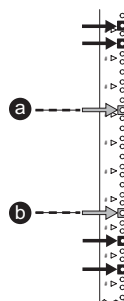
The rack kit includes extra trim brackets. The smaller flush-mount trim brackets are used with flush-mount racks. The larger trim brackets are typically used with older HP racks that have a 55mm bezel depth.

Rackmounting the Library

WARNING Before you begin, lower the rack's leveler feet with the open-ended wrench, and extend the rack's anti-tip foot. Failure to extend the anti-tip foot could result in personal injury or damage to the tape library if the rack tips over.

Note For easiest access to the display panel and to the tape drawers, mount the top of the library in the middle of the rack or 120 cm (48 in) above the floor.

1. Use the template for your model library as a guide, and install five clip nuts into each front column of the rack (**Figure 3** on page 20, **Figure 4** on page 20, or **Figure 5** on page 21, depending on your library model). The upper grey clip nuts (item "a" below) are used for older HP racks (55-mm bezel depth). The lower grey clip nuts (item "b" below) are used for flush-mount racks.



Use the template as a guide, and install four clip nuts into each back column of the rack.

Note Use the EIA markers as a reference point to ensure that the holes on the rack correspond to the holes on the template. The EIA markers on the template are represented by #>. Your rack might look different from the illustration. If the holes in the rack do not align with the template, move the template up one or two holes to create proper alignment.

Figure 3

Clip Nut Placement (2/20 Series)

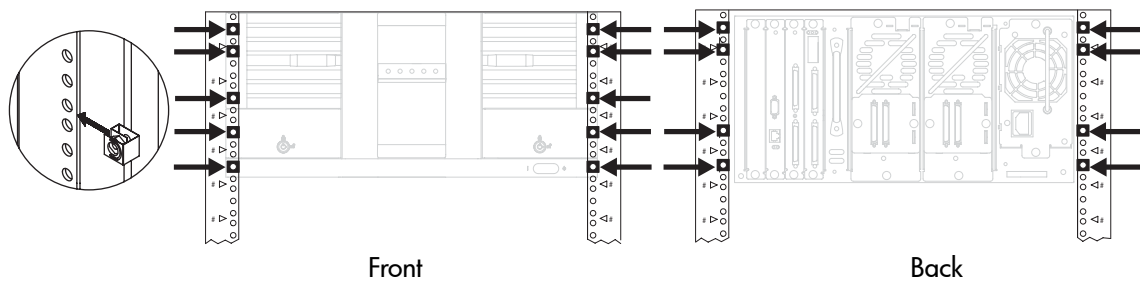


Figure 4

Clip Nut Placement (4/40 Series)

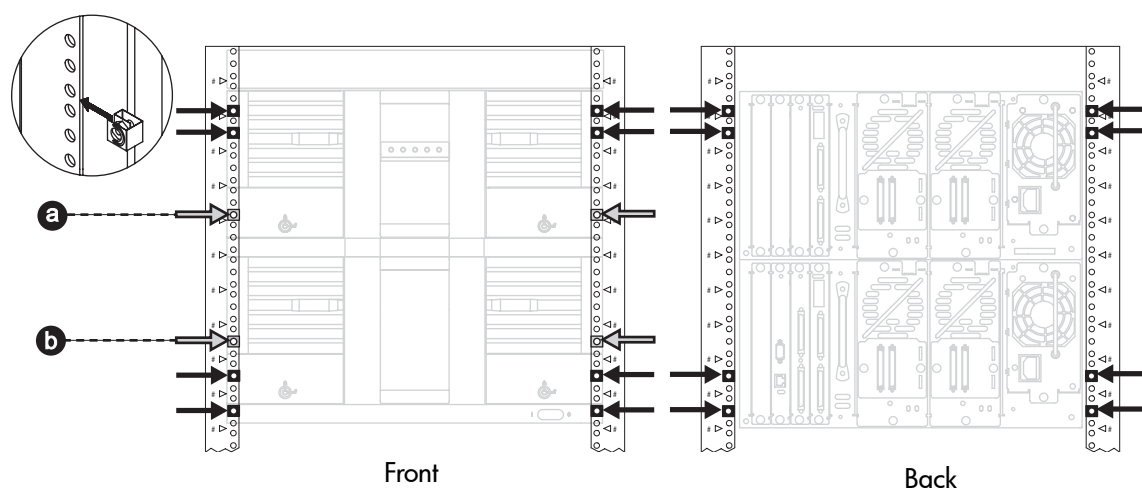
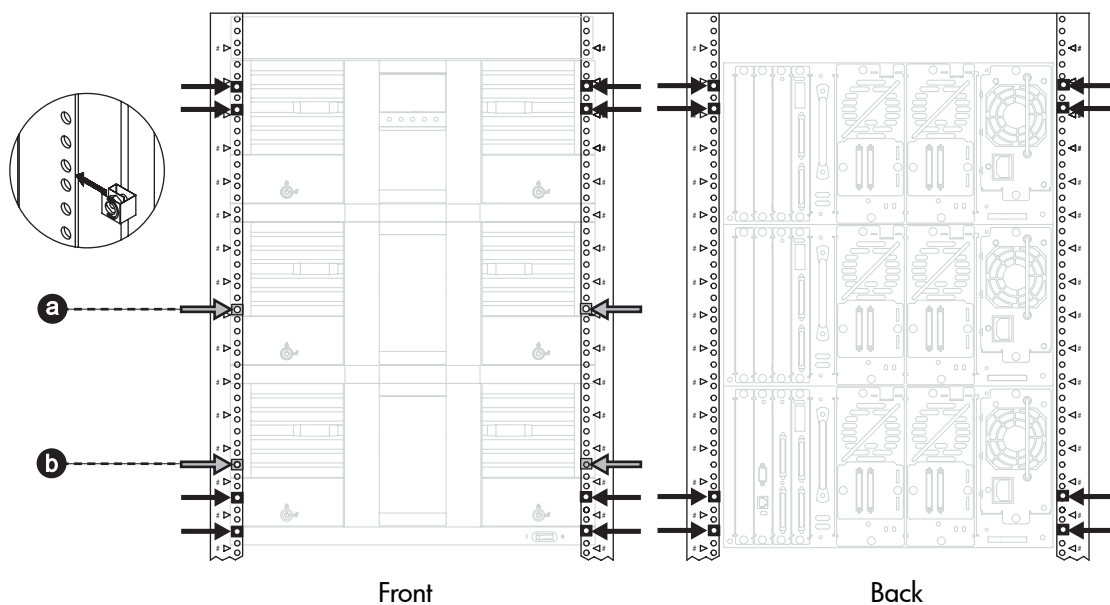


Figure 5

Clip Nut Placement (6/60 Series)



2. Align the upper (black) rail with the top two clip nuts and loosely install a screw into each clip nut. Slide the rail out so that it equals the rack depth, and attach to the back clip nuts. *To allow for enough clearance, do not tighten these screws until you have installed the library.*

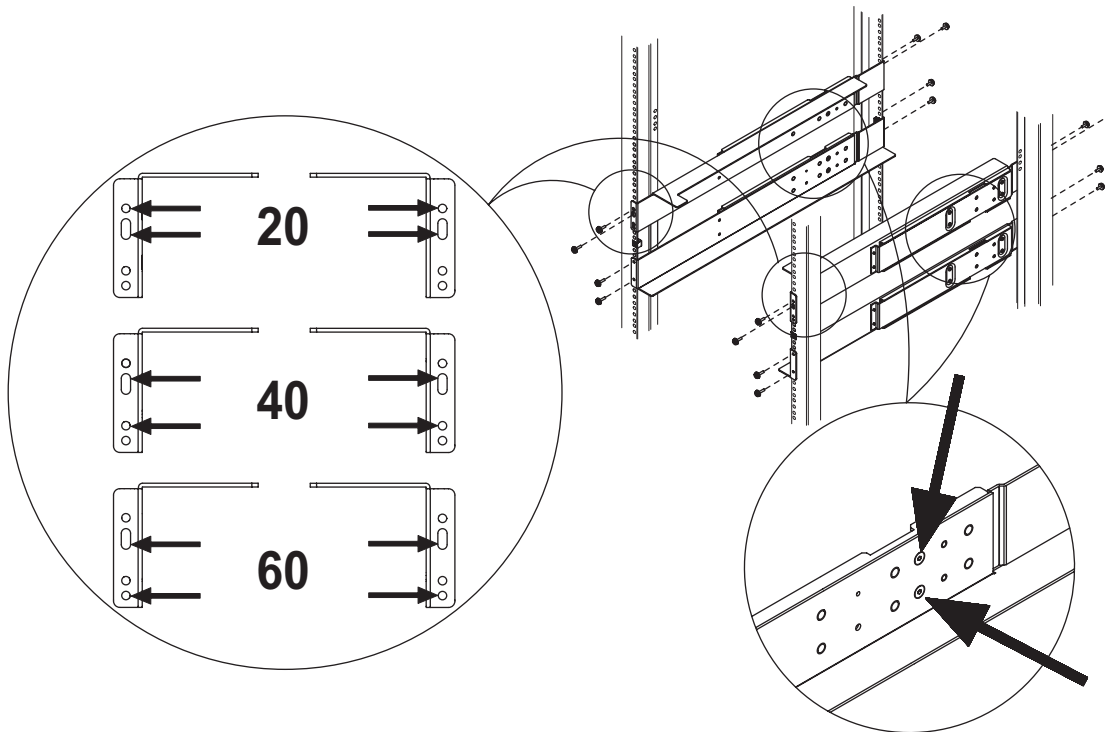
Note

Ensure that you are using the appropriate holes in the upper rail to allow enough clearance, illustrated in **Figure 6** on page 22. The clearance between the top and bottom rails should be approximately: 2/20 series = 22 cm (9 in); 4/40 series = 43 cm (17 in); 6/60 series = 65 cm (26 in).

3. Align the lower (black/silver) rail with the lower two clip nuts, and loosely install a screw into each clip nut. (See **Figure 6**.)
 - a. Slide the rail so that it equals the rack depth, and loosely install the screws.
 - b. Tighten all screws to secure the rails.
 - c. Tighten the two pre-installed screws inside each mounting rail to secure the rail in position.

Figure 6

Upper and Lower Rails



4. Install the library.

WARNING The majority of the weight is near the back of the library. Use appropriate force when lifting the library, while ensuring the library remains level to avoid overturning.

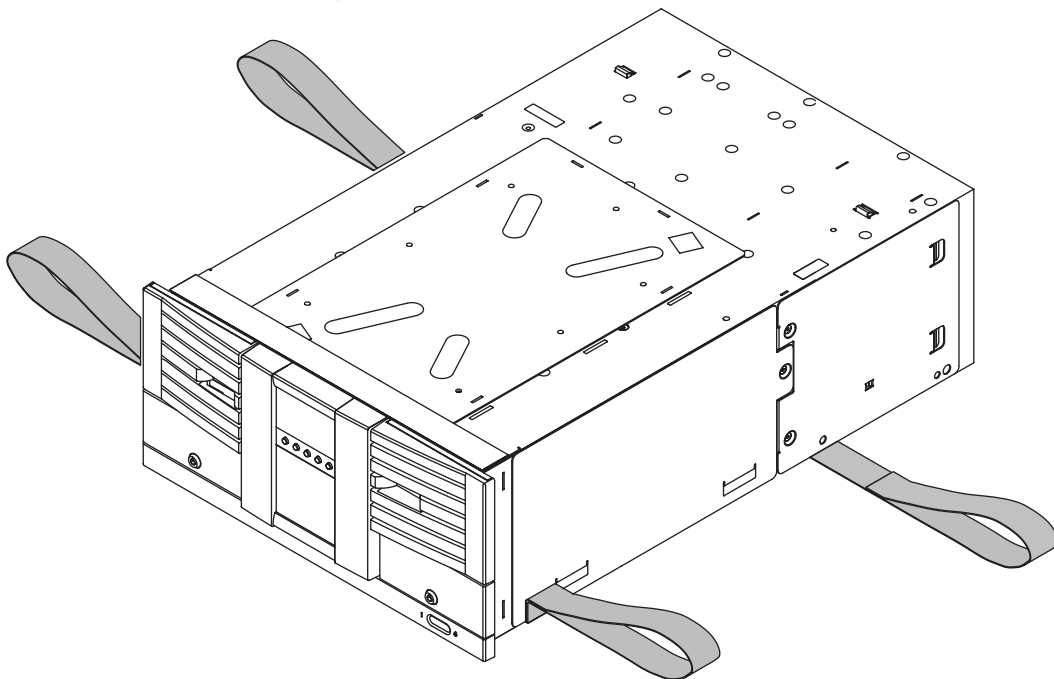
Note To reduce the weight of the library, you can easily remove all the drives. See **Removing and Replacing Drive Modules** on page 162 for more information.

2/20 Series Library:

With the help of another person, use the lifting straps built into the sides of the library, and slide the library between the upper and lower sets of mounting rails. Remove the lifting straps once the library is partially installed. Save these straps for future use when moving the library.

Figure 7

Lifting Straps



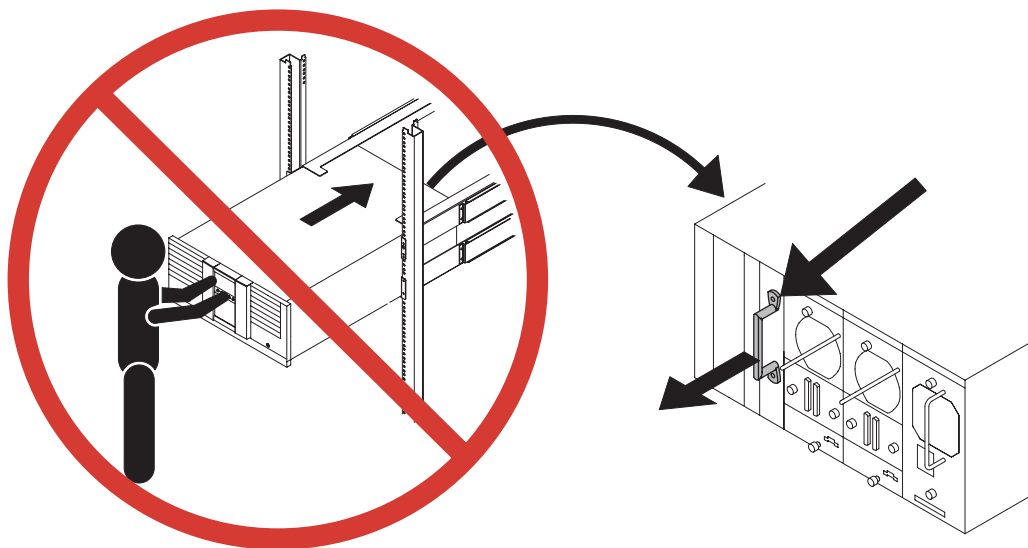
4/40 and 6/60 Series Libraries:

Use a mechanical lift that is rated to the weight of the library, and follow the steps below to install the library.

- Break away the edges of the packing material at the bottom of the library.
- Use the straps to ease the library onto an appropriately rated mechanical lift. Use the lift to raise the library so that it aligns with the bottom rails.
- Slide the library onto the lower rails. Have at least one person guide the library from the front and one person pull the library from the back, using the vertical handle (**Figure 8** on page 24).
- Remove the lifting straps once the library is partially installed. Save the straps for future use when moving the library.

Figure 8

Library Installation



Caution

Do not push the library from the front. Use the handle shown in **Figure 8**. DO NOT pull on the handle(s) located on the back of the power supply or drive modules.

WARNING Do not move the library without additional help or an appropriately rated lift device. The 2/20 series library weighs 40 kg (87 lb). The 4/40 series library weighs 75 kg (165 lb). The 6/60 series library weighs 104 kg (249 lb).

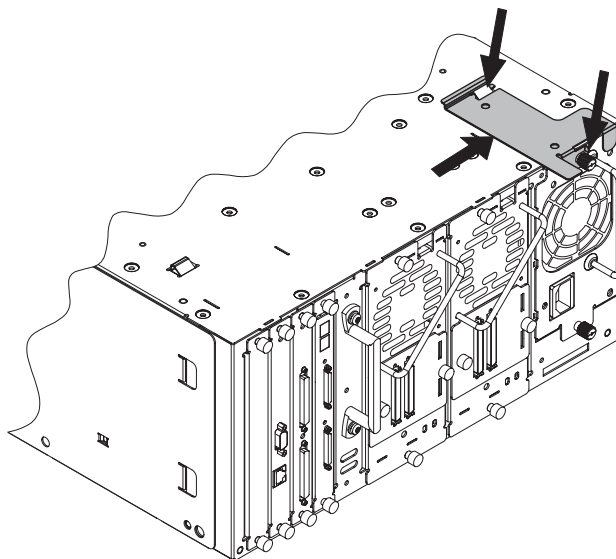
5. Tighten the screws on the top mounting rail to secure the library.
6. Install the stop bracket to ensure the library is secured inside the rack, and will not come out past the service position (approximately 2/3 of the library is out of the rack).

2/20 Series Library:

- a. From the back of the library, unscrew the power supply thumbscrew by hand or with a screwdriver.
- b. Install the stop bracket by sliding the edge of the bracket under the thumbscrew and threading the tab through the **latch stop**.
- c. Tighten the power supply thumbscrew to secure the bracket to the library.

Figure 9

Installing the Stop Bracket for the 2/20 Series Library

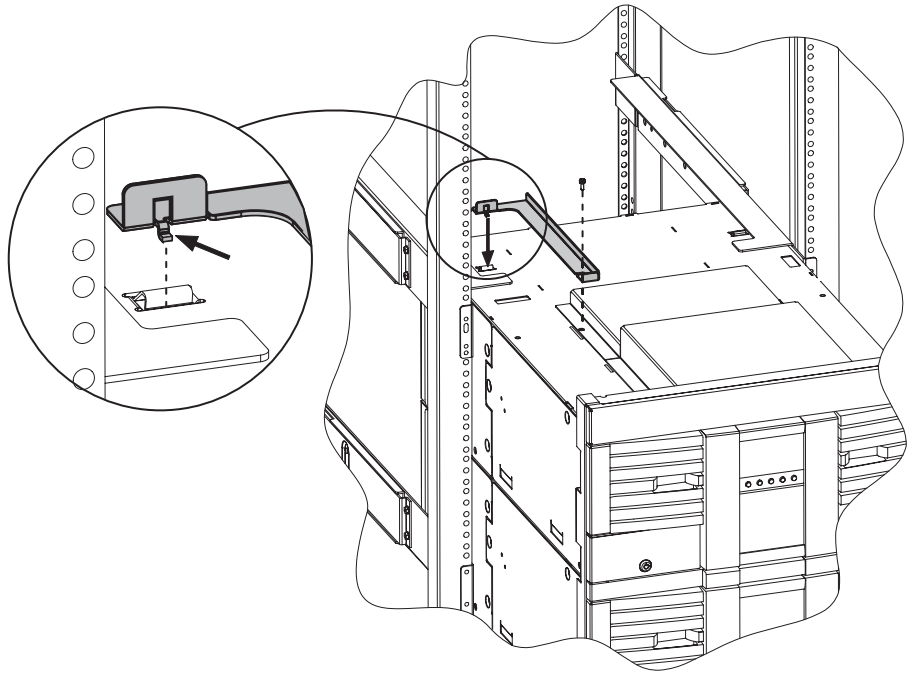


4/40 and 6/60 Series Libraries:

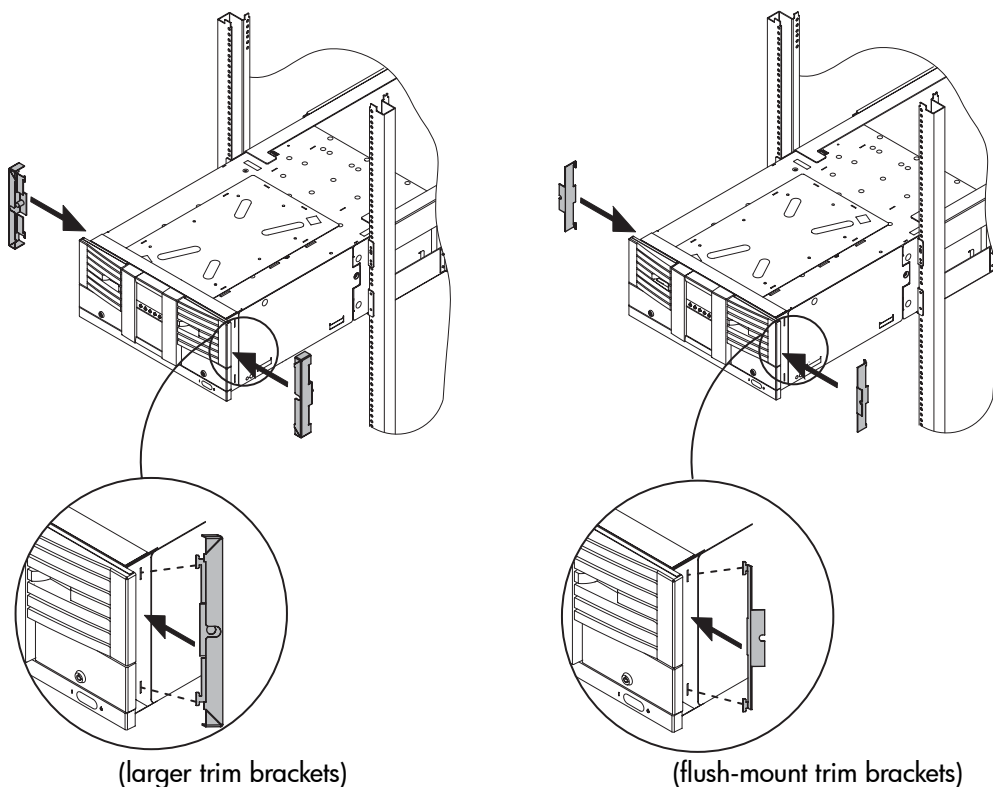
- Ensure access to the top of the library. If necessary, push the library to the service position to access the top cover. *Do not push the library past the latch stop tabs.*
- Remove the left back screw from the top cover.
- Install the stop bracket by inserting the tab into the **latch stop**.
- Re-install the screw into the top cover.

Figure 10

Installing the Stop Bracket for 4/40 and 6/60 Series Libraries



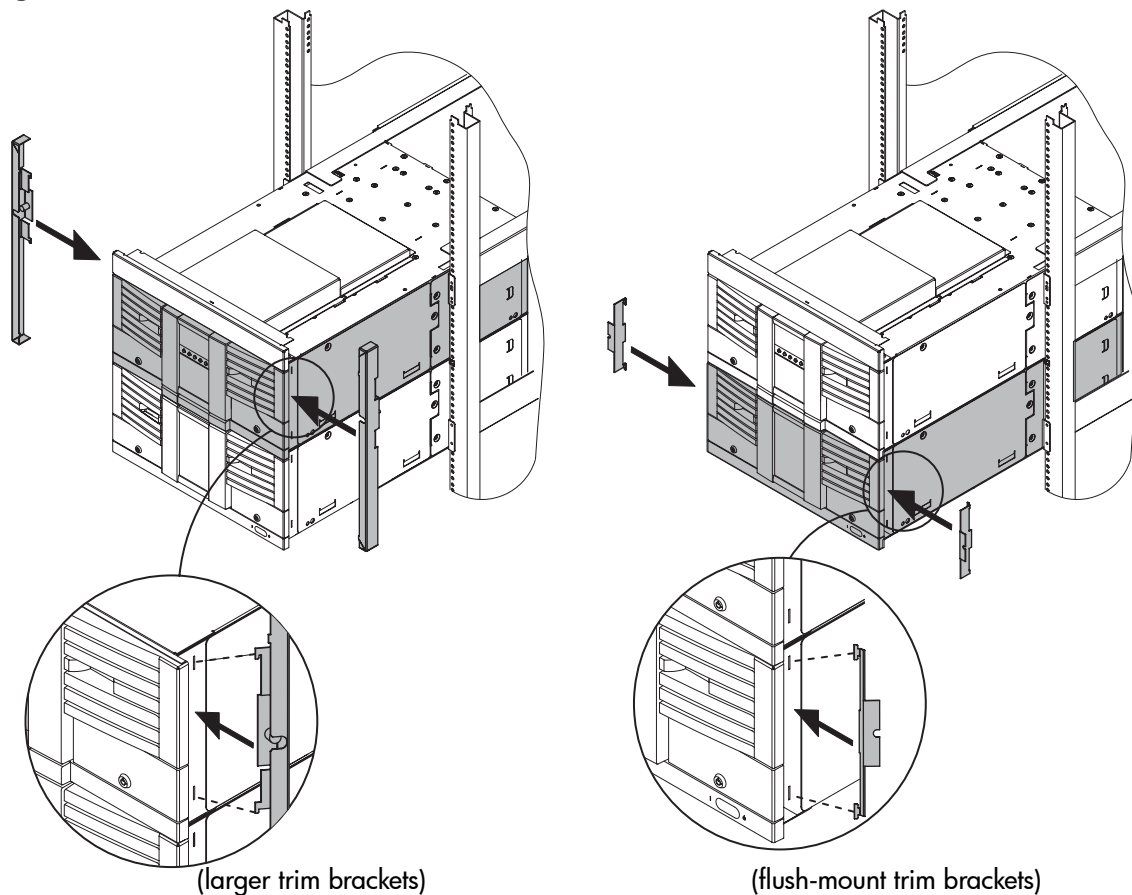
7. Insert trim brackets into the slots on each side of the library (Figure 11 through Figure 13).

Figure 11**Trim Brackets (2/20 Series)****Note**

The rack kit includes extra trim brackets. The smaller flush-mount trim brackets are used with flush-mount racks. The larger trim brackets are typically used with older HP racks that have a 55mm bezel depth.

Figure 12

Trim Brackets (4/40 Series)

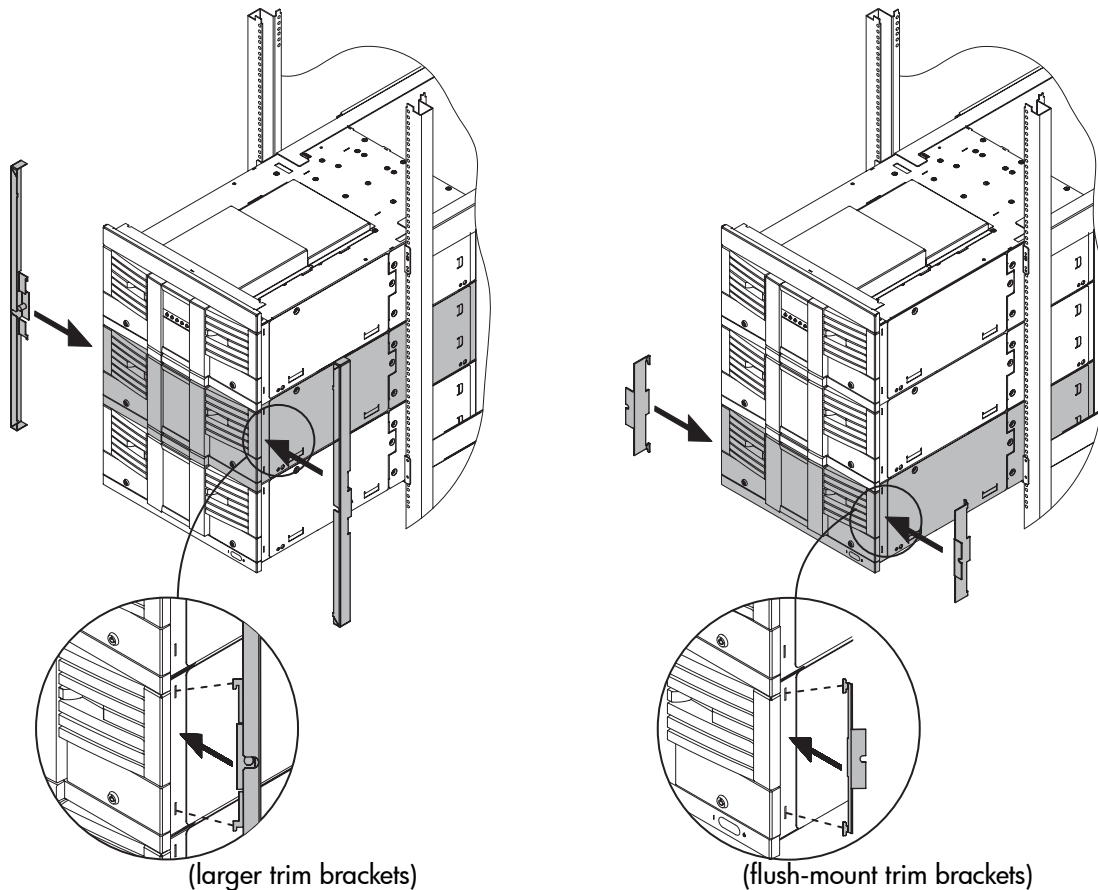


Note

The rack kit includes extra trim brackets. The smaller flush-mount trim brackets are used with flush-mount racks. The larger trim brackets are typically used with older HP racks that have a 55mm bezel depth.

Figure 13

Trim Brackets (6/60 Series)

**Note**

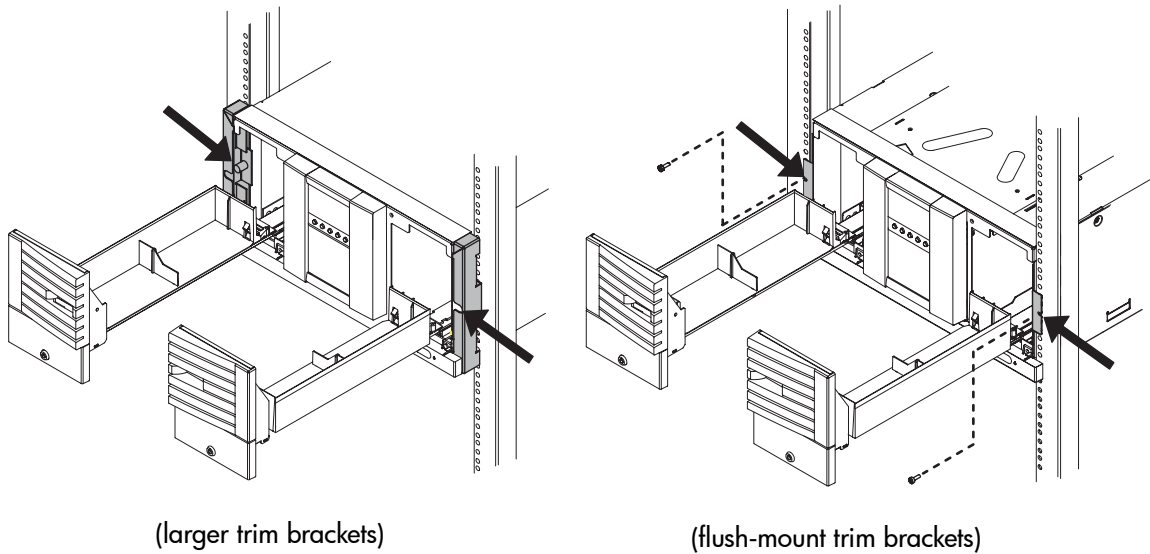
The rack kit includes extra trim brackets. The smaller flush-mount trim brackets are used with flush-mount racks. The larger trim brackets are typically used with older HP racks that have a 55mm bezel depth.

8. Open the tape drawers and tighten the screws to secure the library into place (**Figure 14**).
 - For trim brackets, tighten the existing thumbscrews.
 - For flushmount brackets, use two 10-32 x .50 screws.

Note The drawers may be key locked. The keys are attached to the power supply handle on the back of the library.

Figure 14

Location of Securing Screws



Preparing the Host for Installation

Install the SCSI host bus adapter card(s) and compatible driver(s). Refer to the **host** computer user manual and host bus adapter card instructions, and follow these general procedures:

- When the host is powered on, install software and/or driver(s) into the host that are compatible with the library.
- If the host computer is connected to a network, check with the system administrator before turning off power.
- Properly power off all peripheral devices connected to the host computer.
- Power off the host.
- Use proper procedures to prevent electrostatic discharge (ESD).
- Make sure that the host computer has an appropriate number of card expansion slots available for your library model.
- Ensure the host bus adapter card is supported by your backup software application.
- For optimum performance, there should be a maximum of one tape drive per **bus**. HP supports up to two drives per SCSI host bus adapter, but recommends only one drive per bus. If compression is used when attaching two drives per bus, keep in mind the combined transfer rate of the drives and overhead of the bus must not exceed the throughput of the host bus adapter used.
- Refer to Appendix A and the ANSI SCSI cable specification for more information on SCSI cable length requirements.
- Check for available SCSI IDs if you are installing the library onto the same SCSI bus as other devices. You might need to change the **SCSI ID** from the library **front panel display** if you think there will be an ID conflict with other devices.

Note You can use HP Library & Tape Tools to identify available SCSI IDs. See **page 154** for installing and using this diagnostic utility.

