Hewlett Packard Enterprise

HPE StoreEver MSL2024, MSL4048, MSL8048, and MSL8096 Tape Libraries User and Service Guide

Abstract

This guide provides information on installing, configuring, upgrading, and troubleshooting the tape library. This guide is intended for system administrators and other users who need physical and functional knowledge of the tape library.

Contents

Features

| | WARNING MOVING PARTS: Only personnel with technical and product safety training (referred to as **users** in this document) may have access to or operate the library.

Read all documentation and procedures before installing or operating the library.

Hazardous moving parts exist inside this product. Do not insert any tools or any part of your body into the tape library while it is operating. |

The HPE StoreEver MSL2024, MSL4048, MSL8048, and MSL8096 Tape Libraries provide compact, high-capacity, low-cost solutions for simple, unattended data backup. This unique design houses up to 12 tape cartridges for each U of height. Tape cartridges can be accessed through removable magazines and one or more mailslots. Each magazine holds up to 12 tape cartridges.

The libraries are compatible with most operating systems. However, the libraries require either direct support from the operating system or a compatible backup application to take full advantage of their many features. To verify compatibility, see the StoreEver support matrix at **https://www.hpe.com/storage/StoreEverSupportMatrix**.

The libraries are customer expandable with exchangeable tape drives. The libraries support Ultrium full-height and half-height tape drives. To see the tape drives currently available for each tape library, see the MSL QuickSpecs at **https://www.hpe.com/storage/StoreEverSupportMatrix**. For a list of all supported configurations, see the StoreEver support matrix at **https://www.hpe.com/storage/StoreEverSupportMatrix**.

The library provides two user interfaces:

- Remote management interface (RMI)—With the RMI you can monitor and operate the library from a webpage. You can access most library functions from the RMI. See **The remote management interface (RMI)**.

- Operator control panel (OCP)—With the OCP you can monitor and operate the library from the front panel.
  ◦ MSL2024: See **Using the MSL2024 OCP** .
  ◦ MSL4048, MSL8048 and MSL8096: See **Using the MSL4048, MSL8048, and MSL8096 OCP** .

MSL2024 front panel
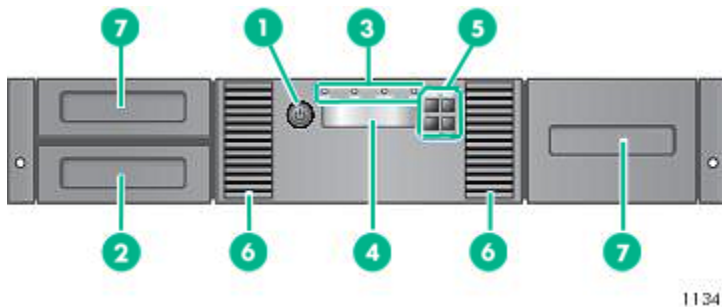
Item	Description
1	Power button
2	Magazine, mailslot location

Item	Description
3	Front panel LEDs
4	Front panel LCD screen
5	Control buttons
6	Air vents
7	Magazines

For OCP functions, see **Using the MSL2024 OCP** .

OCP LEDs

11256

Item	Label	Color	Description
1	Ready	Green	Illuminated when power is on. Blinking when there is tape drive or robotics activity.
2	Clean	Amber	Illuminated when the tape drive has determined that a cleaning cartridge should be used. Cleaning is only necessary when the device directs you to do so. Extra cleaning is not necessary.
3	Attention	Amber	Illuminated if the device has detected a condition that requires attention by the operator.
4	Error	Amber	Illuminated if an unrecoverable error occurs. A corresponding error message displays on the LCD screen.

MSL4048 front panel

The front panel provides access to the power button, OCP, left and right magazines, LEDs, and the mailslot.

11346

Item	Description
1	Power button
2	Magazine, mailslot location
3	Front panel LEDs
4	Front panel LCD screen
5	Control buttons
6	Air vents
7	Magazines

For OCP functions, see **Using the MSL4048, MSL8048, and MSL8096 OCP** .

OCP LEDs

Item	Label	Color	Description
1	Ready	Green	Illuminated when power is on. Blinking when there is tape drive or robotics activity.
2	Clean	Amber	Illuminated when the tape drive has determined that a cleaning cartridge should be used. Cleaning is only necessary when the device directs you to do so. Extra cleaning is not necessary.
3	Attention	Amber	Illuminated if the device has detected a condition that requires attention by the operator.
4	Error	Amber	Illuminated if an unrecoverable error occurs. A corresponding error message displays on the LCD screen.

MSL8048 and MSL8096 front panel
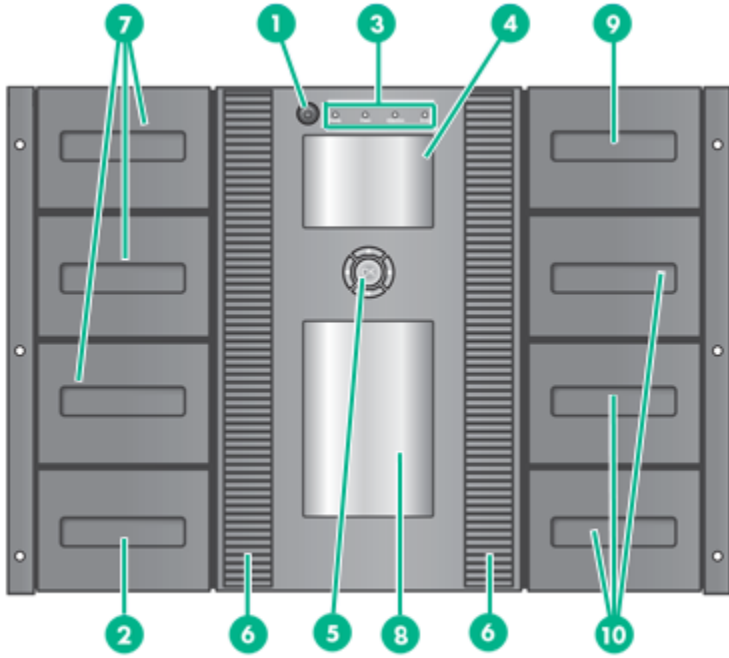
11208

Item	Description
1	Power button
2	Magazine, mailslot location
3	Front panel LEDs
4	Front panel
5	Control buttons
6	Air vents
7	Magazine
8	Observation window
9	12-slot mailslot (MSL8096 only)
10	Magazine (MSL8096 only)

For OCP functions, see **Using the MSL4048, MSL8048, and MSL8096 OCP** .

OCP LEDs

11256

Item	Label	Color	Description
1	Ready	Green	Illuminated when power is on. Blinking when there is tape drive or robotics activity.
2	Clean	Amber	Illuminated when the tape drive has determined that a cleaning cartridge should be used. Cleaning is only necessary when the device directs you to do so. Extra cleaning is not necessary.
3	Attention	Amber	Illuminated if the library has detected a condition that requires attention by the operator.
4	Error	Amber	Illuminated if an unrecoverable error occurs. A corresponding error message displays on the LCD screen. For more information, see **The library displays errors**.

MSL2024 back panel

Item	Description
1	Tape drive assembly
2	Fan
3	Power connector
4	Magazine release hole
5	Pull-out tab containing the serial number and other product information
6	Ethernet port
7	Serial port (Factory use only)
8	Controller health status indicator
9	USB port

MSL4048 back panel

Item	Description
1	Tape drive assembly
2	Fan
3	Power connector
4	Magazine release hole
5	Pull-out tab containing the serial number and other product information
6	Ethernet port
7	Serial port (Factory use only)
8	Controller health status indicator
8	USB port

MSL8048 and MSL8096 back panel

Item	Description
1	Tape drive assembly
2	Fan
3	Power connector
4	Magazine release hole
5	Pull-out tab containing the serial number and other product information
6	Ethernet port
7	Serial port (Factory use only)
8	Controller health status indicator
9	USB port

OCP LEDs

11256

Item	Label	Color	Description
1	Ready	Green	Illuminated when power is on. Blinking when there is tape drive or robotics activity.
2	Clean	Amber	Illuminated when the tape drive has determined that a cleaning cartridge should be used. Cleaning is only necessary when the device directs you to do so. Extra cleaning is not necessary.
3	Attention	Amber	Illuminated if the library has detected a condition that requires attention by the operator.
4	Error	Amber	Illuminated if an unrecoverable error occurs. A corresponding error message displays on the LCD screen. For more information, see **The library displays errors**.

Power supply back panel (MSL4048, MSL8048 and MSL8096)
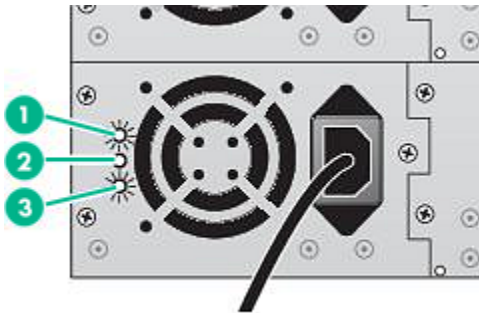
11220

Item	Color	Description
1	Blue	AC power is connected.
2	Yellow	Fan failure. The fan is running too slow or is defective.
3	Green	The power supply is producing good power for the library.

Controller health status indicator

The controller health status indicator is a green LED. The LED is located on the back panel in the lower right corner.
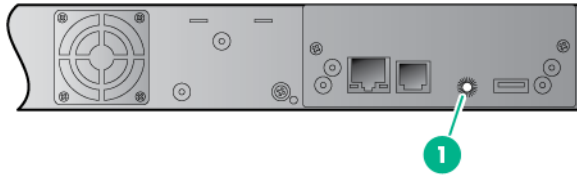
Item	Color	Description
1	Green	Controller health status LED. • Pulses on and off in approximately one second cycles during normal operation. • Solid green or not illuminated while the library is powered on indicates that the controller is not operating correctly.

Tape drive back panels

LTO-4 and LTO-5 full-height FC tape drive back panel
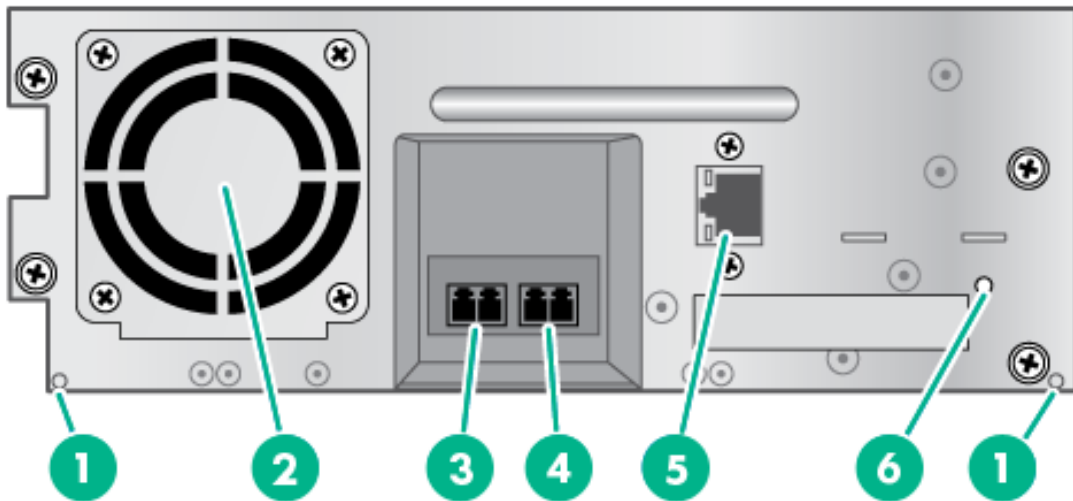
Item	Description
1	Magazine release hole
2	Fan
3	FC port A
4	FC port B (when present)
5	Tape drive Ethernet port (when present)
6	Tape drive power indicator

LTO-5 half-height and LTO-6 FC tape drive back panels
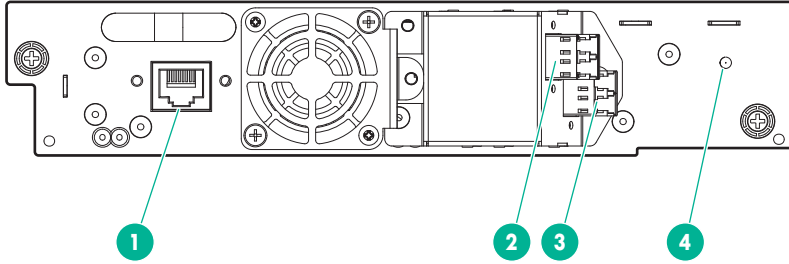
Item	Description
1	Tape drive Ethernet port
2	FC port A
3	FC port B (LTO-6)
4	Tape drive power LED, green

LTO-7 and LTO-8 FC tape drive back panel
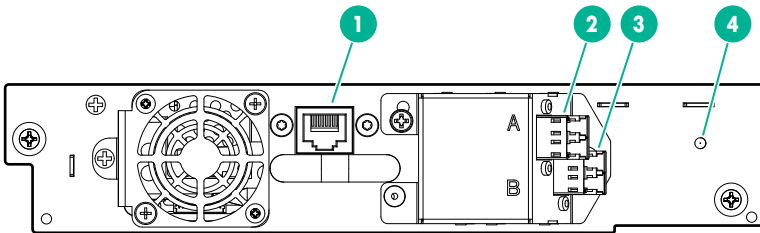
Item	Description
1	Tape drive Ethernet port
2	FC port A
3	FC port B
4	Tape drive power LED, green

LTO-4, LTO-5, and LTO-6 SAS tape drive back panel
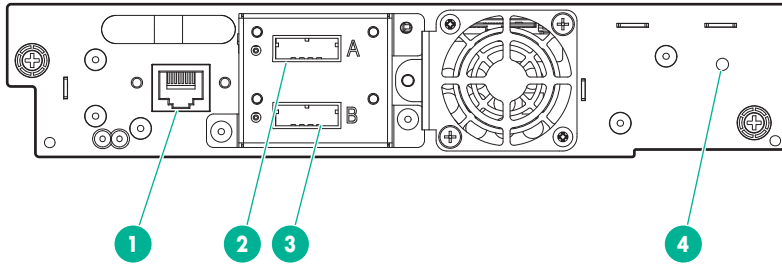
Item	Description
1	Tape drive Ethernet port
2	SAS port A
3	SAS port B (LTO-6)
4	Tape drive power LED, green

LTO-7 and LTO-8 SAS tape drive back panel
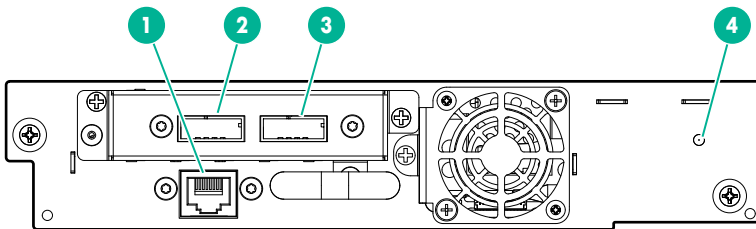
Item	Description
1	Tape drive Ethernet port
2	SAS port A
3	SAS port B
4	Tape drive power LED, green

Parallel SCSI tape drive back panel
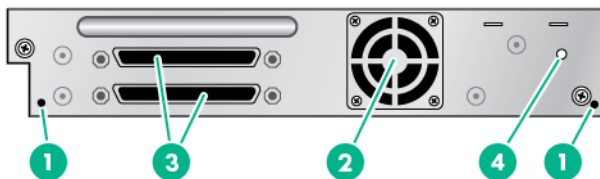
Item	Description
1	Magazine release hole
2	Fan
3	Parallel SCSI ports
4	Tape drive power indicator

Tape drive power indicator

Each tape drive has a green power indicator LED.

Item	Color	Description
1	Green	Tape drive power LED indicates that the tape drive is powered on.

Library options

Redundant power supply

The MSL4048, MSL8048, and MSL8096 tape libraries have a redundant power supply option. The redundant power supply allows the library to continue operating when one power supply fails. With the redundant power supply system, the library can monitor the status of each power supply and power supply fan. The redundant power supply can be installed without powering off the library.

For instructions on installing the redundant power supply, see **Installing a redundant power supply**.

HPE StoreEver 1/8 G2 Tape Autoloader and MSL Tape Libraries Encryption Kit

The encryption kit provides secure generation and storage of encryption keys. The encryption kit can be used with any StoreEver 1/8 G2 Tape Autoloader or MSL2024, MSL3040, MSL4048, MSL6480, MSL8048, and MSL8096 Tape Library with at least one LTO-4 or later generation tape drive.

The encryption kit supports your manual security policies and procedures by providing secure storage for encryption keys. Access to the key server tokens and their backup files is protected with user-specified passwords. You will need to create processes to protect the tokens and secure the passwords.

Before enabling the encryption kit, verify that the library is running the most current firmware to ensure compatibility between the token and library.

To use the encryption kit, insert a key server token in the USB port on the back of the library and then enable the encryption kit and configure the token from the RMI.

ⓘ **IMPORTANT:** When encryption is enabled with the encryption kit, the library will not use encryption keys from other sources, such as a key management system or application software. Disable encryption in applications writing to the library when encryption is enabled with the encryption kit. Applications that attempt to control encryption while encryption is enabled with the encryption kit will not be able to do so, which can cause backups or other write operations to fail.

For information about configuring and using the encryption kit, see the encryption kit user guide, which is available from the Hewlett Packard Enterprise Information Library at **https://www.hpe.com/info/storage/docs**.

Command View TL TapeAssure

HPE Command View TL software provides a browser-based GUI for remote management and monitoring of most Hewlett Packard Enterprise libraries. With Command View TL, you can view and analyze the performance and health of supported tape drives and media in multiple devices at the same time. In addition, TapeAssure displays more extensive drive and media health information than is visible in the RMI.

Command View TL software is installed on a management station. For best performance, locate the management station in the same physical location and on the same IP subnet as the library. Command View TL software is available for download from the Hewlett Packard Enterprise website at **https://www.hpe.com/support/cvtl**.

For information on installing and using Command View TL, see the *HPE StoreEver Command View TL User Guide*, available from the information library: **https://www.hpe.com/info/storage/docs**

Command View TL support is included in all library firmware that supports LTO-5 and later generation tape drives. To find and download the most up-to-date firmware revision, visit the Hewlett Packard Enterprise support website at **https://www.hpe.com/support/hpesc**.

LTFS Support

The HPE StoreOpen Automation application simplifies use of the Linear Tape File System (LTFS) functionality. LTFS makes tape self-describing, file-based, and easy-to-use. The automation application extends LTFS functionality, presenting an autoloader or library and its tape cartridges as a collection of folders. This extension results in easy data access and management. For more information about LTFS capabilities, see **https://www.hpe.com/storage/StoreOpen**.

MSL8048 upgrade license

The MSL8048 can be upgraded to the capacity of an MSL8096 with TA739A, the HPE MSL8048 48 to 96 slot license. The license enables 48 additional storage slots, including 12 slots that can be configured as additional mailslots. To purchase the upgrade license, contact your Hewlett Packard Enterprise sales representative or visit the Hewlett Packard Enterprise website at **https://www.hpe.com**.

Use the RMI **Configure > License Key** screen to manage the license key.

After you order the upgrade license, you can access the additional slots immediately by generating a temporary license key. The temporary key can only be enabled once and is valid for 30 days.

NOTE: The temporary key is intended to provide instant access to the upgrade capabilities until you receive the permanent key. The temporary key expires after 30 days. If you do not have a permanent license key before the temporary key expires, you will lose access to the additional storage slots when the temporary license key expires.

When you receive the permanent license key from Hewlett Packard Enterprise, enter the key and press **Submit**. The permanent license takes effect when the library is rebooted. You might need to reboot the library to enable the additional slots.

HPE MSL Library Extender

The library extender combines two libraries to create a single extended library. Before installing the extender, the libraries must be installed in the rack rails supplied with the libraries in adjacent rack locations, one library above the other.
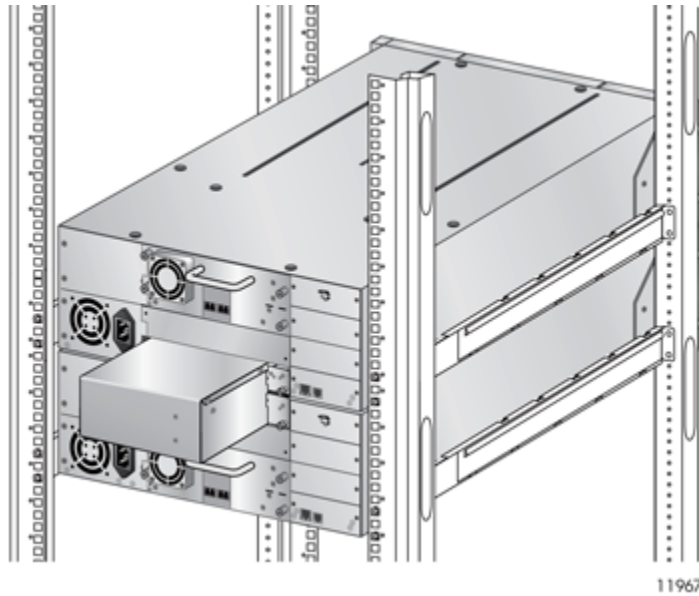
Figure 1: Library Extender installed with two MSL4048 tape libraries

The extender occupies the lower half-height drive bay of the upper library and the top half-height drive bay of the lower library.

The upper library controls the extended library and is called the **master** library. The extended library uses only the master library OCP, USB port, and Ethernet connection.

The master library controls the lower library. The lower library OCP, USB port, and Ethernet connection are not used by the extended library.

Table 1: Library extender supported configurations

Master library	Lower library	Total slots	Total half-height drive bays	Total full-height drive bays
MSL4048	MSL2024	72	3+1	1+0
MSL4048	MSL4048	96	3+3	1+1
MSL8096	MSL2024	120	3+1	3+0
MSL8096	MSL4048	144	3+3	3+1

If you are using the encryption kit with both libraries and then install the extender, you will need to combine the encryption keys onto a single key server token. The extended library only uses the USB port and key server token in the master library; the USB port in the lower library is inactive. For instructions on combining the keys onto a single token, see the encryption kit user guide. If the number of keys on the two tokens is greater than 100, use the **Number of Keys to Backup** option to generate a backup file with a subset of the keys from one of the tokens to restore to the other token.

NOTE: Libraries that require a license to enable all slots must have all slots licensed to operate with the Library Extender.

Hardware-based encryption

The LTO-4 and later generation tape drives include hardware capable of encrypting data while writing data, and decrypting data when reading. Hardware encryption can be used with or without compression while maintaining the full speed and capacity of the tape drive and media.

Encryption is the process of changing data into a form that cannot be read until it is deciphered with the key used to encrypt the data. Encryption protects the data from unauthorized access and use. LTO tape drives use the 256-bit version of the industry-standard AES encrypting algorithm to protect your data.

To use this feature, you need:

- The 1/8 G2 & MSL Encryption Kit or a KMIP-based key server or a backup application that supports hardware encryption.

- LTO-4 or later generation media; no encryption will be performed when writing LTO-3 and earlier generations of tape.

Your company policy will determine when to use encryption. For example, your company could require encryption of company confidential and financial data, but not for personal data. Company policy will also define how to generate and manage encryption keys. Backup applications that support encryption will generate a key for you or allow you to enter a key manually.

For information about using the encryption kit, see **HPE StoreEver 1/8 G2 Tape Autoloader and MSL Tape Libraries Encryption Kit** .

KMIP-based key servers

The library supports integration with encryption key management servers using the Key Management Interoperability Protocol (KMIP) standard. KMIP is an industry standard protocol for communications between a key management server and an encryption system. The KMIP technical committee of the OASIS standards body (Organization for the Advancement of Structured Information Standards) developed the KMIP specification.

The KMIP feature allows the library to obtain encryption keys from selected KMIP-compliant key managers. These keys can be used to encrypt data as it is written to tape. Up to six key servers can be configured for failover purposes.

For instructions on configuring the KMIP feature, see the *HPE StoreEver MSL Tape Libraries Encryption Key Server Configuration Guide*, available from the Enterprise Information Library at **https://www.hpe.com/info/storage/docs**.

Key managers

To use the KMIP feature, the library must have access to a KMIP key manager. Hewlett Packard Enterprise only supports KMIP when used with a supported key manager, listed in the compatibility matrix at **https://www.hpe.com/storage/StoreEverSupportMatrix**.

Operation

When the KMIP feature is enabled and properly configured, tape data will automatically be encrypted with keys delivered from the KMIP key manager. Tapes are encrypted on a key-per-tape basis.

Write, and append operations: The tape drive will request a key when data is written. The library, acting as an intermediary, can request the key manager to create a key. The library then obtains that key and delivers it to the tape drive. A name, which is associated with the media identifier, identifies the key. The key is not retained in the tape drive any longer than necessary to perform encryption operations.

Read operations: The tape drive will request a key. The library, acting as an intermediary, obtains the key identifier, requests that key from the key manager, and delivers it to the tape drive. The key is not retained in the tape drive any longer than necessary to perform decryption operations.

Licensing

The KMIP feature requires that the StoreEver MSL2024/4048/8096 KMIP license has been installed before the feature can be enabled and configured.

Application-managed encryption

Hardware encryption is off by default and is switched on by settings in your backup application. The backup application also generates and supplies the encryption key. Your backup application must support hardware encryption for this feature to work. For a current list of suitable backup software, see the compatibility matrix at: **https://www.hpe.com/storage/ StoreEverSupportMatrix**

NOTE: The library can only obtain encryption keys from one source. Using the encryption kit will prevent application-managed encryption.

Encryption is primarily designed to protect the media once it is offline and to prevent it being accessed from another machine. The tape drive can read and append the encrypted media without being prompted for a key while the machine and application that first encrypted the tape are accessing the tape.

There are two main instances when you will need to know the key:

- If you try to import the media to another machine or another instance of the backup application.

- If you are recovering your system after a disaster.

NOTE: Encryption with keys that are generated directly from passwords or passphrases might be less secure than encryption using truly random keys. Your application will explain the available options and methods. Refer to the application user documentation for more information.

If you are unable to supply the key when requested to do so, no one will be able to access the encrypted data, including support engineers.

This feature guarantees the security of your data, but also means that you must carefully manage the encryption key used to generate the tape.

△ **CAUTION:** Keep a record or backup of your encryption keys and store it in a secure place separate from the computer running the backup software.

For detailed instructions about enabling encryption, see the documentation supplied with your backup application or with the encryption kit. The documentation will also highlight any default states, for example when copying tapes, that might need to be changed when using encrypted tapes.

Logical libraries

You can configure a tape library with multiple tape drives into logical libraries. Each logical library must contain at least one tape drive. Each logical library is configured independently, allowing use by different backup applications and with different backup policies. For example, one logical library could perform a backup operation for one department while the second logical library restores data for another department. Data cartridges in one logical library cannot be shared with other logical libraries.

If the mailslot is enabled, all logical libraries have access to the mailslot. The tape library prohibits a cartridge that was placed in the mailslot by one logical library from being moved into another logical library. The library allows a cartridge that was placed in the mailslot by the operator to be moved into any logical library. If sharing the mailslot among logical libraries is an issue in your environment or your backup application does not support mailslot sharing, disable the mailslot.

Each logical library has a unique serial number and World Wide Identifier (WWID), which can be found in the RMI **Identity > Library** screen.

MSL2024 and MSL8048 Tape Libraries partitions

An MSL2024 tape library with two tape drives can be configured into two logical libraries. Each logical library is assigned one tape drive and one magazine.

An MSL8048 with at least two tape drives can be configured into two logical libraries. Each logical library is assigned at least one tape drive and two magazines.

Table 2: MSL2024 and MSL8048 Tape Libraries partitioned into two logical libraries
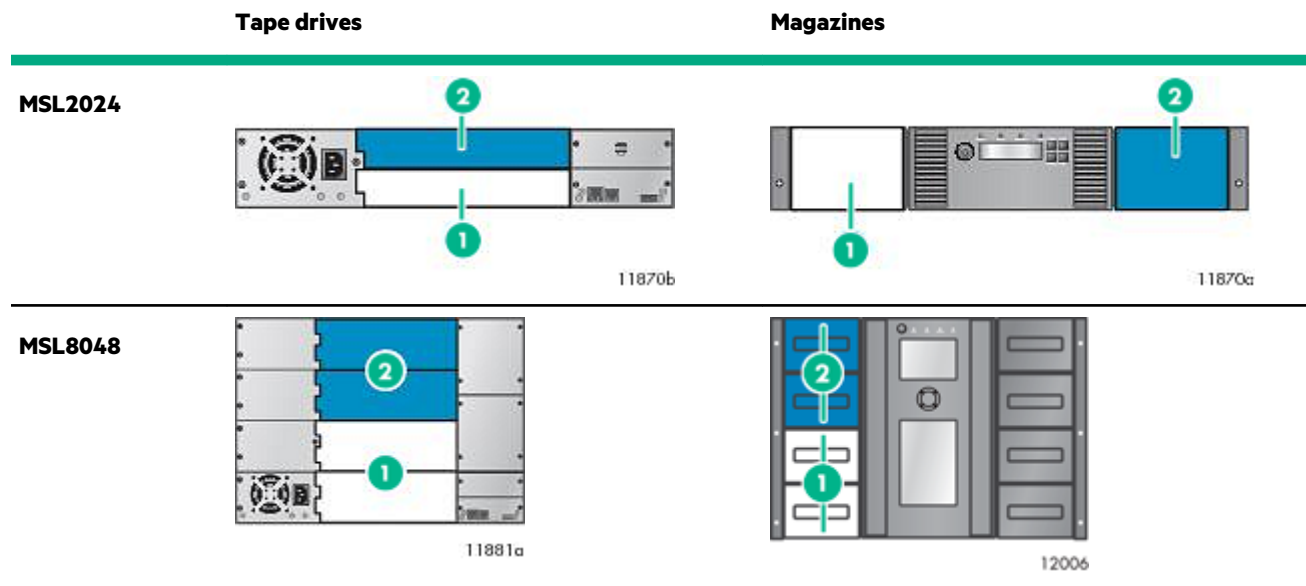
	Tape drives	Magazines
MSL2024	11870b	11870a
MSL8048	11881a	12006

Item	Description
1	Logical library 1 tape drives and magazines
2	Logical library 2 tape drives and magazines

MSL4048 and MSL8096 Tape Libraries partitions

The MSL4048 and MSL8096 Tape Libraries can be configured into two to four logical libraries, depending on the number of tape drives installed. The MSL4048 supports up to two full-height tape drives or up to four half-height tape drives. The MSL8096 supports up to four half-height or full-height tape drives.

Each logical library includes the tape drives in specific drive locations. If there is not a tape drive in the top half of the library, you might need to move a tape drive. If the library only has two tape drives installed in the bottom two drive bays, move one tape drive to the top half of the library. Power off the tape drive from the RMI **Configuration > Drive** screen before moving the tape drive. For instructions on removing and replacing a tape drive, see **Replacing a tape drive**.

NOTE: The MSL4048 tape library will not operate with a full-height tape drive installed in the middle two half-height drive bays. Only install a full-height tape drive in either the upper or lower two half-height drive bays.

Table 3: MSL4048 and MSL8096 Tape Libraries partitioned into two logical libraries
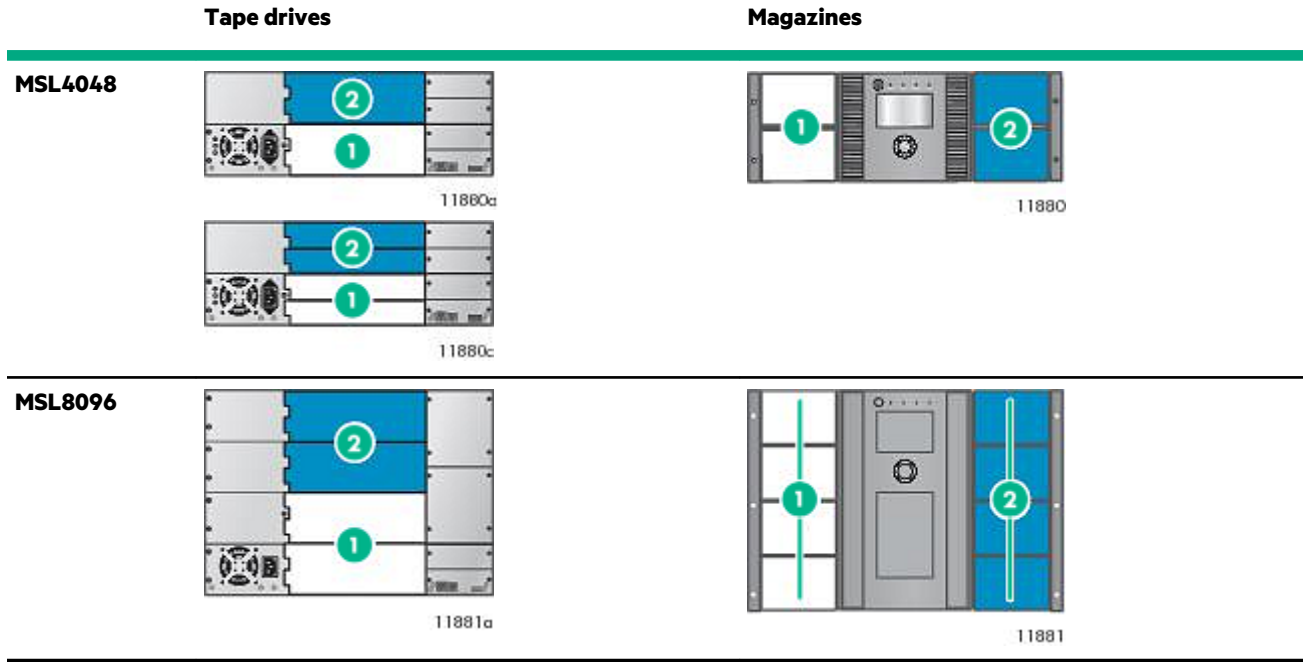
	Tape drives	Magazines
MSL4048	11880a 11880c	11880
MSL8096	11881a	11881

Item	Description
1	Logical library 1 tape drives and magazines.
2	Logical library 2 tape drives and magazines.

NOTE: In the MSL8096, half-height tape drives are installed in the bottom half of each drive bay.

Table 4: MSL4048 and MSL8096 tape libraries partitioned into three logical libraries
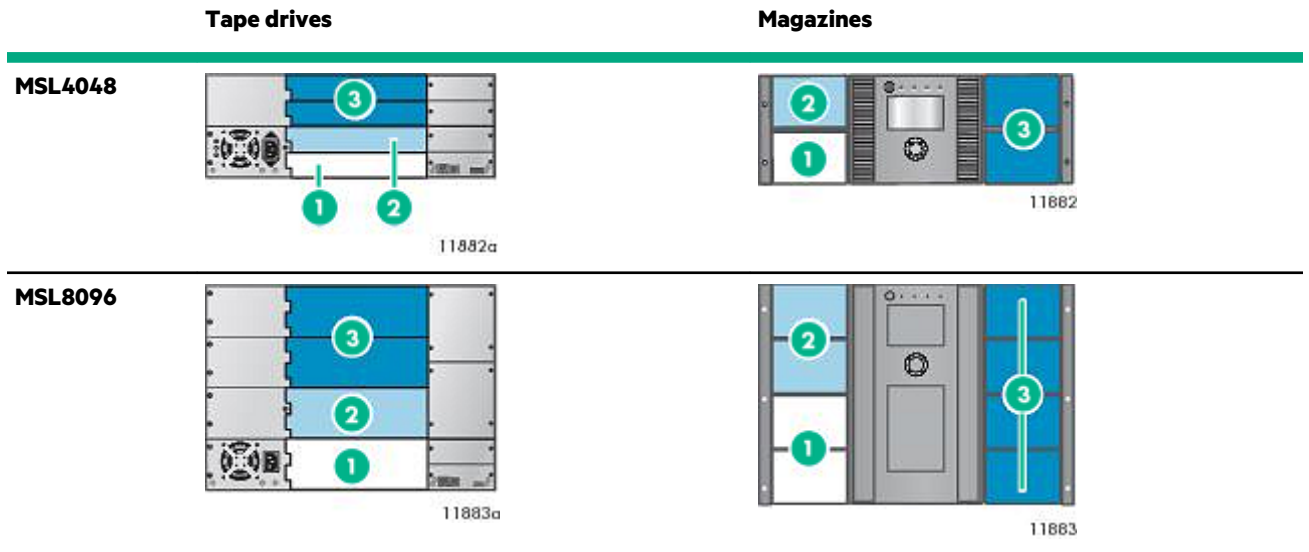
	Tape drives	Magazines
MSL4048	11882a	11882
MSL8096	11883a	11883

Item	Description
1	Logical library 1 tape drive and magazines.
2	Logical library 2 tape drive and magazines.
3	Logical library 3 tape drives and magazines.

Table 5: MSL4048 and MSL8096 Tape Libraries partitioned into four logical libraries
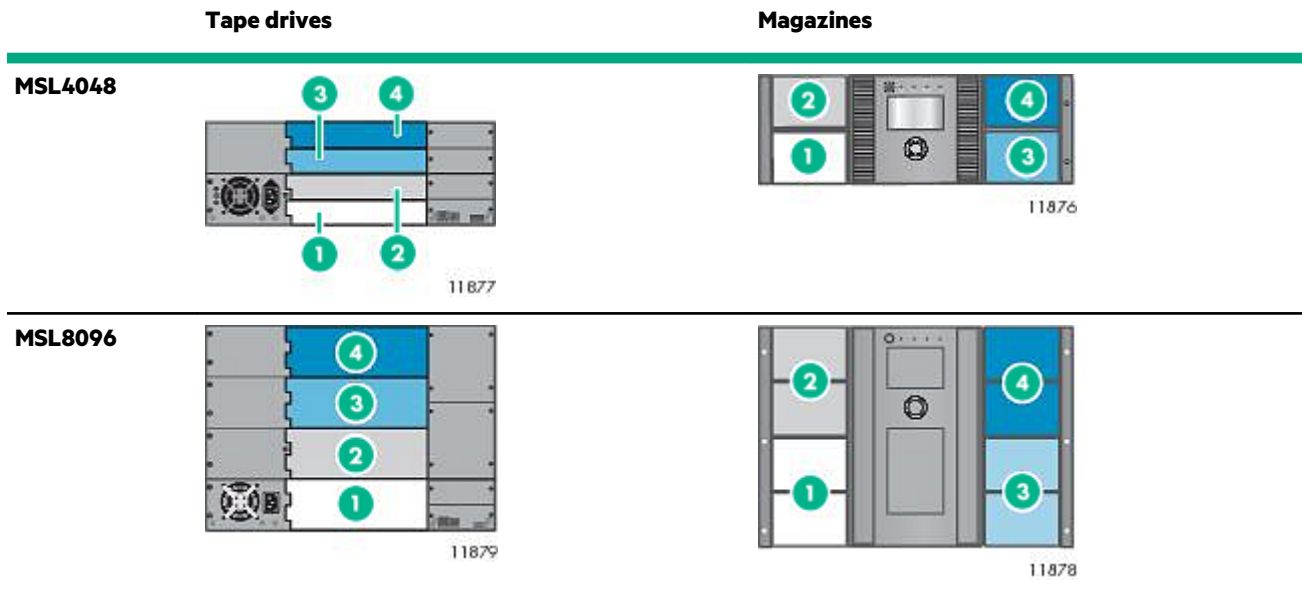
	Tape drives	Magazines
MSL4048		
MSL8096		

Item	Description
1	Logical library 1 tape drive and magazines.
2	Logical library 2 tape drive and magazines.
3	Logical library 3 tape drive and magazines.
4	Logical library 4 tape drive and magazines.

Control path and data path failover

With high dependency on access to business information, safe-guarded data and limited backup windows, the reliability of the backup hardware and software is vital. Additionally, backup operations are automated, often run at night, and any first pass operator intervention is done remotely. To assist with these enterprise demands, Hewlett Packard Enterprise supports data path and control path failover for MSL2024, MSL4048, MSL8048, and MSL8096 tape libraries with LTO-5 and LTO-6 FC tape drives. Failover functionality in the LTO-5 and LTO-6 tape drives and in the tape libraries transfers the active path and all settings to the standby path following failures.

- **Data path failover**—a standby path is configured for the data path to the tape drive and activated following link failures.

- **Library control path failover**—a second drive is configured to host a standby library control path that can be activated following link failures.

For additional information about path failover technology and configuration, see the *HPE StoreEver Tape Libraries LTO-5 and LTO-6 Failover User Guide*, which is available from the HPE Enterprise Information Library at **https://www.hpe.com/info/storage/docs**.

NOTE: Path failover is not currently supported for LTO-7 and later generation tape drives in the MSL2024, MSL4048, MSL8048, or MSL8096 tape libraries.

Network configuration information

The MSL tape library requires several networking ports to enable network functions. The following network ports must be open in any firewalls between the tape library and hosts or appliances it communicates with.

Port	Direction	Use
22 (TCP)	Inbound	Service. This port can be disabled by the administrator when the library is not being serviced.
80 (TCP)	Bidirectional	Remote management interface (RMI)
161 (UDP)	Bidirectional	SNMP
162-169 (UDP)	Inbound	One port in the range is required to receive SNMP traps.
427 (UDP+TCP)	Bidirectional	Service Locator Protocol (SLP)
443 (TCP)	Inbound	HTTPS secure access to the RMI
Configurable (TCP)	Outbound	KMIP communication with a key management appliance (configurable). Multicasting and ping support are also required to set up KMIP communication. The default is 5696.

Installing the tape library

Procedure

1. Plan the installation.

   - **Location requirements**

   - **FC configuration information**

   - **SAS configuration information**

   - **Parallel SCSI configuration information**

2. **Prepare the host**

3. **Unpack the shipping container**

4. **Remove the shipping lock**

5. **Install the library in a rack**

6. **Install the tabletop conversion kit**

7. **Install tape drives**

8. **Change the SCSI address (parallel SCSI drives only)**

9. **Connect the parallel SCSI cable**

10. **Connect the FC cable**

11. **Connect the SAS cable**

12. **Power on the library**

13. **Configure the library**

14. **Verify the connection**

15. **Label the tape cartridges**

16. **Verify the installation**

17. **Configure additional features**

Location requirements

Select an open rack location with access to the host server and a power outlet. If possible, install the library in the middle or higher part of the rack to avoid dust from the floor and to allow easy access to the mailslot and magazines.

(!) **IMPORTANT:** The library must be mounted on the enclosed rack rails. Placing the library on a surface, such as a table top or rack shelf, could result in library errors.

If installing the library with the library extender, determine the master and lower units, and install them in adjacent rack locations, with the master library directly above the lower library. To install the extender, both libraries must be installed in the rack rails.

Table 6: Library extender supported configurations

Master Library	Lower Library
MSL4048	MSL2024
MSL4048	MSL4048
MSL8096	MSL2024
MSL8096	MSL4048

Table 7: Location criteria

Criteria	Definition
Rack requirements	HPE G2 Enterprise Series, Enterprise Series, G2 Advanced Series, Advanced Series, Standard Series and other HPE square-hole or round-hole racks
Rack space requirements	MSL2024: 2U MSL4048: 4U MSL8048 and MSL8096: 8U
Room temperature	10-35º C (50-95º F)) for the tape library. Some tape drives have a more limited temperature range when operating at high altitudes. Verify the tape drive operating requirements before installing a tape drive in a high altitude environment
Power source	AC power voltage: 100-127 VAC; 200-240 VAC Line frequency: 50-60 Hz Place the library near an AC outlet. The AC power cord is the main AC disconnect device for the library and must be easily accessible at all times.
Weight without media	MSL2024: 13.6 kg (29.9 lb) - 15.6 kg (34.3 lb) MSL4048: 18.6 kg (40.9 lb) -24.6 kg (54.1 lb) MSL8048 and MSL8096: 44.6 kg (98.3 lb) - 46.6 kg (102.7 lb)
Weight with media	MSL2024: 18.4 kg (40.5 lb) - 20.4 kg (44.9 lb) MSL4048: 28.2 kg (62.0 lb) - 34.2 kg (75.2 lb) MSL8048: 54.2 kg (117.4 lb) - 56.2 kg (121.9 lb) MSL8096: 66.8 kg (147.2 lb) - 68.8 kg (151.7 lb)

Table Continued

Criteria	Definition
Air quality	Place the library in an area with minimal sources of particulate contamination. Avoid areas near frequently used doors and walkways, stacks of supplies that collect dust, printers, and smoke-filled rooms. Excessive dust and debris can damage tapes and tape drives. ⚠ **CAUTION:** Chemical contaminant levels in customer environments for Hewlett Packard Enterprise hardware products must not exceed G1 (mild) levels of Group A chemicals at any time as described in the current version of *ISA–71.04–1985 Environmental Conditions for Process Measurement and Control Systems: Airborne Contaminants.*
Humidity	20-80 percent relative humidity noncondensing
Clearance	Back: Minimum of 15.4 cm (6 inches) Front: Minimum of 30.8 cm (12 inches) Sides: Minimum of 5.08 cm (2 inches)

💡 **TIP:** Temperature and humidity specifications are more tightly controlled for tape media, tape drives, and tape libraries than many other products installed in the data center. Ensure that the tape media and drives reside in an area within the temperature and humidity specifications.

FC connection information

Connect the FC tape drive directly to the server with an HBA or indirectly through a SAN with an FC switch.

Table 8: FC drive interface speeds

LTO generation	Supported speeds
LTO-3, LTO-4	1 Gb, 2 Gb, 4 Gb
LTO-5, LTO-6, LTO-7, LTO-8	2 Gb, 4 Gb, 8 Gb

Most supported tape drives have two FC ports. Only one port can be used at a time, but both ports can be connected for path failover or with software that supports multipath. If you are using only one port, you can use either port. Path failover is a licensed library feature.

Direct connection

The host must have a 2 Gb, 4 Gb, 8 Gb, or 16 Gb FC HBA. A 4 Gb HBA is recommended for LTO-4 tape drives. An 8 Gb or faster HBA is recommended for LTO-5 and later generation tape drives. To verify that an HBA is supported on your server and qualified for the tape drive, see the compatibility matrix at: **https://www.hpe.com/storage/StoreEverSupportMatrix**

A server that has FC-attached hard drives performs best with at least two FC ports. Using the same FC port for disk and tape drive access can cause performance degradation.

SAN connection

All switches between the host and the tape drive must be of the appropriate type. A 2 Gb switch in the path might cause performance degradation when backing up highly compressible data.

Configure zoning on the FC switch so that only the backup servers can access the tape drive. For more information, see the switch documentation.

Cable requirements

An FC cable is required for each FC port you plan to use. The tape drive has an LC-style connector. The maximum cable length is based on the tape drive and external cable type.

Drive type	Cable type	2 Gb	4 Gb	8 Gb
All	OM2	0.5 - 300 m	0.5 - 150 m	Not supported
LTO-5 HH*	OM3, OM4	0.5 - 300 m	0.5 - 150 m	0.5 - 50 m
All except LTO-5 HH	OM3, OM4	0.5 - 500 m	0.5 - 380 m	0.5 - 150 m

* The LTO-5 Ultrium 3000 half-height drive is shown as **LTO-5 HH**.

SAS connection information

The server must have a SAS host bus adapter with an external connector.

Table 9: SAS drive interface speeds

LTO generation	Supported speeds
LTO-4	1.5 Gb, 3 Gb
LTO-5, LTO-6, LTO-7, LTO-8	1.5 Gb, 3 Gb, 6 Gb

The library uses two SCSI logical unit numbers (LUNs) and requires an HBA with multiple LUN support. Most Hewlett Packard Enterprise SAS RAID controllers support tape devices; many other SAS RAID controllers do not support tape devices. To verify the specifications of your HBA or find a list of compatible HBAs, see the StoreEver Support Matrix: **https://www.hpe.com/storage/StoreEverSupportMatrix**

⚠ **CAUTION:** Do not connect the library to a SAS RAID controller unless the compatibility matrix shows that the controller is qualified with the library. The server might not be able to boot when the library is connected to an unsupported SAS RAID controller.

About SAS

SAS is a computer bus technology for transferring data to and from storage devices, including disk drives and tape drives. SAS-1, which is used for LTO-4 tape drives, is designed to transfer data at 3 Gb/s. SAS-2, which is used for LTO-5 and later generation tape drives, is designed to transfer data at 6 Gb/s.

⚠ **CAUTION:** Reliable data transfer requires high-quality cables and connections.

- Always verify that the SAS cable is rated for the data transfer speed of the HBA and tape drive.

- Do not use adapters or converters between the HBA and the tape drive. SAS signal rates require clean connections and a minimum number of connections between the HBA and the tape drive.

- SAS cables described as "equalized" might not support 6 Gb/s data rates. Do not use equalized cables with LTO-5 or later generation tape drives unless these cables are verified for 6 Gb/s data rates.

- For optimal performance, only use cables of the length specified as qualified for your products. Do not use a SAS cable longer than 6 meters.

Cable requirements

SAS uses serial connections, with a direct connection between the host server and each of the storage devices. This method eliminates the need to configure SCSI buses and assign SCSI IDs, as is required for parallel SCSI devices.

Most SAS HBA ports have four SAS channels. A tape drive uses one channel, so each HBA port can support up to four tape drives. You can use a cable with one connector on each end, but only one channel will be used. The SAS fanout cable recommended for use with the library can connect up to four SAS tape drives to a single SAS HBA port.

11622
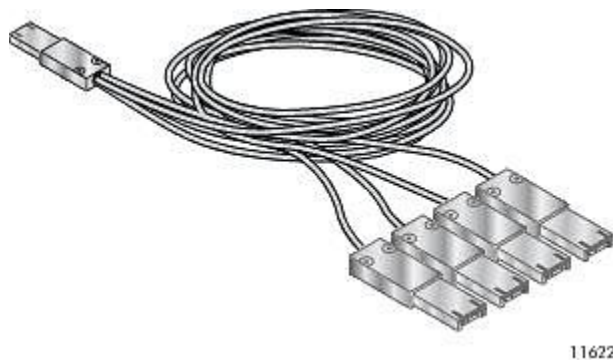
Figure 2: Example SAS fanout cable

Connectors

The host end of the cable must have the same type of connector as the HBA external SAS port.

The tape drive has a mini-SAS connector. The connector is keyed in location 4, which is the standard location for end devices. If you use a cable other than the one recommended for use with the product, verify that it is keyed in location 4.

⚠ **CAUTION:** Mini SAS connectors are keyed. Do not force a SAS cable mini-SAS connector into the tape drive mini-SAS port because it might be keyed differently.

World Wide identifiers

A unique identifier called a World Wide Name (WWN) or World Wide Identifier (WWID) identifies a SAS tape drive. The library assigns the World Wide identifier to the drive bay. When a tape drive is replaced, the World Wide identifier is reassigned to the new tape drive.

The operating system tracks the World Wide identifier for the drive on each HBA channel. Each of the drive connectors on a fanout cable is associated with an HBA channel. Once a drive has been connected, keep it on the same channel to retain the association between the HBA channel and World Wide identifier.

Parallel SCSI configuration information

The parallel SCSI libraries use the Ultra 320 SCSI LVD interface. The libraries use a separate SCSI ID for each tape drive, with dual LUNs on the master drive SCSI ID to control the tape drive (LUN 0) and library robotic (LUN 1). Hewlett Packard Enterprise recommends that each Ultrium tape drive has its own bus when possible.

The parallel SCSI libraries incorporate a wide SCSI-2 or SCSI-3 low-voltage differential (LVD) SCSI bus. Make sure that your SCSI host adapter or controller supports these standards.

> **IMPORTANT:** The libraries are NOT compatible with a high-voltage differential (HVD) SCSI bus. Do not put the library on a narrow (50-pin) parallel SCSI bus because doing so will severely degrade performance.

If the host computer will have multiple parallel SCSI devices, you must decide how they will be configured into one or more parallel SCSI buses.

About parallel SCSI buses

A parallel SCSI bus consists of the host bus adapter (HBA), the parallel SCSI devices, the parallel SCSI cables, and the terminators. The HBA and devices are connected in a chain, with each device connected to the next. The last device must have a SCSI terminator. Each device in the chain must have a unique SCSI address (SCSI ID).

Complex devices, such as the library, assign subaddresses, called logical unit numbers (LUNs), to different parts of the device. The HBA and operating system must support multiple LUNs, also called LUN scanning, for the application software to operate the library. HPE Smart Array controllers, most third-party RAID controllers, and many on-board SCSI controllers do not support multiple LUNs.

An HBA might have one or two channels, with each channel supporting one parallel SCSI bus. Check to see how many channels the HBA has and what devices are already connected to the HBA. Some devices, such as parallel SCSI disk drives, could be inside the server.

The devices on a parallel SCSI bus share bandwidth so be careful about which devices you put together on a bus. Also, putting a single-ended (SE) SCSI device on the bus will slow all the devices on the bus down to SE speed. To see what kind of parallel SCSI interface a device has, see the interface specifications for the device.

HBA requirements

For optimum performance, place each tape drive on its own parallel SCSI bus and use a host bus adapter that can transfer data as fast as the library can read and write. Verify that the operating system supports the HBA. For best performance, use an Ultra 320 HBA. For current HBA compatibility information, see the compatibility matrix at: **https://www.hpe.com/storage/StoreEverSupportMatrix**.

> **IMPORTANT:** Do not connect an LTO tape drive to an SE SCSI bus, as it severely degrades library performance. A single-ended SCSI host bus adapter severely degrades library performance and limits cable length. Also, if any SE devices are on the SCSI bus, all the devices on the bus slow down to SE speed, severely degrading performance.

Multiple LUN support

The library uses a single SCSI ID and two logical unit numbers (LUN). LUN 0 controls the tape drive and LUN 1 controls the robotic. The library requires an HBA that supports multiple LUNs. If multiple LUN support is not enabled, the host computer cannot scan beyond LUN 0 to discover the library. It just sees the tape drive.

Parallel SCSI HPE Smart Array controllers, RAID controllers, and most on-board HBAs do not support multiple LUNs. For current HBA compatibility information, see the compatibility matrix at **https://www.hpe.com/storage/StoreEverSupportMatrix**.

> **IMPORTANT:** The library requires an HBA that supports multiple LUNs, which is also called "LUN scanning."

Optimizing throughput

If possible, put each tape drive on its own parallel SCSI bus. For optimum performance, each LTO-4 tape drive must be on its own Ultra 320 SCSI bus. This configuration will give you the best performance and easiest installation.

If a tape drive must share a parallel SCSI bus with one or more other devices or the library has multiple tape drives that must share a bus, follow these guidelines to plan your parallel SCSI buses for the highest performance:

- Do not put a tape drive on the same parallel SCSI bus as a disk drive because the system and backup performance will be slow when data is written from the hard drive to tape or from tape to the hard drive.

