

StorageTek SL150 Modular Tape Library
Guide

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Preface

This guide is intended for anyone involved with installation planning or the ordering of Oracle's StorageTek SL150 Modular Tape Library.

Documentation Accessibility

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<http://www.oracle.com/pls/topic/lookup?ctx=acc&id=docacc>.

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<http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs> if you are hearing impaired.

Class 1 Laser Product Notice

The StorageTek SL150 Modular Tape Library contains a class-1 laser as defined by IEC 60825-1 Ed. 3 (2014) and EN 60825-1:2014.

Warning: Use of controls or adjustments or performance of procedures other than those specified may result in hazardous radiation exposure.

About the SL150 Library

This chapter provides an overview of Oracle's StorageTek SL150 Modular Tape Library, which is a scalable, rack-mounted, modular automated tape library.

- [About the Base Module](#)
- [About the Expansion Module](#)
- [About the Mailslot](#)
- [About the Robot](#)
- [About Tape Drives](#)
- [Library Weights and Dimensions](#)
- [Library Power Requirements](#)
- [Library Cartridge Capacity](#)
- [Networking and Host Communication](#)
- [Software that Supports the SL150](#)
- [SL150 Part Numbers for Ordering](#)

The SL150 library has two module types: the Base Module and Expansion. Each module has two drive slots and stores up to 30 tapes in two 15-slot magazine (one on the left side and the other on the right side). Additionally, a four slot Mailslots resides in the base module for entering or ejecting tapes.

Figure 1-1 Base Module and Two Expansion Modules (Front View)



Illustration Legend:

- 1 - Base module (Module 1)
- 2 - Expansion module (Module 2)
- 3 - Left cartridge magazines
- 4 - Right cartridge magazines
- 5 - Front control panel
- 6 - Mailslot

Figure 1–2 Base Module and Expansion Modules (Rear View)

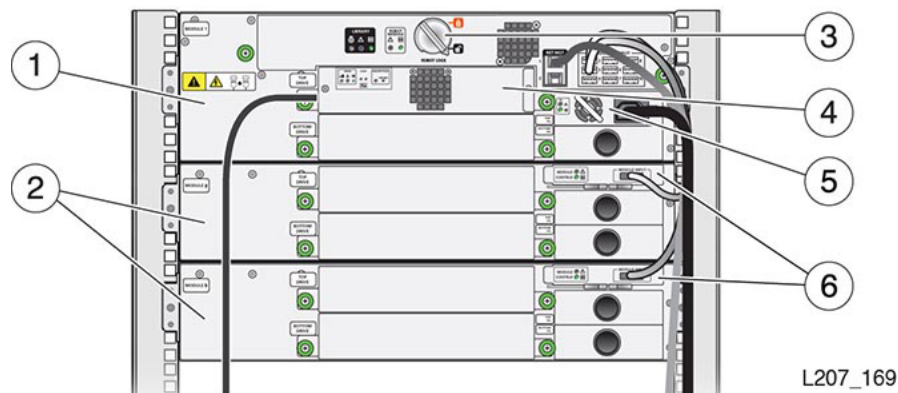


Illustration Legend:

- 1 - Base module (Module 1 label is on the rear panel of the module)
- 2 - Expansion modules (a label with the module number is on the rear panel)
- 3 - Robot lock (knob-type)
- 4 - Tape drive tray
- 5 - Power supply
- 6 - Module controller

About the Base Module

A single base module is the smallest SL150 library configuration. The base module is a 3U rack mounted unit. It ships with:

- Front control panel
- Two 15-slot tape magazines (left and right)
- Standard Mailslot with four tape slots (firmware version 2.25, and later, supports a 19 slot Expanded Mailslot configuration)
- Robot
- Power supply (with an option to add a second power supply)
- Tape drive (with an option to add a second drive)
- Accessory kit containing rail components, attachment hardware, and labels

The rear of the base module contains an Ethernet port for remote management and nine USB Type A ports to connect to expansion modules.

About the Expansion Module

An expansion module provides additional cartridge storage and tape drive capacity. Expansion modules are installed below the base module. The base module connects to each of the expansion modules using a USB Type A connector.

Expansion modules ship without tape drives or power supplies. The expansion module can contain up to two drives and two power supplies. If there is no tape drive, the expansion module can operate off of the power provided by the USB cable, it does not require a power supply. If you install a drive in the expansion module, you must also install at least one power supply. You can add a second power supply for redundancy, however one power supply can provide power for two drive.

Each expansion module requires 2U of rack space. An expansion module ships with:

- Two 15-slot tape magazines (left and right)
- Module controller
- Expansion cable that has two USB Type A connectors
- Mounting hardware to secure the module to the rack
- Identification labels

About the Mailslot

The four cartridge mailslot is located above the right magazine in the base module. The mailslot to imports and exports cartridges without interfering with robot operations. See ["Import and Export Cartridges Using the Mailslot"](#) on page 6-9.

19-slot Expanded Mailslot

The expanded mailslot configuration converts a 15-slot magazine into an additional mailslot. Configuring the expanded mailslot requires library firmware versions 2.25 and later.

About the Robot

The robot automatically retrieves and inserts cartridges into the mailslot, storage cells, and tape drives. Within the base module, a bull wheel and pulley rotate to raise and lower the robot hand, which contains a label barcode scanner and retractable grippers to grab and release cartridges.

See Also:

- ["Robot Module Removal and Replacement"](#) on page 10-8
- ["Unlock the Robot"](#) on page 2-29
- ["Lock the Robot"](#) on page 9-3

About Tape Drives

The SL150 library supports the following tape drives. You can install a mix of HP and IBM drives of various generations within the library.

- HP LTO half-height generation 5 or 6 SAS or short wavelength FC interface
- IBM LTO half-height generation 6, 7, or 8 SAS or short wavelength FC interface

Note: LTO-5, 6, and 7 drives can read two generations back and write one generation back. LTO-8 drives can read and write one generation back. For best capacity and performance, always use cartridges of the same generation as your drives.

See Also

- ["Managing Tape Drives"](#) on page 8-1
- ["Upgrade the Drive Firmware"](#) on page 4-9
- ["Labeling Cartridges"](#) on page 6-3

About M8 Compatibility

With library code 3.50 and above, the library supports the M8 cartridge type, which is an LTO7 cartridge initialized to a 9TB capacity by an LTO8 drive (instead of the standard 6TB capacity of a standard LTO7 cartridge).

For an LTO8 drive to initialize an LTO7 cartridge to M8, the cartridge must be new (unused) and contain an M8 label. Only LTO8 drives can read and write M8 cartridges.

About Library Managed Encryption (LME)

With library code 3.50 and above, the library can manage the enrollment and key delivery for IBM LTO-7 and higher drives. Each drive that you enroll still requires an encryption activation file. However, with LME, the library is the OKM agent instead of individual drives, meaning you only need to enroll the library with OKM rather than individual drives. You will still need to use VOP to enroll HP LTO-6 or lower drives.

For more information on configuring library managed encryption, see ["Configure Library Managed Encryption \(LME\)"](#) on page 4-6.

For more information on the behavior of the ports, see ["Behavior of Port 1 and Port 2"](#) on page 1-4.

Behavior of Port 1 and Port 2

With library code 3.50 and above, you can configure Network Port 2 for library managed encryption (LME). Enabling LME on Port 2 changes the behavior of the ports. If you do not configure Port 2, the behavior of the ports continues to function as before (with Port 1 sending UI, SNMP, and email alerts (SMTP) traffic, and Port 2 reserved for service use).

IMPORTANT: If you plan to configure Port 2, use a separate subnet and gateway than Port 1, otherwise all traffic will go through Port 1.

Table 1–1 Port Configuration Options

LME Configuration	Port 1 Settings	Port 2 Settings
LME enabled on Port 2	Configured normally. Used for UI, SNMP, SMTP, SDP-2 traffic.	New address with different subnet and gateway than Port 1. Used for OKM traffic only.

Table 1–1 (Cont.) Port Configuration Options

LME Configuration	Port 1 Settings	Port 2 Settings
LME enabled on Port 1 (not recommended ¹)	Configured normally. Used for UI, SNMP, SMTP, OKM traffic.	192.168.10.10 (default) Used for SDP-2 traffic and direct Service laptop connection.
No LME Port 2 with Default Settings	Configured normally. Used for UI, SNMP, SMTP traffic.	192.168.10.10 (default) Used for SDP-2 traffic and direct Service laptop connection.

¹ Note that key traffic will be mixed with other traffic.

Port 1 Behavior with LME Enabled on Port 2

With Port 2 enabled for LME, Port 1 continues to act as the primary port for the customer to manage the library sending UI, SNMP, and email alert (SMTP) traffic. In addition, Port 1 will send SDP-2 traffic. Since the library will only send LME (OKM) traffic through Port 2, this requires the Oracle Service tool SDP-2 to now be connected to Port 1 when LME is enabled on Port 2.

Port 2 Behavior with LME Enabled

When Port 2 is configured for LME, the library will send all OKM communication through Port 2. A service representative can still directly connect to Port 2 for troubleshooting when the port is configured for LME. However, they must configure the laptop with a valid IP address on the same subnet as Port 2.

About Tape Drives With Two Ports

When a tape drive has two ports, host applications can treat the second drive port as a failover port. The library may report a Check Condition to a command received on one port when the other port is busy with a library command. When a host application receives either of the following *new* Check Conditions, it should reissue the command:

- Not Ready, Logical Unit Offline (02/04/12h)
- Aborted Command, Logical Unit Communication Failure (OBh/08/00)

Notes: The half-height LTO-5 FC tape drive has one port while the other supported drives have two ports.

Only some host applications support this feature. Be sure to check the status of this feature with your application.

About Bridged Tape Drives

A bridged drive provides a single, unified control and data communication path between the library/partition and the host using the SAS or FC drive interface. A non-partitioned library requires one bridged drive. A partitioned library requires one bridged drive per partition. You select the bridged drive during library configuration (see "[Configure Library Settings](#)" on page 4-3).

- Code versions earlier than 2.0 support two partitions, and a maximum of two bridged drives located in the base module.
- Code version 2.01, and later, supports up to eight partitions and bridged drives located in designated expansion modules.

You must connect the bridged drive to an HBA supporting multiple LUNs (also referred to as LUN scanning). The SL150 Library uses a single SCSI ID and two logical unit numbers (LUN). LUN 0 controls the tape drive and LUN 1 which is configured as a SCSI medium changer device controls the robotics. Data is sent to the remaining LUN on the bridged drive or to LUNs on the other, unbridged drives in the partition, all of which are configured as SCSI sequential-access (tape) devices.

Library Weights and Dimensions

Table 1–2 Shipping (Packaged) Weights and Dimensions

Component	Width	Height	Depth	Weight
Base	63.5 cm (25 in)	40.6 cm (16 in)	115.6 cm (45.5 in)	43 kg (94.8 pounds) ¹ 28.6 kg (63 pounds) ²
Expansion	61 cm (24 in)	24.8 cm (9.75 in)	113 cm (44.5 in)	15.9 kg (35 pounds) ³ 12.3 kg (27 pounds) ⁴
Tape Drive	41.6 cm (16.4 in)	21 cm (8.25 in)	43.8 cm (17.25 in)	3.6 kg (8 pounds)
Power Supply	20.3 cm (8 in)	14.6 cm (5.75 in)	30.5 cm (12 in)	1.6 kg (3.6 pounds)
Robot CRU	47.6 cm (18.75 in)	20.3 cm (8 in)	96.5 cm (38 in)	8.3 kg (18.4 pounds)
Op Panel CRU	24.5 cm (9.6 in)	9.5 cm (3.75 in)	46 cm (18.1 in)	1 kg (2.25 pounds)
Magazine CRU	31.1 cm (12.25 in)	26.4 cm (10.4 in)	73 cm (28.75 in)	3.4 kg (7.5 pounds)

¹ Includes pallet, Base chassis, two magazines, robot, one drive, one power supply

² Includes pallet and Base chassis

³ Includes pallet, Expansion chassis, two magazines, one drive, one power supply

⁴ Chassis only

Table 1–3 Component (Unpackaged) Weights and Dimensions

Component	Width	Height	Depth	Weight
Base	48 cm (18.9 in) std 19 in. rack	3U (13.34 cm, 5.25 in)	92.5 cm (36.4 in)	24.4 kg (53.9 pounds) ¹ 13.1 kg (28.9 pounds) ²
Expansion	48 cm (18.9 in) std 19 in. rack	2U (8.89 cm, 3.5 in)	92.5 cm (36.4 in)	12.1 kg (26.7 pounds) ³ 7.5 kg (16.5 pounds) ⁴
Tape Drive	20.3 cm (8 in)	4.1 cm (1.6 in)	28.4 cm (11.2 in)	2 kg (4.58 pounds)
Power Supply	9.5 cm (3.75 in)	3.2 cm (1.25 in)	22.9 cm (9 in)	0.8 kg (1.82 pounds)
Robot CRU	38.1 cm (15 in)	6.4 cm (2.5 in)	86.9 cm (34.2 in)	5.1 kg (11.18 pounds)
Op Panel CRU	13 cm (5.1 in)	2.5 cm (1 in)	35 cm (13.75 in)	0.4 kg (0.9 pounds)
Magazine CRU	13.7 cm (5.4 in)	8.25 cm (3.25 in)	61.6 cm (24.25 in)	0.9 kg (1.9 pounds)

¹ Includes two magazines, robot, one tape drive, and one power supply

² Chassis only

³ Includes two magazines, one tape drive, and one power supplies

⁴ Chassis only

Note: You can install the SL150 in a rack with front to rear rail spacing from 457 mm (18 inches) to 902 mm (35.5 inches).

Library Power Requirements

Component	Idle (W)	Steady State Maximum (W)
Base module (one power supply)	35	38
Expansion module (no power supplies or drives)	1	1
Tape Drive (each)	9	29.5
Additional Power Supply	6	6

For volt-amp (VA) measurements, add 2 percent to the Watt value.

For Btu/hr, multiply the total wattage number by 3.414.

Refer to the power calculator at:

<http://www.oracle.com/us/products/servers-storage/sun-power-calculators/calculator/sl150-power-calculator-1954625.html>

A minimum library configuration has a total idle power of 44 W (150 Btu/hr) and a steady state maximum of 67.5 W (230 Btu/hr).

A ten module library with 20 tape drives and 20 power supplies has a total idle power of 338 W (1154 Btu/hr) and a steady state maximum of 751 W (2564 Btu/hr).

Library Cartridge Capacity

Cartridge capacity depends on the base module hardware level and software version:

- Hardware level 12 and 3.00 software supports one to 15 modules, one to 450 tape cartridges, and one to 30 tape drives.
- Hardware levels up to 11 and software up to 2.6 support one to 10 modules, one to 300 tape cartridges, and one to 20 tape drives.

Note: You cannot upgrade older hardware to level 12. You must order a new library to have hardware level 12.

The following table shows the number of Storage, Mailslot, and Tape Drive slots as Expansion Modules are added to the library configuration.

Table 1–4 Storage Slot, Mailslot, and Drive Counts for Different Configurations

Modules	Total Storage Slots for Standard Mailslot Configuration	Total Storage Slots for Expanded Mailslot Configuration	Total Drive Slots
Base Module	30	15	2
Base Module plus one expansion module ¹	60	45	4
Base Module plus two expansion modules	90	75	6
Base Module plus three expansion modules	1200	105	8
Base Module plus four expansion modules	150	135	10
Base Module plus five expansion modules	180	165	12
Base Module plus six expansion modules	210	195	14

Table 1–4 (Cont.) Storage Slot, Mailslot, and Drive Counts for Different Configurations

Modules	Total Storage Slots for Standard Mailslot Configuration	Total Storage Slots for Expanded Mailslot Configuration	Total Drive Slots
Base Module plus seven expansion modules	240	225	16
Base Module plus eight expansion modules	270	255	18
Base Module plus nine expansion modules	300	285	20
Base Module plus 10 expansion modules	330	315	22
Base Module plus 11 expansion modules	360	345	24
Base Module plus 12 expansion modules	390	375	26
Base Module plus 13 expansion modules	420	405	28
Base Module plus 14 expansion modules	450	435	30

¹ Each expansion module has 30 Storage Slots and 2 Drive Slots.

Networking and Host Communication

The library uses Ethernet cables for network connections. Always use shielded Ethernet cables to connect to a drive installed in a library.

- [SAS-2 and SAS-3 Configuration Issues](#)
- [Power Over Ethernet \(POE\)](#)
- [IPv6 Network Address Support](#)
- [SAN Connection Zoning](#)

SAS-2 and SAS-3 Configuration Issues

Caution: The SAS driver for Solaris 10 (Update 8 and later) and Solaris 11 (11.1 and later) disrupts communications between Oracle Solaris and common tape backup applications.

The SAS driver only allows one device driver to attach per device (sg, sgen, st, and so forth). Users must have every component in the following list to be affected:

- Oracle Solaris 10 (Update 8 or later) or Solaris 11 (11.1 and later)
- Any SAS-2 or SAS-3 HBA
- Tape drives or libraries using a SAS-2 or SAS-3 connection
- A backup application that requires multiple SAS drivers. The most common backup applications that use multiple device drivers include:
 - CA ARCserve
 - HP Data Protector
 - IBM Tivoli Storage Manager

A SAS tape drive attached through a SAS-2 or SAS-3 HBA will work on the Solaris system using just the Solaris native commands such as `dd` or `tar`. However, this configuration is recommended for a stand-alone drive only.

If you want to use Oracle Solaris 10 (Update 8 and later) or Solaris 11 (11.1 and later) and a SAS-2 or SAS-3 HBA, you should use one of the following backup applications:

- Oracle Secure Backup (OSB): 10.4.0.2 or later
- EMC Networker: current release level with all patches applied
- Symantec NetBackup: current release level with all patches applied

Power Over Ethernet (POE)

Network switches providing power over Ethernet (POE) must be IEEE certified.

Note: A switch that is not IEEE certified might provide too much current over the cable and overload the Ethernet connection on the library. Results of an overload appear as the Ethernet port being unresponsive and the remote management interface not working.

IPv6 Network Address Support

Library firmware versions 2.0 and later support a dual-stack network configuration that uses both IPv4 and IPv6. In dual-stack mode, the library continues to recognize IPv4 addresses while adding the use of IPv6 addresses. To configure the network address, see ["Configure the Network Interfaces"](#) on page 4-2.

Always consult with the network administrator before configuring or changing IPv6 addressing and to get the length of the network prefix for your location.

SAN Connection Zoning

The library can be connected to the host HBA through a storage area network (SAN). Configure zoning on the FC switch so only the backup servers access the library.

Zoning

Use zoning to partition a SAN into logical groupings of devices so that each group is isolated from the other and can only access the devices in its own group. Two types of zoning exist: Hardware zoning (based on physical fabric port number) and Software zoning (defined with the World Wide Node Name (WWNN) or World Wide Port Name (WWPN)).

The dynamic World Wide Name (dWWN) feature assigns world wide names to the library drive slots rather than the drives themselves, which allows you to swap or replace a drive without bringing down the entire operating system.

Software that Supports the SL150

- [About ACSLS \(Automated Cartridge System Library Software\)](#)
- [About StorageTek Tape Analytics](#)
- [About Service Delivery Platform 2](#)

About ACSLS (Automated Cartridge System Library Software)

ACSLS functions as the central service provider for all library operations, efficiently sharing library resources with any ACSLS-enabled application on any system, and allowing centralized library control across multiple StorageTek libraries.

ACSL version 8.2 or later is required for interfacing with the SL150 Library.

ACSL version 8.3 (*second* patch) is required for library firmware version 2.25, and later, which supports new ASC and ASCQ reporting.

Refer to the ACSL documentation library for additional information regarding support for the SL150 Library and tape drives. See the Tape Storage section of OTN (<http://docs.oracle.com/en/storage/#tab5>).

Note:

- ACSL versions 8.2, 8.3, and 8.4 do not support the Expanded Mailslot configuration (19 mailslots) available with library firmware version 2.25 or later.
 - ACSL requires the SL150 setting for Drive Element Addressing be *installed drives only*.
-
-

Tape Drive support:

- SL150 firmware version 2.60 and later:
 - LTO-7 requires the minimum of ACSL version 8.4 with patch 1
 - LTO-5 and LTO-6 ACSL version 8.4 or later
- SL150 firmware version 2.50 with LTO-5 or LTO-6 requires a minimum of ACSL version 8.3 patch 3.

About StorageTek Tape Analytics

StorageTek Tape Analytics (STA) is an intelligent monitoring application. It simplifies tape storage management and allows you to make informed decisions about future tape storage investments based on the current health of the tape storage environment.

Note: STA requires a dedicated server. Oracle recommends that you place the STA server on the same subnet as the library to improve SNMP UDP reliability.

To set up communications between the STA server and the libraries, you must perform some configuration procedures on the libraries and some on the STA server. STA uses both the v2c and v3 SNMP protocols to communicate with the library.

- The initial communication handshake between a library and the STA server is done through the v2c protocol.
- The traps and get functions are done through the v3 protocol. The authentication, encryption, and message integrity features in SNMP v3 provide a secure mechanism for sending library data.

For more information, refer to the STA documentation at:

<http://docs.oracle.com/en/storage/#tab5>

STA version 2.2.1 is the recommended minimum level to support the SL150 Library.

About Service Delivery Platform 2

The StorageTek Service Delivery Platform 2 (SDP-2) is a support enhancement solution that provides faster problem resolution, analysis and trending, and improved diagnostic capabilities. SDP is a remote application that can be installed on a Linux server that connects to the library. SDP collects device events and alerts support analysts, providing remote diagnosis and automatic service requests (ASR).

For more information, contact an Oracle representative or visit:

<http://www.oracle.com/technetwork/systems/asr/documentation/oracle-installed-storage-330027.html>

To configure the library for SDP-2, see "Enable or Disable the Service Delivery Platform (SDP2)" on page 7-5.

SL150 Part Numbers for Ordering

The following table provides ordering part numbers for the SL150. All drives listed are half-height. Oracle recommends a maximum SAS cable length of six meters.