Connecting and Powering on the Library

This section includes information and illustrations for the following:

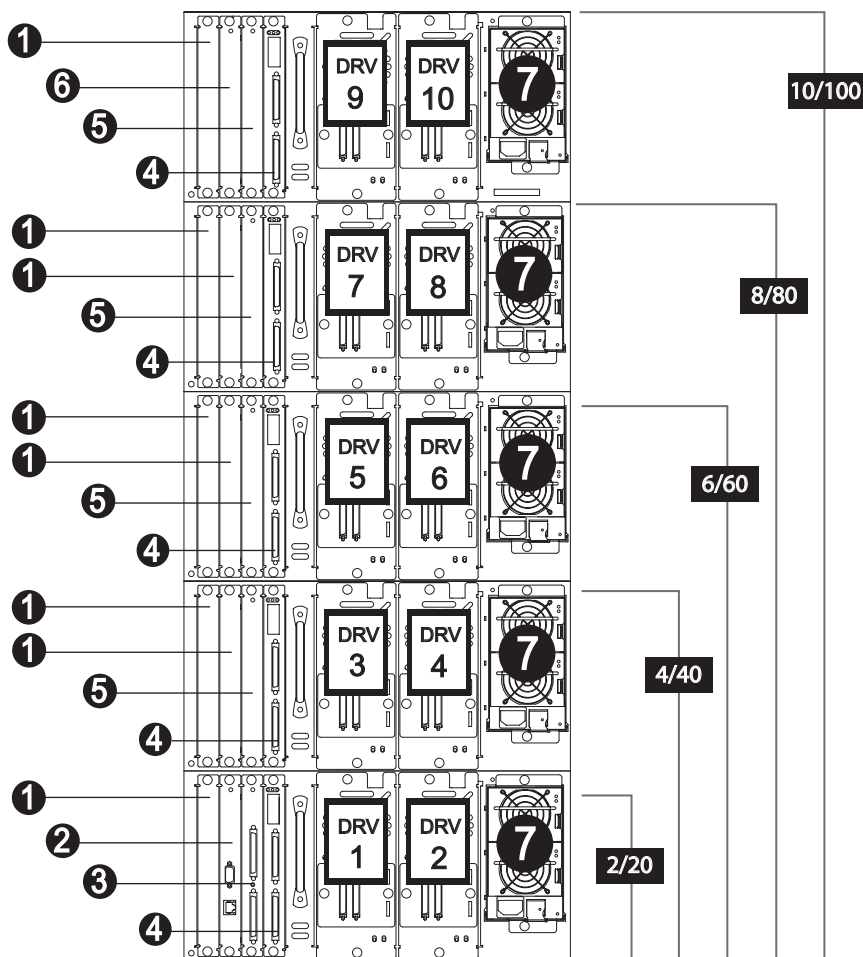
- Library back panel
- SCSI cabling connections
- Fibre Channel cabling connections

Note	The figures in this section depict 2/20, 4/40, 6/60, 8/80, and 10/100 series tape libraries. The number of drives and cards will vary, depending on your model.
-------------	---

Library Back Panel

Figure 15

Library Back Panel Features



1	Vacant slot	5	Slave controller card
2	Remote management card	6	Library expansion card (For the 8/80 and 10/100 series tape libraries only)
3	Library controller card	7	Power supply (standard or redundant)
4	Fibre Channel controller (optional)		

SCSI Cable Connections

Note	Refer to Fibre Channel Cable Connections on page 41 if the library is configured with Fibre Channel.
-------------	---

This section illustrates a standard SCSI configuration that produces a high level of data storage performance (one SCSI host bus adapter card for each drive in the library with the library controller daisy-chained to the first drive). HP supports up to two drives per SCSI host bus adapter, but recommends only one drive per bus. If compression is used when attaching two drives per bus, keep in mind the combined transfer rate of the drives and the overhead of the bus must not exceed the throughput of the host bus adapter used.

Note	Dual port cards are available and will reduce slot usage in the host system.
-------------	--

Connect the library as follows (refer to **Figure 16** on page 36 through **Figure 19** on page 39):

1. Properly power off all peripheral devices connected to the host computer.
2. Power off the host. If the host is connected to a network, check with the system administrator before turning off power.
3. Connect a 68-pin jumper cable from the top connector of the library controller to the left **drive module** on level 1 (drive module 1).

Caution	Use SCSI cables and HVDS differential terminators for high-voltage SCSI interfaces. Use SCSI cables and LVDS differential terminators for low-voltage SCSI interfaces. The label on the library controller indicates high or low voltage.
----------------	---

4. Connect the appropriate 68-pin SCSI terminator to the bottom connector on the library's controller card.
5. Connect a 68-pin SCSI cable from a host SCSI card to each drive module. Add the appropriate terminators to the remaining SCSI connectors.

6. Connect a category 5 ethernet cable from the remote management card to an active network port (see **Using the Remote Management Card** on page 96).

Note	The AC power cord is the library's main AC disconnect device and must be easily accessible at all times.
-------------	--

7. **For 2/20, 4/40, and 6/60 Series Libraries:**

- Connect a power cord to each power supply module on all levels.

For 8/80 and 10/100 Series Libraries:

- Connect the power cords on the rack to a power outlet on each library level.
- Connect the power cord from the power distribution unit to a dedicated, grounded power receptacle.

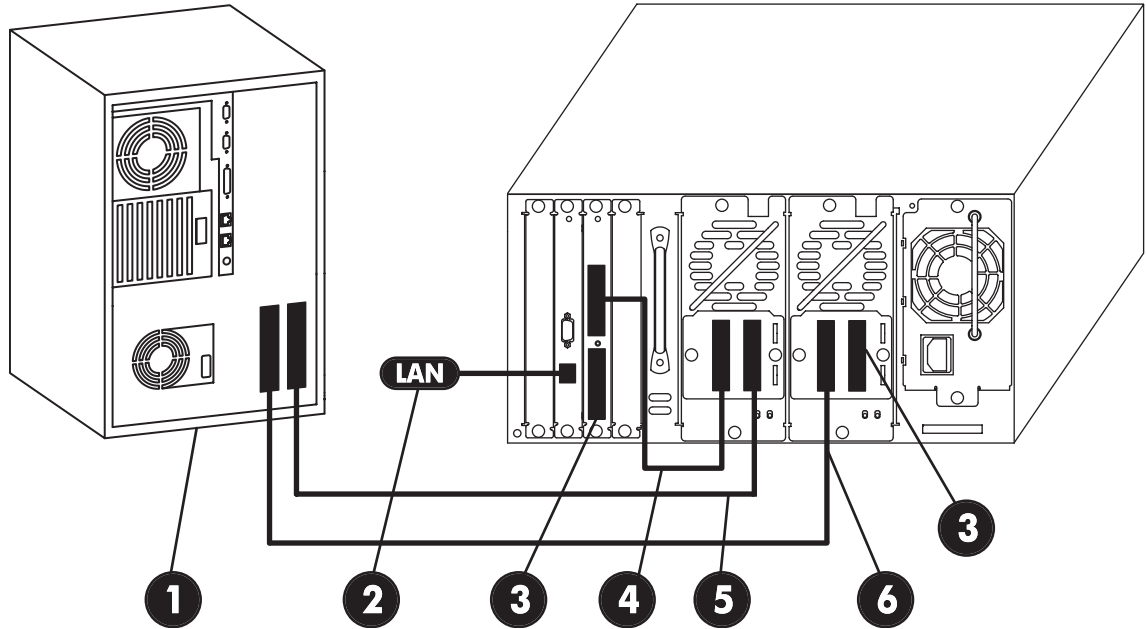
8. Power on the library. The power (standby) switch is recessed and on the lowest level on the front of the library.

After the power-up test is complete (after several minutes), you will see the Home Screen on the library's front panel. The Home Screen displays the status of the drives and library. See **Front Panel Overview** on page 60.

9. Power on other peripherals, and then the host.

Figure 16

2/20 Series SCSI Cable Connections



1	Host (user configured)
2	Remote management card LAN connection
3	Appropriate 68-pin SCSI terminator
4	Jumper cable with SCSI 68-pin connectors
5	SCSI cable from drive 1 to host
6	SCSI cable from drive 2 to host

Figure 17

4/40 Series SCS Cable Connections

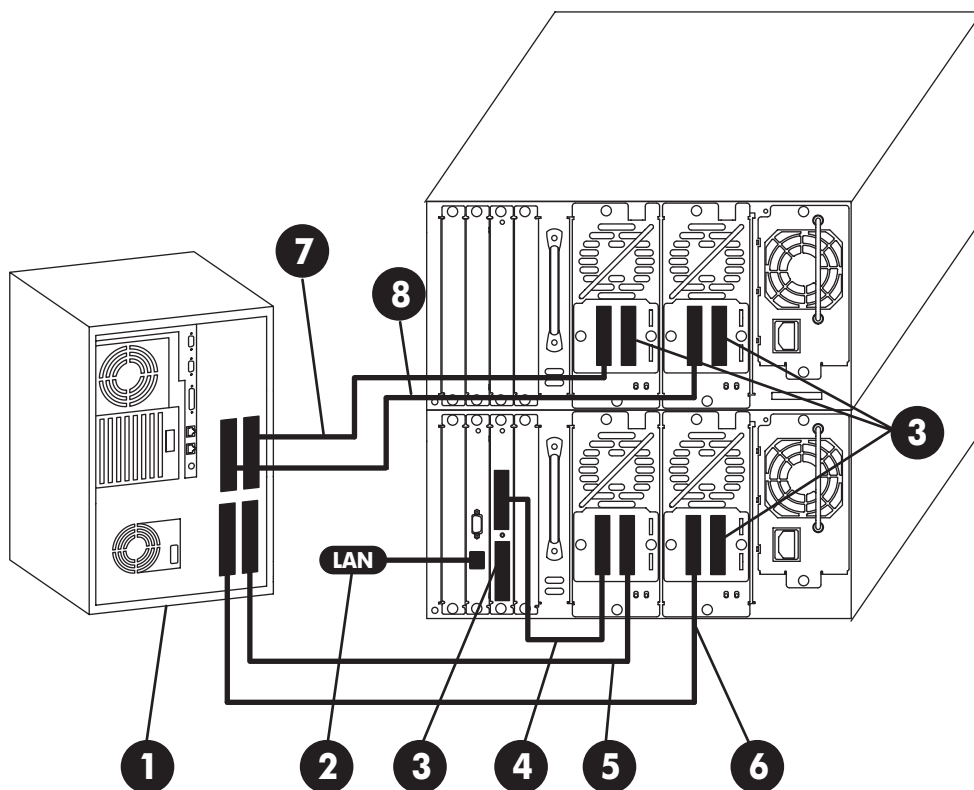
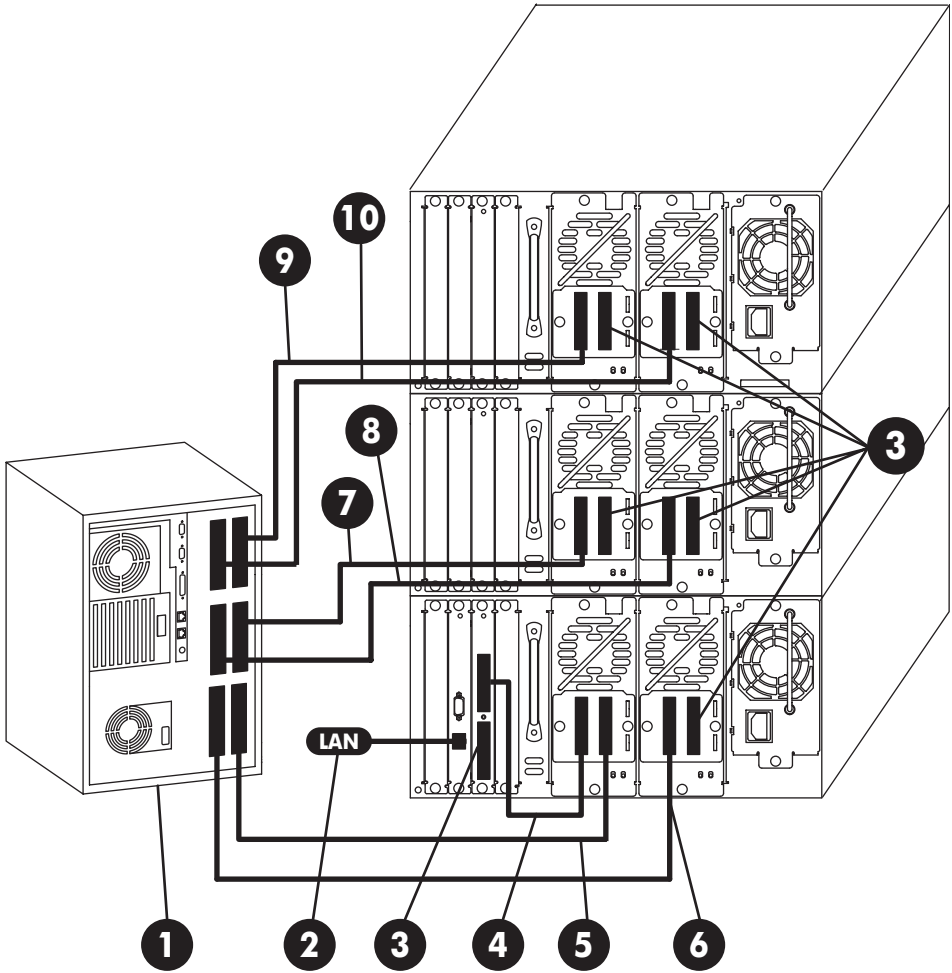


Figure 18

6/60 Series SCS Cable Connections



1	Host (user configured)	6	SCSI cable from drive 2 to host
2	Remote management card LAN connection	7	SCSI cable from drive 3 to host
3	Appropriate 68-pin SCSI terminator	8	SCSI cable from drive 4 to host
4	Jumper cable with SCSI 68-pin connectors	9	SCSI cable from drive 5 to host
5	SCSI cable from drive 1 to host	10	SCSI cable from drive 6 to host

Figure 19

8/80 and 10/100 Series SCSI Cable Connections

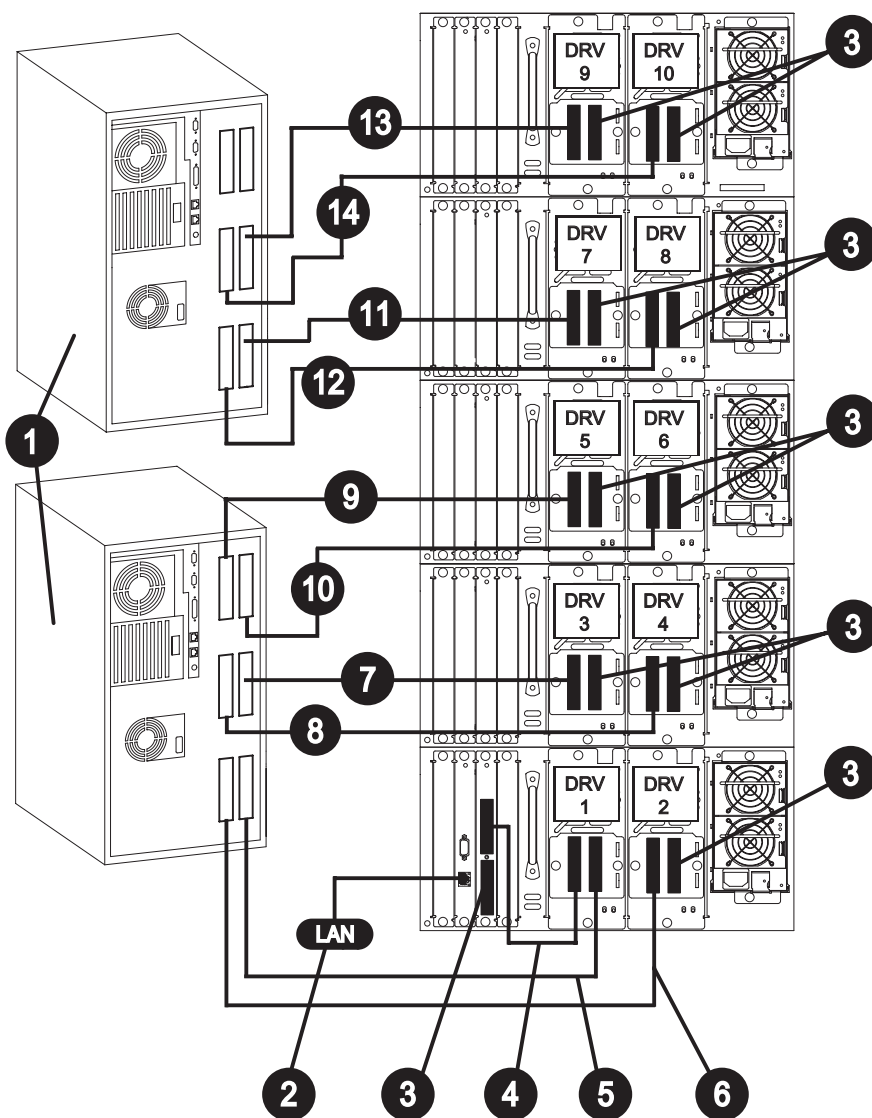


Table 3**8/80 and 10/100 Series SCSI Cable Connections**

1	Host (user configured)
2	Remote management card LAN connection
3	Appropriate 68-pin SCSI terminator
4	SCSI cable from the library controller card to drive 1
5	Host SCSI cable to drive 1
6	Host SCSI cable to drive 2
7	Host SCSI cable to drive 3
8	Host SCSI cable to drive 4
9	Host SCSI cable to drive 5
10	Host SCSI cable to drive 6
11	Host SCSI cable to drive 7
12	Host SCSI cable to drive 8
13	Host SCSI cable to drive 9
14	Host SCSI cable to drive 10

Fibre Channel Cable Connections

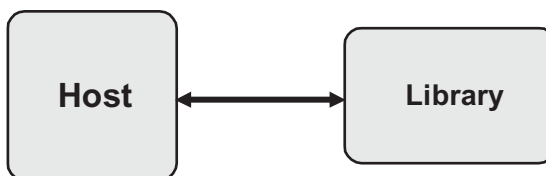
There are several Fibre Channel cabling options. **Figure 20** provides an overview.

Note When using hubs or switches, consult the user documentation for those products. For detailed information on HP supported topologies, refer to the *SAN Solution Installation Guide* available from <http://www.hp.com/go/support>.

Figure 20 Fibre Channel Cabling Alternatives

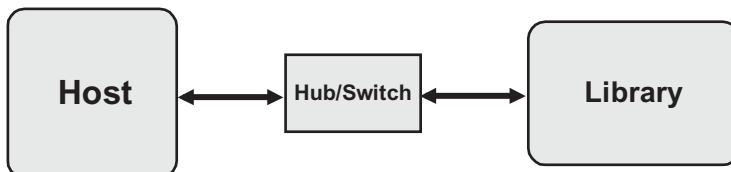
CABLING ALTERNATIVE #1:

Connecting the library directly to a host



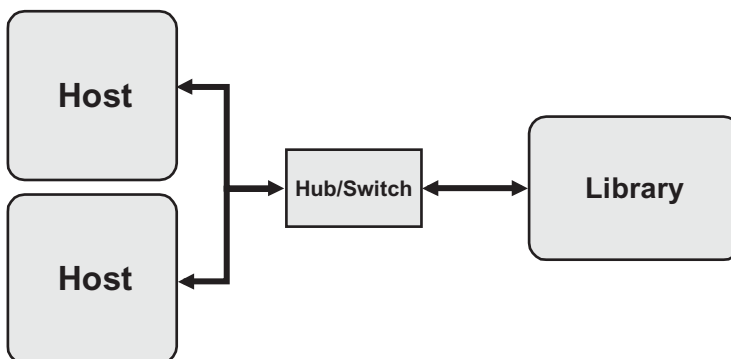
CABLING ALTERNATIVE #2:

Connecting the library to the host through a hub or switch (more detailed instructions are on the following pages)



CABLING ALTERNATIVE #3:

Connecting the library to multiple hosts through a hub or switch



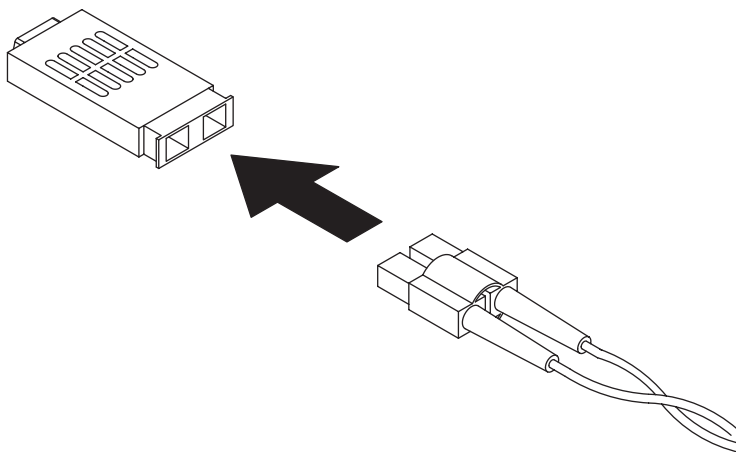
The following steps illustrate a Fibre Channel connection between the **host**, **hub** or **switch**, and library. Refer to **Figure 22** on page 45 through **Figure 25** on page 48, and connect the library as follows:

1. Ensure that the library and host are inactive, and the library is disconnected from the host.
2. Ensure that the required host software has been installed.
3. Power off the host, hub, or switch. If the host is connected to a network, check with the system administrator before turning off power.
4. Install a host bus adapter into the host computer. Use proper procedures to prevent electrostatic discharge (ESD). Use wrist-grounding straps and anti-static mats when removing internal components.
5. Connect the hardware.
 - a. On each level of the library, connect the supplied SCSI jumper cable from bus 1 on each Fibre Channel controller to the left connector on the left drive module.
 - b. On each level of the library, connect the supplied SCSI jumper cable from bus 2 on each Fibre Channel controller to the left connector on the right drive module.
 - c. Connect the supplied SCSI jumper cable from the top connector on the library controller card to the right connector on the left drive module (drive module 1) to daisy chain the library controller to the drive.
 - d. Terminate the bottom connector on the library controller card.
 - e. Connect the appropriate SCSI terminator to the remaining connectors on the drive modules. Ensure that the interface type matches your library.

- f. Connect the Fibre Channel cable(s) to the host, hub, or switch. If necessary, connect the Fibre Channel cable to the GBIC provided before connecting to the host, hub, or switch.

Figure 21

Connecting Fibre Channel Cables to the GBIC



Caution The Fibre Channel printed circuit boards may contain a laser system (GBIC or GLM module) that is classified as a “Class-I Laser Product” under a U.S. Department of Health and Human Services (DHHS) Radiation Performance standard according to the Radiation Control for Health and Safety Act of 1968 and EN60825-1(+A11) safety of laser products. The compliance statement is located on the module.

6. Power on the hub or switch (if present).

Note The AC power cord is the library’s main AC disconnect device and must be easily accessible at all times.

7. **For 8/80 and 10/100 Series Libraries:**

Connect the power cords on the rack to a power outlet on each library level.

For 2/20, 4/40, and 6/60 series libraries, skip to the next step.

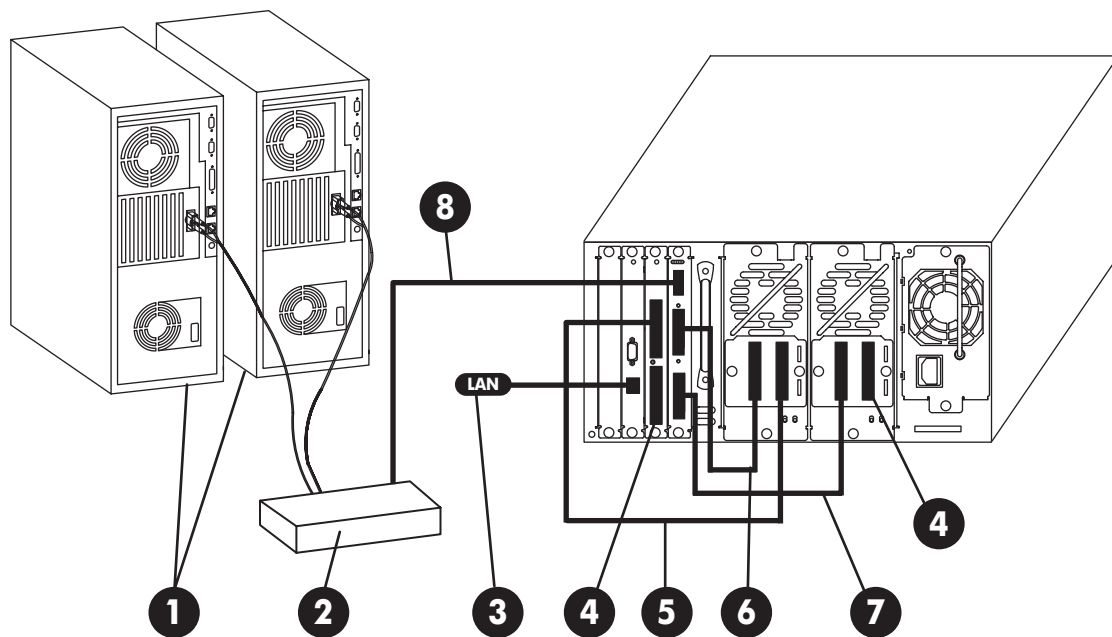
8. Connect the power cord(s) from the library to a grounded power receptacle, and power on the library. The power (standby) switch is recessed and on the lowest level of the library.

After the power-up test is complete (after several minutes), you will see the Home Screen on the library's front panel. The Home Screen displays the status of the drives and library.

9. From the front panel, configure the library for Fibre Channel. See **Configuring the Library for Fibre Channel** on page 102 for more information.
10. Connect a category 5 ethernet cable from the remote management card to an active network port (see **Using the Remote Management Card** on page 96).
11. Power on the host.

Figure 22

2/20 Series Fibre Channel Connections



1	Hosts (user configured)	5	SCSI cable from the library controller card to drive 1
2	Hub or switch	6	SCSI cable from bus 1 on the Fibre Channel controller to drive 1
3	Remote management card LAN connection	7	SCSI cable from bus 2 on the Fibre Channel controller to drive 2
4	Appropriate SCSI terminator	8	Fibre Channel cable to hub or switch

4/40 Series Fibre Channel Connections

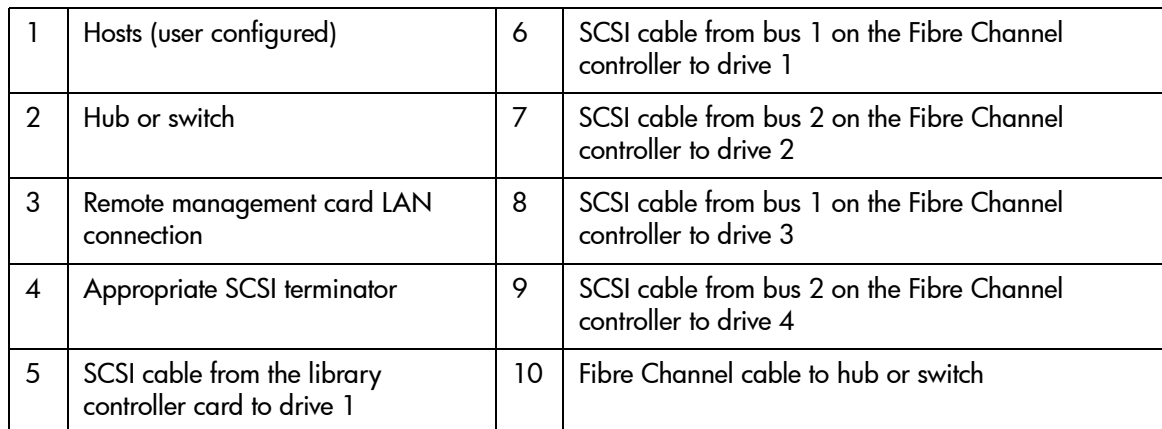
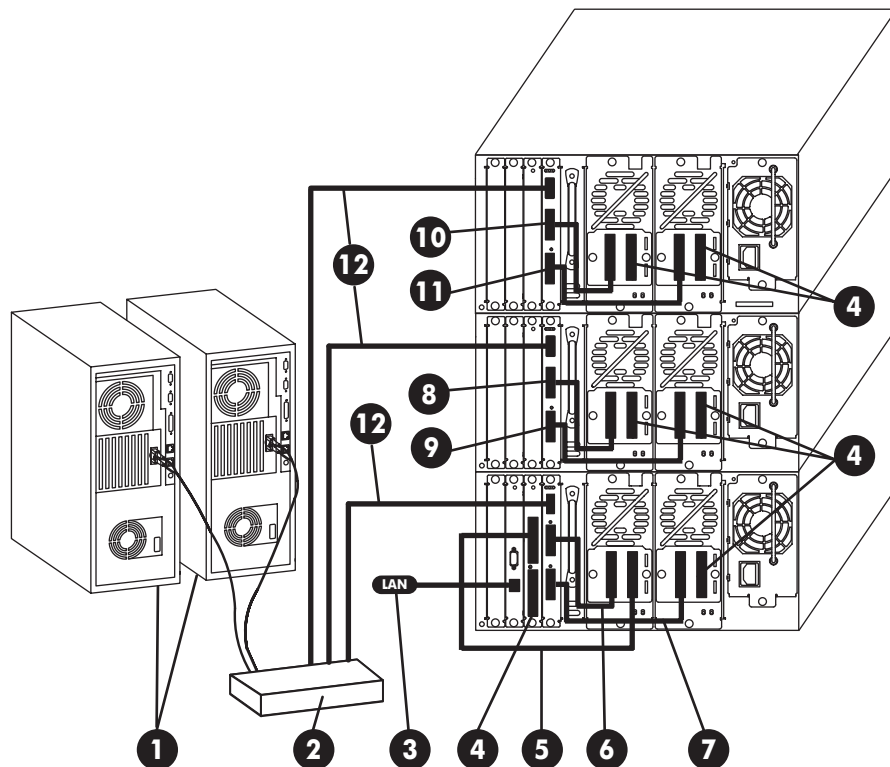


Figure 24

6/60 Series Fibre Channel Connections



1	Hosts (user configured)	7	SCSI cable from bus 2 on the Fibre Channel controller to drive 2
2	Hub or switch	8	SCSI cable from bus 1 on the Fibre Channel controller to drive 3
3	Remote management card LAN connection	9	SCSI cable from bus 2 on the Fibre Channel controller to drive 4
4	Appropriate SCSI terminator	10	SCSI cable from bus 1 on the Fibre Channel controller to drive 5
5	SCSI cable from the library controller card to drive 1	11	SCSI cable from bus 2 on the Fibre Channel controller to drive 6
6	SCSI cable from bus 1 on the Fibre Channel controller to drive 1	12	Fibre Channel cable to hub or switch

Figure 25

8/80 and 10/100 Series Fibre Channel Connections

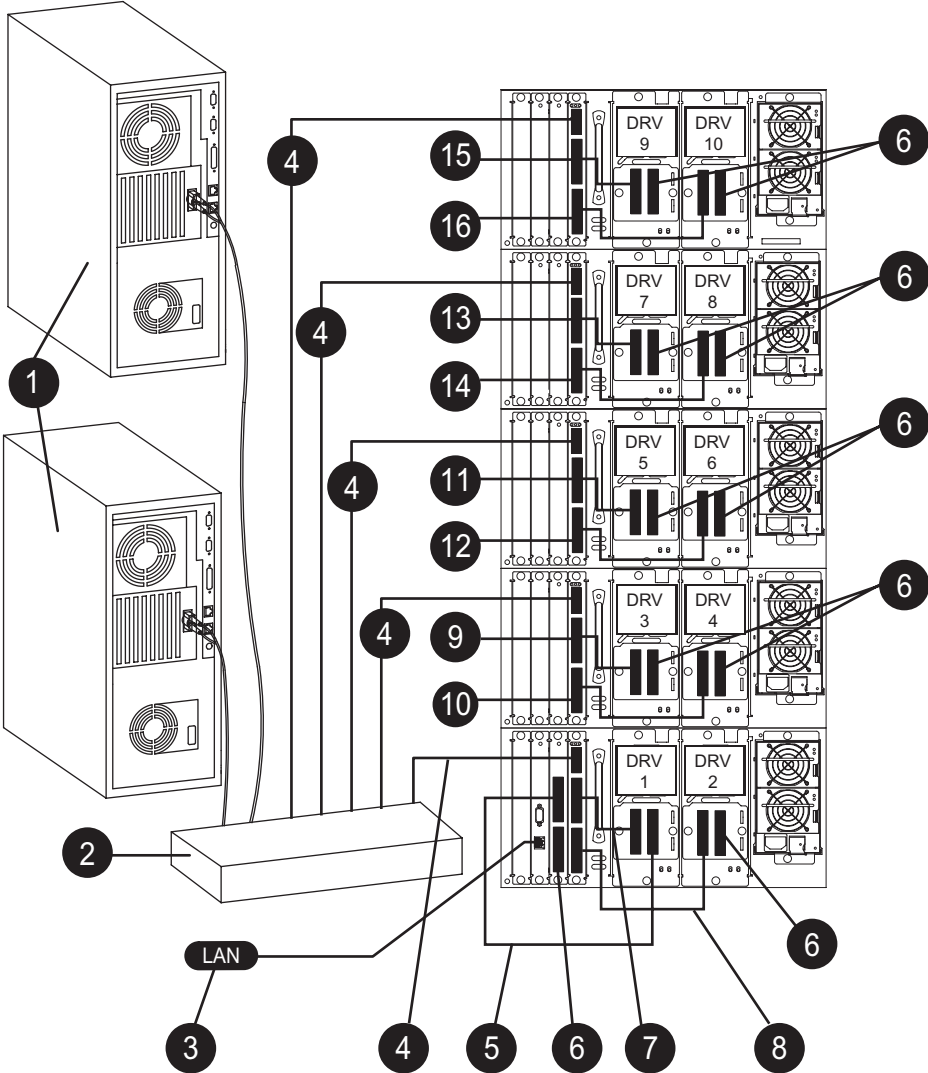


Table 4

8/80 and 10/100 Series Fibre Channel Connections

1	Host (user configured)
2	Hub or switch
3	Remote management card LAN connection
4	Fibre Channel cable
5	SCSI cable from library controller to drive 1
6	Appropriate SCSI terminator
7	SCSI cable from bus 1 on the Fibre Channel interface to drive 1
8	SCSI cable from bus 2 on the Fibre Channel interface to drive 2
9	SCSI cable from bus 1 on the Fibre Channel interface to drive 3
10	SCSI cable from bus 2 on the Fibre Channel interface to drive 4
11	SCSI cable from bus 1 on the Fibre Channel interface to drive 5
12	SCSI cable from bus 2 on the Fibre Channel interface to drive 6
13	SCSI cable from bus 1 on the Fibre Channel interface to drive 7
14	SCSI cable from bus 2 on the Fibre Channel interface to drive 8
15	SCSI cable from bus 1 on the Fibre Channel interface to drive 9
16	SCSI cable from bus 2 on the Fibre Channel interface to drive 10

Verifying the Host Configuration

Once the library is connected to a host, the operating system must be configured to recognize it (if it has not already been configured). The procedures are different, depending on the host system:

- **Windows NT** on page 51
- **Windows 2000** on page 51
- **Sun Solaris** on page 52
- **HP-UX and MPE/iX** on page 52

Backup Software Compatibility

Consult your software documentation for more information on installing, configuring, and operating your backup software.

For software compatibility information, visit <http://www.hp.com/go/automated> or the Website for the backup software manufacturer:

- **HP Omniback II™** (<http://www.openview.hp.com/products/omniback>)
- **Veritas Backup Exec™** (<http://www.veritas.com>)
- **Veritas NetBackup™** (<http://www.veritas.com>)
- **Computer Associates ARCserve 2000™** (<http://www.ca.com/arcserve>)
- **Legato Networker™** (<http://www.legato.com>)
- **Tivoli Storage Manager™** (<http://www.tivoli.com>)

Using HP Library & Tape Tools

In addition to the following procedures, you can also check the installation with HP Library & Tape Tools available from <http://www.hp.com/support/TapeTools>. See **HP Library & Tape Tools** on page 154 for more information.