- Do not put a tape drive on the same parallel SCSI bus as a disk array because the disk and the tape drive performance will be affected. Most RAID controllers do not support multiple LUNs and the data on the disk array could become corrupted.

- Avoid putting an SE SCSI device on the same bus as a tape drive because the SE device will slow the tape drive to SE speed and reduce the allowable cable length.

Default SCSI addresses

NOTE: The HBA also has a SCSI address, which is typically 7.

Verify that each device on the bus has a unique SCSI address. If these preconfigured addresses will not be unique on a bus, change the SCSI address of one or more of the tape drives during the installation process.

- **MSL2024:** For full-height tape drives the default SCSI address is 4. For half-height drives, the default SCSI address for the bottom drive is 4 and the default SCSI address for the top drive is 5 as shown in the following illustration.
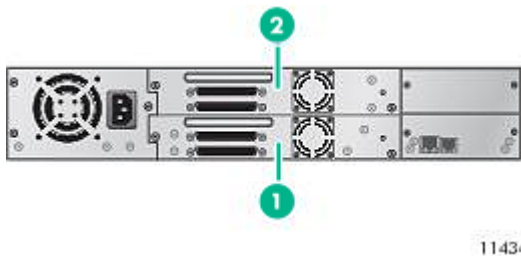
Figure 3: MSL2024 parallel SCSI tape drive default SCSI addresses

Item	Description
1	Tape drive with SCSI address 4
2	Tape drive with SCSI address 5

- **MSL4048:** For full-height tape drives the default SCSI address is 4. For half-height drives, the default SCSI address for the bottom drive in each full-height drive bay is 4 and the default SCSI address for the top drive is 5.
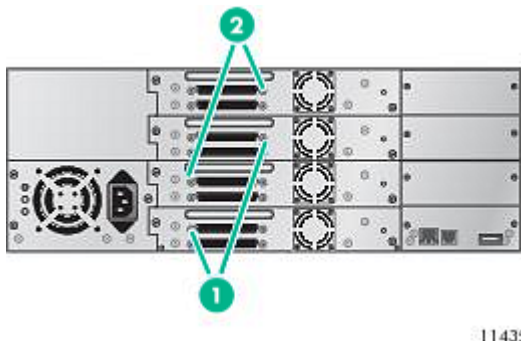
Figure 4: MSL4048 parallel SCSI tape drive default SCSI addresses

Item	Description
1	Tape drives with SCSI address 4
2	Tape drives with SCSI address 5

- **MSL8048 and MSL8096**: The default SCSI address for all tape drives is 4.

NOTE: Use the Library & Tape Tools (L&TT) to check the server parallel SCSI configuration. L&TT is available without cost from the L&TT website at **https://www.hpe.com/support/TapeTools**.

Preparing the host

ⓘ **IMPORTANT:** Use proper procedures to prevent electrostatic discharge (ESD). Use wrist-grounding straps and anti-static mats when handling internal components.

Procedure

- If you are not the system administrator of the host computer, check with the system administrator before powering off the computer.

- For a library with FC drives, install an FC HBA or verify that you have sufficient ports available on a compatible FC switch.

- For a library with SAS drives, if necessary, install a SAS HBA with an external SAS connector that supports multiple LUNs. Refer to the host computer and HBA documentation for installation information.

- For a library with parallel SCSI drives, install a parallel SCSI HBA that supports multiple LUNs.

  Refer to the host computer and HBA documentation for installation information.

- Install application software and compatible drivers on the host computer. See the application software manuals for installation and configuration information.

- Install the Library & Tape Tools (L&TT) diagnostic utility to see what devices are connected to the host, verify the installation, upgrade firmware, and aid in troubleshooting.

  Download L&TT without charge from: **https://www.hpe.com/support/TapeTools**

Unpacking the shipping container

⚠ **CAUTION:** If the temperature in the room where the library will be installed varies 15ºC (30ºF) from the room where it was stored, allow library to acclimate to the surrounding environment for at least 12 hours before unpacking the shipping container.

Procedure

1. Clear a level work surface near where you will place the library.

2. Inspect the container for shipping damage. If you notice any damage, report it to the shipping company immediately.

3. Remove the packaging, accessories, and library from the box one layer at a time.

4. Place the library on a level work surface.

   ⚠ **CAUTION:** Do not place the library on either end or its sides as doing so might damage it.

5. Carefully remove the foam padding and then the bag from the library.

6. Save the packaging materials for moving or shipping the library in the future.

7. Verify that you received the following components:

    a. Library

    b. Ethernet cable

    c. Two rack rails with packets of rack hardware

8. Verify that you have the necessary cables.

    a. For a library with FC drives, you must provide an FC cable for each FC port you plan to use. See **FC connection information**.

    b. For a library with SAS drives, you must provide a SAS cable with the correct connector for your HBA. See **SAS connection information**.

Removing the shipping lock

Skip this step for the MSL8048 and MSL8096.

The shipping lock prevents the robotic transport mechanism from moving during shipment. Remove the shipping lock before powering on the library. The shipping lock is held in place with a piece of tape and is located in the top center of the library. After removing the shipping lock, store it on the back panel of the library for future use.

Procedure

1. Locate the tape and shipping lock at the top of the library.
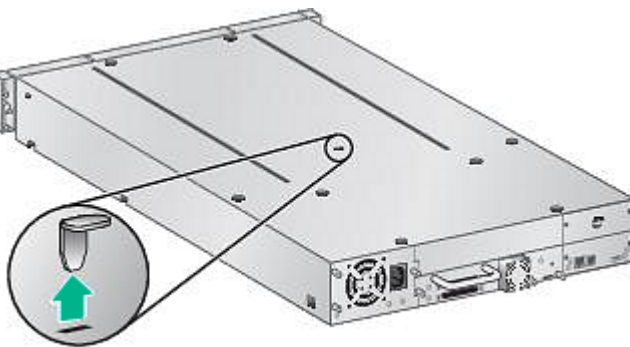
11385

2. Remove the tape, and then remove the lock.

3. Store the lock on the back panel.

    The shipping lock storage location for the MSL4048 is on the back panel, similar to the location on the MSL2024.

11 424

Installing the library in a rack

⊙ **IMPORTANT:** The library must be mounted on the enclosed rack rails unless it is installed in the tabletop conversion kit. Placing the library on a surface, such as a table top or rack shelf, could result in library errors.

⚠ **WARNING:** The MSL2024 weighs up to 15.6 kg (34.3 lb) without media and up to 20.4 kg (44.9 lb) with media (24 cartridges). The MSL4048 weighs up to 24.6 kg (54.1 lb) without media and up to 34.2 kg (75.2 lb) with media (48 cartridges). The MSL8048 weighs up to 46.6 kg (102.7 lb) without media and up to 66.5 kg (151.7 lb) with media (48 cartridges). The MSL8096 weighs up to 46.6 kg (102.7 lb) without media and up to 68.8 kg (151.7 lb) with media (96 cartridges).

When moving the library, to reduce the risk of personal injury or damage to the library: 1) observe local health and safety requirements and guidelines for manual material handing, 2) always remove all tapes to reduce the overall weight of the library, and 3) obtain adequate assistance to lift and stabilize the library during installation or removal.

⚠ **WARNING:** To reduce the risk of personal injury or damage to equipment:

- Extend the leveling jacks to the floor.
- Ensure that the full weight of the rack rests on the leveling jacks.
- Install the rack stabilizer kit on the rack.
- Extend only one rack component at a time. Racks might become unstable if more than one component is extended.

Prerequisites

#2 and #3 Phillips screwdrivers

Procedure

1. Select the hardware packet for your rack.

Packet label	Applicable racks
7.1 mm Round-Hole Rack	HPE supported racks with 7.1 mm round holes in the rack column
9.5 mm Square-Hole Rack	HPE supported racks with 9.5 mm square holes in the rack column

2. Install the rails.

   a. Using the screws from the packet for your rack and a #3 Phillips screwdriver, secure the front of one rail to the front of the rack. The support platform of each rail is tapered, narrowing towards the rear.
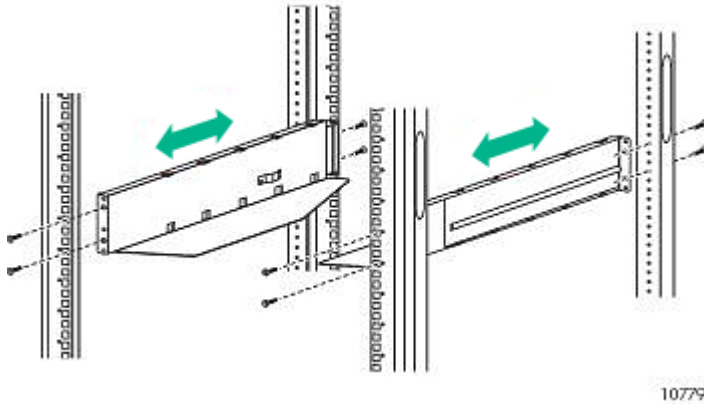
10779

b. Extend the rail to the depth of the rack and secure the rail to the back of the rack.

c. Install the other rail.

d. For the MSL4048, MSL8048, and MSL8096, insert the clip nuts on the front of the rack in the locations shown.

The clip nuts will be used to secure the library to the rack.

MSL4048	MSL8048 and MSL8096

11288   11287
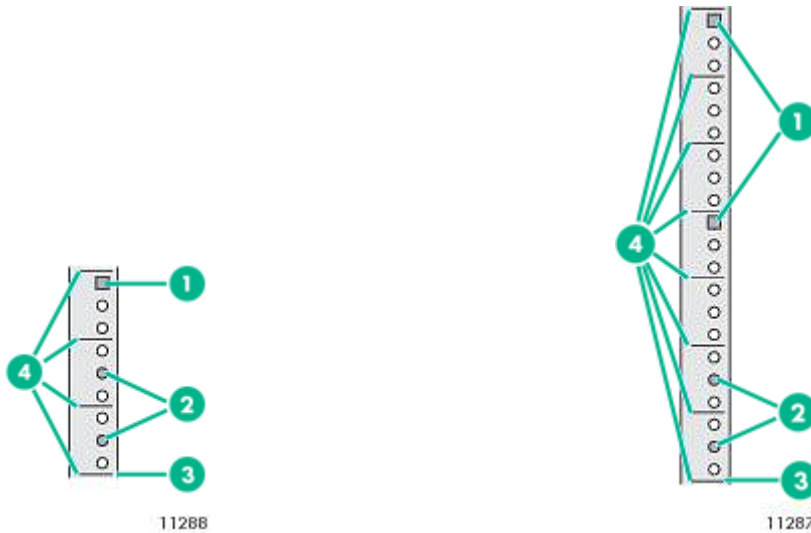
Item	Description
1	Clip nut location
2	Rail screw location
3	Bottom of the library
4	U marker

3. Install the library in the rack.

a. Slide the library onto the rails.

b. From the front of the library, secure the front bezel to the rack using a #2 Phillips screw driver placed through the small holes in the mounting bracket. Tighten the captive screws on each side of the library until they are seated.
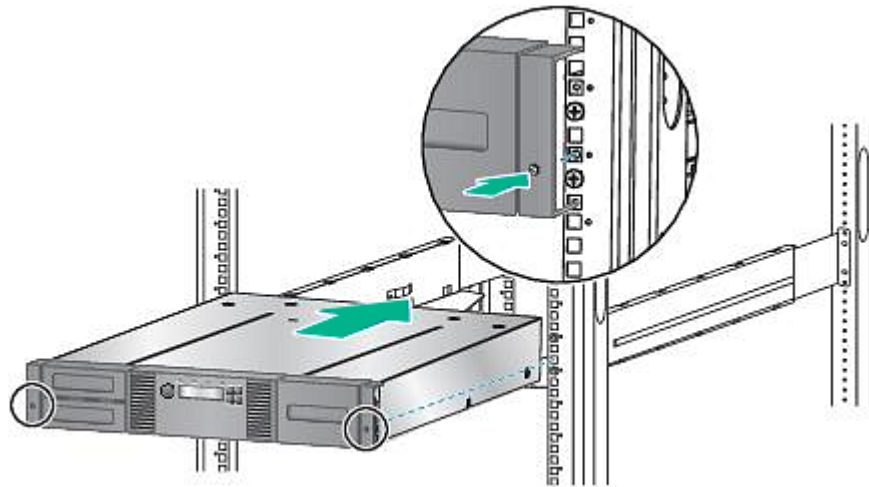
11344

Installing the tabletop conversion kit

The Rack to Tabletop Conversion Kit supports the edges of the library, but is not a structural top.

ⓘ **IMPORTANT:** Do not place any weight on top of the tape library, even with the cover installed.

Procedure

1. Place the cover on a flat, level surface behind the device.

2. Slide the device into the cover until the front panel of the device is aligned with the cover.

11349

Figure 5: Installing the tabletop conversion cover

3. Tighten the captive screws on the front panel until the cover is secure.

Installing tape drives

When possible, install all tape drives during the initial library installation process before the library is powered on. When installing additional tape drives after the library has been powered on, follow the instructions included with the tape drive.

💡 **TIP:** To assist in aligning the drive, only remove the drive bay covers for one drive at a time.

Procedure

1. Locate an appropriate vacant drive bay on the back of the library.

Install the first tape drive in the bottom drive bay. Install each additional tape drive in the drive bay directly above the existing tape drives. If you add a tape drive in a space, the new tape drive will be assigned the next higher drive number, leaving the tape drives numbered out of order. If the settings are restored to the factory defaults or the library is power-cycled, the drives will be renumbered and you might need to update the configuration of your backup servers.

NOTE: The MSL4048 library will not operate with a full-height tape drive installed in the second and third half-height drive bays. Install a full-height tape drive either in the bottom two drive bays or the top two drive bays.

NOTE: If you plan to partition the library into two logical libraries, the second tape drive must be installed in the third half-height drive bay. For tape drive locations for two logical libraries, see **MSL4048 and MSL8096 Tape Libraries partitions**.

The MSL8048 and MSL8096 have four tape drive connectors in the locations where full-height tape drives would be installed. When installing a half-height tape drive, install it in the drive bay directly above a full-height tape drive or above a half-height drive and half-height face plate pair.
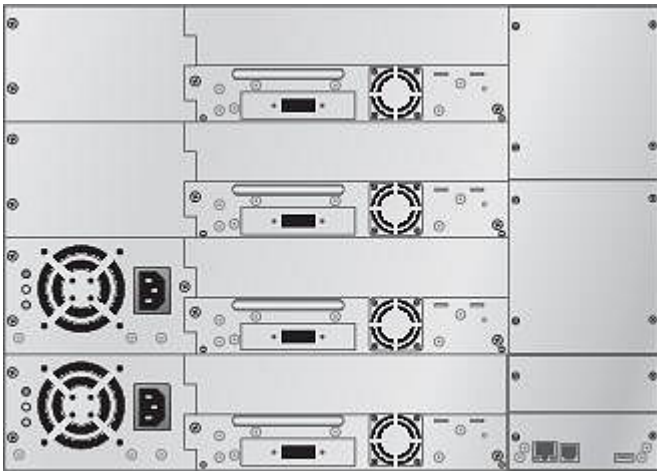
11280

Figure 6: MSL8048 and MSL8096 locations for half-height drives

NOTE: If you plan to partition the library into two logical libraries, the second tape drive must be installed in the third drive bay. For tape drive locations for two logical libraries, see **MSL4048 and MSL8096 Tape Libraries partitions**.

2. Remove the face plate covering the drive bay by removing the screws holding it in place.

   Remove one drive bay cover to install a half-height tape drive; remove two drive bay covers to install a full-height tape drive.

3. Holding the tape drive by the handle and supporting it from the bottom, position the drive on the alignment rails. Slide the tape drive into the drive bay until it is flush with the back of the library.
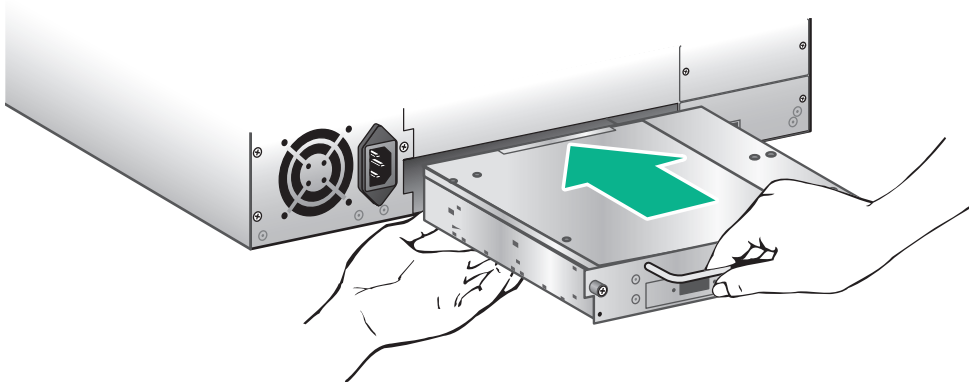
4. To secure the tape drive to the chassis, use a torque driver to tighten the thumbscrews on the drive sled to 6 inch pounds or 0.68 N m.

   If a torque driver is not available, use a #2 Phillips screwdriver to tighten the thumbscrews until a low initial threshold torque achieves a snug tight condition.

   ⚠ **CAUTION:** All drive bays without tape drives installed must have drive bay covers installed.

Installing a redundant power supply

If you have a redundant power supply for the MSL4048, MSL8048, or MSL8096 tape library, you can install it now or wait until the installation process is complete.

Procedure

1. Verify that the power to the library is off and the power cord is not attached.

2. On the back of the library, locate the second power supply bay, which is directly above the existing power supply.

3. Using a #2 Phillips screwdriver, remove the screws that attach the bay cover to the chassis.

4. Position the new power supply on the alignment rails and push it into the library until it is flush with the back panel.

11395
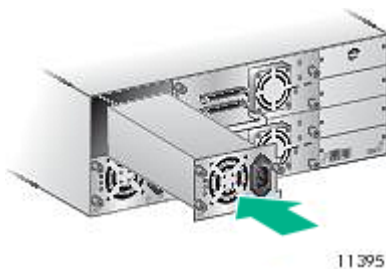
5. Tighten the blue thumbscrews by hand to secure the power supply to the chassis.
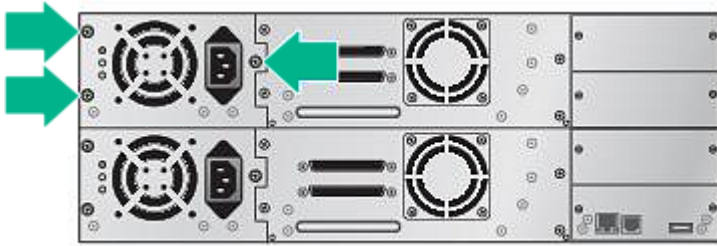
11263

Changing the SCSI address (parallel SCSI drives only)

The preconfigured SCSI address for all full-height tape drives in the MSL2024 and MSL4048, and for all drives in the MSL8048 and MSL8096 is 4. For half-height drives in the MSL2024 and MSL4048, the bottom drive of any pair has SCSI address 4 and the top drive has SCSI address 5. If these preconfigured addresses will not be unique on a bus, you must change the SCSI ID of one or more tape drives before connecting the library to the computer.

Procedure

1. Plug the power cord into the power connector on the back panel and then plug the cord into the power outlet.

2. From the front panel, push the round power button to power on the library.

3. From the front panel, set the new SCSI ID for any drives that must have a different SCSI ID from the **Configuration > Change Drive** page.

   TIP: The SCSI ID can also be changed from the RMI **Configure > Drive** screen once the RMI is configured. See **The Configuration > Drive page**.

4. Power off the library by depressing the power button on the front panel.

Connecting the FC cable

NOTE: Using both ports on a dual-port drive requires path failover or multipath capability in the host application.

Procedure

1. Remove the FC port caps if necessary. Attach one end of the FC cable to Port A on the tape drive.
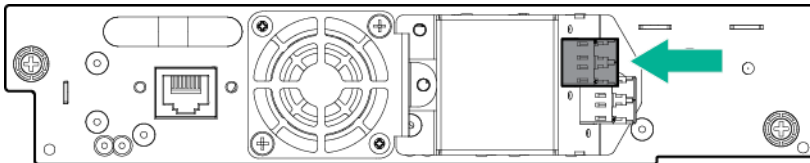
2. Attach the other end of the FC cable to a switch or HBA.

Connecting the SAS cable

NOTE: SAS signal rates require clean connections between the HBA and tape drive. Do not use adapters or converters between the HBA and the tape drive. For reliable operation, use a maximum SAS cable length of 6 meters.

Procedure

1. Determine which end of the cable to plug into the HBA.

   a. For a cable with a single connector on each end, the end with the same type of connector as the HBA is the HBA end.

   b. For a SAS fanout cable, the end of the cable with a single connector is the HBA end.

2. Attach the HBA end of the SAS cable to the HBA port.

3. Attach the drive end of the cable to Port A on the tape drive.

   If you are using a SAS fanout cable, attach one mini-SAS connector to the port on each tape drive.
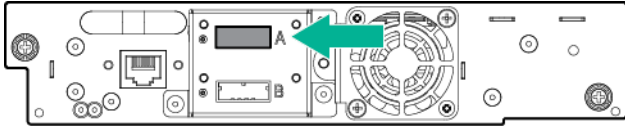
   The unused ends of the SAS fanout cable are single channel and not suitable for use with disk arrays. Use the other ends to connect additional tape drives, or coil and secure them to the rack to minimize stress on the connectors.

   TIP: Mini-SAS connectors are keyed. Do not force a mini-SAS connector into the tape drive SAS port because the connector and port might be keyed differently.

   NOTE: Each tape drive uses one channel. The cable recommended for use with the library maps each of the four channels from the HBA to one channel on the drive end.

   You can plug any of the four drive connectors into any tape drive.

Connecting the parallel SCSI cable

NOTE: LTO-3 and LTO-4 tape drives are Ultra 320 SCSI LVD devices. Use only cables and terminators specified for Ultra 320 or labeled as MultiMode. LTO-2 tape drives are Ultra 160 SCSI LVD/SE devices; use only cables and terminators specified for Ultra 160 or Ultra 320, or labeled as MultiMode.

NOTE: For optimal performance, do not place any other devices on the same bus as a parallel SCSI tape drive.

Procedure

1. Power off the host server before attaching new devices.

2. Attach one end of the parallel SCSI cable to one of the connectors on the back panel of the tape drive.
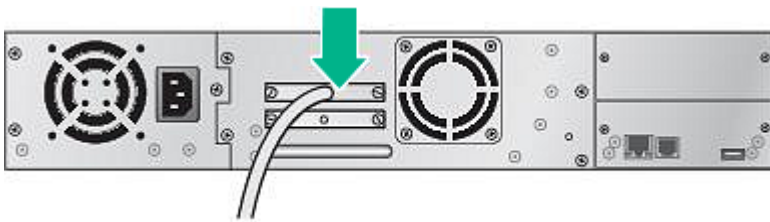
3. Attach the other end of the parallel SCSI cable to the connector on the parallel SCSI host bus adapter or to the connector on the previous device on the parallel SCSI bus.

NOTE: For best performance, use a Low Voltage Differential Signaling (LVDS) HBA. A Single-Ended (SE) SCSI host bus adapter works, but severely degrades performance and limits cable length. If any SE devices are on the same parallel SCSI bus, all of the devices on the parallel SCSI bus slow to SE speed, which severely degrades performance. Never attach an LTO-3 or LTO-4 tape drive to an SE SCSI bus.

4. Attach the terminator to the remaining parallel SCSI connector on the back panel of the tape drive if the library is the last or only device on the parallel SCSI bus. Otherwise, attach one end of a parallel SCSI cable to the remaining port and the other end to the next device on the parallel SCSI bus. Make sure that the last device on the parallel SCSI bus is properly terminated.

   ⓘ **IMPORTANT:** For the library and tape drives to operate correctly, each SCSI tape drive must have a SCSI terminator unless the tape drive is part of a properly terminated chain. A tape drive without an attached SCSI cable must also have a SCSI terminator.

Powering on the library

⚠ **WARNING:** To reduce the risk of electric shock or damage to the equipment:

- Use an approved power cord. If you have questions about the type of power cord to use, contact your authorized service provider.

- Use a power cord rated for your product and for the voltage and current marked on the electrical ratings label of the product. The voltage and current rating of the cord must be greater than the voltage and current rating marked on the product.

Procedure

1. If you plan to use the RMI, use an Ethernet cable to connect the library to a working LAN connection. The library Ethernet connector is on the back of the library.

2. Attach a power cable to the power connector on each power supply on the back of the library.

3. Plug the power cables into the nearest properly grounded power outlets.

4. Power on the library by pressing the power button on the front panel.

5. To verify that the library has power, check the LCD screen.

   If the library does not have power, check the power connections and your power source.

   During the Power On Self-Test (POST), all four LEDs are illuminated briefly, followed by a flashing **Ready** LED. When the initialization sequence is complete, the Home screen is displayed.

   If the inventory takes over five minutes, the splash screen is displayed. To see the Home screen, press any button.

6. Plug in the host server and all attached devices.

7. Power on any other devices you powered off earlier.

8. Power on the server.

Configuring the library

Procedure

1. Set the administrator password.

   Setting an administrator password provides access to the administrator functions with the RMI or OCP, and restricts access to administrator functions to only those people who know the administrator password.

   The library comes with a null administrator password, which until set allows unrestricted access to all administrative functions through the OCP but not the RMI. Once the administrator password has been set from the OCP, it can be changed from either the OCP or RMI.

   - For the MSL2024, see **Changing the administrator password (Configuration > Change Admin Password)**.

   - For the MSL4048, MSL8048, and MSL8096, see **Setting and changing the administrator password (Configuration> Set Admin Password)**.

2. Set the date and time.

   The date and time are used by the library to record events. For ease of communication and product support, set the date and time during the initial installation process.

   - For the MSL2024, see **Setting the date and time (Configuration > Library Date/Time)** .

   - For the MSL4048, MSL8048, and MSL8096, see **Setting the library date and time (Configuration > Set Date and Time)**.

3. If necessary, configure the FC interface.

   Recommended FC interface configuration

4. Configure the library network settings.

   Configuring the library network settings enables you to monitor, configure, and control most library functions from the RMI. By default, the device will obtain an IP address from an IPv4 DHCP server. Optionally, you can configure the device to use a static IP address. Once logged in to the RMI, you can administer further network changes through the RMI.

   - For the MSL2024, see **Configuring IPv4 network settings (Configuration > Configure Network Settings)**.

   - For the MSL4048, MSL8048, and MSL8096, see **Changing the network configuration (Configuration > Network)**.

5. The device supports IPv4 and IPv6 Internet Protocols. By default, the device is configured to use IPv4, the most common version. You can enable IPv6 or both Internet Protocols from the OCP or RMI. Use the RMI to finish configuring IPv6. (See **The Configuration > Network page**.)

Recommended FC interface configuration

Drives connected to a SAN

Leave the FC port at the default settings of **Port Speed: Automatic** and **Port Type: Auto Detect**. With these settings, the tape drive will use the appropriate configuration.

Drives connected directly to the host

- For LTO-7 and later drives, use Loop mode.

- For LTO-6 and earlier drives, leave the FC port at the default settings of **Port Speed: Automatic** and **Port Type: Auto Detect**. With these settings, the tape drive will use the appropriate configuration.

Use the **Configuration > Drives** screen to change the settings.

Verifying the connection

Procedure

1. Install the application software and/or drivers that are compatible with the library.

   Backup software packages might require additional software or licensing to communicate with the robotics.

   For software compatibility information, see the StoreEver support matrix at: **https://www.hpe.com/storage/StoreEverSupportMatrix**

2. Verify the connection between the library and the host:

   a. Install the Library & Tape Tools Diagnostic/Installation Check Utility onto the host computer.

      This utility verifies that the unit is connected and communicating with the host server. It also verifies that the device is functioning and provides diagnostic information. To verify your connections, run the Library & Tape Tools **Installation Check** from the programs menu.

      L&TT is available without cost at: **https://www.hpe.com/support/TapeTools**

   b. Confirm that the host server operating system recognizes the library.

      In Windows, look for tape drives and media changers in the Device Manager.

   For more information on verifying the connection of parallel SCSI devices, consult the operating system documentation.

Labeling the tape cartridges

The library will operate without barcode labels on the cartridges. Using barcode labels in production environments improves inventory time in the library and eases cartridge handling processes outside the library.

Attaching a bar code label to each tape cartridge enables the library and application software to identify the cartridge quickly, which speeds up inventory time. Make using bar code labels on your tapes a practice.

> (!) **IMPORTANT:** Misusing and misunderstanding bar code technology can result in backup and restore failures. To ensure that your bar code labels meet Hewlett Packard Enterprise quality standards, always purchase them from an approved supplier and never print bar code labels yourself.

Prerequisites

High-quality preprinted barcode labels with the correct Media ID.

Procedure

Apply a high-quality preprinted bar code label to each tape cartridge.

LTO tape cartridges have a recessed area on the face of the cartridge next to the write-protect switch. Use this area for attaching the adhesive-backed bar code label.
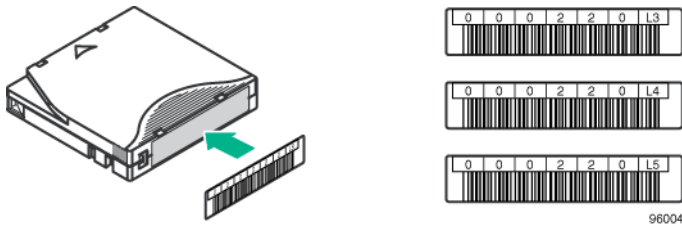
> **IMPORTANT:** Only apply the bar code label as shown, with the alphanumeric portion facing the hub side of the tape cartridge. Never apply multiple labels onto a cartridge because extra labels can cause the cartridge to jam in a tape drive

Verifying the installation

Procedure

1. Determine the firmware revision currently installed on the library.

   - From the RMI **Identity > Library** screen.

   - From the MSL2024 OCP:

     a. From the Home screen, press **Next** until the display shows `Status/Information`. Press **Enter**.

     b. Press **Next** until the display shows `Library Information`. Press **Enter**.

     c. Press **Next** until the display shows the `Firmware Rev`.

        The current installed firmware version is displayed.

     d. Press **Cancel** until the display shows the home screen.

   - From the MSL4048 OCP **Info > Identity Library** menu.

2. Determine the current available firmware version from the storage support website: **https://www.hpe.com/support/storage**

3. If the library or tape drives do not have the current firmware installed, update to the latest firmware from the RMI **Support > Firmware** screen, the OCP **Support > Library FW Upgrade** menu item, or L&TT.

4. Save the library database

   After configuring the library, you can save the configuration database to a USB flash drive from the OCP or to a file from the RMI **Configuration > Save/Restore** screen. Having a backup of the library configuration is helpful when recovering from a configuration error, setting up multiple devices with similar configurations, or if the library needs service.

Downloading product firmware

Procedure

1. Navigate to the HPE Support website: **https://www.hpe.com/support/storage**

> ⓘ **IMPORTANT:** Access to some updates might require product entitlement when accessed through the Hewlett Packard Enterprise Support Center. You must have an HPE Passport set up with relevant entitlements.
>
> To view and update your entitlements, and to link your contracts and warranties with your profile, navigate to: **https://www.hpe.com/support/AccessToSupportMaterials**

2. Browse or search for the necessary firmware.

3. Download the firmware.

   To upgrade firmware from the OCP, copy the firmware image onto a FAT-32 formatted USB flash drive.

Configuring additional features

The tape library has many features to customize it for your organization.

Procedure

1. Naming the tape library, which is done from the RMI Configuration > Network screen. See **The Configuration > Network page**.

2. Partitioning a library with multiple tape drives into logical libraries. See **The Configuration > System page**.

3. Enabling and configuring SNMP network management or Command View TL TapeAssure. See **The Configuration > Network Management page**.

4. Setting up email event notification. See **The Configuration > Alerts page**.

5. To use the RMI and OCP in Japanese, enable the Japanese language option through the RMI. See **The Configuration > System page**.

Tape cartridges and magazines

This chapter explains which media to use with the library, and how to label and write-protect tape cartridges. Careful labeling and handling of the tape cartridges will prolong the life of the tape cartridges and the library.

Tape cartridges

Use the data and cleaning tape cartridges designed for your tape drives.

WORM data cartridges

The LTO-3 and later tape drives support both rewritable and WORM data cartridges. Write-Once, Read-Many (WORM) data cartridges provide an enhanced level of data security against accidental or malicious alteration of data on the tape cartridge. The WORM data cartridge can be appended to maximize the full capacity of the tape cartridge. Data cannot be erased or overwritten on the WORM data cartridge. WORM data cartridges have a two-tone cartridge color for easy identification.

To see whether your backup or archive software application supports WORM cartridges, see the Storage Media website at **https://www.hpe.com/storage/storagemedia**.

LTO-7 Type M media for LTO-8 drives

The library supports LTO-7 cartridges initialized as Type M media in LTO-8 tape drives. See the library firmware release notes for specific library firmware revisions that support LTO-7 Type M media.

Important notes for LTO-7 Type M media:

- When a new, unused LTO-7 cartridge has an 'M8' bar code label applied, it can be initialized as LTO-7 Type M media.

- Once an LTO-7 cartridge has been initialized to LTO-7 Type M media, the format is irreversible. Do not place an 'M8' bar code on an LTO-7 cartridge that has been previously used in an LTO-7 drive. A used LTO-7 cartridge cannot be initialized as LTO-7 Type M media, even in an LTO-8 drive.

- LTO-7 Type M media provides up to 9 TB native capacity, instead of the 6 TB specified for LTO-7. As such, LTO-7 Type M media can provide up to 22.5 TB with 2.5:1 compression (depending on the data being compressed.)

- LTO-7 Type M media support regular LTO features, including encryption, LTFS, and compression. LTO-7 Type M media does not support WORM cartridges.

- LTO-7 Type M media are only compatible with LTO-8 tape drives. They are not compatible with any other generation of LTO tape drives.

For more information about LTO-7 Type M media, see **https://www.hpe.com/storage/storagemedia**.

Recommended practices for using and maintaining tape cartridges

⚠ **CAUTION: Do not degauss LTO data cartridges!** These data cartridges are prerecorded with a magnetic servo signal. This signal is required to use the cartridge with the tape drive. Keep magnetically charged objects away from the cartridge.

- Use only the data cartridges designated for your device.

- Clean the tape drive when the **Clean** drive LED is illuminated.

  ⚠ **CAUTION:** Use only Ultrium Universal Cleaning Cartridges (UCC).

- Do not drop a cartridge. Excessive shock can damage the internal contents of the cartridge or the cartridge case itself, making the cartridge unusable.

- Do not expose data cartridges to direct sunlight or sources of heat, including portable heaters and heating ducts.

- The operating temperature range for data cartridges is 10 to 35° C. The storage temperature range is 16 to 32° C in a dust-free environment with relative humidity always between 20 percent and 80 percent (noncondensing).

- If the data cartridge has been exposed to temperatures outside the specified ranges, stabilize the cartridge at room temperature for the same length of time it was exposed to extreme temperatures or 24 hours, whichever is less.

- Do not place data cartridges near sources of electromagnetic energy or strong magnetic fields such as computer monitors, electric motors, speakers, or X-ray equipment. Exposure to electromagnetic energy or magnetic fields can destroy data and the embedded servo code written on the media by the cartridge manufacturer. The cartridge is unusable without the embedded servo code.

- Place identification labels only in the designated area on the cartridge.

Recommended practices for labeling tape cartridges

The library contains a bar code reader that reads the tape labels and stores the inventory data in memory. The device then provides the inventory information to the host application, OCP, and RMI. A bar code label on each tape cartridge enables the bar code reader to identify the cartridge quickly, which speeds up inventory time. Make using bar code labels on your tape cartridges a practice.

> **TIP:** The bar code scanner scans each tape or the back of the storage slot until it reads the bar code label for the cartridge or storage slot, or determines that the slot is empty. The bar code scanner can identify a properly labeled cartridge on the first scan. It can identify an empty slot on the second scan. It will try several more scans and then tap on the cartridge before determining that an unlabeled cartridge is in the slot, which takes about four times as long as identifying a properly labeled cartridge.
>
> The inventory time for larger libraries filled with unlabeled cartridges can be extremely long. Even if you do not need the bar code information, use bar code labels to speed up inventory time.

A proper bar code label includes the Media ID in the last two characters of the bar code. LTO-3 and earlier generation tape drives prevent later generation media from being loaded into the drive. If an LTO-4 or later tape drive is installed in the library or is in the removed state, the library will not load an unlabeled cartridge into an LTO-3 or earlier generation tape drive.

Though not recommended, checking **Ignore Barcode Media ID** in the **RMI Configuration > System** screen will keep the library from interpreting bar code Media IDs.

The host software might track the following information through the associated bar code:

- Date of format or initialization

- Tape cartridge media pool

- Data residing on the tape

- Age of the backup

- Errors encountered while using the tape (to determine if the tape is faulty)

> **IMPORTANT:** Misusing and misunderstanding bar code technology can result in backup and restore failures. To ensure that your bar code labels meet Hewlett Packard Enterprise quality standards, always purchase them from an approved supplier. Do not print bar code labels yourself. To purchase bar code labels, see the Hewlett Packard Enterprise Storage Media website at: **https://www.hpe.com/us/en/storage/storeever-tape-storage.html**. Search for `Barcode and RFID` to find the document titled: *Barcode and RFID labels for HPE StoreEver tape automation*.

LTO tape cartridges have a recessed area on the face of the cartridge next to the write-protect switch. Use this area for attaching the adhesive-backed bar code label. Only apply labels as shown:
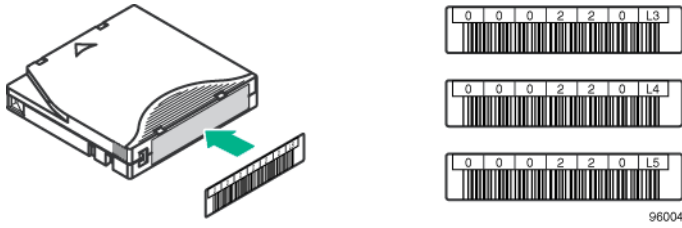
Figure 7: Apply the label within the recessed area.

(!) **IMPORTANT:** Only apply the bar code label as shown, with the alphanumeric portion facing the hub side of the tape cartridge. Never apply multiple labels onto a cartridge because extra labels can cause the cartridge to jam in a tape drive.

Write-protecting data cartridges

All rewritable data cartridges have a write-protect switch to prevent accidental erasure or overwriting of data. Before loading a cartridge into the device, ensure that the write-protect switch on the front of the cartridge is in the desired position.

Procedure

- Slide the switch to the **right** to write-protect the cartridge. An indicator, such as a red mark or small padlock, is visible showing that the cartridge is write-protected.
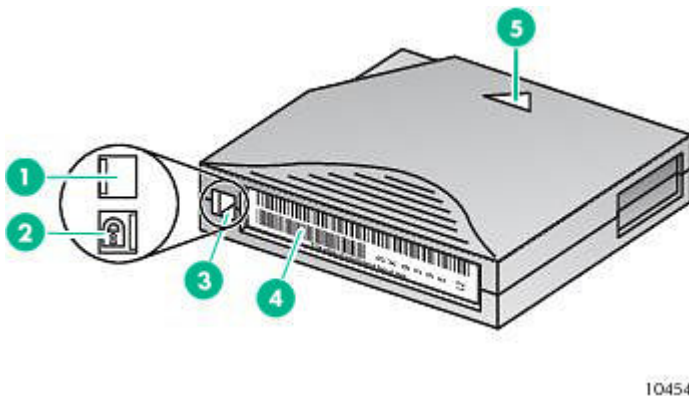
Item	Description
1	Write-enabled
2	Write-protected
3	Write-protect switch
4	Bar code label
5	Insertion arrow

- Slide the switch to the **left** to allow the library to write data to the cartridge.

Read and write compatibility

Hewlett Packard Enterprise Ultrium data cartridges are fully supported and compatible with all Ultrium tape products. Because Hewlett Packard Enterprise Ultrium media is Ultrium logo compliant, it can be used with any other tape drive that bears the Ultrium logo.

	LTO-3 drive	LTO-4 drive	LTO-5 drive	LTO-6 drive	LTO-7 drive	LTO-8 drive
LTO-1 media	Read only	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible
LTO-2 media	Read/Write	Read only	Incompatible	Incompatible	Incompatible	Incompatible
LTO-3 media	Read/Write	Read/Write (no encryption)	Read only	Incompatible	Incompatible	Incompatible
LTO-4 media — unencrypted	Incompatible	Read/Write	Read/Write	Read only	Incompatible	Incompatible
LTO-4 media — encrypted	Incompatible	Read/Write with encryption key	Read/Write with encryption key	Read only with encryption key	Incompatible	Incompatible
LTO-5 media — unencrypted	Incompatible	Incompatible	Read/Write	Read/Write	Read only	Incompatible
LTO-5 media — encrypted	Incompatible	Incompatible	Read/Write with encryption key	Read/Write with encryption key	Read only with encryption key	Incompatible
LTO-6 media — unencrypted	Incompatible	Incompatible	Incompatible	Read/Write	Read/Write	Incompatible
LTO-6 media — encrypted	Incompatible	Incompatible	Incompatible	Read/Write with encryption key	Read/Write with encryption key	Incompatible
LTO-7 media — unencrypted	Incompatible	Incompatible	Incompatible	Incompatible	Read/Write	Read/Write
LTO-7 media — encrypted	Incompatible	Incompatible	Incompatible	Incompatible	Read/Write with encryption key	Read/Write with encryption key
LTO-7 Type M media — unencrypted	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible	Read/Write
LTO-7 Type M media — encrypted	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible	Read/Write with encryption key
LTO-8 media — unencrypted	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible	Read/Write
LTO-8 media — encrypted	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible	Read/Write with encryption key

⚠ **CAUTION:** LTO-2 and LTO-3 tape drives require the most recent firmware to identify LTO-4 media immediately. Without the most recent firmware, loading an LTO-4 cartridge into an earlier generation drive can result in a long media identification and unload time. The drive might not identify the media and then return a load error before the application software times out waiting for the load. For proper operation, keep tape drives updated to the most recent firmware.

Supported media

Use Hewlett Packard Enterprise storage media to prolong the life of the library and tape drives. To learn more about, or to purchase media, see: **https://www.hpe.com/storage/storagemedia**

Cleaning cartridge for all supported tape drives

Cartridge type	Part number
HPE Ultrium universal cleaning cartridge (50 cleans), orange	C7978A

LTO-4 data cartridges

Cartridge type	Part number
HPE LTO-4 Ultrium 1.6TB RW Data Cartridge, green	C7974A
HPE LTO-4 Ultrium 1.6TB WORM Data Cartridge, two-tone (green and gray)	C7974W

LTO-5 data cartridges

Cartridge type	Part number
HPE LTO-5 Ultrium 3 TB RW Data Cartridge, blue	C7975A
HPE LTO-5 Ultrium 3 TB WORM Data Cartridge, two-tone (blue and gray)	C7975W

LTO-6 data cartridges

Cartridge type	Part number
HPE LTO-6 Ultrium 6.25 TB MP RW Data Tape, purple	C7976A
HPE LTO-6 Ultrium 6.25 TB BaFe RW Data Tape, purple	C7976B
HPE LTO-6 Ultrium 6.25 TB MP WORM Data Tape, two-tone (purple and gray)	C7976W
HPE LTO-6 Ultrium 6.25 TB BaFe WORM Data Tape, two-tone (purple and gray)	C7976BW

LTO-7 data cartridges

Cartridge type	Part number
HPE LTO-7 Ultrium 15 TB RW Data Tape, blue	C7977A
HPE LTO-7 Ultrium 15 TB WORM Data Tape, two-tone (blue and gray)	C7977W

LTO-7 Type M media for LTO-8 drives

Cartridge type	Part number
HPE LTO-7 Ultrium Type M 22.5 TB RW Custom Labeled Data Cartridges (20 pack)	Q2078ML
HPE LTO-7 Ultrium Type M 22.5 TB RW Non-Custom Labeled Data Cartridges (20 pack)	Q2078MN

LTO-8 data cartridges

Cartridge type	Part number
HPE LTO-8 Ultrium 30 TB RW Data Tape, green	Q2078A
HPE LTO-8 Ultrium 30 TB WORM Data Tape, two-tone (green and gray)	Q2078W

Magazines

The library has removable magazines. Magazine access is password protected. For safety reasons, the robotic motion is stopped when a magazine is removed.

The magazines can be released using the OCP, the RMI, or by a manual release. When possible, release the magazine using the OCP or RMI.

(!) **IMPORTANT:** To release a magazine manually, see **Releasing the magazines manually**. However, only use this manual process if the magazine cannot be released using the OCP or the RMI, and the library no longer has power.

:Ö: **TIP:** For the slot numbering for your library in its current configuration, see **The Status > Inventory page** .

MSL2024 magazine slot numbering
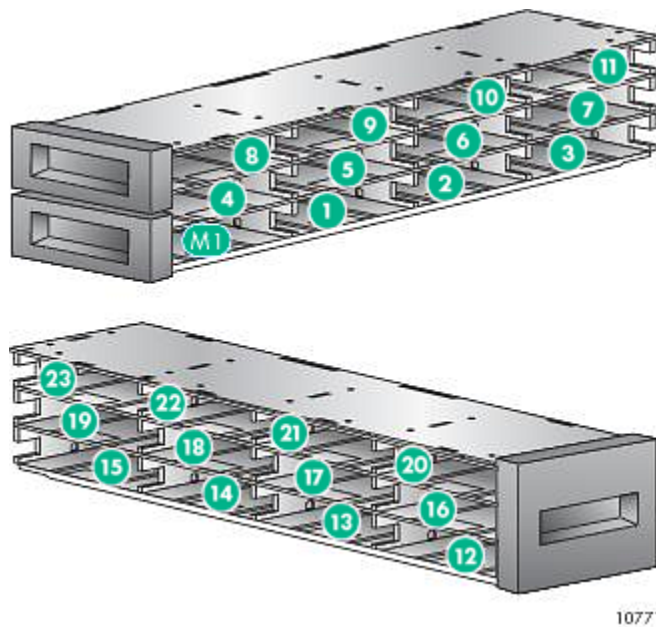
Figure 8: MSL2024 slot numbering with the single mailslot enabled

When the mailslot is disabled, the mailslot (M1) becomes Slot 1 and all other slots are renumbered accordingly.

MSL4048 magazine slot numbering

The storage slots are numbered starting with the bottom front of the lower-left magazine.
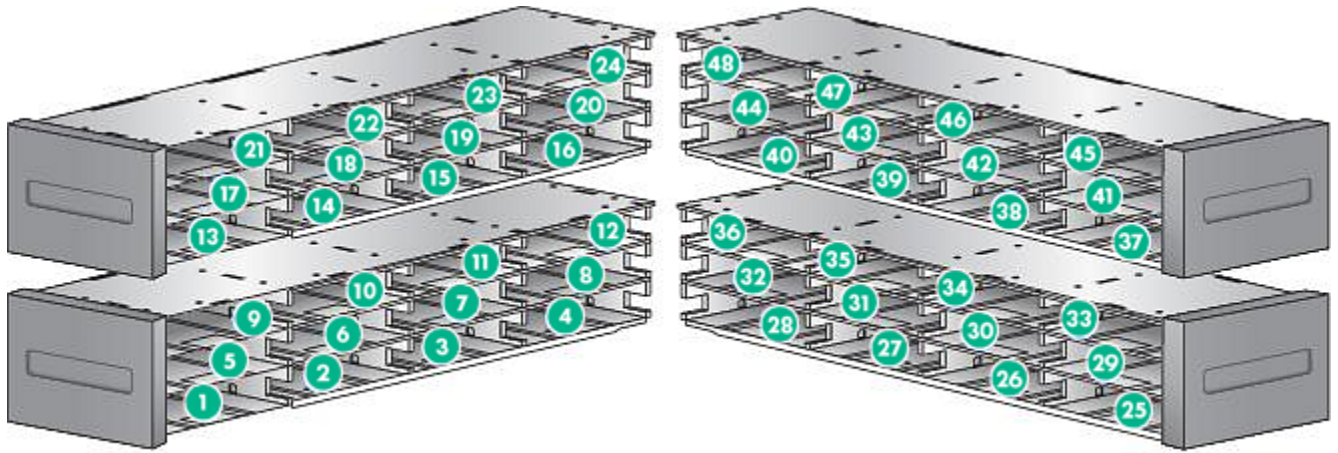
Figure 9: Slot numbering with mailslot disabled

When the mailslot is enabled, all of the storage slot numbers are adjusted. The storage slots in the other magazines are renumbered accordingly.
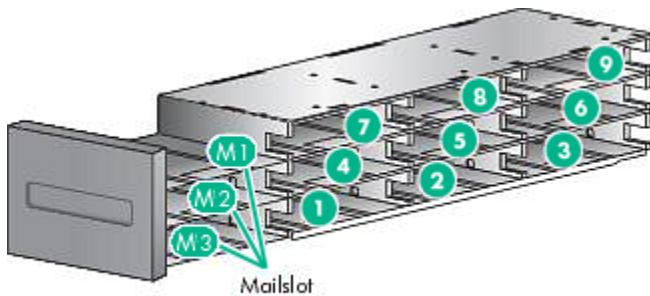
Figure 10: Lower-left magazine slot numbering with mailslot enabled

> **TIP:** For the slot numbering for your library in its current configuration, see **The Status > Inventory page** .

MSL8048 and MSL8096 magazine slot numbering

On the MSL4048, MSL8048, and MSL8096, the storage slots are numbered starting with the bottom front of the lower-left magazine.
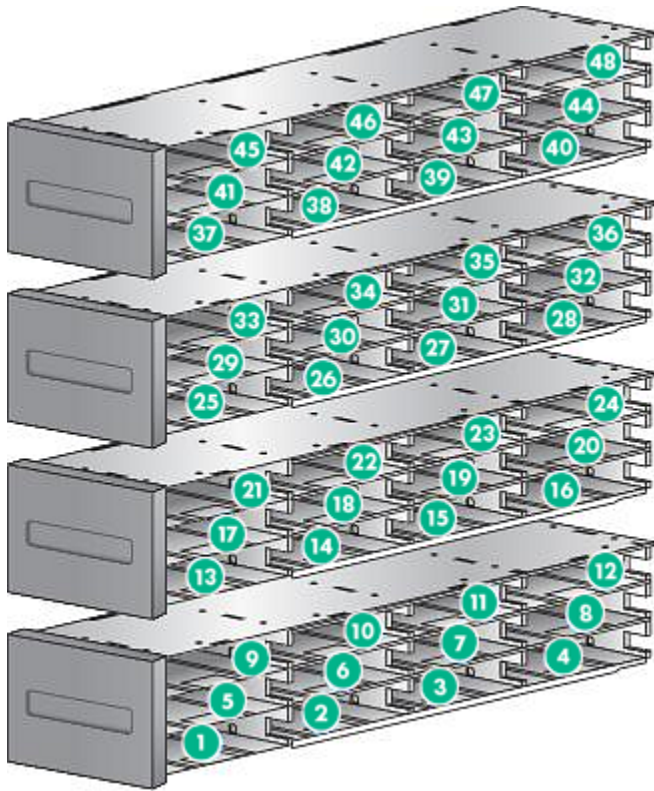
Figure 11: MSL8048 slot numbering with mailslot disabled
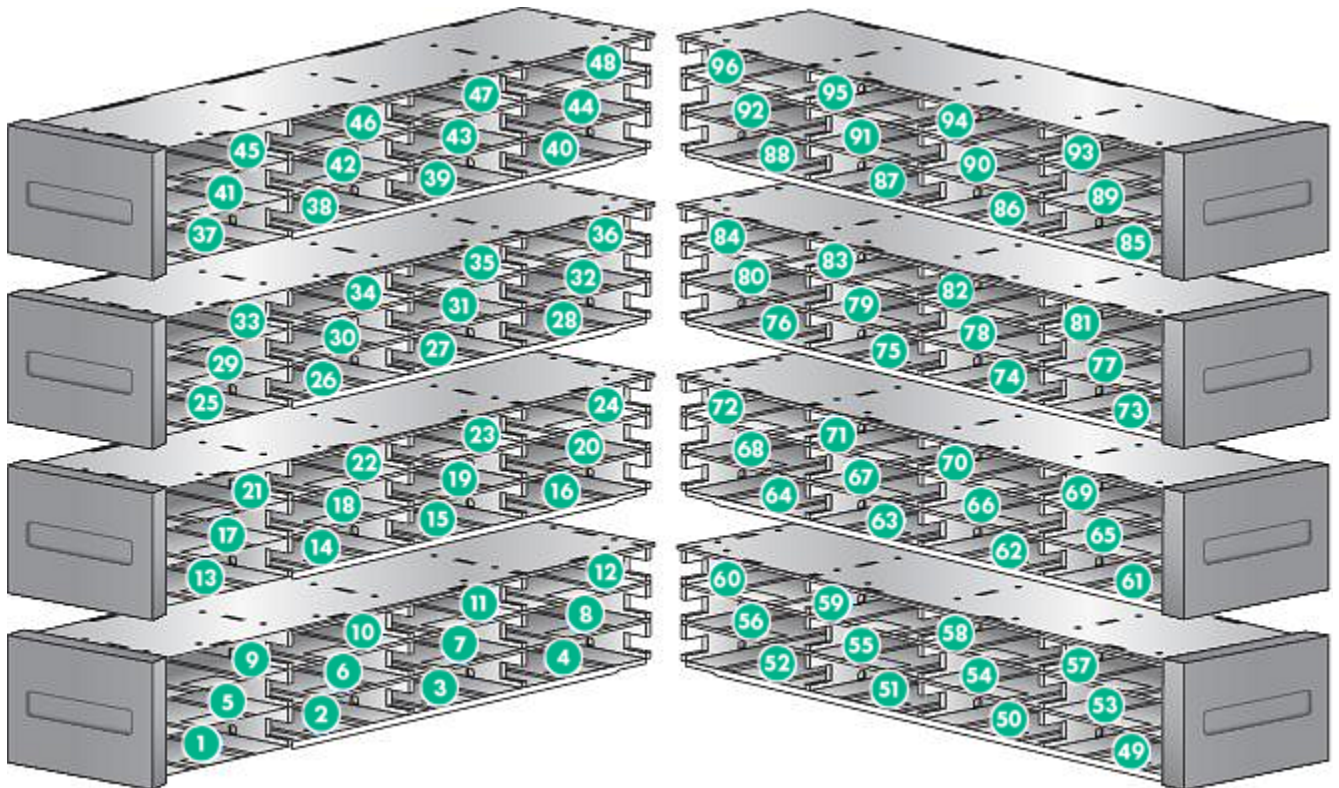
Figure 12: MSL8096 slot numbering with mailslots disabled

11291

When the MSL8096 lower-left mailslot or the MSL8048 mailslot is enabled, all of the storage slot numbers are adjusted. The storage slots in the other magazines are renumbered accordingly.
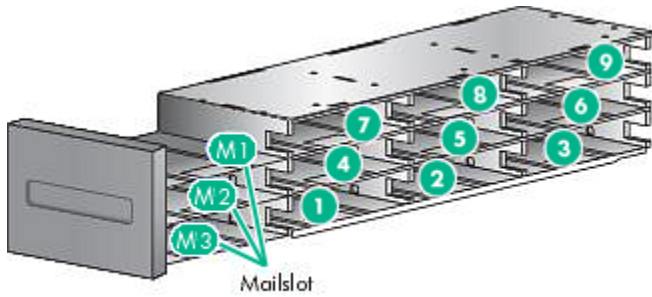
Figure 13: Lower-left magazine slot numbering with mailslot enabled

On the MSL8096, when the upper-right mailslot is enabled, the numbering of the storage slots in the other magazines is not affected. When both mailslots are enabled, the mailslot numbers in the upper-right magazine are adjusted, as shown in the following illustration.
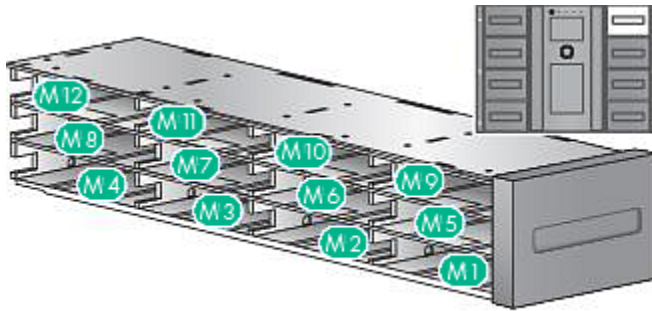
Figure 14: MSL8096 upper-right magazine slot numbering with only the upper-right mailslot enabled
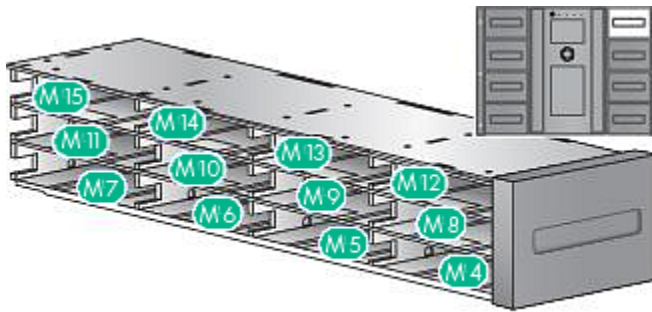
Figure 15: MSL8096 upper-right magazine slot numbering with both mailslots enabled

> **TIP:** For the slot numbering for your library in its current configuration, see **The Status > Inventory page**.