Part Type	Description	Initial Order Part Number	Upgrade Part Number
Base Module	30 slots, one power supply, one HP LTO6 8Gb FC	7104475	N/A
Base Module	30 slots, one power supply, one HP LTO6 6Gb SAS	7104476	N/A
Base Module	30 slots, one power supply, one IBM LTO6 8Gb FC	7108767	N/A
Base Module	30 slots, one power supply, one IBM LTO6 6Gb SAS	7108768	N/A
Base Module	30 slots, one power supply, one IBM LTO7 8Gb FC	7114334	N/A
Base Module	30 slots, one power supply, one IBM LTO7 6Gb SAS	7114339	N/A
Base Module	30 slots, one power supply, one IBM LTO8 8Gb FC	7118433	N/A
Base Module	30 slots, one power supply, one IBM LTO8 6Gb SAS	7118432	N/A
Expansion Module	30 slots (contains no tape drive or power supply)	7101763	7101770
Tape Drive	HP LTO6 — 8Gb FC	7104473	7104449
Tape Drive	HP LTO6 — 6 Gb SAS	7104474	7104450
Tape Drive	IBM LTO6 — 8 Gb FC not OKM compatible	7108772	7108776
Tape Drive	IBM LTO6 — 6 Gb SAS not OKM compatible	7108771	7108775
Tape Drive	IBM LTO7 — 8 Gb FC not OKM compatible	7114335	7114343
Tape Drive	IBM LTO7 — 6Gb SAS not OKM compatible	7114338	7114345
Tape Drive	IBM LTO8 — 8Gb FC not OKM compatible	7118437	7118441
Tape Drive	IBM LTO8 — 6Gb SAS not OKM compatible	7118438	7118440
Tape Drive (activation file)	Encryption Key for LTO4/5/6/7 tape drives (one required for each drive enrolled with OKM)	LTO-ENCRYPT-ACTIVE	N/A
Power Supply	Power supply	7101769	7101771
Magazine	Pair of magazines: one left and one right	N/A	7101774
Ethernet Cable	CAT5E, 50 inches, shielded	CABLE10187035-Z-A	CABLE10187035-Z
Ethernet Cable	CAT5E, 8 feet, shielded	CABLE10187033-Z-A	CABLE10187033-Z
Ethernet Cable	CAT5E, 35 feet, shielded	CABLE10187034-Z-A	CABLE10187034-Z

Part Type	Description	Initial Order Part Number	Upgrade Part Number
Ethernet Cable	CAT5E, 55 feet, shielded	CABLE10187037-Z-A	CABLE10187037-Z
FC Cable ¹	LC-LC, 50/125/ duplex, riser, 1 meter	CABLE10800307-Z-A	CABLE10800307-Z
FC Cable ¹	LC-LC, 50/125/ duplex, riser, 3 meter	CABLE10800340-Z-A	CABLE10800340-Z
FC Cable ¹	LC-LC, 50/125/ duplex, riser, 5 meter	CABLE10800341-Z-A	CABLE10800341-Z
FC Cable ¹	LC-LC, 50/125/ duplex, riser, 2 meter	CABLE10800308-Z-A	CABLE10800308-Z
FC Cable ¹	LC-LC, 50/125/ duplex, riser, 10 meter	CABLE10800310-Z-A	CABLE10800310-Z
FC Cable ¹	LC-LC, 50/125,OM4, 50 meter, riser	7106951	7106952
FC Cable ¹	LC-LC, 50/125/ duplex, plenum, 10 meter	CABLE10800313-Z-A	CABLE10800313-Z
FC Cable ¹	LC-LC, 50/125/ duplex, OM4, 50 meter, plenum	7106953	7106954
SAS Cable	1x2, 3 M mini SAS to mini SAS cable	7100274	7100275
SAS Cable	1x1, 3 M mini SAS to mini SAS cable	7100276	7100277
SAS Cable ²	1x1, 3 M mini SAS HD to mini SAS cable	N/A	7106737
SAS Cable ²	1x1, 6 M mini SAS HD to mini SAS cable	N/A	7104500
SAS Cable ²	1x2, 5 M mini SAS HD to mini SAS cable	N/A	7111455
Power Cable	Japan, 2.5 m, METI plug, IEC60320-1-C13 connector, 15A	PWRCORD10083243-A	PWRCORD10083243-Z
Power Cable	Australia, 2.5 m, SA3112 plug, IEC60320-1-C13 connector, 10 A	PWRCORD10083244-A	PWRCORD10083244-Z
Power Cable	Italy, 2.5 m, CEI23 plug, IEC60320-1-C13 connector, 10 A	PWRCORD10083245-A	PWRCORD10083245-Z
Power Cable	Switzerland, 2.5 m, SEV1011 plug, 10A, IEC60320-1-C13 connector, 10 A	PWRCORD10083246-A	PWRCORD10083246-Z
Power Cable	United Kingdom, 2.5 m, BS1363A plug, 10A, IEC60320-1-C13 connector, 10 A	PWRCORD10083247-A	PWRCORD10083247-Z
Power Cable	Denmark, 2.5 m, DEMKO107 plug, IEC60320-1-C13 connector, 10 A	PWRCORD10083248-A	PWRCORD10083248-Z
Power Cable	South Africa, 2.5 m, BS546 plug, IEC60320-1-C13 connector, 16 A	PWRCORD10083636-A	PWRCORD10083636-Z
Power Cable	Europe, 2.5 meters, CEE 7/VII plug, IEC60320-1-C13 connector, 10 A	PWRCORD10187018-A	PWRCORD10187018-Z
Power Cable	North America, 2.3 m, NEMA 5-15 plug, IEC60320-1-C13 connector, 10 A	PWRCORD10187019-A	PWRCORD10187019-Z
Power Cable	North America, 3.0 m, NEMA 5-15 plug, IEC60320-1-C13 connector, 15 A	PWRCORD10187061-A	PWRCORD10187061-Z
Power Cable	Taiwan, 2.5 m, CNS10917 plug, IEC60320-1-C13 connector, 10 A	PWRCORD10187086-A	PWRCORD10187086-Z
Power Cable	Jumper, 1 m, straight IEC60320-2-2 Sheet E(C14)plug, right angle IEC60320-1-C13 connector, 10A. 250 VAC	333U-10-10-C14	PWRCORD10187055-Z
Power Cable	Argentina, 2.5 m, IRAM207	333A-25-10-AR	N/A
Power Cable	XATO, PWRCRD, 2.5 meter, Brazil C13	333A-25-10-BR	N/A
Power Cable	PWRCORD, CHINA, 2.5 meter, GB2099, 10A	333A-25-10-CN	N/A

Part Type	Description	Initial Order Part Number	Upgrade Part Number
Power Cable	PWRCORD, ISRAEL, 2.5 meter, SI-32, 10A	333A-25-10-IL	N/A
Power Cable	PWRCORD, INDIA, 2.5 meter, IS1293, 10A	333A-25-10-IN	N/A
Power Cable	PWRCORD, KOREA, 2.5 meter, KSC8305, 10A	333A-25-10-KR	N/A

¹ This multimode (50-micron) fiber-optic cables connect Fibre Channel devices. These cables are orange with tan LC connectors. The tape drive only supports LC connectors and short wavelength SFP modules. Riser cable materials are not classified according to flammability. Plenum cables meet UL standards for flammability.

² This cable supports a 12 Gb/s transfer rate, and it must be used when the tape drive is connected to a SAS-3 HBA. Two LTO tape drives can be connected to one SAS-3 HBA with this cable.

Configuration and Ordering Examples

Example 1: 30 cartridge library with an IBM LTO-7 FC drive, a second FC drive, and a second power supply (redundant power):

- 7114334 — Library, 30 slots with IBM LTO-7 half-height FC tape drive
- 7114335 — Drive, IBM LTO-7, half-height FC
- 7101769 — Power supply

Example 2: 60 cartridge library with two partitions, a total of four IBM LTO-6 drives (2 SAS and 2 FC), and four power supplies:

- 7108768 — Library, 30 slots with one IBM LTO-6 half-height SAS tape drive
- 7101763 — Expansion module, 30 slots
- 7108771 — Drive, IBM LTO-6, half-height SAS
- 7108772 — Drive, IBM LTO-6, half-height FC (x2)
- 7101769 — Power supply (x3)

Example 3: 90 cartridge library with one HP LTO-6 FC drive

- 7108767 — Library, 30 slots with one HP LTO-6 half-height FC tape drive
- 7101763 — Expansion module, 30 slots (x2).

Note that an expansion module receives power from the base module. The expansion module requires a power supply only when it contains a tape drive.

Example 4: Upgrade an existing library without partitions from 30 to 120 cartridges with a SAS drive in each module (power is not redundant):

- 7101770 — Expansion module, 30 slots (x3)
- 7104450 — Drive, HP LTO-6, half-height SAS (x3)
- 7101771 — Power supply (x3)

Ordering Media and Labels

- Call 1.877.STK.TAPE to order media from your local reseller or to obtain media pre-sales support.
- E-mail: tapemediaorders_ww@oracle.com

See the tape media area on the corporate website for additional information.

<https://www.oracle.com/storage/products.html#tape>

Click the **Show all Tape Storage products** link, and click the **StorageTek LTO Data Cartridges** link.

Installing the Library

Note: These installation instructions use the Sun Rack II (a standard Oracle 19-inch rack). If your rack is different, use the instructions as a basic guide but alter the steps accordingly.

Library installation involves the following tasks:

- [Verify the Site Meets Environmental Requirements](#)
- [Prepare the Rack](#)
- [Unpack and Acclimate the Library](#)
- [Install the Base Module](#)
- [Install the Expansion Module](#)
- [Install Power Supplies and Tape Drives](#)
- [Cable the Library](#)
- [Unlock the Robot](#)
- [Apply Power to the Library](#)
- [Configure the Library After Powering-on for the First Time](#)
- [Run a Self-Test](#)

Verify the Site Meets Environmental Requirements

For optimal reliability, maintain the environment between the recommended ranges.

Temperature:

- Operating: +10° to +40°C (+50° to +104°F)
- Non-operating -40° to +60°C (-40° to +140°F)

Relative Humidity:

- Operating: 20% to 80% (40% to 50% recommended) non-condensing
- Non-operating: 10% to 95% non-condensing

Airborne Contaminants Limits

Airborne particulates can damage equipment. The operating environment for the library must meet to the following requirements:

- ISO 14644-1 Class 8 Environment
- Total mass of airborne particulates must be less than or equal to 200 micrograms per cubic meter
- Severity level G1 per ANSI/ISA 71.04-1985

Particles ten microns or smaller are particularly harmful to most data processing hardware. Gasses that are particularly dangerous to electronic components include chlorine compounds, ammonia and its derivatives, oxides of sulfur, and petrol hydrocarbons. In the absence of appropriate hardware exposure limits, health exposure limits must be used.

Humidification with chlorinated water is a common source of airborne chlorine. Appropriately-designed carbon filters must be used to ensure safe levels of airborne chlorine when chlorinated water is used for humidification.

Table 2–1 Gas Limit Recommendations

Chemical	ASHRAE	OSHA (PEL)	ACGIH	NIOSH
Acetic Acid (CH ₃ COOH)	Not defined	10 ppm	Not defined	Not defined
Ammonia (NH ₃)	3500 µg/m ³	350 ppm	25 ppm	Not defined
Chlorine (Cl ₂)	2100 µg/m ³	31 ppm (c)	Not defined	0.5 ppm (c)
Hydrogen Chloride (HCl)	Not defined	5 ppm (c)	Not defined	Not defined
Hydrogen Sulfide (H ₂ S)	50 µg/m ³	320 ppm (c)	10 ppm	10 ppm
Ozone (O ₃)	235 µg/m ³	30.1 ppm	Not defined	Not defined
Petrol-hydrocarbons (C _n H _n)	Not defined	500 ppm	75 ppm	300 ppm
Sulfur Dioxide (SO ₂)	80 µg/m ³	35 ppm	2 ppm	0.5 ppm (c)
Sulfuric Acid (H ₂ SO ₄)	Not defined	1 ppm	Not defined	1 ppm (c)

Some basic precautions to follow:

- Do not allow food or drink into the data center.
- Do not store cardboard, wood, or packing materials in the data center clean area.
- Identify a separate area for unpacking new equipment from crates and boxes.
- Do not allow construction or drilling in the data center without first isolating sensitive equipment. Dry wall and gypsum are especially damaging to equipment.

Positive Pressurization and Ventilation - Hot Aisle Containment System (HACS)

If you will be installing the SL150 in an HACS environment, the system must maintain adequate air flow from the cold to hot aisle. Ensure that there is no turbulent air directed at the installed equipment which may reduce the cooling capability of the cold aisle supply air.

The HACS pressure differential should have neutral to negative pressure in the hot aisle. To achieve this, you may need to install rack doors on contributing or affected racks. If this is ineffective to reduce air impediment, you may need to install a supplemental air removal unit to boost airflow through the equipment.

Electrostatic Discharge

Be aware of the precautions needed when handling parts. A discharge of static electricity might damage static-sensitive devices which may reduce the life expectancy of the product.

Electrostatic Discharge Prevention

- 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 work areas.
- Place parts on a grounded surface before removing them from the container.
- Avoid touching pins, leads, or circuitry.
- Use proper grounding practices when touching a static-sensitive component or assembly.

Grounding Methods to Prevent Electrostatic Discharge

- Use a wrist strap connected by a ground cord to a grounded chassis.
- Use conductive field service tools.
- Use a portable field service kit with a folding static-dissipating work mat.

Note: If you do not have the suggested equipment for proper grounding, arrange for an authorized reseller to install the part.

Prepare the Rack

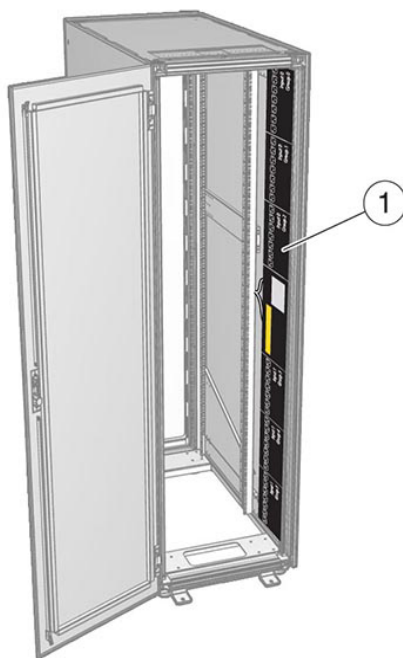
Rack Requirements

- Rack must contain four posts.
- Front and rear service clearance must be at least 965 mm (38 inches).
- Front of the rack must face the cool aisle and the rear face the warm aisle.
- Rack must be level (left to right and front to back). The installed library must remain level for proper operation.
- Vertical rail spacing should be between 457 mm (18 in) and 902 mm (35.5 in).
- Provide sufficient rack space to install the base module (3U) and any expansion modules (2U each).

Rack Preparation

- Position the power distribution unit (PDU) on the right side of the rack as viewed from the rear of the rack (see [Figure 2-1](#)). The power supply outlets are on the right side of the SL150 library. Refer to the rack and power distribution unit documentation for instructions to install the PDU
- To provide access during installation of a library module, remove the front door from the rack.

Figure 2–1 Rear View of Sun Rack II (PDU on Right Side)



L207_136

Illustration Legend:

1 - Power Distribution Unit (PDU)

Unpack and Acclimate the Library

1. Transport the packaged unit to the staging area. Use a pallet jack to transport the base module.
2. Remove plastic wrap and cut shipping straps.

Warning: An unpacked base module containing one tape drive and one power supply weighs approximately 21.5 kg (47 pounds).

3. Open the carton.
4. Remove the front rails from the base module packing material and set them aside.

Note: The rails will be used in a later instruction (see "[Install the Base Module Back Rails](#)").

5. Remove the foam pieces above the library module.
6. Remove the accessory package at the end of the module, and set it aside.
7. Remove the plastic covering the module.
8. Grasp the module by the sides, lift it out of the carton, and set it down.

Warning: Module is heavy. Use two persons when lifting it.

Note: Do not lift the Base Module by the front control panel, the tape drive, or the tape drive filler.

9. Acclimate the module to the environment.

Note: If the module is colder than the location and sufficient humidity exists, condensation may occur.

10. Remove the pallet and any packaging materials from your work area.

Install the Base Module

Installing the Base Module involves the following tasks:

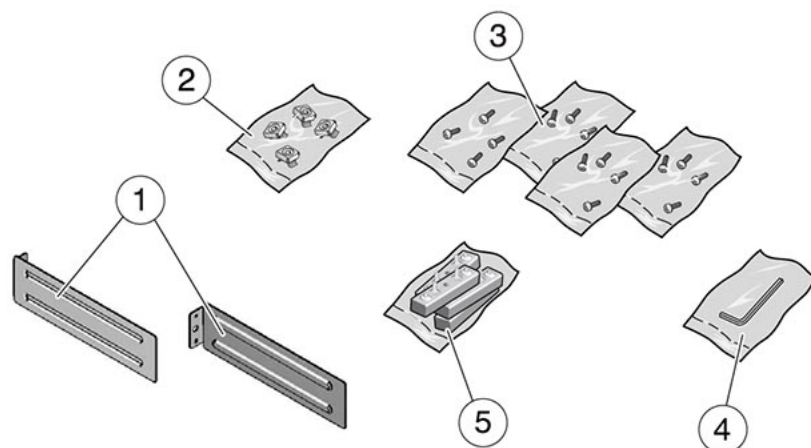
- [Unpack the Base Module Accessory Kit](#)
- [Install the Base Module Back Rails](#)
- [Install the Base Module Front Rails](#)
- [Mount the Base Module](#)

Unpack the Base Module Accessory Kit

The base module accessory package should contain the following:

- Back rails
- 10-32 clip nuts (used in racks with square holes)
- Assorted screws:
 - 8-32 X 5/8 screws (used with the mounting block)
 - 10-32 X 5/8 screws (used with clip nuts and racks with 10-32 threaded holes)
 - M5 0.8 X 16 mm screws (used with M5 threaded hole racks)
 - M6 16 mm screws (used with M6 threaded hole racks)
- Hex key (used to manually open a magazine)
- Mounting block

Figure 2-2 Base Module Accessory Package Mounting Hardware



L207_139

Illustration Legend:

- 1 - Back Rails**
- 2 - Clip Nuts**
- 3 - Screws (Assorted Types)**
- 4 - Hex Key**
- 5 - Mounting Block**

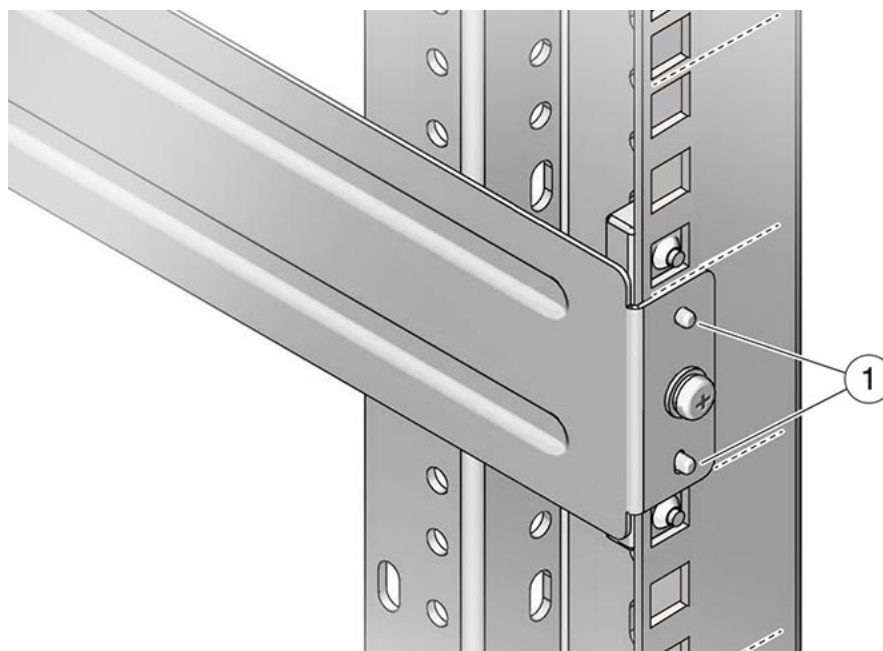
Install the Base Module Back Rails

Tools Required

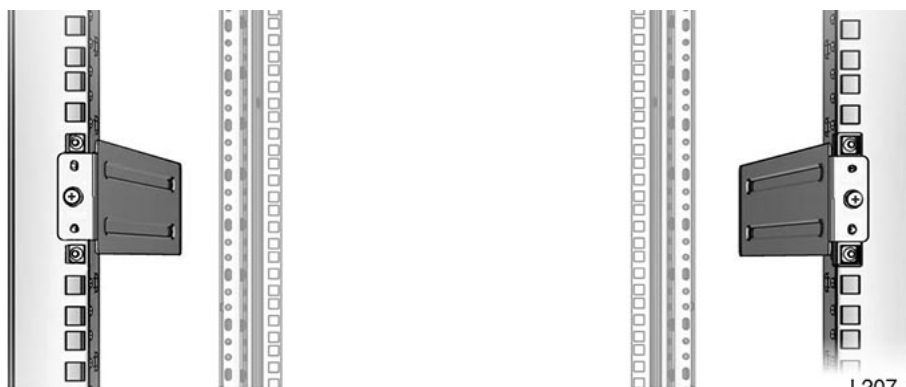
#2 Phillips screwdriver (not provided).

Parts Required

Back rails (1 left, 1 right)
Two Mounting blocks
Two 8-32 X 5/8 screws

Figure 2-3 Back Rail Position

L207_141

Illustration Legend:**1 - Pins****Figure 2-4 Back Rails Installed**

L207_142

1. Locate where you will mount the base module within the rack, allowing space for expansion modules (use the rail installation template as necessary).
The rails must reside with a single U boundary. Do not mount the block with the pins straddling a U boundary.
2. From the accessory kit, select the appropriate attachment hardware for your rack, and set the other hardware aside.

Note: A rack with square mounting holes uses the clip nuts and 10-32 X 5/8 screws (the M5 and M6 screws are only used in threaded hole racks).

3. Position the mounting block so the screw hole is in the second hole (center hole) of the rack unit. Position the back rail so the rail extends to the interior of the rack, align the mounting block pins with the holes in the rail bracket (see [Figure 2-3](#)).

Note: The pins and screw hole must be within the boundaries of a single rack unit.

4. Insert the 8-32 screw into the mounting block hole, and turn the screw several full turns by hand. Tighten the 8-32 screw with a #2 Phillips screwdriver.

Note: If this is a square hole installation, make sure the face of the mounting block is flush with the rack rail. In round hole racks, make sure the pins are within a rack unit and extend an equal distance (see [Figure 2-3](#)).

5. Make sure the wide surface of the back rail is plumb with the inside edge of the rack stile while maintaining an equal gap between the rack stile and the top and bottom edges of the back rail.

Note: The back rails should neither tilt in nor out.

6. Repeat the procedure for the back rail at the identical rack position on the opposite side of the rack.

Note: The top edges of the rails must be level with each other (see [Figure 2-4](#)).