With HP Library & Tape Tools installed on your host computer, you can do the following and much more:

- Identify all SCSI and Fibre Channel devices connected to your system
- View detailed configuration, identification, inventory, and drive information for the library

Windows NT

For Windows NT™ operating systems, perform the following operating system configurations:

- Install the appropriate host bus adapter(s)
- Install the corresponding drivers for the interface card(s)
- To verify the hardware installation, look for the library and drives after powering up the host. Go into **Settings -> Control Panel -> SCSI Adapter**.
- Install the backup software
- Run a test backup to ensure that all components are properly configured.

Windows 2000

For Windows 2000™ operating systems, perform the following operating system configurations:

- Install the appropriate host bus adapter(s)
- Install the corresponding drivers for the interface card(s)
- To verify the hardware installation, look for the library and drives after powering up the host:
 - Right click on **My Computer**
 - Select **Manage -> System Tools -> Device Manager**
 - **Medium Changer** and **Tape Drives** should be listed
- Install the backup software
- Run a test backup to ensure that all components are properly configured.

Sun Solaris

For Sun Solaris™ operating systems, perform the following operating system configurations:

- Install the appropriate host bus adapter(s)
- Install the corresponding drivers for the interface card(s)
- To verify the hardware installation, look for the library and drives after powering up the host.
 - Close all open applications and exit the Common Desktop Environment (CDE).
 - Type “init 0” at any prompt. This will shut down all processes, and take you to the OpenBoot PROM.
 - Type “reset”.
 - At the OK prompt, type “probe-scsi-all”.
- Install the backup software
- Run a test backup to ensure that all components are properly configured.

HP-UX and MPE/iX

For more information on configuring these operating systems and verifying the connection, see the online configuration and diagnostic guide at <http://www.hp.com/go/support>. Select your product and then select **manuals**.

Getting Started

After you install and configure the library, you must complete the following setup tasks from the library's front panel:

- **Setting the date and time:** When you first set up the library or if it has been unplugged for an extended period of time (around 8 days), set the library's real-time clock. See **Setting the Date and Time** on page 108 for more information.
- **Setting the mailslot configuration:** The default setting is for a one-slot mailslot. You can select a 0-slot, 1-slot, 1-magazine, or 2-magazine mailslot. See **Configuring the Mailslot** on page 93 for more information.

Note	Mailslot configuration must be set prior to installing the backup software.
-------------	---

- **Configuring the library for web monitoring:** You can monitor and manage your library anywhere on the network through user friendly web pages. See **Using the Remote Management Card** on page 96 for more information.
- **Enabling the password:** The library does not have an administrator password enabled when it arrives. To ensure security and to get full use of the remote management card, enable and select a password. Be sure to remember this password. See **Enabling and Changing the Password** on page 92 for more information.

Note	You must first set a library password through the front panel to configure the library using the remote management card (see Enabling and Changing the Password on page 92).
-------------	---

Moving or Shipping the Library

WARNING Do not move the library without additional help or an appropriately rated lift device. The 2/20 series library weighs 40 kg (87 lb). The 4/40 series library weighs 75 kg (165 lb). The 6/60 series library weighs 104 kg (249 lb). The 8/80 and 10/100 series libraries weigh approximately 227 kg (500 lb).

Caution To avoid damage to the library, ensure that it is in an upright position at all times. Never place the library on its sides.

Note During normal operation, changes to configurations are stored in Non-Volatile (NV) RAM for eight days. All configuration settings can be permanently saved to flash memory by power cycling the library. This allows the settings to be recovered if the library is unplugged for more than eight days. If this step is not completed and the library is unplugged for more than eight days, any new settings may be lost. Before shipping the library, verify that the configuration settings were saved permanently by first powering down the library, and then powering back up to store the settings and to view them.

To move or ship the library:

1. Verify that all drives are empty. If a drive contains a tape, unload it. Refer to the backup software documentation, use the remote management card (see **page 96**), or use the front panel menu as follows:
 - a. From the **Drive and Tape Operations** menu, select **Unload Tape from Drive**.
 - b. Use the **[-]** or **[+]** keys to select the drive you want to unload.
 - c. Select **[Unload]** to move the tape from the drive to the tape's original location (the slot it occupied before being loaded into the drive). If that slot is occupied, you will be asked to select another slot location.

The tape automatically rewinds before it is unloaded. A status screen displays the library's progress as the tape is relocated.

- d. From the **Drive and Tape Operations** menu, select **[Back]** to return to the **Operations** menu.
2. If shipping the library, remove tape cartridges from the magazines:
 - a. From the **Magazine Access** menu, select one of the following options:
 - Unlock Door**
 - Unlock All Doors**

Use the **[-]** and **[+]** keys to change the door selection.
 - b. Pull the unlocked drawer(s) out to access magazines and tapes. The drawer may also be physically locked with a key. The key is typically attached to the back of the power supply.
 - c. Remove the **magazine** by lifting it straight up with the handle.
 - d. To remove a tape, set the magazine on its back and grasp the top and bottom corners of the tape. Pull the tape straight out of the magazine and return the magazine to the library.
 3. If shipping the library, lock the transport:
 - a. From the **Administration** menu, select the **Run Test** menu.
 - b. From **Run Test**, use the **[-]** or **[+]** keys to select **Lock Transport**.
 - c. Select **[OK]**.
 - d. Select **[Run]**. The front panel display will indicate that the transport has been locked.

Caution Do not power off the library until the interface is inactive. Removing power from a SCSI or Fibre Channel peripheral when the bus is active can result in data loss and/or indeterminate bus states.

4. Power off the library. The power "standby" switch is recessed to avoid accidental power cycles.

5. To ship the library, remove all external cords, cables, and terminators. For an internal move, only disconnect the power cables, SCSI cables, the RMC ethernet cable, and the Fibre Channel connection from the host, hub, or switch.

Note	You do not need to remove the SCSI cables that connect the controller or the Fibre Channel controller to the drive modules, unless the library is being shipped.
-------------	--

WARNING	Before moving the library, the leveler feet must be fully raised to allow for ground clearance. Once the library is in place, the leveler feet should be fully lowered. Failure to follow these precautions could result in personal injury or damage to the library.
----------------	---

6. When moving a stand-alone library, raise the library's leveler feet (for the 6/60 series library only) before moving it to its new location. Reconnect the library using the procedures in **Connecting and Powering on the Library** on page 32.
7. For shipping, place the library in the original packing materials.

For 8/80 and 10/100 Series Libraries:

Refer to the *Rack System User Manual* for more information on repackaging the library. The manual is available at <http://www.hp.com/racksolutions>.

Secure library components for shipping by doing the following:

- Remove the filler panels from the rack
- Wrap the filler panels with bubble-wrap
- Secure the outer rack side panels to the rack with shrink-wrap or bands

Note	If you no longer have the original packaging, contact your sales or service representative to obtain packaging materials.
-------------	---

- For libraries mounted in a rack, proceed to the next step.

8. Extend the rack's anti-tip foot.

WARNING Failure to extend the anti-tip foot could result in personal injury or damage to the library.

9. Open the magazine drawers and loosen the screws that lock the library into place (**Figure 14** on page 30). The screws are located in front of the trim brackets.
10. Remove the stop bracket. (See **Figure 9** on page 25 and **Figure 10** on page 26.)
11. Push the library out of the rack until it hits the latch stops (approximately 2/3 of the library is out of the rack).
12. Reattach the lifting straps to the sides of the library.
13. Release the library from the rack.

4/40 and 6/60 Series Libraries:

Depress the latch stops at the top of the library with a screwdriver or similar tool (**Figure 26** on page 58).

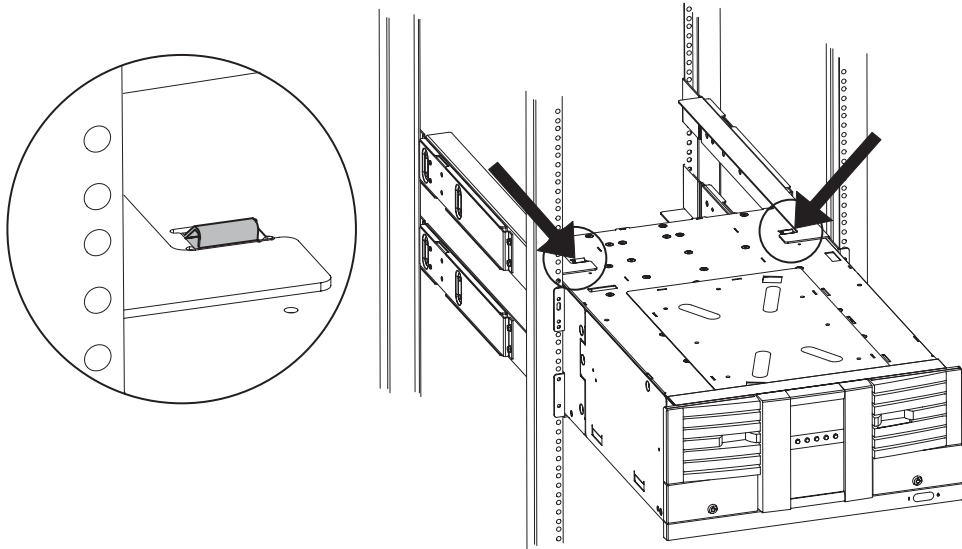
2/20 Series Libraries:

If the library does not have enough clearance above for a tool to be inserted, unscrew the four screws (two on each side) from the top (black) mounting rail on the front of the library. Pull the library partially out, then lower the front half of the library to ease it under the latch stops.

WARNING Once you have loosened the mounting screws, the library is no longer secured inside the rack and can cause bodily harm and/or damage to the library if it is dropped.

Figure 26

Latch Stops



14. Remove the library from the rack.

2/20 Series Libraries:

With the help of two people or a lift, slide the library out of the rack and place it in the original packaging materials.

4/40 and 6/60 Series Libraries

- a. Position the original shipping pallet in front of the rack.
- b. With at least one person on each side, slide the library out of the rack and onto an appropriately rated mechanical lift. Lower the library onto the shipping pallet.

WARNING Do not move the library without additional help or an appropriately rated lift device. The 2/20 series library weighs 40 kg (87 lb). The 4/40 series library weighs 75 kg (165 lb). The 6/60 series library weighs 104 kg (249 lb).

Note If you no longer have the original packaging, contact your sales or service representative to obtain packaging materials.

Operating the Library

2

Chapter Overview

This chapter describes the following:

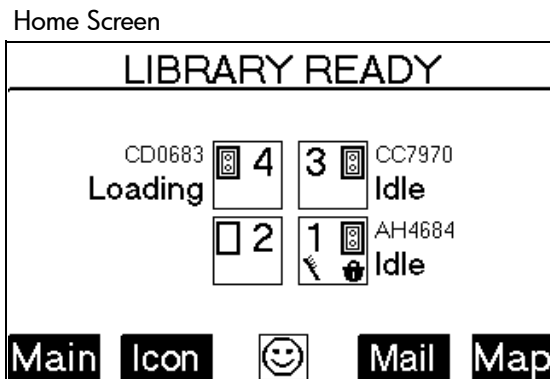
- **Front Panel Overview** on page 60
- **Understanding the Menu Structure** on page 64
- **Using Tapes** on page 65
- **Accessing Tapes in the Library** on page 81
- **Drive and Tape Operations** on page 86

Front Panel Overview

The front panel displays icons and text that provide library, drive, and tape status information. It also uses text prompts and warnings to guide you while making changes. Use the button immediately below the label to execute the desired function. The function of the buttons varies between screens.

The display defaults to the Home Screen. **Figure 27** on page 60 shows a typical Home Screen view, using a four-drive model as an example.

Figure 27



The Home Screen shows the following:

- Statement indicating the general condition of the library
- Drive and tape status
- Tape bar code (if applicable)
- **[Main]** option to go to the **Information, Operations, and Administration** menus
- **[Icon]** option to display the icons with a description
- An icon that indicates the general status of the library. This icon may display a reverse video reminder (icon background reverses to black) when there has been a change in the status of the library. Select this key to obtain more information about the library.
- **[Mail]** option to access the mailslot
- **[Map]** option to view information about the drive and tape slots

Status Bar

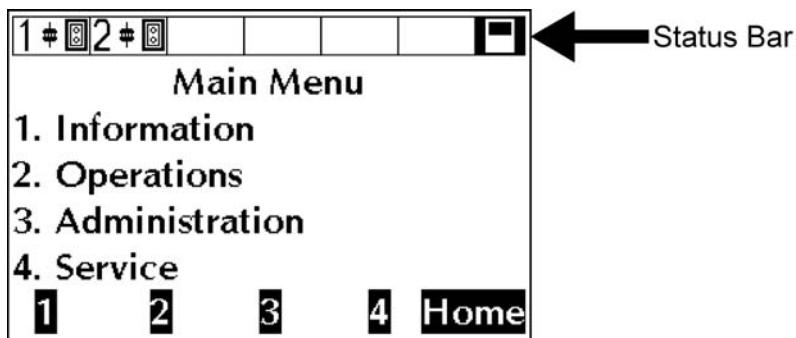
All screens, except the Home and Map screens, show a status bar that summarizes library and drive status (**Figure 28** on page 61).

The status bar shows a reverse video reminder (icon background reverses to black) for drive or library errors that have been entered in the media log or hard error log. You may clear this reminder by viewing either the **Drive Log** or **Library Hard Error Log** screens.

The library's reverse video reminder will also be set if the library's partial availability status changes (see **Partial Availability State** on page 120). You can clear this reminder by viewing the **Library Status** screen by selecting the center icon button on the Home screen.

Figure 28

Status Bar from Main Menu Screen



The status bar can display the icons listed in **Table 5** on page 62 and **Table 6** on page 62.

Table 5

Drive Icons





















	Power is off		Online
	Failed, offline		Full and idle
	Needs to be cleaned		Unloading a tape
	Offline		Seeking data on a tape
	Failed, online		Writing data to a tape
	Tape is cleaning a drive		Rewinding a tape
	Tape is write protected		Reading a tape
	Empty		Erasing a tape
	Loading a tape		

Table 6

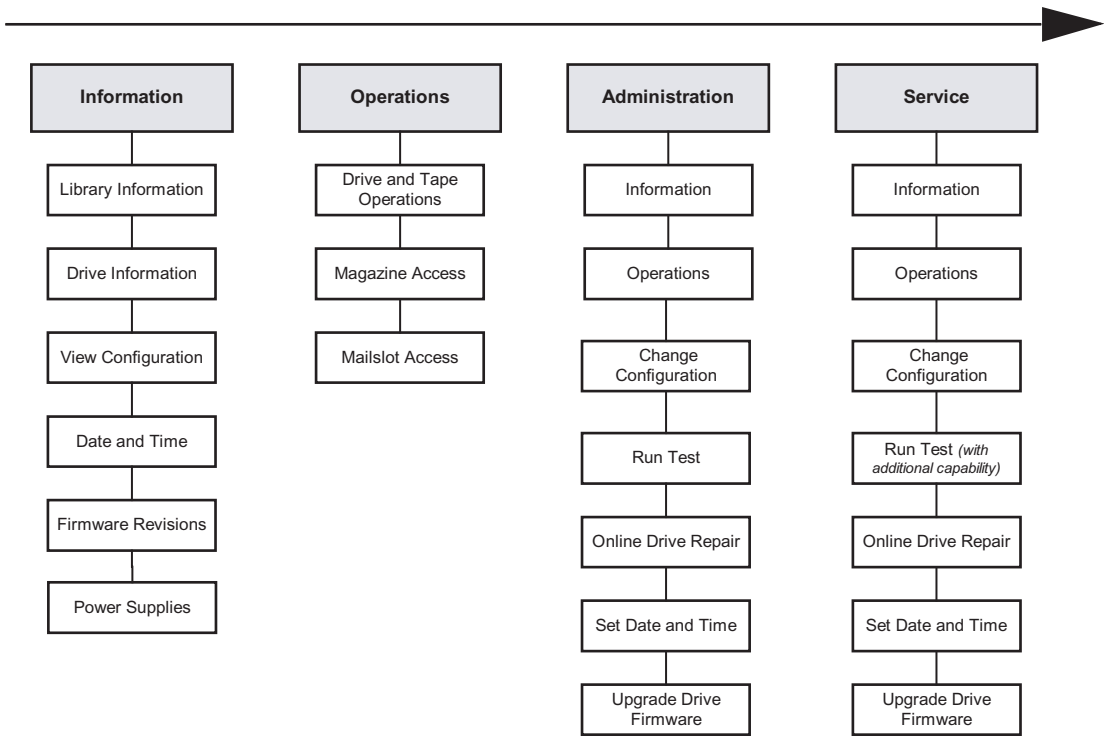
Library Icons

	Failed		Partially available		Healthy
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Nesting

Each level of password-protected menus (**Administration** and **Service**) includes all options available in the subordinate menu. For example, all options available in the **Administration Menu** are also included in the **Service Menu**. This functionality reduces the need to return to the **Main Menu** or re-enter a password. **Figure 29** illustrates this “nesting” concept.

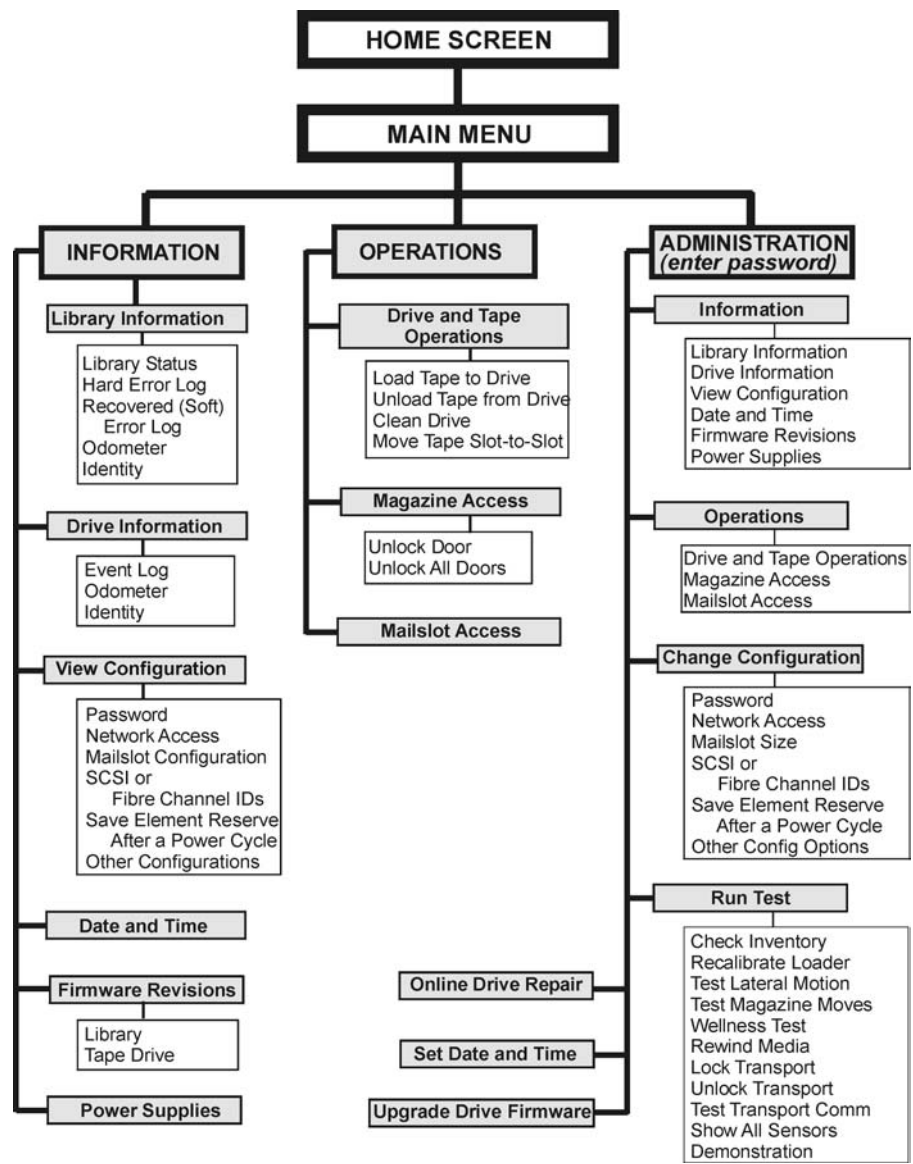
Figure 29 Nesting



Note The front panel defaults back to the home or logo screen after approximately three minutes of inactivity, unless an error message or confirmation message is displayed that needs to be acknowledged.

Understanding the Menu Structure

Figure 30 Front Panel Menu Structure



Using Tapes

This section includes information on:

- **Mixed Media** on page 66
- **Media Migration** on page 67
- **Using HP Ultrium Cartridges** on page 69
- **Using DLT Tape Cartridges** on page 74

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

Mixed Media

Mixed media refers to the option to backup to more than one drive type, such as DLT and LTO, within the same physical tape library.

General considerations when using mixed media:

- Some backup software packages do not support mixed media. Consult your software provider to verify that your configuration is supported.
- In order to provide full mailslot support in a mixed media library, one magazine is required for each drive type for a possible total of 10 mailslots, depending on library model.
- Only DLT tapes can be used in a DLT magazine, and only Ultrium tapes can be used in an Ultrium magazine.
- When mixing drive types, HP only supports using the same type of drive per level of the library.
- HP Library & Tape Tools version 2.2 or greater is required for diagnostic support.
- Upgrade kits are available from HP for Ultrium tape drives, magazines, and tape cartridges.

Media Migration

Utilities and services are available to assist you in migrating from one drive technology to another.

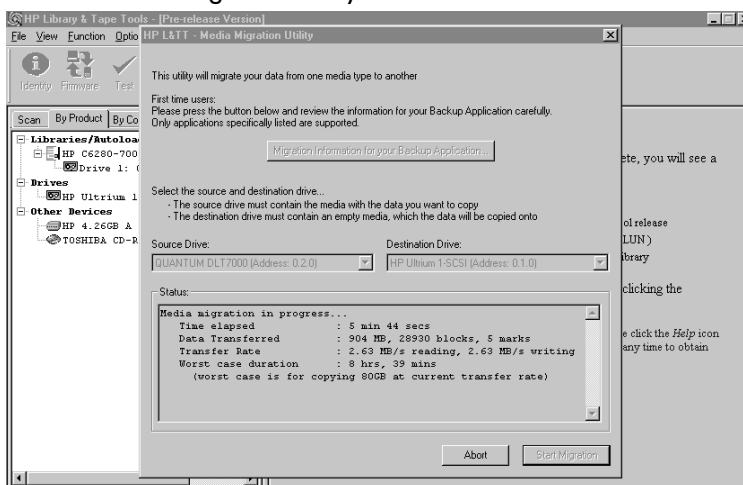
HP Library & Tape Tools

The HP Library & Tape Tools diagnostic assists you in installing and supporting your tape library. This tool provides an intuitive graphical user interface with integrated context-sensitive help. It can be downloaded free of charge from <http://www.hp.com/support/tapetools>.

Among the many features is a **Migrate Backup Media** option available from the **Utility** menu. This utility will copy data from DLT drives to DLT or Ultrium drives. See **Figure 31** for a screen shot from HP Library & Tape Tools.

Figure 31

HP L&TT Media Migration Utility



Note

Before using the media migration utility in HP Library & Tape Tools, ensure that the source media is write-protected. This utility does not provide any library control. You must load media into the selected drives using the library or autoloader front panel, Web-Based Library Administrator, or your backup software utility.

For more information on using HP Library & Tape Tools for media migration, refer to <http://www.hp.com/support/tapetools>.

Service Provider

Vogon International provides migration, recovery, and forensic services with offices in the United Kingdom, Germany, and the United States. Vogon offers a standard service and a fast-track service that generally has a 50% quicker turnaround time from the standard service. Prices vary, depending on the complexity of the service requested.

Vogon International Ltd.

Web address: <http://www.vogon-international.com>

Mailing address: Talisman Business Centre
Talisman Road
Bicester, Oxfordshire
OX6 OJX

Telephone: United States: (405) 321 2585
UK: 44 (0) 1869 355255
Germany: 49 (0) 89 3235030

Using HP Ultrium Cartridges

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

Caution	HP Ultrium tape drives require special cleaning cartridges and data cartridges formatted specifically for HP Ultrium. To avoid damage to your tape drive, it is critical to use appropriate cleaning cartridges and properly formatted data cartridges.
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A unique feature of Ultrium tape cartridges is LTO-Cartridge Memory (LTO-CM). LTO-CM is an intelligent memory chip embedded into the cartridge. It uses a radio frequency interface that eliminates the need for a physical power or signal connection between the cartridge and drive. Information normally stored in the header at the beginning of the tape is contained in the LTO-CM, including identification and usage information such as the number of times the cartridge has been loaded, when it was last cleaned, and error logs.

In addition to the information provided in this manual, you may also want to refer to the documentation provided with your Ultrium media.

Maintaining Ultrium Cartridges

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

Do not apply more than one label onto Ultrium cartridges, as extra labels can cause the cartridges to jam in the tape drive.

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

Write-Protecting Ultrium Cartridges

Each cartridge has a sliding write-protect switch. Using the write-protect switch ensures data safety for files that have been previously written to tape, preventing additional files from being written to that tape.

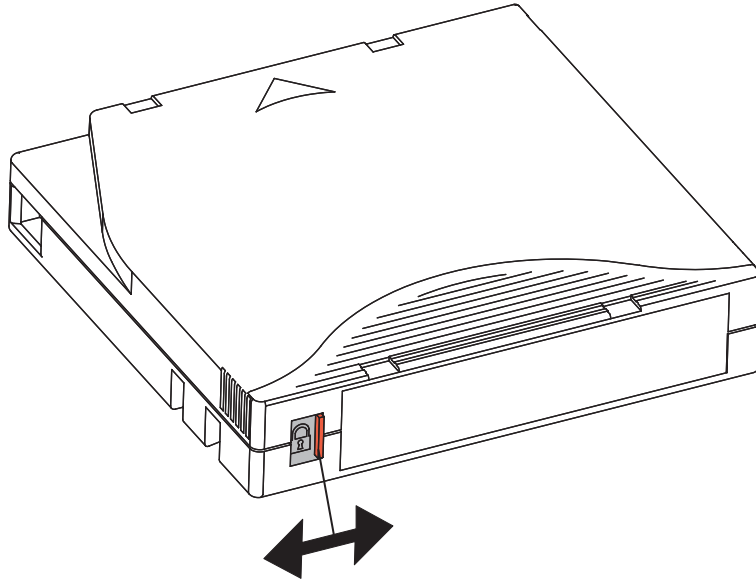
To change the write-protect setting, slide the red tab on the base of the cartridge (**Figure 32**):

- **Right** to prevent data from being written to the cartridge. The red tab on the cartridge displays a padlock when the write-protect switch is in the "ON" position.
- **Left** to allow data to be written to the cartridge (unless the tape is write-protected electronically through your backup software). The padlock on the red tab cannot be seen and the hole is exposed when the write-protect switch is in the "OFF" position.

With the write-protect switch in either position, data can be read from the cartridge.

Figure 32

Ultrium Write-Protect Switch Settings



Using Ultrium Cartridge Bar Code Labels

Make it a practice to use barcode labels on your tape cartridges. Your host software may need to keep track of the following information and the associated bar code:

- Date of format or initialization
- Cartridge owner (such as a group or department)
- Storage purpose

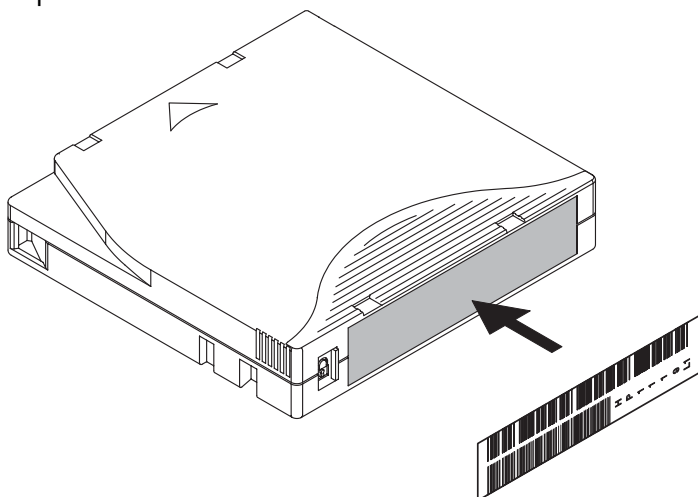
Note If the host software does not keep track of this information, create a method for doing so.

Ultrium cartridges have a recessed area located on the face of the cartridge next to the write-protect switch. Use this area for attaching the bar code label (**Figure 33** on page 71). Do not apply labels onto the cartridge except in this designated area.

Caution The bar code label should be applied as shown in **Figure 33** on page 71 with the alphanumeric portion facing the hub side of the tape cartridge. Never apply multiple labels onto a cartridge, as extra labels can cause the cartridge to jam in a tape drive.

Figure 33

Proper Ultrium Label Position



Ordering Ultrium Cartridges and Bar Code Labels

Ultrium Tape Cartridges

HP Ultrium tape cartridges can be purchased in a variety of ways.

Note Outside of North America, contact your nearest HP authorized dealer or sales representative.

- Call 1-800-752-0900 (North America only) for the location of the nearest authorized Hewlett-Packard dealer
- Contact HP Direct:
 - 1-800-538-8787 (North America only)
 - HP Direct
Hewlett-Packard
ATTN: Mail Order
P.O. Box 1145
Roseville, CA 95678
- Visit the HP Business Store at <http://www.bstore.hp.com> (where available)

Table 7 lists HP Ultrium tape cartridges and their part numbers.

Table 7

Ultrium Tape Cartridges

Part Number	Description
Data Cartridges	
C7970A	100 GB
C7971A	200 GB
Cleaning Cartridges	
C7978A	HP Ultrium Universal Cleaning Cartridge

Ultrium Bar Code Labels

Ensure that you use HP qualified bar code labels only. Contact an HP authorized dealer or sales representative for current compatibility and availability.

You can order Ultrium bar code labels through the following supplier:

- Colorflex:
 - Website: <http://www.colorflex.com>
 - Phone: (800) 522-3528 (800-LABEL2U)

Table 8 lists for part numbers for Colorflex bar code labels.

Table 8

Colorflex Ultrium Bar Code Labels

Part Number	Description
1700-LD	Ultrium Data Cartridge Label
1700-CNDH	Ultrium Cleaning Cartridge Label
1700-DGH	Ultrium Diagnostic Cartridge Label

Using Ultrium Cleaning Cartridges

HP Ultrium drives should only be cleaned if the *clean drive* icon displays on the tape library status bar. Only use appropriately formatted data cartridges and approved cleaning cartridges (see **Table 7** on page 72), and follow the instructions for **Cleaning a Drive** on page 87. In general, replace cleaning cartridges after fifteen uses. Marking the label on the cleaning cartridge after each use will help you keep track of the number of uses.

Caution	Excessive use of the cleaning cartridge can cause unnecessary wear on the drive head. The tape library front panel will display a message when the cleaning cartridge needs to be replaced.
----------------	---

Using DLT Tape Cartridges

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

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

Inspecting DLT Cartridges

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

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

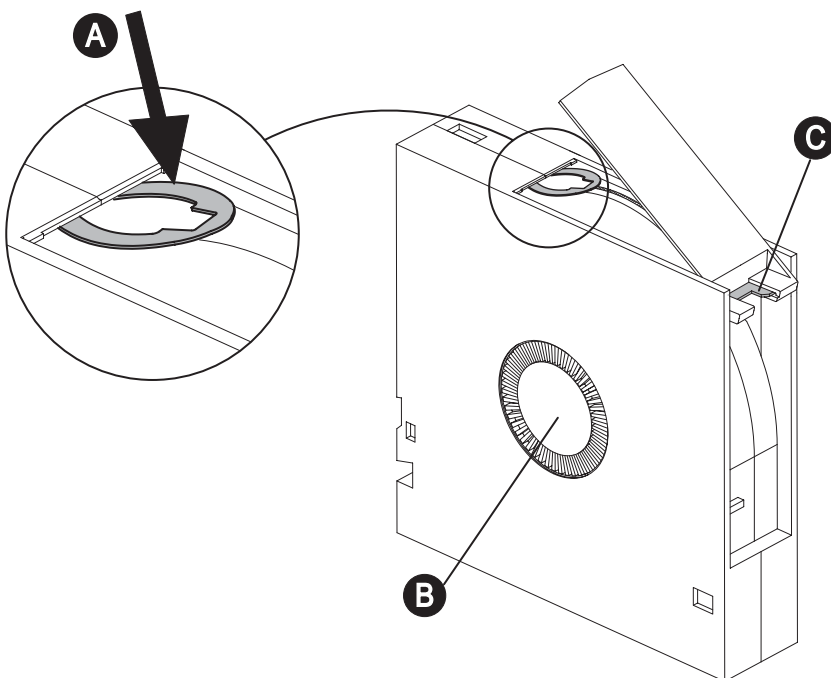
- Gently shake the tape cartridge to verify that no internal parts are rattling, indicating that they may be loose.
- Look at the tape cartridge to check for any obvious cracks or other physical damage. Look for broken or missing parts.
- Verify that the spring-loaded hub (item B in **Figure 34**) is centered within the circular opening on the bottom of the tape cartridge.
- Gently press the hub and make sure that it springs back into place.
- Visually inspect the tape for a broken, unseated, or misaligned tape leader (item A in **Figure 34** on page 75).

To check the leader position:

Press in the door lock (item C in **Figure 34**) to release the cartridge door. While pressing in the door lock, push the tab down to open the door. Be careful not to touch the tape after opening the door. Ensure that the leader is in the correct position (item A in **Figure 34**).

Figure 34

Leader in Correct Position, Hub, and Door Lock Tab



A	Tape leader
B	Spring-loaded hub
C	Door lock

Do NOT Use Cartridges with:

- Tape or leaders that have been touched with bare fingers (may transfer oils to the tape head).
- Labels used on the top, bottom, sides, or back of the cartridge. Use the label slot only.

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

Write-Protecting DLT Cartridges

Each cartridge has a sliding write-protect switch. Using the write-protect switch ensures data safety for files that have been previously written to tape, preventing additional files from being written to that tape.