Operating the library

The library supports the following operation methods:

- **Remote management interface (RMI)**— this interface lets you monitor and control the library from a web page. You can access most library functions from the RMI.

- **Operator control panel (OCP)** — this interface lets you operate the device from the front panel.

- **Host backup software**— You can perform any functions provided by the backup software.

NOTE: Before using the RMI, the library network settings must be configured and the administrator password set.

The remote management interface (RMI)

Overview of the RMI

The RMI lets you monitor and control your device through the World Wide Web (WWW). The RMI hosts a dedicated, protected internet site that displays a graphical representation of your device.

Before using the RMI, you must configure the device network settings and set the administrator password with the OCP. (See **Configuring IPv4 network settings (Configuration > Configure Network Settings)** and **Changing the administrator password (Configuration > Change Admin Password)**.)

To start the RMI, open any HTML browser and enter the IP address of the device in the browser address bar.

TIP: Check the **Help** screens in the RMI for additional information. The help pages are updated with most firmware updates and often contain technical details that are not contained in this document. To access RMI help, click **Help** on the right side of the web page banner, as shown in **The Help link**.

The following functions are available through the RMI:

- **Identity**
  - **The Identity > Library page**
  - **The Identity > Drive page**
  - **The Identity > Network page**

- **Status**
  - **The Status > Library page**
  - **The Status > Drive page**
  - **The Status > Inventory page**
  - **The Status > Security page**

- **Configuration**
  - **The Configuration > System page**
  - **The Configuration > Security page**
  - **The Configuration > Drive page**

- ◦ **The Configuration > License Key page**

- ◦ **The Configuration > Network page**

- ◦ **The Configuration > Network Management page**

- ◦ **The Configuration > Password page**

- ◦ **The Configuration > Date/Time page**

- ◦ **The Configuration > Log page**

- ◦ **The Configuration > Alerts page**

- ◦ **The Configuration > Save/Restore page**

- **Operations**
  - ◦ **The Operations > Move Media page**

  - ◦ **The Operations > Inventory page**

  - ◦ **The Operations > Magazines page**

- **Support**
  - ◦ **The Support > General Diagnostic page**

  - ◦ **The Support > Service page— Service restricted**

  - ◦ **The Support > Firmware page**

  - ◦ **The Support > Reboot page**

  - ◦ **The Support > Library Logs page**

  - ◦ **The Support > Drive page**

  - ◦ **The Support > Support Ticket page**

Logging in to the library

Prerequisites

- **The network settings have been configured from the OCP.**

- **The administrator password is set.**

Procedure

1. Navigate to the library web interface.
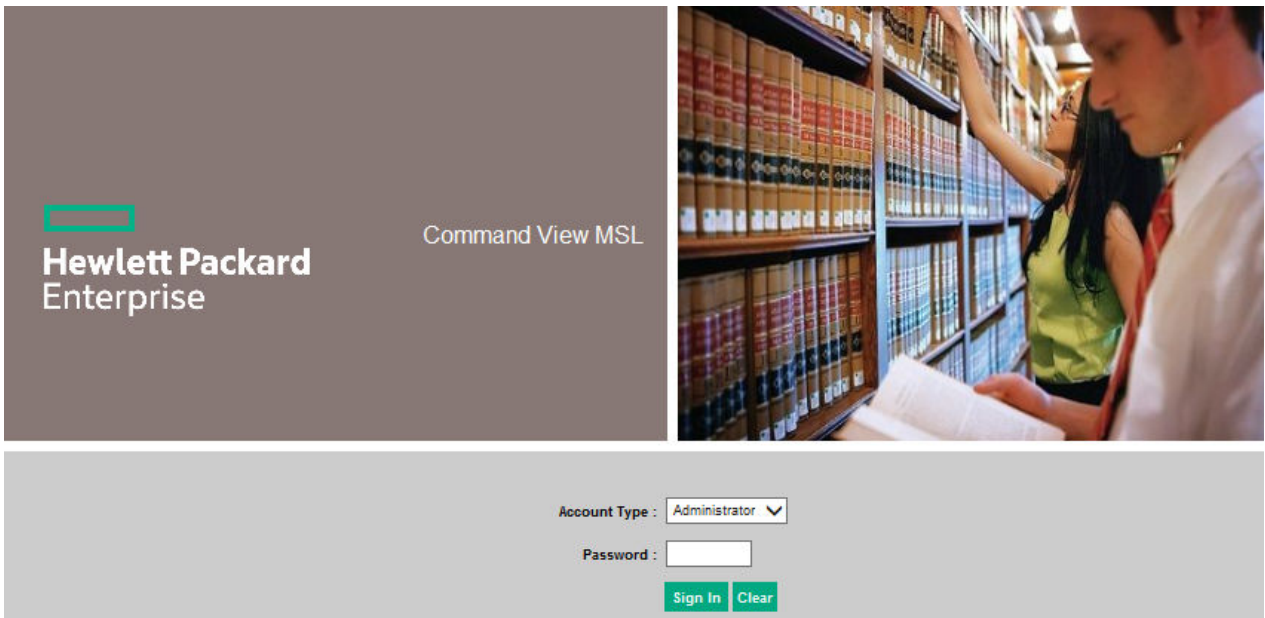
Figure 16: RMI login page

2. Select the **Account Type**.

   - User—no password is required (leave the password box blank).

   - Administrator — the administrator password is required. The same administrator password is used for the RMI and OCP. There is not a default administrator password; the administrator password must be set with the OCP before it can be used with the RMI. If the administrator password is lost, contact the service organization to generate a temporary password that will grant administrator access.

   - Service—**access to this level is by service personnel only.** The service password is set at the factory. The same service password is used for the RMI and OCP.

   The user login provides access to the Identity and Status options, but not the Configuration, Operations, and Support options. Administrator level provides access to all screens except for the Log configuration and Service screens.

   TIP: By default, the administrator password is unset; all of the digits are null. To protect the administrator functions on the OCP and enable the administrator functions in the RMI, set the administrator password from the OCP.

3. Enter a password if necessary.

4. Click **Sign In**.

Status pane

The System Status pane shows the current device and drive status. The System Status pane for the MSL4048, MSL8048, and MSL8096 also shows the power supply status.

System Status	
View Legend	
Updated: Monday, 1/29/2018 16:51:09	
Status	✓ Ready
Drive 1 Status	✓ Ready
Drive 2 Status	✓ Ready
Drive 3 Status	✓ Ready
Drive 4 Status	✓ Ready
Slots (Free/Total)	4/48
Mailslot	Disabled
Library Time	01/29/18 14:49
Power Supply Status	✓ 1 Online
Security Status	ⓘ PIN required

The System Status pane displays the following:

- Updated — the day, date, and time of the most recent status view. This time stamp comes from your computer and might be different from the library Time at the bottom of the pane. To refresh the system status, click your browser reload button.

- Library Name — the name of the library, which was set in the Configuration > System screen.

- Status of the library and tape drives

Status	Icon	Description
OK	✓	The device is fully operational and no user intervention is required.
Warning	ⓘ	User attention is necessary, but the device can still perform most operations.
Error	✕	User intervention is required and the device is not capable of performing some operations

- Slots (Free/Total) — **Free** is the number of empty storage slots. **Total** is the number of storage slots available to the host software, which does **NOT** include reserved slots.

- Mailslot — shows whether the mailslot is open, closed, or disabled.

- Library Time — the date and time from the library, which can be set from the OCP or RMI. The Library Time is updated when the system status is refreshed. The time of the most recent refresh is the Updated time at the top of the pane. If you call the service organization to request a temporary administrator password, refresh the system status with your browser reload button and then give the service engineer this Library Time.

- Power Supply Status (MSL4048, MSL8048 and MSL8096)
  - MSL4048— Online — The power supply is installed.

  - MSL8048 and MSL8096 — Good — The power supply is functioning correctly.

  - MSL8048 and MSL8096 — Functional, fan failure — the power supply is supplying power to the library, but the fan has failed so the power supply could fail soon. Replace the power supply.

  - Installed, failed — The power supply installed in the unit is not working and the library no longer has redundant power. Replace the power supply.

    NOTE: If the MSL4048 has two power supplies and one fails, after a power cycle the library will not recognize the failed power supply as installed in the library.

The number of power supplies installed in the library is displayed next to the icon.

- ◦ MSL8048 and MSL8096 — Removed — a power supply was installed in this location before but has been removed. Power Supply 1 will always show **Removed** when it is missing. Power Supply 2 will show **Removed** until the library is rebooted.

- Security Status — indicates the security status when encryption is enabled.

Status	Icon	Description
OK		Encryption is enabled, the encryption token is inserted, and no operator attention is required.
Warning		User attention is necessary. For example, the token is not inserted or the token PIN has not been entered. For additional information, see the event log.
Error		User intervention is required and the device is not capable of encrypting data.

The Help link

For additional information about fields on the RMI screens, click the **Help** link in the upper right corner. The help pages are updated with most firmware updates and often contain technical details that are not contained in this document.
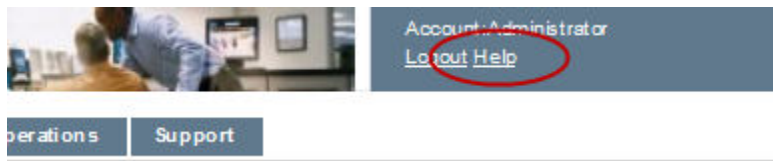
Figure 17: Help link

Identity

The Identity > Library page

The library provides static information about the device.

Figure 18: Identity > Library page

You can see, but not modify, the following:

- Serial Number — the electronic serial number for the device. This electronic serial number will usually match the serial number printed on the library label. The library label is printed on the pull-out tab under the drive on the back of the library.

When the library is configured into multiple logical libraries, the serial number includes the serial number on the device and the logical library number.

- Product ID — how the library identifies itself to the host computer.

- Currently Installed Library Firmware x.xx / y.yy

  ◦ x.xx is the version of the library controller firmware.

  ◦ y.yy is the version of the robotics firmware.

- Bootcode Firmware Revision

- Barcode Reader — version of barcode reader in the device.

- Library Mode

  ◦ Automatic — if the device receives media changer SCSI commands, it will switch from Sequential to Random mode.

  ◦ Manual — the device will stay in the current mode until an administrator configures another mode.

  ◦ Random — the device will not automatically load and unload tapes. Instead, it will wait for commands from the backup software or the OCP to load and unload tapes.

  ◦ Sequential — the library will automatically unload the tape in the drive when the host software sends an unload command to the drive and then automatically load the tape from the next highest sequentially numbered full slot.

  ◦ Loop — in Loop mode, the library will load the tape from the lowest numbered full slot after the tape from the highest numbered full slot is unloaded. If Loop is not listed, the library will stop automatically loading and unloading tapes after the tape from the last full slot is unloaded.

    ⚠ **CAUTION:** Since loop mode will endlessly cycle through the tapes, it is possible to overwrite old data. To avoid overwriting data, ensure that the library has enough tapes or that the tapes are regularly rotated in and out of the library.

  ◦ Autoload — the library will automatically load the tape from the lowest numbered full slot on power-up.

- WWide Node Name — a world wide unique identifier that the library reports over SCSI and might be used by operating systems or software applications to identify and track the library.

- Library Controller Version — version of the controller installed in the device.

The Identity > Drive page

The **Identity > Drive** page provides detailed information about the tape drives. You will only see the fields that apply to the interface type of the drives installed in this library.

Drive Information	(LUN)
Vendor ID	HP
Product ID	Ultrium 7-SCSI
Serial Number	5U▓▓▓93
Firmware Revision	▓▓▓
Physical Drive Slot Number	1
Element Address	1
Autoloader LUN Hosted By Drive	Yes
Data Compression	Yes
Interface Type	Fibre Channel
WWide Node Name	500▓▓▓15
Port A	
WWide Port Name	500▓▓▓16
Port Type	Automatic
Speed	Automatic
Port B	
WWide Port Name	500▓▓▓17
Port Type	Automatic
Speed	Automatic

Figure 19: Identity > Drive page (Fibre Channel)

Drive Information	1 (LUN)
Vendor ID	HP
Product ID	Ultrium 3-SCSI
Serial Number	HU▓▓1K6A
Firmware Revision	C▓▓
World Wide ID - Port A	50060B0000▓▓7D8
Physical Drive Slot Number	1
Element Address	1
Library LUN Hosted By Drive	Yes
Data Compression	Yes
Interface Type	SAS

Figure 20: Identity > Drive page (SAS)

Drive Information	1 (LUN)
Vendor ID	HP
Product ID	Ultrium 3-SCSI
Serial Number	HU▓▓ON
Firmware Revision	C▓▓
SCSI ID	4
Physical Drive Slot Number	1
SCSI Element Address	1
Autoloader LUN Hosted By Drive	Yes
Data Compression	Yes
Interface Type	SCSI

Figure 21: Identity > Drive page (parallel SCSI)

You can see, but not modify, the following:

- Vendor ID — HP or HPE.

- Product ID — product identification information that the drive reports.

- Serial Number — electronic serial number of the drive. This serial number usually matches the physical serial number of the drive.

- Firmware Revision — version of the currently installed drive firmware.

- SCSI ID (parallel SCSI drive only) — SCSI address of the drive. The LUN for the tape drive is 0.

    If a drive is removed or powered off, its number will be reserved. If a drive is added between two other drives, it is assigned the next available number. The drive numbers are persistent until the factory defaults are restored or the library is power cycled.

- World Wide ID (SAS drive only) — world-wide unique name for the drive. The library controller assigns the World Wide ID to the drive bay. This setting cannot be modified. When a tape drive is replaced, the World Wide ID is reassigned to the replacement drive.

- Physical Drive Slot Number — the physical location of the drive.

    By default, the drives are numbered from the bottom of the device up, starting with number 1.

- SCSI Element Address (parallel SCSI or SAS drive) or Element Address (FC drive) — element address. The SCSI Element Address is set at the factory and only a host application can modify it.

- Library LUN Hosted by Drive — Yes, if this drive is hosting the library at LUN 1.

- Data Compression — Yes, if the host has hardware compression turned on for the drive.

- Interface Type — SCSI, Fibre Channel, or SAS

- WWide Node Name (FC drive only) — world-wide unique number for the drive. The library assigns WWNames to the drive bays. When a tape drive is replaced, the WWName is reassigned to the replacement drive.

- Port information for each configured port (FC drive only) Port information (FC drive only)
    - WWide Port Name — world-wide unique identifier for the port. The WW Node and Port Name will be slightly different.

    - Port Type — the current setting of the drive port. Direct connected devices are typically Loop. Devices connected to a switch are typically Fabric.

    - Speed

The Identity > Network page

The **Identity > Network** page displays information about the network configuration.

Network Information	
MAC Address	70▓▓▓▓3D
Full Qualified Domain Name	FL▓▓▓▓ ▓▓▓▓ ▓▓ ▓▓corp.net
IPv4 Addressing	Enabled
IPv4 DNS Server 1	▓▓ ▓▓ ▓35.52
IPv4 DNS Server 2	▓▓ ▓▓ 135.51
DHCPv4 Addressing	Enabled
IPv4 Address	▓▓ ▓▓ ▓8.8
Subnet Mask	255.255.224.0
Default Gateway	▓▓ ▓▓ 0.1
IPv6 Addressing	Enabled
Stateless Addressing	Enabled
DHCPv6 Addressing	Disabled
Static Addressing	Disabled
Clock Synchronization Configuration (SNTP)	Enabled
SNTP Server Address (IPv4 or IPv6)	▓▓ ▓▓ ▓35.123
UTC Time Zone Offset	(GMT-07:00) Mountain Time (US and Canada), Arizona, Chihuahua, La Paz, Mazatlan
Daylight Savings	Disabled
Daylight Savings Auto Adjustment	Enabled

Figure 22: Identity > Network page

You can see, but not modify:

- MAC Address — a unique identifier for the library controller network interface

- Full Qualified Domain Name — the fully qualified domain name for the library

- Clock Synchronization Configuration (SNTP) — When Enabled, the library displays the current time and date from the configured SNTP server. Time is synchronized with the SNTP server each time the library is powered on, as well as each time a drive is unloaded.

When IPv4 Addressing is Enabled, you can see, but not modify:

- IPv4 DNS Server 1 and IPv4 DNS Server 2 — addresses of the configured DNS servers used when DHCP Addressing is not Enabled.

- DHCPv4 Addressing — When Enabled, the library will request an IP address from a DHCP server each time the device is booted.

- IPv4 Address — the library network address

- Subnet Mask — The network mask of the library controller used when DHCP Addressing is not Enabled.

- Default Gateway — the gateway used when DHCP Addressing is not Enabled.

When IPv6 Addressing is Enabled, you can see, but not modify:

- Stateless Addressing — when Enabled, the device will generate an address for itself based on the routing information obtained from a router advertisement and the MAC address. The device can manage up to five global addresses at the same time, which can be assigned from different routers.

- DHCPv6 Addressing — when Enabled, the library will request an IP address from a DHCP server each time the device is booted.

- Static Addressing — when Enabled, the device will use a statically configured address.

- Static Assigned Address — the IPv6 address when Static Addressing Enabled is On.

Status

The Status > Library page

The **Status > Library** page displays dynamic information about the device. When you click **Refresh**, the status is updated immediately.

Library Status At 14:53:08 Library Time	
Status	✅ Ready
Cartridge In Transport	None
Odometer	14090
Total Power On Time	2476d 12h 26min
Robotic Status	Ready
Internal Temperature	34.3 °C
Power Supply Status	✅ 1 Online
Media Removal	Allowed
Level 1 - Left Magazine	Present
Level 1 - Right Magazine	Present
Level 2 - Left Magazine	Present
Level 2 - Right Magazine	Present
Logical Library 1	
Library Control Path Failover	Disabled
Logical Library 2	
Library Control Path Failover	Disabled

Figure 23: Status > Library page

You can see, but not modify, the following:

- Status — the overall status of the device

Status	Icon	Description
OK	✅	The device is fully operational and no user interaction is required.
Warning	⚠	User attention is necessary, but the device can still perform most operations.
Error	❌	User intervention is required and the device is not capable of performing some operations.

- Cartridge in Transport — the slot number where the tape currently in the robot originated. None if there is not a tape in the robotic.

- Odometer — the total number of moves the device has performed since its manufacture.

- Total Power On Time — the number of days, hours, and minutes that the device has been powered on since its manufacture.

- Robotic Status — the status of the robotics and a description of the operation the robot is performing.

- Internal Temperature — the internal temperature reported by the device.

- Power Supply Status — the status of each of the installed power supplies. (MSL4048, MSL8048 and MSL8096)

  ◦ MSL4048 Online — The power supply is installed.

  ◦ MSL8048 and MSL8096 — Good — The power supply is functioning correctly.

  ◦ MSL8048 and MSL8096 — Functional, fan failure — the power supply is supplying power to the library, but the fan has failed so the power supply could fail soon. Replace the power supply.

  ◦ Installed, failed — The power supply installed in the unit is not working and the library no longer has redundant power. Replace the power supply.

    NOTE: If the MSL4048 has two power supplies and one fails, after a power cycle the library will not recognize the failed power supply as installed in the library.

    The number of power supplies installed in the library is displayed next to the icon.

  ◦ MSL8048 and MSL8096 — Removed — a power supply was installed in this location before but has been removed. Power Supply 1 will always show **Removed** when it is missing. Power Supply 2 will show **Removed** until the library is rebooted.

- Media Removal — Prevented, if the backup software is preventing media removal from the device. When media removal is prevented, the mailslot and magazine functionality is disabled.

- Left Magazine — Present, if the device senses the presence of the left magazine. MSL2024

- Level *n*. Left Magazine — Present, if the library senses the presence of the left magazine at level n. The magazine levels are numbered from the bottom of the library to the top. For example, Level 1. Left Magazine is the bottom magazine on the left side looking at the library from the front. (MSL4048, MSL8048 and MSL8096)

- Right Magazine — Present, if the device senses the presence of the right magazine. (MSL2024)

- Level *n*. Right Magazine — Present, if the library senses the presence of the right magazine at level n. (MSL4048, MSL8048 and MSL8096)

- Library Control Path Failover — Present, if the library control path failover is enabled.

The Status > Drive page

The **Status > Drive** page provides detailed information about the tape drives in the library. When you click **Refresh**, the status is updated immediately.

Drive Status At 12:46:36 Autoloader Time	
Status	✅ Ready
Cartridge In Drive	None
Media Removal	Allowed
Drive Error Code	No Error
Internal Drive Temperature (normal range: 15 °C - 70 °C)	36.0 °C
Cooling Fan Active	✅
Drive Activity	Ready
Encryption Status	Encryption off
Secure Mode	Not Configurable - drive has Secure Mode-disabled firmware installed
Port A Status	No light detected
Port B Status	No light detected

Figure 24: Status > Drive page (Fibre Channel)

Identity	Status	Configuration	Operations	Support

Library	Drive	Inventory

Drive 1 Status At 14:42:27 Library Time	
Status	✅ Ready
Cartridge In Drive	None
Media Removal	Allowed
Drive Error Code	No Error
Internal Drive Temperature (normal range: 15 °C - 71 °C)	34.0 °C
Cooling Fan Active	✅
Drive Activity	Ready

Figure 25: Status > Drive page (parallel SCSI)

Drive Status At 14:14:32 Autoloader Time	
Status	✅ Ready
Cartridge In Drive	None
Media Removal	Allowed
Drive Error Code	No Error
Internal Drive Temperature (normal range: 15 °C - 70 °C)	36.0 °C
Cooling Fan Active	✅
Drive Activity	Ready
Encryption Status	Encryption off
Secure Mode	Not Configurable - drive has Secure Mode-disabled firmware installed
Port A Status	Not ready, not connected
Speed	-
Hashed SAS address	000000
Port B Status	Not ready, not connected
Speed	-
Hashed SAS address	000000

Figure 26: Status > Drive page (SAS)

You can see, but not modify, the following:

- Status of the drive

Status	Icon	Description
OK	✅	The drive is operating normally.
Warning	ⓘ	The library is functional, but might have an issue to be addressed.
Error	❌	The drive is in a failed state.

- Cartridge in Drive — information about the cartridge, if any, currently in the drive.

- Media Removal — Prevented if the backup software is preventing media removal from the library. When media removal is prevented, the library will not open the mailslot or magazines.

- Drive Error Code — the current drive error code if the drive is in a failed state. See **Drive error codes** for a list of drive error codes.

- Internal Drive Temperature — internal temperature reported by the drive. The normal temperature range is provided for reference and varies depending on the type of tape drive. If there is any possibility of error due to temperature, the tape drive will send out error events.

  NOTE: The Internal Drive Temperature is not the temperature of the tape path in the drive nor is this temperature the operating environment temperature.

- Cooling Fan Active — On when the cooling fan is on

- Drive Activity — the current drive activity

- Encryption status — The status of encryption on the drive.

- Secure Mode (LTO-7 and later drives)

  - Enabled — the drive has Secure Mode-enabled firmware installed and is in a FIPS Support Mode enabled partition

  - Disabled — the drive has Secure Mode-enabled firmware installed and is in a FIPS Support Mode disabled partition

  - Not Configurable — The drive has Secure Mode-disabled firmware installed. The drive is running the normal firmware image, which is FIPS Secure Mode-disabled.

- Port A Status and Port B Status — status of the ports

- Speed (Fibre Channel and SAS drives) — the current speed setting of the drive port

- Port Type (Fibre Channel drives only) — the current setting of the drive port. Direct connected devices are typically Loop. Devices connected to a switch are typically Fabric.

- N-Port ID (Fibre Channel drives only) — Fabric address. Only relevant when in Fabric mode.

- ALPA (Fibre Channel drives only) — Loop address. Only relevant when in Loop mode.

- Hashed SAS address — A short version of the SAS World Wide Identifier (WWI) that is generated using a well-defined hash algorithm and is suitable for device identification in most systems. Some management software might report this value.

The Status > Inventory page

The **Status > Inventory** page provides detailed information about the tape cartridges in the tape drives, with a summary of tapes in magazine slots.

Figure 27: Status > Inventory page

A dark rectangle indicates a full slot, a red rectangle indicates a cartridge with a problem, and a white rectangle indicates an empty slot.

To see detailed information about the tapes in a magazine, click on the **+** button to expand the display for the magazine.

Media Details						
Slot #	Attn	Status	In Drive	Label	Media Loads	Comment
1, LL1		Full, Gen. 7		SIT860L7	7	Not Encrypted
2, LL1		Empty		------------		
3, LL1		Full, Gen. 8		CH0349L8		Incompatible
4, LL1		Empty		------------		
5, LL1		Full, Gen. 6		AKF647L6		
6, LL1		Full, Gen. 6		KR0772L6		
7, LL1		Full, Gen. 6		CH4762L6		
8, LL1		Empty		------------		
9, LL1		Full, Gen. 6		CH4774L6		
10, LL1		Full, Gen. 6		KR0283L6		
11, LL1		Empty		------------		
12, LL1		Full, Gen. 7		SIT861L7		

Figure 28: Status > Inventory Media details pane

In the media details pane:

- Slot # — lists "Mailslot" or the index number of each slot in the magazine from lowest to highest.

- Attn — indicates an attention state for storage slots or provides information on the mailslot state.

- Status — Full or Empty, and the LTO Generation of the tape.

- In Drive — shows when the tape from this slot is in a drive.

- Label — the bar code label data for the tape in the slot.

- Media Loads — the number of times this tape has been loaded into a drive in its lifetime. This field might be blank if the tape has not been loaded into a drive in this device or if the inventory has changed.

- Comment — any additional information about the tape in the slot (for example, Clean Tape if the cartridge is a cleaning tape).

The Status > Security page

Security Status At 15:05:01 Library Time	
Drive 1 Encryption Status	Encryption off
Drive 2 Encryption Status	Encryption off
Drive 3 Encryption Status	Encryption off
Drive 4 Encryption Status	Encryption off
FIPS Support Mode Status	
Logical Library 1	Disabled
Logical Library 2	Disabled
Key Server Token Status	PIN required
Serial Number	28151F0D
Firmware Version	1.0 Build Number 6
Token Name	Encryption03

Figure 29: Status > Security page

When using the encryption kit, you can see, but not modify the following:

- Drive Encryption Status — The encryption status for the drive, including whether the drive is configured for encryption or not, and whether a requested encryption key has been received.

- Key Server Token Status — The status for the key server token. The status might indicate that some keys might not be backed up, even though none of the individual keys show a status of backup required. In this case, the firmware has detected the presence of keys that have not been backed up, but cannot uniquely identify them. Always back up the keys on the token when the key server token status indicates that a backup is required.

  △ **CAUTION:** If the token is lost or damaged and the encryption keys are not backed up, no one can recover encrypted data from tapes encrypted with the lost encryption keys, including customer service.

- Serial Number — Serial number of the key server token.

- Firmware Version — Version of firmware on the key server token. The firmware cannot be updated but a service engineer might request the version when diagnosing an issue.

- Token Name — The name of the token. The name can be changed on the **Configuration > Security** screen.

- Number of Keys — The number of keys currently stored on the token. The token can hold up to 100 keys.

For information about the keys on the token, click **Gather Key Information**. The RMI displays a list of information about each key, including the creation date and time. For security reasons, the encryption keys are not displayed. The key identified as the **current key** is the key currently used to encrypt data on all new and formatted tapes in the library that are enabled for encryption using the encryption kit.

When KMIP is enabled, you can see, but not modify, the following:

- Drive Encryption Status — The encryption status for the drive, including whether the drive is configured for encryption or not, and whether a requested encryption key has been received. To update the status, click **Refresh**.

- Security Status — Shows whether KMIP key management is configured or not. Configure KMIP in the **Configuration > Security** screen.

- Signed Certificate — Displays information about the library SSL client certificate.
  - Serial Number — The serial number provided by the certificate authority that signed the certificate.

  - Status — Indicates whether the library deems the certificate to be valid or not.

  - Valid Between Dates — Displays the time frame when the certificate is valid. The certificate authority, which is typically on the KMIP server, assigns these dates.

  - Common Name — A name that the library assigns automatically. Some KMIP servers require this name to match the library KMIP client user name.

Configuration

The Configuration > System page

Use the **Configuration > System** page to modify the system configuration.

System configuration changes are only applied after **Apply** or **Submit** is selected. After making the selection, a warning page informs you of the impact of the proposed change. In some cases, a pop-up screen asks you to confirm the change. Many changes also require the device to reboot. You might need to click **Refresh** to see the changes.

Logical Libraries	
Select Mode	One Logical Library ▼ Currently configured: 1 **Apply**
System Configuration	
Library LUN Hosted By Drive	1 ▼
Library Mode	○ Random ○ Sequential ⦿ Automatic ☐ Autoload ☐ Loop
Reserved Slots	0 ▼
Mailslot Configuration Enabled	☐
Auto Clean Enabled	☐
Barcode Label Length Reported To Host	8 ▼
Barcode Label Alignment Reported To Host	Left ▼
Ignore Barcode Media ID (Not Recommended)	☐ Warning: Read the Help page for more information about Ignore Barcode Media ID before checking this option.
Magazine access using front panel - Admin password required	☑
Select Language	English ▼
Enable Extended Mode	☐ Warning: Read the Help page for more information about Enable Extended Mode before checking this option.
Enable Library Control Path Failover	☐ Read the Help page for more information about Library Control Path Failover before checking this option.
Alternate Drive for Library Control Path	N.A., read the Help pages for configuration settings that are required before Library Control Path Failover can be enabled.

Figure 30: Configuration > System page with one logical library

When the library is configured into multiple logical libraries, the settings for the library are separated from the settings for each logical library.

Logical Libraries		
Select Mode	Two Logical Libraries ▼	Currently configured: 2 **Apply**

System Configuration	
Mailslot Configuration Enabled	☐
Auto Clean Enabled	☐
Barcode Label Length Reported To Host	8 ▼
Barcode Label Alignment Reported To Host	Left ▼
Ignore Barcode Media ID (Not Recommended)	☐ Warning: Read the Help page for more information about Ignore Barcode Media ID before checking this option.
Magazine access using front panel - Admin password required	☑
Select Language	English ▼
Enable Extended Mode	☐ Warning: Read the Help page for more information about Enable Extended Mode before checking this option.

Extended Configuration for Logical Libraries	
Logical Library 1	
Library LUN Hosted By Drive	1 ▼
Library Mode	○ Random ○ Sequential ⊙ Automatic ☐ Autoload ☐ Loop
Reserved Slots	0 ▼
Enable Library Control Path Failover	☐ Read the Help page for more information about Library Control Path Failover before checking this option.
Alternate Drive for Library Control Path	N.A., read the Help pages for configuration settings that are required before Library Control Path Failover can be enabled.
Logical Library 2	
Library LUN Hosted By Drive	3 ▼
Library Mode	○ Random ○ Sequential ⊙ Automatic ☐ Autoload ☐ Loop
Reserved Slots	0 ▼
Enable Library Control Path Failover	☐ Read the Help page for more information about Library Control Path Failover before checking this option.
Alternate Drive for Library Control Path	N.A., read the Help pages for configuration settings that are required before Library Control Path Failover can be enabled.

Figure 31: Configuration > System page for two logical libraries

To enable logical libraries, select the number of logical libraries in the **Logical Libraries** pane and click **Apply** in that pane.

The following settings affect all the logical libraries:

- Mailslot Configuration Enabled (MSL2024, MSL4048, and MSL8048) — configures the mailslot in the lower left magazine as a mailslot or storage slots. The MSL2024 mailslot has one slot; the MSL4048 and MSL8048 mailslot has three slots. Enabling the mailslot will reduce the total number of storage slots. The default is disabled.

  If the mailslot is enabled, all logical libraries will have access to the mailslot. If allowing all logical libraries access to the mailslot is a concern or all the slots are needed as storage slots, disable the mailslot.

⚠ **CAUTION:** The mailslot is located where the lowest numbered storage slot would be. Enabling and disabling the mailslot renumbers all the other storage slots. After enabling or disabling the mailslot, update the backup software inventory. You might also need to reconfigure the backup software to adjust the number of storage slots and presence of the mailslot.

• Mailslot Configuration (MSL8096) — configures the mailslot in the lower-left magazine and upper-right magazine as mailslots or storage slots. Enabling a mailslot will reduce the number of storage slots. The default is no mailslots enabled.

  If the mailslot is enabled, all logical libraries will have access to the mailslot. If allowing all logical libraries access to the mailslot is a concern or all the slots are needed as storage slots, disable the mailslot.

  Enable mailslots by selecting the mailslot slots in the **Mailslot Configuration** drop-down list.

  ◦ **0** disables both mailslots.

  ◦ **3** enables the lower-left mailslot only.

  ◦ **12** enables the upper-right mailslot only.

  ◦ **15** enables both mailslots.

  ⚠ **CAUTION:** The lower-left mailslot is located where the lowest numbered storage slots would be. Enabling and disabling it will renumber all the storage slots. On the MSL8096, enabling or disabling the lower-left magazine also affects the numbering of the slots in the upper-right mailslot. After enabling or disabling the lower left mailslot, update the backup software inventory. You might also need to reconfigure the backup software to adjust the number of storage slots and presence of the mailslot.

• Auto Clean Enabled — When auto clean is enabled, the device automatically loads a cleaning cartridge when a tape drive is ready for cleaning. The device identifies a cleaning cartridge if it has a bar code label that starts with CLN. It can only identify an unlabeled cleaning tape after it has been loaded into the tape drive.

  The device can use a cleaning cartridge from any slot, even if the slot is not active. The device tracks the usage count for each of the cleaning cartridges. When multiple cleaning cartridges are available, the device will first choose an unknown cleaning cartridge so the device can start tracking the cartridge usage count. If the device knows the usage count for all the cleaning cartridges, the device will choose the one with the highest usage count.

  Auto cleaning is disabled by default. You can enable automatic cleaning even if there are no cleaning cartridges in the device. In this case, the device will display a warning message.

  The tape library can load a cleaning cartridge from any logical library to any tape drive.

  ⚠ **CAUTION:** Only enable automatic cleaning in either the backup application or the device, not both.

• Barcode Label Length Reported to Host — the number of bar code characters reported to the host application. This option provides interchange compatibility with libraries with more limited bar code reading capabilities. The maximum length is 15 and the default is 8.

  NOTE: The industry standard length for bar code labels is eight total characters. Because of this industry standard, the library and most application software are extensively tested using eight character bar code labels. These applications include Command View TL, HPE Data Protector, and other backup applications. Although the library might be able to read labels with more than eight characters, it is not assured that every application will operate correctly with these labels. For compatibility with other libraries and with applications, use bar code labels with eight characters.

• Barcode Label Alignment Reported to Host — configures the end of the bar code label characters to report to the host application when reporting fewer than the maximum number of characters. For example, when reporting only six characters of the bar code label `12345678`, if alignment is left, the device will report `123456`. If alignment is right, the device will report `345678`. The default is left.

- Ignore Barcode Media ID — when disabled, the device will check the barcode Media ID on the tape cartridges and will only allow appropriate tape cartridges to be loaded into tape drives. The barcode Media ID is the last two characters of the barcode. For example, an LTO-7 labeled cartridge will not be allowed to move into an LTO-6 tape drive. When Ignore Barcode Media ID is enabled, the device will move any tape to any tape drive. If the cartridge is incompatible with the tape drive, a message will be displayed. As a best practice, ensure that all tape cartridges have barcodes with the correct Media ID.

- Magazine access using front panel - Admin password required — when enabled, the Administrator password is required to remove the magazines from the front panel. When disabled, the magazines can be removed using the OCP without entering a password. The default is to require the Administrator password.

- Select Language — The language option affects the text on the RMI, the error messages, and the help pages. It does not affect the OCP menus, which will always be in English.

- Enable Extended Mode— When the library extender is properly installed and extended mode is enabled, the libraries will operate as an extended library.

The following settings are configurable for each logical library:

- Library LUN Hosted By Drive — specifies the master tape drive for the logical library. The default is the lowest numbered tape drive in the logical library. If a logical library has only one tape drive, it is the master drive for the logical library. If a logical library has more than one tape drive, you can specify the master. The number is the physical drive number.

- Library Mode — specifies the library mode for each logical library. The default mode is Automatic.

  The device supports three behavior modes: Random, Sequential, and Automatic. The device automatically detects the required mode from the series of SCSI commands it receives; however, you can also change the mode. Choose the operating mode based on the capabilities of the software controlling the tape cartridges.

  Random mode — In Random mode, the device does not automatically load tapes into the tape drives; it waits for commands from the software or operator to load and unload tapes. Random mode is used with a full featured or a robotics-aware backup application and is the most common mode of operation. Your backup software must support robotics, which might require an additional software module.

  Sequential mode — In Sequential mode, the device automatically loads and unloads tapes from the drive. Sequential mode is used when the backup software is NOT robotics-aware or was designed for standalone drives only.

  In Sequential mode, the logical library will only use the lowest-numbered tape drive in the logical library.

  The operator begins the sequence by loading the desired tape into the tape drive. When a tape is unloaded for any reason, the device returns the tape to its original slot and then loads the tape from the next available higher numbered slot.

  To determine more specifically how you want tapes loaded into the tape drive while in Sequential mode, set the **Loop** and **Autoload** options.

  ◦ When **Autoload** mode is set, the device automatically loads the cartridge from the lowest-numbered full slot into the tape drive. It then follows standard sequential operation. After configuring Autoload mode, you must do one of the following for Autoload mode to take effect:

    – Power cycle the device from the front panel.

    – Reboot the device from the RMI Support > Reboot screen.

    – Move the lowest-numbered cartridge to the drive before starting the backup application. If the mailslot is enabled, the lowest cartridge location will be in the mailslot.

  ◦ When **Loop** mode is on, the original first cartridge in the sequence is reloaded after the device has cycled through all available cartridges. If Loop mode is off and the last cartridge has been unloaded, the device stops loading cartridges. The device waits until an operator loads another tape.

    ⚠ **CAUTION:** Use caution when choosing Loop mode because it makes it possible to overwrite data on previously written cartridges.

When the device is partitioned into logical libraries, each logical library operates as an independent library. The device only loads tapes from the slots associated with one logical library into the tape drive associated with that logical library. The library will not load tapes from slots associated with another logical library. Only the lowest-numbered tape drive in a multidrive logical library will be used.

Automatic mode: In Automatic mode, the device switches from Sequential mode into Random mode when it receives certain SCSI commands. Automatic mode is the default setting.

- Reserved Slots — The number of slots in the logical library that are not available to the backup software. You can store cleaning tapes in reserved slots, or leave reserved slots empty. The slots are reserved from the highest slot number down. The default is to make the maximum number of slots active. Each logical library must have at least two active slots.

- Enable Library Control Path Failover — This option provides a mechanism where a library control path hosted by a Fibre Channel drive can be reassigned to an alternative drive retaining all worldwide names, configuration settings, and with minimal interruption to current operation. The reassignment takes placed when the primary master drive is powered off for service. Reassignment can allow a backup to complete when the master drive suffers a problem and must be removed for service.

  The Alternate Drive for Library Control Path will be displayed as N.A until these requirements are met:

  ◦ The library must have two or more LTO-5 or LTO-6 Fibre Channel drives of the same type (for example, LTO-generation and form factor).

  ◦ If the library is partitioned into multiple logical libraries, each logical library must contain at least two LTO-5 or LTO-6 Fibre Channel drives.

  ◦ A host connection through a SAN switch with NPIV is enabled for associated ports.

  ◦ All drive ports are configured as Fabric.

NOTE: When library control path failover is first enabled, the hardware address for the library will change.

Windows example: Bus Number 0, Target ID 0, LUN 1 becomes Bus Number 0, Target Id 2, LUN 0

Linux example: `/dev/sg3 HP MSL G3 Series 7.41` becomes `/dev/sg5 HP MSL G3 Series 7.41`

If the library detects a situation when it is necessary to remove the primary master drive or force a failover, power off the drive from the RMI **Configuration > Drive 1 (LUN)** screen. This action will disable the drive and pass the library control path to the alternative drive. If the disabled drive is replaced with a new drive, the library LUN stays with the alternative drive until manually reassigned back with **RMI Configuration > System > Library LUN hosted by Drive**.

- Alternative Drive for Library Control Path — If the library is configured for library control path failover, select the drive number of the alternative drive.

The Configuration > Security page

From the **Configuration > Security** page you can configure encryption features.

Figure 32: The Configuration > Security page

USB MSL Encryption Kit Configuration

For information about configuring and using the encryption kit, see the encryption kit user guide, which is available from the Hewlett Packard Enterprise Information Library: **https://www.hpe.com/info/storage/docs**

KMIP Encryption Configuration

For instructions on configuring the KMIP feature, see the *HPE StoreEver MSL Tape Libraries Encryption Key Server Configuration Guide*, available from the Enterprise Information Library: **https://www.hpe.com/info/storage/docs**

The Configuration > Drive page

The **Configuration > Drive** page shows the current configuration of all drives and allows modification to the configuration. You can also select **Power on** through this page.

Drive Configuration	
Drive (LUN)	☑ Power On
Port A Configuration	
Speed	Automatic ▾
Port Type	Automatic ▾
Addressing Mode	Soft ▾
ALPA	0 : 0x01 ▾
Port B Configuration	
Speed	Automatic ▾
Port Type	Automatic ▾
Addressing Mode	Soft ▾
ALPA	0 : 0x01 ▾

Figure 33: Configuration > Drive page (Fibre Channel)

For a Fibre Channel tape drive, you can use this screen to configure the FC ports. The port fields are:

- Speed — Automatic, 1 Gb/s, 2 Gb/s, 4 Gb/s, or 8 Gb/s. Only speeds supported by the drive are listed. The default is Automatic.

- Port Type — Automatic, Fabric (N), or Loop (NL). Direct connected devices are typically Loop. Devices connected to a switch are typically Fabric. The default is Automatic.

  NOTE: When using an LTO-7 or LTO-8 FC drive with a 32Gb or 16Gb HBA in direct attach mode, Port Type is typically set to Fabric Mode. Early (Gen5) 16Gb and 8Gb/4Gb host adapters may require the topology to be set to Loop Mode.

- Addressing Mode — addressing mode when the port type is Loop: Hard, Soft, or Hard auto-select. If the Addressing Mode is Hard, you must configure a fixed ALPA address that is unique on the loop. If the Addressing Mode is Soft, the system will assign an ALPA during fabric login. If the Addressing mode is Hard auto-select, the device acquires an ALPA at the initial system setup and then fixes it as a hard address from then on.

- ALPA — Arbitrated Loop Port Address
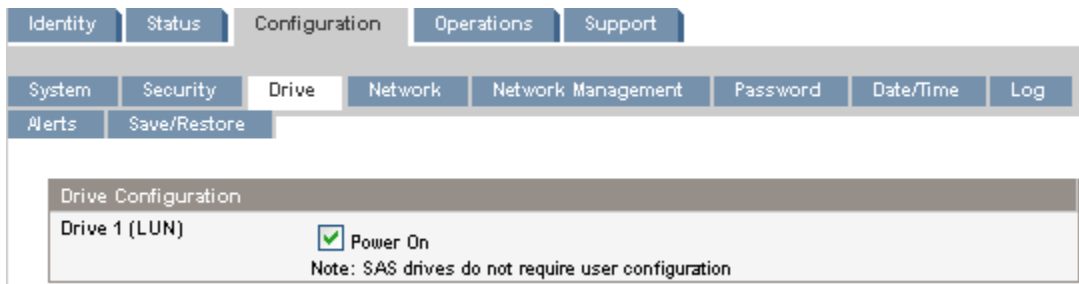
Figure 34: Configuration > Drive page (SAS)
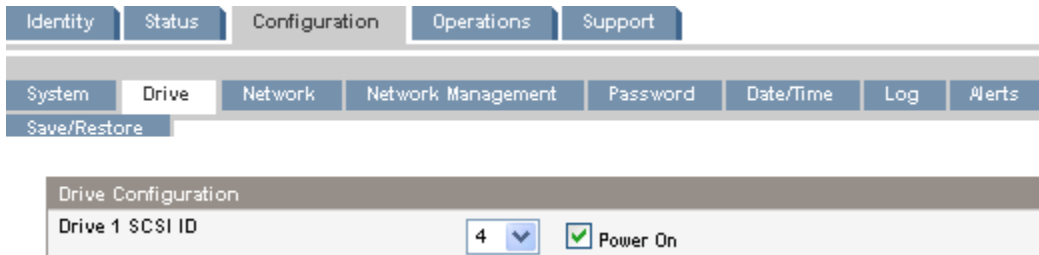
Figure 35: Configuration > Drive page (parallel SCSI)

For each parallel SCSI drive, you can change:

- SCSI ID — the SCSI address for a parallel SCSI tape drive.

- Power On — power the tape drive on or off.

The Configuration > License Key page

Use the **Configuration > License Key** page to install licenses on the library. Enter the license key string in the appropriate field and then press **Submit** to install the license.

NOTE: Licenses will only apply after the library is rebooted.

Figure 36: Configuration > License Key page

The Configuration > Network page

Use the **Configuration > Network** to modify the current network configuration. When you request a change, a pop-up box will ask you to confirm the changes.

Figure 37: Configuration > Network page

Network Configuration

Protocol Version	Dual stack IPv4 + IPv6 ⌄
Host Name	FL░░░3D
Domain Name	am░░░░░░░.net

IPv4

DHCP Address Enabled	☑
Static Address	░░░28.8
Subnet Mask	255.255.224.0
Gateway Address	░░0.1
IPv4 DNS Server 1	░░35.52
IPv4 DNS Server 2	░░35.51

IPv6

IPv6 DNS Server 1	0:0:0:0:0:0:0:0
IPv6 DNS Server 2	0:0:0:0:0:0:0:0
Stateless Addressing	☑
DHCPv6 Addressing	☐
Static Addressing	☐
Static Assigned Address	Please select a Prefix ⌄ : [ ] **Add**
Enable HTTPS	☐
	HTTPS required to be enabled for Command View TL
Disable HTTP (Port 80)	☐
Certificate Size	1024-bit ⌄
Restricted Network Access	☑

A new login may be required for some changes!
If the IP address changes, the new one must be entered in the address bar.

Refresh **Submit**

You can change:

- Protocol version — selects the Internet Protocols that will be enabled. Select IPv4 only, IPv6 only, or both IPv4 and IPv6 protocols. The default is the IPv4 protocol only.

- Host Name — enter the host name provided by your network administrator for the library.

- Domain name — enter the domain name provided by your network administrator for the library.

- Enable HTTPS — when On, the RMI can only be accessed through an HTTPS connection. HTTPs provides authenticated and encrypted transfer of data over the Internet and is commonly used for secure web communication.

- Disable HTTP (Port 80) — when On, the library cannot be accessed through Port 80.

- Certificate Size — select the number of bits used for HTTPS encryption. The default is 1024 bits. Using 2048-bit encryption will cause a slight lag in RMI connections.

- Restricted Network Access — when On, disables all nonessential network functionality that is not required for normal product operation. In most circumstances, leave this option On.

For IPv4, you can change:

- DHCP Address — when On, the library will request an IP address from a DHCP server each time the device is booted. The default is On.

- Static Address — configures the IP address when DHCP is not enabled.

- Subnet Mask — configures the network mask of the library controller when DHCP Address is not On.

- Gateway Address — configures the gateway address when DHCP Address is not On.

- IPv4 DNS Server 1 and IPv4 DNS Server 2 — configures the addresses of up to two DNS servers when DHCP Address is not On.

For IPv6, you can change:

- IPv6 DNS Server 1 and IPv6 DNS Server 2 — configures the addresses of up to two DNS servers when DHCPv6 is not enabled.

- Stateless Addressing Enabled — when On, the library will generate an address for itself based on the routing information obtained from a router advertisement and the MAC address. The library can manage up to five global addresses at the same time, which can be assigned from different routers. The default is On.

- DHCPv6 Addressing Enabled — when On, the library will request an IP address from a DHCP server each time the device is booted. The default is Off.

- Static Addressing Enabled — when On, the library will use a statically configured address. The default is Off.

- Static Assigned Address — configures the address when Static Addressing Enabled is On. You can select the standard prefix, `FE80:`, or the prefix of a nearby router. Enter the remainder of the address and click **Add**.

To remove an IPv6 static IP address, click **Delete** next to the address in the **Current IPv6 Addresses** pane.

The Configuration > Network Management page

Use the **Configuration > Network Management** page to enable and configure SNMP. SNMP allows applications such as HPE Systems Insight Manager to manage the device. The device supports both SNMP configuration and SNMP traps. SNMP can only be configured with the RMI; it cannot be configured with the OCP.

Command View TL TapeAssure provides comprehensive summaries and detailed information about the properties, performance, utilization, and health of all tape drives and media for all monitored Hewlett Packard Enterprise libraries. This data can be exported on demand or at scheduled times to a comma-separated values (CSV) file for analysis with spreadsheet programs or custom scripts.

SNMP Configuration

SNMP Enabled	☑

IPv4 SNMP Target Addresses

IPv4 Target 1	1.2.3.4 ✕ or Host name and domain *	Version SNMPv1 ▾	IPv4 address
IPv4 Target 2	0.0.0.0 or Host name and domain *	Version SNMPv1 ▾	IPv4 address
IPv4 Target 3	0.0.0.0 or Host name and domain *	Version SNMPv1 ▾	IPv4 address

IPv6 SNMP Target Addresses

IPv6 Target 1	0:0:0:0:0:0:0:0 or Host name and domain *	Version SNMPv1 ▾	IPv6 address
IPv6 Target 2	0:0:0:0:0:0:0:0 or Host name and domain *	Version SNMPv1 ▾	IPv6 address
IPv6 Target 3	0:0:0:0:0:0:0:0 or Host name and domain *	Version SNMPv1 ▾	IPv6 address
Community Name	public		

SNMP Trap Notification Filter

- ○ Critical Events
- ○ Critical and Warning Events
- ○ Critical, Warning and Configuration Events
- ◉ Critical, Warning, Configuration and Informational Events
- ○ No Events

Figure 38: Configuration > Network Management page

You can change:

- SNMP Enabled — When checked, computers listed in the SNMP Target IP Addresses field can manage the device. SNMP must be enabled to connect to Command View TL.

- SNMP Target IP Addresses — the IP addresses for up to three computers with IPv4 SNMP management software and up to three computers with IPv6 SNMP management software. IP addresses will not be cleared if SNMP is disabled, but those targets will no longer be able to manage the library and will not receive traps from the library. You can select the SNMP version for each target address.

  If the library is configured to use Command View TL, do not add the CVTL management station as a trap receiver. The CVTL station will be added automatically as an SNMP trap receiver during the CVTL registration process. Adding the CVTL station as a duplicate SNMP receiver could cause issues with SNMP connectivity.

- Community Name — a string used to match the SNMP management station and device. It must be set to the same name on both the management station and the library. The default community name is **public**.

- SNMP Trap Notification Filter — the types of events for which the device will send SNMP traps.

Configuring HPE Systems Insight Manager for the library

The library uses the HPE NetCitizen MIB, which is supported by HPE Systems Insight Manager (SIM) and many other applications. To detect the library using a remote management application, such as HPE SIM, you must first add the IP address for the management system as an SNMP target using the network configuration. SNMP queries are only accepted from configured targets.

Procedure

1. To configure the library for use with HPE SIM:

   a. From the RMI, add the HPE SIM management station as an SNMP target.

   b. If the library IP address is in an HPE SIM automatic discovery IP address list, the SIM management station will detect the library at the next scheduled scan.

2. To configure HPE SIM for manual discovery:

   a. In the HPE SIM toolbar, click **Options > Discovery**.

   b. Click the **Manual** tab.

   c. Enter the library IP address or system name.

SIM 5.1 will automatically detect the system type and product name.