Install the Base Module Front Rails

The front rail engages the back rail and is installed from the front of the rack (see [Figure 2-5](#)). Installation hardware involves three parts: front rail, mounting block, and an 8-32 screw.

Tools Required

#2 Phillips screwdriver.

Parts Required

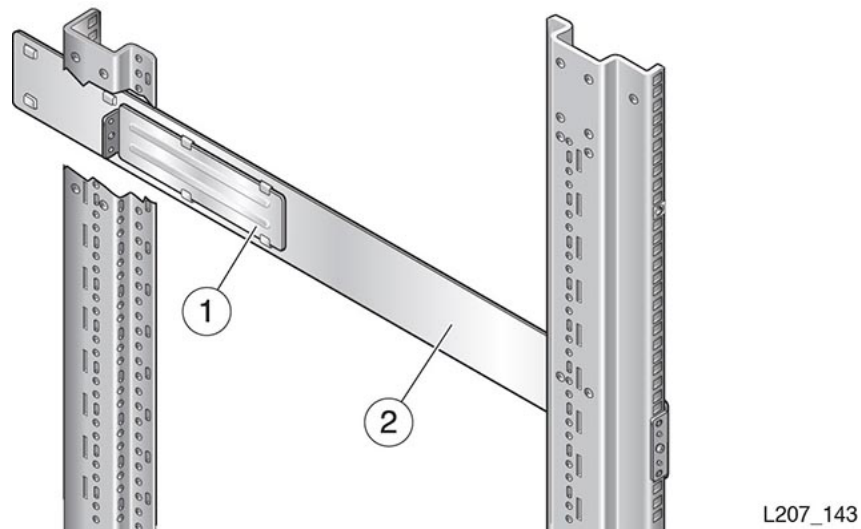
Front rails (1 left, 1 right)

Two Mounting blocks

Two 8-32 X 5/8 screws

Install Base Module Front Rails Task 1: Connect the Front Rail to the Back Rail

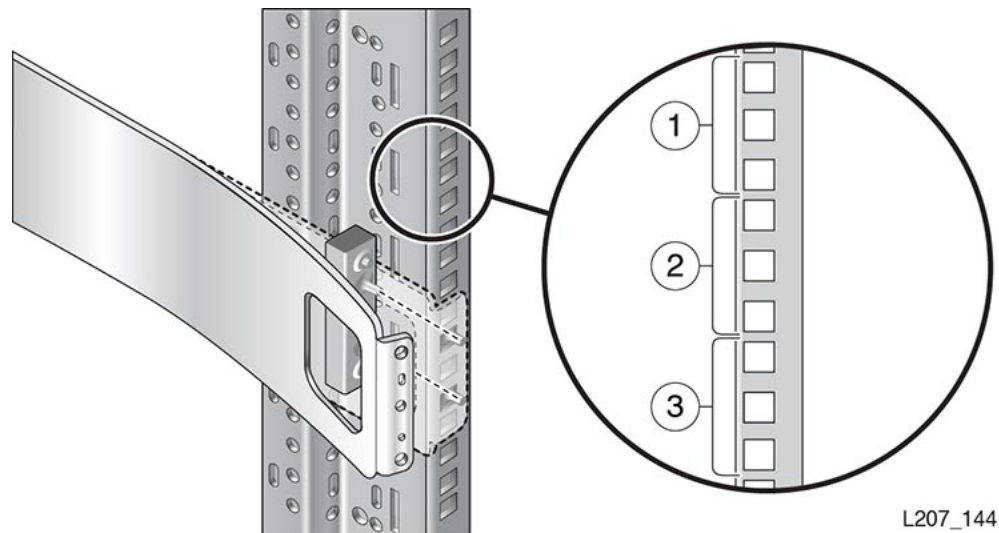
1. Position the front rail with the rail tabs toward the outside of the rack.
2. Slide the front rail toward the back rail to engage the tabs of the front rail.
3. Push the front rail into the rack until the front edge of the rail is approximately 60 mm (2.4 inches) from the rack stile.

Figure 2–5 Front Rail Installation (Left Rail Shown)**Illustration Legend:**

- 1 - Back Rail
- 2 - Front Rail

Install Base Module Front Rails Task 2: Secure the Front Rail

1. Position the mounting block behind the rack stile in the second U of the three U span (see [Figure 2–6](#)). You might need to flex the front of the rail away from the rack stile while positioning the mounting block.

Figure 2–6 Mounting Block for Front Rail (Right Rail Shown)**Illustration Legend:**

- 1 - First U
- 2 - Second U
- 3 - Third U

2. Hold the block in position. Push the front rail against the rack stile.

3. Insert the 8-32 screw through the hole in the front rail and thread the screw by hand a few turns into the mounting block.
4. Tighten the 8-32 screw with a Phillips screwdriver while making sure that the rail is plumb with the inside edge of the rack stile.

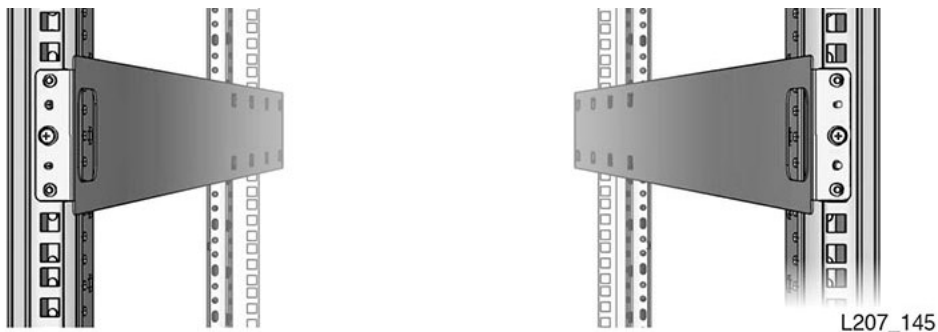
Note: The front rail should not tilt in or out.

5. Repeat to install other front rail on the other side of the rack

Install Base Module Front Rails Task 3: Verify Proper Front Rail Installation

1. Verify that the rack rails are parallel with each other (see [Figure 2-7](#)). If they are not parallel, reinstall the rails. Do not proceed unless the rails are parallel.
2. If your rack has threaded holes, proceed to "[Mount the Base Module](#)."

Figure 2-7 Rails Installed - Front View



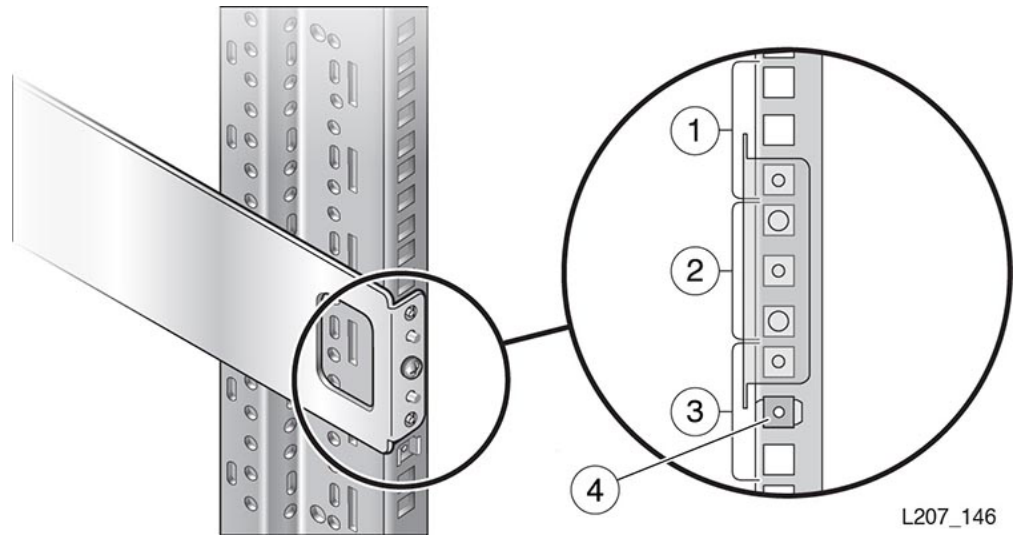
Install Base Module Front Rails Task 4: Install the Clip Nuts (square hole racks only)

Racks with square holes require a clip nut and a 10-32 X 5/8 screw (see [Figure 2-8](#)). The square clip nut is placed on the inside of the rack stile.

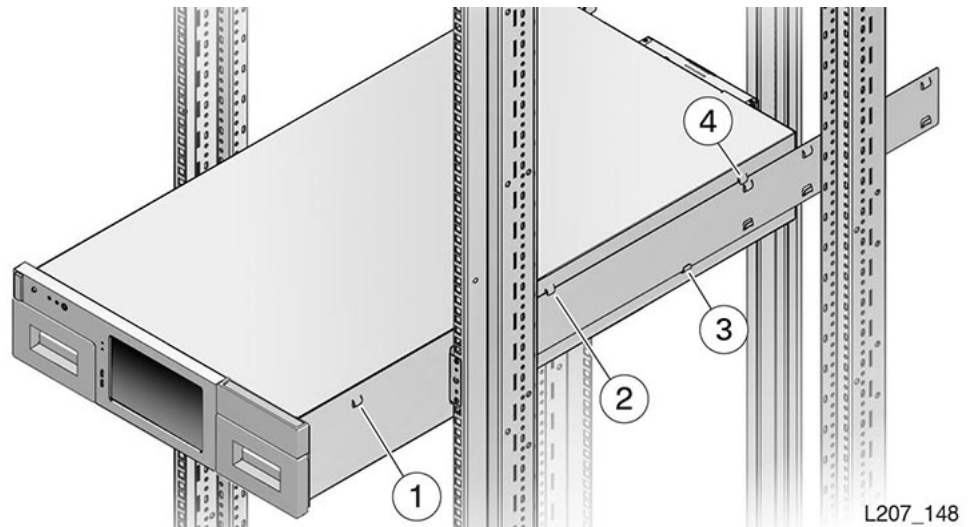
1. Locate the hole immediately below the front rail (second hole in the third U).
2. Seat one edge of the clip nut into the hole from the rear of the rack stile.

Tip: For better access to the compress the spring, position the clip nut tabs horizontally and seat the edge toward the outside of the stile first (see [Figure 2-8](#), callout 4).

3. Compress the other edge of the clip nut and seat it in the hole. A small flat blade screwdriver can simplify the compression.
4. Repeat for each front rail.

Figure 2–8 Clip Nut Location for the Base Module**Illustration Legend:**

- 1 - First U
- 2 - Second U
- 3 - Third U
- 4 - Clip Nut in the Second Hole of the Third U

Mount the Base Module**Figure 2–9 Tab and Rail Engagement****Illustration Legend:**

- 1 - Front Tab
- 2 - Center Tab
- 3 - Bottom Tab
- 4 - Rear Tab

Warning: The base module is heavy and requires two people to lift and install it.

Mount the Base Module Task 1: Engage the Base Module with the Rail

1. Grasp the module along the sides and lift the back above the rack rails.

Note: Never lift the module by the front control panel or the tape drive. Always lift the module from the side.

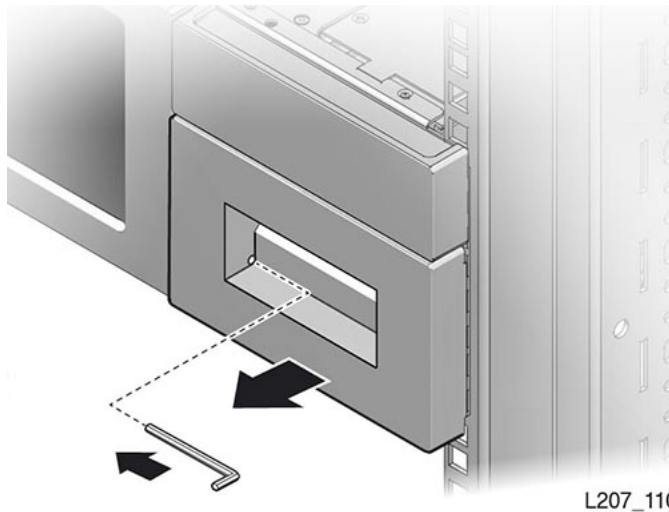
2. Guide the module into the rack and set the rear side-tabs on the rack rails (see [Figure 2-9](#)).

Note: If the module does not fit properly, remove it from the rack. Adjust the rail spacing as necessary. *Never* bend the base module side tabs.

3. Push the module into the rack to engage the bottom and center side tabs.
4. Push the module into the rack until the front side-tabs approach the front of the rack rails.
5. Lift the module up slightly, push it into the rack, and set the front tabs down on the rack rail.

Mount the Base Module Task 2: Remove the Cartridge Magazine with the Hex Key

1. Insert the hex key in the hole at the lower inside corner of the cartridge magazine.



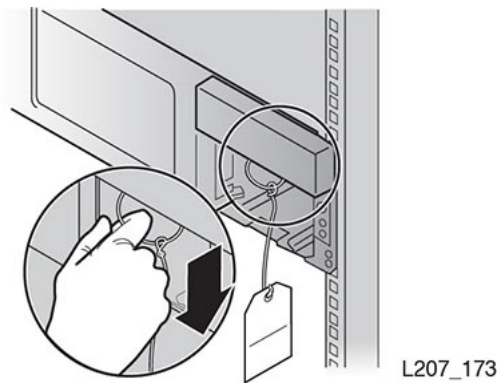
2. Align the hex key shaft parallel with the magazine face.
3. Push the tool slowly into the hole to release the latch located behind the touch screen, and hold the hex key in place.
4. Pull the magazine a short distance out of the library.
5. Remove the hex key and store it for future use.

6. Support the bottom of the magazine with your other hand during removal.
7. Pull the magazine out of the module, and set it aside.

Mount the Base Module Task 3: Remove the Cable Clip

1. Remove both cartridge magazines from the base module.
2. Locate the tag in the right cartridge magazine opening.
3. Grasp the ring and pull down.
4. Discard the cable clip unless you intend to reship the library after rack installation.

Figure 2–10 Cable Clip Removal



Mount the Base Module Task 4: Secure the Base Module to the Rack

1. Insert a screw through the bottom hole of the base module and thread it a few full turns.

Note: Use a 10-32, M5, or M6 screw depending on your rack hardware. Use the 10-32 screw when the rack has square mounting holes (the screw mates with the clip nut).

2. Insert a screw into the bottom hole on the other side of the module and thread it a few full turns.
3. Fully tighten both retaining screws.
4. Replace the cartridge magazines if you are not installing expansion modules.

Note: Left and right magazines are unique. Orient the magazine so the cartridge openings face the Front Control Panel.

Do not put cartridges in the magazine slots.

Install the Expansion Module

Installing the Expansion Module involves the following tasks:

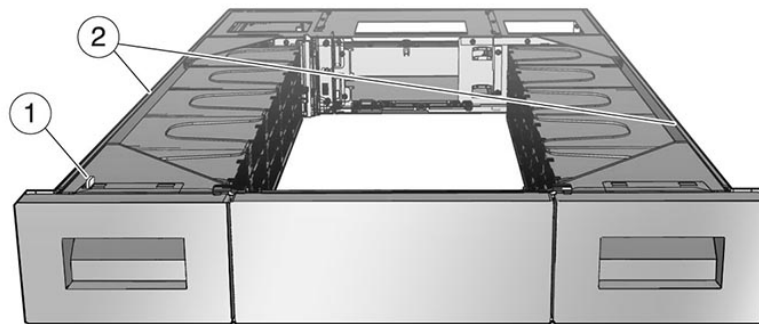
- [Unpack the Expansion Module Accessory Kit](#)
- [Remove the Library Floor](#)
- [Install Clip Nuts for the Expansion Module \(for square hole racks only\)](#)

- Prepare the Expansion Module by Removing the Cartridge Magazines
- Mount the Expansion Module
- Install the Rear Rails for the Expansion Module
- Secure the Expansion Module to the Front Rack Stile
- Replace the Cartridge Magazines

Tools Required

#2 Phillips screwdriver.

Figure 2–11 Expansion Module



L207_150

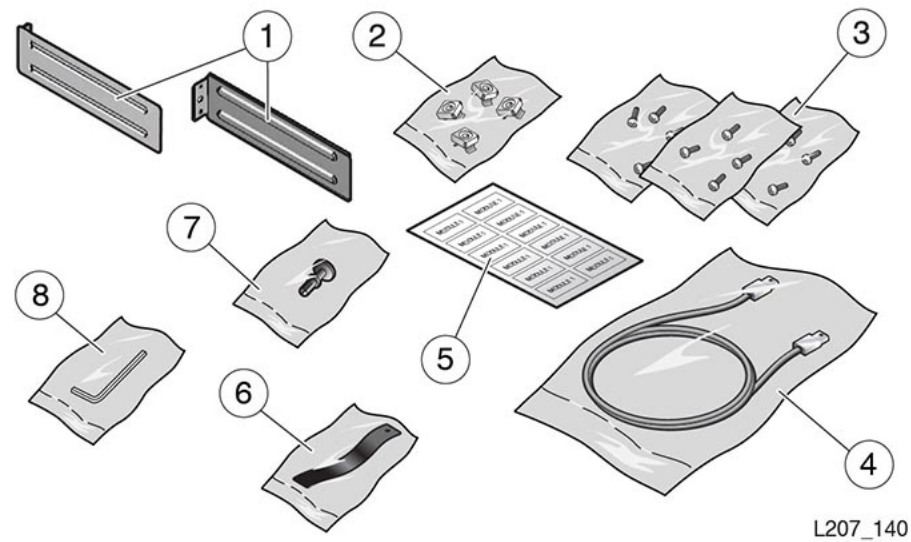
Illustration Legend:

- 1 - Alignment Tab
- 2 - Flanges

Unpack the Expansion Module Accessory Kit

Each expansion module accessory kit should contain the following:

- Back rails
- 10–32 clip nuts (used in racks with square holes)
- Assorted screws:
 - 10–32 X 5/8 screws (used with clip nuts and racks with 10–32 threaded holes)
 - M5 0.8 X 16 mm screws (used with M5 threaded hole racks)
 - M6 16 mm screws (used with M6 threaded hole racks)
- Expansion interconnect cable with USB Type A connectors
- Label set (Module 2 through Module 10)
- Hook and loop strap
- Pop-in rivet
- Hex key

Figure 2–12 Expansion Module Accessory Package Hardware

L207_140

Illustration Legend:

- 1 - Back Rails
- 2 - Clip Nuts
- 3 - Screws (Assorted)
- 4 - Expansion Cable with USB Type A Connectors
- 5 - Module Labels
- 6 - Hook and Loop Strap
- 7 - Rivet
- 8 - Hex Key

Remove the Library Floor

1. If you are upgrading an existing library, power down the library (see ["Power Off the Library"](#) on page 9-2) and verify that you have locked the robot. Otherwise, skip to the next step.
2. Remove the cartridge magazines from the bottom module of the library (see ["Mount the Base Module Task 2: Remove the Cartridge Magazine with the Hex Key"](#) on page 2-12).
3. Grasp the holds on the front edge of the floor in the magazine bay (see figure below).
4. Pull the floor out the front of the module, and set it aside.

Note: If the floor does not move, reach through the magazine opening and push down on the floor behind the touch screen panel to unseat the floor locking tabs. Then pull the floor forward.

Figure 2–13 Library Floor Removal from the Base Module

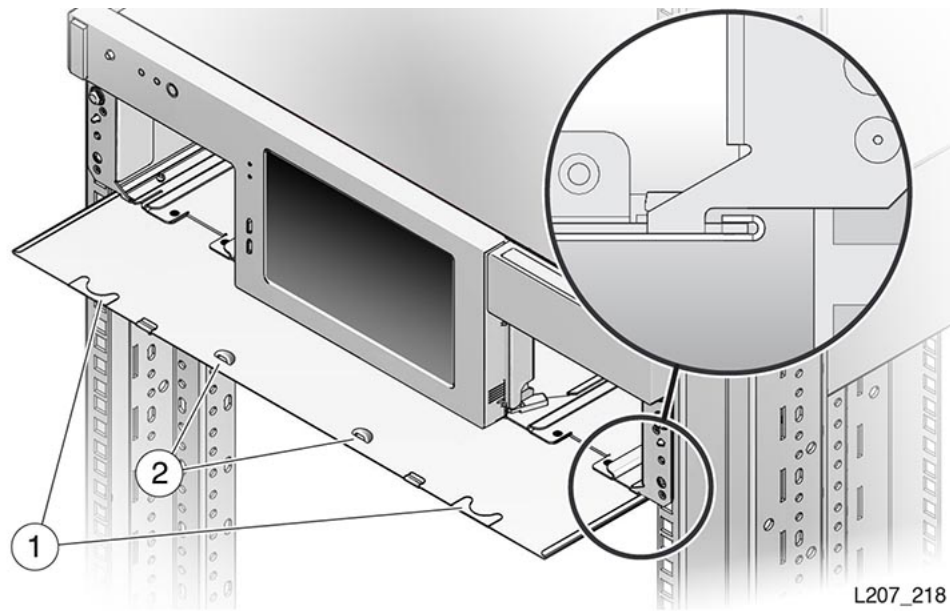


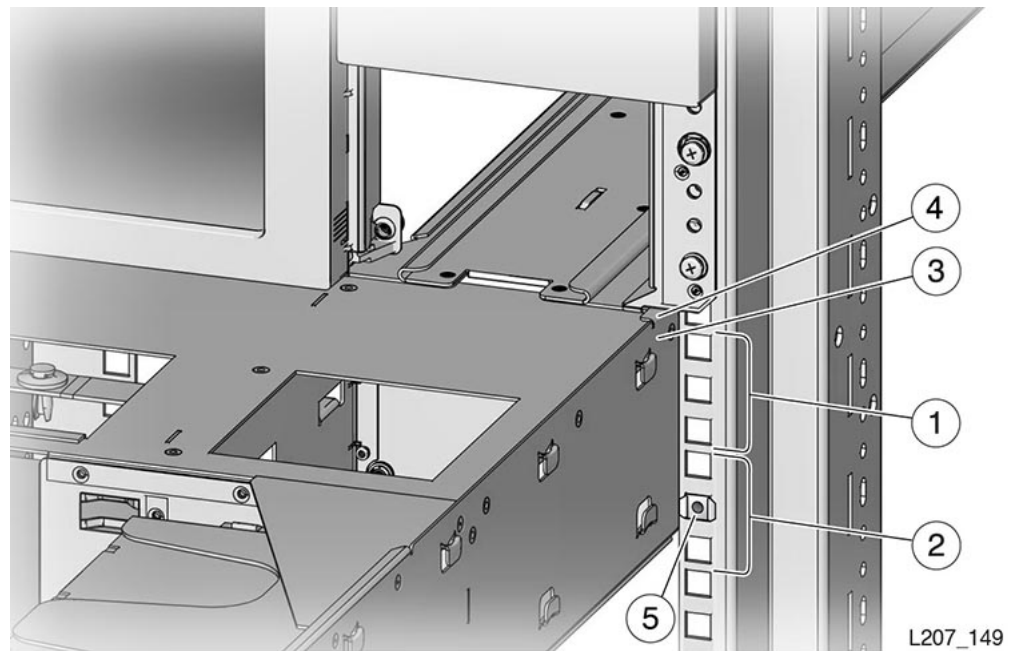
Illustration Legend:

- 1 - Floor Finger Holds**
- 2 - Floor Lock (Improved Floor Design)**

Install Clip Nuts for the Expansion Module (for square hole racks only)

Note: If the rack has threaded holes, skip to "[Prepare the Expansion Module by Removing the Cartridge Magazines](#)" on page 2-17.