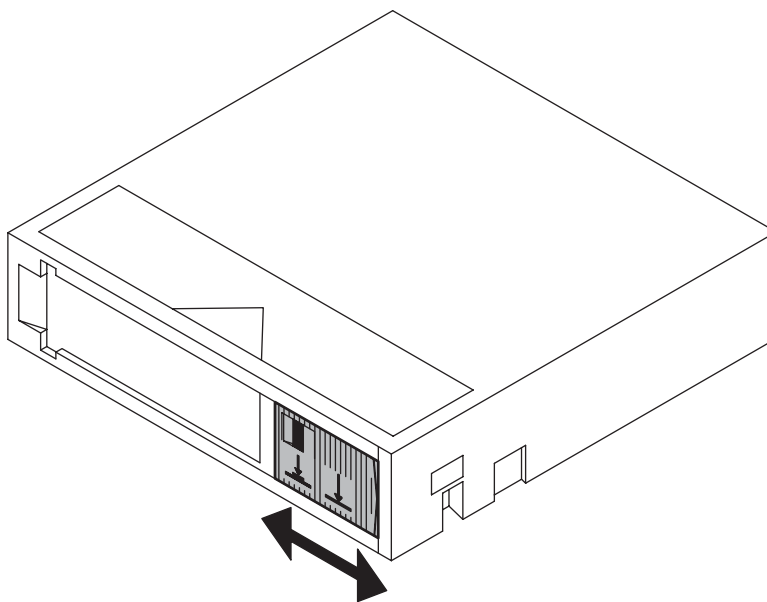
To change the write-protect setting, move the write-protect switch (**Figure 35**):

- **Left** to *prevent* data from being written to the cartridge. The orange indicator on the cartridge can be seen when the write-protect switch is in the “ON” position.
- **Right** to *allow* data to be written to the cartridge. The orange indicator on the cartridge cannot be seen when the write-protect switch is in the “OFF” position.

Note With the write-protect switch in either position, data can be read from the cartridge.

Figure 35

DLT Write-Protect Switch Settings



Using DLT Cartridge Bar Code Labels

Make it a practice to use barcode labels on your tape cartridges. Your host software may need to keep track of the following information and the associated bar code:

- Date of format or initialization
- Cartridge owner (such as a group or department)
- Storage purpose

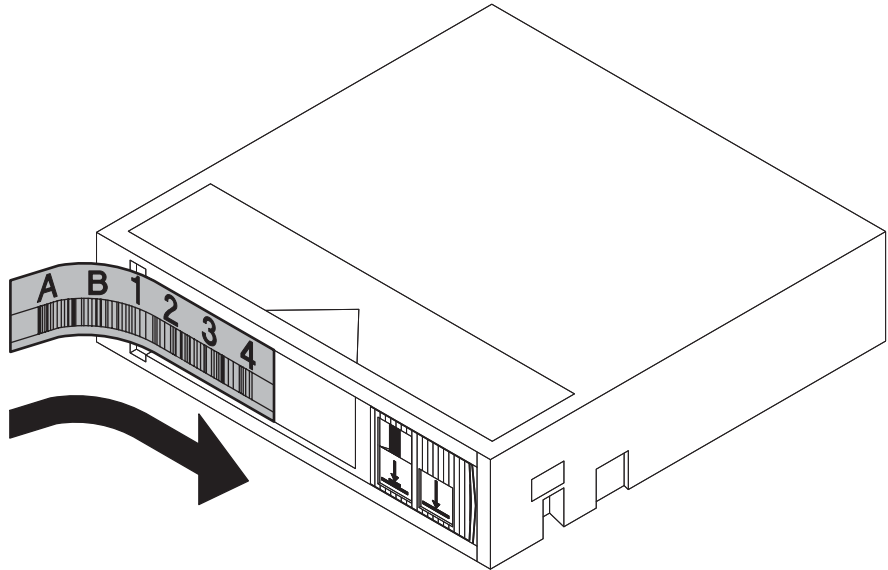
Note If the host software does not keep track of this information, create a method for doing so.

DLT cartridges have a front slide slot located on the face of the cartridge next to the write-protect switch. Use this slot for inserting the barcode label by sliding it into the slot (Figure 36 on page 78).

Caution Do not apply labels onto the top, bottom, sides, or back of the cartridge as this may cause damage to the tape drive or interfere with reliable operation.

Figure 36

Proper DLT Label Position



Ordering DLT Cartridges and Bar Code Labels

DLT Tape Cartridges

HP DLT tape cartridges can be purchased in a variety of ways.

Note Outside of North America, contact your nearest HP authorized dealer or sales representative.

- Call 1-800-752-0900 (North America only) for the location of the nearest authorized Hewlett-Packard dealer
- Contact HP Direct:
 - 1-800-538-8787 (North America only)
 - HP Direct
Hewlett-Packard
ATTN: Mail Order
P.O. Box 1145
Roseville, CA 95678
- Visit the HP Business Store at <http://www.bstore.hp.com> (where available)

Table 9 lists HP DLT tape cartridges and their part numbers.

Table 9

DLT Tape Cartridges

Part Number	Description
Data Cartridge	
C5141F	40/70/80 GB
Cleaning Cartridge	
C5142A	HP DLT Cleaning Cartridge

DLT Bar Code Labels

Ensure that you use HP qualified bar code labels only. Contact an HP authorized dealer or sales representative for current compatibility and availability.

You can order DLT bar code labels through the following supplier:

- Colorflex:
 - Website: <http://www.colorflex.com>
 - Phone: (800) 522-3528 (800-LABEL2U)

Table 10 lists part numbers for Colorflex bar code labels.

Table 10

Colorflex DLT Bar Code Labels

Part Number	Description
1703-0D	DLT Data Cartridge Label
1703-CN	DLT Cleaning Cartridge Label
1703-DG	DLT Diagnostic Cartridge Label

Using DLT Cleaning Cartridges

DLT drives should only be cleaned if the *clean drive* icon displays on the tape library status bar. Only use appropriately formatted data cartridges and approved cleaning cartridges (see **Table 9** on page 79), and follow the instructions for **Cleaning a Drive** on page 87. In general, replace DLT cleaning cartridges after twenty uses. Marking the label on the cleaning cartridge after each use will help you keep track of the number of uses.

Caution	Excessive use of the cleaning cartridge can cause unnecessary wear on the drive head. The tape library front panel will display a message when the DLT cleaning cartridge needs to be replaced.
----------------	---

See **Troubleshooting Common Problems** on page 140 for information on troubleshooting common cleaning problems.

Accessing Tapes in the Library

Tapes in the library may be accessed using the following features:

- Magazine access
- Mailslot access (if configured, see **Configuring the Mailslot** on page 93 for configuration information)

Magazine Access

Main Menu -> Operations -> Magazine Access

1. From the **Magazine Access** menu, select one of the following options:
 - **Unlock Door**
 - **Unlock All Doors**

Use the [-] and [+] keys to change the door selection.

Note The library will inventory only the drawers opened, regardless of how many were unlocked.

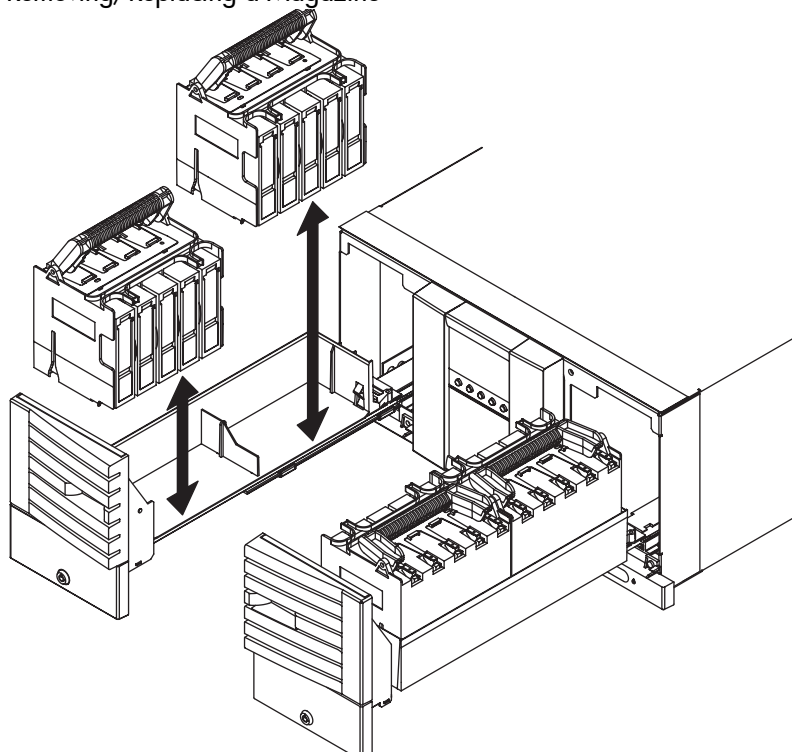
2. Pull the unlocked drawer(s) out to access magazines and tapes. The drawer may also be key locked. Unlock the drawer if needed.

Note Select **[Lock]** to re-lock the drawers that have been unlocked, but not opened. If only one drawer was unlocked, it will automatically lock when the drawer is closed.

Caution If all drawers are unlocked, opened, and then closed, you must press **[Lock]** from the front panel. Otherwise, the library will be in a hung state.

Figure 37

Removing/Replacing a Magazine

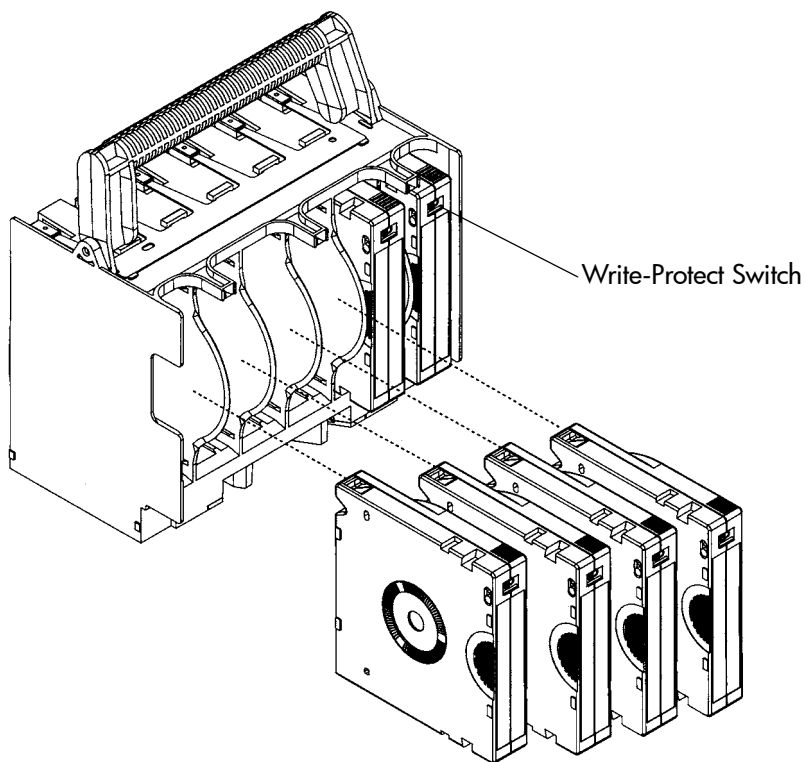


3. Remove the magazine by lifting it straight up with the handle (**Figure 37** on page 82).
4. To remove a tape, set the magazine on its back and grasp the top and bottom corners of a tape. Pull the tape straight out of the magazine.

5. If desired, insert tapes into the magazine. Ensure that you use the appropriate tape type for the magazine.
 - When inserting *Ultrium* cartridges into the tape library magazine, ensure that each cartridge is positioned with the write-protect switch facing out of the magazine and *towards* the magazine handle (**Figure 38**). Push the tape into the slot until it “clicks” into place.

Figure 38

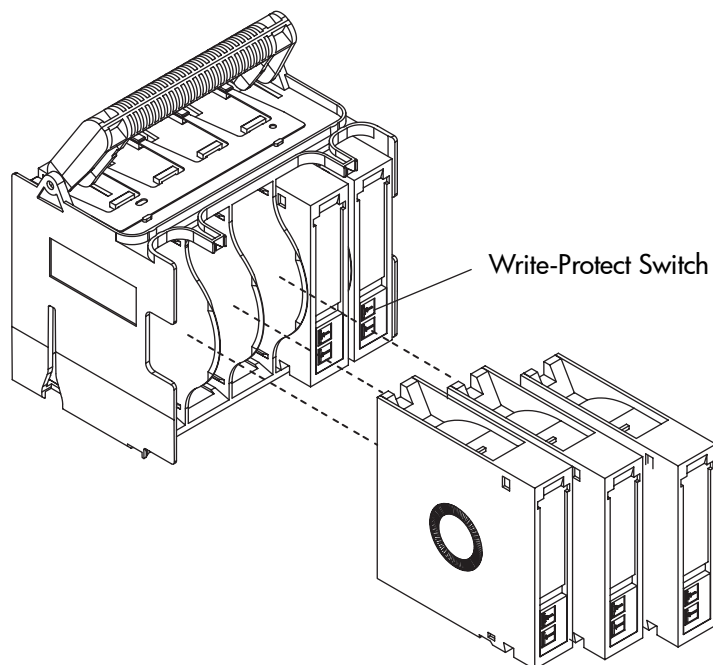
Loading Ultrium Tapes into a Magazine



- When inserting *DLT cartridges* into the tape library magazine, ensure that each cartridge is positioned with the write-protect switch facing out of the magazine and *away from the magazine handle* (**Figure 39**). Push the tape into the slot until it “clicks” into place.

Figure 39

Loading DLT Tapes into a Magazine



6. Reload the magazine into the drawer, and close the drawer. The library will run an inventory check on the contents of that tape drawer.

Note	If the library does not have all magazines, it will report a partial availability message (see Partial Availability State on page 120).
-------------	--

Mailslot Access

Note The mailslot is located in the upper right-hand drawer of the library.

The mailslot can be accessed from the **Operations** sub-menu or from the Home screen.

Main Menu -> Operations -> Mailslot Access

Home Screen -> Mail

1. The **Mailslot Access** screen displays a message indicating the number of tapes in the mailslot and how to open the appropriate drawer.
Open the drawer. The drawer will open only to the number of storage slots that have been configured for the mailslot (see **Configuring the Mailslot** on page 93).
2. Close the drawer. The library automatically detects the closure, locks the drawer, and initiates an inventory check.

Drive and Tape Operations

Main Menu -> Operations -> Drive and Tape Operations

Look at the product information labels on the back of the library and the labels inside each tape drawer for more information about drive and slot numbering. The numbering scheme is also illustrated in **Library Back Panel Features** on page 33.

Note	The "Home" and "Map" front panel screens illustrate the drive, slot, and mailslot numbering schemes. Slot numbers displayed in reverse video indicate those reserved for the mailslot.
-------------	--

Loading a Tape Into a Drive

1. From the **Drive and Tape Operations** menu, select **[Load Tape from Drive]**.
2. Use the [-] or [+] key to select any slot. Only full slots are available for selection.
Select **[OK]**.
3. Use the [-] or [+] key to select the desired drive. You can only select empty drives that are compatible with the tape type.
4. Select **[Load]** to move the tape from a slot to a drive.
A confirmation screen indicates that the tape is loaded.

Unloading a Tape from the Drive

1. From the **Drive and Tape Operations** menu, select **[Unload Tape from Drive]**.
2. Use the **[-]** or **[+]** keys to select the drive you want to unload. You can only select a full drive.
3. Select **[Unload]** to move the tape from the drive to the tape's original location (the slot it occupied before being loaded into the drive). If that slot is occupied, you will be asked to select another slot location.
4. The tape automatically rewinds before it is unloaded. A status screen displays the library's progress as the tape is relocated.
5. From the **Drive and Tape Operations** menu, select **[Menu]** to return to the **Operations** menu.

Cleaning a Drive

Main Menu -> Operations -> Drive and Tape Operations

Note	Use a cleaning cartridge to clean a drive. The drive mechanism should only be cleaned if the <i>clean drive</i> icon displays (see Table 5 on page 62).
-------------	--

Caution	Ensure you use the correct cleaning cartridges for your tape drive. Damage may occur if inappropriate media is used. For more information, refer to Table 36 on page 188.
----------------	--

1. From the **Drive and Tape Operations** menu, select **[Clean Drive]**.
2. From **Choose Cleaning Slot**, use the **[-]**, **[+]** or **[++]** key to select the slot location of the cleaning tape. Refer to the label inside the library drawer, the front panel display, or **Library Back Panel Features** on page 33 for a list of the slot numbers.

Select **[OK]**.

3. Using the **[-]** or **[+]** keys, select the number of the drive to be cleaned.
Select **[Clean]**.

When the cleaning process is complete, the cleaning tape will be returned to the original slot location. If the cycle failed, the screen will display the appropriate status information. See **Troubleshooting Common Problems** on page 140 for possible cleaning problems.

Note	Drives can also be cleaned from remote access. See Using the Remote Management Card on page 96.
-------------	--

Moving Tapes Between Slots

Main Menu -> Operations -> Drive and Tape Operations

1. From the **Drive and Tape Operations** menu, select **[Move Tape Slot-to-Slot]**.
2. Select the slot where you want to move the tape *from* using the **[-]**, **[+]** or **[++]** keys, and press **[OK]**.
3. Select the slot where you want to move the tape *to* using the **[-]**, **[+]** or **[++]** keys, and press **[OK]**. A message will display if the destination slot chosen is reserved or is the original “home” slot for a tape in the drive.

A status screen indicates the tape is being moved.

Library Administration

3

Chapter Overview

This chapter describes the following:

- **Configuring the Library** on page 90
- **Enabling and Changing the Password** on page 92
- **Configuring the Mailslot** on page 93
- **Using the Remote Management Card** on page 96
- **Configuring the Library for Fibre Channel** on page 102
- **Setting SCSI IDs** on page 106
- **Setting the Date and Time** on page 108
- **Retrieving Library Information** on page 110

Configuring the Library

Main Menu -> Administration -> Change Configuration

Note When you reconfigure the library, you may also need to reconfigure your backup software. For more information, consult the documentation provided with your software.

You can change the following configuration options for the library:

Table 11 Configuration Options

Menu Item	Description	Default	Options
Password	See Enabling and Changing the Password on page 92.	Off	On or Off
Network Access	See Using the Remote Management Card on page 96.	DHCP Off	Assign an IP address or use DHCP
Mailslot Configuration	See Configuring the Mailslot on page 93.	One-slot	0 slots, 1 slot, 1 magazine, or 2 magazines
Fibre Channel or SCSI IDs	See Configuring the Library for Fibre Channel on page 102 or Setting SCSI IDs on page 106.	N/A	N/A
Save Element Reserve After a Power Cycle	Allows the host to continue reserving drive or slots after a power cycle (a SCSI element reservation). This is typically used to ensure that only one host can access a slot or drive. See Configuration Information on page 112.	Off	On or Off

Table 11 Configuration Options

Menu Item	Description	Default	Options
Other Configuration Options (see page 112)	■ Report Recovered (Soft) Errors: Reports recovered errors over SCSI.	On	On or Off
	■ Restore Factory Defaults: Restores the default configuration settings (see Table 12 on page 91).	N/A	N/A
	■ Prevent Media Access: Locks the library drawers and prevents front panel access.	Off	On or Off

Factory default configuration settings are listed in **Table 12**.

Table 12 Default Configuration Settings

Description	Setting
Library controller SCSI ID (see page 106)	0
Drives 1-10 SCSI IDs (see page 106)	1-6, 8-11
Clean count (see page 87)	0
Report recovered errors (see page 118)	On
Cleaning cartridge location	Unknown
Mailslot configuration (see page 93)	1
All online drive repair states	Online pending
Prevent media access (see Table 11 on page 90)	Off
Hard error, soft error, drive media, library event, and recovery logs (see page 118)	Cleared
All move stored heights and offsets	Returned to default positions

Enabling and Changing the Password

Note Administration procedures can be password protected. These procedures include: diagnostic tests, configurations, online drive repair, and setting the date and time. A password is also required for administration through the remote management card.

Main Menu -> Administration -> Change Configuration -> Password

When the library is first installed, the password is inactive. To protect the system from unauthorized access, use the following procedure to set a password.

1. Enter the **Password** menu. A status screen will indicate if a password is enabled.
 - If the password is turned off, select **Set New Password** to enable the password.
 - If the password is turned on, select **Change Password** to enter the new password. It must be exactly eight digits.
 - If the password is turned on, select **Turn Password Off** to clear the password.

Note If you enter more than eight digits, the ninth digit will become the first digit of the new password.

2. Select **[OK]** to exit.

Caution Be sure to document the password. If you forget the password, contact your service representative.

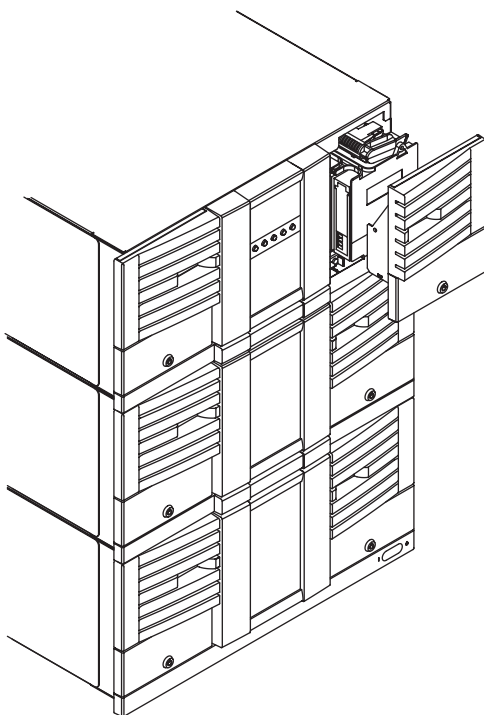
Configuring the Mailslot

The mailslot is used for moving tapes into and out of the library in a controlled manner. Mailslot locations are different than storage locations. Consequently, having a larger mailslot decreases the number of storage locations available in the library. See **Table 13** on page 94.

The mailslot is comprised of magazine locations in the upper right-hand drawer. When a tape is being changed, the drawer opens only to the number of slots that have been configured.

Figure 40

Mailslot Drawer



By default, the library is configured for a one-slot mailslot. This setting can also be configured for 0 slots (no mailslot), 1 slot, 1 magazine, or 2 magazines from the **Administration** or **Service** menus (see **Table 13** on page 94).

Table 13

Mailslot Configuration

Number of Mailslots	Advantages and Disadvantages
0 slots	<p>Magazine access must be used to exchange tapes (see Magazine Access on page 81).</p> <ul style="list-style-type: none"> ■ <i>Advantage:</i> Allows all slots to be used for data storage. ■ <i>Disadvantage:</i> Cannot easily remove or add tapes without an inventory check.
1 slot	<p>A mailslot setting of 1 (one) allows one slot to be designated as the mailslot.</p> <ul style="list-style-type: none"> ■ <i>Advantage:</i> Opens only to the designated slot, which simplifies the manual tape exchange procedure. ■ <i>Disadvantages:</i> Reduces the library's storage capacity by one tape. Also requires more time to import and export multiple tapes.
1 magazine	<p>A mailslot setting of 1 magazine designates an entire magazine as the mailslot.</p> <ul style="list-style-type: none"> ■ <i>Advantage:</i> Provides access to a magazine of tapes, which simplifies the manual tape exchange procedure. ■ <i>Disadvantage:</i> Reduces the library's storage capacity by one magazine.
2 magazines	<p>A mailslot setting of 2 magazines designates an entire drawer as the mailslot.</p> <ul style="list-style-type: none"> ■ <i>Advantage:</i> Provides access to two magazines of tapes, which simplifies the manual tape exchange procedure. Also, if you have more than one drive technology in your library, each magazine could be for a different tape type. ■ <i>Disadvantage:</i> Reduces the library's storage capacity by 2 magazines.

Note When you reconfigure the library, you may also need to reconfigure your backup software. For more information, consult the documentation provided with your software.

Main Menu -> Administration -> Change Configuration -> Mailslot

Note Before changing the mailslot configuration, verify the slots that will become the mailslot are empty and not the original location of a tape in a drive.

Use the following steps to configure the mailslot option.

1. In the **Configure Mailslot** menu, a message will remind you to check the storage slot and mailslot configurations in the backup software.
Select **[OK]**.
2. The next screen will describe the prerequisites for configuring the mailslot. Verify these prerequisites have been met, then select **[OK]**.
3. The display will indicate the current mailslot setting. Select the number of mailslots desired (0 slots, 1 slot, 1 magazine, or 2 magazines). See **Table 13** on page 94 for information about each option.
A confirmation screen automatically displays the success or failure of the change and reminds you to reconfigure the backup software.
4. Select **[Done]** to exit.

Caution Do not change the mailslot setting without reconfiguring your backup software. The backup software must reflect the mailslot setting to assist in tracking tape exchanges and the current location of all tapes. Verify that your backup software supports and reflects the mailslot configuration that you select.

Using the Remote Management Card

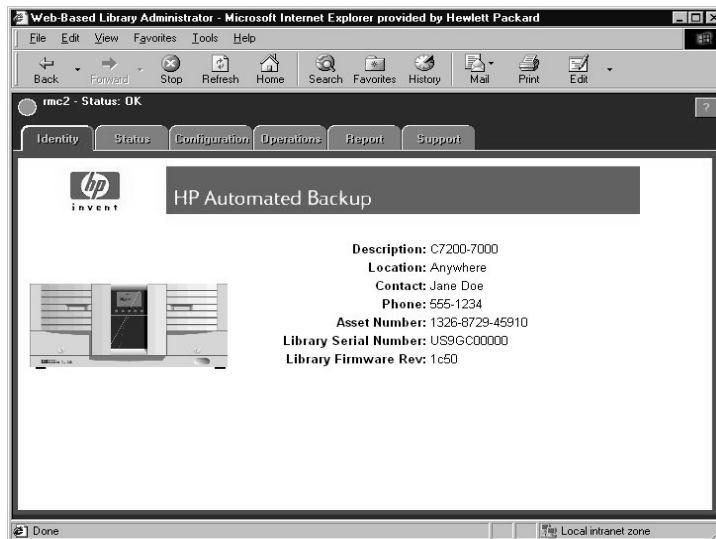
Overview

The remote management card (RMC) includes a Web-Based Library Administrator, which allows web management and monitoring of your library through a network connection. This interface allows you to monitor your library from anywhere on the network through comprehensive and user-friendly web pages. (See **Figure 41**.)

Online instructions are included on the web interface to describe how to use the tool. Simply select the **[?]** key in the upper right-hand corner to access the online help.

Figure 41

RMC Web Interface



The web-based remote management features allow you to obtain status reports and diagnostic information, as well as manage library functions from a remote location. All remote operations are password protected with the administrator password to prevent unauthorized access.

For remote management, you need a network connection and a browser to:

- View the current status of the library, drives, and tapes
- Manage multiple devices from any workstation within the intranet
- Manage and configure the library on your network in a secure environment to:
 - Clean the drives
 - Load and unload tapes
 - Run diagnostics
 - Restart the library
 - Dynamically assign the library's IP address, gateway address, and subnet mask using DHCP or BOOTP mode
- View library, drive, and tape error messages
- Generate error reports to fax or email to your support representative
- Download and install firmware
- Access web-based support, web registration, documentation, and partner information

Dynamic Host Configuration Protocol (DHCP)

DHCP allows a DHCP server to dynamically assign IP addresses to any DHCP client that requests one. The DHCP server usually has a limited set of IP addresses, and assigns them on a first come first serve basis. When a DHCP client boots up, it will broadcast a DHCP request over TCP/IP. If a DHCP server is present, that server will respond to the DHCP client with an IP address, subnet mask and gateway. This response also includes a lease (or expiration) time for the IP address being assigned. If the DHCP client then wants to use this address, the client must acknowledge the server's response, and then periodically renew the lease on that IP address. If the lease expires, the DHCP server is free to re-issue that IP address to another DHCP client.

Note	DHCP only manages dynamic allocation of IP addresses. Assigning device names with DHCP is not recommended.
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BOOTP

BOOTP is similar to DHCP, in that a BOOTP server dynamically assigns an IP address to any BOOTP client that requests one. The difference is that your system administrator must preconfigure the BOOTP server for the library. The system administrator assigns a permanent IP address to the library's MAC address. When the library is booted, the BOOTP server responds and assigns the permanent address to the library. The IP address never expires and the BOOTP server will not reissue the IP address to any other BOOTP client.

Management Programs

In addition to using your browser directly to manage your library, you can also use popular management programs, such as HP OpenView, HP Top Tools, and CA Unicenter TNG. In order to best use HP OpenView and CA Unicenter TNG, you must download a plug-in from the HP Customer Care website at <http://www.hp.com/go/support>. This plug-in can be easily installed in your environment. HP Top Tools has built-in native support for your library, and no plug-in is required.

Table 14

Supported Configurations

Description	Supported Configurations
Browsers	<ul style="list-style-type: none">■ Windows 95/98/2000/NT: Internet Explorer™ 4.01 and higher, Netscape Communicator™ 4.5 and higher, and Netscape Navigator™ 4.08 and higher.■ HP-UX: Netscape Communicator™ 4.5 and higher and Netscape Navigator™ 4.08 and higher. Internet Explorer™ is not supported.■ Sun Solaris: Netscape Communicator™ 4.5 and higher and Netscape Navigator™ 4.08 and higher. Internet Explorer™ and HotJava™ are not supported.

Configuring the Remote Management Card

The library only requires one remote management card, which will already be installed when the library arrives.

Note The library administrator password is required for this process. If the password is not set, you can view information but will not be permitted to configure your remote management card from your web browser. (See **Enabling and Changing the Password** on page 92.)

1. Connect to the network port of the card using a category 5 ethernet cable. Ensure that the cable is also connected to an active network port.
2. On the library's back panel, verify that the link LED on the remote management card is green. If the LED is not green, a link has not been established with the local network. Ensure the network port is active by checking with your system administrator. (See **Table 20** on page 133 for a description of the LEDs.)
3. Enter the **Network Access** menu.

Main Menu -> Administration -> Change Configuration -> Network Access

4. If you would like to use DHCP/BOOTP to configure your remote management card, select **[Yes]**. (See **Dynamic Host Configuration Protocol (DHCP)** on page 97 or **BOOTP** on page 98.)
 - A message will display to confirm your configuration through DHCP/BOOTP, or alert you if DHCP/BOOTP failed.
 - If successful, note the IP address, and skip to step 9.
 - If DHCP/BOOTP was not successful, or if you do not want to use DHCP/BOOTP, contact your system administrator to obtain an IP address, subnet mask, and gateway address. Continue with step 5.

Note	The MAC address is unique to each remote management card and is used for identification. This address cannot be configured. To successfully use BOOTP from the library, your system administrator must first configure the BOOTP server using the MAC address. (See BOOTP on page 98.)
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5. Enter the IP Address.
Use the **[+]** key to change the number.
Use the **[->]** key to move to the next number.
Use the **[Down]** key to move to the next address.
6. Enter the subnet mask using the same procedure.
7. Enter the gateway address.
8. Press **[OK]** when complete to save the changes, or press **[Quit]** to exit the menu and not save the changes. A message will display to confirm the changes you have entered or alert you if the changes have not been saved.
9. Enter the designated IP address into the web browser to launch the Web-Based Library Administrator pages.

Example 1 - All modes (Manual, DHCP, or BOOTP):

IP address = 15.28.33.12

http://15.28.33.12

Example 2 - Manual and BOOTP only:

Device name = library1

http://library1

Note	To use a device name, your system administrator must add the device name you select to the domain name server (DNS).
-------------	--

Note	Instructions and online help screens describing remote management are available from the Web-Based Library Administrator pages by selecting the [?] button in the top right-hand corner of any page.
-------------	---

Retrieving Information about the Remote Management Card

Enter the **Information** menu to view the following remote management card settings:

Main Menu -> Information -> View Configuration -> Network Access

- Network connection speed
- IP address
- Subnet mask
- Gateway address
- MAC address

Configuring the Library for Fibre Channel

Note	When you reconfigure the library, you may also need to reconfigure your backup software. For more information, consult the documentation provided with your software.
-------------	---

The optional Fibre Channel controllers in the library serve as a bridge between SCSI and Fibre Channel.

Note	It is not necessary to connect the library to its Fibre Channel topology (arbitrated loop or fabric) before configuration.
-------------	--

Configuration

Note	When Fibre Channel controllers are installed in the library, device SCSI IDs cannot be changed from their factory default.
-------------	--

Though you do not need to set SCSI IDs for Fibre Channel, you will need to configure Fibre Channel addressing.

Main Menu -> Administration -> Change Configuration -> Fibre Channel
--

1. Enter the **Fibre Channel** menu.
2. Select the level where the Fibre Channel controller you want to configure is located.
Use the **[-]** key to select a lower level in the library.
Use the **[+]** key to select a higher level in the library.
Select **[OK]** if the level is correct.
3. A message displays the following information:
 - Fibre Channel controller type (LVD or HVD SCSI)
 - SCSI bus statusSelect **[MORE]**.

4. A message displays information for the **CURRENT STATUS**, including:
 - Link status
 - Connection type (loop or fabric)
 - AL_PA (Arbitrated Loop Physical Address) for loop connections, or a hex address for fabric connections
 Select **[MORE]**.
5. A message displays information for the **CURRENT SETTINGS**, including the addressing assignment method (hard or soft) and the AL_PA for loop connections.

Select **[MORE]**.
6. A message displays information for the **FUTURE SETTINGS**. This allows you to input the addressing assignment method and AL_PA that you want to use at a later time, without affecting your current connection. *(Changes to the **FUTURE SETTINGS** will take effect on the next power up or board reset.)*

Note For multi-level libraries, settings can be changed simultaneously for each level of the library by changing the **FUTURE SETTINGS** and then power-cycling the library.

- The default addressing is hard addressing with auto-select enabled. Hard addressing allows you to set and maintain a fixed address, but may result in address conflicts. Soft addressing looks for an unused address on every power cycle, so the address might change.

Note Since AL_PAs can change with soft addressing, some backup software applications and operating systems may have difficulty locating the library in this mode. Check the backup software documentation to ensure soft addressing is supported before selecting this mode.

- If you selected hard addressing for a loop connection, select the AL_PA (fixed address) or choose auto-select. Auto-select is an option under hard addressing that automatically selects an available address and then uses it as a hard address from then on.

7. Press **[OK]** when complete to save the changes, or select **[QUIT]** to return to the beginning of the fibre configuration menu. If you select **[QUIT]**, a message will display indicating the old values will be retained.

If you select **[OK]**, a message will display indicating that the settings are being stored onto the Fibre Channel controller. If this is successful, a message displays indicating that the new settings will be attempted *at the next restart*.