To identify the library manually with SIM 5.0 and older:

1. In the HPE SIM **System and Event Collections** pane, click **Systems by Type**.

2. In the **Systems by Type** pane, click **All systems**.

3. Click the link with the IP address or name of the library.

4. Click the **Tools & Links** tab.

5. Click **Edit System Properties**.

6. Set **System Type** to **Tape Library**.

7. Enter the **Product Model** of your library.

8. Click **OK**.

The Configuration > Password page

Use the **Configuration > Password** page to change the administrator password for the RMI and OCP.

NOTE: The administrator password must be set from the OCP before you can access administrator functionality in the RMI.

Change Administrator Password	
New Password (Enter Exactly Eight Numbers)	••••••••
Repeat Password	••••••••
Password Time Out	30 ⌄ Minutes

Figure 39: Configuration > Password page

You can change the:

- Password — The password is exactly eight numbers, each from 0 to 9.

- Password Time Out — The number of minutes that the current administrator login session will remain logged in without user interaction. The default is 30 minutes.

The Configuration > Date/Time page

Use the **Configuration > Date/Time** page to set the date and time.

Clock Configuration	
Time (24H)	08 : 20 : 15
Date	Month : 12 Day : 21 Year : 2017
Clock Synchronization Configuration (SNTP)	
Enable Clock Synchronization	☑ For more information click Help.
SNTP Server Address (IPv4 or IPv6)	▮▮▮▮▮.123 IPv4 or IPv6 address or Host name and domain *
UTC Time Zone Offset	(GMT-07:00) Mountain Time (US and Canada), Arizona, Chihuahua, La Paz, Mazatlan
Daylight Saving Enabled	☐
Daylight Savings Auto Adjustment Enabled	☑ US, Canada, North America and European time zones

Figure 40: Configuration > Date/Time page

You can change:

- Time — configures the hours, minutes, and seconds for the internal clock. The time is based on a 24-hour clock, where 1:00 pm is 13:00.

- Date — configures the current month, day, and year for the internal clock.

- Enable Clock Synchronization — When enabled, the library will use the configured Simplified Network Time Protocol (SNTP) service to obtain the current date and time.

  Time is synchronized with the SNTP server each time the library is powered on, as well as each time a drive is unloaded.

- SNTP Server Address — the IP address of an SNTP server. The SNTP server can be configured with either an IPv4 or IPv6 address, or with a host and domain name. If a host and domain name are entered, the IP address will be resolved from the DNS using that name. The device will store the resulting address, rather than the name. If the address changes, enter the name or a new address so the device can find the server again.

- UTC Time Zone Offset — Select the time zone for your area.

- Daylight Saving Enabled — Enabling daylight saving will advance the local time by one hour. This function will NOT automatically adjust for Daylight Saving time based on the calendar. Enable this setting when daylight saving time starts in your area and disable it when daylight saving time ends.

- Enable Daylight Savings Adjustment — Enabling daylight saving time will advance the local time by one hour. This setting does NOT automatically adjust the device time for daylight saving time based on the calendar. Enable this setting when daylight saving time starts in your area and disable it when daylight saving time ends.

  Daylight Savings Auto Adjustment Enabled — When SNTP is configured, you can also enable the **Daylight Savings Auto Adjustment Enabled** option. When Daylight Savings Auto Adjustment Enabled is enabled, the library will automatically adjust for US/Canada/North America and European daylight saving time.

  The adjustment for US/Canada/North America begins at 2am on the second Sunday in March and reverts at 2am the first Sunday in November. For Europe, the adjustment begins at 2am on the last Sunday of March and reverts at 3 am on the last Sunday of October.

  The option only applies to locations that use the standard daylight saving time dates. The Daylight Savings Auto Adjustment Enabled option can only be enabled when SNTP is enabled.

  The time zones that can use this feature are:

  ◦ (GMT-08:00) Pacific Time (US and Canada), Tijuana

  ◦ (GMT-07:00) Mountain Time (US and Canada), Arizona, Chihuahua, La Paz, Mazatlan

  ◦ (GMT-06:00) Central America, Central Time (US and Canada), Guadalajara, Mexico City, Monterrey, Saskatchewan

- ◦ (GMT-05:00) Eastern Time (US and Canada), Bogota, Lima, Quito, Indiana(East)

- ◦ (GMT-04:00) Atlantic Time (Canada), Caracas, La Paz, Santiago

- ◦ (GMT) Casablanca, Monrovia, Greenwich Mean Time: Dublin, Edinburgh, Lisbon, London

- ◦ (GMT+01:00) Amsterdam, Berlin, Bern, Rome, Stockholm, Vienna, Belgrade

- ◦ (GMT+02:00) Athens, Beirut, Istanbul, Minsk, Bucharest, Cairo, Harare, Pretoria, Helsinki, Kyiv, Riga, Sofia, Tallinn, Vilnius, Jerusalem

The Configuration > Log page

Access to the **Configuration > Log** page requires the service password and is only available to Service engineers.

The Configuration > Alerts page

From the **Configuration > Alerts** page, you can configure email notification of device events.

Figure 41: Configuration > Alerts page

You can change the:

- Notification Level — the types of events for which the library will send email

- To Email Address — the address to which to send the reported events (for example, firstname.lastname@example.com). Only one email address can be configured.

- Email Domain — domain of the return email address (for example, example.com)

- SMTP Server Address — the IP address of the SMTP server. Configure the SMTP server with an IP address or hostname and domain. The IP address can be IPv4 or IPv6, depending on the network stack configuration.

  If a host and domain name are entered instead of an IP address, the IP address is resolved from the DNS. The library saves that IP address rather than the name. If the address changes, enter the name or a new address to update the stored IP address.

- SMTP Port — option to configure SMTP port of the SMTP server. For unsecured communication, use the default port 25. Ports 465 and 587 are secured ports and require SSL configured on the SMTP server. The custom port could be set individually and is also secured.

The Configuration > Save/Restore page

Use the **Configuration > Save/Restore** page to restore the factory defaults, reset the administrator password to null, or save the library configuration database to a file. The library will perform an inventory after the defaults are restored.

> **! IMPORTANT:** Once you reset the administrator password to null, you will not be able to access the administrator functions in the RMI until you set an administrator password through the OCP. To **change** the administrator password, use **Figure 39: Configuration > Password page**.

The saved configuration database will make it easier to recover the library configuration in case you must replace the chassis or library controller.

This feature is also useful when installing multiple devices. Either save the configuration before configuring the network or ensure that only one library with the same network configuration is on the network at a time until they have unique network identities.

> **NOTE:** You can save the device configuration to a USB flash drive from the OCP.

Configuration Reset	
Restore Factory Defaults	Restore
Restore Admin password to null	Restore

Save/Restore Configuration			
Save Configuration to File	Save		
Restore Configuration from File		Browse...	Restore

Figure 42: Configuration > Save/Restore page

> **! IMPORTANT:** When the defaults are restored, the library will rediscover and renumber the tape drives from the bottom of the library up. If a tape drive was added between two other tape drives since the last time the drives were discovered, that tape drive and the ones above it will be renumbered. You might need to update the configuration of the backup application when tape drives are renumbered.

To save the device configuration to a file, click **Save** and follow the instructions on the RMI to specify a file location.

To restore the device configuration from a file, browse to the location of the saved configuration file and click **Restore**.

> **NOTE:** For security reasons, the system configuration cannot be restored from a file or restored to the factory defaults when encryption is enabled. Disable encryption from the **Configuration > Security** screen before restoring the system configuration from a file or from the factory defaults.

Operations

The Operations > Move Media page

Use the **Operations > Move Media** page to move tape cartridges within the device.

> **! IMPORTANT:** Moving media manually can interfere with backup software operations. Ensure that backups are complete before moving media.

	Element	Status	Information	
○	Slot 1 (1)	Full, Gen. 7	SIT860L7	▲
○	Slot 3 (1)	Full, Gen. 8	CH0349L8	
○	Slot 5 (1)	Full, Gen. 6	AKF647L6	
○	Slot 6 (1)	Full, Gen. 6	KR0772L6	
○	Slot 7 (1)	Full, Gen. 6	CH4762L6	
○	Slot 9 (1)	Full, Gen. 6	CH4774L6	
○	Slot 10 (1)	Full, Gen. 6	KR0283L6	
○	Slot 12 (1)	Full, Gen. 7	SIT861L7	
○	Slot 13 (1)	Full, Gen. 7	SIT862L7	
○	Slot 14 (1)	Full, Gen. 7	SIT865L7	
○	Slot 15 (1)	Full, Gen. 7	SIT868L7	
○	Slot 16 (1)	Full, Gen. 7	SIT871L7	
○	Slot 17 (1)	Full, Gen. 7	SIT863L7	
○	Slot 18 (1)	Full, Gen. 7	SIT866L7	
○	Slot 19 (1)	Full, Gen. 7	SIT869L7	
○	Slot 20 (1)	Full, Gen. 7	SIT872L7	
○	Slot 21 (1)	Full, Gen. 7	SIT864L7	
○	Slot 22 (1)	Full, Gen. 7	SIT867L7	▼

Source

Destination

	Element	Status	Information
○	Drive 1 (1)	Empty, LTO7	
○	Drive 2 (1)	Empty, LTO6	
○	Drive 3 (1)	Empty, LTO6	
○	Drive 4 (1)	Empty, LTO6	
○	Slot 2 (1)	Empty	
○	Slot 4 (1)	Empty	
○	Slot 8 (1)	Empty	
○	Slot 11 (1)	Empty	

Move >

Refresh

Figure 43: Operations > Move Media page

To move a tape, select the source and destination and then click the **Move** button in the center of the screen to start the move.

The Operations > Inventory page

Use the **Operations > Inventory** page to have the library update the media inventory.

Rescan Inventory

Rescan
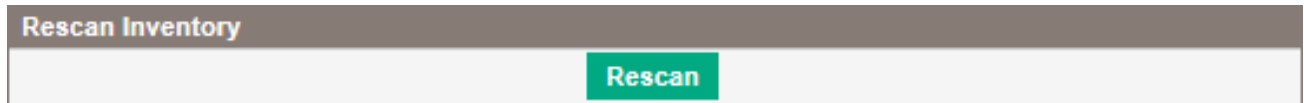
Figure 44: Operations > Inventory page

The Operations > Magazines page

Use the **Operations > Magazines** page to release the left, right, or both magazines. When you click **Release**, the library will unlock the magazine and display **Left Magazine Unlocked** or **Right Magazine Unlocked** on the OCP screen. Once the magazines are unlocked, you can remove any of the magazines on that side. If you do not remove the magazine within a few seconds, the library will lock the magazine. When you replace the magazine, the library will inventory the tape cartridges in the magazine.

Release Magazine

Magazine	Right ▼
	Release

Figure 45: Operations > Magazines page

NOTE: To release a magazine manually, see **Releasing the magazines manually**. However, only use this manual process if the magazine cannot be released using the OCP or RMI.

Support

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

The Support > General Diagnostic page

Use the **Support > General Diagnostic** page to run general tests to verify the usability and reliability of the device. Select the test and enter the number of test cycles before starting the test. To cancel the test early, click on the **Stop** button.
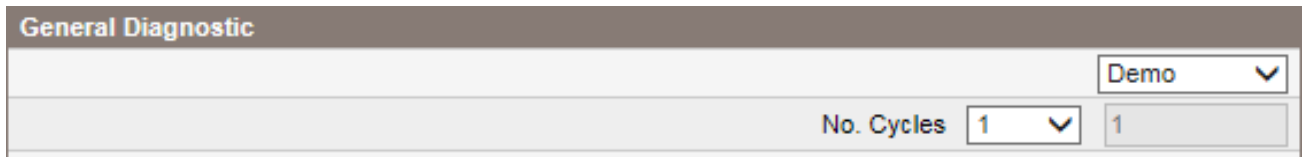
Figure 46: Support > General Diagnostic page

The available tests are:

- Demo — moves cartridges from the slots to the drives and back. At the end of the test, the cartridges are returned to their original slots.

- Slot to slot — shuffles the cartridges between slots to exercise the robot. At the end of the test, the cartridges are NOT returned to their original slots.

The demo and slot to slot test are intended to show the device operating. For service and diagnostics, execute the wellness test from the OCP. See **The wellness test**.

The Support > Service page— Service restricted

This page is only available for the Service user. This page provides access to specialized tests and diagnostics.

The Support > Firmware page

Use the **Support > Firmware** page to see the current version of the device and drive firmware, and upload new firmware. After the firmware is updated, the device or tape drive with updated firmware is reset.

The firmware files must be in the L&TT format with the `.frm` file extension.

> ⚠ **CAUTION:** Do not interrupt the library while a firmware update is in progress. Updating the tape drive firmware can take several minutes because the firmware is transferred through a serial connection.

The library only supports signed firmware image upgrades and downgrades. Once firmware that uses code signing is loaded, the firmware will reject all unsigned images. If you attempt to load an unsigned firmware image, the RMI displays an invalid firmware version error message:

If you see this message, download and install the latest signed firmware image.

Upgrade Library Firmware			
Currently Installed Library Firmware	9.50		
Library Firmware File	Choose File	No file chosen	Update

Upgrade Drive 1 Firmware			
Drive Firmware Revision	HB81		
Drive Firmware File	Choose File	No file chosen	Update

Upgrade Drive 2 Firmware			
Drive Firmware Revision	25MW		
Drive Firmware File	Choose File	No file chosen	Update

Figure 47: Support > Firmware page

The Support > Reboot page

Use the **Support > Reboot** page to do a soft reset of the library. After the reboot, the library will run the Power On Self-Test (POST) and scan for a new inventory. The RMI webpage will refresh itself after a short time delay. If the connection to the library is lost during the reboot, refresh the page from the web browser.

Autoloader Reboot
Reboot

Figure 48: Support > Reboot page

The Support > Library Logs page

From the **Support > Library Logs** page, you can see the device logs. The available logs are: Error Trace, Informational Trace, Warning Trace, Configuration Change Trace, and Standard Trace.

The log entries are displayed in order of most recent to oldest. The format for the log entries is: `YY.MM.DD HH.MM.SS.ss LIB/ERR <80 89 62 40 >`

- YY.MM.DD — the date displayed as Year.Month.Day

- HH.MM.SS.ss — the time displayed as Hour.Minute.Second.Hundredths of a second

- First code — hard or soft error. The code after LIB/ERR (80 in the example) will be 80 or 40. 80 indicates a hard error, 40 indicates a soft error.

- Second code — the main error code (89 in this example). See **Error codes** for a list of error codes and recovery procedures.

- Third code — the subcode (62 in this example). See **Error sub-code descriptions** for a list of subcodes.

- Fourth code — subcode-specific information for factory use only

Logs	
Log Type	Error Trace ▼
Total Number Of Entries	0
Start Entry	1
Number Of Entries Per Page	5
Detail Level	● Summary ○ Details
	Update Dump Log Save Service Dump

Figure 49: Support > Library Logs page

The Support > Drive page

Use the **Support > Clean Drive** page to clean a tape drive.

- Slot # — select the slot number of the cleaning tape

- Drive — select the drive to be cleaned

Clear Drive Reservation — initiate the clearing of reservations on all LTO-5 and later drives installed in the library.

Clean Drive	
Slot #	N.A.
Drive	1 - No Cleaning Required ▼
	Clean

Clear Drive Reservation
Clear Drive Reservation
Note: This operation will impact any ongoing backup operations, therefore this operation should only be performed on idle drives.

Figure 50: Support > Clean Drive page

The Support > Support Ticket page

Use the **Support > Support Ticket** page to download a support ticket for the library or a tape drive. The support ticket can help a service engineer or system administrator diagnose a device problem. It is recommended that Library and Tape Tools be used to download support tickets whenever possible.

NOTE:

- LTO 2 and 3 tape drives must be empty to download support tickets

- LTO 4 tape drives with firmware newer than H36W (FC), B34W (parallel SCSI) or U24W (SAS) automatically generate a support ticket during an unload operation. You can download the ticket at any time.

- LTO 4 tape drives with older firmware must be empty to download a support ticket. Gathering a current ticket for an LTO 4 tape drive might cause a temporary performance decrease while the ticket is generated.

Autoloader Controller Support Ticket		
Download	Note: controller ticket only - download drive support tickets below	
Drive Support Ticket		
Select Drive	Drive 1 Support Ticket - Ultrium 7 ⌄	◉ Health Log
	Download	
HTTP Support Ticket Access		
Allow support ticket retrieval without Administrator login	☑	
	Submit	

Figure 51: Support > Support Ticket page

- Library Controller Support Ticket - downloads the support ticket for the library

- Drive Support Ticket - downloads the support ticket for a tape drive. Select tape drive and the timeframe for the support ticket, and then click **Download**.

- HTTP Support Ticket Access - allows the pulling of support tickets using url commands.

   NOTE: `L1` pulls the library support ticket. `D1`..`D4` pulls the drive tickets.

   When enabled, the following commands may be used to request support tickets:

   ◦ `http://< library_ip >/sticket/L1.ssi`

   ◦ `http://< library_ip >/sticket/<D1>.ssi`

   When not enabled, the following commands may be used to request support tickets:

   ◦ `https://< library_ip >/sticket/L1.ssi?user=admin&passwd= <admin_password>`

   ◦ `https://< library_ip >/sticket/<D1>.ssi?user=admin&passwd= <admin_password>`

   `admin_passwd` is same as used to log into rmi as admin

Using the MSL2024 OCP

The OCP on the front of the library includes a 2-line by 16-character green backlit liquid crystal display (LCD), four function keys, and four LEDs. This panel provides everything you need to monitor the library status and control its functions.

The following functions are available through the OCP:

- **Unlocking the mailslot (Unlock Mailslot)**

- **Status/Information**

   ◦ **Viewing cartridge inventory (Status/Information > Inventory)**

   ◦ **Viewing library information (Status/Information> Library Information)**

   ◦ **Viewing drive information (Status/Information > Drive Information)**

   ◦ **Viewing component status (Status/Information > Component Status)**

   ◦ **Viewing network information (Status/Information > Network Information)**

- **Configuring the library**

- ◦ **Configuring logical libraries (Status/Information > Set Logical Libraries)**

- ◦ **Changing the administrator password (Configuration > Change Admin Password)**

- ◦ **Setting the number of reserved slots (Configuration > Set Reserved Slot Count)**

- ◦ **Configuring the mailslot (Configuration > Configure Mailslot)**

- ◦ **Configuring the bar code reporting format (Configuration > Barcode Format Reporting)**

- ◦ **Changing the SCSI address — parallel SCSI drives (Configuration> Change Drive)**

- ◦ **Setting the master drive (Configuration > Set Master Drive)**

- ◦ **Setting behaviors (Configuration > Library behavior)**

- ◦ **Setting the date and time (Configuration > Library Date/Time)**

- ◦ **Configuring IPv4 network settings (Configuration > Configure Network Settings)**

- ◦ **Configuring automatic cleaning (Configuration > Configure Auto Cleaning)**

- ◦ **Restoring factory defaults (Configuration > Restore Defaults)**

- ◦ **Saving the library configuration (Configuration> Save/Restore Configuration)**

- • **Accessing the operations functions**
  - ◦ **Unlocking, removing, and replacing magazines (Operations > Unlock Left or Right Magazine)**

  - ◦ **Cleaning a tape drive (Operations > Clean Drive)**

  - ◦ **Moving tapes in the library (Operations > Move Tape)**

  - ◦ **Updating tape cartridge inventory (Operations > Perform Inventory)**

  - ◦ **Rebooting the library (Operations > Reboot Library)**

  - ◦ **Enabling password locks (Operations > Enable Library Password Locks)**

- • **Accessing the support functions**
  - ◦ **Powering a drive on or off (Support > Power On/Off Drive)**

  - ◦ **Running the demonstration (Support > Run Demo)**

  - ◦ **Running the slot to slot test (Support > Run Slot To Slot Test)**

  - ◦ **Running the wellness test (Support > Run Wellness Test)**

  - ◦ **Upgrading firmware (Support > Library FW Upgrade)**

  - ◦ **Forcing the drive to eject a tape (Support > Force Drive To Eject Tape)**

  - ◦ **Viewing logs (Support > Library Error Log)**

  - ◦ **Downloading a support ticket (Support > Download Support Ticket)**

LED indicators

The operator panel includes four LEDs that provide a summary of the library status.
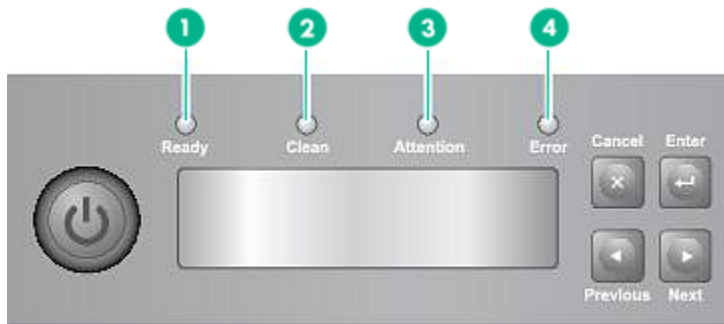
11159

Item	Label	Color	Description
1	Ready	Green	Illuminated when power is on. Blinking during tape drive or robotics activity.
2	Clean	Amber	Illuminated when a cleaning cartridge should be used.
3	Attention	Amber	Illuminated if the device has detected a condition that requires attention.
4	Error	Amber	Illuminated if an unrecoverable error occurs. A corresponding error message displays on the LCD screen. You might need to cycle power the library to clear the Error LED.

Home screen

The first line of the Home screen displays the device product name. The second line displays a brief status message.

Drive status definitions

Status	Definition
IDLE	Drive has a tape inserted, but there is no activity
RD	Drive is reading
FWD	Drive is forwarding
WR	Drive is writing
LD	Drive is loading a tape
ULD	Drive is unloading a tape
CLN	Drive is cleaning
RWD	Drive is rewinding
SEEK	Drive is seeking
MOV	Performing a tape move or tape exchange operation
ERASE	Drive is erasing a tape
CAL	Drive is calibrating
TEST	Performing a test
UPGR	Performing a firmware upgrade operation
DCR	Decrypting
ENC	Encrypting

OCP buttons

With the four OCP buttons, you can traverse the OCP menu structure and enter information.

Button	Description
Cancel	Cancels the current menu option, returns to the previous menu level, or returns to the Home screen.
Enter	Enters the menu or selects the option displayed on the LCD screen.
Previous	Selects the previous item or value in the currently displayed menu.
Next	Selects the next item or value in the currently displayed menu.

The OCP menu structure

The OCP options are organized under five menus: Unlock Mailslot, Status/Information, Configuration, Operations, and Support.

NOTE: The Unlock Mailslot menu is only displayed when the mailslot is enabled. To enable the mailslot, see **Configuring the mailslot (Configuration > Configure Mailslot)**

From the Home screen, press **Enter** to bring up the first menu item. From a menu, use the **Previous** and **Next** keys to cycle through the menus, press **Enter** to see the first option in the menu, or press **Cancel** to return to the Home screen.

From an option, use the **Previous** and **Next** keys to cycle through the options in the menu, press **Enter** to select the option, or press **Cancel** to return to the menu list.

HOME

Unlock Mailslot
- Mailslot Unlocked
- Once sensors detect Mailslot is open
- Close Mailslot

Status/Information
- Inventory
- Library Information
- Drive 1 Information
- Drive 2 Information
- Component Status
- Network Information

Configuration
- Change Admin Password
- Set Reserved Slot Count
- Mailslot Configuration
- Barcode Format Report
- Change Drive 1
- Change Drive 2 SCSI ID
- Set Master Drive
- Library Behavior
- Set Date and Time
- Configure Network Settings
- Restore Defaults

Operations
- Unlock Left Magazine
- Unlock Right Magazine
- Clean Drive
- Move Tape
- Perform Inventory
- Reboot the Library
- Enable Library Password Locks

Support
- Power On/Off Drives
- Run Demo
- Run Slot To Slot Test
- Drive FW Upgrade Using Tape
- Force Drive To Eject Tape
- Library Error Log
- Library Warning Log
- HPE Service Area

Legend:
- Requires administrator password
- Requires HPE Service password (HPE Service personnel only)

11066

The administrator password accesses all of the available functionality, except for the Service Area. A user without the administrator password has access to the **Unlock Mailslot** and **Status/Information** menus.

Entering the administrator password

TIP: By default, the administrator password is unset; all of the digits are null. Set the administrator password from the OCP to protect the administrator functions on the OCP and enable the administrator functions in the RMI.

Options that require a password will prompt for a password before allowing access to the restricted screens. Once entered, the administrator password does not need to be entered again unless there is no user activity for five minutes or the password lock is enabled.

The number **1** should be flashing. To enter the password, do the following:

Procedure

1. From the OCP, press **Next** to scroll to the first number of the password.

2. Press **Enter**. The number you selected is replaced with an asterisk (*), and the cursor proceeds to the next text box.

3. Repeat steps 1 and 2 until you have entered all eight numbers. After the last number has been entered, the screen continues to the restricted area.

NOTE: If you forget the administrator password, you cannot enter a new password. Call your customer service representative.

Unlocking the mailslot (Unlock Mailslot)

The mailslot in the left magazine is used only with host system software that supports this feature. The mailslot feature allows you to insert or remove a single tape without removing the entire magazine. The benefit of using a mailslot is that the device will not inventory the rest of the slots in the magazine so the device can return to service sooner. The mailslot is in the left magazine.

NOTE: The Unlock Mailslot menu is only displayed when the mailslot is enabled. To enable the mailslot, see **Configuring the mailslot (Configuration > Configure Mailslot)**

Procedure

1. From the Home screen, press **Next** until the screen displays **Unlock Mailslot**. Press **Enter** to select.

2. The mailslot ejects automatically. Pull the mailslot out to access the tape.

3. The screen displays **Close Mailslot**.

4. Remove the tape cartridge from the mailslot and insert a different tape cartridge.

5. Push the magazine back into the library.

11345

Figure 52: Removing a tape from the mailslot

Status/Information

The Status/Information menu provides access to the following status options:

- **Viewing cartridge inventory (Status/Information > Inventory)**

- **Viewing library information (Status/Information> Library Information)**

- **Viewing drive information (Status/Information > Drive Information)**

- **Viewing component status (Status/Information > Component Status)**

- **Viewing network information (Status/Information > Network Information)**

Procedure

1. From the Home screen, press **Previous** or **Next** until the screen displays **Status/Information**.

2. Press **Enter** to select.

3. Press **Previous** or **Next** until the screen displays your selected function.

4. Press **Enter** to select.

Viewing cartridge inventory (Status/Information > Inventory)

This option provides information on which slots have cartridges and which are empty. The second line on the screen displays one of:

- Full (tapes without bar code labels)

- Bar code identification from the tape

- Empty

The library has the following inventory locations:

- Mailslot

- Left magazine

- Right magazine

- Drive 1

- Drive 2 (if two drives are present)

Each location provides different information:

- Drive or Mailslot: For example, the screen might display **Mailslot AESO32L3**, where AESO32L3 is on the bar code number on the tape, or it might display **Full** or **Empty**.

- Left or right magazine: The screen might display **Left Magazine** or **Right Magazine.** The second line on the display indicates which slots have a tape or are empty. Slots in the left magazine are numbered 1-12 or 1-11, and slots in the right magazine are numbered 12-23 or 13-24. A character represents each slot.

Table 10: Display indication definitions

Character displayed	Definition
X	Slot has a tape
-	Slot is empty
m	Mailslot is enabled but does not have a tape
M	Mailslot has a tape

Table Continued

Character displayed	Definition
C	Slot has a cleaning tape
!	Media needs attention, often as a result of a damaged or incompatible cartridge

NOTE: If the mailslot is enabled, the storage slot count is reduced.

Procedure

- To view the tape inventory:

    1. From the Home screen, press **Previous** or **Next** until the screen displays **Status/Information**. Press **Enter** to select.

    2. Press **Previous** or **Next** until the screen displays **Inventory**. Press **Enter** to select.

    3. Use **Previous** or **Next** to select from the following inventory locations:

        ◦ Mailslot

        ◦ Left magazine

        ◦ Right magazine

        ◦ Drive 1

        ◦ Drive 2 (if two drives are present)

- To view more details about the contents of each slot, press **Enter** when the screen displays either **Left Magazine** or **Right Magazine**.

    ◦ Mailslot

    ◦ Left magazine

    ◦ Right magazine

    ◦ Drive 1

    ◦ Drive 2 (if two drives are present)

- To view the inventory of a magazine, press **Enter** when the OCP displays **Left** or **Right Magazine**.

    The OCP will display the contents of the lowest numbered slot in the magazine. The display will show the tape bar code number, **Full**, or **Empty**.

    1. Use **Previous** or **Next** to scroll through the remaining slots in the magazine. Press **Cancel** to choose another inventory location.

- To view the inventory of a tape drive, press **Previous** or **Next** until the screen displays **Drive 1**, or **Drive 2**. The display will show the tape bar code number, **Full**, or **Empty**. Press Enter to view the source of the tape loaded in the drive. For example, **Drive 1 Tape Source = Slot 2**, indicates that the tape in Drive 1 was loaded from slot 2.

Viewing library information (Status/Information> Library Information)

Procedure

1. From the Home screen, press **Previous** or **Next** until the screen displays **Status/Information**. Press **Enter** to select.

2. Press **Previous** or **Next** until the screen displays **Library Information** . Press **Enter** to select.

3. By using **Previous** or **Next**, you can select from the following information screens:

    - Library Time

    - Firmware rev.

    - Product ID

    - Serial number

    - SCSI ID and LUN (SCSI devices only)

    - Slots and Mailslots

    - Master drive

    - Odometer

    - Power On Time

    - WWide Node Name for the FC node to which the Library is connected. (Fibre Channel only)

Viewing drive information (Status/Information > Drive Information)

Procedure

1. From the Home screen, press **Previous** or **Next** until the screen displays **Status/Information**. Press **Enter** to select.

2. Press **Previous** or **Next** until the screen displays **Drive 1 Information** or **Drive 2 Information**. Press **Enter** to select.

3. By using **Previous** or **Next**, you can select from the following information screens:

    - Serial number

    - Drive type

    - Firmware revision

    - SCSI ID (parallel SCSI tape drives only)

    For a Fibre Channel tape drive, you can also select from the following information screens:

    - The WWide Node Name for the FC node to which the tape drive is connected.

    - The WWide Port Name and Port Type for Port A.

    - The WWide Port Name and Port Type for Port B.

    World Wide names are assigned automatically; they cannot be configured.

Viewing component status (Status/Information > Component Status)

Procedure

1. From the Home screen, press **Previous** or **Next** until the screen displays **Status/Information**. Press **Enter** to select.

2. Press **Previous** or **Next** until the screen displays **Component Status**. Press **Enter** to select.

3. By using **Previous** or **Next**, you can select from the following information screens:

   - Drive activity

   - Library status

   - Drives status

   - Fan status

   The second line of the screen will display one of the following:

   - Good — the component is operating normally.

   - Warning — the component might have an issue that should be addressed. The Library is functional.

   - Critical — the component has an error condition that should be addressed. The Library might not be fully functional.

   - Failed — the component has a known failure and should be replaced.

Viewing network information (Status/Information > Network Information)

Procedure

1. From the Home screen, press **Previous** or **Next** until the screen displays **Status/Information**. Press **Enter** to select.

2. Press **Previous** or **Next** until the screen displays **Network Information**. Press **Enter** to select.

3. Press **Previous** or **Next** to access the following information:

   - IPv4 Network Enabled or Disabled

   - IPv6 Network Enabled or Disabled

   - Host Name

   - Domain Name

   - MAC Address

4. For IPv4 Network or IPv6 Network, press **Enter** and then use **Previous** or **Next** to access the network addresses and configuration.

Configuring the library

Configure the library from the Configuration menu.

Procedure

1. From the Home screen, press **Previous** or **Next** until the screen displays **Configuration**.

2. Press **Enter** to select.

3. Press **Previous** or **Next** until the screen displays your selected function.

*   **Configuring logical libraries (Status/Information > Set Logical Libraries)**
*   **Changing the administrator password (Configuration > Change Admin Password)**
*   **Setting the number of reserved slots (Configuration > Set Reserved Slot Count)**
*   **Configuring the mailslot (Configuration > Configure Mailslot)**
*   **Configuring the bar code reporting format (Configuration > Barcode Format Reporting)**
*   **Changing the SCSI address — parallel SCSI drives (Configuration> Change Drive)**
*   **Changing the drive configuration — Fibre Channel drives (Configuration> Change Drive)**
*   **Setting the master drive (Configuration > Set Master Drive)**
*   **Setting behaviors (Configuration > Library behavior)**
*   **Setting the date and time (Configuration > Library Date/Time)**
*   **Configuring IPv4 network settings (Configuration > Configure Network Settings)**
*   **Configuring automatic cleaning (Configuration > Configure Auto Cleaning)**
*   **Restoring factory defaults (Configuration > Restore Defaults)**
*   **Saving the library configuration (Configuration> Save/Restore Configuration)**

4. Press **Enter** to select.

Configuring logical libraries (Status/Information > Set Logical Libraries)

Use **Set Logical Libraries** to configure a two-drive tape library into one or two logical libraries. Access to this feature requires the administrator password. For more information about logical libraries, see **Logical libraries**.

Procedure

1. From the Home screen, press **Previous** or **Next** until the screen displays **Configuration**. Press **Enter** to select.
2. Press **Previous** or **Next** until the screen displays **Set Logical Libraries**. Press **Enter** to select.
3. Enter the administrator password if prompted.
4. Press **Previous** or **Next** to scroll through the display until the desired number of logical libraries is displayed, then press **Enter**.

Changing the administrator password (Configuration > Change Admin Password)

Use **Change Admin Password** to set or change the administrator password. Once the administrator password is set, you must know the administrator password or the service password to change the administrator password. Passwords consist of exactly eight numbers each between the values of 0 and 9.

Screens that require a password prompt for the password before allowing access to the restricted areas. Once entered, the administrator password does not have to be entered a second time unless there is no user activity for five minutes. Enter the administrator password if you are prompted to do so.

NOTE: If you forget the administrator password, you cannot enter a new password. Call your customer service representative.

Procedure

1. From the Home screen, press **Previous** or **Next** until the screen displays **Configuration**. Press **Enter** to select.

2. Press **Previous** or **Next** until the screen displays **Change Admin Password**. Press **Enter** to select.

3. The first number is flashing. Press **Previous** or **Next** to change the value of the flashing number. When the flashing number shows the desired value, press **Enter** to select.

4. The screen displays the second number flashing. Repeat Step 3 until you have entered all eight characters. Press **Enter** to select. After the last number has been entered, the password has been set to the new password.

Setting the number of reserved slots (Configuration > Set Reserved Slot Count)

You can access reserved slots from the RMI and the OCP, but the reserved slots are invisible to the host and backup software. For example, you might keep a cleaning cartridge in a reserved slot if your backup software does not manage the cleaning process.

You can reserve up to 22 slots.

Prerequisites

Access to this feature requires the administrator password.

Procedure

1. From the Home screen, press **Previous** or **Next** until the screen displays **Configuration**. Press **Enter** to select.

2. Press **Previous** or **Next** until the screen displays **Set Reserved Slot Count**. Press **Enter** to select.

3. Enter the administrator password if prompted.

4. Press **Previous** or **Next** to scroll through the display until the desired number of slots is displayed, then press **Enter**.

Configuring the mailslot (Configuration > Configure Mailslot)

The mailslot is a single slot at the front of the left magazine that you can access without removing the whole magazine. Loading a tape through the mailslot is faster than opening the magazine because the device does not need to inventory the rest of the magazine slots when you use the mailslot. Also, the device can continue to function when the mailslot is open. Access to this feature requires the administrator password.

Procedure

1. From the Home screen, press **Previous** or **Next** until the screen displays **Configuration**. Press **Enter** to select.

2. Press **Previous** or **Next** until the screen displays **Configure Mailslot**. Press **Enter** to select.

3. Enter the administrator password if prompted.

4. The screen displays either **Mailslot Enabled** or **Mailslot Disabled**.

5. Press **Previous** or **Next** until the screen displays **Disable Mailslot?** or **Enable Mailslot?**. Press **Enter** when the correct action is displayed.

Configuring the bar code reporting format (Configuration > Barcode Format Reporting)

You can configure how the tape bar code is displayed in the OCP and RMI, and how it is reported to the host software. You can configure the number of characters to display and whether to justify the numbers to the left or right. For example, when reporting only six characters of the bar code label `12345678`, if alignment is left, the device will report `123456`. If alignment

is right, the device will report 345678. The maximum length is 15 characters. The default configuration is **8 Left**. The OCP displays bar code labels longer than eight characters in an abbreviated form.

Prerequisites

The administrator password.

Procedure

1. From the Home screen, press **Previous** or **Next** until the screen displays **Configuration**. Press **Enter** to select.

2. Press **Previous** or **Next** until the screen displays **Barcode Format Reporting**. Press **Enter** to select.

3. Press **Previous** or **Next** until the screen displays either **Display Format** or **Host Format**. The second line displays the number of characters and the current format. To change the current format, press **Enter** to select either **Display** or **Host**. An example of the screen display is **# of characters 8**.

4. Press **Previous** or **Next** until the desired number of characters is listed. Press **Enter** to select.

5. The screen displays either **Alignment Left** or **Alignment Right**. Use **Previous** or **Next** to toggle between the two choices. Press **Enter** to select the correct alignment.

Changing the SCSI address — parallel SCSI drives (Configuration> Change Drive)

⚠ **CAUTION:** If you change the SCSI ID, you might need to cycle power on the host server and reconfigure your backup software before you can use the device.

This option changes the SCSI address of a tape drive. The tape drive logical unit number (LUN) will always be LUN 0 on the SCSI address. The library SCSI address will be the same as the master drive, but will use LUN 1. Access to this feature requires the administrator password.

Procedure

1. From the Home screen, press **Previous** or **Next** until the screen displays **Configuration**. Press **Enter** to select.

2. Press **Previous** or **Next** until the screen displays **Change Drive 1** or **Change Drive 2**. Press **Enter** to select.

3. Enter the administrator password if prompted.

4. The screen displays the current SCSI ID. Press **Previous** or **Next** to change the SCSI ID number. Press **Enter** to select.

    An example of the screen display is **Drive 1 SCSI ID 6** .

Changing the drive configuration — Fibre Channel drives (Configuration> Change Drive)

This option allows you to configure the FC ports for your tape drive.

Each drive has two ports, A and B.

NOTE: Hewlett Packard Enterprise recommends that you cable Port A only and that you configure Port B for **Auto Detect** on **Fibre Speed**and **Port Type**.

Only cable Port A and configure Port B for **Auto Detect** on **Fibre Speed** and **Port Type**.

Procedure

1. From the Home screen, press **Previous** or **Next** until the screen displays **Configuration**. Press **Enter** to select.

2. Press **Previous** or **Next** until the screen displays **Change Drive 1**. Press **Enter** to select.

3. Enter the administrator password if prompted.

4. The screen displays **Port A**. Press **Enter** to select and display **Fibre Speed**.

5. Press **Enter** to display **Set Fibre Speed**. Press **Previous** or **Next** to toggle through the speed settings (Auto Detect, 1 Gb/s, 2 Gb/s, 4 Gb/s, or 8 Gb/s). Only speeds supported by the drive are listed. Press **Enter** to select the required speed.

6. The screen displays **Port Type**. Press **Enter** to display **Set Port Type**. Press **Previous** or **Next** to toggle through the port types (Fabric (N), Loop (NL), or Auto Detect). Press **Enter** to select the required port type.

7. If you selected **Fabric (N)** or **Auto Detect**, configuration is now complete; go to step 9. If you selected **Loop (NL)**, **Set Port Loop Mode** is displayed. Press **Previous** or **Next** to toggle through the loop modes (Soft, Hard, or Hard Auto Select). Press **Enter** to select the required loop mode.

8. If you selected **Soft** or **Hard Auto Select**, configuration is now complete; go to step 9. If you selected **Hard**, **Set ALPA** is displayed with the first number flashing. Press **Previous** or **Next** until the flashing number reads correctly. Press **Enter** to move to the next number. Repeat this step until all numbers in the address are correct. Press **Enter**.

9. Press **Enter** to save the settings and reset the port.

   The screen displays **Port B**.

10. Press **Enter** to select and display **Fibre Speed**. Select **Auto Detect**. Press **Enter**.

11. Press **Enter** to select and display **Port Type**. Select **Auto Detect**. Press **Enter**.

Setting the master drive (Configuration > Set Master Drive)

⚠ **CAUTION:** If you change the SCSI ID, you might need to cycle power on the host server and reconfigure your backup software before you can use the device.

Procedure

1. From the Home screen, press **Previous** or **Next** until the screen displays **Configuration**. Press **Enter** to select.

2. Press **Previous** or **Next** until the screen displays **Set Master Drive**. Press **Enter** to select.

3. Enter the administrator password if prompted.

4. Press **Previous** or **Next** until the screen displays either **Master Drive Drive 1** or **Master Drive Drive 2**.

5. Press **Enter** to select the displayed configuration. The screen displays either **Drive 1 Set to Master**, or **Drive 2 Set to Master**, and the Ready LED blinks.

Setting behaviors (Configuration > Library behavior)

The library supports three behavior modes: Random, Sequential, and Automatic. The library automatically detects the required mode from the series of SCSI commands it receives; however, you can also change the mode. Choose the operating mode based on the capabilities of the software controlling the tape cartridges.

The library mode can be set independently for each logical library.

Random mode: In Random mode, the device does not automatically load tapes into the tape drive; it waits for commands from the software or operator to load and unload tapes. Random mode is used with a full featured or a robotics-aware backup application and is the most common mode of operation. Your backup software must support robotics, which might require an additional software module.

Sequential mode: In Sequential mode, the device automatically loads and unloads tapes from the drive. Sequential mode is used when the backup software is NOT robotics-aware or was designed for standalone drives only.

In Sequential mode, the library will only use the lowest-numbered tape drive.

The operator begins the sequence by loading the desired tape into the tape drive. When a tape is unloaded for any reason, the device automatically removes the tape from the drive, returns it to its original slot, then loads the tape from the next available higher numbered slot.

To determine how you want tapes loaded into the tape drive while in Sequential mode, set the **Loop** and **Autoload** options.

- When **Autoload** mode is set, the device automatically loads the cartridge from the lowest-numbered full slot into the tape drive. It then follows standard sequential operation. After configuring Autoload mode, you must do one of the following for Autoload mode to take effect:

    ◦ Power cycle the device from the front panel.

    ◦ Reboot the device from the RMI Support > Reboot screen.

    ◦ Move the lowest-numbered cartridge to the drive before starting the backup application. If the mailslot is enabled, the lowest cartridge location will be in the mailslot.

- When **Loop** mode is on, the original first cartridge in the sequence is reloaded after the device has cycled through all available cartridges. If Loop mode is off and the last cartridge has been unloaded, the device stops loading cartridges until you load another manually.

    △ **CAUTION:** Use caution when choosing Loop mode because it makes it possible to overwrite data on previously written cartridges.

When a library is partitioned into logical libraries, each logical library operates as an independent library. Thus, the library only loads tapes from the slots associated with one logical library into the tape drive associated with that logical library; it will not load tapes from slots associated with another logical library.

Automatic mode: In Automatic mode, the device switches from Sequential mode into Random mode when it receives certain SCSI commands. Automatic mode is the default setting.

Prerequisites

The administrator password.

Procedure

1. From the Home screen, press **Previous** or **Next** until the screen displays **Configuration**. Press **Enter** to select.

2. Press **Previous** or **Next** until the screen displays **Library Behavior** . Press **Enter** to select.

3. Enter the administrator password if prompted.

4. Press **Previous** or **Next** until the screen displays **Library Mode** . Press **Enter**.

5. The screen displays **Set Library Mode** , followed by the current librarymode: **Automatic**, **Sequential**, or **Random**. To change the mode, press **Enter**.

6. Press **Previous** or **Next** to scroll through the screens for **Automatic**, **Sequential**, or **Random**. Press **Enter** to select the library mode.

7. If you enabled Sequential mode, you can configure the Autoload and Loop options:

    a. Press **Previous** or **Next** until the screen displays **Autoload Mode Disable** or **Autoload Mode Enable**. To change the Autoload mode, press **Enter**. The screen displays either **Disable Autoload Mode** or **Enable Autoload Mode.** Press

Previous or **Next** to toggle between the enabled and disabled screens. Press **Enter** to select the Autoload mode. The display shows the new Autoload mode.

b. Press **Previous** or **Next** until the screen displays either **Loop Mode Disable** or **Loop Mode Enable**. To change loop mode, press **Enter.** The screen displays either **Enable Loop Mode** or **Disable Loop Mode.** Press **Previous** or **Next** to toggle between the enabled and disabled screens. Press **Enter** to select the loop mode.

Setting the date and time (Configuration > Library Date/Time)

NOTE: When setting the hours, the time is based on a 24-hour clock. There is no a.m. or p.m. designation.

Use **Set Date and Time** to set the date and time used to record events. Access to this feature requires the administrator password.

Procedure

1. From the Home screen, press **Previous** or **Next** until the screen displays **Configuration**. Press **Enter** to select.

2. Press **Previous** or **Next** until the screen displays **Library Date/Time**. Press **Enter** to select.

3. Enter the administrator password if prompted.

4. The screen displays **Set Yr/Month/Day 2012 / 07 / 21** with a flashing number. Press **Previous** or **Next** to change the value of the flashing number. Press **Enter** to accept the value of the flashing number and move to the next number.

5. Repeat Step 4 until all numbers in the date are correct. Press **Enter**.

6. The screen displays (example) **Set Hour / Mins 16 : 52** with the first number flashing. Press **Previous** or **Next** until the flashing number reads correctly. Press **Enter** to move to the next number. Repeat this step until all numbers in the time are correct. Press **Enter**.

Configuring IPv4 network settings (Configuration > Configure Network Settings)

The library can automatically obtain an IP address from a DHCP server when the device is powered on. The library also supports user-specified fixed addresses through the front panel.

The library also supports SNMP. You can enable SNMP and configure the target addresses with the RMI. See **The Configuration > Network page**.

Procedure

1. From the Home screen, press **Previous** or **Next** until the screen displays **Configuration**. Press **Enter** to select.

2. Press **Previous** or **Next** until the screen displays **Configure Network Settings**. Press **Enter** to select.

3. Press **Previous** or **Next** until the screen displays **IPv4 Networking Enabled**. Press **Enter** to select.

4. Press **Previous** or **Next** until the screen displays **DHCP Enabled**. To change the setting, press **Enter**. Press **Next** until the screen shows the desired setting. Press **Enter** to accept the new setting.

5. If DHCP is disabled, press **Previous** or **Next** until the screen displays **IP Address**. The second line displays the current IP address.

6. To change the IP address, press **Enter**. The screen displays **Set IP Address** with the first number flashing. Press **Previous** or **Next** to change the flashing number to the correct value.

7. Press **Enter** to select the next number, until all numbers have been set. The screen displays **New IP Address.**

8. Press **Previous** or **Next** until the screen displays **Subnet Mask Address**. To change the **Subnet Mask Address**, press **Enter**. The screen displays **Set Subnet Mask Address,** with the first number flashing.

9. Press **Previous** or **Next** to change the flashing number to the correct value. Press **Enter** to select the next number.

10. Repeat Step 9 until all numbers have been set. The screen displays **New Subnet Address.**

11. Press **Previous** or **Next** until the screen displays **Gateway Address**. To change the **Gateway Address**, press **Enter**. The screen displays **Set Gateway Addr,** with the first number flashing.

12. Press **Previous** or **Next** to change the flashing number to the correct value. Press **Enter** to select the next number.

13. Repeat Step 12 until all numbers have been set. The screen displays **New Gateway Addr.** Press **Enter**.

Configuring automatic cleaning (Configuration > Configure Auto Cleaning)

When auto clean is enabled, the library automatically loads a cleaning cartridge when a tape drive is ready for cleaning. The library identifies a tape cartridge as a cleaning cartridge when it has a barcode label that starts with CLN or after an unlabeled cleaning tape has been loaded into the tape drive.

The library can use a cleaning cartridge from any slot, even if the slot is reserved. The library tracks the usage count for each of the cleaning cartridges. When multiple cleaning cartridges are available, the device will first choose an unknown cleaning cartridge so the device can start tracking the cartridge usage count. If the device knows the usage count for all of the cleaning cartridges, the library will choose the one with the highest usage count.

Auto cleaning is disabled by default. You can enable automatic cleaning even if there are no cleaning cartridges in the library. In this case, the library will display a warning message.

⚠ **CAUTION:** Only enable automatic cleaning in either the backup application or the library, not both.

Procedure

1. From the Home screen, press **Previous** or **Next** until the screen displays **Configuration**. Press **Enter** to select.

2. Press **Previous** or **Next** until the screen displays **Configure Auto Cleaning**. Press **Enter** to select.

3. The screen displays **Auto Cleaning Disabled** or **Auto Cleaning Enabled** depending on the current setting. To change the auto cleaning configuration, press **Enter**.

4. Press **Previous** or **Next** until the screen displays the configuration you want. Press **Enter**.

Restoring factory defaults (Configuration > Restore Defaults)

The library can reset most of the configurations to the factory defaults, while retaining the settings necessary to use the RMI. The library will perform an inventory after the defaults are restored.

The restored settings are:

- SCSI addresses: The SCSI ID for the bottom drive is 4; the SCSI ID for the top drive is 5. The library will no longer recall a drive that has been removed.

- Fibre Channel drive configuration: Automatic speed, auto port type

- Master drive: reset to Drive 1 or the lowest numbered existing drive

- Active slots: maximum possible

- Library mode: Automatic

- Loop: No

- Event log levels and filter: continuous trace and all levels and filters active (for Service use only)

- Barcode reader label length: 8

- Barcode reader alignment: Left

- Error recovery: On

- Mailslot configuration: mailslot disabled

- Auto clean: disabled

- SNMP: disabled, but saved addresses do not change

- E-mail notification: disabled, but configurations retained

The following settings are not reset:

- Administrator password

- Network settings (network is always enabled)

- Date and time

Procedure

1. From the Home screen, press **Previous** or **Next** until the screen displays **Configuration**. Press **Enter** to select.

2. Press **Previous** or **Next** until the screen displays **Restore Defaults**. Press **Enter** to select.

Saving the library configuration (Configuration> Save/Restore Configuration)

Use this option to save the configuration settings to a USB flash drive. The saved configuration information will make it easier to recover the device configuration when replacing the chassis.

This feature is also useful when installing multiple devices. Either save the configuration before configuring the network or ensure that only one device with the same network configuration is on the network at a time.

NOTE: You can also save the configuration settings to a file from the RMI. See **The Configuration > Save/Restore page**

Prerequisites

Administrator password

Procedure

1. Insert the USB flash drive in the USB port on the back of the library.

2. From the Home screen, press **Previous** or **Next** until the screen displays **Configuration**. Press **Enter** to select.

3. Press **Previous** or **Next** until the screen displays **Save/Restore Configuration**. Press **Enter** to select.

4. Enter the administrator password if prompted.

5. The screen displays **Save Configuration to USB**. Press **Enter** to save.

6. When the save operation is completed, remove the USB flash drive from the USB port.

Restoring the library configuration (Configuration> Save/Restore Configuration)

Use this option to restore the configuration settings from a USB flash drive.

Procedure

1. Insert the USB flash drive in the USB port on the back of the library.

2. From the Home screen, press **Previous** or **Next** until the screen displays **Configuration**. Press **Enter** to select.

3. Press **Previous** or **Next** until the screen displays **Save/Restore Configuration**. Press **Enter** to select.

4. Enter the administrator password if prompted.

5. Press **Previous** or **Next** until the screen displays **Restore Config from USB**. Press **Enter**.

6. Press **Previous** or **Next** until the screen displays the filename of the device configuration file on the USB drive. Press **Enter** to select the firmware file.

7. When the restore operation is completed, remove the USB flash drive from the USB port.

Accessing the operations functions

The Operations menu provides access to the following functions:

*   **Unlocking, removing, and replacing magazines (Operations > Unlock Left or Right Magazine)**

*   **Cleaning a tape drive (Operations > Clean Drive)**

*   **Moving tapes in the library (Operations > Move Tape)**

*   **Updating tape cartridge inventory (Operations > Perform Inventory)**

*   **Rebooting the library (Operations > Reboot Library)**

*   **Enabling password locks (Operations > Enable Library Password Locks)**

Procedure

1. From the Home screen, press **Previous** or **Next** until the screen displays **Operations**. Press **Enter** to select.

2. Press **Previous** or **Next** until the screen displays your selected function. Press **Enter** to select.

Unlocking, removing, and replacing magazines (Operations > Unlock Left or Right Magazine)

Prerequisites

Administrator password

Procedure

1. From the Home screen, press **Previous** or **Next** on the OCP until the screen displays **Operations**.

2. Press **Enter** to select.

3. Press **Previous** or **Next** until the screen displays either **Unlock Left Magazine** or **Unlock Right Magazine**.

4. Press **Enter** to select the desired magazine to unlock.

5. Enter the administrator password if requested.

6. The display reads **Left Magazine Unlocked** or **Right Magazine Unlocked**.

7. Pull the released magazine out of the library.

8. The screen now displays **Insert Left Magazine** or **Insert Right Magazine**. The library cannot perform any other operation until the magazine is replaced. After exchanging tapes in a magazine, slide the magazine completely into the library. The magazine locks into place once it is correctly installed and the device inventories the magazine. The Ready LED blinks while the device inventories the magazine and then stops when the operation is complete.

Cleaning a tape drive (Operations > Clean Drive)

When the **Clean** LED is on, a tape drive is ready for cleaning. Cleaning times can range from a few seconds to a few minutes during which time the **Ready** LED blinks. Use only the designated cleaning cartridge for your tape drive model.

Use only Ultrium Universal cleaning cartridges.

⚠ **IMPORTANT:** If the cleaning cartridge is not a valid cleaning cartridge, the LCD screen displays **Invalid Tape** and the cartridge is returned to its original location.

⚠ **IMPORTANT:** If the **Clean** LED or the **Attention** LED (on load or unload) lights when inserting the same cartridge after you have cleaned the drive, there might be a problem with that cartridge.

If you use the OCP to clean the tape drive, load the cleaning cartridge into the mailslot or any other empty slot before beginning the cleaning steps. If you would like to keep a cleaning cartridge in the device, the backup software must manage tape drive cleaning or be configured to bypass the slot containing the cleaning cartridge.

Procedure

1. Make sure that a cleaning cartridge is in the mailslot or one of the magazines.

2. From the Home Screen, press **Previous** or **Next** until the screen displays **Operations**. Press **Enter** to select.