1. Locate the middle hole of the second U (fifth hole down from the junction of the first U boundary) on both the left and right rail stiles (see [Figure 2–14](#)) for installation of the clip nut. Use the Rail Installation Template, if desired.
2. For each clip nut location:
 - a. Seat one edge of the clip nut into the hole from the back of the rack stile.
 - b. Compress the other edge of the clip nut and seat it in the hole.
3. Make sure the clip nuts are parallel (in the identical mounting hole).
4. Locate the 2U space at the back of the rack directly below the installed module.
5. Insert a clip nut in the third hole down from the junction of the first U boundary on both the left and right rail stiles.
6. Make sure the clip nuts are parallel (in the identical mounting hole).

Figure 2–14 Expansion Module Installation**Illustration Legend:**

- 1 - First U
- 2 - Second U
- 3 - Module Flange
- 4 - Module Engagement
- 5 - Clip Nut Location (Second Hole of the Second U)

Prepare the Expansion Module by Removing the Cartridge Magazines

1. Remove the expansion module from the shipping container (see "[Unpack and Acclimate the Library](#)" on page 2-4).
2. Reach behind the front panel and lift the latch to release the magazine (see [Figure 2–15](#)).

The expansion module is open at the top, and the latches are located behind the front face of the module.

Tip: You can also release the magazine with the hex tool.

3. Remove the cartridge magazines from the module you are installing.

Figure 2–15 Magazine Latches

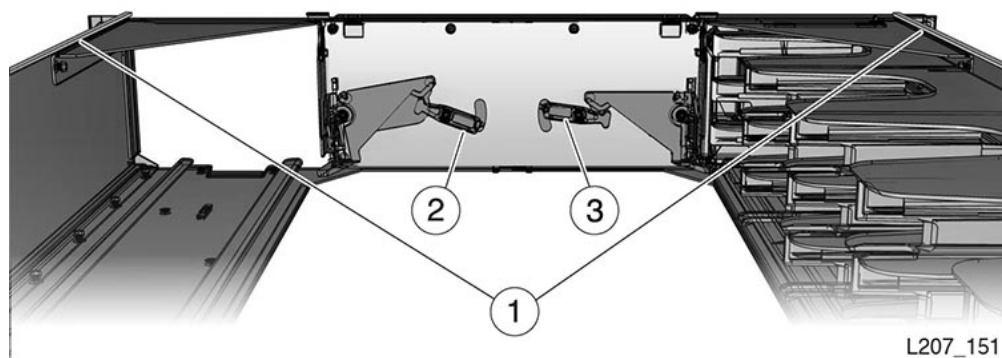


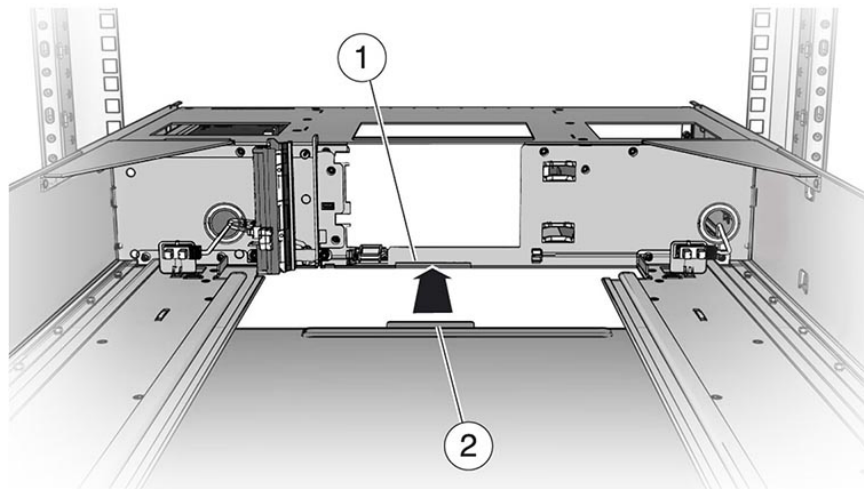
Illustration Legend:

- 1 - Module Flanges**
- 2 - Unlatched Position**
- 3 - Latched Position**

Install the Floor in the Bottom Expansion Module

IMPORTANT: Only perform this procedure for the bottom module.

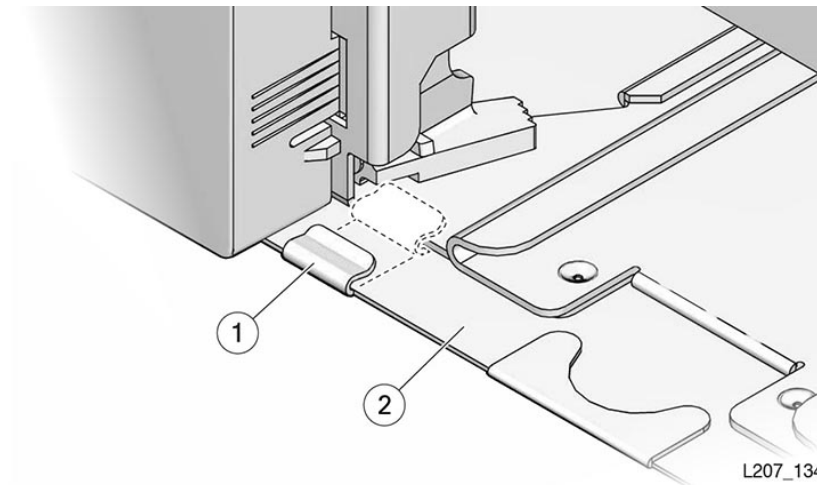
1. Turn the module over.
2. Orient the floor so the finger holds are facing the inside of the cartridge magazine slot (see [Figure 2–13](#)).
3. Insert the rear edge of the floor into the grooves at the bottom of the module.
4. Push the floor in and engage the rear floor tab with the module slot (see [Figure 2–16](#)).
5. Push the floor in and seat the floor clip in each magazine bay (see [Figure 2–17](#)).
6. Turn the module over and verify the floor clips properly engage the chassis.

Figure 2-16 Library Floor

L207_111

Illustration Legend:

- 1 - Floor Slot
- 2 - Floor Tab

Figure 2-17 Floor Secured

L207_134

Illustration Legend:

- 1 - Floor Clip
- 2 - Floor

Mount the Expansion Module

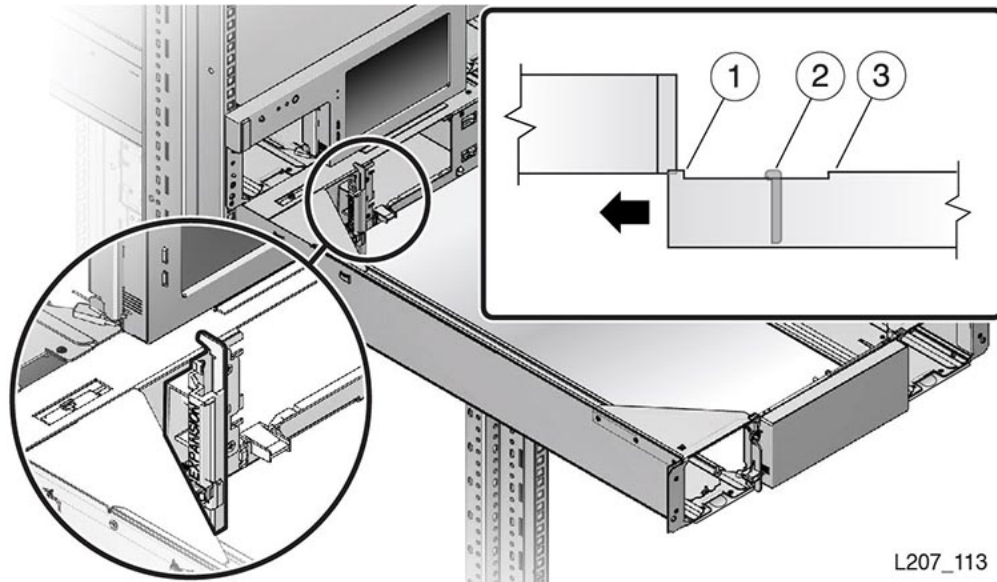
Warning: Two people must lift and install the expansion module. Grasp the module by the sides. Do not lift the module by the tape drive filler.

1. Lift the module to the bottom of the installed module.
2. Insert the rear edge of the module flange into the grooves on the bottom edge of the installed module and push the 2U expansion module in approximately 75 millimeters (3 inches).
3. Lower the front edge of the module approximately 10 mm (0.4 inch), guide any sharp metal edges away from the upper module front panel, and push the module in until the sharp edges are past the front panel (see [Figure 2-18](#)).

Note: Do not scratch the front panel of the module above.

4. Raise the front of the 2U module, push the module in, and engage the module left and right side flanges with the grooves in the previous module.
5. Push the module in and seat the alignment tab in the slot of the left magazine bay (see [Figure 2-19](#)).

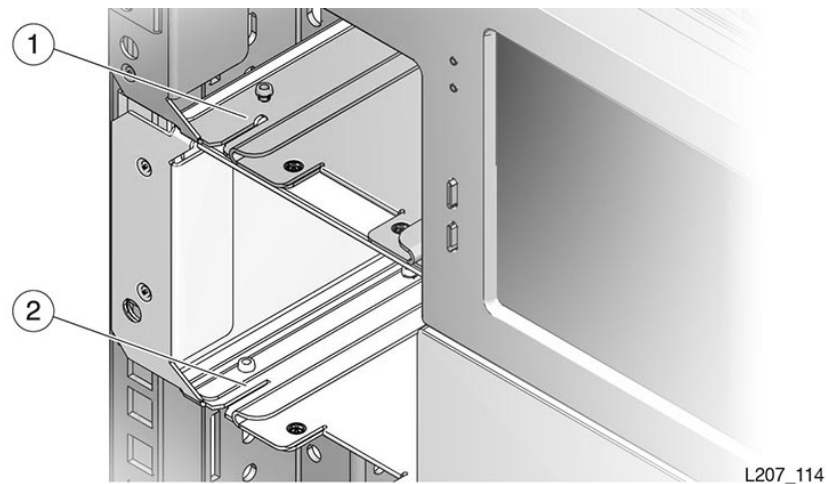
Figure 2-18 Scratch Avoidance



L207_113

Illustration Legend:

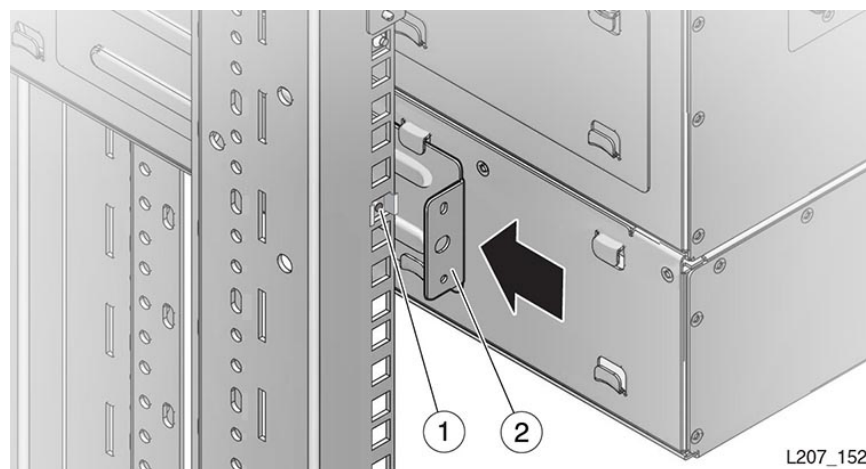
- 1 - Flange (Short Section)
- 2 - Tall Metal Part with Sharp Edges
- 3 - Flange (Long Section)

Figure 2–19 Alignment Tab Seated**Illustration Legend:**

- 1 - Tab Seated in Slot
- 2 - Slot in Magazine Bay

Install the Rear Rails for the Expansion Module

1. Slide the back rail under the expansion module tabs (see [Figure 2–20](#)).
2. Repeat for the rail on the other side of the module.

Figure 2–20 Expansion Module Back Rail and Clip Nut**Illustration Legend:**

- 1 - Clip Nut
 - 2 - Rear Rail
3. Push the back rail against the rack vertical rail.
 4. Secure the back rail to the rack vertical rail with a screw.

Tip: Use a 10-32 screw when a rack has square holes (the screw mates with a clip nut).

5. Repeat this task for the rail on the other side of the module.

Secure the Expansion Module to the Front Rack Stile

Tip: Use a 10-32 screw when a rack has square holes (the screw mates with a clip nut).

1. Insert a screw in the lower left side of the module and thread it a few turns.
2. Insert a screw in the lower right side of the module and thread it a few turns.
3. Fully tighten both screws.
4. Install another expansion module (see "[Unpack the Expansion Module Accessory Kit](#)").

Replace the Cartridge Magazines

Note: Left and right magazines are unique.

1. Orient the magazine with the cartridge slots facing toward the center of the module.

Note: Do not put cartridges in the magazine slots.

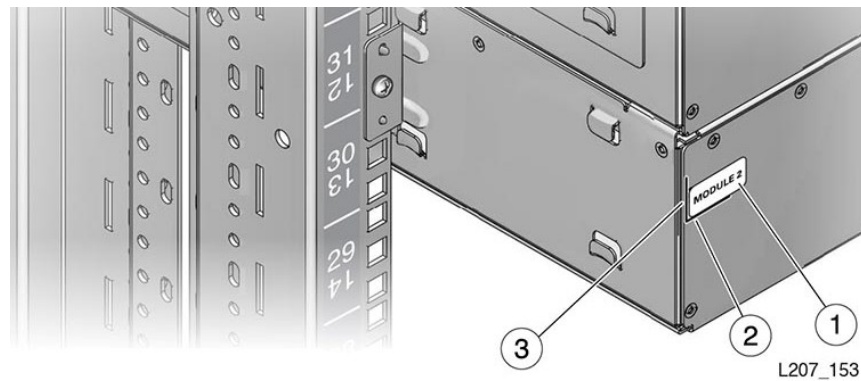
2. Lift the magazine and point the back toward the module slot.
3. Engage the magazine with the track in the magazine slot.
4. Push the magazine fully into the slot.
5. Repeat as necessary until each expansion modules has two magazines.

Label the Modules

1. Locate the scribe lines in the upper left corner of the expansion module (as viewed from the back of the rack).
2. Obtain the module label sheet from the accessory kit.
3. Peel the proper label from the label sheet.

Note: The sheet has labels for Module 2 through Module 10.

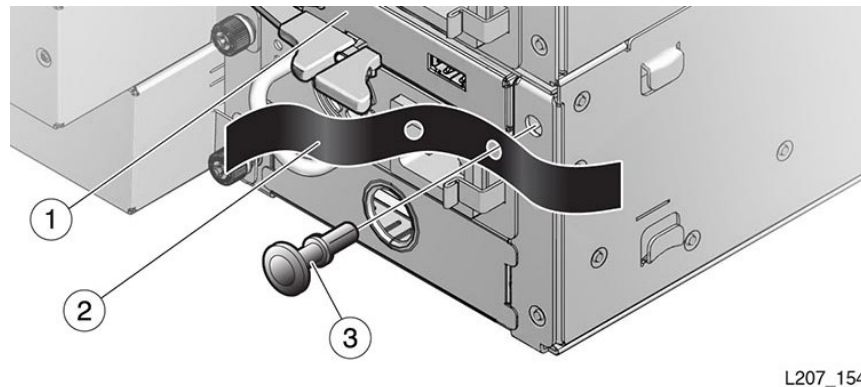
4. Orient the label properly, align the label with the scribe lines, and adhere the label to the chassis (see [Figure 2-21](#)).

Figure 2–21 Expansion Module ID Label**Illustration Legend:**

- 1 - Module Label
- 2 - Horizontal Scribe Line
- 3 - Vertical Scribe Line

Install the Hook and Loop Strap

1. Insert the rivet into a hole in the hook and loop strap (see [Figure 2–22](#)).

Figure 2–22 Hook and Loop Strap**Illustration Legend:**

- 1 - Module Controller
- 2 - Hook and Loop Strap
- 3 - Rivet

2. Pull the plunger back from the rivet face.
3. Align the rivet with the hole beside the module controller.
4. Push the rivet into the hole.
5. Push the plunger in to secure the rivet.

Install Power Supplies and Tape Drives

Note: If you are not installing additional drives or power supplies, skip to "Cable the Library" on page 2-27.

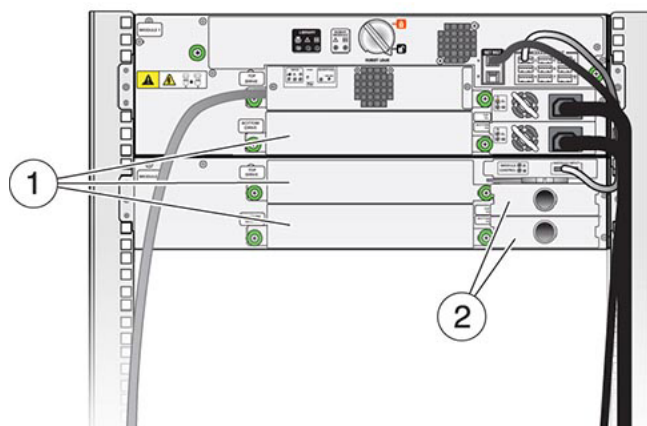
- Remove the Power Supply Filler
- Insert a Power Supply into the Slot
- Remove a Tape Drive Filler
- Insert a Tape Drive Tray into the Slot

The power supply and tape drive can be added while the library is powered-on. However, you must *restart* the library for it to recognize and account for the tape drive if the library is not set to address all drive slots.

The instructions in this chapter have you remove the power supply or drive filler and immediately insert the new power supply or tape drive in the open slot.

Warning: Do not operate the library with open tape drive or power supply slots.

Figure 2-23 SL150 Library Rear View



L207_168

Illustration Legend:

1 - Tape Drive Filler

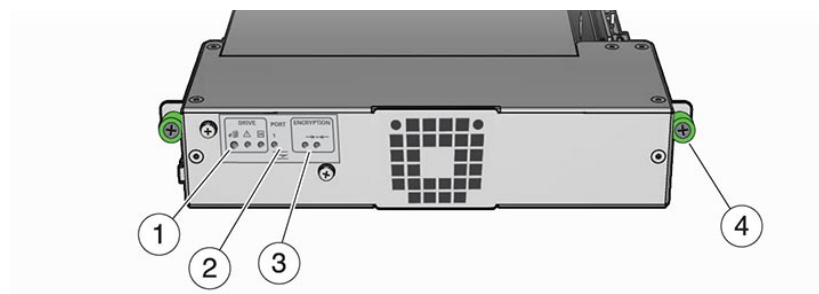
2 - Power Supply Filler

Figure 2-24 Power Supply

L207_115

Illustration Legend:

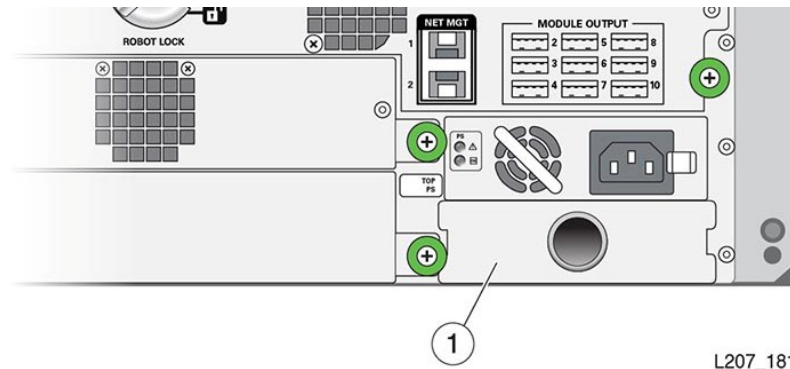
- 1 - Power Supply Indicators
- 2 - Power Supply Latch

Figure 2-25 Tape Drive Tray**Illustration Legend:**

- 1 - Drive Indicators
- 2 - Port Indicators (HP drives only)
- 3 - Encryption Indicators
- 4 - Thumbscrew (One on Each Side of the Tray)

Remove the Power Supply Filler

1. Hook your finger in the hole of the power supply filler.
2. Pull the filler from the power supply slot and set it aside.



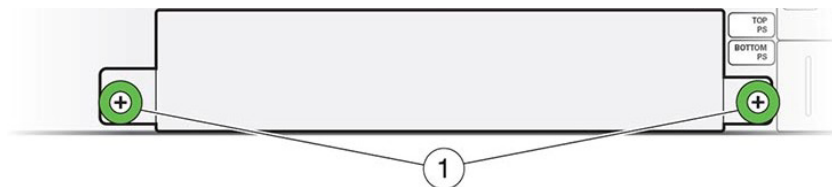
L207_181

Insert a Power Supply into the Slot

1. Remove the power supply from the shipping carton.
2. Grasp the power supply by the handle with one hand and support the bottom of the supply with your other hand.
3. Guide the power supply into the power supply slot.
4. Make sure the power supply is latched in place.
5. Connect a power cord to the power supply receptacle and a receptacle on the rack power strip.
6. Gather cord slack to the outside of the library and wrap the hook and loop strap(s) around the cord.

Remove a Tape Drive Filler

1. Loosen the thumbscrew on each side of the tape drive filler.



L207_162

2. Grasp the captive screws and pull the filler toward you.
3. Remove the filler from the drive slot and set it aside.

Insert a Tape Drive Tray into the Slot

Caution: Equipment damage. Do not touch the drive tray circuit card or static sensitive components. The circuit card is located on the right side of the drive tray (see [Figure 2-25](#)).

1. Follow accepted practices to prevent ESD.
2. Remove the drive tray from the shipping carton. Handle the drive tray by the rear corners (close to the thumbscrews) and the bottom of the tray. Avoid contact with the top cover of the actual tape drive.