8. To immediately apply the new settings, select **[RESTART]**, or select **[DONE]** to wait until the next power cycle.

When the Fibre Channel controller is restarted, or when the library is power-cycled, **FUTURE SETTINGS** are copied into **CURRENT SETTINGS**. The Fibre Channel controller always attempts to connect using **CURRENT SETTINGS**.

If you select **[RESTART]**, the Fibre Channel controller is restarted. *This should not be attempted if data transfers or library operations are in progress.* The **[RESTART]** operation normally completes within 90 seconds. The display will report the status of the operation when it is complete.

Note	The actual connection achieved depends on the external topology and network. Consequently, CURRENT STATUS may differ from CURRENT SETTINGS .
-------------	--

Note	You can also change configuration from remote access. See Using the Remote Management Card on page 96.
-------------	---

Retrieving information about Fibre Channel

Enter the **Information** menu to view information such as:

- Fibre Channel interface or SCSI interface type (LVD or HVD)
- SCSI bus status
- Current status (link status, connection type, address)
- Current settings (addressing assignment method, AL_PA)
- Future settings (addressing assignment method, AL_PA)
- World wide node name
- World wide port name

Setting SCSI IDs

Main Menu -> Administration -> Change Configuration -> SCSI IDs

Note This menu is unavailable for libraries using Fibre Channel because the SCSI IDs are configured automatically.

Table 15

Default SCSI IDs

Device ^a	SCSI ID
Library controller	0
Drive position 1	1
Drive position 2	2
Drive position 3	3
Drive position 4	4
Drive position 5	5
Drive position 6	6
Drive position 7	8
Drive position 8	9
Drive position 9	10
Drive position 10	11

a. The number of drives depends on the library model.

Note Each device on the same SCSI bus must have its own unique SCSI ID. SCSI ID 7 is not used as the default for drive position 7 because it is typically used by the host computer.

Caution Changing SCSI ID settings from factory defaults may affect the backup software configuration. Consult your backup software manual for SCSI ID requirements.

The SCSI ID for a drive position can be configured, even when no drive is present. When a drive is later added, it will use the ID already assigned to that location.

1. Enter the **SCSI IDs** menu. A message warns you that devices with the same SCSI IDs must be connected to different SCSI buses.
Select **[OK]**.
2. The **Configure SCSI ID** screen displays a message that indicates the drive position selected.
Use the **[-]** or **[+]** key to select the drive or library controller, then select **[OK]**. Refer to **Library Back Panel** on page 33 or the product information labels on the back of the library for the library's drive numbering arrangement.
3. The next screen displays the drive number and the current SCSI ID.
Use the **[-]** or **[+]** key to select the desired SCSI ID, then select **[OK]**.
4. A confirmation screen will indicate either a successful or failed operation. If the SCSI ID assignment failed, the screen will indicate the reason and then return to the **Configure SCSI ID** screen.

Note After changing SCSI IDs, you can save the new settings to flash ROM by power cycling the library, which allows the settings to be recovered if the library is powered off for more than eight days. If this step is not completed and the library is powered off for more than eight days, the new settings may be lost.

Note You can also set SCSI IDs from remote access. See **Using the Remote Management Card** on page 96.

Setting the Date and Time

Main Menu -> Administration -> Set Date and Time

When the library is initially set up, or if it has been disconnected for more than eight days, you need to set the date and time. If the date and time are not set, logs will not include date and time stamps. To set the date and time, enter the **Administration** menu. If you want to only view the date and time, enter the **Information** menu.

To set the date and time:

1. Enter the **Set Date & Time** menu.
2. Use the [-] or [+] keys to select the year, month, and day. Use the [->] to scroll to the next entry when complete.
3. Set the hour and minutes (00:00:00) using the [+] or [-] keys. Use the [->] key to scroll over to the next selection. The seconds are automatically set at 00.
4. Use the [-] or [+] keys to select the time zone. **UTC** stands for Coordinated Universal Time. (See **Table 16** on page 109.) This will keep your host time and library time synchronized.
5. Press **[OK]** to save your changes. Press **[Quit]** to exit this menu and not save your changes.

Note	The time does not automatically adjust for time changes such as daylight savings time and is accurate to within one hour per year. Occasional adjustment is normal.
-------------	---

Table 16 **World Time Zones**

UTC -12	Eniwetok, Kwajalein
UTC -11	Midway Island, Samoa
UTC -10	Hawaii
UTC -9	Alaska
UTC -8	Pacific Time (US and Canada), Tijuana
UTC -7	Mountain Time (US and Canada), Arizona
UTC -6	Central Time (US and Canada), Saskatchewan, Mexico City, Tegucigalpa
UTC -5	Eastern Time (US and Canada), Bogota, Lima
UTC -4	Atlantic Time (Canada), Caracas, La Paz
UTC -3	Brasilia, Buenos Aires, Georgetown
UTC -2	Mid-Atlantic
UTC -1	Atlantic Ocean
UTC	Great Britain, Lisbon, Monrovia, Casablanca
UTC +1	Berlin, Stockholm, Rome, Bern, Brussels, Vienna, Paris, Madrid, Amsterdam, Prague, Warsaw, Budapest
UTC +2	Athens, Helsinki, Istanbul, Cairo, Eastern Europe, Harare, Pretoria, Israel
UTC +3	Baghdad, Kuwait, Nairobi, Riyadh, Moscow, St. Petersburg, Kazan, Volgograd
UTC +3:30	Tehran
UTC +4	Abu Dhabi, Muscat, Tbilisi
UTC +4:30	Kabul
UTC +5	Islamabad, Karachi, Ekaterinburg, Tashkent
UTC +5:30	Mumbai, Calcutta, Madras, New Delhi, Colombo
UTC +6	Almaty, Dhaka
UTC +7	Bangkok, Jakarta, Hanoi
UTC +8	Beijing, Chongqing, Urumqi, Hong Kong, Perth, Singapore, Taipei
UTC +9	Tokyo, Osaka, Sapporo, Seoul, Yakutsk
UTC +9:30	Adelaide, Darwin
UTC +10	Brisbane, Melbourne, Sydney, Guam, Port Moresby, Vladivostock, Hobart
UTC +11	Magadan, Solomon Is., New Caledonia
UTC +12	Fiji, Kamchatka, Marshall Is., Auckland, Wellington

Retrieving Library Information

The following information is available from the **Information** and **Administration** menus:

- Library information
- Drive information
- Configuration information
- Date and Time
- Firmware revisions
- Power supplies

Note	This information is also available from remote access. See Using the Remote Management Card on page 96.
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Library Information

Main Menu -> Information -> Library Information

Use the following procedure to view information about the library. **Table 17** on page 111 explains each option.

1. From the **Library Information** menu, select one of the following options:
 - Library Status
 - Hard Error Log
 - Recovered (Soft) Error Log
 - Odometer
 - Identity
2. Select **[Back]** to return to the **Library Information** menu.

Table 17

Library Information

Menu option	Information
Library Status	Displays information about the overall status of the library and any partial availability flags. (See page 120 .)
Hard Error Log (see page 126)	Displays a history of unrecovered errors. Returns a message indicating that there are no hard errors, or provides an error entry. Use the [Older] or [Newer] keys to select an entry.
Soft (Recovered) Error Log (see page 118)	Displays a history of recovered errors (errors that were resolved by one or more automatic retries). Returns a message indicating that there are no soft entries or supplies an error entry. Use the [Older] or [Newer] keys to select an entry.
Odometer	Displays a count of cumulative power-on hours and drive loads. Note: <i>This option is available for DLT tape libraries only.</i>
Identity	Displays the library's serial number.

Drive Information

Main Menu -> Information -> Drive Information

1. From the **Drive Information** menu, use the [-] or [+] keys to select the desired drive module.
2. Select **[OK]** to display and select one of the following options:
 - **Event Log:** Displays significant events for the selected drive position, including drive errors, online/offline transitions, and drive cleaning.

Note This log is still available while a drive is being removed.

- **Odometer:** Displays a count of cumulative power-on hours and drive loads. (This option is available for DLT tape libraries only.)
- **Identity:** Displays the drive type, serial number, and firmware revision.

Configuration Information

Main Menu -> Information -> View Configuration

From the **View Configuration** menu, select the desired library function to view current information about the following. (See **page 91** for factory defaults.)

- Password enabled status
- Network access configuration
- Mailslot configuration
- SCSI ID assignments or Fibre Channel status
- Save SCSI element reserve after a power cycle
- Other configuration options (report recovered error logs and prevent media access)

Date and Time

Main Menu -> Information -> Date and Time

Access this menu to view the library's settings for the date, time, and time zone. Use the **[Powered]** key to display the date and time of the last power on. (See **page 108** for setting the date and time.)

Firmware Revisions

Main Menu -> Information -> Firmware Revisions

From the **Firmware Revisions** menu, you can view information about the following (see **page 176** for upgrading firmware):

- Library
- Tape drives
- Fibre Channel

Power Supplies

Main Menu -> Information -> Power Supplies

From the **Power Supplies** menu, you can view information about the status of your power supply and whether or not your library contains a redundant power supply.

Troubleshooting and Diagnostics

4

Chapter Overview

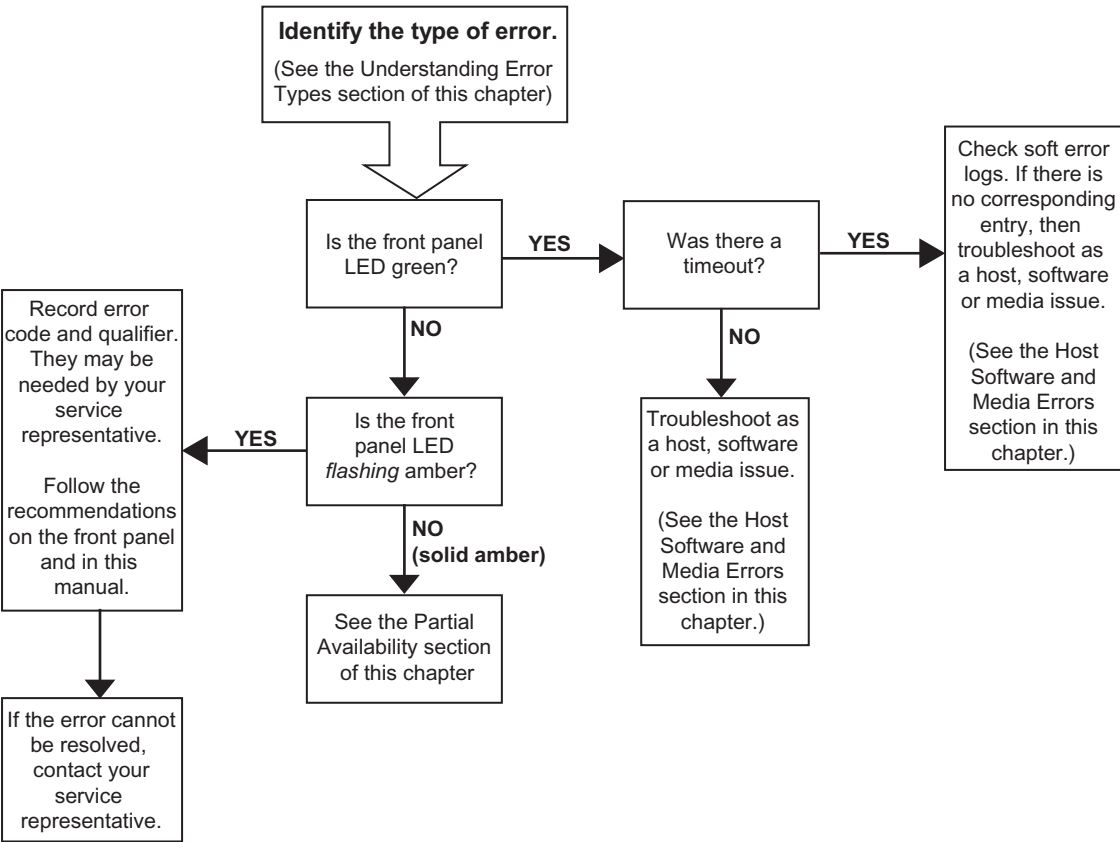
This chapter includes information on the following:

- **Troubleshooting Overview** on page 116
- **Understanding Error States** on page 118
- **Interpreting Library LEDs** on page 130
- **Troubleshooting Common Problems** on page 140
- **Diagnostic Support Tools** on page 154

Troubleshooting Overview

Below is an overview of the troubleshooting process. More detailed information is provided on the following pages.

Figure 42 Troubleshooting Overview

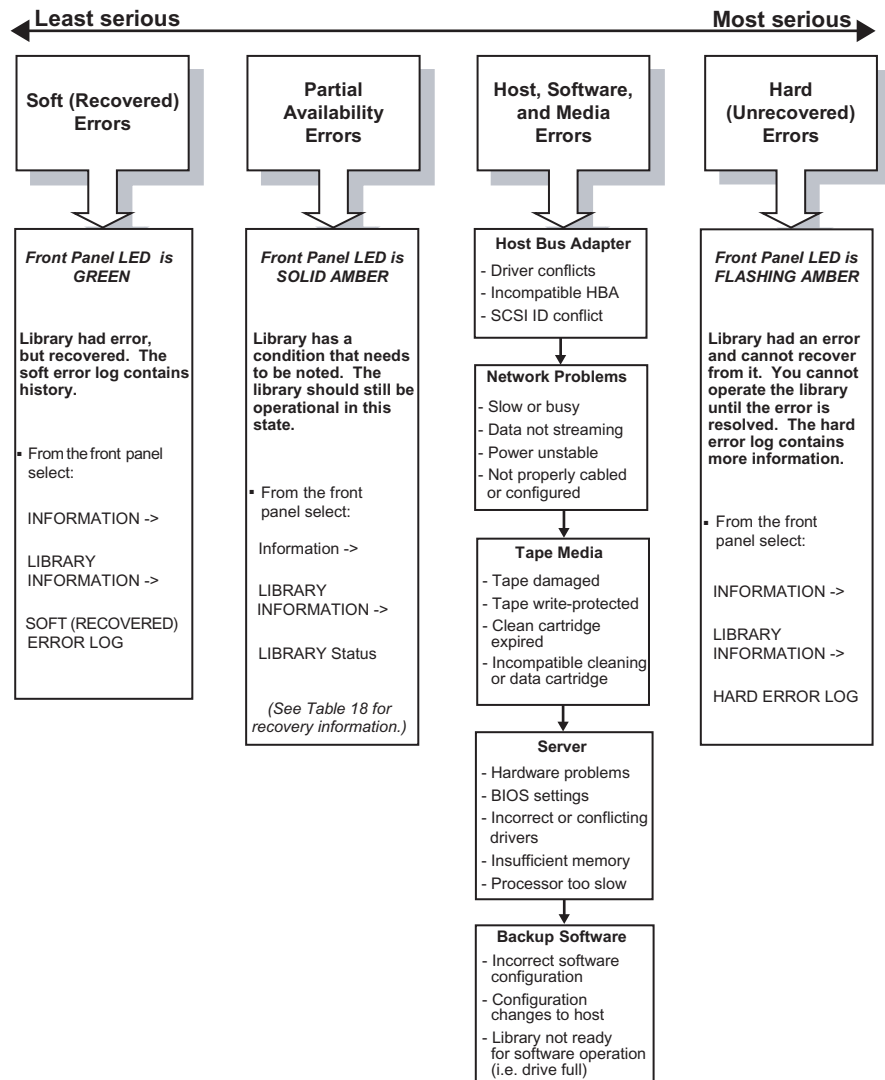


Understanding Error Types

There are several categories of errors that might occur when you are using your library. Each error category has a different troubleshooting process, which is described in more detail later in this chapter.

Figure 43

Error Types



Understanding Error States

This section describes the difference between the following types of errors:

- **Soft (Recovered) Errors** on page 118
- **Partial Availability State** on page 120
- **Hard (Unrecovered) Errors** on page 126
- **Host Software and Media Errors** on page 128

Soft (Recovered) Errors

Soft errors are hardware errors that the library recovered from by retrying the operation. Though they are often transparent to a user, the time required to complete the operation may be noticeably longer.

Main Menu -> Information -> Library Information -> Soft (Recovered) Error Log

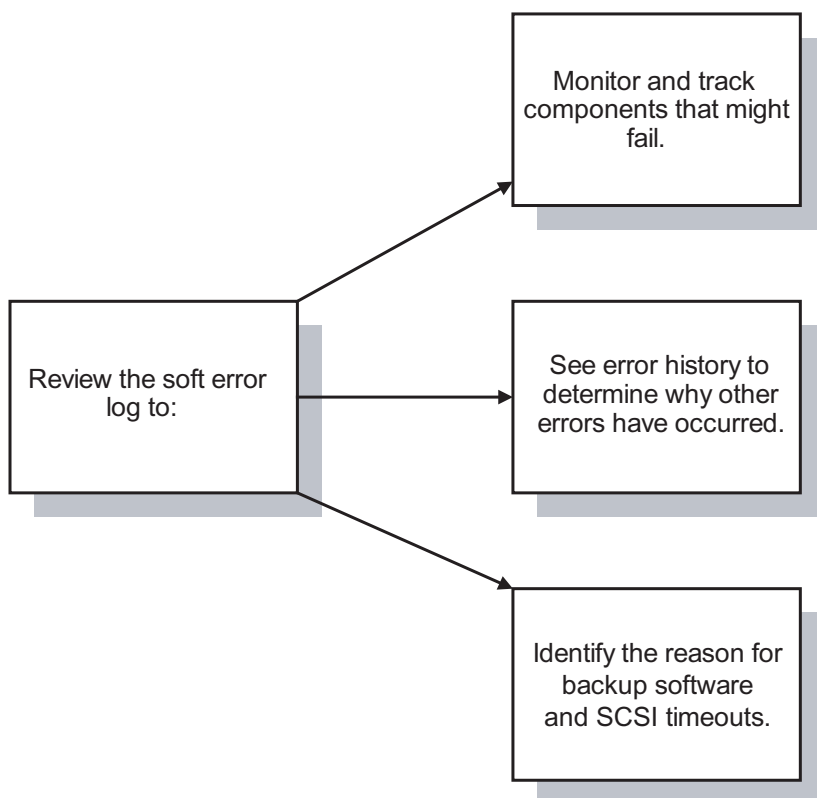
Periodically review the soft error log to detect and track errors before they become serious. If you see that a component has many soft errors, it might indicate a library component that is wearing out or will fail in the future. If the library has a hard error and you are unsure what caused it, you can review the soft error log to help identify problem areas.

You can also use soft errors to identify the cause of software time-outs. The backup software on the host computer only allows a designated time for each operation. If the library takes longer than the backup software allows, it may be due to the library retrying a failed operation, which will be logged as a soft error.

Note	The date and time stamp will help you resolve errors by establishing a timeline of when events occurred.
-------------	--

Figure 44

Using the Soft Error Log



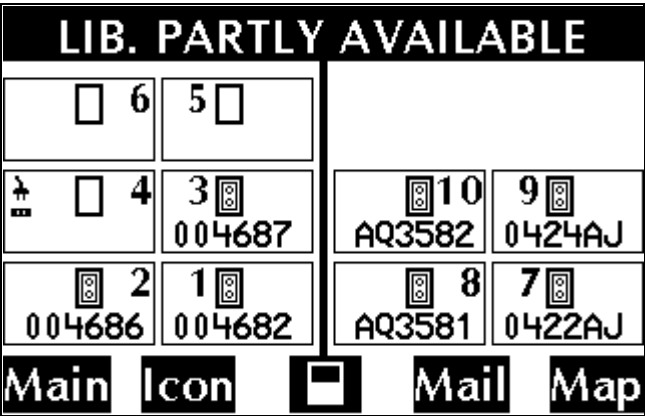
Partial Availability State

Note A partial availability state is most commonly an indication of a configuration issue and does not necessarily indicate a hardware failure.

When the library is in a partial availability state, it is still functional, but is not in an optimum or supported configuration, as described in **Table 18** on page 121. When this occurs, the front panel will display **Partly Available**, and the illuminated bar beneath the front panel display will be solid amber until the condition is resolved. See **Figure 45** for an example of how the partial availability state appears from the Home Screen. The front panel uses the term “Partly Available” due to display size limitations.

Figure 45

Partial Availability State



The center icon button on the Home screen is a shortcut to the **Library Status** menu and partial availability information. This icon, as well as the icon on the status bar, shows a reverse video reminder (icon background reverses to black) when the library’s partial availability status changes. You may clear this reminder by viewing the **Library Status** screen.

To view more information about the partial availability error, you can access the log by following this menu path:

Main Menu -> Information -> Library Information -> Library Status

The partial availability state is caused by one of the conditions listed in **Table 18** on page 121. The condition will be displayed on the library front panel or the RMC Web-Based Library Administrator pages

Table 18 **Partial Availability Conditions**

Library Status	Cause	Solution
Drives		
Drive not present	<p>The library could not detect all the expected drive modules.</p> <p>Note: This typically occurs because a drive was physically removed from the library. This may also occur for a brief time during an online drive repair. This condition will persist over a power cycle.</p>	<p>If a drive is present in the library:</p> <ul style="list-style-type: none"> ■ Power off the library. ■ Reseat the drive module. ■ Power on the library. ■ Contact your service representative.
Drive offline	<p>Drive taken offline because of the following:</p> <ul style="list-style-type: none"> ■ Taken offline from front panel, host computer, or library controller. ■ Drive(s) failed power-on test. ■ Drive module board failed power-on test. ■ Failed serial communication to drive. ■ Failed to load/unload tape. 	<ul style="list-style-type: none"> ■ Verify that the drive is online. If not, put drive back online from the front panel. ■ Power cycle the library. ■ Verify cabling and termination. ■ Verify that the drive is seated properly. ■ Check the error log from the front panel or RMC Web-Based Library Administrator pages for possible causes. ■ Contact your service representative.

Table 18 Partial Availability Conditions

Library Status	Cause	Solution
Drive online pending	Drive(s) are present and powered up, but have outdated firmware.	<ul style="list-style-type: none"> ■ Update drive firmware. (See Upgrading Firmware on page 176.)
Drive firmware mismatch	Drives are present and powered up, but have different revisions of firmware.	<ul style="list-style-type: none"> ■ Update drive firmware. (See Upgrading Firmware on page 176.)
Drive needs cleaning	One or more drives need cleaning.	<ul style="list-style-type: none"> ■ Clean the drive(s). (See Cleaning a Drive on page 87.)
Drive critical error	A critical error has occurred on a drive.	<ul style="list-style-type: none"> ■ Check the Drive Event Log from the front panel or RMC Web-Based Library Administrator pages for possible causes. ■ Contact your service representative.
Drive not on Fibre Channel	Drive(s) are detected by library controller, but are not detected by any of the Fibre Channel controllers.	<ul style="list-style-type: none"> ■ Verify that Fibre Channel is your intended configuration. ■ Verify that cabling is set up correctly. ■ Verify that there are no broken or bent pins on the SCSI cables (for standard performance Fibre Channel controller only). ■ Tighten all SCSI cables and power cycle the library. ■ If problem persists, replace the SCSI cables. ■ Contact your service representative.

Table 18 Partial Availability Conditions

Library Status	Cause	Solution
Magazine/Mailslot		
Magazine(s) missing	Library could not detect all the magazines.	<ul style="list-style-type: none"> ■ Ensure that all magazines are present and correctly installed. (See Figure 37 on page 82.)
Incompatible magazine(s)	The magazine is incompatible with the drive type.	<ul style="list-style-type: none"> ■ Ensure that you use the correct magazine for your drive type.
Mailslot open	Mailslot drawer is open. The library robotics will not move until the mailslot is closed.	<ul style="list-style-type: none"> ■ Ensure that the mailslot drawer is closed.
Cards		
RMC not present	Library could not detect the remote management card.	<ul style="list-style-type: none"> ■ Power cycle the library. ■ Contact your service representative.
Slave card not present	<p>Library could not detect the library slave controller cards.</p> <p>Note: Slave controller cards are required in all but the lowest level of the library.</p>	<ul style="list-style-type: none"> ■ Verify that there is a slave card present in all but the lowest level of the library. ■ Verify that the cards are properly seated. ■ Power cycle the library. ■ Contact your service representative.
Remote management card failed	Remote management card failed power-up test.	<ul style="list-style-type: none"> ■ Power cycle the library. ■ Contact your service representative.

Table 18 **Partial Availability Conditions**

Library Status	Cause	Solution
Slave card failed	Library slave controller card failed power-up test. Note: Slave controller cards are required in all but the lowest level of the library.	<ul style="list-style-type: none"> ■ Verify that a slave card is present in all but the lowest level of the library. ■ Verify that the cards are properly seated. ■ Power cycle the library. ■ Contact your service representative.
Fibre Channel controller failed	Fibre Channel controller failed power-up test. (Usually due to problems on the SCSI bus, such as an LVDS drive or terminator on an HVDS bus, etc.)	<ul style="list-style-type: none"> ■ Verify that proper SCSI terminators and/or tape drives are attached to the Fibre Channel controller. ■ Verify that there are no bent pins on the controller. ■ Power cycle the library. ■ Contact your service representative.
Front Panel		
Front panel not present	Library could not detect the front panel display.	<ul style="list-style-type: none"> ■ Power cycle the library. ■ Contact your service representative.
Front panel failed	Front panel display failed power-up test.	<ul style="list-style-type: none"> ■ Power cycle the library ■ Contact your service representative.
Miscellaneous		
Date and time not set	The date and time is not set on the front panel	■ Set the date and time. (See Setting the Date and Time on page 108.)
Door open	One or more tape doors are open. The library robotics will not move until the door is closed.	■ Ensure that doors are closed.

Table 18 **Partial Availability Conditions**

Library Status	Cause	Solution
Power supply fault	Library detected one or more redundant power supplies in a failed condition.	<ul style="list-style-type: none"> ■ Determine which power supply has failed. (See Table 26 on page 139 for LED status information.) ■ Contact your service representative to replace the power supply.
Library fan failure	A library card cage fan has failed.	<ul style="list-style-type: none"> ■ Power cycle the library. ■ Contact your service representative.
Upgrade library firmware	<p>A library component has firmware that is different from the rest of the library.</p> <p>Note: This is a common problem when replacing parts.</p>	<ul style="list-style-type: none"> ■ Update library firmware. (See Upgrading Firmware on page 176.)

Hard (Unrecovered) Errors

When a hard error occurs, the front panel will display an error message that indicates the problem, and the LED bar will be flashing amber. You cannot operate the library until this error is resolved.

Note This information can also be found in the latest entry of the hard error log. For a list of error codes, see **Library Error Codes** on page 209.

View the hard error log after the initial error has been cleared. You can do this by accessing the following menu path from the front panel or press the center icon button.

Main Menu -> Information -> Library Information -> Hard Error Log

Note The date and time stamp will help you resolve errors by establishing a timeline for the failures. Failures can also be associated with events that may have occurred outside of the library. When you review the error log, select **[Older]** to view error history and **[Newer]** to see more recent errors.

Error information includes:

- Time stamp or error event
- Error code number(s)
- Library component that *potentially* caused the problem
- Error code description
- Error code qualifier that provides more information on the type of error
- Recovery suggestions
- Sequence numbers, which are used for factory diagnostics

Use the following steps to resolve the problem:

1. From the screen with the initial error message or from the **Hard Error Log**, select **[More]** to retrieve more information about the error.
2. Record all information from this screen for later reference.
3. Select **[More]**. Record the list of recommendations on this and any subsequent screens. To retrieve this information after you exit, view the latest entry in the hard error log.
4. Perform the recommendations in the order presented. Continue with each successive recommendation until the problem is isolated. Here are some examples of the types of recommendations:
 - Power cycle the library.
 - Remove a tape from the library.
 - Check the library or host configuration.
 - Check the cable connections (data or power).
 - Run front panel diagnostic tests.
 - Reposition a tape or magazine.

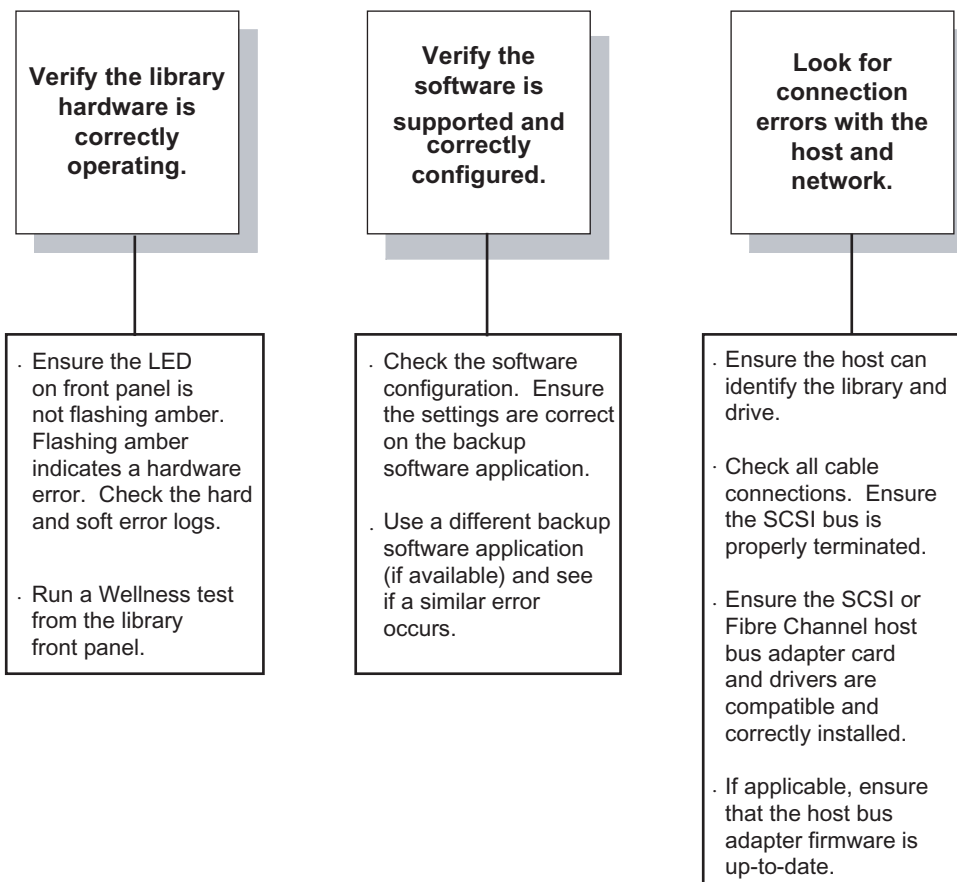
Caution Before upgrading firmware, be sure to generate a support ticket using HP Library & Tape Tools (see **page 154**). The resulting information may be helpful to your service representative in resolving potential issues that may have prompted the firmware upgrade.

- Upgrade firmware.
5. If the problem persists after implementing all of the recommendations presented on the front panel display, contact your service representative. (See **page 195**.)

Host Software and Media Errors

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

Use the following troubleshooting procedures to help determine if an error is caused by the library hardware, host, or backup software.



Backup Software Errors

While the library product itself is supported by Hewlett-Packard, all software products are supported by individual software vendors. (See **Backup Software Support** on page 201.)

Your software applications may need to be reconfigured or, in some cases, reinstalled after you have installed additional drives or slots into the library. In addition, some backup software applications may require the purchase of additional add-on components and/or licenses when increasing the number of storage slots or drives.

Contact your software application provider for more information or if newly installed storage slots and drives are not recognized by your backup software application.

Interpreting Library LEDs

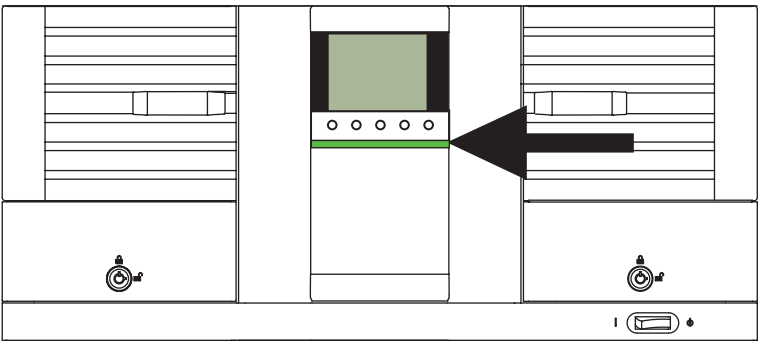
LEDs communicate status and errors as they are occurring. Use the library LEDs to get an indication of how the library is functioning.

All library cards and drive modules contain LEDs. In general, a yellow LED comes on during power up and changes to green when power up is successful. This may take a few minutes on some library cards.

The LED bar underneath the front panel display indicates library activity.

Figure 46

Library LED Bar

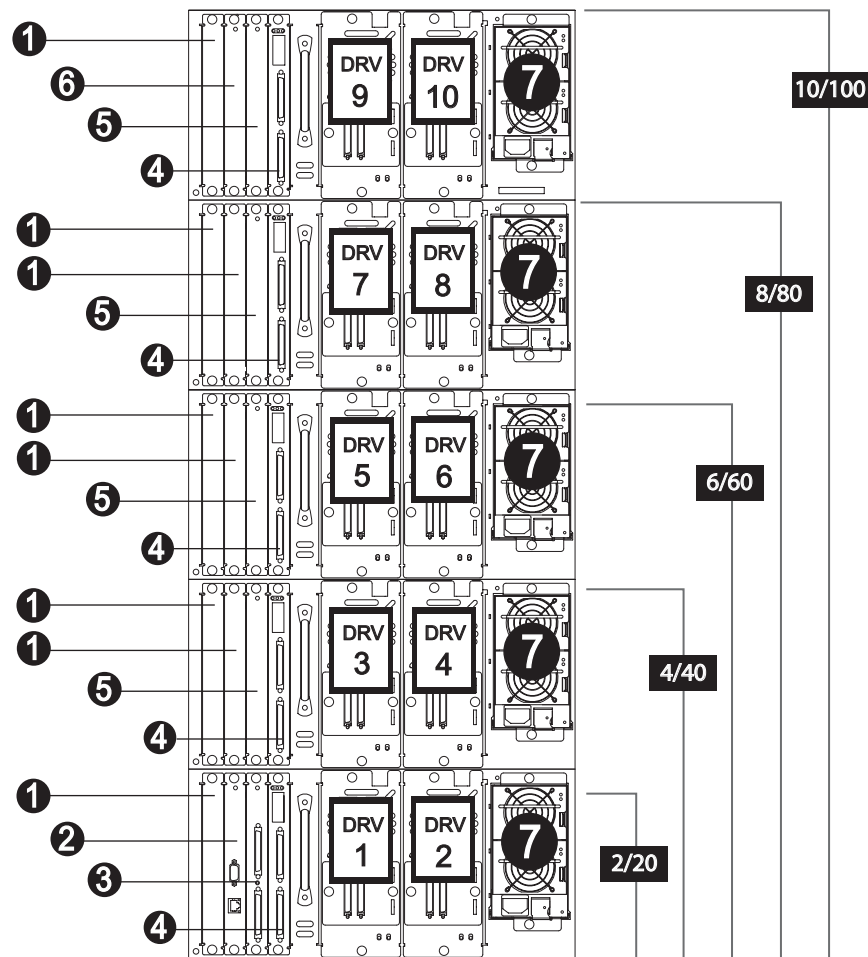


Green	Library is ready and idle.
Flashing Green	Library or drive is active.
Amber	Library is partially available and idle (Partial Availability State on page 120).
Flashing Amber	Library failed (Hard (Unrecovered) Errors on page 126).