3. Press **Previous** or **Next** until the screen displays **Clean Drive**. Press **Enter** to select.

4. Use **Previous** or **Next** until the screen displays **Drive 1** or **Drive 2**. The second line can display either **Clean Required** or **Good** for both drives. Select the drive for **Clean Required**.

5. When the screen displays the correct drive, press **Enter**.

   The screen displays either **Cleaning Tape Slot 4** or **Cleaning Tape Slot XX**, where **XX** represents flashing blocks. If a slot number is displayed, the tape in that slot has a bar code label identifying the tape as a cleaning tape. If a slot number is displayed, continue to Step 6. If no slot number is displayed, it indicates that the device is not able to detect that a cleaning tape with a bar code is in the device. In this case, the operator must select the slot where a cleaning tape resides.

6. Use **Previous** or **Next** to display the location of a cleaning tape.

7. When the correct location for the cleaning tape is displayed, press **Enter** to select.

   While the library cleans the drive, the screen displays **Cleaning Drive 1 in progress** or **Cleaning Drive 2 in progress**.

   After the cleaning cycle is complete, the screen displays either **Cleaning Drive 1 Complete** , or **Cleaning Drive 1 Failed** . If the cleaning cycle failed, press **Enter** to display the error code and message explaining the failure.

   The library returns the cleaning cartridge to the original slot. If you loaded the cartridge from the front panel, unload it now by using the mailslot or by removing the magazine. When the tape drive cleaning cycle is complete, the **Clean** LED turns off (if previously on).

Moving tapes in the library (Operations > Move Tape)

Use this option to move a cartridge from a tape drive, a tape slot in any magazine or the mailslot to any other location not already holding a tape. You can also load and unload tape cartridges to and from the installed tape drives. Select where you want to move the tape from and then indicate where you want to move the tape to.

Prerequisites

Administrator password.

Procedure

1. From the Home screen, press **Previous** or **Next** until the screen displays **Operations**. Press **Enter** to select.

2. Press **Previous** or **Next** until the screen displays **Move Tape**. Press **Enter** to select.

3. Enter the administrator password if prompted. Use **Previous** or **Next** to select the source.

    *   Mailslot

    *   Right Magazine

    *   Left Magazine

    *   Drive 1

    *   Drive 2 (if two drives are present)

4. When the correct source is displayed, press **Enter** to select.

5. If the source selected is a magazine, use **Previous** or **Next** to select the slot. Only slots with tapes are listed. The second line displays the bar code for the tape or reads **Full**.

6. Once the correct slot is displayed, press **Enter** to select.

    You have now selected the tape you would like to move. The screen now requests the destination for this tape.

7. Use **Previous** or **Next** to select from the destination.

    *   Mailslot

    *   Right Magazine

    *   Left Magazine

    *   Drive 1

    *   Drive 2 (if two drives are present)

8. When the correct destination is displayed, press **Enter** to select.

9. If the destination selected is a magazine, use **Previous or Next** to display the slot. Only empty slots are listed.

    Once the correct slot is displayed, press **Enter** to select. The library now moves the tape from the selected source, to the selected destination. While the library moves the tape, the screen displays **Moving Tape**. Once the tape has been moved, the screen displays either **Move Complete**, or **Move Failed**. If the move failed, press **Enter** to display the error code and message explaining the failure.

Updating tape cartridge inventory (Operations > Perform Inventory)

This option updates the library tape cartridge inventory. The device checks each slot and drive to determine which tape, if any, is present.

NOTE: This command is only needed if the inventory in the library is different than the inventory displayed on the front panel, which would not happen under normal conditions.

Procedure

1. From the Home screen, press **Previous** or **Next** until the screen displays **Operations**. Press **Enter** to select.

2. Press **Previous** or **Next** until the screen displays **Perform Inventory**. Press **Enter** to select.

3. While the inventory is in progress, the screen displays **Inventory in Progress…**

4. The library now checks the drive and each slot for the presence of a tape to update the inventory information. The **Ready** LED blinks during this operation.

Rebooting the library (Operations > Reboot Library)

This option reboots the library and forces a new cartridge inventory, clearing any current error condition.

⚠ **CAUTION:** This option interrupts the current backup or restore operation and causes the operation to fail. Use this option if the device is in an error state.

Procedure

1. From the Home screen, press **Previous** or **Next** until the screen displays **Operations**. Press **Enter** to select.

2. Press **Previous** or **Next** until the screen displays **Reboot Library**. Press **Enter** to select.

3. The **Ready** LED blinks during the reboot operation.

Enabling password locks (Operations > Enable Library Password Locks)

This option locks the restricted areas. This option is typically used if you do not want to wait for the time out to reset the locks. Power cycling or rebooting the library also resets the locks.

Procedure

1. From the Home screen, press **Previous** or **Next** until the screen displays **Operations**. Press **Enter** to select.

2. Press **Previous** or **Next** until the screen displays **Enable Library Password Locks**. Press **Enter** to select.

Accessing the support functions

The Support menu provides access to the following support functions:

- **Powering a drive on or off (Support > Power On/Off Drive)**

- **Running the demonstration (Support > Run Demo)**

- **Running the slot to slot test (Support > Run Slot To Slot Test)**

- **Running the wellness test (Support > Run Wellness Test)**

- **Upgrading firmware (Support > Library FW Upgrade)**

- **Downloading a support ticket (Support > Download Support Ticket)**

- **Viewing logs (Support > Library Error Log)**

- **Forcing the drive to eject a tape (Support > Force Drive To Eject Tape)**

Procedure

1. From the Home screen, press **Previous** or **Next** until the screen displays **Support**. Press **Enter** to select.

2. Press **Previous** or **Next** until the screen displays your selected function. Press **Enter** to select.

Powering a drive on or off (Support > Power On/Off Drive)

Use this option to power a drive on or off without interrupting power to the rest of the library and the second drive. This option is typically used when replacing one drive in a two-drive configuration.

Prerequisites

Administrator password.

Procedure

1. From the Home screen, press **Previous** or **Next** until the screen displays **Support**. Press **Enter** to select.

2. Press **Previous** or **Next** until the screen displays **Power On/Off Drives**. Press **Enter** to select.

3. Enter the administrator password, if prompted.

4. Press **Previous** or **Next** until the screen displays the drive you are powering on or off. The screen displays **Drive 1**. The second line in the screen displays the current state, which is either **Power ON** or **Power OFF**.

5. To change the power status, press **Enter**. The screen displays either **Press Enter to Power off DRV 1**, or **Press Enter to Power on DRV 1**. Press **Enter** to select. The **Ready** LED blinks during the operations.

Running the demonstration (Support > Run Demo)

Use this option to run a device demonstration program. The demonstration continues until the OCP **Cancel** button is pressed. During the demonstration, the device will move cartridges to the tape drive and back. At the end of the demonstration, the cartridges are returned to their original slots.

NOTE: To stop the demonstration, press **Cancel** on the OCP.

Prerequisites

Administrator password.

Procedure

1. From the Home screen, press **Previous** or **Next** until the screen displays **Support**. Press **Enter** to select.

2. Press **Previous** or **Next** until the screen displays **Run Demo**. Press **Enter** to select.

3. Enter the administrator password if prompted.

4. Use **Previous** and **Next** to select the number of cycles: 270, 540, 1080, or Endless. Press **Enter** to start the demonstration.

5. While the test is running, the first line of the screen displays **Demo Test**. The second line displays the number of cycles completed and the number of errors. The **Ready** LED blinks until the test is complete.

Running the slot to slot test (Support > Run Slot To Slot Test)

Use this option to verify that the robot can move media in and out of each of the magazine slots.

To stop the slot to slot test, press the **Cancel** button.

NOTE: At the end of the test, the cartridges are NOT returned to their original slots.

Prerequisites

Administrator password

Procedure

1. From the Home screen, press **Previous** or **Next** until the screen displays **Support**. Press **Enter** to select.

2. Press **Previous** or **Next** until the screen displays **Run Slot To Slot Test**. Press **Enter** to select.

3. Enter the administrator password, if prompted.

4. Press **Previous** or **Next** until the screen displays **Select Number of Cycles.** Use **Previous** or **Next** to select the number of cycles: 270, 540, 1080, or Endless. Press **Enter**.

5. While the test is running, the screen displays progress as shown: **Run Slot To Slot**. The second line on the display shows the number of cycles completed. The **Ready** LED blinks until the test is complete.

6. When the test is complete, the screen displays the number of cycles completed and the number of errors. If the test failed, press **Enter** to display the error and message describing the cause.

Running the wellness test (Support > Run Wellness Test)

Use this option to check the health of the library for the specified number of loops. If a failure occurs during the test, check the error code and failure message for more information. Access to this feature requires the administrator password. For more information about the wellness test, see **The wellness test**.

For complete testing, enable the mailslot and ensure that each top-row corner slot contains a tape cartridge. During the test, the library will open the mailslot and ask you to insert a tape cartridge. You can use any compatible Ultrium data tape cartridge for this test.

> ⊙ **IMPORTANT:** The library will remove any tape cartridges from tape drives and go offline when running the wellness test. Verify that any applications using the library have completed before starting the wellness test.
>
> To stop the wellness test, press the **Cancel** button.

Prerequisites

Administrator password.

Procedure

1. From the Home screen, press **Previous** or **Next** until the screen displays **Support**. Press **Enter** to select.

2. Press **Previous** or **Next** until the screen displays **Run Wellness Test**. Press **Enter** to select.

3. Enter the administrator password, if prompted.

4. On a library with two tape drives, press **Previous** or **Next** to select the tape drive to test: **Drive 1**, **Drive 2**, or **All Drives**. Press **Enter** to select the drive option.

5. Use **Previous** or **Next** to select a number of cycles: 1 - 10. Press **Enter**.

6. While the test is running, the screen displays progress as shown: **Wellness test**. The second line on the display shows the number of cycles completed. The **Ready** LED blinks until the test is complete.

7. When the test is complete, the screen displays the test completion status, including any recoveries or errors that might have occurred. See **Error codes** for a list of error codes and error messages.

Upgrading firmware (Support > Library FW Upgrade)

The library allows two types of firmware to be upgraded — one for the tape drive and the other for the library itself. You can upgrade both types of firmware from a USB flash drive. You can also upgrade the tape drive firmware from a firmware upgrade tape. Access to this feature requires the administrator password.

The library only supports signed firmware image upgrades and downgrades. Once firmware that uses code signing is loaded, the firmware will reject all unsigned images. If you attempt to load an unsigned firmware image, the RMI displays an invalid firmware version error message.

If you see this message, download the latest signed firmware image from the support website at **https://www.hpe.com/support/storage**.

Prerequisites

Administrator password.

Procedure

1. Download current library firmware using Library & Tape Tools or from the Hewlett Packard Enterprise support website at **https://www.hpe.com/support/storage**. Copy the firmware onto the USB flash drive.

   > **TIP:** The display will only show the first 16 characters of the file name. If the USB drive has multiple firmware files, ensure that you can distinguish the files from the first 16 characters in their file names.

2. Insert the USB flash drive into the USB port on the back of the library.

3. From the Home screen, press **Previous** or **Next** until the screen displays **Support**. Press **Enter** to select.

4. Press **Previous** or **Next** until the screen displays **Library FW upgrade**. Press **Enter** to select.

5. Enter the administrator password if prompted.

6. Press **Previous** or **Next** until the screen displays the filename of the library\ firmware file on the USB drive. Press **Enter** to select the firmware file.

7. If the upgrade failed, press **Enter** to display the error code and message describing the cause of the failure.

8. Remove the USB flash drive from the USB port.

Upgrading drive firmware from a USB flash drive (Support> Drive FW Upgrade)

The library allows two types of firmware to be upgraded — one for the tape drive and the other for the library itself. You can upgrade both types of firmware from a USB flash drive. You can also upgrade the tape drive firmware from a firmware upgrade tape.

The library only supports signed firmware image upgrades and downgrades. Once firmware that uses code signing is loaded, the firmware will reject all unsigned images. If you attempt to load an unsigned firmware image, the RMI displays an invalid firmware version error message.

If you see this message, download the latest signed firmware image available for your library model on the HPE Support Center site.

Prerequisites

Administrator password.

Procedure

1. Insert the USB flash drive into the USB port on the back of the device.

2. From the Home screen, press **Previous** or **Next** until the screen displays **Support**. Press **Enter** to select.

3. Press **Previous** or **Next** until the screen displays **Drive FW Upgrade**. Press **Enter** to select.

4. Enter the administrator password if prompted.

5. Press **Previous** or **Next** until the screen displays **Drive FW Upgrade by USB**. Press **Enter** to select.

6. Press **Previous** or **Next** until the screen displays the filename of the drive firmware file on the USB drive. Press **Enter** to select the firmware file.

   If the upgrade failed, press **Enter** to display the error code and message describing the cause of the failure.

7. Remove the USB flash drive from the USB port.

Upgrading drive firmware from a firmware upgrade tape (Support> Drive FW Upgrade)

The library allows two types of firmware to be upgraded — one for the tape drive and the other for the library itself. You can upgrade both types of firmware from a USB flash drive. You can also upgrade the tape drive firmware from a firmware upgrade tape. Access to this feature requires the administrator password.

The library only supports signed firmware image upgrades and downgrades. Once firmware that uses code signing is loaded, the firmware will reject all unsigned images. If you attempt to load an unsigned firmware image, the RMI displays an invalid firmware version error message.

If you see this message, download the latest signed firmware image available for your library model on the HPE Support Center site.

Prerequisites

Administrator password

Procedure

1. Load a firmware upgrade tape into the mailslot or any open slot. If all slots are full, remove a data tape to make room for the firmware upgrade tape.

2. From the Home screen, press **Previous** or **Next** until the screen displays **Support**. Press **Enter** to select.

3. Enter the administrator password if prompted.

4. Press **Previous** or **Next** until the screen displays **Drive FW Upgrade**. Press **Enter** to select.

5. Press **Previous** or **Next** until the screen displays **Drive FW Upgrade by Tape**. Press **Enter** to select.

6. Press **Previous** or **Next** until the display shows the correct slot location of the firmware upgrade tape installed in the device (example) **FW Tape Location Slot: Mailslot**. Press **Enter** to select the correct firmware tape location. The screen displays **Upgrading Drive FW**.

   When the update is complete, the screen displays either **Success Export FW Tape**, or **Failed Export FW Tape**.

7. If the upgrade failed, press **Enter** to display the error code and message describing the cause of the failure.

8. Remove the firmware upgrade tape from the library using either the mailslot or by removing the magazine where the tape has been placed.

Viewing logs (Support > Library Error Log)

The library keeps a log of recent error and warning messages. See **Error codes** for more information about error codes.

Procedure

1. From the Home screen, press **Previous** or **Next** until the screen displays **Support**. Press **Enter** to select.

2. Press **Previous** or **Next** until the screen displays **Library Error Log** to see error messages or **Library Warning Log** to see warnings. Press **Enter** to select.

3. Enter the administrator password, if prompted.

4. Press **Enter** to see the message description. Press **Cancel** to return to the message code.

5. Press **Next** to see the next message.

Downloading a support ticket (Support > Download Support Ticket)

A support ticket contains information that can help a system administrator or support engineer diagnose library problems. Use this option to download a support ticket to a USB flash drive. Downloading the support ticket to a USB flash drive lets you view the ticket on a computer that is not connected to the library.

You can view the support ticket with the Library & Tape Tools.

Procedure

1. Insert a USB flash drive into the USB port on the back panel.

2. From the Home screen, press **Previous** or **Next** until the screen displays **Support**. Press **Enter** to select.

3. Press **Previous** or **Next** until the screen displays **Download Support Ticket**. Press **Enter** to select.

Forcing the drive to eject a tape (Support > Force Drive To Eject Tape)

Use this option to make the tape drive eject the tape and place it into an open slot. Before issuing this command, attempt to eject the tape with the move command (See **Moving tapes in the library (Operations > Move Tape)**).

Procedure

1. From the Home screen, press **Previous** or **Next** until the screen displays **Support**. Press **Enter** to select.

2. Press **Previous** or **Next** until the screen displays **Force Drive To Eject Tape**. Press **Enter** to select.

3. Press **Previous** or **Next** until the screen displays **Drive 1** or **Drive 2**. The second line on the display shows the bar code number of the tape, **Full**, or **Empty.** To select the desired drive to eject the tape, press **Enter**.

4. If the tape is successfully ejected from the drive, the screen displays the slot location where the tape was moved to.

   NOTE: If the drive has difficulty ejecting the tape, suspect bad or damaged media.

Using the MSL4048, MSL8048, and MSL8096 OCP

Overview

The front panel includes:

- A liquid crystal display (LCD) that shows tape library status information and is used to access the OCP menus.

- LEDs that illuminate to indicate library conditions and alerts.

- Navigation buttons that allow you to scroll through, select, and make changes to different OCP menus and settings.

This panel provides everything you need to monitor library status and access the OCP menus.

Operations available using the OCP

- **Info menu**
  - **Viewing status information (Info > Status)**
  - **Viewing identity information (Info > Identity Library)**
  - **Viewing identity information (Info > Identity Drives)**
  - **Viewing inventory information (Info > Inventory)**
  - **Viewing network information (Info > Network)**

- **Configuration menu**
  - **Changing the number of logical libraries (Configuration > Logical Libraries)**
  - **Changing the library configuration (Configuration > Library)**
  - **Changing the drive configuration (Configuration > Drives)**
  - **Changing the network configuration (Configuration > Network)**
  - **Barcode reporting format (Configuration > Barcode Reporting)**
  - **Setting and changing the administrator password (Configuration> Set Admin Password)**
  - **Restore defaults (Configuration > Restore Defaults)**
  - **Setting the library date and time (Configuration > Set Date and Time)**
  - Display Contrast
  - **Saving and restoring the library configuration (Configuration> Save/Restore)**

- **Operations menu**
  - **Opening the mailslot (Operations > Open Mailslot)**
  - **Unlocking, removing, and replacing magazines (Operations > Unlock Left/Right Magazines)**
  - **Moving Media (Operations > Move Media)**
  - **Performing Inventory (Operations > Inventory)**
  - **Enabling Password Locks (Operations > Enable Password Locks)**

- **Support menu**
  - **Powering drives on and off (Support > Power on/off Drives)**
  - **Cleaning the tape drive (Support > Clean Drive)**
  - **Running tests (Support > Run Tests)**
  - **Viewing logs (Support > View Logs)**

- ◦ **Updating library and drive firmware (Support > FW Upgrade)**

- ◦ **Force ejecting a drive (Support > Force Drive Eject)**

- ◦ **Rebooting the tape library (Support > Reboot)**

OCP navigation buttons

Four menus are accessed through the OCP: **Info**, **Configuration**, **Operations**, and **Support**. Use the navigation buttons to select menu items and work with the screen displays. The navigation buttons have different functions depending upon where you are in the menu structure.

10854
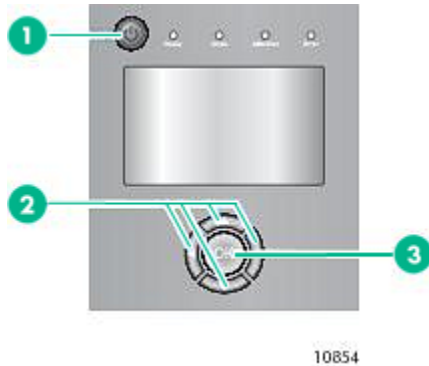
Item	Description
1	Power button
2	Navigation buttons
3	OK button

Navigation buttons

Icon	Label	Description
▶	Right	Moves to the next item at the current menu level. When a top-level menu item is highlighted, the key press moves the selection to the next menu item, for example, from Info to Configuration. When a digit is highlighted on a screen field, this key press moves to the next digit. If there is no next item, this button is not active.
◀	Left	Moves to the previous item at the current menu level. When a top-level menu item is highlighted, the key press moves to the previous menu item, for example, from Configuration to Info. When a pull-down menu is displayed, the left button can be used to close or collapse that menu. When a digit is highlighted on a screen field, this key press moves to the previous digit. If there is no previous item, this button is not active.
▲	Up	Scrolls upwards through available choices at the current menu level. (If used on the top item it returns to the bottom item.) When a menu pull-down is displayed, this key press scrolls through all items for that menu. When a screen is displayed, this key press highlights individual lines. When editable fields are highlighted, this key press scrolls through available choices for that field.

Table Continued

Icon	Label	Description
▼	Down	Scrolls downwards through available choices at the current menu level. (If used on the bottom item it returns to the top item.) If used from a top-level menu item, it highlights the top selection in the submenu. When a submenu is displayed, this key scrolls through all items for that menu. When a screen is displayed, this key press highlights individual lines. When editable fields are highlighted, this key press scrolls through available choices for that field.
OK	OK	Selects the highlighted menu or screen item. If used from a top-level menu item, it displays the submenu with no items highlighted; press OK a second time to return to the top-level menu. When a submenu is displayed, OK selects the highlighted menu item. In a configuration screen, the OK button toggles from navigation to editing a selection. Navigate to an option you wish to change and press OK to edit it. Once the item has been changed, press OK again to go back into navigation mode. The OK button is also used for selecting highlighted choices such as <Save> or <Cancel>.

Using the OCP

Each time the tape library is powered on or rebooted, or after five minutes of inactivity, a splash screen is briefly displayed, after which the OCP menu is displayed, showing current system status information.

You will be required to enter the administrator password for all functions that are password-protected.

```
Status: Warning      MSL 4048          13:43

Info  Configuration   Operations    Support

System Status:


Library Status              ✓
Library Name                MS0001234
IP Address                  192.168.000.001
Drive 1                     Ready
Drive 2                     Writing
Drive 3                     Ready
Drive 4                     Idle
Slots free/total            10/48
```

Figure 53: OCP menu, showing initial system status information

The OCP menu includes a status message bar, menu bar, and display area. Initial system status information includes basic library, drive, and magazine status and information. All drives that have been activated are included. If drives are subsequently removed or powered down, they will still be listed on this screen until you restore defaults.

Status message bar

The highlighted line at the top of the display shows the time and overall status of the library. It is always visible.

Status	Definition
Ready	Library is ready for normal operation
Warning	Library is in a warning condition such as a drive needs cleaning (normal operation)
Error	Library is in an error condition (normal operation)
Offline	Library is running tests
Load	Library is loading a tape
Unload	Library is unloading a tape

Menu bar

The menu bar contains four groups of menu functions:

- Info

- Configuration

- Operations

- Support

```
                    ┌──────────────┐
                    │    HOME      │
                    └──────────────┘

┌──────────┐   ┌────────────────┐   ┌──────────────┐   ┌──────────────┐
│   Info   │───│ Configuration  │───│  Operations  │   │   Support    │
└──────────┘   └────────────────┘   └──────────────┘   └──────────────┘

┌──────────┐   ┌────────────────┐   ┌──────────────┐   ┌──────────────────┐
│  Status  │   │Logical Libraries│  │Open Mailslot(s)│ │Power On/Off Drives│
└──────────┘   └────────────────┘   └──────────────┘   └──────────────────┘

┌──────────────┐ ┌────────────┐    ┌──────────────┐   ┌──────────────┐
│Identity Library│ │  Library   │   │   Unlock     │   │ Clean Drive  │
└──────────────┘ └────────────┘    │Left Magazines│   └──────────────┘
                                    └──────────────┘

┌──────────────┐ ┌────────────┐    ┌──────────────┐   ┌──────────────┐
│Identity Drives│ │   Drives   │    │   Unlock     │   │  Run Tests   │
└──────────────┘ └────────────┘    │Right Magazines│  └──────────────┘
                                    └──────────────┘

┌──────────────┐ ┌────────────┐    ┌──────────────┐   ┌──────────────┐
│  Inventory   │ │  Network   │    │  Move Media  │   │  View Logs   │
└──────────────┘ └────────────┘    └──────────────┘   └──────────────┘

┌──────────────┐ ┌────────────────┐ ┌──────────────┐  ┌──────────────┐
│   Network    │ │Barcode Reporting│ │  Inventory   │  │  FW Upgrade  │
└──────────────┘ └────────────────┘ └──────────────┘  └──────────────┘

                 ┌────────────────┐ ┌──────────────┐  ┌────────────────┐
                 │Set Admin Password│ │   Enable    │  │Force Drive Eject│
                 └────────────────┘ │Password Locks│  └────────────────┘
                                     └──────────────┘

                 ┌────────────────┐ ┌──────────────┐  ┌──────────────┐
                 │Restore Defaults│  │  Open All    │  │Support Ticket│
                 └────────────────┘ │  Magazines   │  └──────────────┘
                                     └──────────────┘

                 ┌────────────────┐                    ┌──────────────┐
                 │Set Date and Time│                   │    Reboot    │
                 └────────────────┘                    └──────────────┘

                 ┌────────────────┐                    ┌──────────────┐
                 │Display Contrast│                     │   Service    │
                 └────────────────┘                    └──────────────┘

                 ┌────────────────┐
                 │  Save/Restore  │
                 └────────────────┘
```

▨ Requires Admin password

▨ Requires Service password (Service personnel only)

Setting the administrator password

💡 **TIP:** By default, the administrator password is unset; all of the digits are null. Set the administrator password from the OCP to protect the administrator functions on the OCP and enable the administrator functions in the RMI.

The administrator password grants access to all OCP functions except the **Service** area. A user without knowledge of the administrator password can access:

- **Info:** Status, Identity Library, Identity Drives, Inventory, and Network

- **Configuration:** Display Contrast

- **Operations:** Open Mailslots, Inventory, and Enable Password Locks

All other **Configuration**, **Operations**, and **Support** options are locked.

After five minutes of inactivity, the OCP returns to the splash screen. To access password-protected tasks, you must re-enter the administrator password.

The administrator password is originally null. Hewlett Packard Enterprise strongly recommends that you assign a password during the installation process, see **Setting and changing the administrator password (Configuration> Set Admin Password)**. You will not be able to access the administrator functions of the tape library from the RMI until the administrator password is set.

Screens that require a password are indicated by a padlock icon on the menu list and prompt the user to enter the password before allowing access to the restricted screens. Once entered, the administrator password does not need to be entered a second time unless there is no user activity for five minutes or unless the password locks are re-enabled.

Passwords must be exactly eight digits consisting of the numbers 0 through 9.

NOTE: If you forget the administrator password, you cannot enter a new password. Call your customer service representative.

Procedure

1. Use the ▲ Up or ▼ Down buttons to set the left-most digit of the password.

   The left-most digit of the password will be highlighted; each nonhighlighted digit will appear as an X.

2. Use the ▶ Right button to advance to the next digit.

3. Continue using the ▲ Up, ▼ Down, ◀ Left, and ▶ Right buttons to set the remaining digits.

4. Press **OK** to submit the password.

   The screen continues to the restricted area.

Illustrated menu option and navigation examples

The following examples illustrate how to use the menu options and navigation buttons to open mailslots and to move media. Subsequent menu options described in this chapter do not include step-by-step instructions.

Opening mailslots (Operations > Open Mailslots)

The mailslots are used only with host system software that supports this feature. The mailslot feature allows you to insert or remove up to three tapes for the MSL4048 and MSL8084, or up to 15 tapes for the MSL8096.

Left magazines are available without mailslots, with one mailslot, or with three mailslots. The MSL4048, MSL8048, and MSL8096 Tape Libraries are shipped with the three-mailslot magazine on the lower left side. Mailslot-capable left magazines are marked with a white dot on the lower right corner that aligns with a white dot on the front bezel, as shown in the following illustration. Placing a mailslot magazine in any location other than the lower-left location will result in the magazine being treated as a magazine with no mailslots.
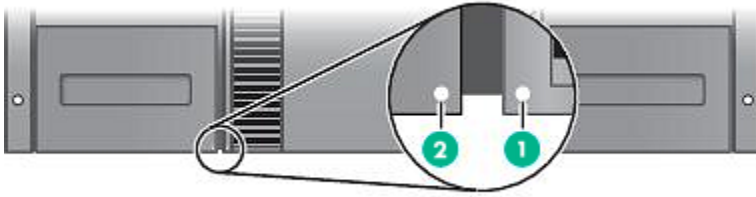
Figure 54: Mailslot-capable magazine and slot, each marked with a white dot

The library will eject the mailslot in the lower left magazine when instructed to open mailslots. After the mailslot is closed, the library will inventory the tapes in the mailslot, but not the rest of the tapes in the magazine, which allows the library to resume operations sooner.

On the MSL8096, the upper-right magazine can be configured as a 12–slot mailslot. All of the right-side magazines are the same so it does not have a special marking. When instructed to open both mailslots, the library first ejects the lower-left mailslot and then unlocks the upper-right mailslot a few seconds later. The library does not **eject** the upper-right mailslot. The upper-right mailslot remains unlocked until 30 seconds after the lower-left mailslot is replaced. After the upper-right mailslot is replaced, the library inventories all of the tapes in the magazine. The OCP displays a series of informative messages so you can see what the library is doing.

NOTE: If you exchange the magazine in the lower-left position with one that has different mailslot capabilities, the library displays a warning that the mailslot type is incompatible with the configuration.

Procedure

1. Highlight **Operations -> Open Mailslots** and press **OK** to select it.
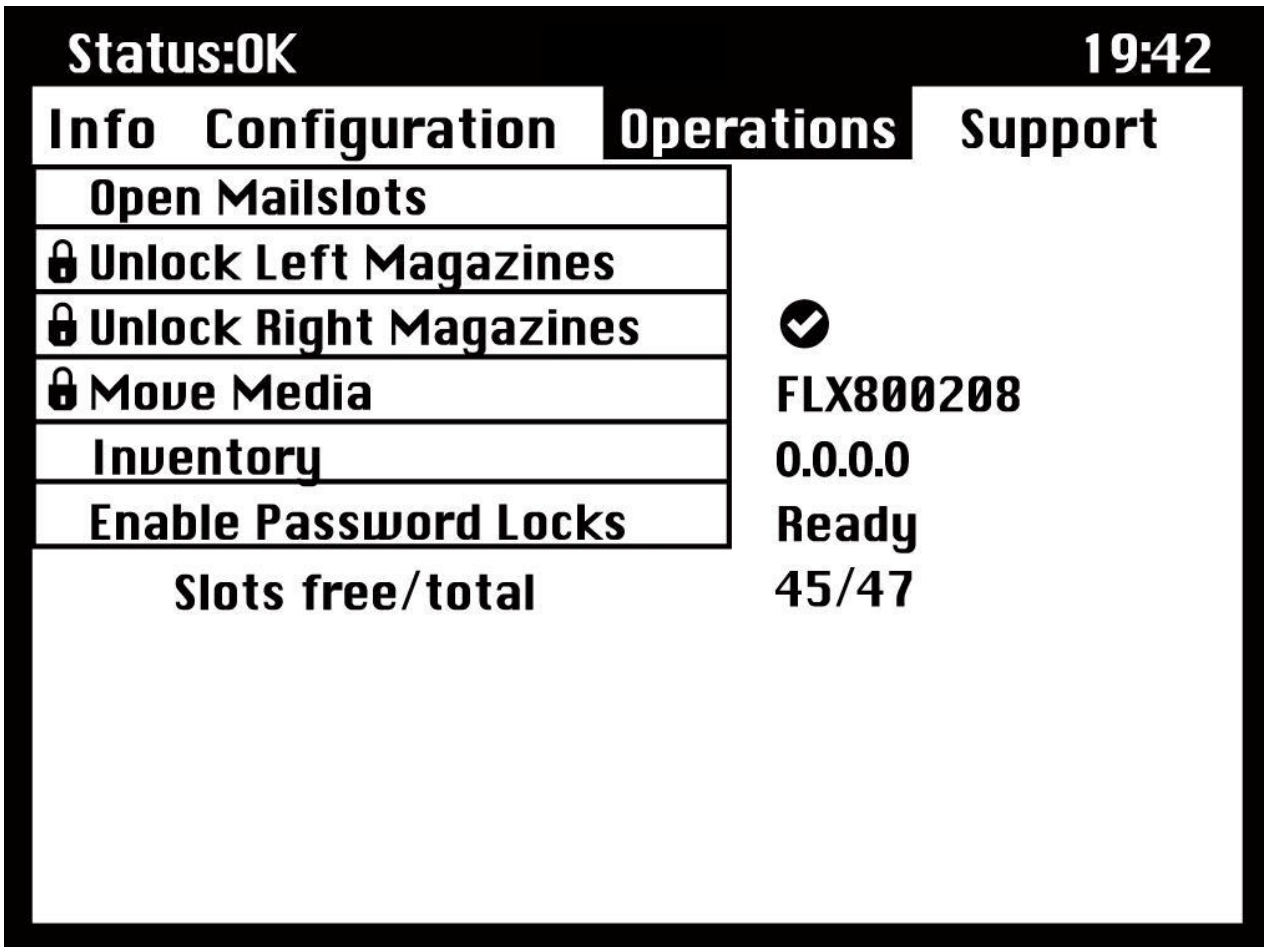
Figure 55: Operations menu

2. On the MSL8096, if both mailslots are enabled, select which mailslots to open. The menu will cycle through **Bottom Left (3)**, **Both (15)**, or **Top Right (12)**.

3. The mailslot located in the lower left magazine ejects automatically. Pull out the magazine until you can access the tape cartridge (see the following illustration).

11350
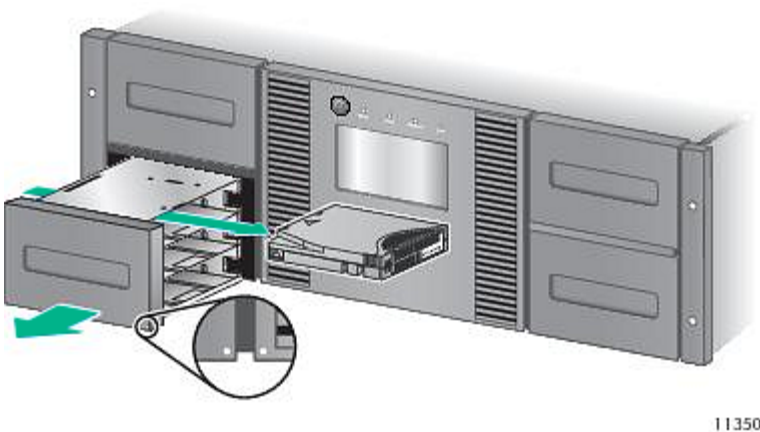
Figure 56: Removing the existing tape from the mailslot

4. On the MSL8096, the magazine in the upper right side will be unlocked if it is configured as a mailslot and you choose to open it. To open the upper right magazine, grasp the magazine and pull it straight out until you can access the desired slot.

> **NOTE:** The following message might be displayed: **Mailslot opening**. No button pushes are accepted during this time.

> **NOTE:** If the SCSI Prevent/Allow Media Removal bit is set, the mailslot cannot be unlocked/opened from the front panel and the following message is displayed: **Media Removal Prevented by Host Software**. Press **OK** to continue and return to the open mailslot pull-down menu. Try the operation again from the backup software.

5. The following message is displayed: **Please close Mailslot(s)**. Remove the existing tape cartridges from the mailslot and insert new tape cartridges, as required.

6. Push the mailslot back into the library.

Unlocking, removing, and replacing magazines (Operations > Unlock Left/Right Magazines)

This option grants access to the left and right magazines. After exchanging tapes in a magazine, slide the magazine completely into the library. The magazine locks into place. Access to the magazines requires the use of the administrator password.

On the MSL4048, once all left or right magazines are correctly installed, the library inventories the magazines. The Ready LED blinks during the inventory operation.

On the MSL8048 and MSL8096, the library leaves all magazines on a side unlocked for several seconds. During that time, you can pull out as many magazines on the side as you want. A magazine is locked when it is pushed back into the library. The library will wait about 30 seconds after the last magazine is installed before starting the inventory. Before the inventory starts, you can unlock the magazines on either side.

> **NOTE:** Due to the library design, all left or all right magazines will be unlocked. The library will halt robotic functions until all magazines are present. It is not possible to unlock all of the magazines at once from the front panel.

Moving Media (Operations > Move Media)

This option instructs the library to move a cartridge from a tape drive, a tape slot in any magazine or the mailslot in the left magazine to any other location not already holding a tape. This option also lets you load and unload tape cartridges to and from the installed tape drives. To use this command, you must first select where you want to move the tape from (in one of the Source fields), and then indicate where you want to move the tape to (in one of the Destinations fields).

Source Type: This option toggles between all available sources: mailslot, magazines, and the active drives.

Source -> Source by Label: If appropriate, this option toggles between available source cartridges. In the following example, the source type is a magazine, so you must select a cartridge from the magazine. You can do this by selecting a specific slot (Source field) or specifying the target cartridge barcode (Source by Label field). Only Full source slots are available for selection.

Destination Type: This toggles between all available destinations: Mailslot, Magazine, and Drive.

Destination: If appropriate, this option allows you to specify the cartridge destination. For a magazine, select a slot. Only Empty destination slots are available for selection.

Access to the **Move Media** option requires the use of the administrator password.

Procedure

1. Highlight **Operations ->** Move Media and press **OK** to select it.
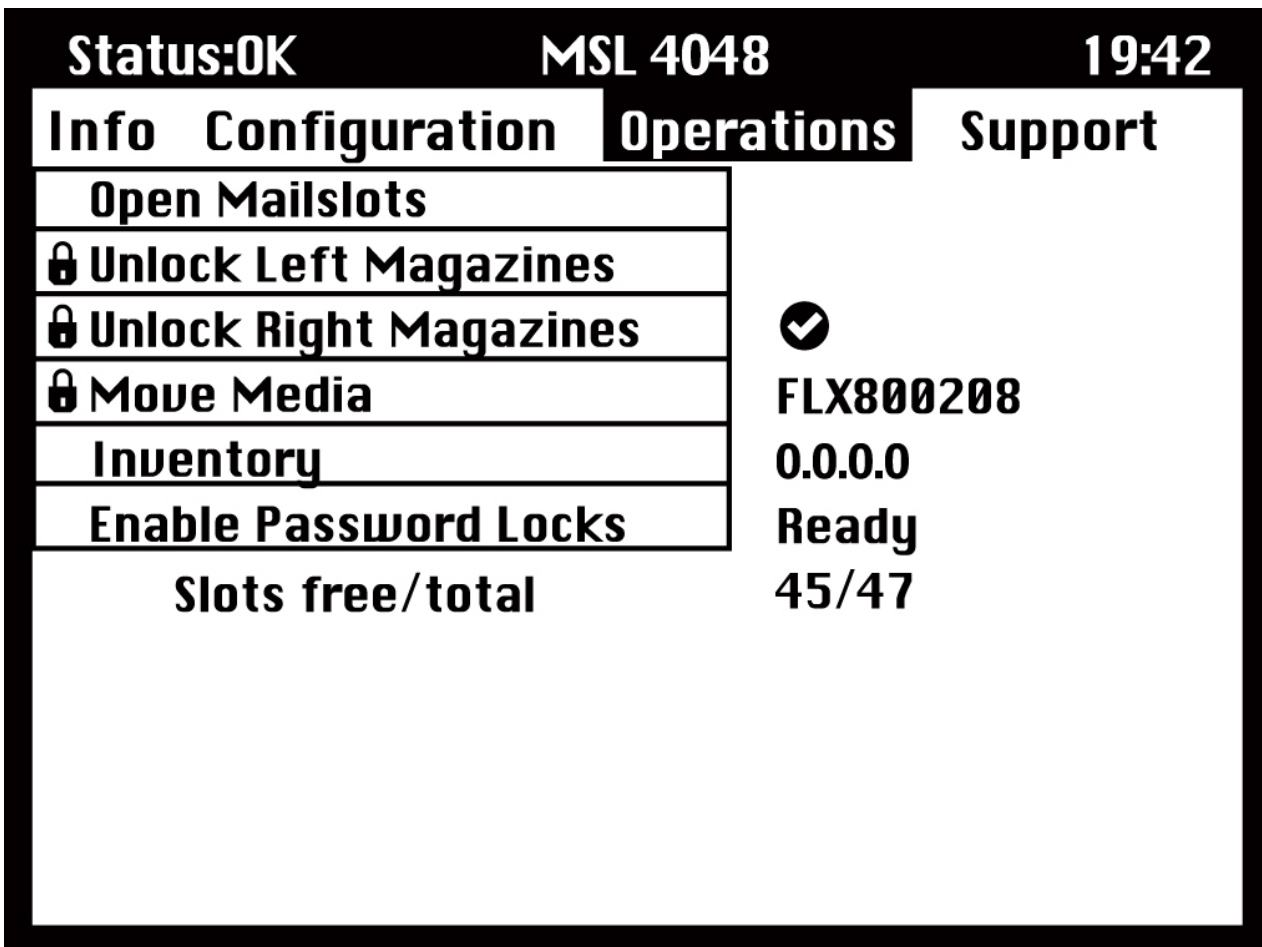
Figure 57: Operations menu

2. Enter the administrator password if prompted.

3. Use the Up and Down arrows to move to the **Source Type** field and press **OK**.

4. Use the Up and Down arrows to change the value of the highlighted field. When the highlighted field shows the desired value, press **OK** to select.

5. If appropriate, move to the **Source** field and press **OK**. Repeat step 4 to specify the source cartridge.

6. Use the Up and Down arrows to move to the **Destination Type** field and press **OK**.

7. Use the Up and Down arrows to change the value of the highlighted field. When the highlighted field shows the desired value, press **OK** to select.

8. If appropriate, move to the **Destination** field and press **OK**. Repeat step 7 to specify the cartridge destination

9. Use the Up and Down arrows to move to the **<Move>** area and press **OK** to carry out the operation (or move to the **<Cancel>** area and press **OK** to cancel the operation).

   The library now moves the tape from the selected source to the selected destination. While the tape is being moved, the screen displays **Moving Tape**. Once the tape has been moved, the screen displays either **Move Complete**, or **Move Failed**. If the move failed, press **OK** to display the error code and message explaining the failure.

Info menu

The **Info** menu options provide the following options. None of these options is password protected.

- **Viewing status information (Info > Status)**

- **Viewing identity information (Info > Identity Library)**

- **Viewing identity information (Info > Identity Drives)**

- **Viewing inventory information (Info > Inventory)**

- **Viewing network information (Info > Network)**

Viewing status information (Info > Status)

Status information can be displayed for the system, the library, or for a specific drive.

NOTE: The number of drives available for selection in the Status menu depends on the number of drives that have been active in the library. For a library that has only two drives, the menu displays Drive 1 and Drive 2. For a library that has four drives, the menu displays Drive 1, Drive 2, Drive 3, and Drive 4 (even though the status of some might be offline or missing).

- **Library:** displays the status of the library without the drives. It shows the library status, odometer, power on time, robotic status, slot and barcode of any cartridge in transport, number of free and total slots, and status of the mailslots.

- **Drives:** displays the status of the selected drive. It shows the drive status, source slot, tape barcode, error code (if appropriate), drive temperature, status of cooling fan, and drive activity. For Fibre Channel drives, the following additional items are displayed:

  ◦ The link status of each port might be: No Light, Logged In, Logged Out, ALPA Conflict, or Negotiation Link. No Light or ALPA Conflict indicates an error condition. See **Fibre Channel connection problems**.

  ◦ The speed for each port: 1 Gb/s, 2 Gb/s, 4 Gb/s, or 8 Gb/s. Only speeds supported by each port are displayed.

NOTE: Use the Left or Right buttons to toggle through the status information for all drives without returning to the **Info -> Status** submenu.

Viewing identity information (Info > Identity Library)

Displays

- Library serial number

- Library product ID

- Controller and bootcode firmware revisions

- Library mode

- Number of reserved slots

- Status of the mailslot

- Library LUN Host Drive

A Fibre Channel library also displays the WW Node Name for the FC node to which it is connected.

World Wide names are assigned automatically; they cannot be configured.

Viewing identity information (Info > Identity Drives)

Displays the status of the selected drive. It shows the SCSI ID, physical drive number, serial number, firmware revision, element address, the ID string, and whether the drive is the library LUN host drive.

The following additional information is displayed for a Fibre Channel drive:

- WWide Node Name for the FC node to which the tape drive is connected.

- WWide Port Name and Port Type for Port A.

- WWide Port Name and Port Type for Port B.

NOTE: Use the Left or Right buttons to toggle through the identity information for all drives without returning to the **Info -> Identity** menu.

World Wide names are assigned automatically; they cannot be configured.

Viewing inventory information (Info > Inventory)

Inventory information can be displayed for a magazine or for a drive.

- **Magazine:** The first inventory screen displays the contents of magazine number 1 (lower left). The top section of this screen shows which mailslots are occupied (shaded background) or empty (white background). If the mailslot is enabled, the storage slot count is reduced. The lower section gives more information about each slot. Mailslots are identified in the Slot column as MS1, MS2, or MS3. The label shows any barcode details. Slots containing tapes without barcodes are labeled Full. Info shows whether the tape is write-protected (WP) or if that media needs attention (!). Use the Left or Right buttons to scroll through and view the inventory for all magazines.

- **Drive:** This screen displays the contents of each drive. The Label column identifies which tape is in the drive and the Source column identifies the slot from which it came. Other information defines the type of tape (data or cleaning) and whether tapes are write-protected or valid/invalid.

Viewing network information (Info > Network)

This option provides information about the network setting for the library. This screen will show information about the network connectivity of the library. If DHCP is ON, the values currently being found by DHCP for IP Addr, Netmask and Gateway will be displayed.

Configuration menu

The Configuration menu provides the following options:

- **Changing the number of logical libraries (Configuration > Logical Libraries)**

- **Changing the library configuration (Configuration > Library)**

- **Changing the drive configuration (Configuration > Drives)**

- **Changing the network configuration (Configuration > Network)**

- **Barcode reporting format (Configuration > Barcode Reporting)**

- **Setting and changing the administrator password (Configuration> Set Admin Password)**

- **Restore defaults (Configuration > Restore Defaults)**

- **Setting the library date and time (Configuration > Set Date and Time)**

- Display Contrast

- **Saving and restoring the library configuration (Configuration> Save/Restore)**

Changing the number of logical libraries (Configuration > Logical Libraries)

This option allows you to specify the number of logical libraries for the physical tape library. For more information about logical libraries, see **Logical libraries**.

Access to this feature requires the administrator password.

Changing the library configuration (Configuration > Library)

This option allows you to specify the drive that is assigned as master drive and the library mode, and define how many slots are active and whether the mailslots are enabled.

Access to this feature requires the administrator password.

- **Library Master Drive:** This option designates which drive acts as the master and hosts the library LUN.

  NOTE: The library SCSI ID will be the master drive SCSI ID with a LUN of 1.

- **Library Mode:** The library supports three behavior modes: Random, Sequential, and Automatic. The library automatically detects the required mode from the series of SCSI commands it receives; however, you can also change the mode. Choose the operating mode based on the capabilities of the software controlling the tape cartridges. The library mode can be set independently for each logical library.

- **Reserved Slots:** This option sets the number of reserved slots in the library. Reserved slots are slots that can be accessed by the RMI and the OCP, but are invisible to the host and backup software. On the MSL4048 and MSL8048, you can reserve up to 46 slots. On the MSL8096, you can reserve up to 94 slots.

- **Mailslots enabled:** This option enables or disables mailslots. On the MSL4048 and MSL8048, all three mailslots are enabled or disabled based on this setting. On the MSL8096, you can choose to enable the lower-left mailslot (three slots), the upper-right mailslot (12 slots), both mailslots (15 slots), or disable the mailslots.

- **Auto Cleaning:** This option enables or disables automatic cleaning.

Library modes

The library supports three behavior modes: Random, Sequential, and Automatic.

Random mode: In Random mode, the device does not automatically load tapes into the tape drives; it waits for commands from the software or operator to load and unload tapes. Random mode is used with a full featured or a robotics-aware backup application and is the most common mode of operation. Your backup software must support robotics, which might require an additional software module.

Sequential mode: In Sequential mode, the device automatically loads and unloads tapes from the drive. Sequential mode is used when the backup software is NOT robotics-aware or was designed for standalone drives only.

In Sequential mode, the library will only use the lowest-numbered tape drive.

The operator begins the sequence by loading the desired tape into the tape drive. When a tape is unloaded for any reason, the device automatically removes the tape from the drive, returns it to its original slot, then loads the tape from the next available higher numbered slot.

To specify how you want tapes loaded into the tape drive while in Sequential mode, you can set the **Loop** and **Autoload** options.

- When **Autoload** mode is set, the device automatically loads the cartridge from the lowest-numbered full slot into the tape drive. It then follows standard sequential operation. After configuring Autoload mode, you must do one of the following for Autoload mode to take effect:

- Power cycle the device from the front panel.

- Reboot the device from the RMI Support > Reboot screen.

- Move the lowest-numbered cartridge to the drive before starting the backup application. If the mailslot is enabled, the lowest cartridge location will be in the mailslot.

- When **Loop** mode is on, the original first cartridge in the sequence is reloaded after the device has cycled through all available cartridges. If Loop mode is off and the last cartridge has been unloaded, the device stops loading cartridges until you load another manually.

  △ **CAUTION:** Use caution when choosing Loop mode because it makes it possible to overwrite data on previously written cartridges.

When a library is partitioned into logical libraries, each logical library operates as an independent library. Thus, the library only loads tapes from the slots associated with one logical library into the tape drive associated with that logical library; it will not load tapes from slots associated with another logical library. Only the lowest-numbered tape drive in a multi-drive logical library will be used.

Automatic mode: In Automatic mode, the device switches from Sequential mode into Random mode when it receives certain SCSI commands. Automatic mode is the default setting.

Automatic cleaning

When auto clean is enabled, the tape library automatically loads a cleaning cartridge when a tape drive needs to be cleaned. The library identifies a tape cartridge as a cleaning cartridge if it has a barcode label that starts with CLN or after an unlabeled cleaning tape has been loaded into the tape drive.

The library can use a cleaning cartridge from any slot, even if the slot is reserved. The library keeps track of the usage count for each of the cleaning cartridges. When multiple cleaning cartridges are available, the library will first choose an unknown cleaning cartridge so the library can start tracking the cartridge usage count. If the library knows the usage count for all of the cleaning cartridges, the library will choose the one with the highest usage count.

Auto cleaning is disabled by default. You can enable automatic cleaning even if there are no cleaning cartridges in the device. In this case, the device will display a warning message.

△ **CAUTION:**

Only enable automatic cleaning in either the backup application or the library, not both.

Changing the drive configuration (Configuration > Drives)

Parallel SCSI drives: This option allows you to configure the SCSI ID of the drive.

△ **CAUTION:** If you change the SCSI ID, you must also cycle power on the host server and reconfigure the backup software before using the library.

Fibre Channel drives: This option allows you to configure the Fibre Speed, Type, ALPA, and Loop mode for the drive Fibre Channel ports. See **The Configuration > Drive page** for more information about configuring the Fibre Channel ports.

Access to this feature requires the administrator password.

Procedure

1. Highlight the setting you want to change. Press **OK** to select the value field.

2. Press the ▲ Up or ▼ Down buttons to until the correct value is displayed. Press **OK** to accept the value.

3. Press the ▲ Up or ▼ Down buttons to navigate to **<Save>**. Press **OK** to save.

Changing the network configuration (Configuration > Network)

The library can automatically obtain an IP address from a DHCP server when the library is powered up. The library also supports user-specified fixed addresses through the front panel. This option allows the operator to set the network settings or allow the library to autoconfigure using the DHCP server settings.

Access to this feature requires the administrator password.

Barcode reporting format (Configuration > Barcode Reporting)

This option sets the format for displaying the tape bar codes for both the OCP and the host. With this option, you can configure the number of characters to display and the justification of those numbers to the left or right. Access to this feature requires the administrator password.

Setting and changing the administrator password (Configuration> Set Admin Password)

This option allows you to change the administrator password. Access to this feature requires the administrator password or the Service password. Passwords consist of exactly eight characters each between the value of 0 and 9.

Restricted areas (indicated by a padlock icon) prompt for this administrator password before granting access. Once entered, the administrator password does not have to be entered a second time unless there is no user activity for five minutes. To access this screen, enter the administrator password first, if you have not already done so.

NOTE:

If you forget the administrator password, you cannot enter a new password. Call your customer service representative.

Restore defaults (Configuration > Restore Defaults)

This option returns the library to its original shipping configuration, leaving the settings necessary for the RMI. Access to this feature requires the administrator password.

The following settings are reset:

- SCSI drive addresses:
  - MSL4048: For full-height tape drives the default SCSI address is 4. For half-height drives, the default SCSI address for the bottom drive in each full-height drive bay is 4 and the default SCSI address for the top drive is 5 as shown in the following illustration. The default SCSI address for the bottom drive in each full-height drive bay is 4 and the default SCSI address for the top drive is 5 as shown in the following illustration.
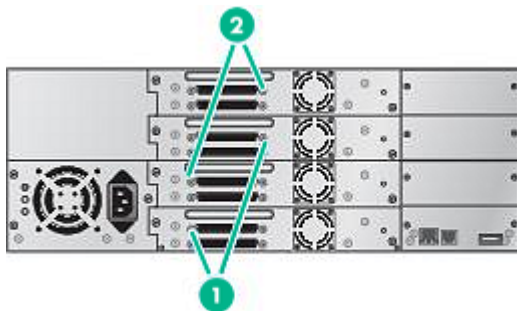
Figure 58: MSL4048 parallel SCSI tape drive default SCSI addresses

Item	Description
1	Tape drives with SCSI address 4
2	Tape drives with SCSI address 5

   ◦ MSL8048 and MSL8096: The default SCSI address for all tape drives is 4.

   The library will no longer recall drives that have been removed.

- Fibre Channel drive configuration: Automatic speed, auto port type

- Master drive: reset to Drive 1 or the lowest numbered existing drive

- Drive power: all drives powered on

- Active slots: maximum possible

- Library mode: Automatic

- Event log levels and filter: continuous trace and all levels and filters active (for Service use only)

- Barcode reader label length: 8

- Barcode reader alignment: Left

- Ignore barcode media ID: Disabled

- Admin password required for magazine access: Enabled

- All types of failover: Disabled

- Encryption: Disabled

   NOTE: Defaults will not be reset if encryption is enabled.

- HTTPS: Disabled

- Restricted Network Access: Enabled

- Error recovery: On

- Mailslot configuration: mailslot disabled

- Auto clean: disabled

- SNMP: disabled, but saved addresses do not change

- E-mail notification: disabled, but configurations retained

- License keys

The following settings are not reset:

- Administrator password

- Network settings (network is always enabled and the network addresses are retained)

- Date and time

> **IMPORTANT:** When the defaults are restored, the library will rediscover and renumber the tape drives from the bottom of the library up. If a tape drive was added between two other tape drives since the last time the drives were discovered, that tape drive and the ones above it will be renumbered. You might need to update the configuration of the backup application when tape drives are renumbered.