3. Grasp the rear corners of the drive tray and guide the front of the drive tray into the library drive slot. Push the drive tray completely into the drive slot.
4. Tighten the thumbscrews. Ensure there is no tray movement in any direction.
5. Connect the interface cable to the port on the left side of the drive.

Cable the Library

- [Cable the Library Task 1: Cable the Expansion Modules](#)
- [Cable the Library Task 2: Connect Cables to the Drive Assembly and Power Supply](#)
- [Cable the Library Task 3: Connect the Network Port](#)
- [Cable the Library Task 4: Align and Dress the Cables and Cords](#)

Cable the Library Task 1: Cable the Expansion Modules

Connect expansion interconnect cables between the ports listed in the table below.

These Output Ports:	Connect to:
Base Module Output Port 2	Module 2 Controller Input Port
Base Module Output Port 3	Module 3 Controller Input Port
Base Module Output Port 4	Module 4 Controller Input Port
Base Module Output Port 5	Module 5 Controller Input Port
Base Module Output Port 6	Module 6 Controller Input Port
Base Module Output Port 7	Module 7 Controller Input Port
Base Module Output Port 8	Module 8 Controller Input Port
Base Module Output Port 9	Module 9 Controller Input Port
Base Module Output Port 10	Module 10 Controller Input Port
Module 1 thru 5 Controller Output	Do not connect anything. Leave dust cover in place.
Module 6 Controller Output Port	Module 11 Controller Input Port
Module 7 Controller Output Port	Module 12 Controller Input Port
Module 8 Controller Output Port	Module 13 Controller Input Port
Module 9 Controller Output Port	Module 14 Controller Input Port
Module 10 Controller Output Port	Module 15 Controller Input Port
Module 11 thru 15 Controller Output	Do not connect to anything. Leave dust cover in place.

Figure 2–26 Base Module Output Ports (ports 2 through 10)

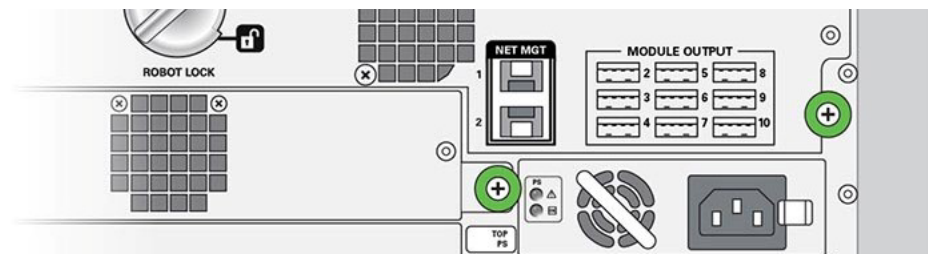
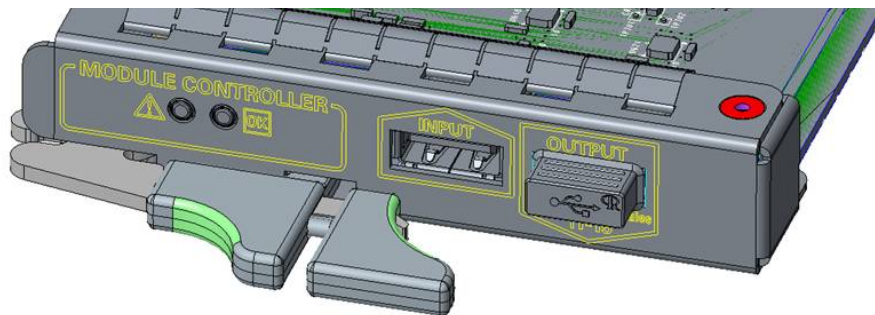


Figure 2–27 Module Controller Ports (Output port shown with dust cover)

Cable the Library Task 2: Connect Cables to the Drive Assembly and Power Supply

1. For each power supply, connect the power cord to power supply and the power distribution unit in the rack.
2. For each installed tape drive, connect the interface cable(s) to the tape drive interface port(s). Attach a label indicating the tape drive position in the module and port to ensure proper connection after a service action.

Note: The interface port is located on the left side of the drive tray assembly (as viewed from the rear of the library).

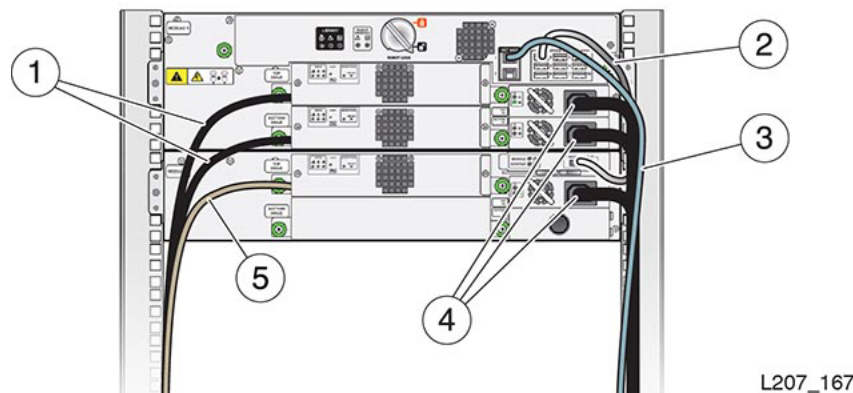
Figure 2–28 Initial Cabling

Illustration Legend:

- 1 - Tape Drive Fibre Channel Cable
- 2 - Expansion Cable
- 3 - Ethernet Cable (Net Mgt Port 1)
- 4 - Power Supply Cord
- 5 - Tape Drive Serial Attached SCSI (SAS) Cable

Cable the Library Task 3: Connect the Network Port

1. Locate the NET MGT area of the base module (above the power supply and left of the Module Output ports).
2. Insert the Ethernet cable plug in the top port, designated with a 1 on the chassis.

3. Attach a label to the cable indicating the network port to ensure proper connection after a service action.

Cable the Library Task 4: Align and Dress the Cables and Cords

1. Gather cable slack to the outside edge of the expansion module, if necessary.
2. Wrap the hook and loop strap around the cables and cords.
3. Stow excess cord and cable length into the cavity between the rack stile and the side cover.

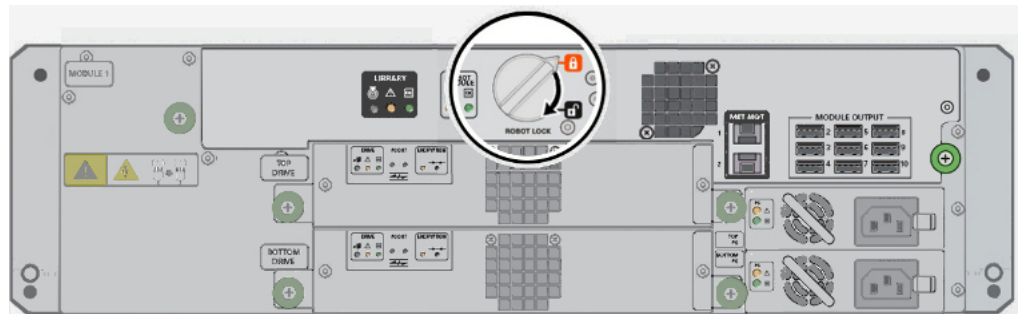
Unlock the Robot

Locate the robot lock on the back of the base module. Follow the instructions that match your lock type:

- [Unlock the Knob-type Robot Lock \(newer version\)](#)
- [Unlock the Thumbscrew-type Robot Lock \(older version\)](#)

Unlock the Knob-type Robot Lock (newer version)

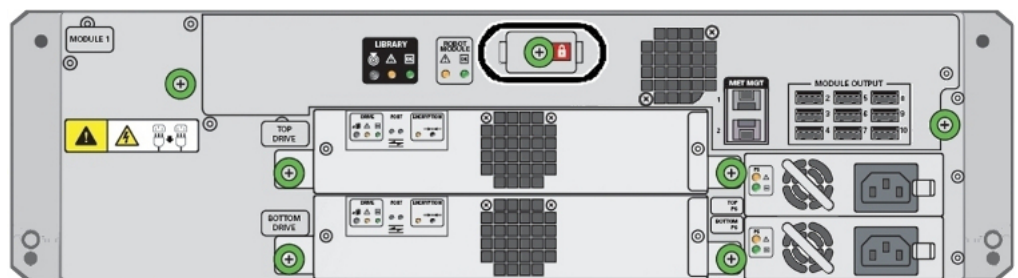
Turn the knob clockwise until it clicks into place.



The pointer on the knob should point past the black, unlocked padlock icon:.

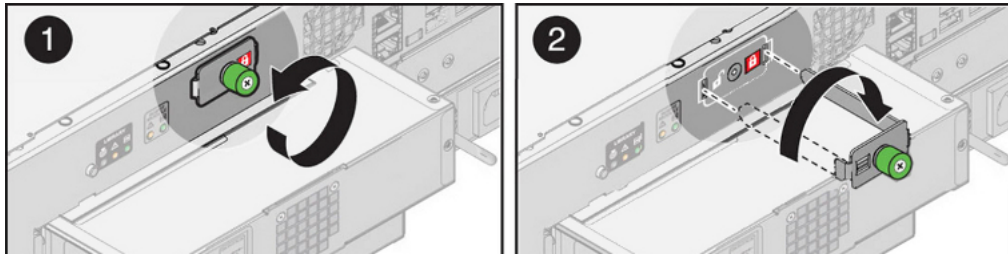


Unlock the Thumbscrew-type Robot Lock (older version)



1. Loosen the thumbscrew. Pull the lock assembly straight out until the long tab comes out of the slot at left.

2. Rotate the lock clockwise 180 degrees, and slide the long tab into the slot at right. Verify that the white unlocked padlock icon is visible in the small window.



3. Secure the lock assembly by tightening the captive screw.

Apply Power to the Library

1. Make sure the robot is unlocked.
2. Press the power button on the front panel of the base module.

The time duration of the startup varies based the size of the library. See the ["Library Startup Sequence"](#) on page 9-2 for what the library does during the startup.

Note: Do not manually remove a cartridge magazine while the library is performing a restart. Only perform a manual cartridge magazine removal when the library is *operational* and *offline*.

Configure the Library After Powering-on for the First Time

Use the front touch screen to perform initial library configuration.

Note: The Initialization Wizard in code versions before 2.0 did not include setting the drive element addressing mode or configuring the mailslots.

- [Configure the Library: Login with the Default Admin](#)
- [Configure the Library Step 1 of 6: Change the Default Administrator Password](#)
- [Configure the Library Step 2 of 6: Configure the Network Port 1](#)
- [Configure the Library Step 3 of 6: Set the Library Date and Time](#)
- [Configure the Library Step 4 of 6: Set the Drive Element Addressing Mode\)](#)
- [Configure the Library Step 5 of 6: Configure the Mailslot, Reserved Slots and Volume Label Format](#)
- [Configure the Library Step 6 of 6: Review and Apply Initialization Settings](#)
- [Configure the Library: Finish the New Configuration](#)

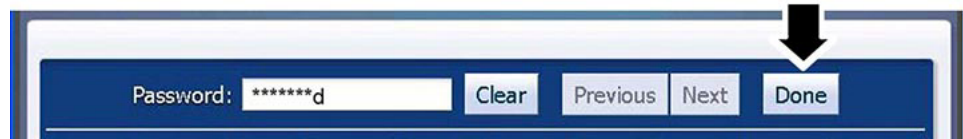
Configure the Library: Login with the Default Admin

1. After powering on the library for the first time, tap **Start**.

2. Log in as the default admin user.
3. Tap the **keyboard** button. Enter the default password: `passw0rd`



4. Tap **Done**.



5. Tap **Log In**.

Configure the Library Step 1 of 6: Change the Default Administrator Password

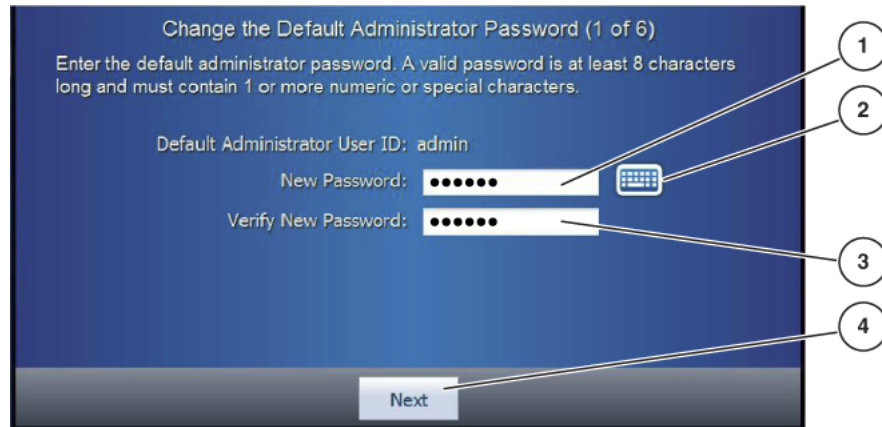


Figure Legend:

- 1 - New Password Field
- 2 - Keyboard Button
- 3 - Verify New Password Field
- 4 - Next Button

1. Tap the **keyboard** button .
2. Enter a new administrator password and then tap **Next**.

Note: The password must be at least eight characters long and contain one or more numeric or special characters. The value `passw0rd` is invalid.

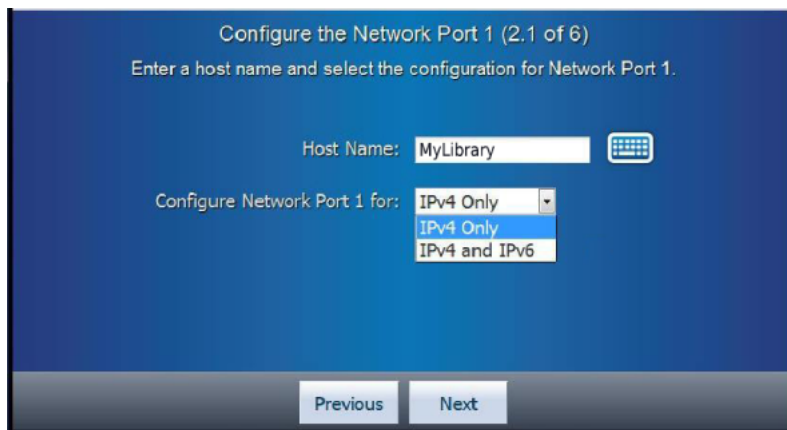
3. Enter the new password again in the **Verify New Password** field.
Make sure to remember the default user ID (`admin`) and your *new* password.
4. Tap **Done**.

Note: The six large dots in the password fields do not represent the actual number of characters you entered for the password.

If an error message appears, click the keyboard button to access the keyboard screen and clear the password field before you tap any key. Repeat previous steps as necessary to correct the password entries.

5. Tap **Next**.

Configure the Library Step 2 of 6: Configure the Network Port 1



1. Enter the host name:
 - a. Tap the **Keyboard** button.
 - b. Clear the default value. Enter a new host name and then tap **Next**.
Valid host names contain the following characters: **A** through **Z**, **a** through **z**, **0** through **9**, and the hyphen (-). A hyphen cannot be the first or last character in the host name.

Note: Neither the space nor the underscore (_) is supported.

- c. Select an IP address type: **IPv4 only** or **IPv4 and IPv6**.
 - d. Tap **Next**.
2. *Option 1:* Configure Network Port 1 with an IPv4 Address
 - a. Use the Configure IPv4 list to select either **Static** or **DHCPv4**.
If you select **DHCPv4**, for a successful startup, DHCPv4 must be running on your network.
If you select **Static**, tap the **keyboard** button and then enter the following:
 - **Address** — Clear the default value. Enter the IPv4 Address in the format XXX.XXX.XXX.XXX and then tap **Next**.
 - **Netmask** — Clear the default value. Enter the IPv4 Netmask in the format XXX.XXX.XXX.XXX and then tap **Next**.
 - **Gateway** — Clear the default value. Enter the IPv4 Gateway value in the format XXX.XXX.XXX.XXX and then tap **Done**.

- b. Verify the values are correct (you can change any incorrect value by tapping the keyboard button). Tap **Next**.
 3. *Option 2: Configure Network Port 1 with an IPv6 Address*
 - a. Use the Configure IPv6 list to select **DHCPv6**, **Stateless (SLAAC)**, or **Static**.
 - If you select the DHCPv6 option, for a successful startup, DHCPv6 must be running on your network.
 - If you selected **Static**, you must enter the IPv6 Address, Prefix Length, and Gateway.
 - b. Verify the values are correct (you can change any incorrect value by tapping the keyboard button). Tap **Next**.

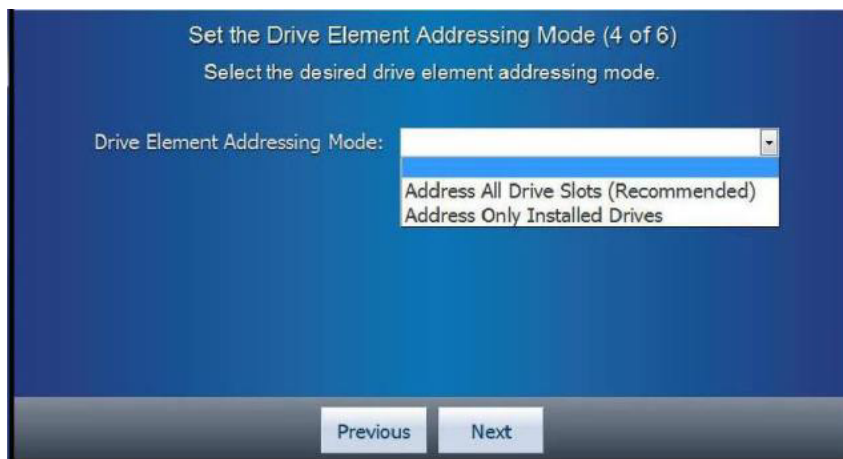
Configure the Library Step 3 of 6: Set the Library Date and Time

The third step of library initialization is to set the library date and time.

1. Set the library time zone:
 - a. Select the **Time Zone** from the list.
 - b. Select the **Closest City or Region** from the list.
 - c. Tap **Next**.
2. Configure the date and time by selecting either **Manually** or **Using Network Time Protocol** from the list.
 - If you select **Using Network Time Protocol**, you must provide the IP address of a Network Time Protocol server on your network. The steps are similar to those for setting an IP address for Network Port 1.
 - If you select **Manually**, enter the current date in the format MM/DD/YYYY. Enter the current time in the format HH:MM:SS where HH represents 24-hour format.

3. Verify the values are correct (change any incorrect value by tapping the keyboard button). Tap **Next**.

Configure the Library Step 4 of 6: Set the Drive Element Addressing Mode)



1. Select the **Drive Element Addressing Mode** from the list. The options are:

Address All Drive Slots

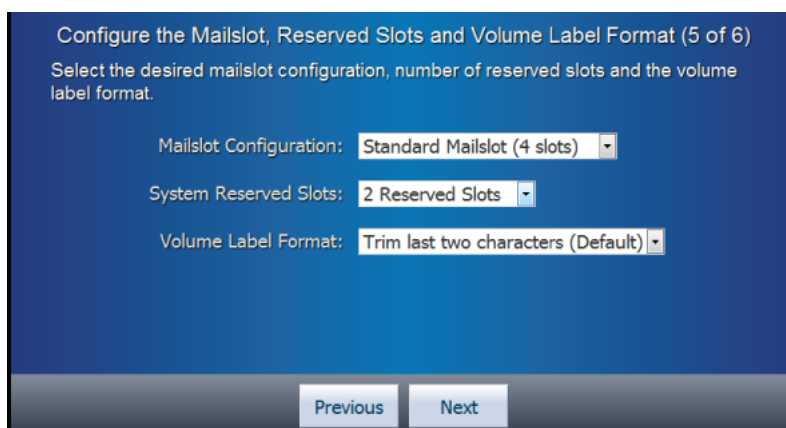
All drives, including empty drive slots, are assigned a sequential SCSI element address which is always reported to attached hosts. In this mode, the library does not need to be restarted for newly installed drives to become usable by attached hosts, and drive SCSI element addresses never change. Also, empty drive slots can be assigned to a partition.

Address Only Installed Drives

Only installed drives are assigned a sequential SCSI element address. Empty drive slots are not assigned a SCSI element address and are not reported to attached hosts. In this mode, the library must be restarted before newly installed drives are usable by attached hosts, and drive SCSI element addresses may change. Also, only installed drives can be assigned to a partition.

2. Tap **Next**.

Configure the Library Step 5 of 6: Configure the Mailslot, Reserved Slots and Volume Label Format



1. Configure the mailslot.

Note: Refer to the ACSLS documentation for release levels which support the Expanded Mailslot Configuration.

Select the mailslot type from the list that corresponds to your configuration:

- Standard Mailslot (4 slots)
- Expanded (19 slots)

2. Set the system reserved slots.

System reserved slots are storage slots in the SL150 library typically used to house cleaning tapes or diagnostic tapes. Use the **System Reserved Slots** list to select the desired number of slots (see ["Determine the Required Number of Reserved System Slots"](#) on page 6-5).

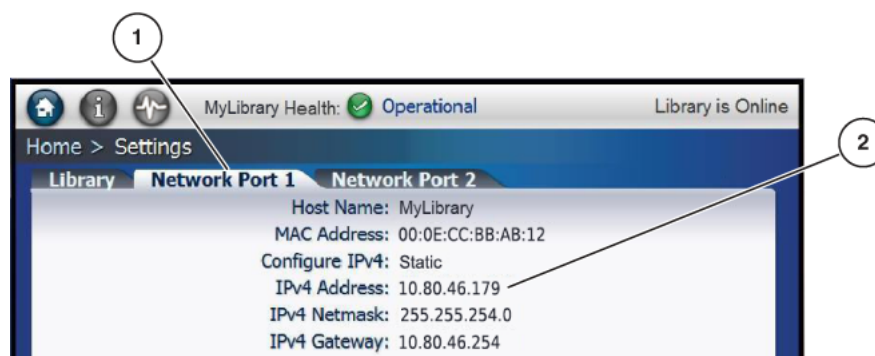
- No reserved slot
- 1 reserved slot
- 2 reserved slots
- 3 reserved slots

3. Set the volume label format. Use the **Volume Label Format** list to select the desired number of slots and then tap **Next**.

To accommodate various cartridge labeling schemes, the SL150 library supports labels eight to 14 characters long and provides a label windowing feature that lets you specify how the labels should be interpreted by the host application. See ["Label Format Types"](#) on page 6-4 for a description of the format types.