Note **Figure 47** on page 131 shows where components that contain LEDs are located. These LEDs are described later in this chapter.

Figure 47

Library Back Panel



1	Vacant slot	5	Slave controller card
2	Remote management card	6	Library expansion card
3	Library controller card	7	Power supply (standard or redundant)
4	Fibre Channel interface (optional)		

Table 19

Slave Controller LED


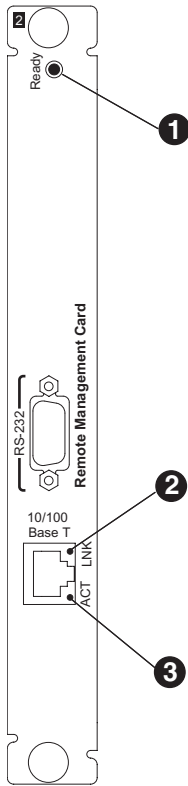
Ready LED		
Color	Description	
Yellow	Default boot mode on power-up. Will remain in this state until board completes initialization.	
Green	Slave controller board is ready.	

Table 20

Remote Management Card LEDs

1) Ready LED	
Color	Description
Yellow	Powering up, failed power-on test, or fatal error was detected during operation.
Green	Card passed power-on test. Card ready.
2) Link LED	
Color	Description
Green	Indicates valid network connection.
3) Activity LED	
Color	Description
Flashing Green	Indicates transmission activity by the card's ethernet port.



The diagram illustrates the physical layout of the Remote Management Card. It is a vertical card with several components labeled. At the top, there is a circular LED labeled 'Ready' with a callout '1'. Below this is an RS-232 port labeled 'RS-232'. Further down is a 10/100 Base T Ethernet port. To the right of the Ethernet port, there are two LEDs: one labeled 'LINK' with a callout '2' and another labeled 'ACT' with a callout '3'.

Table 21

HVDS Library Controller Card LEDs

1) Controller LED	
Color	Description
Flashing Green	Controller needs firmware.
Yellow	In the process of powering up.
Flashing Yellow	Controller failed power-on test.
Green	Controller passed power-on test.
2) SCSI LED	
Color	Description
Green	No bus connected or high-voltage differential SCSI bus connected.
Yellow	Error; single-ended SCSI device connected.

The diagram shows a vertical HVDS Library Controller Card. At the top, there is a circular LED labeled 'Ready' with a callout '1'. Below it, there is a long, narrow rectangular LED labeled 'Library Controller Card' with a callout '2'. To the left of the SCSI LED, there are labels for 'Differential SCSI' and 'HVDS' with arrows pointing to the corresponding ports on the card.

Table 22

LVDS Library Controller Card LEDs

1) Controller LED	
Color	Description
Flashing Green	Controller needs firmware.
Yellow	In the process of powering up.
Flashing Yellow	Controller failed power-on test.
Green	Controller passed power-on test.
2) SCSI LED	
Color	Description
Green	No bus connected or low-voltage differential SCSI bus connected.
Flashing Green	Single-ended SCSI bus attached. SCSI performance reduced.
Yellow	Error; high-voltage differential SCSI bus connected.

The diagram shows a vertical controller card. At the top, there is a circular LED labeled 'Ready' with a callout '1'. Below it, there is a rectangular LED labeled 'Differential SCSI' with a callout '2'. The card is labeled 'Controller Card' and 'LVDS'.

Table 23

Library Expansion Card LED (8/80 and 10/100 Series Libraries Only)


Ready LED		
Color	Description	
Yellow	Powering up, hardware error, or card located on an unsupported level of the library.	
Green	Card is ready.	
Flashing Green	Indicates internal library communication bus activity.	

Table 24

High-Performance Fibre Channel Interface (HVDS or LVDS)

1) Activity LED	
Color	Description
Flashing Green	Indicates transmission activity by the Fibre Channel interface.
2) Link LED	
Color	Description
Green	Indicates valid Fibre Channel connection.
Yellow	Fibre Channel interface is being reset.
Off	Fibre Channel is not connected.
3) Ready LED	
Color	Description
Yellow	Fibre Channel interface is being reset, failed power-on test, or a fatal error was detected during operation.
Green	Fibre Channel interface passed power-on test. Interface is ready.
Flashing Green	One SCSI port is faulty.
4 & 5) SCSI Bus LEDs	
Color	Description
Green	SCSI bus is operational.
Yellow	SCSI bus is not operational, or is partially available.
Flashing Green	Indicates transmission activity by the SCSI bus.

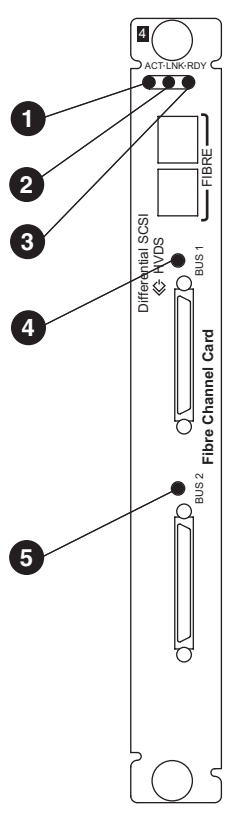
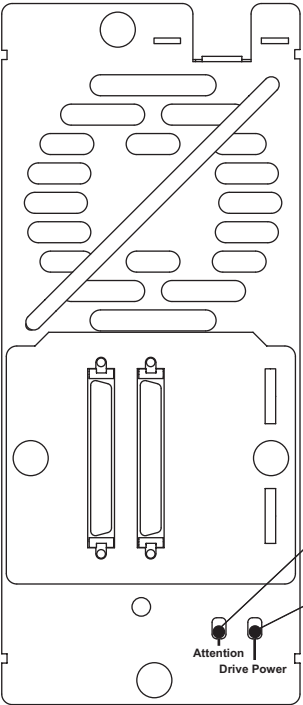


Table 25

Drive Module LEDs

1) Yellow	2) Green	Description	
Off	On	Drive is online and available.	
Flashing	Off	Drive is offline and may be replaced without powering off the library.	
On	Flashing	Drive is being brought online.	
Flashing	On	Drive is offline. Internal communication has been lost.	
On	On	Drive module controller is in reset.	
On	Off	Power-on test in progress.	
Flashing	Off	Drive module failed power-on test.	

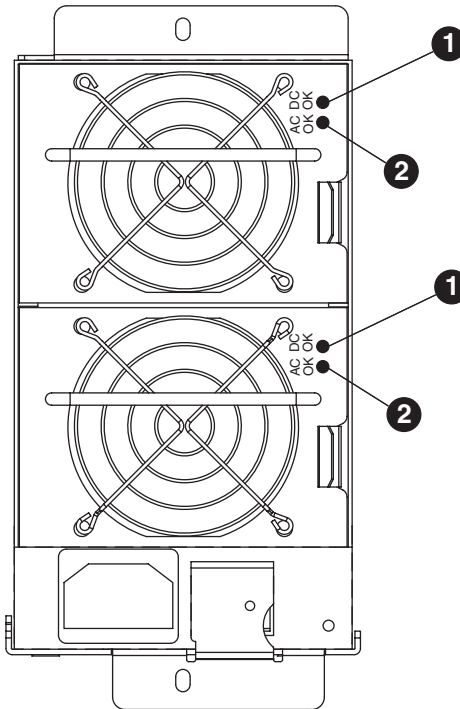
Note Depending on your library’s drive type(s), the back of the drive module might look different from the illustration above.

Table 26

Redundant Power Supply LEDs

1) DC Output LED	
Color	Description
Green	DC output is within the specified limit.
Off	DC output is outside of specified limit.

2) AC Input LED	
Color	Description
Green	AC input is within the specified limit.
Off	AC input is outside of specified limit.



The diagram shows a front view of a redundant power supply unit. It features two identical power supply modules stacked vertically. Each module has a circular fan with a cross-hair pattern. To the right of each fan, there are two small circular LEDs. The top LED is labeled '1' and the bottom LED is labeled '2'. Both LEDs are labeled 'AC DC OK'. The unit has a top and bottom flange with mounting holes. At the bottom, there are two rectangular ports, likely for input/output connections.

Note

The redundant power supply comes standard with the 8/80 and 10/100 series libraries, but is an option for 2/20, 4/40, and 6/60 series libraries. If you do not have this option, your power supply will not have LEDs.

Troubleshooting Common Problems

This section includes information on troubleshooting common library problems. For problems that may be related to the host or application software, refer to the host system documentation, the application software instructions, and **Host Software and Media Errors** on page 128. If these procedures fail, contact your service representative for further assistance.

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

Table 27 Troubleshooting Table

Problem	Solution
Power	
Library will not power on.	<ul style="list-style-type: none">■ Check all power cord connections.■ Make sure the power (standby) switch is on.■ Make sure there is power to the outlet by trying another working outlet.■ Verify that the LEDs on the back of the library are on and that the fans are turning to ensure the library is receiving power (Table 26 on page 139).■ If you have a multi-level library, swap power supplies with the one on the lowest level.■ Replace the power cord(s).■ Contact your service representative.
Power-on test failed. An error message appears in the front panel display.	<ul style="list-style-type: none">■ Follow the recovery procedures from the library front panel.■ Note the error code and error code qualifier.■ Contact your service representative.

Table 27

Troubleshooting Table

Problem	Solution
One of the redundant power supplies is not functioning properly.	<ul style="list-style-type: none"> ■ Check the LEDs on the power supplies to identify the one that may be at fault (Table 26 on page 139) and contact your service representative.
The library's power failed while a tape was in the drive and did not return to the ready state after the power came on.	<ul style="list-style-type: none"> ■ Verify that the LEDs on the back of the library are on and the fans are turning (Interpreting Library LEDs on page 130). ■ Power cycle the library ■ Contact your service representative.
No display messages appear.	<ul style="list-style-type: none"> ■ Make sure the power cord is connected. ■ Make sure the power switch is on. ■ Check that the LEDs on the back of the library are on and the fans are turning (Interpreting Library LEDs on page 130). ■ Power cycle the library. ■ Try to access the library from the web or through a host-based diagnostic tool (Using the Remote Management Card on page 96). ■ Download library firmware (Upgrading Firmware on page 176). ■ Contact your service representative.
Tape Movement	
An error message appears after inserting the magazine or loading tapes.	<ul style="list-style-type: none"> ■ Verify that tapes are inserted correctly in the magazine. (Accessing Tapes in the Library on page 81). ■ Verify that the correct tape type is used. (See Media Compatibility on page 187.)

Table 27

Troubleshooting Table

Problem	Solution
Tape stuck in drive.	<ul style="list-style-type: none"> ■ Power cycle the library and retry unloading the tape from the library front panel, the remote management card Web-Based Library Administrator pages, or the host backup software. ■ Ensure the backup host software is not reserving the slot. The backup software needs to cancel the reservation. If necessary, disconnect from the host, and power cycle. ■ For DLT tapes, see Removing a Stuck DLT Tape on page 152. ■ For Ultrium tapes, contact your service representative.
Tape stuck in transport.	<ul style="list-style-type: none"> ■ Run the Recalibrate Library test (See Running Library Diagnostic Tests on page 156). ■ Power cycle the library. ■ Contact your service representative.
Tape stuck in storage slot.	<ul style="list-style-type: none"> ■ Using the front panel display, open the appropriate drawer. Slide the drawer outward and remove the magazine. ■ Pull the tape out. ■ Reinsert the magazine. ■ If the magazine is damaged, contact your service representative.
Transport is misaligned. Transport won't get a tape. Tape/drive/transport is misaligned.	<ul style="list-style-type: none"> ■ Run the Recalibrate Library test (See Running Library Diagnostic Tests on page 156). ■ Ensure that you are using the correct tape type. (See Media Compatibility on page 187.) ■ Contact your service representative.
Media	
Cleaning or data cartridge incompatible with drive.	<ul style="list-style-type: none"> ■ Ensure you are using cleaning and data cartridges that are compatible with the drive(s). (See Media Compatibility on page 187.)
Cannot load tape into drive.	<ul style="list-style-type: none"> ■ Ensure your media and format type matches your drive type. (See Media Compatibility on page 187.)

Table 27

Troubleshooting Table

Problem	Solution
DLT tape has circular wear patterns around the hub.	<ul style="list-style-type: none"> ■ The DLT drive hub may not be engaging the tape hub properly. Discard the tape and contact your support representative.
Error message appears: "Drive rejected load of tape" (error code 101, qualifier 65 H).	<ul style="list-style-type: none"> ■ Retry the operation. If you continue to get this error, replace the tape cartridge. If data recovery is needed, contact your support representative.
LTO-Cartridge Memory (LTO-CM)	
A new data cartridge that is write-enabled is rejected by the drive.	<ul style="list-style-type: none"> ■ LTO-CM has failed or is damaged. Replace the data cartridge.
A new data cartridge that is write-protected is rejected in multiple known good drives.	<ul style="list-style-type: none"> ■ LTO-CM has failed and the drive has found no data to recover. Replace the data cartridge.
A cartridge that has data written to it and is write-enabled is rejected by the drive.	<ul style="list-style-type: none"> ■ LTO-CM has failed or is damaged. The data can still be recovered. Contact your support representative for more information. ■ After data recovery, replace the cartridge.
A cartridge that has data written to it and is write-protected restores very slowly.	<ul style="list-style-type: none"> ■ LTO-CM has failed and the drive cannot use the tape directory information to recover the data. The data can still be recovered, but may take longer than normal. Contact your support representative for more information.
Cleaning	
The Universal Cleaning Cartridge does not operate properly.	<ul style="list-style-type: none"> ■ Specific revisions of firmware may be required for proper operation. See Upgrading Firmware on page 176. ■ Contact your service representative.

Table 27

Troubleshooting Table

Problem	Solution
A new data cartridge is used and the <i>clean drive</i> icon is displayed.	<ul style="list-style-type: none"> ■ Ensure you are using an approved cleaning cartridge for your drive type. (See Media Compatibility on page 187.) ■ Clean the outside of the data cartridge using a damp cloth. ■ Clean the drive using the drive cleaning procedure. Cleaning a Drive on page 87. ■ If the icon is displayed again within a short amount of time, replace the data cartridge.
Recurring cleaning message.	<ul style="list-style-type: none"> ■ Ensure you are using an approved cleaning cartridge for your drive type. (Media Compatibility on page 187.) ■ Replace the existing cleaning cartridge with a new one. ■ If the message reappears when a particular data cartridge is used, verify that the data cartridge is readable by: <ul style="list-style-type: none"> — Clearing the error message. — Reading the tape again. ■ If the data cartridge can be read, backup data from the damaged cartridge to another cartridge, and discard the damaged one.
Cannot load the cleaning cartridge.	<ul style="list-style-type: none"> ■ Ensure you are using an approved cleaning cartridge for your drive type. (See Media Compatibility on page 187.) ■ Check the drive media log using the RMC Web-Based Library Administrator. ■ Contact your service representative.
Cleaning lights	
Cause: Contamination by loose debris.	<ul style="list-style-type: none"> ■ Avoid by ensuring the drive is operated in a clean, contamination-free environment. Cartridges should be stored vertically in their plastic cases.

Table 27

Troubleshooting Table

Problem	Solution
Cause: Contamination by head staining. (Resulting from adhesion of chemicals that are present in the tape media to the head surface)	<ul style="list-style-type: none"> ■ One or two passes with a cleaning tape should resolve cleaning lights caused by normal head staining. If a cleaning tape is unsuccessful in resolving a cleaning light after 3 or more attempts, the cleaning tape may be contaminated, and should NOT be used in another drive.
Cause: Temperature and humidity	<ul style="list-style-type: none"> ■ Tapes should be stored and used in the middle of the temperature and humidity specifications range of 64-79 F, and 40-60 RH.
Cause: Non-acclimated media	<ul style="list-style-type: none"> ■ A tape should be acclimated for a minimum of 24 hours before being used, particularly if it has been stored at a substantially different temperature or level of humidity than the tape library.
Cause: Wrong cleaning cartridge	<ul style="list-style-type: none"> ■ Only use the cleaning cartridge specifically designated for each drive type.
Cause: Wrong tape format	<ul style="list-style-type: none"> ■ Attempting to load, read, or write tapes that were written in other formats can cause cleaning lights.
Cause: Abnormal build up of head debris (Frequent load/unload operations with minimal tape reading or writing can cause this condition.)	<ul style="list-style-type: none"> ■ Do not perform frequent load/unloads without also doing tape operations. The front panel load/unload test should NOT be run for more than 100 cycles since it does not perform actual tape operations.
Cause: Bad/defective/contaminated media	<ul style="list-style-type: none"> ■ If a cleaning light is cleared using a cleaning tape, and then immediately reappears when a particular cartridge is reloaded, that cartridge should be suspected as being contaminated. ■ If this occurs, re-clean the drive, loading a known good tape. In rare cases, a tape cartridge can be worn out, have bad calibration tracks, or have a bad tape directory recorded by another drive. ■ Any cartridge that is suspected of being defective or contaminated should NOT be reused in any drive.

Table 27

Troubleshooting Table

Problem	Solution
Cause: Expired cleaning cartridge	<ul style="list-style-type: none">■ A cleaning cartridge is good for 20 uses. After that, the drive will still load the cartridge, but it will not perform any cleaning, and the cleaning light will stay on. If cleaning is performed from the front panel of the library, the library will provide a front panel message if the cleaning cartridge has expired.
Cause: Cleaning requested/required and overuse of cleaning cartridges	<ul style="list-style-type: none">■ Use of a cleaning cartridge should only be done when the drive front panel states "cleaning required."
Cause: Old firmware revisions	<ul style="list-style-type: none">■ If a cleaning tape does not resolve a cleaning light issue, make sure the latest drive firmware is being used.
Connections	
Changed drive SCSI ID, but the new ID is not recognized by the host computer.	<ul style="list-style-type: none">■ Check that all SCSI devices on the same bus have different ID numbers.■ Reboot the host.■ If the drive SCSI ID remains at 5, regardless of what is selected, then the drive is not communicating with the library. Contact your service representative.

Table 27

Troubleshooting Table

Problem	Solution
Host does not detect the library.	<ul style="list-style-type: none"> ■ Ensure that the HBA type matches the library type (HVDS, LVDS, or single-ended SCSI) and is properly installed and configured. ■ Check that the library is terminated and properly cabled. ■ Ensure that the terminator is compatible with the library (HVDS, LVDS, or single-ended SCSI). ■ Check that the library is recognized on the operating system. ■ Check that the backup software is compatible with the library. ■ Check that the device is properly installed and configured using HP Library & Tape Tools available from http://www.hp.com/support/TapeTools. ■ Power cycle the library and power down the host. Wait until the library completes its power cycle before powering up the host. ■ Check for SCSI ID conflicts (Setting SCSI IDs on page 106). ■ If using Fibre Channel, make sure you power on the devices in the correct order (switch, hub, library, host). ■ Contact your service representative.
Network Monitoring	
Cannot navigate through the RMC Web-Based Library Administrator interface.	<ul style="list-style-type: none"> ■ Do not use the [Back] or [Forward] buttons on the browser to navigate. Instead, use the tabs and buttons on the actual interface page.

Table 27

Troubleshooting Table

Problem	Solution
The RMC Web-Based Library Administrator interface is slow in updating the web pages or does not display clearly.	<ul style="list-style-type: none">■ Check your computer's display settings. For best results, make sure the display resolution is set to 800 x 600 and the color palette is set to 65535 colors or higher.■ To speed up the display of pages, be sure to bypass proxies for local access by listing the domains to exclude in the Connections/Advanced page of the browser options.■ Check your browser's caching options to ensure the browser is looking for newer versions of the stored pages. (Configuring the Remote Management Card on page 99.)
Library Performance	
HP-UX host responds slowly or crashes after connecting to the library.	<ul style="list-style-type: none">■ Check the SCSI IDs of all devices on the host buses to ensure there are no conflicts.■ Check that the backup software does not require SCSI IDs to be in a certain order.■ Contact your service representative.

Table 27

Troubleshooting Table

Problem	Solution
The library is not efficiently backing up data.	<ul style="list-style-type: none"> ■ Check the network bandwidth from the host computer. ■ Check that the library's drive(s) are on their own SCSI bus and not daisy-chained to another tape drive or the hard drive. ■ Check that the server and file system have the processing power and memory needed to stream the tape drive. ■ Ensure that the drive is clean. (See Cleaning a Drive on page 87.) ■ Try a new tape. A marginal tape can cause performance problems due to bad spots on the tape requiring retries. ■ Ensure that the backup software is using fixed-length records (or blocks) to maximize throughput and has not defaulted to a smaller record size. (64K should be sufficient.) ■ Ensure that the data is being compressed, however do not turn on both software and hardware compression. ■ Check the size of the files. Backing up several small files can impact performance.
Operations	
Cannot remember the administration menu password.	<ul style="list-style-type: none"> ■ Contact your service representative.
Need to abort internal test cycle.	<ul style="list-style-type: none"> ■ Press [STOP]. The current test loop completes, then the test stops. It may take a few minutes to stop the current test loop.

Table 27

Troubleshooting Table

Problem	Solution
Cannot write to the tape.	<ul style="list-style-type: none"> ■ Check the write-protect tab on the tape to assure write-enabled status. ■ Ensure that the backup software does not have the write-protect setting activated. ■ Check the host device file system access permissions. ■ Verify that you are using the correct tape type. (See Media Compatibility on page 187.) ■ Check the Drive Event Log (See Drive Information on page 112). ■ Try a new tape. <p>Caution: During the troubleshooting process, do not put the tape in question into another drive since damaged tapes can damage drives.</p>
Front Panel Display	
Front panel display does not work.	<ul style="list-style-type: none"> ■ Power cycle the library. ■ Attempt to access the library through the remote management card (See Using the Remote Management Card on page 96). ■ Attempt to access the library from the host computer (either SCSI or Fibre Channel, depending on how the library is configured). ■ Contact your service representative.
The soft keys on the front panel display do not work.	<ul style="list-style-type: none"> ■ Power cycle the library. ■ Attempt to access the library through the remote management card (See Using the Remote Management Card on page 96). ■ Attempt to access the library from the host computer (either SCSI or Fibre Channel, depending on how the library is configured). ■ Contact your service representative.

Manually Rewinding a Stuck DLT Tape

Note The following procedure is for DLT tape drives only. For tapes stuck in an Ultrium tape drive, contact your support representative.

Before manually rewinding a stuck DLT tape:

- Attempt to eject the tape using the tape library front panel, remote management card Web-Based Library Administrator pages, and your host backup software.
- You must first remove the DLT drive module from the tape library. Refer to **Removing a Drive Module** on page 163.

After removing the DLT drive module, view the drive hub through the clear plastic to determine if the tape has been rewound. If the tape has not been rewound, follow the steps below and refer to **Figure 48** on page 152:

Caution The DLT drive does not automatically eject a cartridge if a power failure occurs.

1. Place the DLT drive module on its top side so that the bottom of the drive module is facing up.
2. Insert a Phillips #2 screwdriver in the rewind hole on the bottom of the drive module and engage the screw.

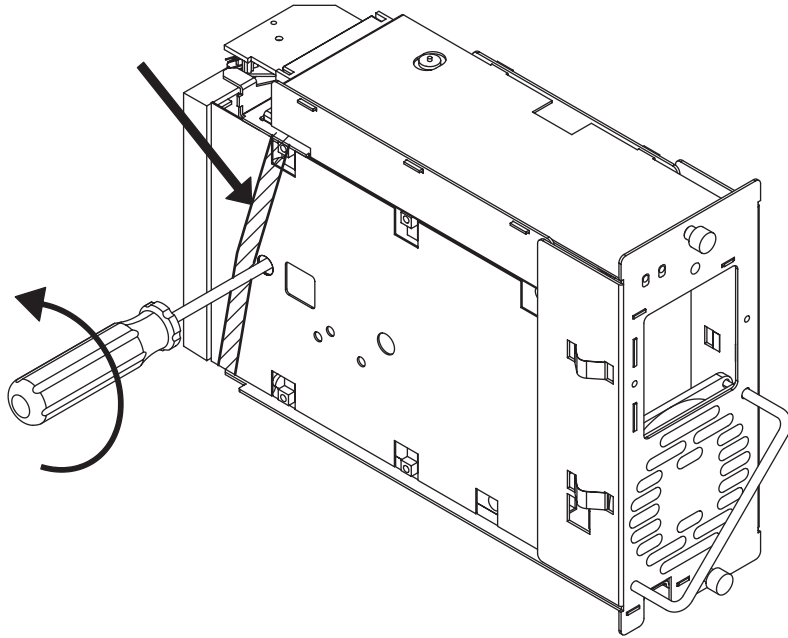
Note Gently move the ribbon cable to one side of the rewind hole if necessary.

3. Turn the screwdriver counter-clockwise to rewind the tape. Continue rewinding until the leader is seated in the tape cartridge.

Caution Do not use a power screwdriver as damage may result to the tape.

Figure 48

Rewinding a Tape in the DLT Drive Module



Removing a Stuck DLT Tape

Use the following procedure and **Figure 49** to remove a tape stuck in a DLT drive module:

1. Ensure that the tape has been rewound. See **Manually Rewinding a Stuck DLT Tape** on page 151.
2. Locate the spring-loaded latch near the opening on the drive module, and push it outward (item 1 in **Figure 49**). Ensure that you move both parts of the latch.
3. While holding the latch outward, rotate the thumb-wheel (drive gear) until the tape ejects (item 2 in **Figure 49**).

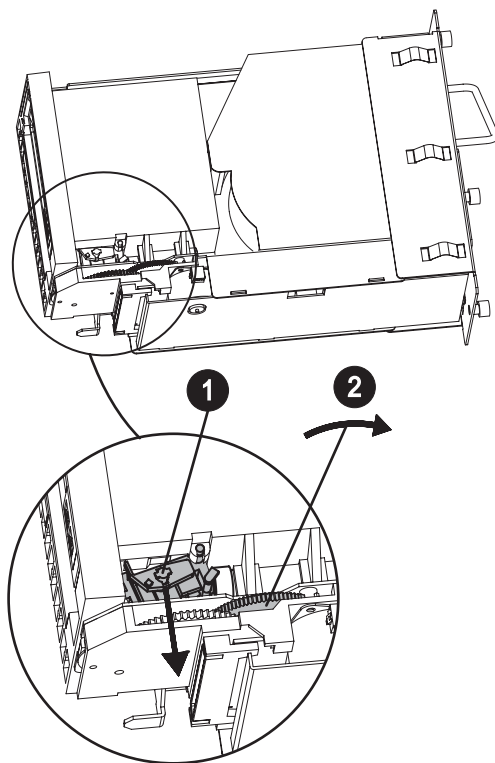
Note

If turning the thumb-wheel does not eject the tape, or if you encounter high resistance in turning the thumb-wheel, check to ensure that the spring-loaded latch has been rotated outward.

4. Verify the tape is not damaged (see **Inspecting DLT Cartridges** on page 74).

Figure 49

Spring-Loaded Latch and Thumb-Wheel



Diagnostic Support Tools

The following tools are available for the library:

- **HP Library & Tape Tools** on page 154
- **Support Tools Manager and Sysdiag** on page 155
- **Running Library Diagnostic Tests** on page 156

HP Library & Tape Tools

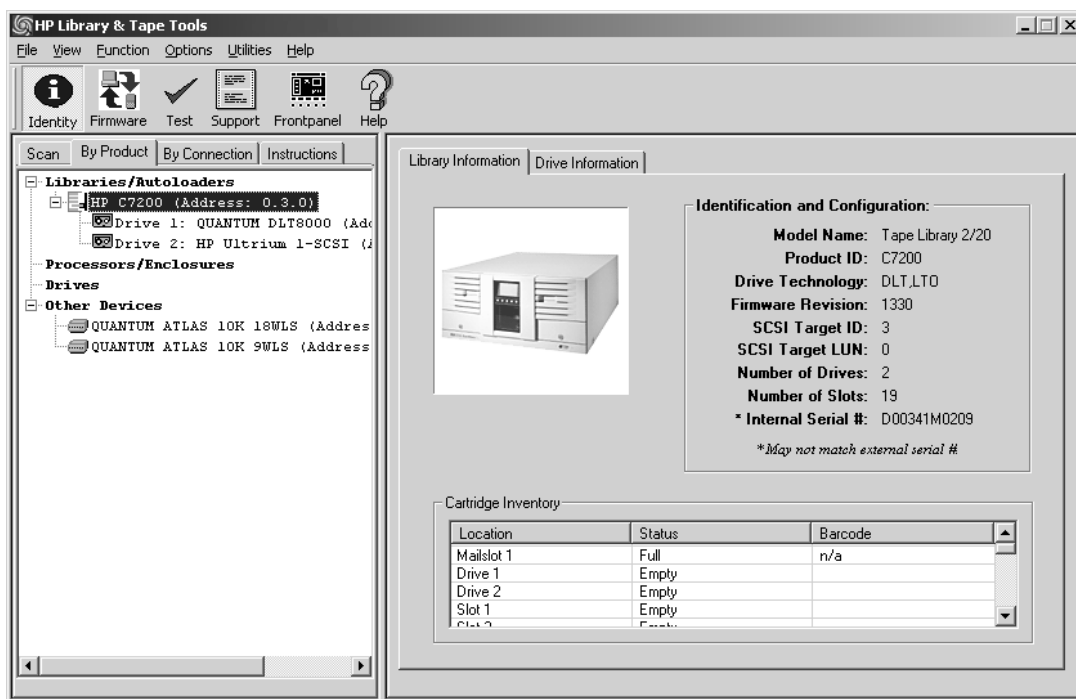
With HP Library & Tape Tools installed on your host computer, you can do the following:

- Identify all SCSI and Fibre Channel devices connected to your system
- View detailed configuration, identification, inventory, and drive information for the library
- Easily update library and drive firmware (**Upgrading Firmware** on page 176)
- Run advanced diagnostic tests, including connectivity, read/write, media validation, and testing library functionality
- View library and drive error logs
- Generate a detailed support file that can be emailed or faxed to your support representative for analysis

The HP Library & Tape Tools diagnostic provides an intuitive graphical user interface with integrated context-sensitive help (see **Figure 50** on page 155). It can be downloaded free of charge from <http://www.hp.com/support/TapeTools>.

Figure 50

HP Library & Tape Tools Interface (example)



Support Tools Manager and Sysdiag

For more information on these diagnostic tools, see the online *Configuration and Diagnostic Guide* at <http://www.hp.com/go/support>. Search for the library model and then select **[Manuals]**.

Note This tool is for use with HP-UX and MPE/iX operating systems.

Running Library Diagnostic Tests

Main Menu -> Administration -> Run Test

Use the following procedure to run internal tests of library functions. **Table 28** on page 156 describes these tests.

1. From **Administration**, select **[More]** to display additional administrative options. Select **[Run Test]**.
2. From **Run Test**, use the **[-]** or **[+]** key to view available tests.
3. Select **[OK]** to select the test.
4. Select the number of times this test will run.
5. Select **[Run]** to start the test cycle. The test results will display at the conclusion of the test cycle.

Note	Select [Stop] to abort a test. The current test cycle completes before the test stops. Stopping the test may take a few minutes.
-------------	---

Table 28

Front Panel Diagnostic Tests

Test	Description
Check Inventory	Physically scans the entire library to determine which slots and drives contain tapes and reads all bar code labels.
Recalibrate Library	Performs the power-up self-tests. Each test runs one time per test loop. This test recalibrates the mechanics and clears hard errors, but not the hard error log.
Test Lateral Motion	Moves the transport assembly to a random slot. No tape is required.
Test Magazine Moves	Moves a tape from a random slot to an empty, random slot, and then returns it to the original location.

Table 28

Front Panel Diagnostic Tests

Test	Description
Wellness Test	Moves a tape from a random slot to an empty drive, repeats the process until all drives are full, and then returns all tapes to their original slots.
Rewind Media	Caution: Do not run this test if the drive contains a tape that is receiving data from the host. Rewinds the tape in the drive.
Lock Transport	Locks the transport assembly in place to allow for shipping the library. Power down the library after running this test. Motion commands may fail if issued after the transport assembly is locked. Note: The transport assembly automatically unlocks when library is powered on.
Unlock Transport	Unlocks the transport assembly without power cycling the library. The transport must have already been locked to use this test. Note: The transport assembly automatically unlocks when library is powered on.
Test Transport Comm	Exercises the infrared communications path between the library controller and the transport controller. Reports the health of this link. If the test passes, the infrared communication link is good.
Show All Sensors	Dynamically displays the state of sensors. To toggle drawer sensors, open and close the drawers. To toggle the mailslot sensor, open the mailslot to access the first two tapes.

Table 28

Front Panel Diagnostic Tests

Test	Description
Demonstration	<p>Caution: <i>Run an inventory check from the host backup application after performing this test to ensure that tapes are returned to their original locations</i></p> <p>Selects a random full storage slot, moves the tape to the drive, and repeats the process until all drives are full. The test locates a full slot, a full drive, an empty slot, and then performs an exchange.</p>

Replacing Parts and Upgrading Firmware

5

Chapter Overview

This chapter includes information on the following:

- **Removing and Replacing Cards** on page 160
- **Removing and Replacing Drive Modules** on page 162
- **Replacing the Redundant Power Supply** on page 169
- **Removing the Library Cover and Feet (2/20 & 4/40 Series Only)** on page 172
- **Removing and Replacing a Cosmetic Door** on page 174
- **Upgrading Firmware** on page 176

Removing and Replacing Cards

Caution	This library contains very sensitive electrical components. It is important to follow the proper procedures to prevent electrostatic discharge (ESD). Use wrist-grounding straps and anti-static mats when removing and replacing cards and major assemblies.
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Failure to follow proper procedures could lead to intermittent failures or premature hard failures.