Setting the library date and time (Configuration > Set Date and Time)

This option sets the date and time used by the library to record events. Access to this feature requires the administrator password.

> **NOTE:**
>
> Time is based on a 24-hour clock. There is no a.m. or p.m. designation. For example: 1:00 p.m. is 13:00.

Saving and restoring the library configuration (Configuration> Save/Restore)

This option saves the library configuration to a USB flash drive and restores the configuration from the USB flash drive.

For a list of the configuration settings that are saved, see **Default and restore defaults settings**.

Operations menu

The Operations menu contains the following library operation options:

- **Opening the mailslot (Operations > Open Mailslot)**

- **Unlocking, removing, and replacing magazines (Operations > Unlock Left/Right Magazines)**

- **Moving Media (Operations > Move Media)**

- **Performing Inventory (Operations > Inventory)**

- **Enabling Password Locks (Operations > Enable Password Locks)**

Opening the mailslot (Operations > Open Mailslot)

The mailslots are used only with host system software that supports this feature. The mailslot feature allows you to insert or remove up to three tapes for the MSL4048 and MSL8048, or up to 15 tapes for the MSL8096.

Left magazines are available without mailslots, with one mailslot, or with three mailslots. The MSL4048, MSL8048, and MSL8096 tape libraries are shipped with the three-mailslot magazine on the lower left side. Mailslot-capable left magazines are marked with a white dot on the lower right corner that aligns with a white dot on the front bezel, as shown in the following illustration. Placing a mailslot magazine in any location other than the lower-left location will result in the magazine being treated as a magazine with no mailslots.
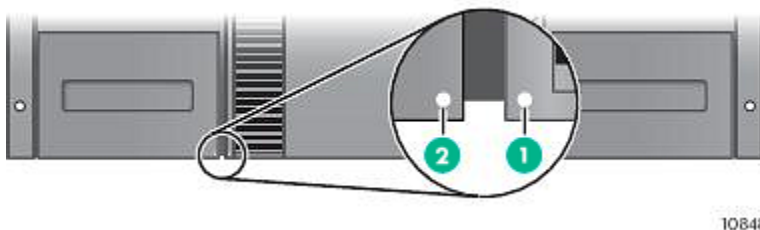
Figure 59: Mailslot-capable magazine and slot, each marked with a white dot

The library will push the mailslot open when instructed to open mailslots. After the mailslot is closed, the library will inventory the tapes in the mailslot, but not the rest of the tapes in the magazine, which allows the library to resume operations sooner.

On the MSL8096, the whole magazine on the upper right of the library can also be used for mailslots. All of the right magazines are the same so it does not have a special marking. The library will unlock the upper right magazine when instructed to open mailslots, but will not push out the magazine. After the magazine is replaced, the library will inventory all of the tapes in the magazine.

NOTE: If you exchange the magazine in the lower-left position with one that has different mailslot capabilities, the library displays a warning that the mailslot type is incompatible with the configuration.

Unlocking, removing, and replacing magazines (Operations > Unlock Left/Right Magazines)

This option grants access to the left and right magazines. After exchanging tapes in a magazine, slide the magazine completely into the library. The magazine locks into place. Access to the magazines requires the use of the administrator password.

On the MSL4048, once all left or right magazines are correctly installed, the library inventories the magazines. The Ready LED blinks during the inventory operation.

On the MSL8048 and MSL8096, the library leaves all magazines on a side unlocked for several seconds. During that time, you can pull out as many magazines on the side as you want. A magazine is locked when it is pushed back into the library. The library will wait about 30 seconds after the last magazine is installed before starting the inventory. Before the inventory starts, you can unlock the magazines on either side.

NOTE: Due to the library design, all left or all right magazines will be unlocked. The library will halt robotic functions until all magazines are present. It is not possible to unlock all of the magazines at once from the front panel.

Moving Media (Operations > Move Media)

This option instructs the library to move a cartridge from a tape drive, a tape slot in any magazine or a mailslot to any other location not already holding a tape. This option also lets you load and unload tape cartridges to and from the installed tape drives. To use this command, you must first select where you want to move the tape from (in one of the Source fields), and then indicate where you want to move the tape to (in one of the Destinations fields).

Source Type: This toggles between all available mailslot, magazines, and drives.

Source -> Source by Label: If appropriate, this toggles between available source cartridges. Only Full source slots are available for selection.

Destination Type: This toggles between all available destinations: Mailslot, Magazine, and Drive.

Destination: If appropriate, this option allows you to specify the cartridge destination. For a magazine, select a slot. Only Empty destination slots are available for selection.

Access to the **Move Media** option requires the use of the administrator password.

Performing Inventory (Operations > Inventory)

This option updates the inventory status of the library. The library checks each slot and drive for bar codes and determines if tapes are present or not.

NOTE:

This command is needed only if the inventory in the library is different than the inventory displayed on the front panel, which would not happen under normal conditions.

Enabling Password Locks (Operations > Enable Password Locks)

This option locks the restricted areas. This is typically used if the operator does not want to wait for the time out to reset the locks. Power cycling or library Reset also resets the locks.

Support menu

The following **Support** menu options are available:

- **Powering drives on and off (Support > Power on/off Drives)**
- **Cleaning the tape drive (Support > Clean Drive)**
- **Running tests (Support > Run Tests)**
- **Viewing logs (Support > View Logs)**
- **Updating library and drive firmware (Support > FW Upgrade)**
- **Force ejecting a drive (Support > Force Drive Eject)**
- **Rebooting the tape library (Support > Reboot)**

Powering drives on and off (Support > Power on/off Drives)

This option allows the powering up or down of a drive without interrupting power to the rest of the library and the other drives. This is typically used when replacing one drive. Access to this feature requires the administrator password.

Cleaning the tape drive (Support > Clean Drive)

This option allows you to clean the drives. Access to this feature requires the administrator password.

When the **Clean** drive LED is on, the tape drive needs to be cleaned. Cleaning times can range from a few seconds to a few minutes during which time the **Ready** LED blinks. Use only the designated cleaning cartridge for your tape drive model. All cartridges are available at **https://www.hpe.com/storage/storagemedia**.

Use only Ultrium Universal cleaning cartridges.

> (!)   **IMPORTANT:** If the cleaning cartridge is not a valid cleaning cartridge, the LCD screen displays **Invalid Tape** and the cartridge is exported.

> (!)   **IMPORTANT:** If the **Clean** drive LED or the Media **Attention** LED (on load or unload) occurs when inserting the same cartridge after you have cleaned the drive, there might be a problem with that cartridge.

When using the OCP to clean the tape drive, import the cleaning cartridge into the mailslot or any other empty slot before beginning the cleaning steps. If you would like to keep a cleaning cartridge in the library, the backup software must manage tape drive cleaning or be configured to bypass the slot containing the cleaning cartridge.

The **Clean** drive option lets you load a cleaning tape into any active drive. To use this command, you must first select the drive to be cleaned and then select where you want to load the cleaning tape from.

- **Source Type:** This toggles between all available sources: Mailslot, Magazine.
- **Source/Source by Label:** If appropriate, this toggles between available source cartridges. Barcode labels beginning with CLN are automatically displayed at the top of the list.

After cleaning, the library returns the cleaning cartridge to the original slot. If you loaded the cartridge from the front panel, you should now unload it from that slot either by using the mailslot, or by removing the magazine. When the tape drive cleaning is complete, the **Clean** LED turns off (if previously on).

Running tests (Support > Run Tests)

This option allows you to run a demo, a wellness test, or a slot to slot test and to specify the number of test cycles required. You can abort the test at any time, if necessary. Access to this feature requires the administrator password. For more information about the wellness test, see **The wellness test**.

Viewing logs (Support > View Logs)

This option allows you to view the following logs: Error, Warning, Informational, Configuration, and All Events possible. Access to this feature requires the administrator password.

Updating library and drive firmware (Support > FW Upgrade)

The tape library allows two types of firmware to be upgraded — one for the tape drives and the other for the tape library itself. You can upgrade both types of firmware from a USB flash drive, the RMI, or L&TT. You can also upgrade drive firmware from a firmware upgrade tape.

The library only supports signed firmware image upgrades and downgrades. Once firmware that uses code signing is loaded, the firmware will reject all unsigned images. If you attempt to load an unsigned firmware image, the RMI displays an invalid firmware version error message:

If you see this message, download the latest signed firmware image available for your library model on the HPE Support Center site.

Using a USB flash drive to upgrade firmware (Support > FW Upgrade> By USB)

This option allows you to upgrade tape library or tape drive firmware using a USB flash drive in the tape library USB port on the back panel. No operations will be available until the upgrade completes. Access to this feature requires the administrator password.

Procedure

1. Download current firmware using Library & Tape Tools or from the Hewlett Packard Enterprise support website: **https://www.hpe.com/support/storage**.

2. Copy the firmware onto the USB flash drive.

3. Insert the USB flash drive into the USB port on the back of the device.

4. From the **Support** menu, select **FW Upgrade > By USB**.

5. Select the target for the upgrade, which will be one of the tape drives or the library, and select the filename of the firmware.

6. Click **Upgrade**.

7. When the upgrade is complete, remove the USB flash drive from the USB port.

Using Library & Tape Tools (L&TT) to update library and drive firmware

You can download library and drive firmware using the L&TT diagnostic utility. This utility might already be installed on your server. If not, download it from **https://www.hpe.com/support/TapeTools**.

Online help and instructions are included with L&TT. The firmware download procedure involves these steps:

Procedure

1. Run the L&TT utility.

2. If prompted to download new firmware from the website, select **Yes**; otherwise, select **Get Firmware from Web** under the **File** menu.

3. Select the desired firmware revisions for the library that you would like to download firmware to, and then click **Download**. The firmware file is copied into the L&TT firmware folder.

4. Close the firmware window.

5. Select the library in the **By Product** device list tab, and then select the **Firmware** button. The latest revision available for the library is automatically selected.

6. Click **Start Update** to update the firmware for the library.

Using a firmware upgrade tape to update drive firmware (Support> FW Upgrade > By Tape)

This option allows the updating of drive code using a firmware upgrade tape. No operations will be available until the update completes. Access to this feature requires the administrator password. To use this command, select the drive or drives to be upgraded, and then select where you want to load the firmware upgrade tape from.

- **Source Type:** This toggles between all available sources: magazines and drives.

- **Source:** This toggles between available source cartridges. You can select a specific slot (Source field) or specify the firmware upgrade tape barcode (Source by Label field). Unlabeled tapes must be accessed by their slot number.

  NOTE: To use the **All Drives** function, all of the drives must be the same type. If they are not, you are warned: "Not all drives the same. Upgrade drives individually". Press **OK** to return to the option list with All Drives highlighted.

Force ejecting a drive (Support > Force Drive Eject)

This option attempts to force the tape drive to eject the tape and place it into an open slot in the library. Access to this feature requires the administrator password.

Before issuing this command, Hewlett Packard Enterprise recommends that you attempt to eject the tape using the backup software and move command on the OCP. While a drive is being force ejected, a window indicating the process is ongoing should appear. No operations will be available until force eject completes.

NOTE: If the drive has difficulty ejecting the tape, suspect bad or damaged media.

Downloading a support ticket (Support > Support Ticket)

A support ticket provides information that can help you or a service engineer diagnose problems with the tape library. You can view the support ticket with Library & Tape Tools version 4.2 and later. Downloading the support ticket to a USB flash drive lets you view the ticket on a computer that is not connected to the tape library. Access to this feature requires the administrator password.

Rebooting the tape library (Support > Reboot)

This option reboots the tape library and the tape drives within the library and forces a new cartridge inventory, clearing any current error condition. It updates drive lists in sub-menus. Access to this feature requires the administrator password.

> **△ CAUTION:**
>
> This option interrupts the current backup or restore operation and causes the operation to fail. It is primarily used if the library is in an error state.

Troubleshooting information and procedures

> ⚠️ **CAUTION: Shipping Lock:** The shipping lock must be removed for the robotics to operate properly on the MSL2024 and MSL4048. The library displays a robot move error if the shipping lock is not removed (see **Removing the shipping lock**).

The library displays errors

Symptom

The library displays library errors and the library edges are not properly supported.

Cause

> ⚠️ **CAUTION:** This library is designed to operate when installed in a rack using the included rack rails. Operating the library without installing it in the rails, such as on a table or rack shelf, could result in library errors. Placing any weight on top of the library might also cause errors.

Fibre Channel connection problems

The MSL4048 library will not operate with a full-height tape drive installed in the middle two half-height drive bays. Verify that the full-height tape drive is installed in a supported position. A full-height drive can only be installed in either the upper or lower two half-height drive bays.

Use the Status screen to check the link connection for your tape drive.

If the screen shows Logged Out:

- Check that the Fibre speed is set to Automatic (on the RMI) or Auto Detect (on the OCP), or that the correct fibre speed is selected. If you are unsure of the speed of the HBA or switch that the library is connected to, try Automatic (on the RMI) or Auto Detect (on the OCP).

- Check that the correct port type, fabric or loop, is selected. Loop requires additional configuration. If you are unsure of the correct port type, try Automatic (on the RMI) or Auto Detect (on the OCP).

If the screen shows No Link, the Speed Status is – and the Link LED on the back of the drive is off:

- The speed is probably set incorrectly. Try setting the speed to Automatic (on the RMI interface) or Auto Detect (on the OCP).

- If there are still issues, change the port type to Auto Detect.

If the screen shows No Light:

- The cable is not plugged in correctly. Check that it is connected correctly to Port A of the tape drive.

- The cable is damaged. FC cables are delicate. If the cable has been bent or twisted sharply, it might be broken and must be replaced.

If the screen shows ALPA Conflict:

There might be a conflict with the ALPA address on Loop ports. Select Soft for the Loop mode to allow the system to select an available address each time the tape drive connects to the FC fabric. If your server configuration does not support changing

addresses, try using the Hard Auto-Select option for the Loop mode. This allows the system to select an available address when it first connects, and then retain that address for future connections.

Detection problems after installing a SAS drive

Problems encountered after installation are often caused by improper SAS cable connections, application software configuration errors, or an incorrectly configured operating system. If the application software or operating system does not communicate with the library or drive after installation, determine the extent of the detection problem:

- Does the application software detect the tape drive?

- Does the application software detect the library?

- Does the operating system detect the tape drive?

- Does the operating system detect the library?

- Does the operating system detect the library, but list it as a generic device?

Based on the extent of the detection problem, check the following:

- If neither the application software nor operating system detects the tape drive, or they do not detect both the tape drive and the library:
  - Verify that all SAS cables are securely connected on both ends. If the mini-SAS connectors that connect to the tape drive and some HBAs will not plug in, check the key. The mini-SAS connector on the tape drive is keyed at location four, which is the standard location for end devices. If the connector on the cable is keyed in a different location, the connector not plug in and the cable probably will not work.
  - Check the length and integrity of your SAS cabling. For reliable operation, do not use a SAS cable longer than 6 meters. Do not use a cable adapter or converters between the HBA and the library.
  - Check the SAS connectors for damage or debris.
  - Verify that your HBA is supported by the host computer and qualified with the library. For current HBA compatibility information, see the compatibility matrix at **https://www.hpe.com/storage/StoreEverSupportMatrix**.
  - Verify that your HBA has the latest firmware.

- If the application software or operating system detects the tape drive, but not the library:

  Verify that multiple LUN support is enabled on the HBA. The device uses two Logical Unit Numbers (LUNs) to control the tape drive (LUN 0) and robotic (LUN 1). The device requires an HBA with multiple LUN support and multiple LUN support must be enabled on the host computer. When multiple LUN support is not enabled, the host computer can see the tape drive, but not the library.

  NOTE: Many RAID or array controllers do not provide multiple LUN support.

- If the application software or operating system does not detect any devices on the HBA:
  - Verify that the SAS host adapter is installed correctly. Refer to the manual that came with your host adapter for installation and troubleshooting instructions. Pay particular attention to any steps describing configuration settings. Ensure that the host adapter is properly seated in the motherboard slot and the operating system correctly detects the host adapter.
  - Verify that the proper device driver is installed for the SAS host adapter.

- If the library is detected by the operating system, but not by the application software:

  Refer to the documentation included with your backup application for instructions on how to verify proper installation. Some backup software packages require an additional module to communicate with the robotics.

- If the library is detected by the operating system, but is listed as an unknown or generic device:

  Make sure that the proper device driver, if applicable, is installed for the device. Check your software provider website for the latest drivers and patches.

  NOTE: Many backup applications use their own drivers. Before installing a driver, make sure that it is not in conflict with the application software.

If you continue to have problems with a SAS library, check the following:

- Ensure that the device is compatible with the SAS host adapter and backup application you plan to use. For a list of compatible SAS host bus adapters and application software, check with your SAS host adapter manufacturer, backup application vendor, or the compatibility matrix at **https://www.hpe.com/storage/StoreEverSupportMatrix**.

- Verify that your HBA is supported by the host computer and qualified with the library. For current HBA compatibility information, see the compatibility matrix at **https://www.hpe.com/storage/StoreEverSupportMatrix**.

- Ensure that you are using a compatible, high-quality cable. See the product QuickSpecs for a list of supported cables.

Detection problems after installing a parallel SCSI drive

The MSL4048 library will not operate with a full-height tape drive installed in the middle two half-height drive bays. Verify that the full-height tape drive is installed in a supported position. A full-height drive can only be installed in either the upper or lower two half-height drive bays.

Problems encountered after installation are often caused by improper parallel SCSI bus configuration, application software configuration errors, or an incorrectly configured operating system. If the application software or operating system does not communicate with the library or drive after installation, determine the extent of the detection problem:

- Does the application software detect the tape drive?

- Does the application software detect the library?

- Does the operating system detect the tape drive?

- Does the operating system detect the library?

- Does the operating system detect the library, but list it as a generic device?

Based on the extent of the detection problem, check the following:

- If neither the application software nor operating system detects the tape drive, or they do not detect both the tape drive and the library:

  ◦ Check the SCSI ID and change it if necessary. The default SCSI ID for each tape drive will be 4 or 5 depending on the library model and drive slot:

    – MSL2024: For full-height tape drives the default SCSI address is 4. For half-height drives, the default SCSI address for the bottom drive is 4 and the default SCSI address for the top drive is 5 as shown in the following illustration.
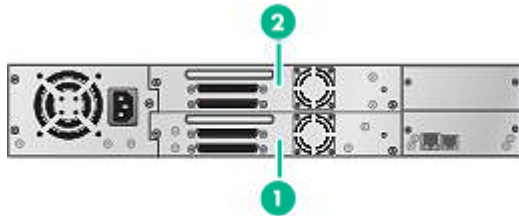
Figure 60: MSL2024 parallel SCSI tape drive default SCSI addresses

Item	Description
1	Tape drives with SCSI address 4
2	Tape drives with SCSI address 5
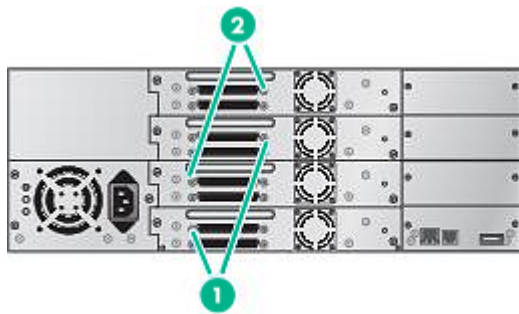
- MSL4048: For full-height tape drives the default SCSI address is 4. For half-height drives, the default SCSI address for the bottom drive in each full-height drive bay is 4 and the default SCSI address for the top drive is 5.

Figure 61: MSL4048 parallel SCSI tape drive default SCSI addresses

Item	Description
1	Tape drives with SCSI address 4
2	Tape drives with SCSI address 5

- MSL8048 and MSL8096: The default SCSI address for all tape drives is 4 as shown in the following illustration.
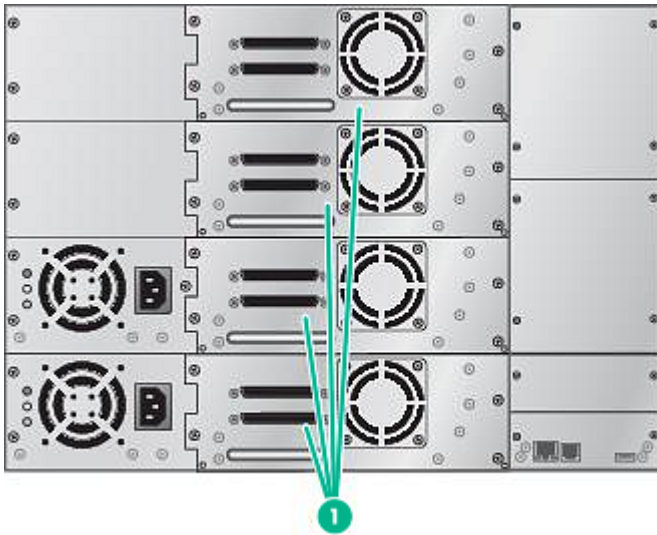
Figure 62: MSL8048 and MSL8096 parallel SCSI tape drive default SCSI addresses

Item	Description
1	Tape drives with SCSI address 4

Depending on other devices attached to the same parallel SCSI bus and their SCSI IDs, you might need to change the SCSI ID before using the library. Review the manuals for the other devices on the parallel SCSI bus or your operating system to determine which SCSI IDs are currently in use. Change the library SCSI ID with the OCP or RMI.

◦ Verify that all parallel SCSI cables are securely connected on both ends. Check the length and integrity of your parallel SCSI cabling. Check the parallel SCSI connector for bent pins. The length of the internal parallel SCSI cabling inside the device is 0.5 m (1.6 ft). This length must be included in any calculations of cable length.

– For LVD SCSI, the maximum length with only a single device on the parallel SCSI bus is 25 m (82 ft).

– For Ultra 320 or multiple devices on an LVD bus, the maximum combined internal/external length is 12 m (40 ft).

– If you have a combination of LVD and SE devices on the bus, the maximum cable length reverts to the SE specification. The maximum cable length for Ultra devices is 3 m (10 ft) for four or fewer devices, and 1.5 m (5 ft) for more than four devices.

• If the application software or operating system detects the tape drive, but not the library:

Verify that multiple LUN support is enabled on the HBA. The device uses two Logical Unit Numbers (LUNs) to control the tape drive (LUN 0) and robotic (LUN 1). The device requires an HBA with multiple LUN support and multiple LUN support must be enabled on the host computer. When multiple LUN support is not enabled, the host computer can see the tape drive, but not the library.

NOTE: Many RAID or array controllers do not provide multiple LUN support.

• If the application software or operating system does not detect any devices on the HBA:

Verify that your parallel SCSI host adapter is installed correctly. Refer to the manual that came with your parallel SCSI host adapter for installation and troubleshooting instructions. Pay particular attention to any steps describing configuration settings. Ensure that the HBA is properly seated in the motherboard slot and that the operating system correctly detects the HBA. Make sure that the proper device driver is installed for the parallel SCSI host adapter.

- If the library is detected by the operating system, but not by the application software:

  See the backup application documentation for instructions on how to verify proper installation. Some backup software packages require an additional module to communicate with the robotics.

- If the library is detected by the operating system, but is listed as an unknown or generic device:

  Make sure that the proper device driver, if applicable, is installed for the device. Check your software provider website for the latest drivers and patches.

  NOTE: Many backup applications use their own drivers. Before installing a driver, make sure that it is not in conflict with the application software.

If you continue to have problems with a parallel SCSI library, check the following:

- Ensure that the device is compatible with the parallel SCSI host adapter and backup application you plan to use. For a list of compatible parallel SCSI host bus adapters and application software, check with your parallel SCSI host adapter manufacturer, backup application vendor, or the compatibility at **https://www.hpe.com/storage/ StoreEverSupportMatrix**.

  NOTE: The host bus adapter should be SCSI-3 LVDS. A single-ended parallel SCSI host bus adapter severely degrades performance. Also, if any SE devices are on the same parallel SCSI bus, all the devices on the bus slow down to SE speed, which severely degrades performance.

  The library is NOT compatible with a standard differential (Diff) or high-voltage differential (HVD) SCSI bus.

- Verify that your HBA is supported by the host computer and qualified with the library. For current HBA compatibility information, see the compatibility matrix at **https://www.hpe.com/storage/StoreEverSupportMatrix**.

- If one of the ports on the device is not connected to another parallel SCSI device, the port must be terminated. Only terminate the devices physically at the beginning and end of the parallel SCSI bus. For information on enabling or disabling termination on other devices on the parallel SCSI bus, see the documentation provided with the device.

  To terminate the second parallel SCSI port on a device, press the terminator from the accessories package firmly into one the two parallel SCSI connectors on the back panel. Secure the terminator by tightening the finger-screws until snug. The supplied terminator is "dual mode" and works on both Low-Voltage Differential (LVD) and Single Ended (SE) SCSI buses. Check all parallel SCSI and power connections and confirm that the unit is attached to a valid SCSI SE or LVDS bus.

Operation problems

Problem	Solution
Device does not power on.	1. Check all power cord connections. 2. Make sure that the power button on the front panel has been pressed, and the green **READY** LED is illuminated. 3. Make sure that the outlet has power. Try another working outlet. 4. Replace the power cord.
No display messages appear.	1. Make sure that the power cord is connected. 2. Make sure that the power button on the front panel has been pressed, and the green **READY** LED is illuminated. 3. Power cycle the device. 4. If the display is still blank but the device seems to be powered on, try to get the device status or error information from the RMI.
All power supply LEDs are off (MSL4048, MSL8048 and MSL8096).	1. Check all power cord connections. 2. Make sure that the power button on the front panel has been pressed, and the green **READY** LED on the front panel is lit. 3. Make sure that the outlet has power. Try another working outlet. 4. Replace the power cord.
The power button has been pressed, the blue power supply LED is lit, and green power supply LED is off (MSL4048, MSL8048 and MSL8096).	The blue LED is lit when the power supply is plugged into a good outlet. The green LED is lit when the power supply is producing good power. Replace the power supply.
Yellow power supply LED is lit (MSL4048, MSL8048 and MSL8096).	The yellow LED is lit when the power supply fan is not rotating at an acceptable speed. 1. Check the power supply fan for obstructions. 2. Replace the power supply.

Failure/attention indications displayed on the front panel

Problem	Solution
"!" in operator panel inventory display.	Export the data cartridge marked with an **!** in the inventory. The cartridge is either damaged, incompatible with the drive, or the wrong type for the attempted operation. For the MSL2024, see **Moving tapes in the library (Operations > Move Tape)** for more information. For theMSL4048, MSL8048 and MSL8096, see **Moving Media (Operations > Move Media)**.
The LCD displays an error code.	Look up the error code, try to resolve the failure, and power cycle the device (see **Error codes**). On the MSL2024 OCP, press **Enter** to see the error message for the error code.

Tape movement problems

Problem	Solution
Tape stuck in drive.	Try the following steps, in this order, to remove the stuck tape.
	NOTE: The tape drive must rewind the tape before ejecting it. This can take as long as five minutes, depending on how much tape must be rewound. Once the tape is rewound, the eject cycle will take fewer than 16 seconds.
	The **READY** light flashes while the tape rewinds. Wait for the tape to finish rewinding before attempting another operation.
	1. Attempt to unload the tape from your backup software.
	2. Shut down the backup software and stop the operating system's removable storage services. From the OCP, attempt to unload or move the tape to a slot. (For MSL2024, see **Moving tapes in the library (Operations > Move Tape)** . For MSL4048, MSL8048 and MSL8096, see **Moving Media (Operations > Move Media)**).
	3. Power down the unit, disconnect the cable from the drive, power up the unit, and wait until the tape drive is idle or ready. From the OCP, attempt to unload or move the tape to a slot.
	4. From the OCP, attempt a force eject or emergency unload operation. (For MSL2024, see **Forcing the drive to eject a tape (Support > Force Drive To Eject Tape)**. For MSL4048, MSL8048 and MSL8096, see **Force ejecting a drive (Support > Force Drive Eject)**)
	ⓘ **IMPORTANT:** Inspect the tape cartridge that was stuck. Damage or misplaced labels on the cartridge could have caused the load/unload failure. Discard any tape cartridge found to have issues.
Tape stuck in storage slot.	To remove a stuck tape from a storage slot:
	If the OCP or the RMI is still operational:
	1. Move the tapes from the drives to the magazines using the **Move Tape** command. (For MSL2024, see **Moving tapes in the library (Operations > Move Tape)** . For MSL4048, MSL8048 and MSL8096, see **Moving Media (Operations > Move Media)**.)
	2. Use the magazine removal process to release the magazine and remove it from the device. To use the MSL2024 OCP, see **Unlocking, removing, and replacing magazines (Operations > Unlock Left or Right Magazine)**. To use the MSL4048, MSL8048 and MSL8096 OCP, see **Unlocking, removing, and replacing magazines (Operations > Unlock Left/Right Magazines)**. To use the RMI, see **The Operations > Magazines page**. If neither one of these processes works, see **Releasing the magazines manually**.
	3. Manually remove the cartridge from the magazine by inserting a finger in the hole at the back of the magazine. Some tapes need to be inserted and removed several times to condition them for free movement in and out of the magazine.

Media problems

Problem	Solution
Cleaning or data cartridge incompatible with drive.	Make sure that you are using data and cleaning cartridges that are compatible with the drive and model of your device (see **Tape cartridges**) and that you are using the correct cartridge type for the operation. The device automatically unloads incompatible cartridges, the **Attention** LED flashes, and an exclamation point (!) displays in the inventory display for the indicated slot number. Export the media to clear the state.
Cannot write to or read from tape.	• Make sure that the cartridge is not a WORM cartridge that has already been used. • Make sure that the cartridge is write enabled (move the write-protect switch to the enabled position). • Make sure that the data cartridge is compatible with the drive model. (See **Read and write compatibility**.) • Make sure that you are using an Ultrium cartridge that has not been degaussed. **Do not degauss Ultrium cartridges!** • Make sure that the cartridge has not been exposed to harsh environmental or electrical conditions and is not physically damaged in any way. • Many backup applications do not read or write to cartridges that were created using a different backup application. In this case, you might have to perform an erase, format, or label operation on the cartridge. • Make sure that you understand any data protection or overwrite protection schemes that your backup application might be using, which could prevent you from writing to a given cartridge. • Retry the operation with a different, known good tape. • Clean the tape drive. (For MSL2024, see **The Support > Drive page** . For MSL4048, MSL8048 and MSL8096, see **Cleaning the tape drive (Support > Clean Drive)**.)

Parallel SCSI device not detected

Problem	Solution
Device not detected	• Check that the HBA supports multiple LUNs and this feature is enabled. If not, only the tape drive will be detected. • Check for conflicting SCSI IDs. • Power on the device before powering on the host computer. • Make sure that the library does not have the drive off line and that the library is not running a test. • Attach the device to an LVDS SCSI host adapter/bus. • The parallel SCSI cable length might be too long. Use a shorter cable or remove other devices from the bus. • Parallel SCSI bus not properly terminated. See **Detection problems after installing a parallel SCSI drive**. • Check that the device is fully powered up and is not in an error state. • Check the parallel SCSI connector and terminator for bent pins. See **Detection problems after installing a parallel SCSI drive** for more detailed troubleshooting help.
Changed drive SCSI ID, but the host server does not recognize the new ID.	• Make sure that all parallel SCSI devices on the same bus have unique SCSI ID numbers. • Only SCSI IDs 0 through 7 are available on a narrow (50 pin) bus. If the device is on a narrow bus and has a SCSI ID of 8 or greater, the host server will not detect the drive. If you must use SCSI IDs 8 or greater, use a wider bus. • Reboot the host server.

Attention LED is illuminated

Problem	Solution
Both the Attention and Cleaning LEDs are lit.	This is most likely caused by a dirty drive that cannot read a tape and marks the tape invalid. 1. View the inventory with the RMI. Note the slots that have tapes marked with **!** . 2. Remove any magazines that contain tapes marked with **!** . 3. Remove the tapes that were marked with **!** . 4. Inspect each removed tape for damage, check that the tape is compatible with the drive, and ensure that it is not past its usage life. See **Tape cartridges**. Discard any tapes that are damaged or past their usage life. Do not use cartridges that are incompatible with the tape drive. 5. Reload the magazines with tapes that have passed inspection and new tapes to replace cartridges that did not pass inspection. 6. Replace the magazines. 7. Clean the tape drive.
A particular cartridge sets off the cleaning light.	Check the cartridge for contamination by loose debris.
A cartridge recently imported from a different environment is causing issues.	Media that is moved from one environment to another can cause issues until it has acclimated to the new conditions. A cartridge should be acclimated for at least 24 hours before being used, particularly if it has been stored at a substantially different temperature or level of humidity than the device.
The Attention LED is lit but the Cleaning LED is not lit after a cartridge load.	The library was unable to complete the requested operation with the selected tape cartridge. • Use only cartridges that are compatible with the drive type (see **Tape cartridges**) . • Use the correct type of cartridges for the operation. For example, use a cleaning cartridge for cleaning. • Make sure that you are using an Ultrium Universal cleaning cartridge (see **Tape cartridges**) .

Table Continued

Problem	Solution
The Cleaning LED is lit after using a cleaning cartridge.	The cleaning cartridge is expired. A cleaning cartridge will expire after 50 cleaning cycles.
A particular cartridge sets off the Attention LED and possibly the Cleaning LED.	If the Media Attention LED is cleared and the drive has been cleaned, and then immediately redisplays each time a particular cartridge is reloaded, that cartridge should be suspected as being defective. • If this occurs, export the cartridge and load a known good cartridge. In some cases, a cartridge can be worn out, have a defective Cartridge Memory, or have been formatted as a Firmware Upgrade Cartridge. • Any cartridge that is suspected of being defective or contaminated should NOT be reused in any drive. • If the bad cartridge is a cleaning cartridge, it might be expired.

Inventory problems

Problem	Solution
The inventory labels the cartridge **Full** instead of showing its bar code	• Verify that the label is a Hewlett Packard Enterprise label. The bar code reader might not be able to read other labels. • Verify that the label is properly applied. See **Labeling the tape cartridges**. • Verify that the label is not soiled.
The inventory process takes a long time	Apply high-quality Hewlett Packard Enterprise labels to all tape cartridges. During the inventory process, the bar code reader attempts to read the bar code on the cartridge or the bar code on the back of the storage slot until it identifies the cartridge or determines that the slot is empty. The reader can usually identify a properly labeled cartridge the first time, while determining that an unlabeled cartridge is in a storage slot can take four times as long.

RMI network connection issues

Problem	Solution
Cannot connect to the remote management interface (RMI)	• Verify that the device is connected to the LAN with a CAT 5E, 6, or 6E Ethernet cable.
	• Verify that the link LED on the RJ45 (LAN) connector is lit when the device is powered up. If the LED is not lit, the device is not communicating with the LAN. See your network administrator for help.
	• Verify that the device has been configured with a valid static network address or DHCP has been enabled so the device can obtain a network address. If using DHCP, write down the device network address from the OCP Information menu. If the device did not obtain a valid address via DHCP, verify that the DHCP server is up and the device has network access to it. If necessary, set a static network address instead.
	• Enter the device IP address into the address bar of a web browser connected to the same LAN as the device. If the RMI web page does not display, ping the device IP address. If the ping fails, verify that the device has a valid network address and that there are no firewalls or other obstructions to network traffic between the computer with the web browser and the device. See your network administrator for help.

Cleaning problems

Problem	Solution
Cannot load the cleaning cartridge.	• Make sure that you are using an Ultrium Universal cleaning cartridge (see **Tape cartridges**) .
	• Make sure that the cleaning cartridge has not expired. A cleaning cartridge will expire after 50 cleaning cycles.
	• Contact your service representative.

Performance problems

The process of backing up files involves many system components, from the files in the file system on the disk, through the backup server, and out to the library, all managed by software running on an operating system. The backup process can only run as fast of the slowest component in the system.

Performance issues are solved by identifying and addressing performance limitations in your system.

Potential performance limitations:

- **Average file size**

- **File storage system**

- **Connection from the backup server to the disk array**

- **Backup/archive server**

- **Backup/archive software and method**

- **Connection from the archive/backup host server to the library**

- **Data cartridges**

- **Tape drive read or write performance seems slow**

You can use the L&TT system performance test to assess the performance of simulated backup and restore operations. For information on downloading and using L&TT, see **Diagnosing problems with Library & Tape Tools**.

Average file size

The hard drive must seek to the position of a file before it can start reading. The more time the disks are seeking to files, the lower the performance. Therefore, if the average file size is small, the read performance will be lower.

To determine the average file size, divide the size of the backup by the number of files.

If the average file size is small (64 KB or less), consider using a sequential, image, or block backup method that backs up the whole hard drive or LUN image instead of individual files. The trade-off for using one of these methods is that you might only be able to restore the entire image instead of individual files.

NOTE: File fragmentation will also cause excessive drive seeking, which lowers performance, so ensure that files are regularly defragmented.

File storage system

The file storage system determines the organization of the files on the disks. Using RAID controllers to spread files over multiple disks can improve performance because some disks can be seeking while others are reading. Storing files on a single non-RAID disk results in the slowest performance while storing files on a high-end disk array results in the fastest performance.

Converting standalone disks to RAID can improve performance.

Ensure that the file systems being backed up have no or minimal fragmentation.

Connection from the backup server to the disk array

The connection between the host server and the disks determines how much data can be transferred from the disks to the host computer at a time. A connection with insufficient bandwidth cannot provide enough data for the tape drives to write at full speed. For optimum performance, the storage subsystem must be able to provide data at the tape drive maximum transfer rate.

Backup systems using a lower speed Ethernet network should use multiple network connections.

Backup/archive server

The backup server must have enough RAM and processor power to transfer the files from the disk to the tape drive while also running the backup or archive software and any other processes.

Check the RAM and processor usage during a backup operation. If they are operating at capacity, adding RAM or processor capability can improve performance.

Backup/archive software and method

Each backup method has its own impact on performance, depending on how well it can keep data streaming to the tape drive. In most cases, native applications do not have the features required to maximize performance for LTO tape drives. Hewlett Packard Enterprise recommends using a full-featured backup or archive application with this library.

File-by-file backup or archive methods provide the best restore performance if you only need to restore individual files. However, if the average file size is small, file-by-file methods will significantly reduce performance.

Disk image, flash, or sequential backup methods provide the fastest performance because they back up an entire disk, partition, or LUN, which minimizes disk seeking. The disadvantage is that backup and restore operations work on an entire

disk, partition, or LUN. You might not be able to back up a subset of files or restore a single file. If you can restore a single file, the restore process will be slow.

Database backup performance will vary based on the use model. To improve performance when backing up data from a database:

- Use specific backup agents for the database.

- Use the latest versions of the databases.

- Do not back up individual mailboxes.

- Do not back up specific records or do a record-by-record backup.

- Do not back up when the database is in heavy use.

Connection from the archive/backup host server to the library

For the best performance, the connection from the host server to the library must have enough bandwidth to provide enough data to keep the tape drive streaming. Current LTO tape drives take advantage of some of the fastest interfaces available so the type of interface used to connect the library to the host server is not likely to be the cause of a performance issue. However, issues with cables and connectors can limit performance.

Verify that the system is using cables that are listed in the QuickSpecs, are in good condition, and do not exceed recommended cable lengths.

Data cartridges

The type and condition of the data cartridges also affect backup performance. For best performance, use Hewlett Packard Enterprise cartridges that are the same LTO generation as the tape drives. If you suspect a performance issue related to data cartridges, use the L&TT media assessment test to evaluate the condition of the data cartridges.

Tape drive read or write performance seems slow

Symptom

Tape drive read or write is slower than expected.

Cause

If the tape drive is not properly secured to the chassis or the library is not properly secured to the rack, vibration may cause slow read or write performance. Vibration could come from the cooling fan or external sources.

Action

1. Ensure that the tape drives are securely tightened to the chassis.

   Use a torque driver to tighten the thumbscrews on all the tape drives to 6 inch pounds or 0.68 N m.

   If a torque driver is not available, use a #2 Phillips screwdriver to tighten the thumbscrews until a low initial threshold torque achieves a snug tight condition. Do not over tighten.

2. Ensure that the chassis is securely tightened to the rack.

   From the front of the library, use a torque driver to tighten the captive fasteners to 6 inch pounds or 0.68 N m.

   If a torque driver is not available, use a #2 Phillips screwdriver to tighten the captive fasteners until a low initial threshold torque achieves a snug tight condition. Do not over tighten.

Service and repair

Releasing the magazines manually

Only use this manual process if the magazine cannot be released using the OCP or RMI, and the device no longer has power.

Procedure

1. If the library is powered on, return all cartridges to the magazines with the OCP **Operations > Move Tape** option and then power off the library.

2. Unplug the power cord from the library.

3. From the back of the library, find the access holes for the right and left magazines.
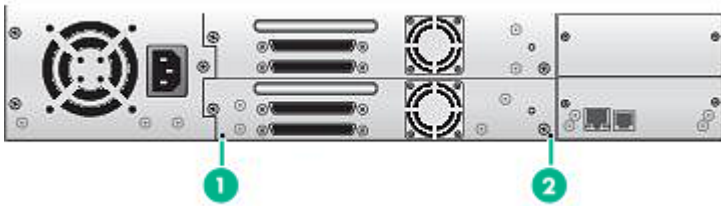
11410

Item	Description
1	Right magazine release access hole
2	Left magazine release access hole

The magazine release is a small latch.

4. Insert the end of a small metal pin or straightened paper clip into the appropriate magazine access hole at the back of the library about 1.5 cm (0.6 inch), while another person grasps the magazines on that side and pulls them out of the front of the library. For the MSL4048, MSL8048 and MSL8096 , all magazines on a side are released and should be removed at the same time.
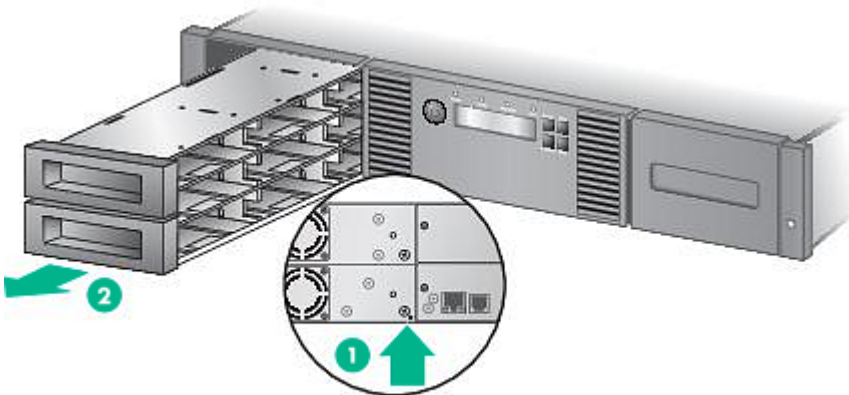
11342

Item	Description
1	Push a paper clip into the access hole.
2	Pull the magazine out of the front of the library.

> (!) **IMPORTANT:** Do not force the pin once you encounter resistance. Doing so can damage the device.

5. Repeat step 3 for the other magazine if necessary.

6. If other tapes are still in the library or if you were unable to remove the magazines and drive, contact customer service for further instructions.

The wellness test

The wellness test exercises all library and tape drive hardware, except the external connections, and is useful for verifying that a library is working correctly. The wellness test requires operator interaction with the mailslot so cannot be initiated from the RMI.

For complete testing, enable the mailslot and ensure that each top-row corner slot contains a tape cartridge.
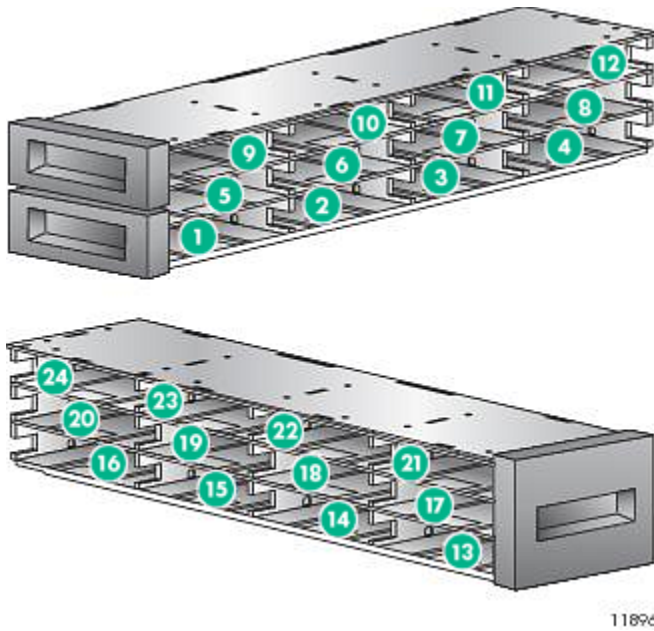
Figure 63: MSL2024 top-row corner slots with mailslot disabled: 9, 12, 21, 24
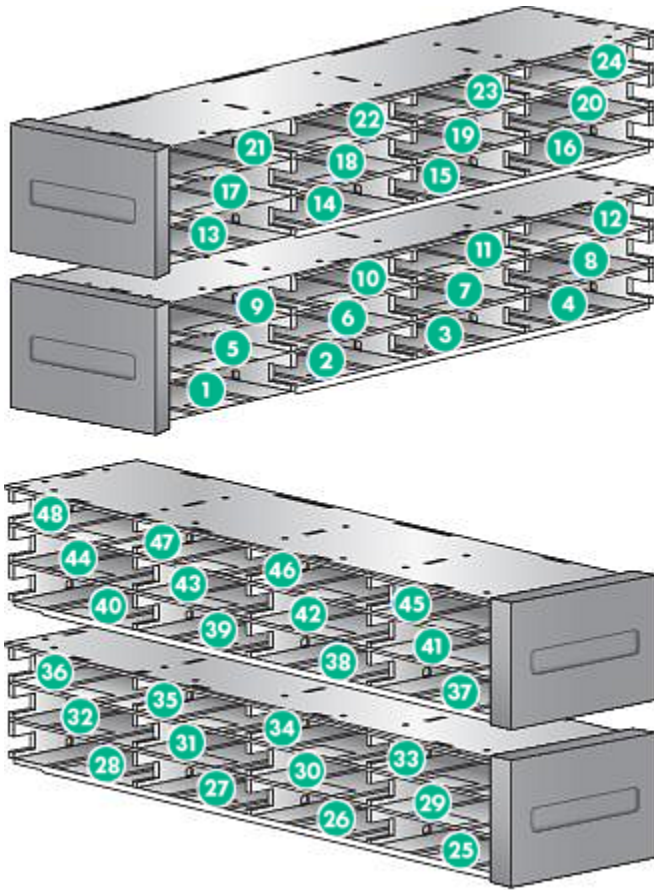
Figure 64: MSL4048 top-row corner slots with mailslot disabled: 21, 24, 45, 48
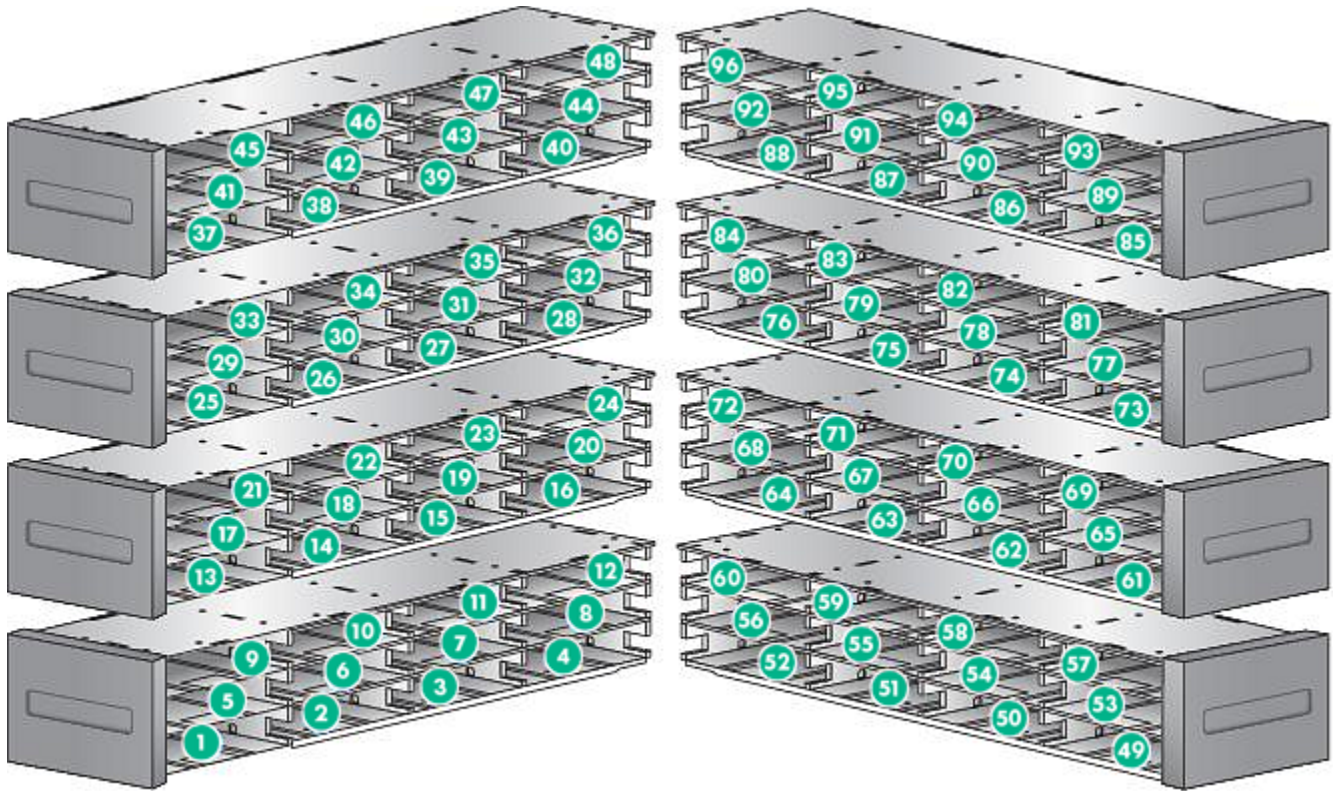
Figure 65: MSL8096 top-row corner slots with mailslot disabled: 45, 48, 93, 96

> ⓘ **IMPORTANT:** The library will remove any tape cartridges from the tape drives and go offline when running the wellness test. Verify that any applications using the library have completed before starting the wellness test.

You can have the library run up to 10 cycles of the wellness test. If the library has more than one tape drive installed, you can select whether to run the test on one or all of the tape drives. The wellness test operates on the whole library, without regard to logical libraries.

Running the wellness test

The wellness test requires operator interaction and can only be run from the OCP.

Prerequisites

Administrator password.

Procedure

1. Start the wellness test from the OCP.

2. The library performs a self test and verifies that it can communicate with the tape drive.

3. The library returns the tape cartridge in the tape drive to its home slot, if necessary. If the home slot is not known, the library will move the cartridge to the mailslot and prompt the operator to remove it.

4. When prompted, enter the number of cycles to run the test.

5. The library opens the mailslot and prompts the operator to insert a scratch cartridge.

   In the MSL8096, the 12-slot mailslot does not pop out; the operator must open it.

6. Insert a scratch cartridge into the lowest-numbered mailslot. If no mailslots are enabled or the operator closes the mailslot without inserting a cartridge into the lowest-numbered mailslot, the library will perform a shortened version of the wellness test, skipping step 7.

7. The library loads the scratch cartridge into the first tape drive, unloads the scratch cartridge from the tape drive, and returns the scratch cartridge to the mailslot. If the operator selected to test all of the tape drives, the library will load the scratch cartridge into each tape drive before returning it to the mailslot.

8. The library moves the tape cartridge from the four top-row corner slots to the tape drive load point and then returns the tape cartridge to its slot. If one of the top-row corner slot positions does not contain a tape cartridge, the library will skip that location. If none of the top-row corner slots contain a tape cartridge, the library displays an error message.

9. The test continues for the specified number of cycles.

10. At the conclusion of the test, the library pops open the mailslot and waits for the operator to remove the scratch tape.

   In the MSL8096, if only the 12-slot mailslot is configured, the library will prompt the operator to open the mailslot and remove the scratch tape cartridge.

11. The library displays the test completion status, including any recoveries or errors that might have occurred.

Error codes

If an error occurs during operation, the device stops the current operation and displays an error code on the LCD screen. Unless otherwise noted in the Operations section, record the error code or error message from the LCD screen, and then try to resolve the error by cycling power to the device and retrying the operation.

To check the overall operation of the device, run the wellness test from the OCP. The wellness test exercises all robotic movements and checks the status of the electrical components and communication.

If the error persists, contact support personnel.

There are three ways to obtain error codes from the device:

- On the OCP

- On the RMI

- On an L&TT support ticket or report

Finding error code information on the MSL2024 OCP

When an error first occurs, the error message and error code are displayed on the OCP.
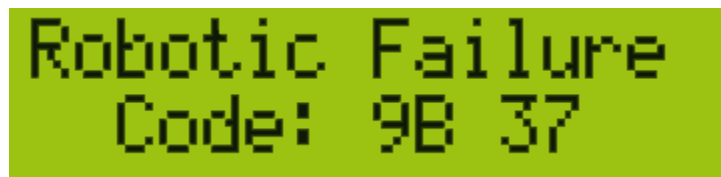
Figure 66: Initial OCP error message

The code **9B** is the main error code, and **37** is the error sub-code.

If you review the Error Log in the Support menu, the OCP error log displays the error code.

Figure 67: Error code in the OCP Error Log

The code **9B** is the main error code, **37** is the error sub-code, and **31** is sub-code specific information for factory use only. When you press **Enter**, the OCP displays the error message.

Figure 68: Error message in the OCP Error Log

If you press **Next**, the OCP will display additional information, if available.

Figure 69: No additional information in the OCP error log

If you press **Next** again, the OCP will display the date and time in the format: **YYYY-MM-DD** followed by the time in 24–hour clock format, where 1:00 pm is 13:00.
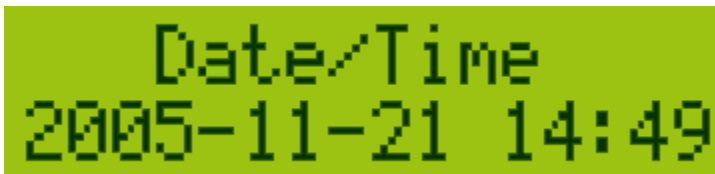
Figure 70: Date and time in the OCP error log

Finding error code information on the MSL4048, MSL8048 and MSL8096 OCP

Error codes are displayed in pop-up messages when an error occurs during an operation that is initiated from the OCP.

The message shows the error code and a description of the error.