Configure the Library Step 6 of 6: Review and Apply Initialization Settings

1. Verify the value of each initialization settings (alter any incorrect value before applying changes by tapping **Previous**).
2. To verify the network settings, tap the **Settings** button on the Home screen, and then tap the **Network Port 1** tab.



3. If all settings are correct, tap **Apply**.
4. The library restarts. The duration of the restart depends on the size of library.

Caution: Do not manually remove a cartridge magazine while the library is performing the restart. Only perform a manual cartridge magazine removal when the library is *operational* and *offline*.

5. After the restart completes, the Home screen appears on the touch screen. **Library Health** displays in the status bar at the top of the screen. If the library is not Operational, perform the troubleshooting procedures listed in ["Servicing the Library"](#) on page 9-1 before proceeding.

Configure the Library: Finish the New Configuration

At this point, the newly installed tape library should be operational. But to finish the configuration and fully integrate the equipment into your environment, you may need to carry out the following, additional tasks:

- Upgrade library or drive firmware (see ["Update Library and Drive Firmware"](#) on page 4-7).
- Add any additional users that you require (see ["Add a User and Assign a Role"](#) on page 5-1).
- Set up system monitoring, if required (see ["Configure Simple Network Management Protocol \(SNMP\)"](#) on page 7-2).
- Configure system notifications, if required (see ["Configure Email Notifications"](#) on page 7-5).
- Load cartridge magazines (see ["Importing and Exporting Cartridges"](#) on page 6-1).

Run a Self-Test

A self-test can be helpful for troubleshooting. Before placing a newly installed or reconfigured library into production, you should run a full self test.

1. Before running a self-test, verify the following:
 - There is at least one diagnostic tape ("DG" label) in the mailslot or reserved system slot. The diagnostic tape should be compatible with at least one unoccupied drive.
 - The mailslot is closed and all magazines are securely latched.
 - At least one of the four slots in the standard mailslot is empty.
 - At least one slot in the library is empty.
2. From the remote interface, select **Library** in the left menu.
3. From the **Library** drop-down **Library** ▾, select **Run Self Test**.
4. Select a test type:
 - **Basic Self Test** — a quick (6 move) test used to verify basic library function to test robot access to the corner locations of the library.
 - **Full Self Test** — a thorough test that moves a tape to every slot and to every unoccupied drive compatible with the chosen diagnostic tape. A full test can take significant time depending on the number of modules in the library, so plan accordingly.

5. Optionally, select **Set the Library back Online** to automatically bring the library online after the test (the library goes offline to perform the self test)
6. Click **OK** to start the test.

Note: If the test fails, click **Degraded** to open a health table identifying a failed or degraded component. See "[Use the Health Table to Diagnose the Issue](#)" on page 9-7 more information.

7. If you did not check the **Set the Library back Online** checkbox, remember to bring the library back online manually, once you are ready. See "[Place the Library Online and Offline](#)" on page 9-1.

Stopping a Self-test

To stop a test that is in progress, from the **Library** drop-down **Library ▼**, select **Stop the current test**. The test may take a few moments to stop. If the diagnostic cartridge was not returned to its reserved cell at the end of the test, move the diagnostic cartridge now (see "[Move Tape Cartridges with the Remote Interface](#)" on page 6-11).

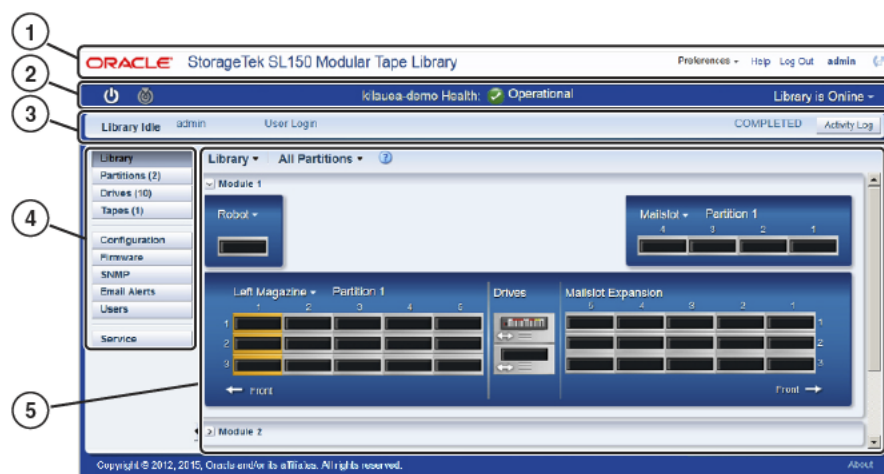
Basic User Interface Operations

- Using the Remote Interface
- Using the Front Touch Screen
- Log In to the Remote Interface
- Configure Accessibility Settings
- Log Out of the Remote Interface
- Change Your Password
- Interpret the Graphical Library Display
- Show, Hide, and Reorder Table Columns
- Export a Table
- Print a Table
- Set Automatic Screen Refresh

Using the Remote Interface

The remote library interface is a browser application that you can access from any workstation with a network connection to the library. Since the interface is web-based, you do not need to download or locally install anything to monitor and operate the library. To log in, see "Log In to the Remote Interface" on page 3-2.

The main areas of the remote interface are described below.



1. **Masthead** — Displays the current user and allows you to set user preferences, access the help, and logout
2. **Status Bar** — Displays the current library state and allows you to control the online/offline and on/off state of the library.
3. **Library Activity Bar** — Displays current library operations and allows you to access the activity log.
4. **Navigation** — Each button navigates to view different parts of the interface. Depending upon the user's role, some of these buttons may not appear.
5. **Content** — Changes depending on the navigation area selected

Using the Front Touch Screen

The touch screen is on the front of the base module. You can use the touch screen to check on library status and configuration when you are working directly with the hardware. However, the touch interface only provides access to a limited set of functions. You cannot carry out most system-configuration and administration tasks.

Figure 3–1 Front Control Panel Home Screen



Status Bar — Located at the top of every screen. The status bar displays the current library state and contains the Home button, Copyright information button, and library activity button.

Home screen — The various home screen buttons provide access to information on library components. Use the various screens to operate and monitor the library from the local op panel. You can click the Home button in the upper-left of the Status bar at anytime to return to the home screen.

Log In to the Remote Interface

1. In a browser, enter the URL of the library.
2. Enter your **User ID** and **Password**. Contact the library administrator if you do not have login credentials.
3. Click **Log In**.

Configure Accessibility Settings

Users with low vision, blindness, color blindness, or other visual impairments can adjust Accessibility Settings when logging into the remote interface:

1. From the login screen, select **Set Accessibility Settings**.
 - **Screen reader** - If you are using a screen reader, select this option. The interface generates components that have rich user interface interaction and are accessible through the keyboard.
 - **High contrast** - The interface generates high-contrast-friendly visual content. High-contrast mode is designed for use with operating systems or browsers that have high-contrast features enabled.
 - **Large-fonts** - The interface generates browser zoom-friendly content.
2. Click **Log In** to close the property sheet and log in to the library.

Navigate the User Interface with a Keyboard

You can navigate between the different parts of an SL150 user interface screen, menu, or list using the tab and arrow keys on the keyboard. You select interface elements by pressing the Return key on the keyboard.

Log Out of the Remote Interface

For security reasons, always log out using the procedure below. While the interface will log out inactive users automatically, you should not rely on this. Never leave a session open and unattended.

1. Near the top right of the interface, click **Log Out**.
2. Wait until the "Logged Out" dialog indicates that you have successfully signed out before closing the browser window.

Change Your Password

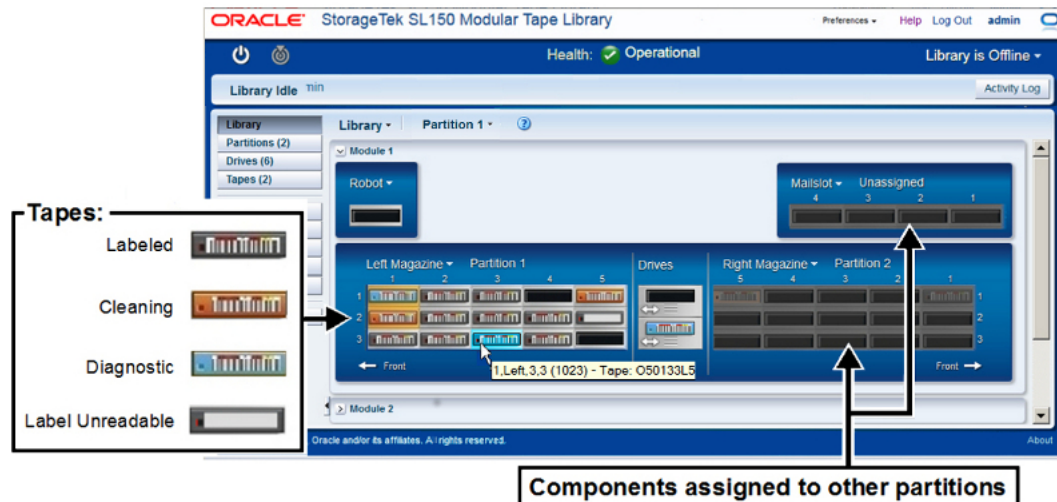
1. In the dashboard area at the top of the interface, click the **Preferences** control.
2. From the context menu, select **Change Password**.
3. In the **Old Password** field, enter your current password.
4. In the **Password** field, enter your new password.
5. In the **Verify Password** field, re-enter your new password.

See Also:

- ["Reset Another User's Password"](#) on page 5-2

Interpret the Graphical Library Display

The **Library** screen of the SL150 user interface lets you view the locations and characteristics of library components at a glance. You can view the whole library or, if partitioned between hosts, a single partition at a time. When you place the cursor over one of these tape icons, the icon is highlighted and a fly-over tool tip displays the corresponding slot address and label value.



If you are viewing one partition in a library that dedicates resources to separate host applications, resources that are assigned to the other partition are grayed out.

See Also:

- ["Monitoring the Library"](#) on page 7-1
- ["Run a Self-Test"](#) on page 2-36
- ["Audit the Library"](#) on page 9-4
- ["Import and Export Cartridges Using the Mailslot"](#) on page 6-9

Show, Hide, and Reorder Table Columns

You can selectively show and hide the data fields that appear in the records shown by a tabular data display. You can also change the order of the table columns.

1. On a page with a table, click the **View** drop-down.
2. Select **Columns**, and then select the columns to show/hide.
3. Select **Reorder Columns...**, and then use the up and down arrows to order the columns.

Export a Table

The **Export** option of a tabular display downloads the contents of the data table to your desktop in an HTML-based .xls file format that is compatible with current spreadsheet applications, such as Microsoft Excel 2010 and Apache OpenOffice Calc 3.4. You can also view these files in web browsers: simply rename the file using the .html file extension in place of .xls.

Print a Table

The **Print** option of a tabular display reformats the screen data as a new, print-friendly HTML document.

Set Automatic Screen Refresh

You can pause and resume automatic refreshes of the browser-based user interface.

1. In the top-right of the remote interface, click **Preferences**.
2. Select **Pause Automatic Refresh** or **Resume Automatic Refresh** from the drop-down menu.

When auto-refresh is paused, you must use your web browser's reload/refresh control.

Configuring the Library

This section covers how to change the library configuration at any time after the initial installation configuration. For initial installation configuration, see ["Configure the Library After Powering-on for the First Time"](#) on page 2-30.


- [Set the Time, Network Address, Library Settings, and Encryption](#)
- [Update Library and Drive Firmware](#)
- [Manage the Library's SSL/TLS Certificate for HTTPS](#)

Set the Time, Network Address, Library Settings, and Encryption

Use the configuration wizard to change the library time, network parameters, library settings (such as auto cleaning, mailslots, partitioning, and so on), and encryption.

- ["Run the Configuration Wizard"](#) on page 4-1
- ["Configure the Network Interfaces"](#) on page 4-2
- ["Set the Library Date and Time"](#) on page 4-3
- ["Configure Library Settings"](#) on page 4-3
- ["Partition the Library"](#) on page 4-5
- ["Configure Library Managed Encryption \(LME\)"](#) on page 4-6
- ["Review and Apply Configuration Changes"](#) on page 4-7

Run the Configuration Wizard

1. From the remote interface, select **Configuration** in the left menu.
2. Click **Configure** .
3. Within the Configuration Wizard, select each configuration task that you need to perform, and then click **Next**. Proceed to the relevant sections:
 - [Configure the Network Interfaces](#)
 - [Set the Library Date and Time](#)
 - [Configure Library Settings](#)
 - [Configure Library Managed Encryption \(LME\)](#)

Note: You cannot configure the network interfaces and encryption simultaneously.

Configure the Network Interfaces

You can configure the library's two local area network interfaces:

- **Network Port 1** — connects browser-based, remote user interface clients to the interface server on the library.
- **Network Port 2** — a second network connection for service use or for library managed encryption (LME) for OKM communication.

Before deciding on a configuration, review the "[Behavior of Port 1 and Port 2](#)" on page 1-4 and consult with your network administrator. Support for IPv6 and local addressing requirements can vary from site to site.

- [Configure Network Interfaces Task 1: Verify Job Activity and Launch the Wizard](#)
- [Configure Network Interfaces Task 2: Configure Network Port 1](#)
- [Configure Network Interfaces Task 3: Configure Network Port 2 \(optional\)](#)

Configure Network Interfaces Task 1: Verify Job Activity and Launch the Wizard

1. Check the activity log for active jobs, such as tape moves or mounts. Never change the network configuration during active jobs, if at all possible.
2. If any tape jobs are active, wait for them to complete before continuing. You may want to take the library offline before configuring to prevent host activity.
3. [Run the Configuration Wizard](#). Select **Configure Network Settings**.

Configure Network Interfaces Task 2: Configure Network Port 1

The library supports either both IPv6 and IPv4 (dual-stack mode) or IPv4-only configuration. In dual-stack mode, the library continues to recognize IPv4 addresses while adding the ability to use hexadecimal IPv6 addresses.

1. Enter the desired library name in the **Host Name** field.

Valid host names contain characters in the ranges [A-Z], [a-z], and [0-9], plus the hyphen (-). A hyphen cannot be the first or last character in the host name. Spaces and underscores (_) are not supported.
2. From the "Configure Network for" drop-down list select either:
IPv4 only or **IPv4 and IPv6**
3. For **IPv4** select either:
 - **Static** — You must enter the Address, Netmask, and Gateway. In most cases, you will want to choose Static so that library interface clients can always find the server at a stable, well-known network location.
 - **DHCP** — A DHCP server must be running on your network to use this setting.
4. For **IPv6** select either:
 - **Static** — You must enter the Address, Prefix Length, and Gateway. In general, if your DNS (Domain Name Service) supports IPv6 addresses, select Static so that library interface clients can always find the server at a stable, well-known network location.
 - **Stateless (SLAAC)** — If DNS does not support IPv6 addresses, select Stateless (SLAAC). With a stateless address, library interface clients can find the server at an address based on the unique MAC (media access control) address of the

network interface card in the robot/controller assembly. A stateless address will not change unless the robot has to be replaced

- **DHCPv6** — If a DHCPv6 server is available on your network, you can select DHCPv6. Be aware the network address of the library user interface will change.

5. Click **Next**.

Configure Network Interfaces Task 3: Configure Network Port 2 (optional)

With library code 3.50 and above, you can configure Network Port 2 for library managed encryption (LME). Configuring Port 2 will force LME through Port 2 only. Leaving the Port 2 configuration set to default will force LME through Port 1 only.

IMPORTANT: Do not configure Port 2 for any other use than with LME, otherwise you may encounter issues. If you are not using LME, Oracle recommends that you leave Port 2 set to the defaults. See ["Behavior of Port 1 and Port 2"](#) on page 1-4 for more information.

1. From the **Network Port 2** list, select **On** or **Off**.
2. For **IPv4** select either: **Static** or **DHCP** (see [Configure Network Interfaces Task 2: Configure Network Port 1](#) for a description of these options).

The library supports Port 2 being on the same subnet as KMA IPv4 addresses. Entering a gateway is not required if Port 2 and the KMA are on the same subnet. You should enter a gateway that can reach all OKM cluster KMA's.

Note: You should configure Port 2 to be on a different network than Port 1 to create a secure and private connection to pass the encryption keys between the library and the OKM cluster.

3. Click **Next**.

Set the Library Date and Time

1. [Run the Configuration Wizard](#). Select **Set the Library Date and Time**.
2. Select the **Time Zone** and **Closest City or Region** from the drop-down lists. Click **Next**.
3. Either set the time **Manually** or use **NTP**:
 - **Manually** — Enter the date using the format *mm/dd/yyyy* (month/day/year). Enter the time using the format *hh:mm:ss* (hour:minute:seconds).
 - **Network Time Protocol** — Enter the addresses of up to three NTP servers.
4. Click **Next**.

Configure Library Settings

1. [Run the Configuration Wizard](#). Select **Configure Library Settings**.
2. Select the Drive Element Addressing Mode. The correct setting for your system depends on your current configuration (for help deciding on a mode, see ["Selecting a Drive Element Addressing Mode"](#) on page 4-4).

- **Address All Drive Slots (Recommended)** — Assigns new SCSI hardware addresses to all drive bays in the library, whether or not drives are actually installed.
 - **Address Only Installed Drives** — Assigns SCSI address to drive bays that contain an installed drive. Does not address empty drive bays.
3. Select a Drive Auto Clean mode:
- **On** — Enables library auto cleaning. You must have one or two cleaning cartridges in reserve slots to enable this feature. See "[Configure Drive Cleaning](#)" on page 8-1 for more information.
 - **Off** — Disables library auto cleaning. You must configure host-managed cleaning or manually clean. See "[Configure Drive Cleaning](#)" on page 8-1 for more information.
4. Select the Mailslot Configuration:
- **Standard (4 slots)**
 - **Expanded (19 slots)** — Converts the right magazine of the base module into an additional mailslot. The magazine must be empty before selecting this configuration.
5. Select the number System Reserve Slots. If you are unsure on the number required, see "[Determine the Required Number of Reserved System Slots](#)" on page 6-5.
6. Select whether to partition the library:
- **Partitioning Off**
 - **Partitioning On** — You will need to partition the library now (see "[Partition the Library](#)" on page 4-5).
7. Select a **Library Bridged Drive**. The default bridged drive is Module 1 Top Drive. For more information on bridge drives, see "[About Bridged Tape Drives](#)" on page 1-5.
8. Select a **Library Volume Label Format**. For a description of each type, see "[Labeling Cartridges](#)" on page 6-3.

Selecting a Drive Element Addressing Mode

Use the following guidelines to help decide which addressing mode to select.

Select **Address All Drive Slots** if:

- If you control the library using a version of Oracle StorageTek ACSLS software that supports the Drive Element Addressing option.
- If you are installing a new library. This means host system drive assignments do not need to be remapped when drives are subsequently added or replaced.

Select **Address Only Installed Drives** if:

- If you control the library using a version of Oracle StorageTek ACSLS software that does *not* support the Drive Element Addressing option.
- If you are upgrading an SL150 library that does not currently assign addresses to empty drive bays. Entering **Address Only Installed Drives** retains the current addresses and assigns the next address in sequence to the new drive.

Partition the Library

Partitioning lets multiple host systems access library resources. Each partition behaves as an independent library, but all partitions share the reserved cells, the single robot, and the four-cartridge mailslot.

Requirements:

- Maximum of 8 partitions (code versions before 2.0 only support two partitions)
- Each partition must have its own bridged drive
- Each partition must have at least one magazine

Tasks:

- [Partition the Library Task 1: Create a New Partition](#)
- [Partition the Library Task 2: Assign Resources to the Partition](#)
- [Partition the Library Task 3: Delete an Existing Partition](#)
- [Partition the Library Task 4: Verify the Partitioning Configuration Changes](#)

Partition the Library Task 1: Create a New Partition

To access the Configure Library Partitioning screen: [Run the Configuration Wizard](#). Select **Configure Library Settings**. Select **Partitioning On**, and then click **Next**. Use the tasks below to create the partitioning configuration.

If at any point you do not wish to proceed, click **Previous** or **Cancel**.

1. Click **Add Partition**.
2. Enter the **Partition Name**.
3. Select a **Bridged Drive** from the list. Each partition must have a bridged drive. For more information on bridge drives, see "[About Bridged Tape Drives](#)" on page 1-5.
4. Select a **Volume Label Format** from the list (see "[Labeling Cartridges](#)" on page 6-3 for more information).
5. Assign the partition resources, see .

Partition the Library Task 2: Assign Resources to the Partition

1. In the left-hand menu, select the partition to modify.
2. To **add** resources to the partition, click on an unassigned resource (gray in color). For each partition that you need to add to the current library configuration, create a new partition.
3. To **remove** resources from the partition, click on a resource the partition owns.

Partition the Library Task 3: Delete an Existing Partition

IMPORTANT: Before deleting a partition, make sure that it no longer holds tape volumes that contain valid data. When you reassign the slots, the host application that controls the partition may treat any resident tape cartridges as scratch volumes.

1. In the left-hand menu, select the partition to delete.
2. Click **Delete Partition**, just below the list of partitions.

3. Click **OK**. Reassign resources as needed (see [Partition the Library Task 2: Assign Resources to the Partition](#) above).
4. Otherwise, if you are finished, review and apply the configuration changes.

Partition the Library Task 4: Verify the Partitioning Configuration Changes

Once you are finished partitioning, review your changes and then click **Next**.

Configure Library Managed Encryption (LME)

The library can manage the encryption enrollment and key delivery of all IBM LTO-7 or higher drives. For HP LTO-6 drives and earlier, you must still use the Virtual Op Panel (VOP) software to enroll the drives.

- [Configure LME Task 1: Obtain Information from OKM](#)
- [Configure LME Task 2: Configure the SL150 to Manage Encryption](#)
- [Configure LME Task 3: Verify the SL150 Agent is Enrolled](#)

Configure LME Task 1: Obtain Information from OKM

Have the OKM administrator use the OKM GUI to create an SL150 library agent and then record the following information to use in the SL150 configuration:

- Agent Name
- Passphrase

Configure LME Task 2: Configure the SL150 to Manage Encryption

IMPORTANT: Library encryption must be configured separately and after all other library configuration options. Make sure you have completed the network configuration and completed a library reboot before configuring encryption. If not, see "[Configure the Network Interfaces](#)" on page 4-2.

1. In the SL150 GUI, [Run the Configuration Wizard](#). Select **Configure Library Encryption**.
2. Set "Library Encryption Status" to **Encrypting**.

This globally enables library managed encryption for all IBM LTO-7+ drives within the library regardless of the partitioning configuration.
3. Enter the following information:
 - OKM Cluster IP address
 - Agent ID
 - Agent Passphrase
4. Note the port that will be used for OKM communication.