Caution	The Fibre Channel printed circuit boards may contain a laser system (GBIC or GLM module) that is classified as a “Class-I Laser Product” under a U.S. Department of Health and Human Services (DHHS) Radiation Performance standard according to the Radiation Control for Health and Safety Act of 1968 and EN60825-1(+A11) safety of laser products. The compliance statement is located on the module.
----------------	---

Before powering the library off to remove a card, review the LEDs on the back of each card to ensure there is no activity (see **Interpreting Library LEDs** on page 130).

Removing a Card

1. Note the library configuration settings (if you will be downloading new firmware), and power off the library.
2. Note how the library is connected and the placement of the card, and then remove all external cables attached to the card.
3. Loosen the two thumbscrews on the card by hand or with a screwdriver.
4. Remove the card by gently pulling it outward.

Replacing a Card

1. Align the edges of the replacement card with the card slot.
2. Gently push on the lower third of the replacement card, inserting it into the library until the card is flush with the library. This will help ensure that the backplane pins are optimally aligned.
3. Tighten the thumbscrews with a flat-blade screwdriver.
4. Reconnect external cables.
5. Power on the library.
6. Download new firmware (see **Upgrading Firmware** on page 176).
7. If installing Fibre Channel cards for the first time, configure the library from the front panel. See **Configuring the Library for Fibre Channel** on page 102.

Removing and Replacing Drive Modules

This section explains how to replace a drive module in the following situations:

- **The library is powered off.**
- **The library is powered on.** If the library needs to remain powered on when you are placing the drive, you need to check that the backup software supports this.

Unloading a Tape from a Drive

Before replacing a drive, unload any tape from the drive (if applicable).

1. From the **Drive and Tape Operations** menu, select **Unload Tape from Drive**.
2. Use the [-] or [+] keys to select the drive you want to unload.
3. Select **[Unload]** to move the tape from the drive module to the original slot where the tape was located. The tape is automatically rewound before it is unloaded.

Taking a Drive Offline (for on-line drive replacement only)

Although a drive module can be removed without powering off the library, *you must first take the drive module offline*. This process may be accomplished by using the library's front panel and following these steps:

1. Check the drive icons on the front panel display to see if the drive has already been taken offline. Verify the drive module's status by checking the LEDs on the back of the drive module (**Table 25** on page 138).
2. If the drive module *is not* already offline, go to the **Administration** and then **Online Drive Repair** menus.
3. Select the drive with the [-] or [+] keys, and press **[OK]**.
4. Select **[Put Drive Offline]**. The front panel indicates the success or failure of this operation. When the drive module has been successfully taken offline, one of the LEDs on the back of the drive will be flashing yellow.

Removing a Drive Module

Note To preserve SCSI communications, do not loosen or remove the SCSI cable(s) connected to the outside of the drive module. *The connection to be removed is located inside the drive module.*

Remove the drive module using the steps below:

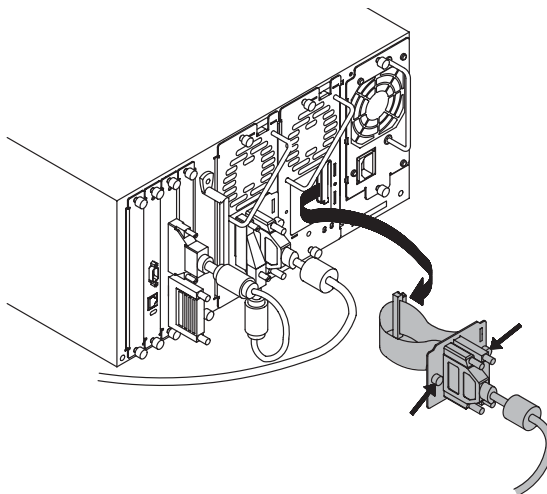
1. Verify the external SCSI cable is tightened to the connector plate.
2. Loosen the thumbscrews on each side of the connector plate, located in the middle of the drive module (**Figure 51** on page 163). If this is your first time loosening the thumbscrews, use a screwdriver.
3. Gently remove the connector plate, with SCSI cable(s) still connected.

Caution Use standard precautions for electro-static discharge (ESD) protection.

4. Grasp the ribbon cable that is plugged into the drive module. Remove the cable by pulling the connector to the left. See **Figure 51** on page 163 for the location of the ribbon cable and connector.

Figure 51

Ribbon Cable and Connector



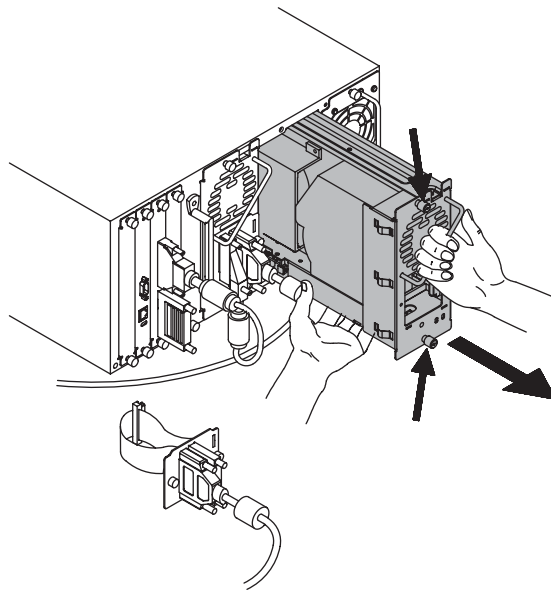
5. Lay the connector assembly to the side, allowing the external cables to hang from the connection(s). Do not disconnect external cables from the connector plate.
6. Loosen the top and bottom thumbscrews on the drive module (**Figure 52** on page 164).
7. Using the handle that is mounted on the back of the drive module, pull the drive module straight out with one hand while supporting the bottom of the drive module with the other hand.

Caution As the drive module is pulled out, support the bottom of the drive module to avoid dropping or damaging it.

WARNING To avoid injury, do not insert your hand or foreign objects through the empty drive bay and into the vertical lift assembly area.

Figure 52

Removing a Drive



Installing a Drive Module

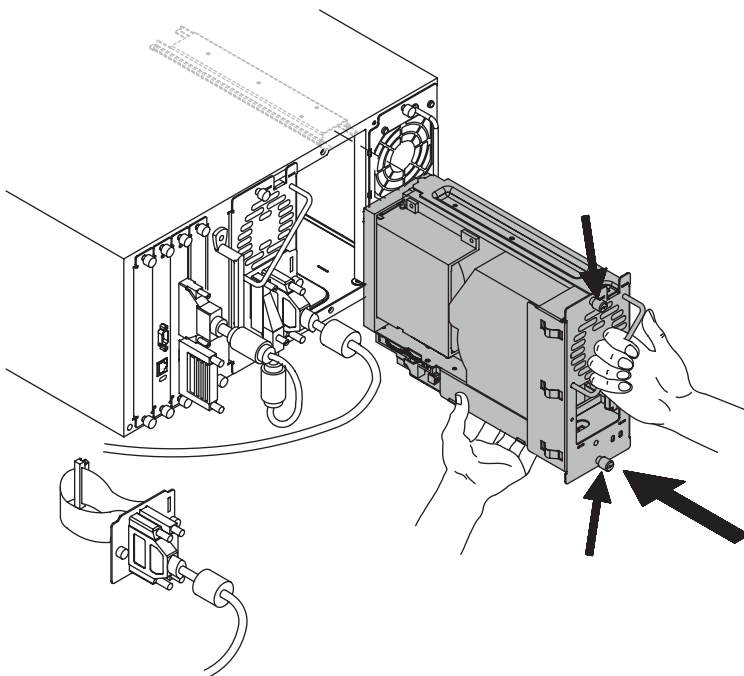
WARNING It is not necessary to power off the library when inserting a replacement drive module. However, to avoid injury, do not insert your hand or foreign objects through the empty drive bay and into the vertical lift assembly area.

1. Hold the drive module with one hand on the drive module handle while the other hand supports the bottom (**Figure 53** on page 165).
2. Install the drive by inserting the rail at the top of the drive module into the slot at the top of the drive module opening.

Note Higher force will be required in the last half-inch of insertion to engage the electrical connection.

Figure 53

Installing a Drive Module



3. Tighten the top and bottom thumbscrews, securing the drive module into the library.
4. Plug the ribbon connector into the back of the drive module (**Figure 51** on page 163).
5. Gently fold the ribbon cable (attached to the plate and SCSI cable), into the back of the drive module.
6. Holding the connector plate in place, tighten the thumbscrews on each side of the connector.
7. Bring the new drive module online if necessary using the front panel display.
 - a. Enter the **Administration** then the **Online Drive Repair** menus.
 - b. Select the drive module that has been replaced. Bring the drive back online.

The library will automatically run a self-test when the drive has been brought online. When the drive is successfully brought online, the new drive will adopt the SCSI ID of the current drive position.

Note	If you have increased the number of drives since the last power cycle, you must power cycle the library for the library to recognize the additional drives.
-------------	---

Note	You may get a drive firmware mismatch error if you have multiple drives with different firmware revisions. To correct this error, update firmware as necessary until all drives of the same type (such as LTO) have the same firmware revision. See Upgrading Firmware on page 176.
-------------	--

8. Update the drive firmware if needed. (See **Upgrading Firmware** on page 176.)

Note	You may need to use the host backup software to recognize the new drive when bringing it online. If the software or operating system does not have the capability to automatically detect the new drive, you may need to reboot the host.
-------------	---

Removing and Replacing the Power Supply

A failing power supply on a 2/20 series library disables the library. A failing power supply on upper library levels results in a *partial availability* state.

Note	Power cycling the library at this point will result in a hard error. If you want to continue using the library in its partially available state, do not power cycle.
-------------	--

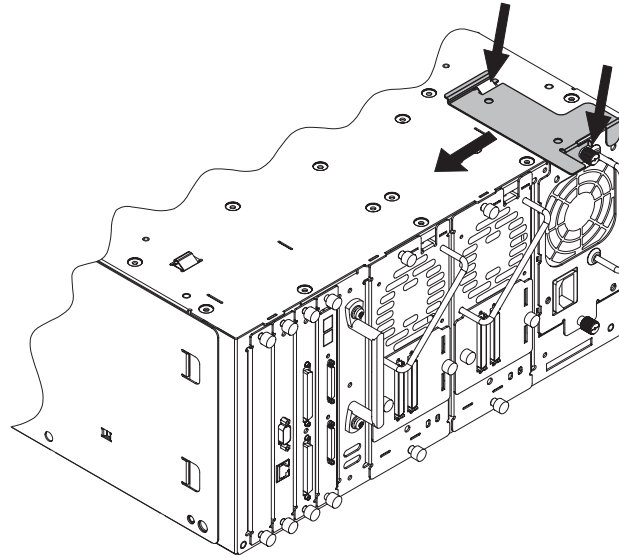
When the library is in a partial availability state, it is still functional, but is not in optimum configuration. When this occurs, the front panel will display **Partly Available**, and the illuminated LED beneath the front panel display will be solid amber until the condition is resolved (see **Table 26** on page 139).

Removing the Power Supply

1. Power off the library.
2. Disconnect the power cord from the back of the power supply.
3. Loosen the thumbscrews at the top and bottom of the power supply. If the thumbscrews are too tight to loosen by hand, loosen them with a screwdriver.
4. Remove the stop bracket (if applicable). See **Figure 56** on page 171.
5. Remove the power supply with one hand by pulling outward (see **Figure 56** on page 171). Support the bottom of the power supply to avoid dropping the module.

Figure 54

Removing the Stop Bracket for 2/20 Series Library



Replacing the Power Supply

1. Grasp the power supply handle with one hand while supporting the bottom with your other hand. Align the power supply with the guide notch at the top of the power supply bay.
2. Fully insert the power supply into the library.
3. Replace the stop bracket (if applicable).
4. Tighten the two thumbscrews with a flat-blade screwdriver.
5. Connect the power cord to the power supply.

Replacing the Redundant Power Supply

To replace individual power supply units:

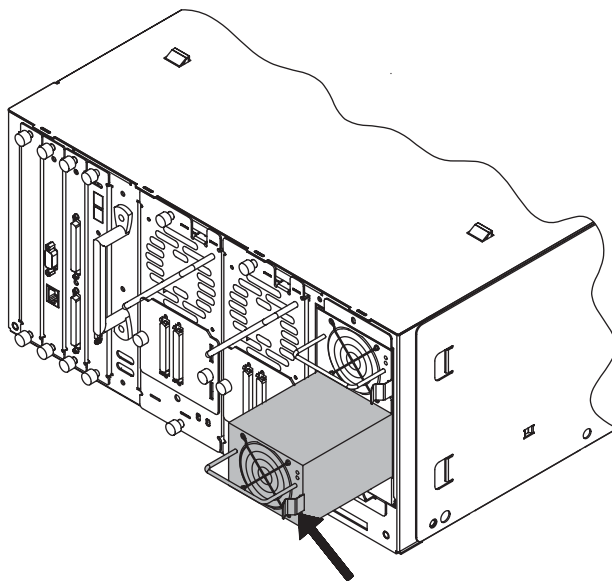
1. Push the tab on the power supply unit to the left.
2. Remove the supply using the handle on the back of the unit and pulling outward. Support the bottom of the power supply to avoid dropping or damaging it.

WARNING Avoid touching the top surface of the power supply unit since it may be hot.

3. Install the new power supply by sliding the replacement unit into the vacant slot until it “clicks” into place.

Figure 55

Replacing Individual Power Supply Units



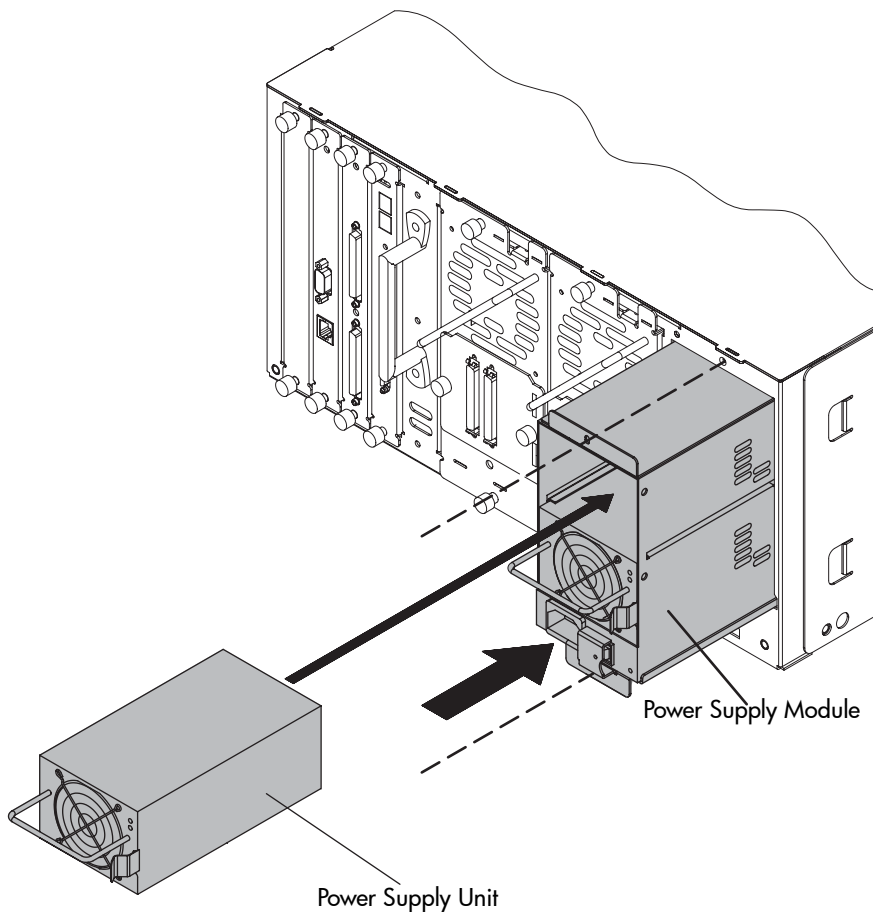
Replacing the Redundant Power Supply Module

Caution	When replacing the entire power supply module, note that the library does not have redundant power backup until the new module is installed. See page 170 for the procedure for replacing individual power supply units.
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1. Disconnect the power cords from the library. Contact the system administrator to ensure there is no activity on the SCSI bus.
2. Remove the power supply module by loosening the two 6-32 x .25 T-15 screws and pulling the module straight out.
3. Install the replacement power supply module by aligning the bottom of the module with the bottom of the power supply bay.
4. Fully insert the power supply module into the back of the library.
5. Tighten the two screws.
6. The replacement supply comes with the entire redundant power supply module and one individual unit. If you need to install an additional unit, install one of the units from the original power supply.
7. Reconnect the power cord to the power supply.

Figure 56

Replacing the Redundant Power Supply Module

**Caution**

Do not move the covered power switch located at the bottom of the module. By default, power is always kept on to ensure redundant backup.

Note

The redundant power supply module FRU comes with the entire module and one power supply unit. If you need an individual unit and not the entire module, then use the one that comes with the replacement module and discard the rest of the housing.

Removing the Library Cover and Feet (2/20 & 4/40 Series Only)

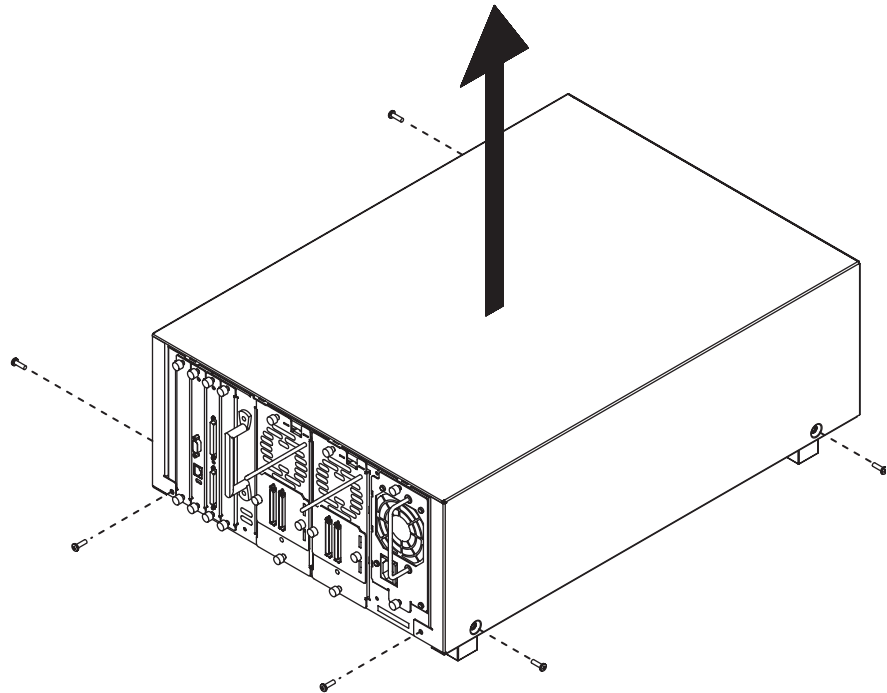
To install a stand-alone library in a rack, remove the cover and feet by following these steps:

1. Remove the following six screws (**Figure 57**):
 - a. Four screws, one located at each of the four feet
 - b. Two screws near the bottom of the library and in the back
2. Lift the cover off the library.

Note	The cover may fit tightly. If you cannot remove it easily, ease the sides out while lifting up on the cover.
-------------	--

Figure 57

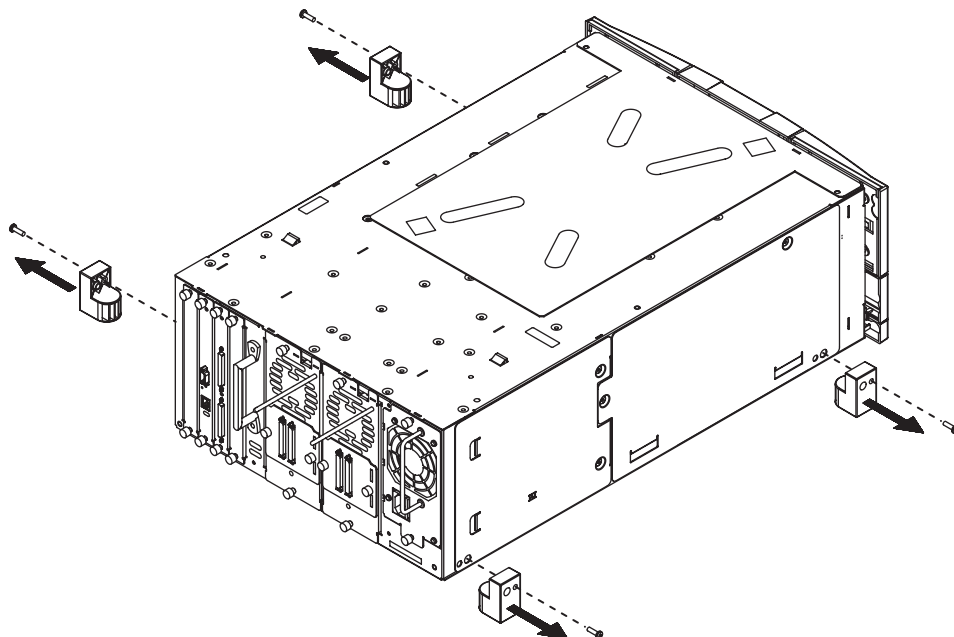
Removing the Cover



3. Remove the feet as follows:
 - a. Remove the 10-24 torx T20 machine screws from the side of each foot assembly.
 - b. Slide the feet off the library.

Figure 58

Removing the Feet



Removing and Replacing a Cosmetic Door

Removing a Cosmetic Door Face

1. Pull the front door outward. Use the front panel display and/or key to unlock the door.
2. Remove the front magazine by lifting the handle on the top of the magazine and pulling upward.
3. Twist the release tab on the back of the cosmetic door and simultaneously pull upward on the sheet-metal tab to release (see **Figure 59** on page 175).

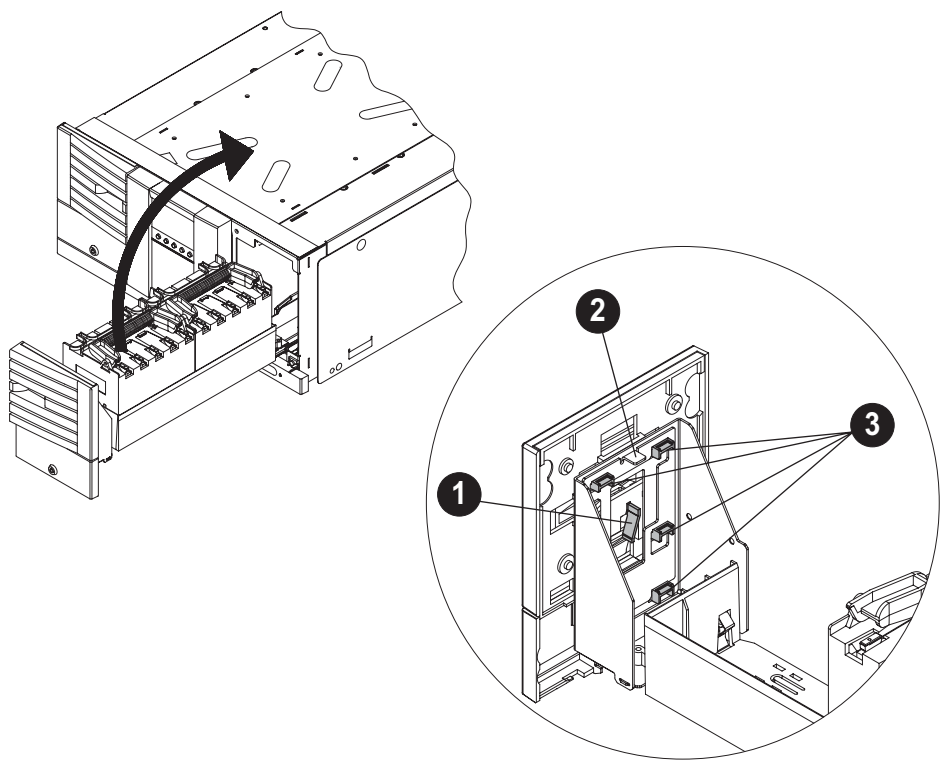
Caution To avoid breaking the tab, do not use excessive force.

Replacing a Cosmetic Door

1. Insert the cosmetic door's connecting hooks through the holes in the front of the door.
2. Holding the cosmetic door in place, align the holes in the sheet-metal with the holes in the door front.
3. Push the sheet-metal tab downward so that the sheet-metal plate clicks into place beneath the plastic tab.
4. Replace the magazine, and close the door.

Figure 59

Removing the Front Door Face



1	Release tab
2	Sheet-metal tab
3	Cosmetic door connecting hooks

Upgrading Firmware

Caution Before upgrading firmware, be sure to generate a support ticket using HP Library & Tape Tools (see **page 154**). The resulting information may be helpful to your service representative in resolving potential issues that may have prompted the firmware upgrade.

This section details the processes for upgrading library and drive firmware. Some of the processes used for upgrading library firmware are different from those used to upgrade drive firmware.

Firmware can be downloaded by:

- Using HP Library & Tape Tools (*library and drive firmware*)
- Using the remote management card (*library and LTO drive firmware*)
- Using a firmware upgrade tape (*drive firmware only*)

Note After upgrading firmware, library configuration settings will revert back to the factory defaults, which could affect remote management. For a complete list of factory defaults, see **Table 12** on page 91.

Checking the Firmware Revision

Before downloading new firmware, check your current firmware revisions, and compare them to the latest available revisions at <http://www.hp.com/go/support>.

Note If the library is in a partial availability state due to a firmware mismatch, new firmware must be downloaded to resolve the condition. (See **Partial Availability State** on page 120.)

1. Use the following menu from the front panel:

Main Menu -> Information -> Firmware Revisions

2. From the **Firmware Revisions** menu, use **[More]** to view the drive firmware revisions.

You can also check your current firmware revisions from the remote management card:

1. Enter the designated IP address into the web browser to launch the Web-Based Library Administrator pages. (See **Using the Remote Management Card** on page 96.)
2. Select the **[Report]** tab.
3. Scroll down to the **Firmware Revisions** section of the page to view your library and drive firmware revisions.

Note Ensure that your backup software does not “SCSI reserve” the library, as this can prevent a firmware download.

Using HP Library & Tape Tools (library and drive firmware)

You can download library and drive firmware using the HP Library & Tape Tools diagnostic utility. This utility may already be installed on your host. If not, you can download it from <http://www.hp.com/support/TapeTools>.

Online help and instructions are included with HP Library & Tape Tools. The firmware download procedure involves these simple steps:

1. Run the HP Library & Tape Tools utility.
2. Generate a support ticket for the library.
3. If prompted to download new firmware from the website, select **[Yes]**, otherwise, select **[Get Firmware from Web]** under the **File** menu.
4. Click on the firmware revisions for the library and drive that you would like to download firmware to, and then click the **[Download]** button. The firmware file(s) will be copied into the firmware folder of the HP Library & Tape Tools utility.
5. Close the firmware window.
6. Select the library in the **[By Product]** device list tab, and then select the **[Firmware]** button. The latest revisions available for the library and drive will automatically be selected.
7. Select **Start Update** to update the firmware for the library and/or drive.

Note The firmware download may take several minutes to complete.

Using the Remote Management Card (library and LTO drive firmware)

All library components, except drives, can be easily downloaded from the remote management card.

Note The firmware file is available from HP Support at <http://www.hp.com/go/support>. These files must be loaded onto the local host computer before downloading firmware. First select your product, and then make a selection from the **Downloads & Drivers** pull-down menu.

1. Once the library is configured for network access, enter the IP address within your web browser to launch the Web-Based Library Administrator pages. (See **Using the Remote Management Card** on page 96.)

Note The library administrator password is required for this process and is not set by default. If the password is not set, you will not be permitted to download firmware.

2. Select the **[Configuration]** tab from the main screen.
3. Select the **[Firmware Download]** button.
4. Enter the full pathname for the download file, or use the **[Browse]** button to locate the file.
5. Select the **[Start Firmware Download]** button to begin the actual process of downloading the library firmware.

Once the download process begins, the progress and status of the download will display on the lower half of your screen.

Note The firmware download may take several minutes to complete.

Using a Firmware Upgrade Tape (drive firmware only)

1. Contact your service representative to get the drive upgrade tape.
2. Ensure that the drive is empty. The drive icon(s) on the Home screen indicates the presence of a tape in the drive. If a tape is in the drive, use the front panel to return the tape to a storage slot. See **Unloading a Tape from the Drive** on page 87.
3. Place the firmware upgrade tape in an available storage slot in the library, and note the slot number.
4. Use the following menu to perform the firmware upgrade:

Main Menu -> Administration -> Upgrade Drive Firmware
--

5. From the **Upgrade Drive Firmware** menu, use the [-], [+] or [++] key to select the slot containing the firmware upgrade tape. Select **[OK]**.
6. Use the [-] or [+] key to select the drive that you want to upgrade. Select **[OK]**.
7. Watch the upgrade status on the library's front panel. Only drives that are online and empty (not reserved) can be upgraded.

Note	When the operation is complete, the tape will be returned to its original slot.
-------------	---

8. Remove the firmware upgrade tape from the library.

Technical Specifications



Appendix Overview

The appendix provides information on the following:

- **Environmental Specifications** on page 182
- **Library Specifications** on page 183
- **Physical Specifications** on page 184
- **Cable Specifications** on page 186
- **Drive Compatibility Specifications** on page 187
- **HP Ultrium Drive and Media Specifications** on page 189
- **DLT Drive and Media Specifications** on page 192

Environmental Specifications

Table 29

Environmental Specifications

Characteristic	Specification
Temperature/Humidity	
Operating	10° to 35° C
Non-operating	-35° to 65° C
Operating wet-bulb temperature (media)	25° C maximum
Non-operating wet-bulb temperature (drive)	46° C maximum
Gradient	10° C per hour
Transportation	-30 to 60° C (<14 consecutive days)
Humidity	
Operating	20% to 80% RH non-condensing
Non-operating	10% to 90% RH non-condensing
Shock	
Operating	4.0g (half-sine)
Non-operating	10g/24ips
Vibration (5-500 Hz)	
Operating	0.21g RMS (random)
Non-operating	2.1g RMS (random)
Operating	0.25g (0-peak, swept-sine)
Non-operating	0.5g (0-peak, swept-sine)

Library Specifications

Table 30

Library Specifications

Description	All models
General	
Average tape access time	15 seconds
Average tape exchange time (mean time to eject tape from drive, robotically exchange tape from magazine and reload drive)	46 seconds
Storage capacity	Dependent upon the model and configuration
MTBF	100,000 Hours (robotics only) 50,000 Hours (including drives) 45,000 (library only)
MSBF (robotics)	1,000,000 swaps (robotics)
Line voltage	100-127/200-240 VAC Auto-selecting
Line frequency	50-60 HZ

Physical Specifications

Table 31

Physical Specifications

Description	Specification
Height	
2/20 Series	216 mm (9 in)
4/40 Series	489 mm (19 in)
6/60 Series	711 mm (28 in)
8/80 & 10/100 Series	1,969 mm(78 in)
Width	
2/20, 4/40 & 6/60 Series	442 mm (17 in)
8/80 & 10/100 Series	597 mm (24 in)
Depth	
2/20, 4/40 & 6/60 Series	696 mm (27 in)
8/80 & 10/100 Series	940 mm (37 in)
Weight (net)	
2/20 Series	40 kg (87 lb)
4/40 Series	75 kg (165 lb)
6/60 Series	104 kg (249 lb)
8/80 & 10/100 Series	approximately 227 kg (500 lb)
Weight (packaged)	
2/20 Series	41 kg (90 lb)
4/40 Series	82 kg (180 lb)
6/60 Series	111 kg (244 lb)

Table 31

Physical Specifications

Description	Specification
8/80 & 10/100 Series	approximately 318 kg (700 lb)
SCSI Interface	<ul style="list-style-type: none">■ Two ports, Very High Density Cable Interconnect (VHDCI), small form factor■ Auto-negotiation (fast, narrow, wide, ultra2)■ Supports SCSI-2 and SCSI-3 protocols■ Available as HVD or LVD/SE
Fibre Channel Interface	<ul style="list-style-type: none">■ One 1.0625 Gbps port■ Embedded shortwave optical connector, type SC■ Supports FC-AL (arbitrated loop) and FC-SW (switched fabric) topologies■ FCP-2 compliant■ Private Loop Direct Attach (PLDA) profile■ Class 3 connection with SCSI-FCP protocol■ Tachyon™ TL protocol controller
RMC interface	<ul style="list-style-type: none">■ RJ45 standard network connector■ 10/100 Base-TX network port

Cable Specifications

Table 32 SCSI Cable Specifications

Maximum Supported Length	Interface		
	Single-Ended	Low-Voltage Differential	High-Voltage Differential
Fast SCSI <i>10 MB/second Narrow</i> <i>20 MB/second Wide</i>	3 meters	12 meters	25 meters
Normal/Slow SCSI <i>5MB/second Narrow</i> <i>10MB/second Wide</i>	6 meters	12 meters	25 meters
Ultra SCSI-3 <i>20 MB/s (single-ended)</i> <i>40 MB/s (LVD/HVD)</i>	<ul style="list-style-type: none"> ■ 3 meters for 4 devices ■ 1.5 meters for 8 devices 	12 meters	25 meters
Ultra2 SCSI <i>40 MB/s (HVD)</i> <i>80 MB/s (LVD)</i>	N/A	12 meters	25 meters
Ultra3 SCSI <i>160 MB/s (LVD)</i>	N/A	12 meters	N/A

Note Ensure that all cables conform to the ANSI SCSI specifications.

Table 33 Fibre Channel Cable Specifications

Cable	Maximum supported length
50/125 fibre-optic cable	500 meters
62.5/125 fibre-optic cable	175 meters

Drive Compatibility Specifications

Drive Compatibility

Table 34 on page 187 shows read and write compatibility between Quantum DLT and LTO, Linear Tape-Open, Ultrium formats.

Table 34

Drive Read/Write Compatibility

Drive Type	Read-compatible	Write-compatible
DLT 8000	DLT 4000 DLT 7000 DLT 8000	DLT 4000 DLT 7000 DLT 8000
LTO Ultrium	LTO Ultrium	LTO Ultrium

Media Compatibility

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

Table 35 on page 187 shows drive technologies and compatible data cartridges.

Table 35

Unformatted Cartridge Compatibility

Drive type	Data cartridge type	HP part number
Quantum DLT	DLT Type IV	C5141F (40/70/80 GB)
HP Ultrium	HP Ultrium 200 GB	C7970A (100 GB) C7971A (200 GB)

Table 36 on page 188 shows drive technologies and compatible cleaning cartridges.