For example:

```
8D 52    Mechanical Block
```

Where:

8D is the main error code 52 is the error sub-code.

The error log contains a list of all errors, with a separate row for each error. The log shows the Date/Time, Code, and Description.

For example,

```
24/06/05 01:48   D7 50   System Error
```

Where:

`24/06/05` is the date in the format DD-MM-YY `01`:`48` is the time in 24-hour format. For example, 1:00 pm is 13:00. `D7` is the main error code `50` is the error sub-code.

Finding error code information on the RMI

You can find error codes on the RMI **Figure 71: Support > Library Logs page**. The available logs are: Error Trace, Informational Trace, Warning Trace, Configuration Change Trace, and Standard Trace.

The log entries are displayed in order of most recent to oldest. The format for the log entries is: YY.MM.DD HH.MM.SS.ss LIB/ERR<80 89 62 40

- YY.MM.DD — the date displayed as Year.Month.Day

- HH.MM.SS.ss — the time displayed as Hour.Minute.Second.Hundredthsofa second

- First code — hard or soft error. The code after LIB/ERR (80 in the example) will be 80 or 40. 80 indicates a hard error, 40 indicates a soft error.

- Second code — the main error code (89 in this example). See **Error codes** for a list of error codes and recovery procedures.

- Third code — the sub-code (62 in this example). See **Error sub-code descriptions** for a list of sub-codes.

- Fourth code — sub-code-specific information for factory use only

Figure 71: Support > Library Logs page

Generating a report or support ticket from L&TT

Procedure

1. In the L&TT **By Product** or **By Connection** tab, select the device from the device list.

2. Click the **Health** button on the main toolbar to generate and display a standard report, or click the **Support** button on the main toolbar to display the **Support** screen for additional report or support ticket options.

Downloading a support ticket from the library

> **TIP:** Each support ticket downloaded from the RMI will only contain information for the library itself or one drive. To capture all support information, download a ticket from the library and from each drive. To generate a consolidated support ticket with all support data in a single compressed file, download the support ticket with L&TT.

Procedure

- From the RMI **Support > Support ticket**screen, click **Download**.

- Insert a USB flash drive into the USB port on the rear panel and then from the OCP, select **Download support ticket to USB**.

Viewing a downloaded support ticket

Procedure

1. From the L&TT **File** menu, select **Load Support Ticket**.

2. Select the support ticket file in the browser.

Finding error code information on an L&TT support ticket or report

An L&TT support ticket or report contains detailed information about the device configuration, along with errors and warnings. The support ticket and report contain the same information. The report is easier to read, but must be generated and read on the host computer. The support ticket can be downloaded from the device and then viewed on any computer with L&TT installed.

The top of the support ticket contains basic configuration information about the library.
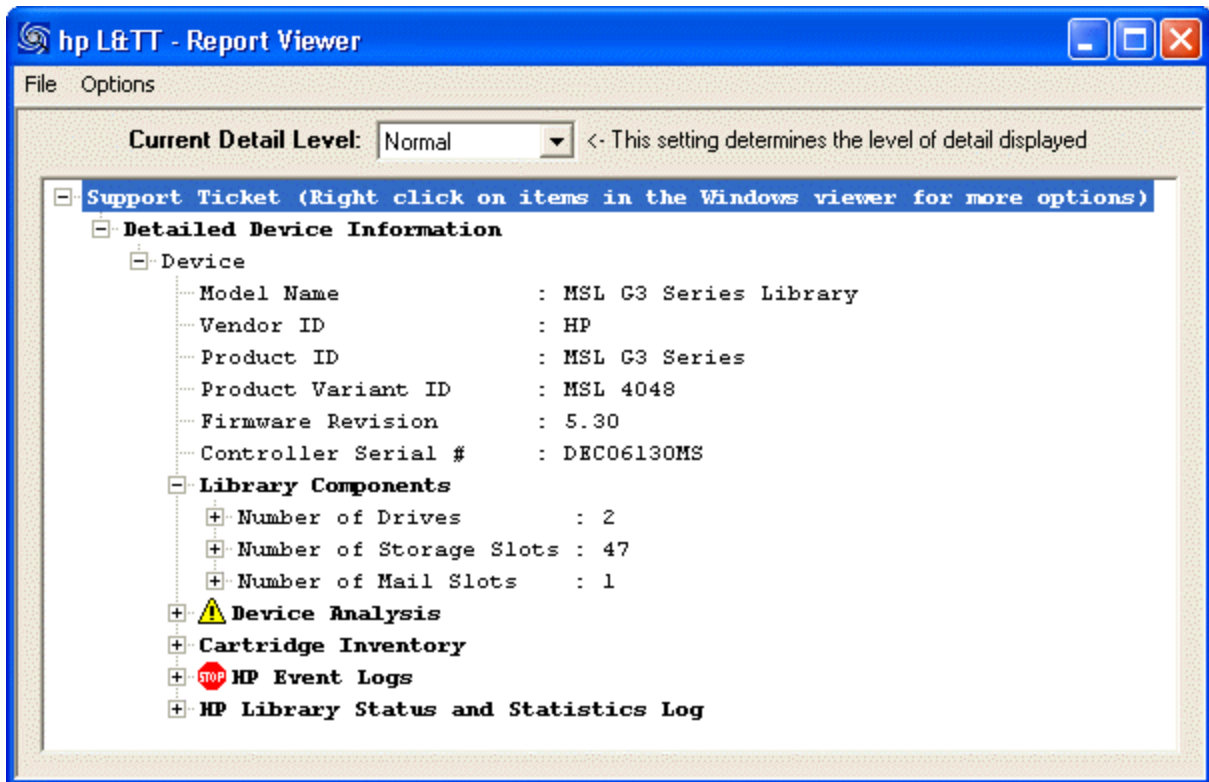
Figure 72: Support ticket in viewer

Expand **HP Event Logs** to see events divided into three categories:

- Events in the last 24 hours

- Events in the last 31 days

- Events older than 31 days

Set the **Current Detail Level** to see additional types of events:

- **Normal** will only show critical events or hard errors.

- **More details** will also show warning and configuration events.

- **Everything** shows all events.

Critical events are designated with a STOP sign icon. Expand the event for more information.

```
14:17:02 - 2006/10/04 Crit:0x006E HE: robotic controller error
   Global error code: 131 (0x83) Robotic controller generic problem
   Module error code: 2 (0x02) Robotic:Connection to slave robotic failed
   Current command: 0 (0x00)
```

Figure 73: Critical event details

- The time stamp is in the format hours : minutes : seconds. The hours are in 24–hour clock format. For example, in this case `14` is 2 p.m.

- The date is in the format year/month/day.

- The event ID is the number on the header line, `0x006E` in this example. It uniquely maps to an error code.

- `HE` designates a hard error. The STOP sign icon and the word `Crit` before the event ID also indicate a hard error.

- The text description in the header ("robotic controller error" in this example) is the simple text description of the main error code.

- The main error code (`0x83`) is displayed in parentheses as the **Global error code**. The text after the main error code (`Robotic controller generic problem` in this example) is the text description for the error code.

- The error sub-code (`0x02`) is displayed in parentheses as the **Module error code**. The error sub-codes are described in **Error sub-code descriptions**. The text after the error sub-code (`Robotic: connection to slave robotic failed` in this example) is name of the component followed by the text description of the error sub-code.

- The **Current command** provides information for factory use only.

Main error code descriptions

Error code	Description	Details and solution
80	Cannot initialize bar code reader	Power-cycle the unit and retry the operation.
81	No response from bar code reader	- Power-cycle the unit and retry the operation. - Update the firmware to the latest version.

Table Continued

Error code	Description	Details and solution
82	No response from EEPROM on robotic controller	Power-cycle the unit and retry the operation.
83	Robotic controller generic problem	• Power-cycle the unit and retry the operation. • If the library robotics OR library controller were just replaced, update the firmware to the latest version. • If this error occurs right after a firmware update, update the firmware again — the robotics firmware might not have been properly updated the first time. ⚠ **CAUTION:** Never replace the library robotics and library controller at the same time. Critical library identification data will be lost.
84	Setting of gripper[1] motor parameters failed	• Power-cycle the unit and retry the operation. • If the robotics have been replaced, update the firmware. (MSL8048 and MSL8096 only). • Update the firmware to the latest version.
85	Setting of slider[2] motor parameters failed	
86	Setting of elevator[3] motor parameters failed	
87	Setting of rotation[4] motor parameters failed	
88	Setting of sled[5] motor parameters failed	
89	Gripper[1] obstructed	• Ensure that nothing is obstructing the gripper. • If the device was moved, verify that each of the tape cartridges is properly seated in a magazine. • Run the wellness test.

Table Continued

Error code	Description	Details and solution
8A	Slider[2] obstructed	• If this error occurs with subcode 45 and new media, remove the magazine and manually load and unload the new media five times for each new cartridge to condition the new cartridges.
		• Update the firmware to the latest version. Many firmware enhancements have been made to reduce the occurrence of this error.
		• If this error occurs with sub-code 43, it could be the result of a misaligned magazine in combination with failed sensor cable. Ensure that the magazine is fully and correctly inserted, and then check whether the device can detect when the magazine is removed.
		• Remove all magazines and ensure that nothing is obstructing the robot. With the magazines removed, you can see inside the device with a flashlight. For increased visibility, also remove the tape drives.
		• MSL2024 only: If this error occurs after a firmware update and with subcode 0E on a unit that previously had a firmware revision earlier than 2.00, this error was caused by the firmware using a sensor that was unused in the earlier versions of firmware. There could be a problem with the sensor. Power cycle the unit and if the problem persists, contact Hewlett Packard Enterprise service.
		• If this error occurs on a tape load or unload, power off the tape drive. Remove the drive and inspect the front of the drive for any obstructions, such as an improperly placed label.
		• Run the wellness test.

Table Continued

Error code	Description	Details and solution
8B	Elevator[3] obstructed	- MSL8048 and MSL8096 only: If the robotic assembly was just replaced, update the firmware to the latest version. - Update the firmware to the latest version. There have been a few firmware enhancements to reduce the occurrence of this error. - Remove all magazines and ensure that nothing, such as a loose tape in the device, is obstructing the raising and lowering movement of the robot. - Run the wellness test.
8C	Rotation[4] obstructed	- If the device was moved or shipped with tape cartridges in the magazines, verify that none of the cartridges is loose, obstructing access to the tape drive. - Remove all magazines and check for any kind of obstruction. - Run the wellness test.

Table Continued

Error code	Description	Details and solution
8D	Sled[5] obstructed	• MSL8048 and MSL8096: If the robotic has been replaced, update the library firmware to the latest version.
		• MSL2024 and MSL4048:
		If this error occurs on the first power-on after unpacking or moving the device, or after replacing the chassis, ensure that the shipping lock was removed from the top and stored on the back panel (see **Removing the shipping lock**) .
		• If the device was moved or shipped with tape cartridges in the magazines, verify that the cartridges did not come out of the magazines to obstruct the robotic.
		• Ensure that nothing is stacked on top of the device because any weight on top of the device can bow down the top cover and interfere with the robotics.
		• Ensure that the device is either mounted in a rack with its rack kit or in a tabletop conversion cover. The device must be supported only under both of its side edges or the bottom can bow and impede robotic movement.
		• Remove all magazines and look for any obstructions to the robot.
		• Run the wellness test.
8E	Ends of gripper[1] movement not in expected range	• Remove all magazines and look for any obstructions to the robot.
		• Run the wellness test.

Table Continued

Error code	Description	Details and solution

8F	Ends of slider[2] movement not in expected range	• Early firmware versions were not able to use as much force to get or place media in a magazine. Upgrading the library firmware might resolve this issue.
		
		• If the error consistently happens on the same slot, try different tape cartridges in that slot.
		   ◦ If the failure remains with the same slot, the magazine might be at fault.
		   ◦ If the failure follows the tape cartridge, the tape cartridge might be at fault.
		
		• If the device is performing an operation that automatically returns a tape cartridge to a certain slot, make sure that another tape is not loaded in that slot.
		
		• Run the wellness test

90	Ends of elevator[3] movement not in expected range	• Remove all magazines and look for any obstructions to the robot. • Run the wellness test.
91	Ends of rotation[4] movement not in expected range	• Remove all magazines and look for any obstructions to the robot. • Run the wellness test.
92	Ends of sled[5] movement not in expected range	• Remove all magazines and look for any obstructions to the robot. • Run the wellness test.
93	Gripper[1] reached a position beyond expected range	• Remove all magazines and look for any obstructions to the robot. • Run the wellness test.
94	Slider[2] reached a position beyond expected range	
95	Elevator[3] reached a position beyond expected range	
96	Rotation[4] reached a position beyond expected range	
97	Sled[5] reached a position beyond expected range	
98	Cartridge present sensor not found	Power cycle the device and retry the operation.
99	Slider[2] home sensor not found	
9A	Rotation[4] home sensor not found	

Table Continued

Error code	Description	Details and solution
9B	Sled[5] position sensor not found	• Power cycle the device and retry the operation. • Remove the magazines and verify that all the clear plastic inserts in the magazine storage slots, except the mailslots, are present and firmly seated. • Run the wellness test.
9C	Gripper[1] range of motion out of specification	• Remove all magazines and look for any obstructions to the robot. • Update the firmware to the latest version. • Run the wellness test.
9D	Slider[2] range of motion out of specification	• Remove all magazines and look for any obstructions to the robot. • Run the wellness test.
9E	Elevator[3] range of motion out of specification	
9F	Rotation[4] range of motion out of specification	• Remove all magazines and look for any obstructions to the robot. • Run the wellness test.
A0	Sled[5] range of motion out of specification	• Remove all magazines and look for any obstructions to the robot. • Run the wellness test.
A1	Open Mailslot failed	• Retry the operation. • Ensure that nothing is obstructing the opening of the mailslot. • Remove the magazine and check for issues such as a tape label preventing the mailslot from opening.
A2	Error during elevator locking.	• Remove magazines and look for any obstructions to the robot. • Run the wellness test.
A3	Sled motor #2 blocked. (MSL8048 and MSL8096 only)	• Remove magazines and look for any obstructions to the robot. • If this error occurs after a robot or library controller replacement it might be due to a firmware revision mismatch between the robotic and library controller. Update the
A4	Cannot find sled #2 block within the expected range. (MSL8048 and MSL8096 only)	
A5	Sled home sensor #2 not found (MSL8048 and MSL8096 only)	

Table Continued

Error code	Description	Details and solution
A6	Elevator sensor not found (MSL8048 and MSL8096 only)	library firmware to the latest version to resolve the mismatch. • Run the wellness test.
B0	Command from the library controller to robotics controller did not complete in time allotted	Reset the device and retry the operation.
B1	Robot controller reported format error on command from library controller	Reset the device and retry the operation.
B2	Communication to robot from library controller failed	• Update the firmware to the latest version. • Power cycle the device and retry the operation.
B3	Robot stopped due to a released magazine	• Check that all magazines are completely inserted and retry the operation. • If this error was caused by a manual magazine removal, replace the magazine and try the operation again. • In earlier firmware versions, the device could appear unresponsive if a magazine was left out of the device too long. Power cycle the device to restore operation. Update to the latest firmware version to prevent this issue in the future.
B4	"Tape in gripper[1]" sensor did not report the expected value	• Update the firmware to the latest version. • Remove the magazines and inspect them for a stuck tape. If no tapes are stuck in the magazines, shine a light in one of the open magazine bays to see if there is a tape in the robot or drive. If there is a tape in the robot, replace the magazines and power-cycle the device. If there is a tape in a drive, replace the magazines and run the Force Tape Eject operation. • Run the wellness test
B5	Robotic controller not responding to command from library controller	• Update the firmware to the latest version. • MSL8048 and MSL8096: If this error occurs with sub-code 02, verify that the robotics cable is installed correctly. • Power cycle the device and retry the operation.

Table Continued

Error code	Description	Details and solution
B8	Library Extender missing.	See Sub-codes for error B8 for details. • If this is a new installation, verify that the Extender is installed properly and that both libraries are powered on. • Update the firmware to the latest version. • Power cycle both libraries.
B9	Communication error on the I²C bus between the master library and the Extender.	See Sub-codes for error B9 for details. • If this is a new installation, verify that the Extender is installed properly and that both libraries are powered on. • Update the firmware to the latest version. • Power cycle both libraries.
BA	Communication error on the serial connection between the master and lower libraries.	The master library cannot communicate with the lower library. • If this is a new installation, verify that the Extender is installed properly and that both libraries are powered on. • Update the firmware to the latest version. • Power cycle both libraries.
BB	Stack link not established due to communication issues between the master and lower libraries.	The master library has some communication with the lower library, but not enough to function. • If this is a new installation, verify that the Extender is installed properly and that both libraries are powered on. • Update the firmware to the latest version. • Power cycle both libraries.
BC	Power of lower library not detected in time.	The lower library did not respond to the master library within the specified time. • Verify that the lower library is powered on. • Verify that extended mode is enabled in the lower library. • Power cycle both libraries. • If the lower library is MSL4048, verify that its power supply status is **Good** ✅ • Verify that the master and lower libraries have the most recent firmware versions.

Table Continued

Error code	Description	Details and solution
BD	Library Extender has reported an error condition.	See Sub-codes for error BD for details. • Power cycle both libraries. • Run the Library Extender cycle test. • Retry the operation.
BE	Extender or library stack incompatibility.	The Extender is incompatible with the libraries, or the firmware versions on the libraries and Extender are incompatible with each other. See Sub-codes for error BE for details. • Download the current library extender firmware bundle to update the libraries to compatible firmware versions. • Retry the operation.
C0	Network initialization failed	• Check the network cable. • Check that the network configuration is correct. • If DHCP is enabled, ensure that a DHCP server is up and running on the same network as the device. • Power cycle the device and try again.
C1	Telnet interface initialization failed	• Check the network cable. • Check that the network configuration is correct. • Power cycle the device and try again.
C2	Web server initialization failed	
C3	EEPROM parameter failure	Power cycle the device and try again.
C4	LAN card initialization failed.	
C5	EEPROM write data to failure.	
C6	Ping command did not reach target	• Check the network cable. • Check that the network configuration is correct. • Power cycle the device and try again.
C7	Cannot upgrade firmware from USB	• Ensure that the correct file was selected. • Retry firmware upgrade. • If not successful, attempt a different firmware upgrade method.
C8	Cannot upgrade firmware from FTP	

Table Continued

Error code	Description	Details and solution
C9	Cannot upgrade robotic firmware from Flash.	• Retry firmware upgrade. • If not successful, attempt a different firmware upgrade method. • If still not successful, contact customer support.
D0	ROM checksum incorrect	• Retry library firmware upgrade. • Ensure that the firmware is correct for the device. • If the device continues to fail, contact customer support.
D1	RAM error during Power-On-Self-Test	Power-cycle the unit.
D2	Read or Write to NVRAM on library controller failed	Power-cycle the unit.
D3	Time controller failed during Power-On-Self-Test	Power-cycle the unit.
D4	Internal UART serial communication error	
D5	Communication to display failed	Power-cycle the unit.
D6	Library controller memory error	
D7	Firmware upgrade error	This error can occur is an attempt is made to upgrade a drive with the wrong personality or version for that drive. • Ensure that the correct drive firmware is being used to update the drive. • If the correct drive firmware is being used, update the library firmware. • Power cycle the device and attempt the operation again.
D8	Library controller data base error	Power-cycle the unit.
D9	No SCSI IC detected	
DA	When running the wellness test, the bar code did not match the previous value for that tape	• Check the bar code label for proper application and damage. • Run the wellness test again.

Table Continued

Error code	Description	Details and solution
DC	I2C Bus failure.	• Power-cycle the device. • On the MSL4048, MSL8048 and MSL8096, power off the library and reseat the library controller from the back panel.
E0	Incompatible magazine detected. The mailslot was enabled with a different mailslot magazine type than is currently in the library. For example, the mailslot was enabled with a three-slot mailslot magazine and then the lower-left magazine was replaced with a one-slot mailslot magazine.	• Either replace the lower left magazine with the original magazine, or disable and re-enable the mailslot to reconfigure the library with the new mailslot configuration. Note: You will need to reconfigure your backup software. • If the issue continues, inspect the magazine for damage and missing light pipes or magazine prism pieces (clear plastic pieces in each slot).
E1	Key server token backup not successful (not enough available space on target token)	Retry the backup with a token with space for more keys. **NOTE:** Each token can hold 100 keys. Keys cannot be overwritten or deleted; only unique keys will be written to the token.
E2	Unsupported hardware detected. Some hardware that is connected to the library requires updated library firmware.	Update the library firmware to the current version.
E3	Error during key server token backup; backup process unsuccessful.	• Retry the backup with a different token. • If the error occurs again, contact customer support.

E4	Drive firmware does not support encryption.	• Ensure that all tape drives that support encryption (LTO-4 and later generations) are at the minimum firmware required for the Encryption Kit:
		  ◦ Ultrium 1760 SCSI: W22W
		  ◦ Ultrium 1760 SAS: U26W
		  ◦ Ultrium 1840 SCSI: B45W
		  ◦ Ultrium 1840 SAS: H44W
		
		• If necessary, update the tape drive firmware to the current version.

Table Continued

Error code	Description	Details and solution
E5	Drive generation does not support encryption.	When encryption is enabled with the Encryption Kit, ensure that all tape drives in the logical library support encryption (LTO-4 and later generations). When possible, avoid including LTO-2 and LTO-3 tape drives in a logical library when encryption is enabled.
E6	Key Server Token restore process did not complete, Key Server Token restore failed.	• Retry the operation on the same key server token. • Retry the operation on a new key server token.
E7	Incorrect Key Server Token Type. Token not supported within this device.	• Verify that the USB device is an HPE key server token from the 1/8 G2 & MSL Encryption Kit. • Retry the operation on a new key server token.
E8	Encryption Kit not available due to incompatible library controller.	The first MSL2024 libraries do not support the Encryption Kit. Contact your Hewlett Packard Enterprise service representative to upgrade your MSL2024 chassis to a newer version.
EF	Data path failover occurred	Restore the path that failed so the library will be prepared for another data path failover. • Check all FC cables between the host and the library for damage or disconnections. • Check all FC switches between the host and the library for failures or configuration issues.
F0	Drive exceeded temperature specification	• Check ambient temperature to ensure that it is within operating specifications. • Check all fans to determine whether they are working properly.
F1	Library controller lost communication with the drive	• Power-cycle the device and retry the operation. • Update library and drive firmware to the latest versions.
F2	Drive sled[5] not present	• Reseat the tape drive to ensure a good connection to the device. • If possible, try the drive in another drive bay.
F3	Drive hardware error	Cycle power, after several occurrences, contact technical support.

Table Continued

Error code	Description	Details and solution
F4	Load time-out. The drive has run into a time-out while loading a tape.	• Check that the tape cartridge is supported and has not exceeded its usage life. Inspect it for damage. • Retry the operation. • Clean the drive. The error sub-code 00 indicates drive 1, sub-code 01 indicates drive 2, and so on. • If the issue continues, remove the drive and inspect the opening for any obstructions. • Attempt the Force Tape Eject process. Once the tape cartridge is ejected, unlock the magazine holding the cartridge and inspect the cartridge for damage. Discard the tape cartridge if it is damaged.
F5	Time allotted for drive unloading exceeded	• Retry the operation. • Attempt the Force Tape Eject process. Once the tape cartridge is ejected, unlock the magazine holding the cartridge and inspect the cartridge for damage. Discard the tape cartridge if it is damaged.
F6	No drive installed. A tape drive has never been installed.	• Install at least one tape drive. • If a tape drive is installed, reseat it by removing it and replacing it.
F7	Support ticket download from drive not possible.	• Upgrade the tape drive firmware to the current version and try to download the support ticket again. • Use the OCP or RMI to power cycle the tape drive and then retry the operation. • Attempt to use L&TT to get the tape drive support ticket.
F8	Invalid drive command	• Update the tape drive firmware to the current version.
F9	Invalid drive parameter	• Try the operation again.
FA	SDCI microcode error	• If the error occurs again, contact customer support.

Table Continued

Error code	Description	Details and solution
FB	Drive logged out	• Update the tape drive firmware to the current version.
FC	Internal SCSI command failed with check condition	• Try the operation again.
FD	Internal SCSI command timeout	• If the error occurs again, contact customer support.

[1]Gripper: The part of the robotics assembly that pinches media to grip it.

[2]Slider: The part of the robotics assembly that plunges in and out for **get** and **put** operations.

[3]Elevator: The part of the robotics assembly that moves in the vertical direction.

[4]Rotation: The part of the robotics assembly that turns the robot to face each magazine and the drive.

[5]Sled: The part of the robotics assembly that moves the robot towards the OCP or back towards the drive.

Error sub-code descriptions

Robotic error sub-codes

Sub-code	Description
01	Mechanical initialization failure
02	Connection to slave robotic failed
03	Error motor initialization
04	Error during gripper[1] close
05	Error slider[2] home positioning
06	Error elevator[3] home movement
07	Error during sled[5] movement to rotation[4] position
08	Error during rotation[4] initialization, get range failed
09	Error elevator[3] init
0A	Error during rotation[4] to far position
0B	Error first sled[5] init, move to sensor failed
0C	Error during sled[5] movement to rotation[4] position

Table Continued

Sub-code	Description
0D	Error during rotation[4] to slide position
0E	Error slider[2] init, get range failed
0F	Error during slider[2] forward movement
10	Error gripper[1] init, get range failed
11	Error during slider[2] home movement
12	Error during rotation[4] to FAR position
13	Error sled[5] init, move to sensor failed
14	Error during sled move — check shipping lock
20	Error inventory scan
21	Error during gripper[1] close
22	Error slider[2] home movement
23	Error during move gripper[1] to scan pos
24	Error reading bar code label
28	Error Extra inventory scan
29	Error during closing gripper[1]
2A	Error slider[2] preposition movement
2B	Error during opening gripper[1]
2C	Error during sled[5] movement up to sensor
2D	Error slider[2] preposition backwards movement
30	Error slot preposition
31	Error during sled[5] movement in FLMoveRotation
32	Command sending to robotic failed

Table Continued

Sub-code	Description
33	Error during elevator[3] movement in FLMoveRotation function
34	Error during rotation[4] in FLMoveRotation function
35	Error during elevator[3] movement in FLMoveRotation function
36	Error during sled[5] movement in FLMoveSled function
37	Error during sled[5] positioning to sensor in FLMoveSled function
38	Error during sled[5] positioning to mailslot in FLMoveSled function
39	Error during sled[5] positioning without sensor
3A	Error during elevator movement without sensor
3B	Error slot position sensor not found
40	Movement to/from slot failed
41	Error during first slider[2] movement
42	Error during first gripper[1] movement
43	Error during second slider[2] movement
44	Error during second gripper[1] movement, get range failed
45	Error during third slider[2] movement, move home failed
46	Error during set hold current to avoid torsion
47	Negative direction blocked — the robot cannot move backward.
48	Positive direction blocked — the robot cannot move forward.
49	Robot is blocked in both directions.
4A	Cartridge present sensor failure.
4B	Destination blocked or full.
4C	Source location empty.

Table Continued

Sub-code	Description
4D	Could not pull tape out of slot.
4E	Unexpected tape on elevator, possible inventory lost.
50	Preposition to drive failed
51	Elevator[3] movement to home sensor failed
52	Sled[5] movement to home sensor failed
53	Error during sled[5] movement to drive position
54	Error during rotation[4] to drive position
55	Error during elevator[3] movement in drive position
56	Error during sled[5] movement to rotation position.
57	Error during rotation to end position.
60	Move from/to drive failed
61	Error during first slider[2] movement
62	Error during first gripper[1] movement
63	Error during second slider[2] movement
64	Error during second gripper[1] movement, get range failed
65	Error during third slider[2] movement, move home failed
70	Release magazine failed
71	Error during sled[5] movement to rotation[4] position
72	Error during rotation[4] to unlock position
73	Error during move sled[5] to block
80	Opening mailslot failed
81	Error during movement to mailslot open position

Table Continued

Sub-code	Description
82	Error during moving back, sensor was found
90	Movement to home position failed
91	Elevator[3] movement to home position failed
92	Error during sled[5] movement to rotation[4] position
93	Error during rotation[4] to home or far position
94	Sled[5] movement to home sensor position failed
95	Sled[5] movement to transport position failed
99	Error during rotation movement to rotation minimum position
A0	Movement to mailslot failed
A1	Sled[5] movement to sensor failed
A2	Sled[5] movement to rotation[4] position failed
A3	Elevator[3] movement to home position failed
A4	Error during rotation[4] to far position
A5	Sled[5] movement to mailslot position failed
A6	Error during elevator movement to position
A7	Error during mailslot detection
B0	EEPROM on robotics controller not accessible or error during read/write operation
B1	Save/restore configuration settings: not enough internal memory available for creating the file and restoring the file respectively
B2	Save/restore configuration settings: restore buffer corrupted, checksum calculation failed
B3	Save/restore configuration settings: database field corrupted
B4	Save/restore configuration settings: invalid personality
B5	Save/restore configuration settings: invalid file

Table Continued

Sub-code	Description
C0	Check on magazine type failed
C1	Rotation[4] movement during check on magazine type failed
C2	Elevator[3] movement during check on magazine type failed
C3	Sled[5] movement during check on magazine type failed
C4	Sled[5] movement to sensor during check on magazine type failed
D0	12-mailslot magazine release failed
D1	Elevator[3] movement to home position during 12-mailslot magazine release failed
D2	Sled[5] movement to rotation position during 12-mailslot magazine release failed
D3	Rotation[4] movement to far position during 12-mailslot magazine release failed
D4	Sled[5] movement to home position during 12-mailslot magazine release failed
D5	Sled[5] movement during 12-mailslot magazine release failed
D6	Rotation[4] movement during 12-mailslot magazine release failed
D7	Elevator[3] movement during 12-mailslot magazine release failed
D8	Slider[2] pre-position during 12-mailslot magazine release failed
D9	Open gripper[1] movement during 12-mailslot magazine release failed.

[1]Gripper: The part of the robotics assembly that pinches media to grip it.

[2]Slider: The part of the robotics assembly that plunges in and out for **get** and **put** operations.

[3]Elevator: The part of the robotics assembly that moves in the vertical direction.

[4]Rotation: The part of the robotics assembly that turns the robot to face each magazine and the drive.

[5]Sled: The part of the robotics assembly that moves the robot towards the OCP or back towards the drive.

Device error sub-codes

Error code	Description
90	Robotic load not reached Cartridge Present sensor
91	No activity after Load command

Table Continued

Error code	Description
92	Time-out while loading tape
93	No activity after load command
94	Time-out drive Unload
95	Drive terminated unsuccessfully
96	Tape not ejected at robot unload
97	Slot not free at robot unload
98	Cartridge not seated in load phase 1

Sub-codes for error B8

Sub-code	Message
40	Library Extender expected
41	Lower library expected
42	Master library expected

Sub-codes for error B9

Sub-code	Message
31	No device present
32	I²C write error
33	I²C read error

Sub-codes for error BD

Sub-code	Message	Cause	Solution
01	Sensor master home not found.	The Extender robotic cannot locate its home position within the master library.	• Power cycle the master library. • Run the Library Extender cycle test. • Retry the operation.
02	Sensor lower home not found.	The Extender robotic cannot locate its home position within the lower library.	• Power cycle the lower library. • Run the Library Extender cycle test. • Retry the operation.
03	Motor blocked in master home position.	The Extender robotic is stuck in its home position within the master library.	• Power cycle the master library and run the Library Extender cycle test. • Retry the operation. If the motor is still blocked, remove the Extender from the libraries, and then inspect the Extender and master library for a physical blockage. Reinstall the Extender.
04	Motor blocked in lower home position.	The Extender robotic is stuck in its home position within the lower library.	• Power cycle both libraries and run the Library Extender cycle test. • Retry the operation. If the motor is still blocked, remove the Extender from the libraries, and then inspect the Extender and libraries for a physical blockage. Reinstall the Extender. • Retry the operation.
05	Motor blocked between master and lower home position.	The Extender robotic is stuck between its two home positions.	
06	Motor blocked and hot.	The Extender robotic is stuck and the motor is hot.	
10	Motor error.	The library controller could not start the motor in the Extender robot.	• Power cycle both libraries. • If this is a new installation or the libraries have been moved, verify that the Extender is installed properly and that both libraries are powered on.

Table Continued

Sub-code	Message	Cause	Solution
11	Motor block in extender path.	Debris is keeping the Extender robotic from moving.	• Power cycle both libraries and run the Library Extender cycle test. • Retry the operation. If the motor is still blocked, remove the Extender from the libraries, and then inspect the Extender and master library for a physical blockage. Reinstall the Extender.
12	Motor position not valid.	The Extender robotic does not know where it is positioned.	• Power cycle both libraries and run the Library Extender cycle test. • Retry the operation.
13	Extender has not been initialized yet.	The library controller issued a move command to the Extender, but the Extender was not initialized.	• Power cycle both libraries and run the Library Extender cycle test. • If this is a new installation or the libraries have been moved, verify that the Extender is installed properly and that both libraries are powered on.
14	Motor is hot.	The motor that moves the Extender robotic has exceeded its thermal limit.	Verify that airflow to the Extender has not been blocked.
21	Timeout while waiting for extender becoming ready.	The Extender did not respond to the master library within the specified time.	Verify that the Extender is installed properly and that both libraries are powered on.

Sub-codes for error BE

Sub-code	Message	Cause	Solution
51	Extender personality not matching.	The Extender is not an HPE MSL Library Extender.The Extender is not the same brand as the libraries.	Verify that the Extender is an HPE MSL Library Extender.
52	Lower library personality not matching.	The lower library is not an MSL2024 or MSL4048 tape library.The lower library is not the same brand as the master library.	Verify that the lower library is an MSL2024 or MSL4048 tape library.

Table Continued

Sub-code	Message	Cause	Solution
53	Extender firmware not matching.	The firmware version of the Extender is not compatible with the firmware version of the master library.	Update the extended library firmware with the current firmware bundle, which will update both libraries and the Extender with compatible firmware versions.
54	Lower library firmware level not matching.	The firmware versions of the master library and lower library are not compatible with each other.	Disable extended mode, update both libraries to the most recent released versions, and then re-enable extended mode.
55	Incompatible height form factor for master library.	The master library is not an MSL4048 or MSL8096.	Verify that the master (top) library is an MSL4048 or MSL8096.
56	Incompatible height form factor for lower library.	The lower library is not an MSL2024 or MSL4048.	Verify that the lower library is an MSL2024 or MSL4048.
57	Extender firmware corrupted	The firmware upgrade failed, possibly because of a power failure during the upgrade operation.	Power cycle the master library. (The master library will attempt to download the Extender firmware to the Extender when the master library is powered on.)

Sub-codes related to robotics errors during movement to extender position

Sub-code	Message
F0	Invalid stack configuration (1U cannot be the master or lower library)
F1	Error during elevator home movement
F2	Error during sled movement to home sensor
F3	Error during sled movement to extender position
F4	Error during rotation movement to extender position
F5	Error during elevator movement to extender position
F6	Error during sled movement to rotate position
F7	Error during rotation movement
F8	Error cartridge present sensor during cartridge transfer from robotics to extender carrier (and reverse)

Table Continued

Sub-code	Message
F9	Cartridge present sensor deviates from expected parameter
FA	Error during first slider movement (movement with opened gripper) from/to extender position
FB	Error during first gripper movement (open gripper) from/to extender position
FC	Error during second gripper movement (close gripper) from/to extender position
FD	Error during third slider movement (move to block) from/to extender position
FE	Error during third gripper movement (close gripper) from extender position
FF	Error during fourth slider movement (pull back) from/to extender position

Drive error codes

Error code	Description
01	Drive broken
02	Temperature exceeds limit
03	Tape error
04	Cleaning cartridge is expired
05	Drive needs cleaning
06	Library lost communication with the drive
07	Warning that the tape is nearing its end of life

Warning events

Event code	Description	Details and solution
30	SCSI: transport element full	The application software made an illegal request.
31	SCSI: all slots empty	
32	SCSI: invalid opcode	
33	SCSI: invalid element address	
34	SCSI: invalid field in CDB	
35	SCSI: invalid drive specified	
36	SCSI: SEND DIAGNOSTIC command: invalid test number	
37	SCSI: invalid LUN	

Table Continued

Event code	Description	Details and solution
38	SCSI: parameter list length error	
39	SCSI: parameter list error: invalid field	
3A	SCSI: parameter list error: parameter not supported	
3B	SCSI: parameter value invalid	The application software made an illegal request.
3C	SCSI: saving parameters not supported	
3D	SCSI: invalid ID message	
3E	SCSI: destination element full	
3F	SCSI: source slot or drive empty	
40	SCSI: wrong checksum	
41	SCSI: command sequence error	
42	SCSI: drive disabled	The application software requested to use a drive that is disabled. Check the device configuration.
43	SCSI: mailslot disabled	The application software requested to use the mailslot, but the mailslot is disabled. Check the device configuration.
44	SCSI: flash image does not fit bootcode	Check the version of firmware used for the upgrade. The firmware is incompatible with this device.
45	SCSI: media removal prevented by drive	The application software has locked media removal and either the software or device user interface attempted to remove the media.
46	SCSI: media removal prevented by library	**NOTE:** This IS NOT a hardware issue. If the issue cannot be resolved with the application software, power off the device, disconnect the data cable, and then power on the device.
47	SCSI: flash image does not fit personality	Check the firmware file used for the upgrade. The firmware is incompatible with this device.
48	SCSI: tape drive not supported by this library	The tape drive is not supported by the firmware in this device. Upgrade the device firmware to the most up-to-date version. Verify that the drive has an HPE MSL-G3 or 1/8 G2 firmware revision. If firmware is not the correct type, the wrong tape drive has been installed. Use only Hewlett Packard Enterprise-approved support to insure that the correct tape drives are used.
49	SCSI: incompatible magazine, magazine not accessible	Verify that a supported magazine for that slot is inserted. If the magazine is in the lower left position, verify that the type of magazine is consistent with the mailslot configuration.

Table Continued

Event code	Description	Details and solution
4A	Source not ready	• Retry the operation. • Check the status of extended libraries.
4B	Destination not ready	• Retry the operation. • Check the status of extended libraries.
4C	Reservation failed	The application software made an illegal request.
4D	Library controller busy	Retry the operation.
4E	Invalid robotic request	
4F	Robotic not initialized	
50	Cartridge location in a different partition; move across partition boundaries was initiated.	The library will not move a cartridge from one logical library to another logical library. To move a cartridge from one logical library to another: 1. Move the cartridge to the mailslot. 2. Remove the cartridge from the mailslot. 3. Close the mailslot. 4. Replace the cartridge in the mailslot. 5. Move the cartridge to a slot in the new logical library.
51	Incompatible medium	• Verify that the drives are installed correctly. • Verify that the cartridge and tape drive generation are compatible. See **Read and write compatibility**. • Verify that the tape is correct for the operation initiated.
52	All slots full; no movement possible	To make a slot available for the move operation, remove a cartridge from the device.
53	Wellness test: invalid test setup	Load tapes in the four top-level corner slots. See**The wellness test**.
55	Invalid license key	• Verify that the correct license key was entered. • Verify that the **Caps Lock** key is not stuck down. The key is case sensitive.
56	No decryption key available on token	Ensure that the key server token containing the key used to encrypt the tape is installed in the USB port.

Table Continued

Event code	Description	Details and solution
57	Key server token PIN required	Use the RMI to enter the PIN for the key server token that is installed in the USB port. **NOTE:** The PIN is required every time a token is installed in the USB port and every time the library is powered on.
58	Parity error	• Retry the operation.
59	Error log overflow	• If the problem continues, contact customer support.
5A	Unable to downgrade firmware while encryption enabled.	Disable encryption before downgrading firmware.
5B	Invalid cartridge. LTO3 media is not supported with encryption enabled.	• Verify that the tape cartridge is supported. • To use LTO-3 media, update the tape drive firmware to the latest version.
5C	IPv6 will not be supported after downgrading firmware.	Change the network settings to IPv4 before downgrading firmware.
5D	Wrong drive firmware — invalid drive firmware type.	Drive firmware is specific to the drive model and interface. Select the drive firmware specific to this drive. If the firmware file could have been renamed, obtain a new copy of the firmware file.
5E	Illegal drive position of FH drive.	In the MSL4048, a full-height tape drive cannot be installed in the middle two drive bays; it must be installed in either the upper two drive bays or lower two drive bays. Reinstall the tape drive in a supported drive bay.
5F	No firmware downgrade possible.	The device firmware cannot be downgraded in cases that would compromise encrypted data, critical component support, or license terms. Check the configuration settings. If the device has been using the Encryption Kit, you might need to disable encryption before downgrading firmware. If the library extender is installed, you might need to uninstall the library extender before downgrading firmware.
60	Cleaning tape installed.	Complete the cleaning process and retry the operation.
61	Cleaning failure. Cleaning process could not be performed.	• Check cleaning tape and exchange if necessary. • Retry the operation.
62	Cleaning tape expired.	Exchange the cleaning tape.

Table Continued

Event code	Description	Details and solution
63	Invalid cartridge. Drive has rejected the cartridge as invalid.	• Verify that the cartridge generation and technology are supported by the device. See **Tape cartridges**.
64	Invalid cleaning cartridge. Drive has rejected the cartridge as invalid.	• Retry the operation. • If problems persist, exchange the data cartridge.
65	Invalid upgrade cartridge. Drive has rejected the cartridge as invalid.	• Retry the operation. • If problems persist, exchange the data cartridge.
66	Diagnostic tape write protect.	The diagnostic test must write data but the tape being used for the test is write protected. Ensure that the device has a tape that is not write protected for use during the diagnostic test.
67	Incompatible medium	The drive tried to read or write data from a tape from an incompatible LTO generation.
70	SCSI message error	Check the SCSI cable connection and verify that the maximum cable length is not exceeded. Verify that the SCSI bus is properly terminated.
71	SCSI parity error	
72	SCSI invalid message	
73	SCSI: overlapped command attempt	The application software made an illegal request.
74	SCSI: echo buffer overwritten	
75	Download prevented — barcode reader hardware requires newer code revision.	Update the library to the most current firmware version.
76	Destination element unexpectedly full.	This event can be reported if a cartridge is moved without the library completing a full inventory. Rescan the tapes from the RMI or OCP.
77	Download prevented because of an incompatible library controller.	Update the library to the most current firmware version.
78	Download prevented because of incompatible robot firmware.	Update the libraryto the most current firmware version.
7B	Invalid firmware version. Only signed firmware images are allowed.	The library will only accept signed firmware images. Download a signed firmware image.
80	Movement retry. Robotics movement did not succeed but was successful on a retry.	Recovered error move operation. No action required. Occasional retries are normal operation.
81	Drive sled fan alert. Fan motion has stopped.	To see whether the fan is operational and not obstructed, check the tape drive fan on the library back panel. **NOTE:** The sub-error code indicates the affected tape drive. For example, 00 is drive 1 and 01 is drive 2. **NOTE:** Fan only operates when cooling is required.

Table Continued

Event code	Description	Details and solution
82	Clean request from the tape drive	Clean the indicated tape drive using a valid cleaning tape.
		NOTE: The sub-error code indicates the affected tape drive. For example, 00 is drive 1 and 01 is drive 2.
83	Media attention	Evaluate media status using L&TT.
84	Tape drive tape alert; tape drive reported a warning or critical tape alert.	Evaluate drive status using L&TT.
85	DHCP request has failed.	• Check the network to ensure connection to the DHCP server.
		• Check that the network configuration is correct.
		• If DHCP is enabled, ensure that the DHCP server is up and running on the same network as the device.
		• Power cycle the device and retry the operation.
86	Autoclean media warning; not enough media present to support autocleaning.	Insert a valid cleaning cartridge into the library.
87	Drive not supported; the tape drive was disabled because it cannot be used in this library.	Replace the drive with a compatible tape drive.
88	Drive firmware revision has not changed after a tape drive firmware upgrade.	• Verify that the firmware image is correct for the tape drive.
		• Retry the operation.
		• Retry using an alternative firmware upgrade method.
89	Power supply fan has failed. Redundancy may be at risk.	• Verify that the indicated fan is operational and not physically obstructed.
		• Upgrade to the latest version of firmware.
		NOTE: The sub-error code indicates the affected power supply. 00 is the bottom power supply. 01 is the second power supply.
8A	Power supply has failed. Redundancy is not available.	• Check the AC power cable connection.
		• Verify that the indicated power supply is correctly installed and the thumbscrews are tight.
		NOTE: The sub-error code indicates the affected power supply. 00 is the bottom power supply. 01 is the second power supply.

Table Continued

Event code	Description	Details and solution
8B	One of the redundant power supplies has failed.	• Check the AC power cable connections. • Verify that both power supplies are correctly installed and the thumbscrews are tight.
8C	Invalid robotics code; does not match with the loaded library firmware.	Install new library firmware, which will install a compatible robotics firmware version.
8E	Cleaning tape nearly expired. Only one or two cleaning operations remain.	Obtain a new cleaning tape for use when the current cleaning tape expires.
8F	I^2C bus recovery	Contact Service if this unexpected condition occurs.
90	Power supply has failed. Master library power redundancy not available.	• Verify that both power supplies are correctly installed and the thumbscrews are tight. • Check AC power cable connections.
91	Power supply has failed. Lower library power redundancy not available.	**NOTE:** The MSL2024 does not have a redundant power supply option.
92	VPD data recovery.	Power cycle the device and retry the operation.
DB	External drive cooling fan failure (fan motion has stopped). The subcode indicates which drive sled fan is affected. Subcode 00: drive sled #1 Subcode 01: drive sled #2, and so on	Verify that the fan for the indicated drive sled is operational and not obstructed. **NOTE:** The fan only operates when cooling is required.
DD	Power supply cooling fan failure. Power supply x fan has failed. Redundancy might be at risk. (MSL8048 and MSL8096 only) The subcode indicates which power supply fan is affected. Subcode 00: lower power supply Subcode 01: upper power supply	• Verify that the fan for the indicated power supply is operational and not obstructed. • Upgrade to the latest version of library firmware. • If the problem continues, replace the power supply.
DE	Power supply x has failed. Redundancy is not available. (MSL8048 and MSL8096 only) The subcode indicates which power supply fan is affected. Subcode 00: lower power supply Subcode 01: upper power supply	

Table Continued

Event code	Description	Details and solution
DF	One of the redundant power supplies has failed. Redundancy is not available. (MSL4048 only) The subcode indicates which power supply fan is affected. Subcode 00: lower power supply Subcode 01: upper power supply	• Verify that the power supply is correctly inserted and that the thumbscrews are tightened. • Power cycle the device. • If the problem continues, contact customer support.
E9	Power supply redundancy not available in the master library.	• Verify that the power supplies in the library are inserted correctly with the thumbscrews properly adjusted. • Check the AC power cable connections. **NOTE:** The MSL2024 does not have a redundant power supply option.
EA	Power supply redundancy not available in the lower library.	
EC	Unable to negotiate for NPIV. Library control path failover has been disabled.	The port of the FC switch connected to the library master drive must be in NPIV mode. Verify the FC switch configuration.
ED	Common control or data path failover issue. Failover has been disabled.	
EF	A data path failover-related error has occurred.	
F2	Drive sled missing.	• Power cycle the device and retry the operation. • To ensure a good connection to the device, reseat the tape drive. • MSL8048 and MSL8096: Verify that the drive is installed in one of the four locations that has a drive connector.
FE	The master drive was removed without being powered off. Library path failover cannot be performed.	The master drive must be powered off from the RMI or OCP to activate control path failover.

Configuration change events

Value	Event	Description
0x41	Drive SCSI changed	Drive SCSI ID has changed
0x42	Library SCSI changed	Library SCSI ID changed (*)
0x43	Drive enable	Drive was enabled
0x44	Drive disable	Drive disabled
0x45	Master drive assigned	Drive master assigned

Table Continued

Value	Event	Description
0x46	Drive sled added	Drive sled added
0x47	Drive sled removed	Drive sled removed
0x48	Library mode changed	Library mode changed (automatic, sequential, random)
0x49	Element address	Element address changed
0x4A	Net parameter	Network parameter has changed
0x4B	Slots reserved	Slots reserved
0x4C	Mailslot support	Mailslot support
0x4D	Admin password	Admin password has changed
0x4E	Date/time set	Date and time of RTC set
0x4F	Barcode format	Barcode format alignment changed
0x50	Default config set	Default configuration set
0x51	FW upgrade library	Library firmware was upgraded
0x52	FW upgrade drive	Drive firmware was upgraded
0x53	Auto-clean feature set	Auto-cleaning switched on or off
0x54	Drive FC parameters	Drive Fibre Channel parameters changed
0x55	Power supply added	A power supply was added to the system
0x56	Key server token was removed	A key server token was removed
0x57	Key server token was inserted	A key server token was inserted
0x58	Encryption has been enabled	Encryption has been enabled
0x59	Encryption has been disabled	Encryption has been disabled
0x60	Extender unit has been inserted	The library extender has been inserted
0x61	Extender unit has been removed	The library extender has been removed
0x62	Extender unit has been enabled	The library extender has been enabled
0x63	Extender unit has been disabled	The library extender has been disabled
0x64	Library door lock status change	The status of the library door lock has changed
0x65	Hostname has been changed	Hostname has been changed
0x66	Database has been restored from robot	The library configuration has been restored from the robot
0x67	Serial number has been changed	The serial number has been changed
0x68	World wide identifier base has been changed	The world-wide identifier base has been changed
0x69	UI64 identifier has been changed	EUI64 identifier has been changed
0x6E	License key has been added or removed	License key has been added or removed
0x71	User interface language change	User interface language has changed
0x72	DPF enabled	Data path failover was enabled

Table Continued

Value	Event	Description
0x73	DPF disabled	Data path failover was disabled
0x74	CPF enabled	Control path failover was enabled
0x75	CPF disabled	Control path failover was enabled
0x76	Magazine access changed	The setting for whether the administrator password is required to remove magazines or not has been changed.
0x78	Ignore barcode Media ID configuration changed	The setting for whether the Media ID is required or ignored has been changed.
0x7E	KMIP encryption enabled	KMIP-based encryption was enabled.
0x7F	KMIP encryption disabled	KMIP-based encryption was disabled.

Information events

Value	Event	Description
0x01	Move element	Move element command
0x02	Inventory rescan	The inventory was rescanned.
0x03	Drive clean	Drive cleaning process
0x04	Mailslot open	Open mailslot command
0x05	Mailslot close	Close mailslot
0x06	Magazines remove	Magazines remove event
0x07	Magazine reinsertion	Magazine insertion event
0x08	Power on	Power on event
0x09	Power off	Power off event
0x0A	User login	User log in at interface (RMU, OCP, SERIAL)
0x0B	User logout	User log out at interface (RMU, OCP, SERIAL)
0x0C	System test run	System test run
0x0D	Wellness test run	The wellness test was run.
0x0E	Bus reset occurred	A bus reset occurred
0x0F	Device reset	Device reset command
0x10	Abort	SCSI task aborted
0x11	Drive tape alert flag	Drive reported informational tape alert flag.
0x12	Power on initialization done	Power on initialization completed successfully.
0x13	Incorrect key server token PIN entered	Incorrect key server token PIN entered
0x14	Backup initiated on key server token	The backup of the key server token has started.
0x15	Backup off key server token finished	The backup of the key server token has finished.

Table Continued

Value	Event	Description
0x16	A new write key was automatically generated on the key server token.	A new write key was automatically generated on the key server token.
0x17	A new write key was manually generated on the key server token.	A new write key was manually generated on the key server token.
0x18	More than 5 invalid key server token PIN attempts	More than five attempts were made to set the key server token with invalid PINs.
0x19	Restore initiated on key server token.	A restore operation was initiated on the key server token.
0x1A	Restore off key server token finished.	A restore operation was completed on the key server token.
0x1B	Key server token is over 90% full.	The key server token is over 90% full.
0x1C	Key server token contains keys that have not been backed up.	The key server token contains keys that have not been backed up.
0x31	Proactive support ticket retrieval skipped.	The library will not pull a support ticket when it does not have the resources to do so. Subsequent tickets will contain the information needed for analysis.
0x32	Could not reach SNTP server.	The configured SNTP server could not be reached. Synchronization with the time server is not possible.
0x33	Control path failover reported.	A control path failover event occurred. The master drive was successfully switched to the alternative master drive.
0x34	Data path failover reported.	A datapath failover event occurred. The active port was successfully changed to the previous standby port.
0x35	Drive generation less than LTO-5. LTFS not supported.	LTFS is not supported with the current configuration. LTFS requires LTO-5 or later generation drives and media.
0x36	Proactive support ticket retrieval skipped.	

Diagnosing problems with Library & Tape Tools

With Library & Tape Tools installed on the host server you can:

- Identify all parallel SCSI devices connected to your system.

- View detailed configuration, identification, inventory, and drive information for the device.

- Easily update device and drive firmware.

- Run advanced diagnostic tests, including connectivity, read/write, media validation, and testing the functionality of the device.

- View device and drive error logs.

- Generate a detailed support ticket that can be e-mailed or faxed to your support representative for analysis.

The Library & Tape Tools diagnostic provides an intuitive graphical user interface with integrated context-sensitive help. It can be downloaded free of charge from **https://www.hpe.com/support/TapeTools**.

Procedure

1. Run L&TT on the host server.

   You can install L&TT on the host server, or run it from a CD-ROM or USB flash drive on the host server.

2. Pull a support ticket for the device.

3. Look at the device analysis results for additional information about the device operation.

Upgrading and servicing the library

⚠️ **WARNING MOVING PARTS**: Only personnel with technical and product safety training (referred to as **users** in this document) may have access to or operate the library.

Read all documentation and procedures before installing or operating the library.

Hazardous moving parts exist inside this product. Do not insert any tools or any part of your body into the tape library while it is operating.

⚠️ **CAUTION:** A discharge of static electricity can damage static-sensitive devices or microcircuitry. Proper packaging and grounding techniques are necessary precautions to prevent damage.

To prevent electrostatic damage, observe the following precautions:

- Transport products in static-safe containers such as conductive tubes, bags, or boxes.

- Keep electrostatic-sensitive parts in their containers until they arrive at static-free stations.

- Cover the device with approved static-dissipating material. Provide a wrist strap connected to the work surface and properly grounded tools and equipment.

- Keep the work area free of nonconducting materials, such as ordinary plastic assembly aids and foam packing.

- Make sure that you are always properly grounded when touching a static-sensitive component or assembly.

- Avoid touching pins, leads, or circuitry.

- Use conductive field service tools.