If you altered the Port 2 configuration, all LME traffic will go through Port 2. If you left the Port 2 configuration set to default values, LME traffic will go through Port 1.
5. Leave the OKM tuning parameters at their default setting unless instructed to change them by your OKM administrator.


6. Click **Next**, then review and apply the changes.

Configure LME Task 3: Verify the SL150 Agent is Enrolled

After confirming the changes within the Configuration Wizard, have the OKM administrator go to the OKM GUI and verify that the SL150 agent now shows "Enrolled: True".

See the OKM documentation for more information.

Review and Apply Configuration Changes

1. Review the **Summary of Configuration Changes** screen. Altered settings are indicated by "changed" in the changes column.
2. Note any alerts  at the bottom of the screen.
3. If you see a problem, click **Previous** to return to an earlier screen or **Cancel** to quit.
4. Otherwise, select the **Accept all changes** check box, and then click **Apply**.

Update Library and Drive Firmware

You should check and update firmware after you first install the library. Oracle recommends that you regularly check for firmware updates.

- [Identify Current Firmware Versions](#)
- [Download Firmware from My Oracle Support](#)
- [Upgrade the Library Firmware](#)
- [Upgrade the Drive Firmware](#)
- [Revert to the Previous Library Firmware](#)

Identify Current Firmware Versions

1. From the remote interface, select **Firmware** in the left menu.
2. Click the **Library Firmware** tab. Note the **Current Firmware Version** field.
3. Click the **Drive Firmware** tab. For each drive in the list, note the values:
 - **Firmware Version** — contains an alphanumeric string
 - **Type** — a vendor identifier plus an LTO Generation number
 - **Interface Type** — Fibre (for Fibre Channel) or SAS (for Serial Attached Small Computer System Interface)

Download Firmware from My Oracle Support

1. Log in to My Oracle Support: <https://support.oracle.com>.
2. Click the **Patches & Updates** tab.
3. Within the **Patch Search** area, click on the **Product or Family (Advanced)** link.
4. In the **Product is** field, enter:
 - *For library firmware:* Enter SL150, and then select **StorageTek SL150 Modular Tape Library** from the list of results.

- *For drive firmware:* Enter LTO, and then select the drive model (for example, **IBM LTO7 Tape Drive**).
- 5. From the **Release** drop-down list, select the release version you want to download (for example 3.20 for library firmware, or HH-FC or HH-SAS for drive firmware).
- 6. Click **Search**.
- 7. In the **Patch Search Results** table, click a row. A button bar displays.
- 8. Click **Read Me** to confirm the firmware version.

For drive firmware, make sure it is intended for the SL150 library. Note the firmware release level. Scan the drive firmware Read Me file for lines like the following:

Unbundled Product: StorageTek LTO-6hh FC Tape Drive for the SL150 library
Unbundled Release: 23DS

- 9. Click **Download**, and then within the download dialog click the file name to begin the download.

Library firmware is named `p12345678_xyz0_Generic.zip`, where `p12345678` represents a part number, `x` represents the major release number, and `yz` represents the minor release number.

Drive firmware is named `123456_01.zip`, where `123456_01` represents a part number.


Verify the Download

- 1. At the bottom of the **File Download** dialog, click on the **View Digest Details** link.
- 2. Copy the MD5 and SHA checksums and paste them into a text file.
- 3. Verify the integrity of the downloaded ZIP file. Using a suitable checksum utility, calculate the MD5 or SHA-1 digest value of the downloaded file, and compare the result to the corresponding MD5 or SHA-1 value saved in your text file.

You can use `digest` (Oracle Solaris) and `dgst` (Linux). Microsoft offers a commandline File Checksum Integrity Verifier utility (`fciv.exe`) as a free download from <http://support.microsoft.com/kb/841290>.

- 4. If the digest value that you calculated for the file does not match the value displayed in the dialog, the file is corrupt and cannot be installed successfully. Stop here, and re-download the firmware zip.

Upgrade the Library Firmware

- 1. Download the library firmware (see "Download Firmware from My Oracle Support" on page 4-7).
- 2. Extract the firmware ZIP (the extracted file should contain a .tar file and release notes).
- 3. Log in to the remote interface as an administrator.
- 4. Select **Firmware** in the left menu.
- 5. Select the **Library Firmware** tab, and then click **Upgrade** .
- 6. Browse to the folder that contains the firmware, and select the `SL150_xyz0.tar` file, where `xyz0` is the four-digit form of the release number.
- 7. To install the new firmware and restart the library, click **OK**.

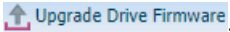
The upgrade dialog displays a progress meter and the estimated time required for the upgrade. *Do not close this window until the installation process finishes.*

8. If a library firmware upgrade fails, create a service request. For more information, see ["Create a Service Request"](#) on page 9-11.

Upgrade the Drive Firmware

If possible, update drive firmware during periods when host applications are not making heavy use of the library. The library cannot respond to host commands during the updates, which may take up to 20 minutes per tape drive.

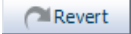
For each drive model and interface type that requires new firmware, proceed as follows:

1. Download the drive firmware (see ["Download Firmware from My Oracle Support"](#) on page 4-7)
2. Extract the drive firmware ZIP (the extracted folder should contain HTML and text release notes, a `LEGAL_LICENSE.TXT` file, a `tload.tar` file, and two versions of the firmware file).
3. Log in to the remote user interface as an administrator.
4. Take the library offline (see ["Place the Library Online and Offline"](#) on page 9-1).
5. Select **Firmware** in the left menu. Click the **Drive Firmware** tab.
6. Click **Upgrade Drive Firmware** .
7. Click on the table entries to select the drive(s) that you want to update (hold down the Shift key to select multiple drives). Click **Next**.
8. Browse to the folder that contains the drive firmware, and select the file with the `.E` extension (such as `Z5BD.E`).
9. Verify you have selected the correct file, and then click **Upgrade**. The update begins immediately.

If you are updating multiple drives, you can click **Cancel** to skip the upgrade for any drives that have not yet been processed. However, the upgrade that is currently underway will continue.
10. If a firmware upgrade fails, make sure that the chosen firmware is correct for the LTO generation and interface specification of the drive. If it is not, repeat this procedure to download a copy of the correct firmware.
11. When all firmware is up to date, bring the library back online.

Revert to the Previous Library Firmware

If you ever have problems with a library firmware update, you can roll the library back to the most recent, previously installed version using the following procedure.

1. Log in to the remote user interface as an administrator.
2. Click **Firmware** in the left menu.
3. To roll back the library firmware, click **Revert** .
4. If the library has been operating normally and if its contents have not changed, check the **Bypass audit for a faster restart ...** check box.
5. Click **OK** to restart the library and activate the old firmware.


Manage the Library's SSL/TLS Certificate for HTTPS

A certificate encrypts SSL/TLS traffic to and from the library. At initial installation, the library has a default certificate. At a minimum, you should replace the default certificate with a new self-signed certificate. Then, optionally, you can install a certificate signed by a certifying authority (CA).

- [Generate a Self-Signed Certificate](#)
- [Install a Third-Party Signed Certificate](#)

Generate a Self-Signed Certificate

A self-signed certificate is secure, but will require you to manually tell the browser to trust the certificate before you can view the login screen. To eliminate this browser security exception, you can install a certificate signed by a certifying authority (CA) (see "[Install a Third-Party Signed Certificate](#)" on page 4-10).

1. Click **Configuration** in the left navigation area of the GUI.
2. Click the **Certificate** tab, and then click **New Certificate** .
3. Enter in the certificate information.

Install a Third-Party Signed Certificate


Installing a third-party certificate is a multistep process of submitting a certificate signing request (CSR) to the CA, obtaining the certificate from the CA, and then importing the certificate file to the library.

- [Install a Certificate Task 1: Verify the Library Has a Self-Signed Certificate](#)
- [Install a Certificate Task 2: Export Certificate Signing Request \(CSR\) File](#)
- [Install a Certificate Task 3: Obtain Required Certificates](#)
- [Install a Certificate Task 4: Import the Certificate File](#)

Install a Certificate Task 1: Verify the Library Has a Self-Signed Certificate

The library must have a self-signed certificate before installing a third-party signed certificate. You cannot go directly from the default certificate to a third-party certificate. To install the self-signed certificate, see "[Generate a Self-Signed Certificate](#)" on page 4-10.

Install a Certificate Task 2: Export Certificate Signing Request (CSR) File

1. Click **Configuration** in the left navigation area of the GUI.
2. Click the **Certificate** tab, and then click **Export CSR** .
3. Click **Download**.
4. Submit the CSR to the third-party certifying authority (CA).


Install a Certificate Task 3: Obtain Required Certificates

Verify that you have obtained the following before importing:

- Primary certificate of the trust anchor CA (such as VeriSign's public primary root CA)

- Intermediate certificate of the issuing SSL CA (optional). In cases where there is no intermediate issuer, you can omit the intermediate certificate. This is highly site-specific, so check with your company's security experts for requirements.
- Your newly issued SSL certificate

Install a Certificate Task 4: Import the Certificate File

1. Click **Configuration** in the left navigation area of the GUI.
2. Click the **Certificate** tab, and then click **Import Certificate** .
3. Copy and paste each certificate file (as noted above in task 3) into the text box and click **Next**. To skip the intermediate certificate, leave the box blank and click **Next**.

Managing Users

The library manages user access to the system based on user and role. This section outlines how to add and manage users.

- [User Roles and Access](#)
- [Add a User and Assign a Role](#)
- [Remove a User](#)
- [Change an Assigned Role](#)
- [Reset Another User's Password](#)

User Roles and Access

A user's role determines their access to library functions. The administrator can assign a user one of the following roles:


- **Viewer** — a read-only role. Viewers can login, monitor library operations, and view component states and properties, but they cannot alter the configuration or operation of the library.
- **Operator** — limited control over the operation of the library, but cannot change the configuration. Operators can take the library online/offline, power the library on/off, import and export cartridges, and run self-tests.
- **Administrator** — has full control over the operation and configuration of the library, and can manage other users. The administrator can grant or deny users access, assign user roles, set and change library properties, configure the TCP/IP connection and SNMP communication. Since the administrator role can alter configuration settings, you should limit the number of users with this role.
- **Service** — a special role for service technicians. The service user has all the privileges of an administrator except for managing users. When you require the assistance of an Oracle service representative, you can create a log-in account for the service person and assign the account to the Service user.

See Also:

- ["Add a User and Assign a Role" on page 5-1](#)

Add a User and Assign a Role

1. Log into the remote interface with the administrator or service role.
2. Select **Users** in the left menu.


3. Click **Add User** .
4. Enter a User ID and Password. Assign a role from the drop-down list.

Note: Once the account is set up, users can choose their own passwords. See "[Change Your Password](#)" on page 3-3.


See Also:

- "[User Roles and Access](#)" on page 5-1

Remove a User

1. Log into the remote interface with the administrator role.
2. Select **Users** in the left menu.
3. Select the user account by clicking on the corresponding table row.
4. Click **Delete User** .


Change an Assigned Role

1. Log into the remote interface with the administrator role.
 2. Select **Users** in the left menu.
 3. Select the account by clicking on the corresponding table row.
 4. Click **Change Role** .
 5. Select a role from the drop-down list.
- See "[User Roles and Access](#)" on page 5-1 for more information on each role.

Reset Another User's Password

To change your own password, use the Preferences drop-down at the top of the user interface. See "[Change Your Password](#)" on page 3-3.

If you are an administrator, you can change another user's password:





1. Log into the remote interface with the administrator role.
2. Select **Users** in the left menu.
3. Select the user account by clicking on the corresponding table row.
4. Click **Reset Password** .
5. Enter a new password.

Importing and Exporting Cartridges

- Viewing Tape Cartridge (Media) Health
- Guidelines for Handling Tape Cartridges
- Labeling Cartridges
- Determine the Required Number of Reserved System Slots
- Determine the Number of Cleaning Cartridges
- Apply a Label to a Tape Cartridge
- Prepare Diagnostic, Cleaning, and Data Tape Cartridges
- Load the Magazines (Bulk Loading)
- Import and Export Cartridges Using the Mailslot
- Move Tape Cartridges with the Remote Interface

Viewing Tape Cartridge (Media) Health

After a tape mounts to a drive, the drive will report on the health of the tape based on information from the tape's previous use. You can view the health of the specific tape in the Tapes table.

1. From the remote interface, select **Tapes** in the left menu.
2. View the Media Health column. Possible states are:
 - **Unknown**  — the tape has not yet been mounted in a drive, therefore the health of the tape is not known.
 - **Operative**  — the tape is in good health.
 - **Degraded**  — the tape is in moderate health and should be replaced.
 - **Failed**  — the tape is in bad health or incompatible with a tape drive. It should not be used and should be replaced.

Guidelines for Handling Tape Cartridges

CAUTION: Improperly handling tape cartridges can cause loss of data or damage the library.

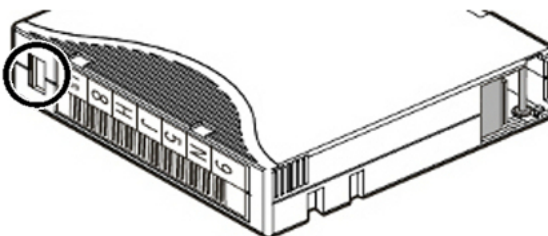
- Keep tapes clean and inspect for damage before each use.

- When unwrapping the plastic from a new cartridge, use the string or pull tab. Do not use letter openers, knives, box cutters, scissors, or other sharp instruments.
- Never open a tape cartridge housing.
- Do not handle tape that is outside the cartridge; the tape edge might be damaged.
- Do not expose the tape or cartridge to direct sunlight, moisture, excessive temperatures, or magnetic fields.
- Transport cartridges in shock resistant cases

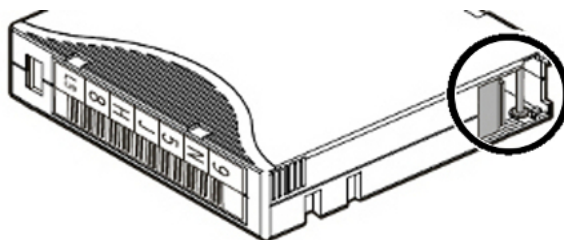
Inspect a Tape Cartridge

Always inspect a tape before you insert it into a drive or a library. A defective or dirty tape can damage a drive. Never use a damaged tape. Look for:

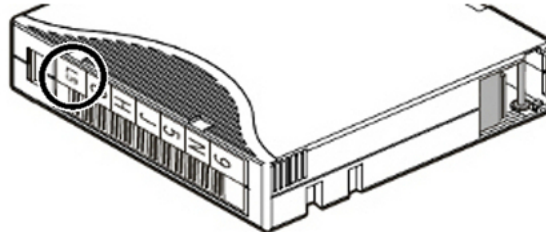
- Dirt or debris
- Cracked or broken housing
- Damaged hub-wheel teeth
- Damaged write-protect switch (front left of cartridge, see below). The switch should slide easily.



- Damaged leader door or pin (located on near rear of cartridge, see below). The door should open cleanly and snaps shut when released. The pin should be straight.



- Liquid in the tape cartridge
- Labels not firmly attached, or that extend over the tape cartridge edge
- Incorrect media type. The cartridge type must be supported by the drives in the library. See "[Labeling Cartridges](#)" on page 6-3 to verify that the two digit media identifier is supported.



Clean the Tape Cartridge Exterior

Wipe all dust, dirt, and moisture from the cartridge with a lint-free cloth. Use Oracle StorageTek Tape Cleaner Wipes to clean the cartridge exterior. These wipes are saturated with isopropyl alcohol. Do not let any solution touch the tape or get inside the cartridge.

CAUTION: To avoid damage to cartridges, do not use acetone, trichloroethane, toluene, xylene, benzene, ketone, methylethyl ketone, methylene chloride, ethyldichloride, esters, ethyl acetate, or similar chemicals to remove labels or clean cartridges.

Store Tape Cartridges

Store tapes in a clean environment. Do not take a tape cartridge out of its protective wrapping until you are ready to use it. Use the tear string (not a sharp instrument) to remove the wrapping. Before using a tape cartridge, ensure that it has been in its operating environment for at least 24 hours so that it can adjust to changes in temperature and humidity.

Labeling Cartridges

For instructions on how to apply a label, see ["Apply a Label to a Tape Cartridge"](#) on page 6-6.

The library identifies individual storage volumes using ANSI standard, code 39 barcode labels that are attached to the front of the tape cartridge. The label has both alphanumeric characters and a machine-readable barcode. The following sections describe labeling standards.

- [Tape Media ID](#)
- [Tape Cartridge Types](#)
- [Label Format Types](#)
- [Non-Standard Label Formats](#)

Tape Media ID

Standard LTO data cartridge labels have a unique, customer-assigned, six-character volume ID, followed by a two-character media ID field. The media ID characters are:

- L5 = LTO Generation 5
- L6 = LTO Generation 6
- L7 = LTO Generation 7
- L8 = LTO Generation 8

- M8 = LTO Generation 7 cartridge initialized to 9TB capacity (only compatible with LTO8 drives, see "[About M8 Compatibility](#)" on page 1-4 for more information)
- LV = LTO Generation 5 WORM
- LW = LTO Generation 6 WORM
- LX = LTO Generation 7 WORM
- LY = LTO Generation 8 WORM
- CU = LTO Universal cleaning

If you need to configure the library for a non-standard labeling scheme, see "[Non-Standard Label Formats](#)" below.

Tape Cartridge Types

Cleaning and diagnostic tapes require unique labels to distinguish them from data tapes. The first three alphanumeric characters in the vol-id determine the type of tape.

- **Cleaning tapes** — use CLNUnn for the vol-id plus the cleaning-specific media ID, where CLNU is the cleaning tape identifier and nn is a sequence of numbers (for example, CLNU01CU).
- **Diagnostic tapes** — use DG[space]nnn plus the media ID, where DG[space] is the diagnostic tape identifier, and nnn is a sequence of numbers (for example, DG 001L6 would be an LTO6 diagnostic tape label).

Label Format Types

Oracle recommends using the default setting.

No type checking

Passes all characters in the label without modification and without checking the media domain and type. Use this option if your labels do not identify the media type: M123456789AB does not, for example, contain a media descriptor, such as L5.

Prepend last two characters

Passes all the characters after moving the last two characters in the label to the front: KL1020L5 is translated to L5KL1020.

Full label

Passes the first eight characters in the physical label: KL1020L5 is translated to KL1020L5.

Trim last character

Passes the first seven characters in the physical label: KL1020L is translated to KL1020L.

Trim last two characters (default)

Passes the first six characters in the physical label: KL1020L5 is translated to KL1020.

Trim first two characters

Passes the third through eighth characters in the physical label: KL1020L5 is translated to 1020L5.

Trim first character

Passes the second through eighth characters in the physical label: KL1020L5 is translated to L1020L5.

Non-Standard Label Formats

By default, the library uses the eight-character label format that is standard for LTO cartridges. While most backup and storage management applications support the standard LTO labeling format, a few use proprietary labeling schemes to track volumes. If you use such an application, you can, in most cases, configure the SL150 to automatically translate between the physical labels on your cartridges and the logical label format that the application uses internally.

Translating Between Physical and Logical Labels

To accommodate the fullest range of possible labeling schemes, the library supports labels 8 to 14 characters long and provides a *label windowing* feature that lets you specify how labels should be interpreted when communicating with the host application.

So, for example, if the host application uses only a portion of the physical cartridge label to identify volumes, you can tell the library to construct a logical label using a subset of the characters. Alternatively, if the physical cartridge label is simply a string of characters that does not identify the media domain (LTO) and generation, you can tell the library to skip domain and type checking and send all characters to the host without any further processing (you should *not* use this option, if your labels include a domain and type).

Managing Unidentifiable, Unsupported, or Missing Labels

If the physical label on a cartridge is missing, misapplied, damaged, or incorrectly formatted, the cartridge can be loaded and stored in the library. Since the library software cannot identify the cartridge, it marks the Tape Label field of the corresponding tape properties sheet [UNREADABLE].

Determine the Required Number of Reserved System Slots

You can reserve up to a maximum of three slots. Based on your cleaning strategy and your diagnostic needs, decide how many system reserved slots to configure:

- **Diagnostic Cartridge** — may require 1 reserved slot.

If you are planning to use a diagnostic cartridge, Oracle recommends that you configure one reserved system slot to hold it. This insures that it is always available when needed. But if storage space is at a premium, you can also import the diagnostic cartridge from the mailslot as needed.

- **Cleaning Cartridge** — may require 2 reserved slots.

If using library auto cleaning or manual cleaning: configure at least one, preferably two reserved slots. Two cleaning cartridges in reserved slots minimizes downtime by insuring a usable cleaning cartridge is always available, so drives do not sit idle while awaiting cleaning.

If using host-managed cleaning: do not configure system reserved slots for cleaning cartridges. Host applications cannot access system reserved slots. Cleaning cartridges must reside in storage slots controlled by the host application.

Determine the Number of Cleaning Cartridges

Note: Always use new cleaning cartridges. To the library, every newly imported cleaning cartridge is new, with a usage count of zero. So if you load used cleaning cartridges, you will not have an accurate count of the number of remaining cleanings.

At least two cleaning cartridges should be available for drive cleaning. The total number of cleaning cartridges in the library and where they need to reside depends on your drive cleaning strategy and partitioning configuration:

- **If using library auto-cleaning or manual cleaning:** Oracle recommends that you provide two, new, LTO universal (CU) cleaning cartridges into reserved system slots. The partitioning configuration does not affect this number.
- **If using host-managed cleaning:** the number of cleaning cartridges required depends on your partitioning configuration.

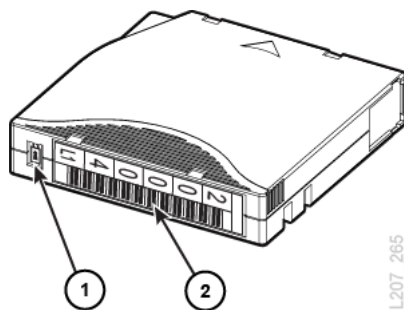
For a non-partitioned library, Oracle recommends that you provide two, new, LTO universal (CU) cleaning cartridges placed into storage slots.

For a partitioned library, Oracle recommends that you provide two, new, LTO universal (CU) cleaning cartridges *per partition*. A host application cannot access drives or library slots that are not in the partition that it controls. So each partition must contain cleaning media. For example, three partitions would require three cleaning tapes at a minimum and six for best drive availability

Apply a Label to a Tape Cartridge

1. When handling cartridges, follow all precautions in "[Guidelines for Handling Tape Cartridges](#)" on page 6-1.
2. Clean the surface where the label will be placed using a small amount of isopropyl alcohol-based cleaning solution. Never use any other type of solvent.
3. Orient the label with the barcode side down. Orient the cartridge so that the write-protect switch is to your left (see figure below).
4. Peel the backing off the label. Apply the label within the slight indentation. The label must not overlap the edges of this indentation.