Table 36

Cleaning Cartridge Compatibility

Drive type	Cleaning cartridge type	HP part number
Quantum DLT	DLTtape cleaning cartridge	C5142A
HP Ultrium	HP Ultrium Universal Cleaning Cartridge	C7978A

Note Ensure you use the correct cleaning cartridge for your tape drive.

HP Ultrium Drive and Media Specifications

Table 37

Ultrium Drive Specifications

Description	HP Ultrium
Read/write transfer rate: (maximum sustained)	<ul style="list-style-type: none">■ Non-compressed mode: 15 MB/second■ Compressed (2:1 typical): 30 MB/second
Burst transfer rate	80 MB/second
Average access time	90 seconds
Loading time	25 seconds (maximum)
Unloading time	13 seconds (maximum)
MTBF	250,000 hours
Interface type	<ul style="list-style-type: none">■ Low-Voltage Differential (LVD) Ultra 2 SCSI■ High-Voltage Differential (HVD) Ultra SCSI

Table 38

Ultrium Media Specifications

Characteristic	Ultrium Media
Formatted capacity	200 GB (2:1 typical compression)
Basic description	0.5 inch (metal particle)
Tape length	580 meters (1903 feet)
Cartridge dimensions	10.2 x 10.5 x 2.2 cm (4.02 x 4.15 x 0.85 in)
Shelf life	30 years
Cartridge life	■ 1,000,000 passes ■ 20,000 loads/unloads
Cleaning cartridge life	15 uses

Note Only use Ultrium cleaning cartridges with HP Ultrium tape drives. For data cartridges, only use those specified as having met Ultrium standards. Approved media will have the Ultrium format trademark (**Figure 60**), which indicates that the media has passed Ultrium format compliance testing. For best results, always use HP-branded media.

Figure 60

Ultrium Format Trademark



Table 39

Ultrium Cartridge Bar Code Specifications

Description	Specification
Data cartridge message	8-character: 6 alphanumeric (user preference) followed by 2 alphanumeric (media ID)
Cleaning cartridge message	8-character: 'CLN', 'H', 2 numeric, and 2 alphanumeric (media ID)
Dimensions	7.8 cm x 1.7 cm (3.07 in x 0.67 in)
Symbology	code 39 without check digit
Start/stop characters	*/*
<div>■ Short bar</div> <div>■ Long bar</div>	<div>■ 6.0 mm (0.24 in)</div> <div>■ 8.5 mm (0.33 in)</div>
Ratio	2.75:1
Print quality	ANSI Grade "A"

Note For data cartridge messages, 'n' represents the volume serial number (or volser), and 'XY' represents the media ID. The HP Ultrium media ID is 'Lg' where 'g' (alphanumeric) designates a generation of the cartridge. For example, the HP Ultrium media ID for first generation data cartridges is 'L1'.

For cleaning cartridge messages, 'CLN' denotes that it is a cleaning cartridge, 'H' represents Hewlett-Packard as the drive manufacturer, 'n' is the volume serial number, and 'XY' represents the media ID (as stated above). Bar codes will resemble 'CLNHnnL1'.

DLT Drive and Media Specifications

Table 40

DLT Drive Specifications

Description	Quantum DLT 8000
Read/write transfer rate: maximum sustained (DLT Type IV media)	<ul style="list-style-type: none">■ Non-compressed mode: 6.0 MB/second■ Compressed (2:1 typical): 12.0 MB/second
Burst transfer rate	20 MB/second
Average access time	60 seconds
Loading time to BOT (for previously written tape)	37 seconds (average)
MTBF	250,000 hours
Interface type	<ul style="list-style-type: none">■ Low-Voltage Differential (LVD) Fast wide SCSI■ High-Voltage Differential (HVD) Fast wide SCSI

Table 41

DLT Media Specifications

Characteristic	DLT Type IV Media
DLT 8000 Formatted capacity	<div><div></div>40 GB (non-compressed)</div> <div><div></div>80 GB (2:1 typical compression)</div>
Basic description	0.5 inch (metal particle)
Tape length	557 meters (1828 feet)
Cartridge dimensions	10.4 x 10.4 x 2.5 cm (4.1 x 4.1 x 1.0 in)
Shelf life	30 years (minimum) @ 20° C 40% RH (non-condensing)
Cartridge life	<div><div></div>1,000,000 passes (any point on the tape passing the recording head in either direction)</div> <div><div></div>2,000 loads/unloads</div>
Cleaning cartridge life	20 uses

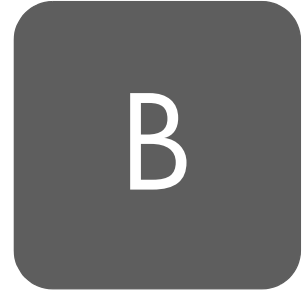
Note You can also use DLT Type IIIXT media, though it has a significantly reduced capacity and performance compared to DLT Type IV media.

Table 42

DLT Bar Code Specifications

Description	Specification
Data cartridge message	6-character: 2 alpha, 4 numeric, (AAnnnn)
Cleaning cartridge message	6-character: 'CLN', 3 numeric (CLNnnn)
Dimensions	5.6 cm x 2.1 cm (2.2 in x .82 in)
Symbology	code 39 without check digit
Start/stop characters	*/*
Narrow bar	0.036 cm (0.014 in)
Ratio	2.5:1
Print quality	ANSI Grade "A"

Customer Support



Appendix Overview

This appendix provides information on the following:

- **Registering Your Product** on page 196
- **Support Services** on page 197
- **Contacting HP Customer Support** on page 202
- **Warranty Information** on page 207

Registering Your Product

Registering your product ensures fast and easy access to Hewlett-Packard Customer Support.

- HP registration web site:

<http://www.register.hp.com>

HP customers who register on our web site join a select group who register to receive:

- Technical support updates
- Special Hewlett-Packard offers
- Direct-to-you details on:
 - Ideas and ways to use your new HP Surestore Tape Library
 - Other exciting HP products
 - News on emerging technologies

Support Services

HP support services upgrade and/or extend the warranty on your tape library. A wide range of service options are available to meet your business uptime needs.

SupportPacks

SupportPacks are available *within* 180 days of your purchase. If you choose to purchase one, your warranty will be upgraded. Once your warranty has expired, post-warranty SupportPacks are also available.

Table 43 on page 198 lists HP SupportPack service options.

Note	To order HP SupportPacks, visit http://www.hp.com/hps/support/supportpack , or contact your support or sales representative.
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Table 43

SupportPacks

SupportPack Number	Description
2/20 series	
H5520A/E	3 year, same day, onsite
H4434A/E	3 year, 24x7, onsite
U2063PA/PD (post-warranty)	1 year, next day, onsite
H2734PA/PE (post-warranty)	1 year, same day, onsite
4/40 series	
H5533A/E	3 year, same day, onsite
H4435A/E	3 year, 24x7, onsite
U2064PA/PE (post-warranty)	1 year, next day, onsite
H2735PA/PE (post-warranty)	1 year, same day, onsite
6/60 series	
H5534A/E	3 year, same day, onsite
H4436A/E	3 year, 24x7, onsite
U2065PA/PE (post-warranty)	1 year, next day, onsite
H2736PA/PE (post-warranty)	1 year, same day, onsite
80 and 100 series	
U2061A/E	3 year, same day, onsite
U2062A/E	3 year, 24x7, onsite
U2066PA/PE (post-warranty)	1 year, next day, onsite
U2067PA/PE (post-warranty)	1 year, same day, onsite

Service Contracts

Service contracts are available *after* the first 180 days of your purchase. If you choose to purchase one, your warranty will be upgraded. To purchase a service contract, or for information on additional options, contact your HP sales representative.

Table 44 on page 199 and **Table 45** on page 200 lists post-warranty service contracts and upgrade options.

Note	To purchase a service contract, or for more information, contact your support or sales representative.
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Table 44

Post-Warranty Service Contracts

Option	Description
01A	Standalone hardware call-to-repair, 6 hour response, 24x7 coverage
02A	Onsite, same day, 4 hour response
02C	Onsite, next working day response
02G	Onsite, 4 hour response, 24x7 coverage
02L	Onsite scheduled response
02V	6 hour hardware call-to-repair
02X	4 hour hardware call-to-restoration

Table 45

Warranty Upgrade Service Contracts

Option	Description
01B	Standalone upgrade to hardware warranty to 6 hour call-to-repair, 24x7 coverage
07A	Priority
07G	Upgrades hardware warranty response to 24x7
07V	Upgrades hardware warranty to 6 hour call-to-repair
07X	Upgrades hardware warranty to 4 hour call-to-restoration

Backup Software Support

While the library product itself is supported by Hewlett-Packard, all software products are supported by individual software vendors. When contacting the software vendor for support, you will need the following information:

- Your name and telephone number
- Product name, release number, operating system, build, and serial number
- Detailed list of error messages reported
- Configuration files and log files related to the problem
- Screen dumps, if applicable
- Explanation of how to reproduce the problem, if possible
- Events that may have contributed to the problem, recent operator actions, recent events in the software or the system, and recent changes to the computer system, software, or network environment.

Contacting HP Customer Support

If your library fails during the warranty period and the suggestions in the documentation do not solve the problem, you can receive support by doing the following:

- Access HP Support on the World Wide Web at: <http://www.hp.com/go/support>
- Contact your authorized HP dealer or Authorized Service Provider
- Call the HP Customer Care Center in your region (See **Telephone Support** on page 203.)

If you purchased a service contract through HP or an authorized reseller, make sure that you register immediately. Failure to register may result in slower response time. Registering allows the local repair office to prepare for the proper response level needed. If your library fails while under the support contract period, contact the appropriate support number included in your contract information.

If your library fails after the warranty period, contact your authorized HP dealer/distributor or the nearest HP sales and service office. Customers in the US and Europe can use a credit card for phone assistance.

Information Needed for Support

Before calling, please have the following information ready:

- Model number of your library
- Serial number (see **Library Information** on page 110)
- Drive type(s)
- Error codes and error code qualifiers
- Revision number for library and drive firmware
- Brand and model of your host computer
- Brand and model of your SCSI or fibre channel host adapter
- Library drivers and backup application software that you are using and the version number(s)

Telephone Support

To obtain technical assistance, call the support representative nearest you.

North and South America

Note	For the latest list of phone numbers for HP Customer Support, see http://www.hp.com/go/support . Phone charges may apply.
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- Argentina
(541) 778 8380
- Brazil
(011) 829 6612
- Canada
905-206-4663
- Chile
800 360 999
- Mexico
800 427 6684
- United States
(970) 635-1500; Monday - Friday,
7 am - 5pm Mountain Time
- Venezuela
800 47 888 (Caracas 207 8488)

European Customer Support Centers

Monday - Friday, 8:30 - 18:00 (C.E.T)

Note	For the latest list of phone numbers for HP Customer Support, see http://www.hp.com/go/support . Phone charges may apply.
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- Austria
+ 43 (0) 7114 201080
- Belgium, Dutch
+ 32 (0) 2 626 8806
- Belgium, French
+ 32 (0) 2 626 8807
- Denmark
+ 45 39 29 4099
- English
International + 44 (0) 171 512 52 02
- Finland
+ 358 (0) 203 47 288
- France
+ 33 (0) 1 43 62 34 34
- Germany
+49 (0) 180 52 58 143
- Ireland
+ 353 (0) 1 662 5525
- Israel
+ 972 (0) 9 9524848
- Italy
+ 39 02 264 10350
- Netherlands
+ 31 (0) 20 606 8751
- Norway
+ 47 22 11 6299
- Portugal
+ 351 (0)1 318 00 65

- Spain
+ 34 902 321 123
- Sweden
+ 46 (0) 8 619 2170
- Switzerland
+ 41 (0) 848 80 11 11
- Turkey
+ 90 212 224 59 25
- United Kingdom
+ 44 (0) 171 512 52 02

Asia Pacific Customer Support Centers

Note For the latest list of phone numbers for HP Customer Support, see <http://www.hp.com/go/support>. Phone charges may apply.

- Australia
+ 61 3 8877 8000
- China
+ 86 (0) 10 6564 5959
- Hong Kong
800 96 7729
- India
+ 91 11 682 6035
- Indonesia
+ 62 21 350 3408
- Japan
+ 81 3 3335 8333
- Korea
+ 82 2 3270 0700
- Outside Seoul
080 999 0700
- Malaysia
+ 60 3 295 2566

- New Zealand
+ 64 9 356 6640
- Penang
1 300 88 00 28
- Philippines
+ 63 2 867 3551
- Singapore
+ 65 272 5300
- Taiwan
+ 886 2 717 0055
- Thailand
+ 66 2 661 4000
- Vietnam
+ 84 (0) 8 823 4530

Elsewhere

Contact your authorized HP dealer/distributor or the nearest HP sales and service office.

Warranty Information

HP Product: HP Surestore Tape Library 20/20, 40/40, 60/60, 8/80 and 10/100 series

Duration of limited warranty: One Year

1. HP warrants HP hardware, accessories, and supplies against defects in materials and workmanship for the period specified above. If Hewlett-Packard receives notice of such defects during the warranty period, Hewlett-Packard will, at its option, either repair or replace products which prove to be defective. Replacement products may be either new or like-new.
2. HP warrants that HP software will not fail to execute its programming instructions, for the period specified above, due to defects in material and workmanship when properly installed and used. If HP receives notice of such defects during the warranty period, HP will replace software media that does not execute its programming instructions due to such defects.
3. HP does not warrant that the operation of HP products will be uninterrupted or error free. If HP is unable, within a reasonable time, to repair or replace any product to a condition as warranted, customer will be entitled to a refund of the purchase price upon prompt return of the product.
4. HP products may contain remanufactured parts equivalent to new in performance or may have been subject to incidental use.
5. The warranty period begins on the date of delivery or on the date of installation if installed by HP. If customer schedules or delays HP installation more than 30 days after delivery, warranty begins on the 31st day from delivery.
6. Warranty does not apply to defects resulting from (a) improper or inadequate maintenance or calibration, (b) software, interfacing, parts or supplies not supplied by HP, (c) unauthorized modification or misuse, (d) operation outside of the published environmental specifications for the products, or (e) improper site preparation or maintenance.
7. TO THE EXTENT ALLOWED BY LOCAL LAW, THE ABOVE WARRANTIES ARE EXCLUSIVE AND NO OTHER WARRANTY OR CONDITION, WHETHER WRITTEN OR ORAL, IS EXPRESSED OR IMPLIED AND HP SPECIFICALLY DISCLAIMS ANY IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY, SATISFACTORY QUALITY, AND FITNESS FOR A PARTICULAR PURPOSE.
8. HP will be liable for damage to tangible property per incident up to the greater of \$300,000 or the actual amount paid for the product that is the subject of the claim, and for damages for bodily injury or death, to the extent that all such damages are determined by a court of competent jurisdiction to have been directly caused by a defective HP product.

TO THE EXTENT ALLOWED BY LOCAL LAW, THE REMEDIES IN THIS WARRANTY STATEMENT ARE THE CUSTOMER'S SOLE AND EXCLUSIVE REMEDIES. EXCEPT AS INDICATED ABOVE, IN NO EVENT WILL HP OR ITS SUPPLIERS BE LIABLE FOR LOSS OF DATA OR FOR DIRECT, SPECIAL, INCIDENTAL, CONSEQUENTIAL (INCLUDING LOST PROFIT OR DATA), OR OTHER DAMAGE, WHETHER BASED IN CONTRACT, TORT, OR OTHERWISE.

Error Code Reference



Library Error Codes

Table 46 on page 210 lists the hard error codes and suggestions for recovery. Use the recovery instructions from the front panel display as the primary approach to troubleshooting. Each hard error is accompanied by a qualifier code and a list of sequence (micro-move) IDs (only used for factory diagnostics).

Note	If you need to contact a service representative to resolve an issue, be sure to note the error code and qualifier code beforehand. For more information, see Information Needed for Support on page 202.
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Each hard error code and qualifier code is paired with a list of recovery suggestions. The library suggests the appropriate recovery procedures, which could include:

- Power cycling the library.
- Removing a tape from the drive.
- Checking the library or host configuration.
- Checking the cable connections (data or power).
- Running diagnostic tests. Diagnostic tests are recommended to help isolate the appropriate FRU for replacement, or to clear the error condition.
- Repositioning a tape or magazine.
- Upgrading firmware.
- Replacing a FRU. Replace FRUs in the order listed. Test after each FRU replacement to determine when the error condition is resolved.

Table 46

Error Codes and Recovery Procedures

Decimal Error	Hex Error	Description	Recovery Method
0	00H	Error code not set.	<ul style="list-style-type: none"> ■ Power cycle the library. ■ Observe the LEDs on the back of the library controller card. See Interpreting Library LEDs on page 130 to understand what the LEDs may indicate.
1-8	01H - 08H	Failed library controller self test.	<p>01h through 08h are controller tests. These errors are possible only on power-up.</p> <ul style="list-style-type: none"> ■ Power cycle the library. ■ Observe the LEDs on the back of the library controller card. See Interpreting Library LEDs on page 130 to understand what the LEDs may indicate. ■ If failure persists, the library controller card may be faulty.
9	09H	Failed translate motor test.	<p>Cannot translate the transport.</p> <ul style="list-style-type: none"> ■ Check for a possible obstruction in the transport pathway and remove it. ■ The umbilical cable may be faulty. ■ If the transport moves a little, but cannot fully rotate around the assembly, a faulty motor is indicated.
10	0AH	Failed vertical motor test.	<p>Occurs when trying to sense if the transport assembly moves vertically. If the assembly does not move:</p> <ul style="list-style-type: none"> ■ Ensure that the motor leads are connected to the vertical motor and the vertical lift board. ■ Check the umbilical cable under the translate frame.

Table 46

Error Codes and Recovery Procedures

Decimal Error	Hex Error	Description	Recovery Method
11	0BH	Failed plunge motor test.	<ul style="list-style-type: none"> Note the error code qualifier to help determine appropriate testing.
12	0CH	Transport failed to find the translate home position.	<ul style="list-style-type: none"> Make sure that all tape cartridges are fully seated in their slots.
13	0DH	Transport failed to find the vertical home position.	<ul style="list-style-type: none"> Check for a possible obstruction in the transport pathway and remove it. Verify that the vertical path is physically clear. Make sure that all tape cartridges are fully seated in their slots. (When manually loaded, cartridges may not have been fully inserted into slots.)
14	0EH	Transport failed to find the plunge home position.	<ul style="list-style-type: none"> The plunge motor can be moved. Therefore, the motor and umbilical cable are probably not indicated. Replace the transport assembly.
15	0FH	Has wrong library family firmware or the controller is on the wrong level.	Download new firmware (see Upgrading Firmware on page 176).
18	12H	Failed because magazine door) is open.	Close magazine doors.
19	13H	Vertical motor cable is missing or faulty.	Check that the vertical cable connections are secure.
20	14H	Transport umbilical cable is missing or faulty.	Check the transport cable connections or the cable that goes from the transport to the library.

Table 46

Error Codes and Recovery Procedures

Decimal Error	Hex Error	Description	Recovery Method
21	15H	A chassis fan is disconnected or faulty.	Check that the chassis fan cable connection is secure.
22	16H	Chassis interconnect cables are disconnected or faulty.	Check that the chassis interconnect cables are secure.
23	17H	Front panel cable is disconnected or faulty.	Check that the front panel cable connections are secure.
24	18H	Transport bar code reader failed self test.	Power cycle the library.
25	19H	Library levels measured does not match the number of levels detected.	<ul style="list-style-type: none"> ■ Check for obstructions in the vertical path. ■ Check that the chassis interconnect cable connection is secure.
26	1AH	Upper level fan cable failed.	See Troubleshooting Common Problems on page 140 for troubleshooting procedures.
27	1BH	Transport controller unable to communicate with transport.	Replace the transport assembly.
28	1CH	Transport controller needs new firmware.	Update the library's firmware (see Upgrading Firmware on page 176).
29	1DH	Failed transport firmware download.	Update the transport's firmware (see Upgrading Firmware on page 176).
50	32H	Test not run, an invalid test number was specified.	If incorrect test number was designated when initiating a test over the SCSI interface, select desired number and then re-initiate the test.

Table 46

Error Codes and Recovery Procedures

Decimal Error	Hex Error	Description	Recovery Method
51	33H	Test not run, tapes not in required locations.	The library needs at least one tape and an empty slot to perform this test.
52	34H	Test not run, an inventory check is needed.	<ul style="list-style-type: none"> ■ Run the Inventory Check test from the front panel (see Running Library Diagnostic Tests on page 156). ■ Update the backup software to show the correct tape and slot configuration.
53	35H	Failed test, refer to previous error.	Note the error code qualifier to help determine appropriate testing.
54	36H	Test not run, some elements are reserved.	Check the backup software documentation to disable the reserved condition.
56	38H	Cannot run test with tapes in current locations.	The library needs at least one tape and an empty slot to perform this test. For a drive test, it cannot rewind the media.
57	39H	Test not run, not enough tapes in the library.	Load one additional tape into the library.
58	3AH	Test not started, the transport contains a tape.	Run the Empty Transport test (see Running Library Diagnostic Tests on page 156).
59	3BH	Failed to put tape into magazine slot.	Note the error code qualifier to help determine appropriate testing.
60	3CH	Failed to get tape from magazine slot.	Note the error code qualifier to help determine appropriate testing.
61	3DH	Failed inventory check on a magazine slot.	<ul style="list-style-type: none"> ■ Note the error code qualifier to help determine appropriate testing. ■ Check magazine back slot for debris or marks. Clean if necessary.

Table 46

Error Codes and Recovery Procedures

Decimal Error	Hex Error	Description	Recovery Method
62	3EH	Failed to load a tape into a drive.	Note the error code qualifier to help determine appropriate testing.
63	3FH	Failed to unload a tape from a drive.	Note the error code qualifier to help determine appropriate testing.
64	40H	Transport unable to inventory drive.	Note the error code qualifier to help determine appropriate testing.
65	41H	Failed while checking for a cartridge in the transport.	Note the error code qualifier to help determine appropriate testing.
66	42H	Transport stuck at home position.	Note the error code qualifier to help determine appropriate testing.
67	43H	Transport stuck at vertical home position.	Note the error code qualifier to help determine appropriate testing.
68	44H	Failed to move after finding the plunge home position.	Note the error code qualifier to help determine appropriate testing.
69	45H	Transport unable to move to the end of the track.	Note the error code qualifier to help determine appropriate testing.
70	46H	Failed inventory check, transport contains a tape.	Note the error code qualifier to help determine appropriate testing.
71	47H	Timeout moving transport to the top of the library.	<ul style="list-style-type: none"> ■ Power cycle the library. ■ Check the vertical path for obstructions. ■ Note the error code qualifier to help determine appropriate testing.

Table 46 Error Codes and Recovery Procedures

Decimal Error	Hex Error	Description	Recovery Method
72	48H	Unable to put tape back into slot after power cycle.	Note the error code qualifier to help determine appropriate testing.
74	4AH	Drive module disconnected or has failed.	<ul style="list-style-type: none"> ■ Ensure that all drive modules are fully inserted into the drive bays at the rear of the library. ■ Note the LEDs on the drive modules. See Interpreting Library LEDs on page 130 to understand what the LEDs may indicate. ■ If the LED indicates failure, replace the drive module.
75	4BH	Drive(s) fan disconnected or faulty.	Note the error code qualifier to help determine appropriate testing.
76	4CH	Failed to perform an inventory check.	Note the error code qualifier to help determine appropriate testing.
77	4DH	Transport moved above highest detected level.	Run the Test Vertical Motion test (see Running Library Diagnostic Tests on page 156).
78	4EH	Not all drives in the library are the same type.	Check to ensure that you have the correct type of drive.
80	50H	Drive reports hardware error.	<ul style="list-style-type: none"> ■ Power cycle the library and re-try. ■ Replace the drive module if unsuccessful. See Removing and Replacing Drive Modules on page 162.
81	51H	Library failed during initialization.	Power cycle the library.

Table 46

Error Codes and Recovery Procedures

Decimal Error	Hex Error	Description	Recovery Method
82	52H	Incorrect external SCSI connection. Library connected to wrong type of SCSI bus.	Check the cable configuration (see Connecting and Powering on the Library on page 32).
89	59H	Cleaning cartridge has expired.	Use a new cleaning cartridge.
90	5AH	Not a cleaning cartridge.	Insert a cleaning cartridge.
100	64H	Library controller unable to communicate with drive module.	Power cycle the library.
101	65H	Drive module unable to communicate with drive.	Power cycle the library.
102	66H	Drive command timeout on drive module controller.	Command timeout on 8051.
103	67H	A drive module controller has failed.	Power cycle the library and re-try. Replace the drive module if unsuccessful (see Removing and Replacing Drive Modules on page 162).
104	68H	Failed drive module initialization.	Power cycle the library.
105	69H	Drive module serial timeout to drive.	Retry command.
110	6EH	Library controller unable to communicate with slave card.	Power cycle the library.

Table 46 Error Codes and Recovery Procedures

Decimal Error	Hex Error	Description	Recovery Method
111	6fH	Slave controller card missing or faulty.	Ensure the slave controller card is installed and fully seated.
112	70H	Slave board command timeout.	Retry command.
113	71H	Slave controller card failed self test.	Power cycle the library.
114	72H	Slave controller card failed initialization.	Power cycle the library.
118	76H	Slave controller is on level 1.	Remove slave controller card from the bottom level of the library.
120	78H	Library controller unable to communicate with Fibre Channel card.	Ensure Fibre Channel card is installed and fully seated.
121	79H	Failed to detect all of the Fibre Channel cards.	Power cycle the library.
122	7AH	Fibre Channel board command timeout.	Power cycle the library.
123	7BH	A Fibre Channel card has failed.	Power cycle library and retry. Replace card if unsuccessful (Removing and Replacing Cards on page 160).
126	7EH	More than one Fibre Channel card is on a library level.	Remove duplicate Fibre Channel card.
130	82H	Library controller unable to communicate with remote management card.	Power cycle the library.

Table 46

Error Codes and Recovery Procedures

Decimal Error	Hex Error	Description	Recovery Method
131	83H	Remote management card is missing or faulty.	<ul style="list-style-type: none"> ■ Ensure the remote management card is installed. ■ Power cycle the library.
132	84H	Remote management card board timeout.	Retry command.
133	85H	A remote management card has failed.	Power cycle the library.
134	86H	The remote management card is not on library level 1.	Move the remote management card to the correct library level (on the bottom level). See Figure 47 on page 131.
135	87H	Failed because more than one remote management card is present.	Remove the extra remote management card. There should be one card installed on the library and on the bottom library level. See Figure 47 on page 131.
136	88H	Failed because the library expansion card is missing or faulty.	Ensure the library expansion card is properly installed, seated, and connected.
137	89H	Failed because the library expansion card is present, but on the wrong library level.	Move the library expansion card to the fifth library level. See Figure 47 on page 131.
138	8AH	Failed because more than one library expansion card is present.	Remove the extra library expansion card. There should be one card installed on the library and on the fifth library level.
140	8CH	Front panel Send command did not complete.	Retry the operation.

Table 46 Error Codes and Recovery Procedures

Decimal Error	Hex Error	Description	Recovery Method
141	8DH	Front panel board missing.	Power cycle library.
142	8EH	Front panel board timeout.	Retry command.
143	8FH	Front panel board failed.	Power cycle the library.
150-155	96H - 9BH	Failed transport controller self test.	Note the error code qualifier to help determine appropriate testing.
157	9DH	Transport plunge motor cable is missing or faulty.	Note the error code qualifier to help determine appropriate testing.
158	9EH	Transport translate motor cable is missing or faulty.	Note the error code qualifier to help determine appropriate testing.
159	9FH	Transport barcode reader cable is missing or faulty.	Note the error code qualifier to help determine appropriate testing.
160	A0H	Transport illuminator cable is missing or faulty.	Note the error code qualifier to help determine appropriate testing.
161	A1H	Two transport cables are missing or faulty.	Note the error code qualifier to help determine appropriate testing.
162	A2H	Three transport cables are missing or faulty.	Note the error code qualifier to help determine appropriate testing.
163	A3H	Four transport cables are missing or faulty.	Note the error code qualifier to help determine appropriate testing.

A

AL_PA Arbitrated loop physical address

B

backup software Software that runs on the host computer that is used to track data backups and execute library functions.

board A printed circuit assembly (PCA). Also called a card or adapter.

bulk load A way to load magazine slots with tapes. Usually refers to the initial loading of the library.

bus A common data path over which data is transported.

C

calibration A routine that is run immediately after a tape cartridge is loaded, in order to determine if the tape is blank or written, compatible with the drive, and capable of being written and read.

cleaning tape A tape that is used only for cleaning a drive.

D

DLT Digital Linear Tape; a family of tape device and media technologies developed by Quantum Corporation.

drawer The area of the library that contains the magazines. Each level of the library has two drawers. Also referred to as *tray*.

drive, tape drive The device that the library uses to record data onto tapes.

<i>drive cleaning</i>	A library feature that uses a cleaning tape to clean a tape drive.
<i>drive module</i>	The entire assembly that houses the drive, including the metal housing and connectors.
<i>differential SCSI</i>	A type of SCSI cable that can carry data a maximum of 25 meters.
E	
<i>event</i>	A significant function of the library displayed in the event log that reports drive errors, online/offline transitions, drive cleaning, and other information.
F	
<i>fabric</i>	Switched interconnect methodology that supports high-speed data routing in Fibre Channel networks.
<i>Fibre Channel</i>	A switched protocol that allows concurrent communication among workstations, supercomputers, mainframes, data storage devices, and other peripherals. Fibre Channel is capable of transmitting at rates exceeding one gigabit per second in both directions simultaneously.
<i>Fibre Channel Arbitrated Loop (FC-AL)</i>	Topology that provides a low-cost solution for attaching multiple Fibre Channel ports in a loop without switches.
<i>front panel display</i>	An LCD (liquid crystal display), equipped with five soft keys, mounted on the front of the library (top level on multi-level libraries) that controls all library functions.
G	
<i>GBIC</i>	Gigabit Interface Converter
H	
<i>hard errors</i>	Electronic errors in library functions that cannot be recovered. These errors are recorded in the hard error log. May also be referred to as host interface card.
<i>HBA</i>	Host Bus Adapter - A circuit board residing in the host system that handles requests to and from the host system and the library. May also be referred to as a host interface card.

<i>home screen</i>	The view on the front panel display that provides status information after the library has been powered on. Also, the default view to which the display returns after being left idle after approximately three minutes.
<i>host</i>	One or more computers that generate and communicate data to the library.
<i>hub</i>	A device that provides a multiple port loop interconnect system to implement a Fibre Channel arbitrated loop using a physical “star” configuration.
<i>HVDS</i>	High Voltage Differential SCSI
I	
<i>identity</i>	A front panel display option that provides the library’s serial number.
<i>IP</i>	Internet Protocol
J	
<i>jumper cables</i>	Cables used to connect the library controller card to a drive. May also be referred to as daisy-chain cables.
L	
<i>latch stop</i>	A spring-loaded safety device that protrudes through the mounting rail. The latch stop allows 2/20, 4/40, and 6/60 tape libraries to be pulled approximately two-thirds out of a rack, while preventing them from being pulled out completely.
<i>LEDs</i>	Light-emitting diodes, also called lamps, found in various library assemblies, including drive modules, power supplies, library cards, and internal assemblies. An LED communicates status information about the assembly.
<i>library</i>	A data storage system that stores electronic data on tape media. Depending on the model, the library can use up to six drive modules.
<i>LTO</i>	Linear Tape-Open; a family of tape device and media technologies developed by Hewlett-Packard, IBM, and Seagate.
<i>LVDS</i>	Low Voltage Differential SCSI

M

<i>MAC Address</i>	Media access control address - a unique hardware-based address that identifies each node on a network.
<i>magazine</i>	A slotted container that resides in the tape drawers that provides individual slots for five tape cartridges.
<i>magazine access</i>	A process of loading or unloading tapes that involves opening a tape drawer and exchanging one or more magazines.
<i>mailslot</i>	A process of loading or unloading tapes that allows the user to access either 1 slot, 1 magazine, or 2 magazines.
<i>move</i>	A single library action, such as loading a tape into a drive, or unloading a tape from a drive.

N

<i>node</i>	An addressable entity connected to an I/O bus or network, used to refer to storage devices and subsystems.
<i>nesting</i>	The menu approach implemented in the library that uses increasing levels of library control.

O

<i>odometer</i>	A front panel option that displays the odometer logs for power-on hours and moves.
<i>originator</i>	A Fibre Channel term that refers to the initiating device.

P

<i>port</i>	The hardware entity within a node that performs data communications.
<i>power (stand-by) switch</i>	A low holding voltage remains in the library even though library has been powered off.

R

<i>RMC, remote management card</i>	A circuit card that provides the ability to gain access to the library from a computer at a different location.
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S

<i>SCSI</i>	Small Computer Systems Interface - A bus that transfers data between the host system and the library.
<i>SCSI ID</i>	The electronic identification number for each SCSI device in the library. The library SCSI devices are the drives and the library interface controller card.
<i>SCSI element reservation</i>	This allows the host to continue reserving drive or slots after a power cycle. This is typically used to ensure that only one host can access a slot or drive.
<i>single-ended SCSI</i>	A type of cable that is limited to short distances.
<i>soft error</i>	Electronic errors in library functions that can be recovered. These errors are recorded in the soft error log.
<i>soft keys</i>	Five buttons located along the bottom edge of the front panel display that are used to execute commands on the display.
<i>swap</i>	Two related library actions, or moves, such as moving a tape from a slot to a drive, and then back to a slot.
<i>switch</i>	A device that provides a (n by n) interconnect to allow a port to have full communication bandwidth with any other port while other communications are occurring.

T

<i>tape, tape cartridge</i>	The media that the library uses for recording data from the host computer(s).
<i>TCP/IP</i>	Transmission Control Protocol/Internet Protocol
<i>terminator</i>	An electronic device that connects to the end of the SCSI bus to stabilize bus signals.
<i>tray</i>	The area of the library that contains the magazines. Each level of the library has two trays. Also referred to as a <i>drawer</i> .

U

<i>Ultrium</i>	A tape format specification for the high capacity implementation of LTO technology.
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UTC Coordinated Universal Time

W

web-based library administrator Describes the interface that allows you to monitor and manage the library over the network via the remote management card.

wide SCSI A 68-pin connector that can be single-ended or differential in implementation.

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i n v e n t



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