⚠️ **WARNING:** The MSL2024 weighs up to 15.6 kg (34.3 lb) without media and up to 20.4 kg (44.9 lb) with media (24 cartridges). The MSL4048 weighs up to 24.6 kg (54.1 lb) without media and up to 34.2 kg (75.2 lb) with media (48 cartridges).

The MSL8048 tape library weighs up to 46.6 kg (102.7 lb) without media and up to 56.2 kg (122.6 lb) with media (96 cartridges). The MSL8096 tape library weighs up to 46.6 kg (102.7 lb) without media and up to 68.8 kg (151.7 lb) with media (96 cartridges).

⚠️ **WARNING:** To reduce the risk of personal injury or damage to equipment:

- Extend leveling jacks to the floor.

- Ensure that the full weight of the rack rests on the leveling jacks.

- Install stabilizing feet on the rack.

- Extend only one rack component at a time. If more than one component is extended, a rack can become unstable.

⚠️ **CAUTION:** Before moving the library, remove all media. During a move, the cartridges could come out of the storage slots and damage the library.

Possible tools needed

To service the library, you might need one or more of the following tools:

- Flat-blade screwdrivers (large and small)

- Short-handle #1 Phillips screwdriver

- #2 and #3 Phillips screwdrivers

- Ground strap

- Paper clip or pin (for manual magazine removal)

- Library and Tape Tools (L&TT) diagnostic software

NOTE: You can use the L&TT diagnostic utility to perform diagnostic functions for the library. L&TT is a diagnostic tool designed to aid in the installation and maintenance of tape storage products. L&TT includes several features designed for use by both storage customers and trained service personnel.

Hewlett Packard Enterprise updates L&TT periodically with new diagnostic features and device support. When using L&TT for troubleshooting, download and update to the current version. You can verify that you are using the latest version and download L&TT without cost from the L&TT website: **https://www.hpe.com/support/TapeTools**

Installing a new tape drive

The tape libraries support LTO Ultrium tape drives. The MSL2024 can support one full-height tape drive or up to two half-height tape drives. The MSL4048 tape library can support up to two full-height drives or up to four half-height drives. The MSL8048 and MSL8096 can support up to four tape drives.

Procedure

1. Locate the next vacant drive bay on the back of the library, which is usually directly above the currently installed drives.

   When installing the first tape drive in the library, install it in the bottom drive bay.

   NOTE: The MSL4048 library will not operate with a full-height tape drive installed in the second and third half-height drive bays. Install a full-height tape drive either in the bottom two drive bays or the top two drive bays.

   NOTE: Tape drives are numbered from the bottom of the library up starting with 1. If you leave a space and later add a drive in the space, the new drive will be assigned the next available number, leaving the drives numbered out of order. If the settings are restored to the factory defaults or the library is power-cycled, the drives will be renumbered and you might need to update the configuration of your backup software.

   The MSL8048 and MSL8096 only have drive connectors at the locations of the full-height drives, so you must leave a half-height space above a half-height drive, as shown in the following illustration.
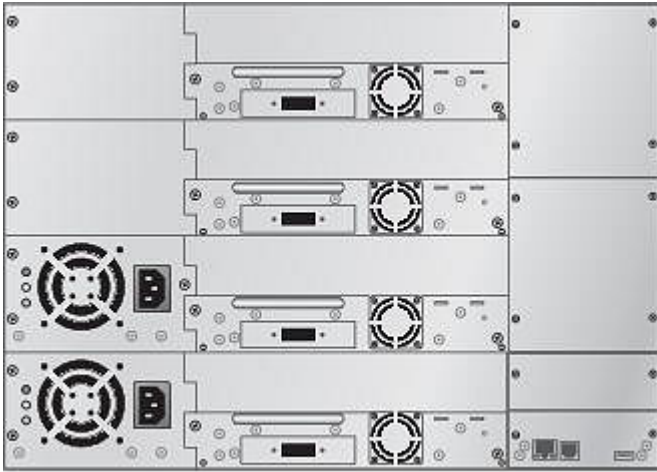
11280

Figure 74: MSL8048 and MSL8096 half-height drive bay locations

2. Remove the face plate covering the drive bay by removing the screws holding it in place.

   Remove one drive bay cover to install a half-height tape drive; remove two drive bay covers to install a full-height tape drive.

3. Holding the tape drive by the handle and supporting it from the bottom, slide it into the drive bay until it is flush with the back of the library.
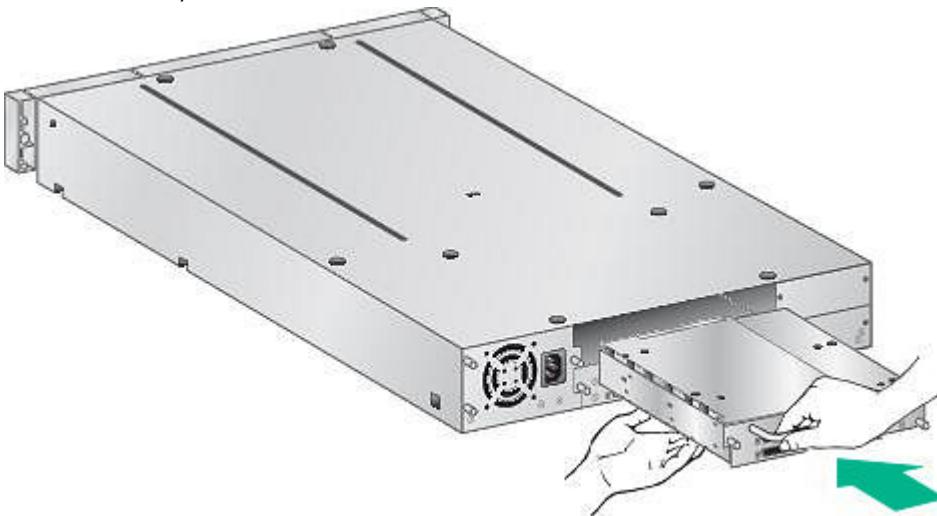
10807

4. To secure the tape drive to the chassis, use a torque driver to tighten the thumbscrews on the drive sled to 6 inch pounds or 0.68 N m.

   If a torque driver is not available, use a #2 Phillips screwdriver to tighten the thumbscrews until a low initial threshold torque achieves a snug tight condition.
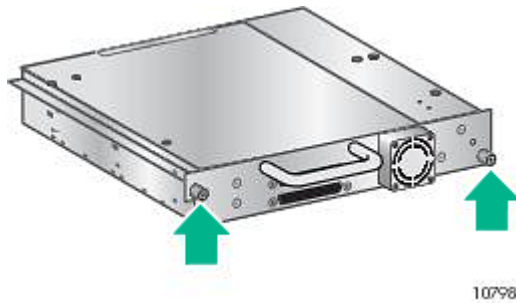
Figure 75: Tighten the blue thumbscrews

5. Plan the configuration for the new tape drive:

   - FC: See **FC connection information**.

   - SAS: See **SAS connection information**.

   - Parallel SCSI: See **Parallel SCSI configuration information**. If the tape drive SCSI address must be changed, do so before connecting the drive to the host. See **Changing the SCSI address (parallel SCSI drives only)**.

6. Connect the tape drive to the host:

   - FC: Plug one end of the FC cable into a port on the tape drive. Plug the other end of the cable into the HBA or switch.

   - SAS: The cable recommended for use with the SAS library can connect up to four SAS tape drives to an HBA. Any tape drive can be connected with any of the four tape drive ends of the cable. Plug one of the unused mini-SAS connectors on the tape drive end of the cable into the connector on the tape drive.

   - Parallel SCSI: Connect one of the connectors on the parallel SCSI cable to the tape drive and connect the other end of the cable to the HBA or other device on the same parallel SCSI bus. If the tape drive is the last device on the parallel SCSI bus, attach the terminator to the other parallel SCSI connector on the tape drive.

   ⓘ **IMPORTANT:** For the library and tape drives to operate correctly, each SCSI tape drive must have a SCSI terminator unless the tape drive is part of a properly terminated chain. Tape drives without an attached SCSI cable must also have a SCSI terminator.

7. If necessary, upgrade the library and drive firmware using Library & Tape Tools, the RMI, or a USB flash drive.

Replacing a tape drive

Remove and replace the tape drive from the back of the library.

NOTE: If you are upgrading a parallel SCSI drive, use supported cabling configurations.

NOTE: The library assigns the WWNames used by Fibre Channel drives to the drive locations. When you replace a tape drive, the WWName is reassigned to the replacement drive.

The library assigns SAS World Wide IDs to the drive locations. When you replace a SAS tape drive, the World Wide ID is reassigned to the replacement drive.

NOTE: You do not need to power off the library to replace a drive.

⚠ **CAUTION:** Powering off the master drive interrupts SCSI communication to the library and robotics.

Procedure

1. Using the RMI or the OCP, unload any tape cartridge from the drive you would like to remove, if present.

2. Power off the drive from the OCP or RMI.

   - MSL2024: see **Powering a drive on or off (Support > Power On/Off Drive)**

   - MSL4048, MSL8048 and MSL8096: see **Powering drives on and off (Support > Power on/off Drives)**

3. Make sure that the LED on the tape drive is off.

Figure 76: Drive LEDs

4. Remove the cables and terminator, if applicable, from the tape drive being removed.

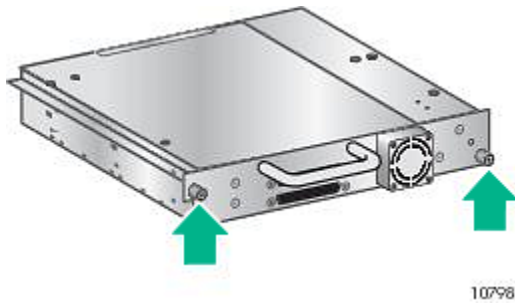5. Loosen the blue captive thumbscrews on the drive.

Figure 77: Captive screws on the tape drive

Half-height drives have two captive thumbscrews; full-height drives have four captive thumbscrews.

6. To remove the tape drive from the library, pull straight back on the tape drive handle.
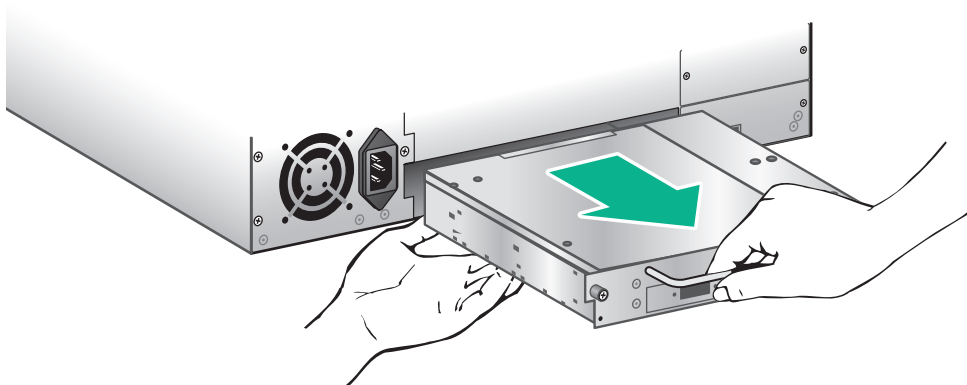

Figure 78: Removing a tape drive

7. Before installing the new drive, inspect the connectors on the tape drive. Ensure that the connectors are intact, free of any foreign objects, and have no cracks or deformed or bent contacts.

8. Holding the tape drive by the handle and supporting it from the bottom, slide it into the drive bay until it is flush with the back of the library.

⚠ **CAUTION:** Push in on the tape drive handle while supporting the bottom of the tape drive. Stop pushing when the tape drive is properly seated. If this procedure is not followed, the connector pins can be damaged.
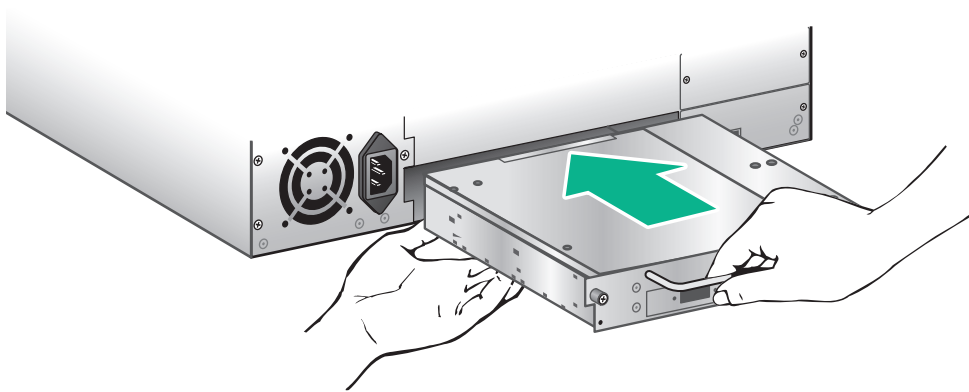
Figure 79: Installing a tape drive

9. To secure the tape drive to the chassis, use a torque driver to tighten the thumbscrews on the drive sled to 6 inch pounds or 0.68 N m.

   If a torque driver is not available, use a #2 Phillips screwdriver to tighten the thumbscrews until a low initial threshold torque achieves a snug tight condition.

10. Attach the cords and terminator, if necessary, that you removed from the old tape drive.

11. Power on the tape drive.

12. If necessary, upgrade the library and drive firmware using L&TT, the RMI, or a USB flash drive.

Removing and replacing a magazine

The library has removable magazines. Magazine access is password protected. For safety reasons, the robotic motion is stopped when a magazine is removed. The magazines can be released using the OCP, the RMI, or by a manual release. When possible, release the magazine using the OCP or RMI.

ⓘ **IMPORTANT:** To release a magazine manually, see **Releasing the magazines manually**. However, only use this manual process if the magazine cannot be released using the OCP or the RMI, and the device no longer has power.

💡 **TIP:** MSL4048, MSL8048 and MSL8096: The library has multiple magazines on each side. The library will release all of the magazines on a side at the same time. If you want to remove more than one magazine from a side, pull the magazines that you are removing out a few centimeters or inches immediately after the library releases them. You can then remove the magazines from the library one at a time.

Removing a magazine using the MSL2024 OCP

Prerequisites

Administrator password

Procedure

1. From the Home screen, press **Previous** or **Next** until the screen displays **Operations**.

2. Press **Enter** to select.

3. Press **Previous** or **Next** until the screen displays either **Unlock Left Magazine** or **Unlock Right Magazine**.

4. Press **Enter** to select the desired magazine to unlock.

5. Enter the administrator password if requested.

6. The display reads **Left Magazine Unlocked** or **Right Magazine Unlocked**.

7. Pull the released magazine out of the device.

8. The screen displays **Insert Left Magazine** or **Insert Right Magazine**. **The library cannot perform any other operation until the magazine is replaced.** After exchanging tapes in a magazine, slide the magazine completely into the library. The magazine locks into place after it is correctly installed and the library inventories the magazine.

Removing a magazine using the MSL4048, MSL8048 and MSL8096 OCP

Prerequisites

Administrator password

Procedure

1. From the **Operations** menu, select **Unlock Left Magazines** or **Unlock Right Magazines**.

   NOTE: The MSL8048 will only unlock the left magazines.

2. Enter the administrator password if requested.

3. Pull all the magazines you want to remove out a few centimeters or inches until they are past the latch.

4. Pull the magazines out one at a time.

5. **The library cannot perform any other operation until the magazines are replaced.** After exchanging tapes in a magazine, slide the magazine completely into the library. Each magazine locks into place after it is correctly installed. When all magazines are in place, the library inventories the replaced magazines.

Releasing magazines using the RMI

Procedure

1. Log in to the RMI as the administrator user.

2. Select the Administrator Account Type, enter the administrator password, and press **Sign In.**

3. Navigate to the **The Operations > Magazines page**.

   From this page you can release the right, left, or both magazines from the library. Once the magazines are released, you have 30 seconds to pull out the magazines before they relock.

Releasing the magazine using the manual magazine release

> **IMPORTANT:** Only use this manual process if the magazine cannot be released using the OCP or the RMI and the device no longer has power.

Procedure

1. From the back of the library, locate the magazine release hole associated with the magazine being released. The magazine release latches are accessed from the magazine release holes on the bottom tape drive plate.
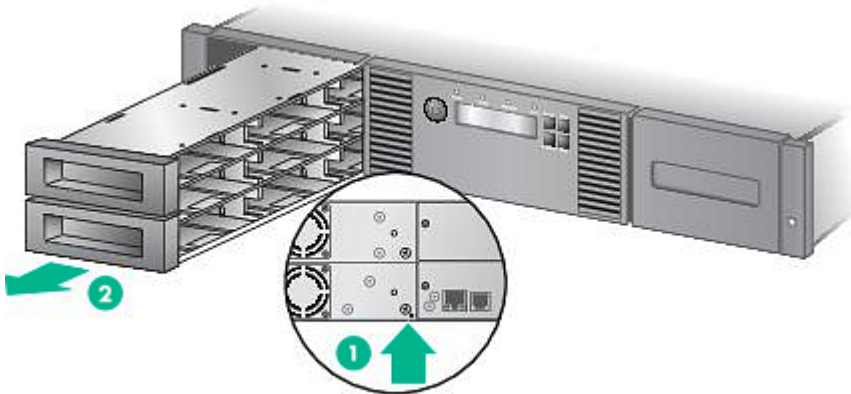
   For the MSL4048, MSL8048 and MSL8096, the library will release all magazines on a side at the same time.

11410

Item	Description
1	Right magazine release access hole
2	Left magazine release access hole

2. Push a small metal pin or paper clip about 1.5 cm (0.6 inch) into the appropriate release hole to push the release latch while another person grasps the magazine and removes it from the library.

11342

Item	Description
1	Insert a pin into access hole.
2	Release and remove the magazine.

> **IMPORTANT:** Do not force the pin once you encounter resistance. Doing so can damage the library.

Installing a redundant power supply (MSL4048, MSL8048, and MSL8096 only)

The MSL4048, MSL8048, and MSL8096 Tape Libraries have an optional redundant power supply system, which allows the library to continue operating when one power supply fails. With the redundant power supply system, the library can monitor the status of each power supply and power supply fan. The redundant power supply can be installed without powering off the library.

In this procedure you will:

- Remove the power supply bay cover.

- Install the new power supply.

- Verify the installation.

⚠ **CAUTION:** Parts can be damaged by electrostatic discharge. Keep parts in electrostatic containers until needed. Ensure that you are properly grounded when touching static-sensitive components.

Procedure

1. From the back of the library, use a Phillips screwdriver to remove the power supply bay cover. The cover is designated with a label.

2. Position the new power supply on the alignment rails and push it into the library until it is flush with the back panel.
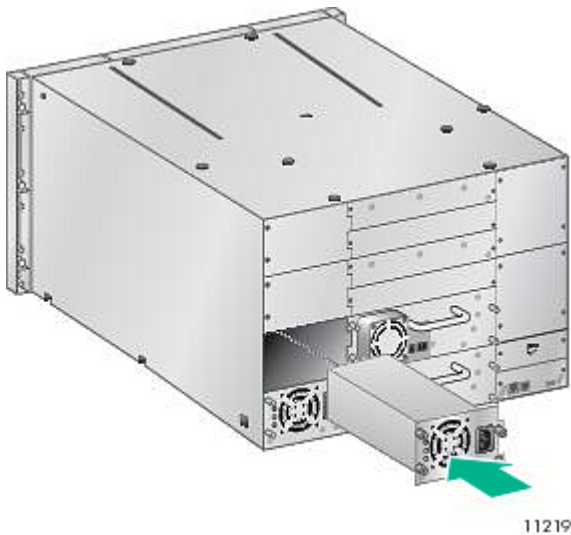

11219

Figure 80: Installing the new power supply

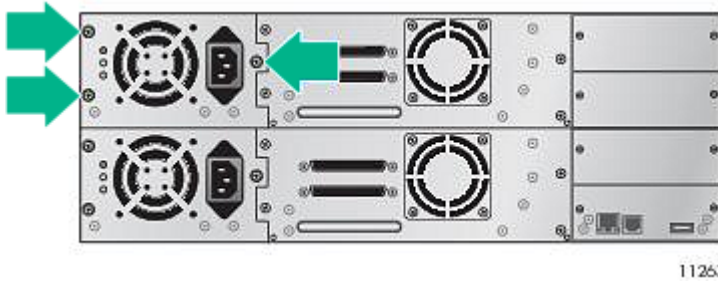3. Tighten the blue thumbscrews to secure the power supply to the library.

Figure 81: Securing the power supply to the library

4. Attach an AC power cord to the new power connector and plug the other end into a power outlet.

5. Verify that the new power supply is operating properly.

   When operating properly, the blue and green LEDs on the power supply module will be lit and the yellow LED will be off, as shown in the following illustration, and both power supplies will be listed on the OCP screen.
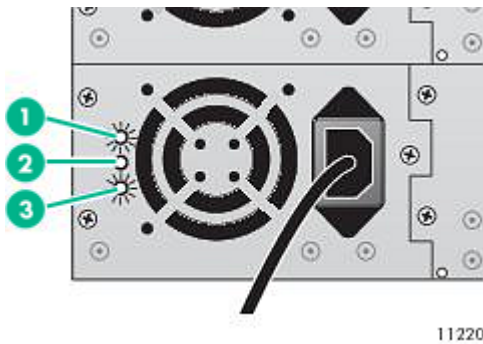

Figure 82: Power supply LEDs

Item	Color	Description
1	Blue	AC power is connected.
2	Yellow	Fan failure. The fan is running too slow or is defective.
3	Green	The power supply is producing good power for the library.

# Replacing the power supply (MSL4048, MSL8048 and MSL8096)

This process applies to the MSL4048, MSL8048 and MSL8096 only. A redundant power supply can be replaced without powering off the library.

⚠ **CAUTION:** Parts can be damaged by electrostatic discharge. Keep parts in electrostatic containers until needed. Ensure that you are properly grounded when touching static-sensitive components.

Procedure

1. If the library only has one power supply, power off the library from the front panel and then remove the AC power cord. Otherwise, only remove the AC power cord from the power supply to be replaced.

2. Loosen the three captive thumbscrews on the power supply. Grasp a thumbscrew stem on each side of the power supply and while supporting the bottom, pull the power supply out of the library.
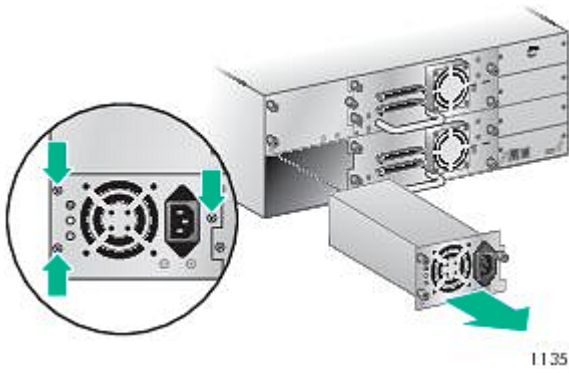
3. Position the new power supply on the alignment rails and slide it into the library until it is flush with the back panel. Tighten the three blue thumbscrews to secure the power supply.
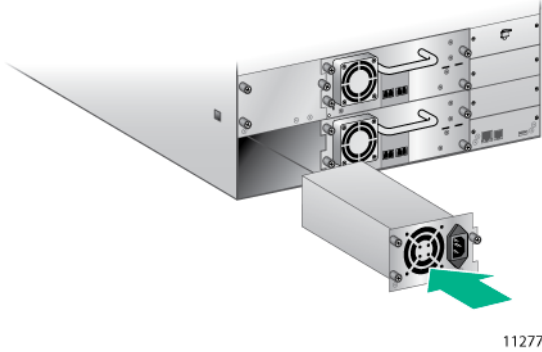
4. Verify that the new power supply is operating properly.

When a power supply with LEDs is operating properly, the blue and green LEDs on the power supply module are lit and the yellow LED is off. For a power supply without LEDs, verify that the power supply fan is running and the OCP does not show a warning message about the power supply.
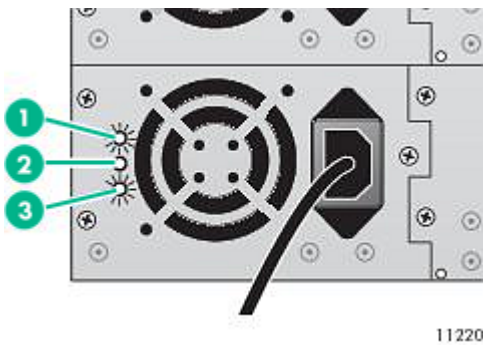
Figure 83: Power supply LEDs

Item	Color	Description
1	Blue	AC power is connected.
2	Yellow	Fan failure. The fan is running too slow or is defective.
3	Green	The power supply is producing good power for the library.

Replacing the library controller (MSL4048, MSL8048 and MSL8096)

⚠️ **CAUTION:** Parts can be damaged by electrostatic discharge. Keep parts in electrostatic containers until needed. Ensure that you are properly grounded when touching static-sensitive components.

⚠️ **CAUTION:** This part is not hot-pluggable. Power off the library before replacing the library controller.

Procedure

1. If the OCP or RMI works, save the configuration settings to the USB flash drive from the OCP or to a file from the RMI.

   You will need these settings to re-configure the library after replacing the chassis.

2. Power off the library from the front panel. Remove the Ethernet cable and USB device, if applicable.

3. Loosen the two captive thumbscrews on the library controller and remove it from the library.
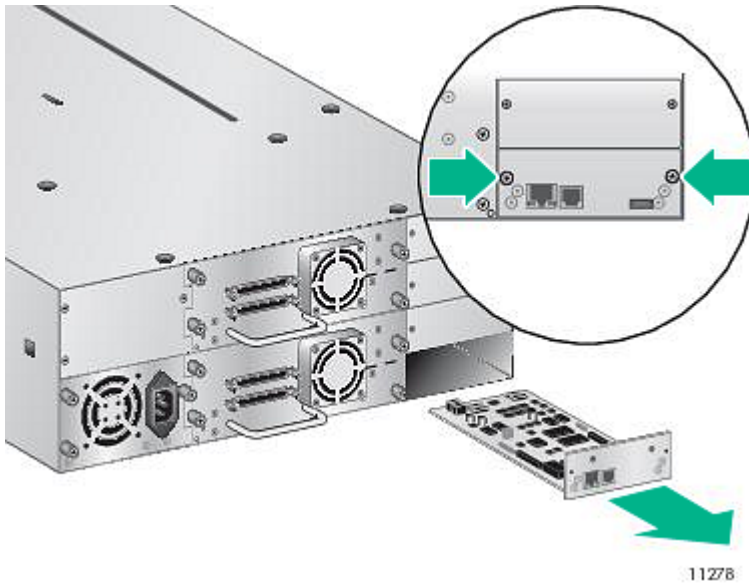
4. Position the new library controller on the alignment rails and slide it into the library until it is flush with the back panel. Tighten the two blue thumbscrews to secure the card to the library.
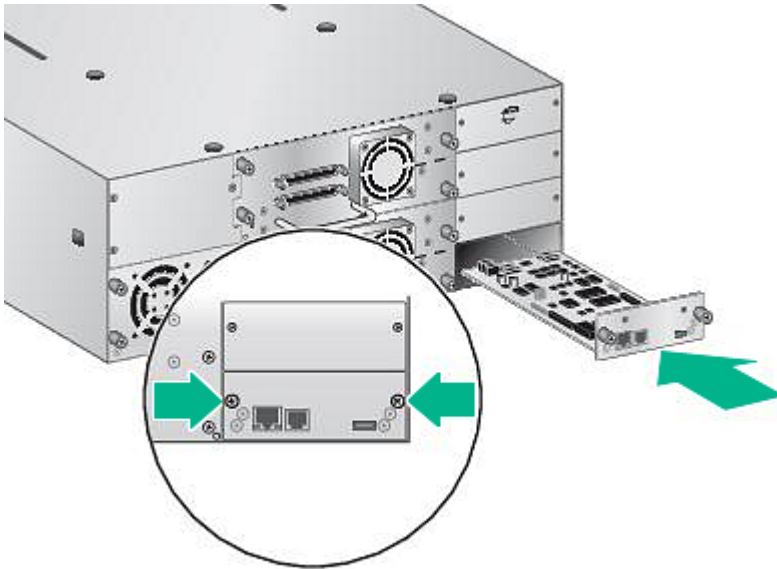
10917

5. Replace the Ethernet cable and USB device, if applicable. Power on the tape library.

> **NOTE:** For the MSL4048 or MSL8096, if you see a message on the OCP that says: `Identity Data Mismatch Serial No. Mismatch between Chassis and Controller. Use Data from: Controller/ Chassis.`
>
> Select **Chassis**.

6. Confirm that the library recognized the new library controller by checking the System Status on the front panel.

Figure 84: MSL4048, MSL8048 and MSL8096 system status

7. Verify the configuration settings are correct. If necessary restore the settings from a file of saved settings, or re-enter them using the OCP or RMI.

   a. If the library has licensed features, verify that the license information was retained and then re-enable the features if necessary.

   b. Verify the date, time, and timezone information and reset them if necessary.

   c. Update any configuration settings that changed since the settings were saved.

8. Run Library & Tape Tools (L&TT) diagnostic software to verify that the library and drives have the latest firmware. L&TT can be downloaded without charge from **https://www.hpe.com/support/TapeTools**. If necessary, upgrade the library firmware through L&TT, the RMI, or a USB flash drive.

9. If using the Encryption Kit, re-enter the PIN.

Removing and replacing the base chassis

⚠ **WARNING:** The MSL2024 tape library weighs up to 15.6 kg (34.3 lb) without media and up to 20.4 kg (44.9 lb) with media (24 cartridges). The MSL4048 tape library weighs up to 24.6 kg (54.1 lb) without media and up to 34.2 kg (75.2 lb) with media (48 cartridges).

NOTE: Replacing the MSL2024 chassis changes the library and drive mac address and WWNN because the library controller is a component of the MSL2024 chassis.

Procedure

1. Record the configuration settings.

    If the OCP or RMI works, save the configuration settings to the USB flash drive from the OCP or to a file from the RMI. You will need these settings to re-configure the library after replacing the chassis.

2. **Remove the tape cartridge from the tape drive**.

3. **Remove the cables, magazines, and tape drive**.

4. **Remove the power supply and library controller.** (MSL4048, MSL8048 and MSL8096)

5. **Remove the chassis from the rack or tabletop conversion cover**.

6. Unpack the new chassis and place it on a sturdy table. Save the packaging materials to return the old chassis.

7. **Install the replacement chassis in the rack** or **replace the tabletop conversion cover**.

8. **Replace the library components and cables**.

9. **Verify the chassis replacement**.

Removing the tape cartridge from the tape drive

⚠ **CAUTION:** If you cannot remove the tape cartridge from the tape drive, handle the tape drive gently during the rest of the procedure to avoid damaging the tape and losing data.

Procedure

*   RMI: **The Operations > Move Media page**

*   MSL2024 OCP: **Moving tapes in the library (Operations > Move Tape)**

*   MSL4048, MSL8048 and MSL8096 OCP: **Moving Media (Operations > Move Media)**

Removing the cables, magazines, and tape drive

Procedure

1. If the OCP or RMI is operational, remove the magazines using the RMI or OCP.

2. Power off the library.

3. Remove the power cord and other cables from the library.

4. If the magazines have not been removed, remove the magazines from the library using the manual process (see **Releasing the magazines manually**).

5. Loosen the blue captive thumbscrews on the drive.
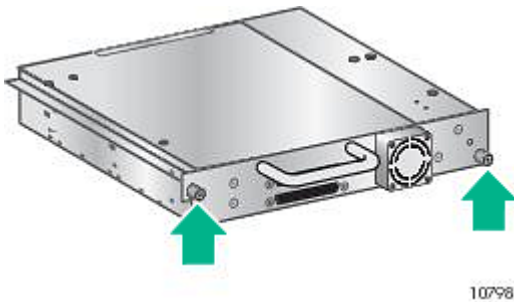
Figure 85: Captive screws on the tape drive

6. While supporting the bottom of the tape drive, pull straight back on the tape drive handle to remove the tape drive from the library.

   Place the drive on a static-safe surface, noting its position in the library.

7. Remove any additional tape drives following the same procedure.

Removing the power supply and library controller (MSL4048, MSL8048 and MSL8096 only)

On the MSL4048, MSL8048 and MSL8096, the power supply and library controller are moved to the new chassis.

Procedure

1. Remove the power supply.

   a. Loosen the three captive thumbscrews on the power supply.

   b. Grasp a thumbscrew stem on each side of the power supply. Support the bottom while pulling the power supply out of the library.
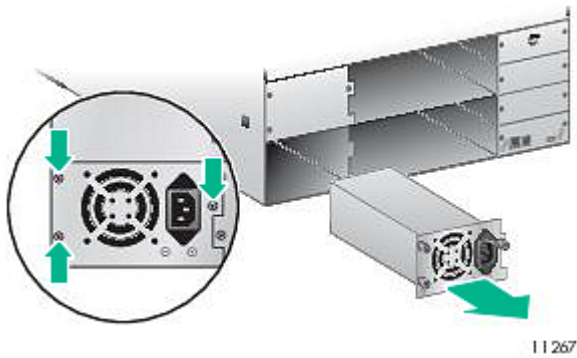
Figure 86: Removing the power supply

2. Remove the library controller.

   a. Loosen the two blue thumbscrews on the library controller and remove it from the library.
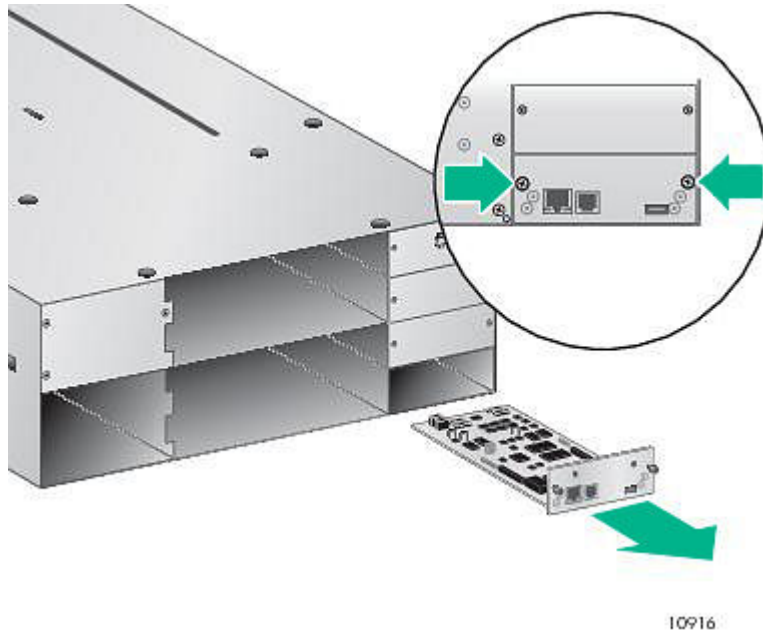
Figure 87: Removing the library controller

   b. Place the library controller into a static safe bag.

Removing the base chassis

⚠ **CAUTION:** Lift the library from the side edges. Lifting the library from the magazine or tape drive openings can damage the library.

Prerequisites

#2 Phillips screwdriver

Procedure

1. Obtain adequate assistance to lift and stabilize the library during removal and replacement.

2. From the front of the library:

a. Loosen the screws inside the left and right front bezel (these screws are captive and cannot be removed.

b. Slide the library out, using assistance.

11348
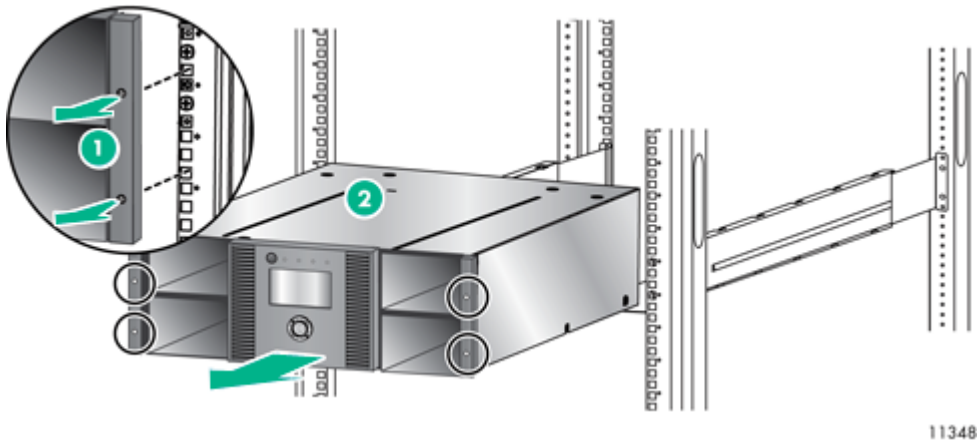
Installing the replacement chassis

⚠ **CAUTION:** Lift the library from the side edges. Lifting the library from the magazine or tape drive openings can damage the library.

Procedure

1. Remove and store the shipping lock.

NOTE: Skip this step for the MSL8048 and MSL8096.

The shipping lock prevents the robotic transport mechanism from moving during shipment. Remove the shipping lock before powering on the library. The shipping lock is held in place with a piece of tape and is located in the top center of the new chassis. After the shipping lock is removed, it should be stored on the back panel of the chassis for future use.

a. Locate the tape and lock at the top of the chassis.

10806
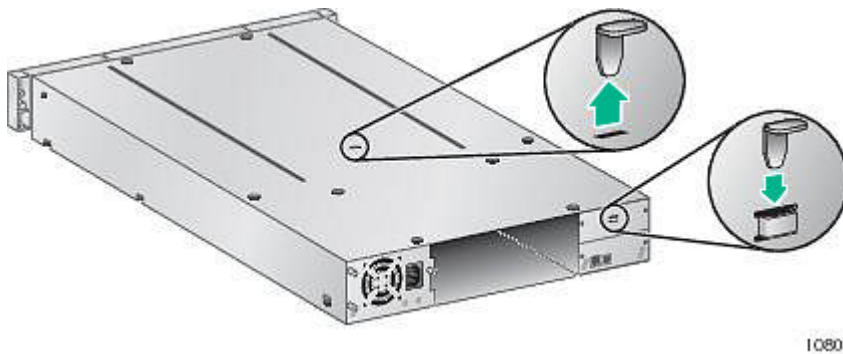
b. Remove the tape, then remove the lock.

c. Store the lock on the back panel of the library.

10808

2. Mount the library in a rack.

    a. With assistance, slide the library onto the metal rails that are already in position in the rack.

    b. From the front of the library, secure the front bezel to the rack using a #2 Phillips screw driver placed through the small holes in the mounting bracket to tighten the captive screws on each side of the library.

11343
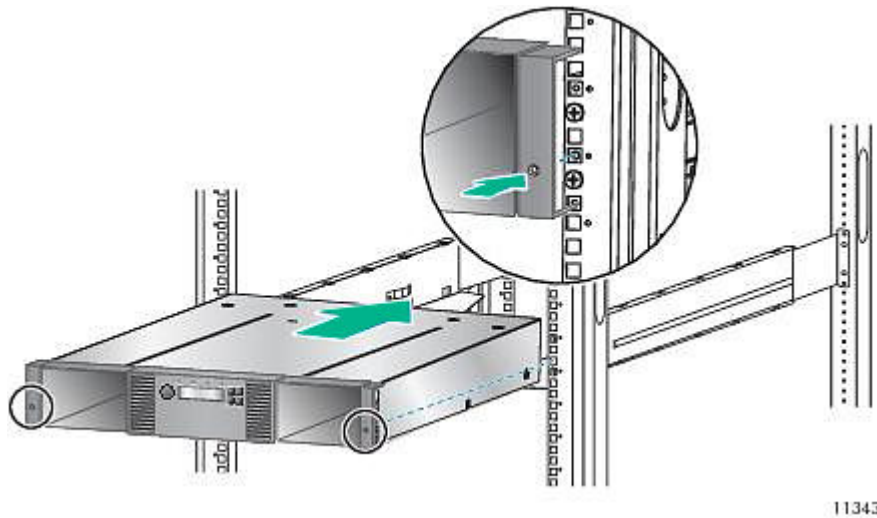
Replacing the tabletop conversion cover

Procedure

1. Set the replacement base chassis on a sturdy surface in front of the cover.

2. Slide the chassis into the cover until the front panel of the chassis is aligned with the cover.

3. Tighten the captive screws on the chassis front panel until the cover is secure.

Replacing the library components and cables

Replace the library components by reversing the removal procedures. Align the components carefully in the guide slots. If the thumbscrews cannot be tightened easily, verify that the component is aligned properly.

Procedure

1. Replace the magazines in the same locations.

2. Replace the tape drives in the same locations.

   > **TIP:** To assist in aligning the drive, only remove the drive bay covers for one drive at a time.

   To secure the tape drive to the chassis, use a torque driver to tighten the blue captive thumbscrews on the drive sled to 6 inch pounds or 0.68 N m.

   If a torque driver is not available, use a #2 Phillips screwdriver to tighten the thumbscrews until a low initial threshold torque achieves a snug tight condition.

3. Replace the power supplies. (MSL4048, MSL8048 and MSL8096)

4. Replace the controller board. (MSL4048, MSL8048 and MSL8096)

5. Reattach any SAS, FC, and Ethernet cables removed earlier.

6. Reinsert the USB device if you removed it earlier.

7. Reattach the power cords.

Verifying the chassis replacement

Procedure

1. Power on the library.

   > **NOTE:** For the MSL4048 or MSL8096, if you see a message on the OCP that says: `Identity Data Mismatch Serial No. Mismatch between Chassis and Controller. Use Data from: Controller/ Chassis.`
   >
   > Select **Controller**.

2. Check the overall library status from the RMI **Status > Library** screen.

3. Verify that the configuration settings are correct.

   If necessary, restore the settings from a file or saved settings or re-enter them using the RMI or OCP.

   a. If the library has licensed features, verify that the license information was retained and then re-enable the feature.

   b. Verify the date, time, and timezone information and reset them if necessary.

   c. Update any configuration settings that changed since the settings were saved.

4. If using the MSL Encryption Kit, re-enter the token password.

5. Resume host applications.

Electrostatic discharge

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

Preventing electrostatic damage

To prevent electrostatic damage, observe the following precautions:

- Avoid hand contact by transporting and storing products in static-safe containers.

- Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.

- Place parts on a grounded surface before removing them from their containers.

- Avoid touching pins, leads, or circuitry.

- Always be properly grounded when touching a static-sensitive component or assembly. See the next section.

Grounding methods

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

- Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megohm (±10 percent) resistance in the ground cords. To provide proper ground, wear the strap snug against the skin.

- Use heel straps, toe straps, or boot straps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.

- Use conductive field service tools.

- Use a portable field service kit with a folding static-dissipating work mat.

If you do not have any of the suggested equipment for proper grounding, have your Hewlett Packard Enterprise authorized reseller install the part.

NOTE: For more information on static electricity, or assistance with product installation, contact your Hewlett Packard Enterprise authorized reseller.

Technical specifications

Library capacity

Characteristic	MSL2024	MSL4048	MSL8048	MSL8096
Form factor	2U	4U	8U	8U
Maximum cartridge slots	24	48	48	96
Mailslots	0, 1	0, 3	0, 3	0, 3, 12, 15
Maximum full-height tape drives	1	2	4	4
Maximum half-height tape drives	2	4	4	4

Supported interfaces

LTO generation	Interface	SCSI ID
LTO-3, LTO-4	Fibre Channel, Ultra 320 SCSI LVD, SAS	4
LTO-5, LTO-6, LTO-7, LTO-8	Fibre Channel, SAS	NA

Physical specifications

MSL2024 physical specifications: all models

Characteristics	Product alone	Packaged
Height	87.5 mm (3.44 inches)	250 mm (9.84 inches)
Width	445 mm (17.5 inches)	580 mm (22.83 inches)
Depth	775.5 mm (30.53 inches)	990 mm (38.97 inches)
Weight	15 kg (33.07 pounds)	25.5 (56.22 pounds)

MSL4048 physical specifications: all models

Characteristics	Product alone	Packaged
Height	174 mm (6.85 inches)	344 mm (13.54 inches)
Width	445 mm (17.5 inches)	596 mm (23.46 inches)
Depth	776 mm (30.55 inches)	994 mm (39.13 inches)
Weight	20.6 kg (45.32 pounds)	33.2 (73.04 pounds)

MSL8048 and MSL8096 Tape Library physical specifications: all models

Characteristics	Product alone	Packaged
Height	352 mm (13.86 inches)	533 mm (20.98 inches)
Width	480 mm (18.9 inches)	589 mm (23.19 inches)
Depth	806 mm (31.73 inches)	987 mm (38.86 inches)
Weight	46.6 kg (102.7 pounds)	66.6 (146.8 pounds)

Environmental specifications

Characteristic	Specification	
	LTO-7 and LTO-8	**LTO-5 and LTO-6**
Temperature		
Operating	10° to 35° C up to 3000 m 10° to 30° C above 3000 m and up to 4000 m	10° to 35° C
Storage	-30° to 60° C	
Temperature shock immunity — maximum rate of change	10° C per hour	
Miscellaneous		
Dust concentration	ISO 14644 -1 Class 8	less than 200 microgram / cubic meter
Altitude	4000 meters (see operating temperature)	4000 meters
Humidity		
Operating	20% to 80% RH (noncondensing, max wet bulb temperature = 26C)	
Nonoperating	10% to 90% RH noncondensing	10% to 95% RH noncondensing

Electrical specifications

Power

- MSL2024: 168 Watts (max)

- MSL4048, MSL8048 and MSL8096: 312 Watts (max)

Input Requirements

- MSL2024:100 - 240V AC, 1300 - 700mA, 50/60Hz

- MSL4048, MSL8048 and MSL8096: 100 - 240V AC, 2500 - 1300mA, 50/60Hz

Regulatory specifications

CSA test conditions

Characteristic	Tested condition or value
Equipment mobility	Stationary (rack-mount or desk-top)
Connection to the mains	Pluggable — Type A
Operating condition	Continuous
Access location	Operator accessible
Over voltage category (OVC)	OVC II
Mains supply tolerance (%) or absolute mains supply values	-10%, +6%
Tested for IT power systems	No
IT testing, phase-phase voltage (V)	N/A
Class of equipment	Class I
Considered current rating (A)	20 A (branch circuit protection)
Pollution degree (PD)	PD 2
IP protection class	IPX0
Altitude during operation (m)	Max 2000
Altitude of test laboratory (m)	38
Mass of equipment (kg)	Max 25 kg
Manufacturer's Declared Ambient (°C)	40 °C

NOTE: The CSA test conditions might differ from the product specification limits.

Regulatory compliance identification numbers

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

The Regulatory Compliance label is on the bottom of the library. To view this information, from the back of the library, tilt the library up until the label is visible.

Product-specific information:

Regulatory model number: LVLDC-0501

FCC and CISPR classification: Class A

These products contain laser components. See Class 1 laser statement in *Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products*, available at **https://www.hpe.com/support/Safety-Compliance-EnterpriseProducts**

Manufacturer: Hewlett Packard Enterprise Company, Palo Alto, California

Manufacturer's representative: ZAO Hewlett-Packard A.O.

Default and restore defaults settings

You can save the libraryconfiguration settings to a file, restore the settings, or reset the library configuration to the default settings. The following table lists the library configuration parameters, with their default settings and whether they are reset to default or saved to a file.

Parameter	Default setting	Reset by Set Defaults	Stored in Saved Config file
Tape drive settings			
SCSI drive address	• MSL2024: A full-height tape drive has SCSI ID 4. The bottom half-height tape drive has SCSI ID 4 and the top drive has SCSI ID 5. • MSL4048: All full-height tape drives have SCSI ID 4. Half-height drive slots have SCSI ID of 4, 5, 4, 5 from the bottom up. • MSL8048 and MSL8096: All tape drives have SCSI ID 4.	Yes	Yes
FC drive configuration	Automatic speed, auto port type	Yes	Yes
Master drive	Drive 1 or the lowest numbered existing drive	Yes	Yes
Drive power	All drives powered on	Yes	Yes
Auto clean	Disabled	Yes	
Slots			

Table Continued

Parameter	Default setting	Reset by Set Defaults	Stored in Saved Config file
Active slots	Maximum possible	Yes	
Reserved slots	0	Yes	Yes
Mailslot configuration	Mailslot disabled	Yes	Yes
Administrator password required for mailslot removal	Enabled	Yes	Yes
Barcode reader settings			
Barcode reader label length	8	Yes	Yes
Barcode reader alignment	Left	Yes	Yes
Ignore barcode Media ID	Disabled	Yes	Yes
Error and event settings			
Event log levels and filter	Continuous trace and all levels and filters active (for Hewlett Packard Enterprise Service use only)	Yes	Yes
Error recovery	On	Yes	
E-mail notification	Disabled	Yes, but configurations retained	Yes
Administrator password	Unset	No	Yes
Network settings		No. The network is always enabled and the network addresses are retained.	Yes, including DHCP, DNS, IPv4, and IPv6 addresses
HTTPS	Disabled	Yes	Yes
SNMP	Disabled, but saved addresses do not change	Yes, but saved addresses do not change	Yes
Restricted network access	Enabled	Yes	Yes
Miscellaneous settings			
Library mode	Automatic	Yes	Yes
Date and time	Blank or existing	No	

Table Continued

Parameter	Default setting	Reset by Set Defaults	Stored in Saved Config file
Display contrast setting (MSL4048, MSL8048 and MSL8096 only)	Default factory setting	TBD	Yes
Logical library configuration	Disabled (no logical libraries)	Yes	Yes
Encryption and security settings	Disabled	Not applicable	Yes
License Keys	None	No	Yes

(!) **IMPORTANT:** When the defaults are restored, the library will rediscover and renumber the tape drives from the bottom of the library up. If a tape drive was added between two other tape drives since the last time the drives were discovered, that tape drive and the ones above it will be renumbered. You might need to update the configuration of the backup application when tape drives are renumbered.

Websites

General websites

Hewlett Packard Enterprise Information Library

   https://www.hpe.com/info/EIL

Single Point of Connectivity Knowledge (SPOCK) Storage compatibility matrix

   https://www.hpe.com/storage/spock

Storage white papers and analyst reports

   https://www.hpe.com/storage/whitepapers

For additional websites, see **Support and other resources**.

HPE StoreEver library websites

For more information on StoreEver products, see **https://www.hpe.com/storage/msl**.

For the most current list of supported devices, see the StoreEver Support Matrix at **https://www.hpe.com/storage/StoreEverSupportMatrix**.

For product information about Command View for Tape Libraries, see **https://www.hpe.com/storage/cvtl**.

To download Command View for Tape Libraries, see **https://www.hpe.com/support/cvtl**.

For more information about TapeAssure Advanced, see **https://www.hpe.com/storage/tapeassure**.

For more information about Data Verification, see **https://www.hpe.com/storage/dataverification**.

Download HPE Library & Tape Tools without charge from **https://www.hpe.com/support/TapeTools**.

Support and other resources

Accessing Hewlett Packard Enterprise Support

- For live assistance, go to the Contact Hewlett Packard Enterprise Worldwide website:

  https://www.hpe.com/info/assistance

- To access documentation and support services, go to the Hewlett Packard Enterprise Support Center website:

  https://www.hpe.com/support/hpesc

  Information to collect

- Technical support registration number (if applicable)

- Product name, model or version, and serial number

- Operating system name and version

- Firmware version

- Error messages

- Product-specific reports and logs

- Add-on products or components

- Third-party products or components

Accessing updates

- Some software products provide a mechanism for accessing software updates through the product interface. Review your product documentation to identify the recommended software update method.

- To download product updates:

  Hewlett Packard Enterprise Support Center

  > **https://www.hpe.com/support/hpesc**

  Hewlett Packard Enterprise Support Center: Software downloads

  > **https://www.hpe.com/support/downloads**

  My HPE Software Center

  > **https://www.hpe.com/software/hpesoftwarecenter**

- To subscribe to eNewsletters and alerts:

  https://www.hpe.com/support/e-updates

- To view and update your entitlements, and to link your contracts and warranties with your profile, go to the Hewlett Packard Enterprise Support Center **More Information on Access to Support Materials** page:

  https://www.hpe.com/support/AccessToSupportMaterials

Remote support

Remote support is available with supported devices as part of your warranty or contractual support agreement. It provides intelligent event diagnosis, and automatic, secure submission of hardware event notifications to Hewlett Packard Enterprise, which will initiate a fast and accurate resolution based on your product's service level. Hewlett Packard Enterprise strongly recommends that you register your device for remote support.

If your product includes additional remote support details, use search to locate that information.

Remote support and Proactive Care information

HPE Get Connected

> **https://www.hpe.com/services/getconnected**

HPE Proactive Care services

> **https://www.hpe.com/services/proactivecare**

HPE Datacenter Care services

> **https://www.hpe.com/services/datacentercare**

HPE Proactive Care service: Supported products list

> **https://www.hpe.com/services/proactivecaresupportedproducts**

HPE Proactive Care advanced service: Supported products list

> **https://www.hpe.com/services/proactivecareadvancedsupportedproducts**

Proactive Care customer information

Proactive Care central

> **https://www.hpe.com/services/proactivecarecentral**

Proactive Care service activation

> **https://www.hpe.com/services/proactivecarecentralgetstarted**

Warranty information

To view the warranty information for your product, see the links provided below:

HPE ProLiant and IA-32 Servers and Options

> **https://www.hpe.com/support/ProLiantServers-Warranties**

HPE Enterprise and Cloudline Servers

> **https://www.hpe.com/support/EnterpriseServers-Warranties**

HPE Storage Products

> **https://www.hpe.com/support/Storage-Warranties**

HPE Networking Products

> **https://www.hpe.com/support/Networking-Warranties**

Regulatory information

To view the regulatory information for your product, view the *Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products*, available at the Hewlett Packard Enterprise Support Center:

https://www.hpe.com/support/Safety-Compliance-EnterpriseProducts

Additional regulatory information

Hewlett Packard Enterprise is committed to providing our customers with information about the chemical substances in our products as needed to comply with legal requirements such as REACH (Regulation EC No 1907/2006 of the European Parliament and the Council). A chemical information report for this product can be found at:

https://www.hpe.com/info/reach

For Hewlett Packard Enterprise product environmental and safety information and compliance data, including RoHS and REACH, see:

https://www.hpe.com/info/ecodata

For Hewlett Packard Enterprise environmental information, including company programs, product recycling, and energy efficiency, see:

https://www.hpe.com/info/environment

Documentation feedback

Hewlett Packard Enterprise is committed to providing documentation that meets your needs. To help us improve the documentation, send any errors, suggestions, or comments to Documentation Feedback (**docsfeedback@hpe.com**). When submitting your feedback, include the document title, part number, edition, and publication date located on the front cover of the document. For online help content, include the product name, product version, help edition, and publication date located on the legal notices page.