Figure 6-1 Correct Label Orientation



- 1 - Write Protect Switch
 2 - Cartridge label correctly applied (barcode side down/character side up)

Prepare Diagnostic, Cleaning, and Data Tape Cartridges

Before loading cartridges into the library you need to prepare the various tape cartridge types: diagnostic, cleaning, and data.

Prepare a Diagnostic Tape Cartridge

Diagnostic cartridges are specially labeled data cartridges used for testing library robotics and drives. You can purchase diagnostic cartridges or you can create them by applying an Oracle-supplied diagnostic label to any available, blank LTO tape. Oracle recommends that you have a diagnostic tape on hand during system configuration and at all times thereafter, if possible.

To create a diagnostic cartridge, apply the DG label from the library's accessory kit to a blank LTO data cartridge (see ["Apply a Label to a Tape Cartridge"](#) on page 6-6).

Prepare Cleaning Tape Cartridges

Universal cleaning cartridges carry the media descriptor CU. Note that Oracle strongly recommends universal cleaning tapes and requires their use with library-managed drive cleaning. Apply the appropriate label to the cleaning cartridge (see ["Apply a Label to a Tape Cartridge"](#) on page 6-6). Labels for universal cleaning cartridges take the form CLNUxxCU, where CLNU is a descriptive prefix, xx is a sequence number, and CU is the media descriptor for universal cleaning media.

Prepare the Data Tape Cartridges

Locate the correct label for the data tape (see ["Labeling Cartridges"](#)) and apply the label (see ["Apply a Label to a Tape Cartridge"](#) on page 6-6). Make sure that the label's media ID matches the cartridge type.

If you need to configure the library for a non-standard labeling scheme, see ["Non-Standard Label Formats"](#) on page 6-5.


Load the Magazines (Bulk Loading)

Each library module has two magazines that hold 15 cartridges each. Before putting the library into production, you can load the magazines to save time importing cartridges. Additionally, there may be times when it makes sense to bulk load the library using the magazines. The library must always perform an audit after bulk loading.

- [Load the Magazines Task 1: Unlock and Remove the Magazines](#)
- [Load the Magazines Task 2: Load the Left Magazine in the Base Module](#)
- [Load the Magazines Task 3: Load the Remaining Magazines](#)
- [Load the Magazines Task 4: Locking the Magazines and Auditing the Library](#)
- [Updating Media Health After a Bulk Load](#)

Load the Magazines Task 1: Unlock and Remove the Magazines

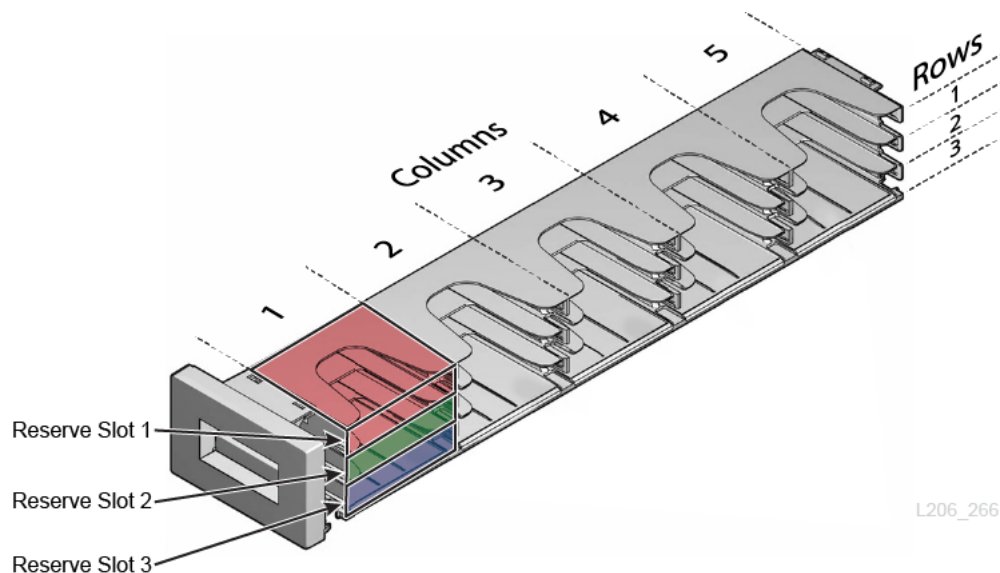
If the magazines have already been inserted into the enclosures, proceed as follows.

1. From the remote interface, select **Library** in the left menu. For instructions on logging in, see ["Log In to the Remote Interface"](#) on page 3-2.
2. From the **Library** drop-down menu , select **Unlock Magazines**.

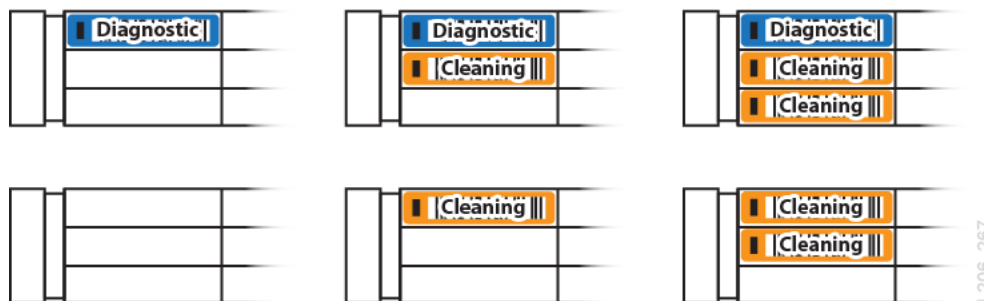
3. Select the magazines to unlock and click **OK**. The library remains offline and busy until all selected magazines are unlocked.
4. Slide magazines smoothly out of the enclosure, supporting the underside with one hand.

Load the Magazines Task 2: Load the Left Magazine in the Base Module

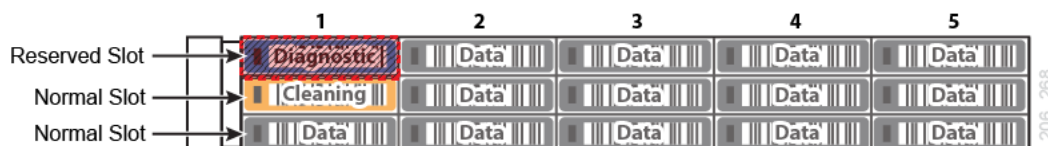
1. The figure below shows the layout of the base module left magazine.



2. Optionally, populate the reserve slots with diagnostic and/or cleaning cartridges (see ["Determine the Required Number of Reserved System Slots"](#) on page 6-5). Place the diagnostic cartridge at the top (if using), followed by the cleaning cartridges. The following are all valid reserve slot configurations:



3. When inserting the cartridges into the magazine, orient the cartridge with the hub down and the label on the open side of the magazine. Gently push the cartridge into the slot until the plastic retention spring snaps into place.
4. If using host-managed drive cleaning, place one or two LTO universal cleaning cartridges in *unreserved*, data slots. Reserved slots are optional, so the following figure could represent a valid configuration for host-managed cleaning.




5. Load the remaining slots with data tapes.
6. Once loaded, reinstall the left magazine. Be careful to hold the magazine so that tapes do not fall out. Push the magazine into place until it latches with a click.

Load the Magazines Task 3: Load the Remaining Magazines

IMPORTANT: If using the 19-slot mailslot configuration, leave the right base module magazine empty.

1. Slide each magazine out of the enclosure, supporting the underside with one hand.
2. Load data cartridges into the magazine slots.
REMINDER: If host-managed drive cleaning and partitioning the library, place one, preferably two, LTO universal cleaning cartridges in each partition.
3. Once loaded, reinstall the magazines. Be careful to hold each magazine so that tapes do not fall. Push the magazine into place until it latches with a click.

Load the Magazines Task 4: Locking the Magazines and Auditing the Library

1. Log in to the remote user interface.
2. From the **Library** drop-down menu , select **Lock and Audit Magazines**.
3. Optionally, select **Set the Library back Online...** to automatically bring the library online after the audit.
4. Click **OK** to lock the magazines, take the library offline, and start the audit (see ["Audit the Library"](#) on page 9-4).

Updating Media Health After a Bulk Load

The library assesses each tape and updates the Media Health state whenever the cartridge mounts a drive. After bulk loading tapes, Media Health for many cartridges will be listed as "Unknown". As the library mounts cartridges during the course of routine operations, the library progressively updates the Media Health property, replacing the "Unknown" values. However, you can force an immediate update of an individual cartridge by taking the library offline and mounting the cartridge.

Import and Export Cartridges Using the Mailslot

When you need to import cartridges into a library or partition or export them from a library or partition, use the *mailslot* (also known as the *cartridge access port* or *CAP* in other StorageTek libraries). The standard mailslot holds up to four cartridges. The optional, expanded magazine holds up to nineteen.

To load or unload cartridges using the mailslot, carry out the following tasks:

- [Assign the Mailslot to a Partition](#) (if the library is partitioned),
- [Open the Mailslot](#),
- [Import Tape Cartridges](#) and [Export Tape Cartridges](#),
- [Close the Mailslot](#),

- [Unassign the Mailslot](#) when finished.

Assign the Mailslot to a Partition

If your library is partitioned and controlled by two separate host applications, you must assign the mailslot to a partition before exporting or importing. For information on how SCSI hosts handle a shared mailslot, see the *SL150 SCSI Reference Guide*.

Assign the Mailslot Using the Remote User Interface

1. Select **Library** in the left menu.
2. From the **Mailslot** drop-down Mailslot ▼, select **Assign**.
3. Select a partition from the **Assign Mailslot to Partition** drop-down list.

Assign the Mailslot Using the Local Operator Panel

1. On the Home screen, tap **Mailslot**.
2. Tap **Assign to a Partition** at the bottom of the screen.
3. Select a partition to assign.

Import Tape Cartridges

1. If importing into a partitioned library, [Assign the Mailslot to a Partition](#).
2. [Open the Mailslot](#), and place the tapes in the mailslot. [Close the Mailslot](#).
3. Use the host application to move the tapes from the mailslot to the storage slots.
If you cannot use the host application, you may [Move Tape Cartridges with the Remote Interface](#). Then, update the host application database to account for the new tapes.
4. Once you are finished importing tapes, [Unassign the Mailslot](#).

Export Tape Cartridges

1. If exporting from a partitioned library, [Assign the Mailslot to a Partition](#).
2. Use the host application to move the tapes from the storage slots to the mailslot.
If you cannot use the host application, [Move Tape Cartridges with the Remote Interface](#). Then, after closing the mailslot update the host application database to account for the removed tapes.
3. [Open the Mailslot](#), and remove the tapes. [Close the Mailslot](#).

Open the Mailslot

1. If using the *remote interface*:
Select **Library** in the left menu. From the **Mailslot** drop-down Mailslot ▼, select **Open** and then click **OK**.
If using the *local touch panel*:
On the Home screen, tap **Mailslot**. Tap **Open Mailslot**. If you do not see an Open Mailslot button, the mailslot is incorrectly assigned, see "[Assign the Mailslot Using the Local Operator Panel](#)" on page 6-10.
2. Pull the standard mailslot out from the upper-right corner of the base module.

If using the expanded mailslot, slide out the right magazine in the base module, supporting the weight with one hand. Be careful to hold it so that tape cartridges do not fall out of the slots

3. Add and/or remove cartridges, following the guidelines for "[Guidelines for Handling Tape Cartridges](#)" on page 6-1.

Close the Mailslot


IMPORTANT: The library cannot access mailslots until the mailslot is positively latched (you will hear a noticeable click).

- *Expanded mailslot (the right base module magazine):*
Grasp the front handle while supporting the magazine weight with the other. Carefully align the magazine with the right magazine bay of the base module, and gently push it into the bay until it latches into place with a noticeable click.
- *Standard mailslot:*
Push the mailslot into the bay using a single, steady motion, so that it latches into place with a noticeable click. If you do not insert the mailslot smoothly, you may fail to engage the latch and may trigger needless, multiple re-audits of the mailslot.

Unassign the Mailslot

You should unassign the mailslot when you are finished importing/exporting so that other partitions can access it.

Unassign the Mailslot Using the Remote User Interface

1. Select **Library** from the left menu.
2. From the **Mailslot** drop-down , select **Unassign**.
3. Click **OK**.

Unassign the Mailslot Using the Local Operator Panel

1. On the Home screen, tap **Mailslot**.
2. Tap the **Unassign Mailslot** button at the bottom of the interface.
3. Tap **OK**.

Move Tape Cartridges with the Remote Interface

Always use the host application to move tapes when possible. Moving cartridges with the SL150 interface can cause host database inconsistencies that force audits.

1. If the library is partitioned and you will be moving a tape to/from the mailslot, [Assign the Mailslot to a Partition](#).
2. Select **Library** in the left menu. Right-click on a tape, select **Move Tape**.
3. At the top of the screen. Optionally, check the **Set the Library back Online ...** checkbox (the library automatically goes offline when moving tapes with the remote interface). Click **OK**.

4. The **Source** field is pre-populated. To select a **Destination**, click on where you want to move the tape to within the graphical library map.
5. To move the tape, click **OK**.
6. If you did not check the **Set the Library back Online ...** checkbox, remember to bring the library back online once you are ready.

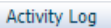
Monitoring the Library

You can monitor library operations for component failures and operational problems. Careful monitoring and prompt corrective action will minimize library downtime and maximize the availability of your data.

- [View User and Host Activity](#)
- [View the Library State](#)
- [Configure Simple Network Management Protocol \(SNMP\)](#)
- [Enable or Disable the Service Delivery Platform \(SDP2\)](#)
- [Configure Email Notifications](#)




View User and Host Activity

Use the activity log to display recent user and host activity.

1. Click **Activity Log**  near the top-right of the screen.
2. Click either the **User Activity** tab or **Host Activity** tab to view the library activity.

View the Library State




The status bar at the top of the interface displays the library **Health**, which represents the combined state of every component in the system.

- **Operative**  — the library is fully operational.
- **Degraded**  — a device in the library has failed or is offline, but the library can continue to function (such as a faulty drive).
- **Failed**  — a device has failed and the library cannot function (such as a failed robot).

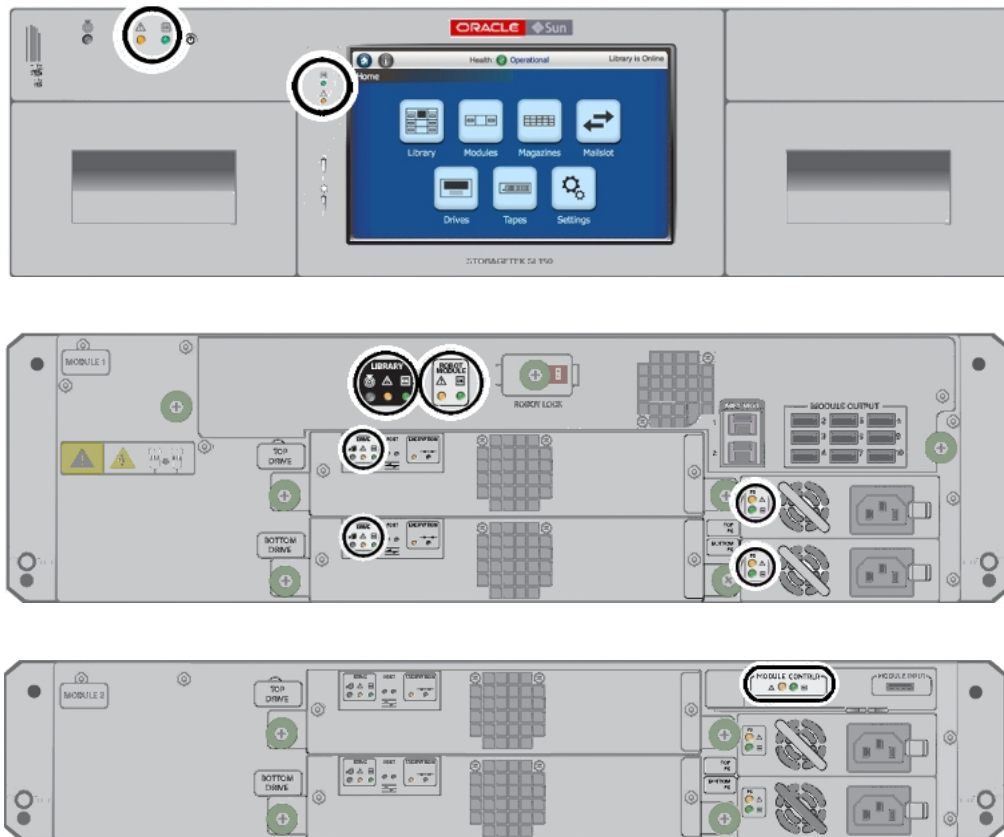
Note: Clicking the library state in the status bar displays the Library Health pop-up which you can use to troubleshoot the library (see ["Determine the Possible Cause of a Degraded or Failed Library State"](#) on page 7-2).

Library LED Status Indicators



Library status indicators are located on the front control panel above the left cartridge magazine and at the rear of the library on the robot customer replaceable unit [CRU].

Indicator State	Meaning
 Green OK is solid.	The library or component is fully operational.
 Green OK is solid. Amber ! is solid.	The library or component is degraded. It is still operating but with reduced functionality.
 Amber ! is solid.	The library or component has failed and cannot perform its function.

Indicator Locations



Determine the Possible Cause of a Degraded or Failed Library State

1. Click on the **Degraded**  or **Failed**  health state in the status bar.
2. Use the **Library Health** pop-up to view the list of library faults. Look through the suspected components and recommended actions lists to determine how to correct the faulty library state. For more information on interpreting library health information, see ["Diagnose a Library Problem"](#) on page 9-6.

Configure Simple Network Management Protocol (SNMP)

Network management applications can monitor the library using the Simple Network Management Protocol (SNMP). The library's SNMP agent can automatically send traps to alert network management stations of faults and configuration changes. You can configure the library's SNMP agent to automatically send traps that alert up to six

network management stations about faults and configuration changes. The library supports both SNMP version 2c and version 3.

- ["SNMP Versions"](#) on page 7-3
- ["SNMP Traps"](#) on page 7-3
- ["Enable or Disable SNMP"](#) on page 7-4
- ["Configure an SNMP User"](#) on page 7-4
- ["Configure an SNMP Trap Recipient"](#) on page 7-4
- ["Send a Test Trap"](#) on page 7-5
- ["Download the Management Information Base \(MIB\)"](#) on page 7-5

SNMP Versions

- **v3** — Version 3 is not backward compatible, but it supports a more secure authentication method and can encrypt management data. Always choose v3 unless you need compatibility with older SNMP versions and have no security concerns. v3 requires the following information:
 - **User Name**
 - **Authentication Protocol** — Select **SHA** for best security or **MD5** for compatibility with systems that use MD5.
 - **Authentication Passphrase** — Enter a strong user-authentication password.
 - **Privacy Protocol** — Select **AES** (Advanced Encryption Standard) for best security or **DES** (Data Encryption Standard) for compatibility with systems that use DES.
 - **Privacy Passphrase** — Enter a strong data-protection password.
 - **Engine ID** — Only required when adding a trap recipient. In most cases accept the default value. If you must override this value, enter a hexadecimal value that starts with 0x and does not contain either all zeroes (0) or all sixteens (F).
- **v2c** — Backward compatible with earlier versions of the standard, but it is not secure because authentication credentials (community strings) and management data are exchanged in clear text.

This is the less secure option. Only select this option if you need compatibility with older SNMP versions. v2c requires the following information:

- **Community Name** — A 31-character, alphanumeric password or phrase. Do not use factory-set default community names or obvious strings like *public* and *private*.

SNMP Traps

The table below lists traps returned by the SL150.


Table 7–1 *SNMP Trap Levels*

Trap Level	Description
1	error log entry
2	warning log entry

Table 7-1 (Cont.) SNMP Trap Levels




Trap Level	Description
3	info log entry
4	configuration
11	agent start
13	test
14	heartbeat A (2.5 minute period)
15	heartbeat B (24 hour period)
21	Library Status Good
25	Library Status Check
27	Environmental Hardware Check
41	Drive Status Good
45	Drive Status Check
61	CAP (mailslot) Status Good
63	CAP (mailslot) Status Open
65	CAP (mailslot) Status Check
100	<i>Proprietary</i>
102	<i>Proprietary</i>

Enable or Disable SNMP

1. From the remote interface, select **SNMP** in the left menu.
2. Click the **SNMP is Enabled/Disabled**  drop-down.
3. Select either **Enable SNMP** or **Disable SNMP**.
4. Click **OK** to confirm the change.

Configure an SNMP User




SNMP users can access the library's SNMP agent. You can add, modify, or delete an SNMP user:

1. From the remote interface, select **SNMP** in the left menu.
2. Select the **SNMP Users** tab.
3. Click **Add SNMP User** , or select a user and then click **Edit SNMP User**  or **Delete SNMP User** .
 - See "SNMP Versions" on page 7-3 for the required version information.

Configure an SNMP Trap Recipient


An SNMP trap recipient is a network management station that you designate to receive notifications sent by the SNMP agent on the library. You can add up to six trap recipients. You can add, modify, or delete an SNMP trap recipient:

1. From the remote interface, select **SNMP** in the left menu.
2. Click the **SNMP Trap Recipients** tab.


3. Click **Add Trap Recipient** , or select a recipient and then click **Edit Trap Recipient**  or **Delete Trap Recipient** .
 - **Host Address** — IP address of the management host that will receive the traps
 - **Trap Level** — Comma-delimited list of the Trap Levels to send to this management station. For a list of valid entries, see "SNMP Traps" on page 7-3.
 - **Version** — The SNMP version. See "SNMP Versions" on page 7-3 for details on additional required information.

Send a Test Trap


To verify the configuration, you can send a test trap (level 13) to all trap recipients.

1. From the remote interface, select **SNMP** in the left menu.
2. Click the **SNMP Trap Recipients** tab.
3. Click **Send a Test Trap** . If the icon is grayed-out, try clicking on a recipient in the list. Make sure you have enabled SNMP.

Download the Management Information Base (MIB)

1. From the remote interface, select **SNMP** in the left navigation menu.
2. Click **Download Mib** .
3. Save the file or view it in a text editor.

Enable or Disable the Service Delivery Platform (SDP2)


1. From the remote interface, select **SNMP** in the left menu.
2. Click the **SDP2 is Enabled/Disabled**  drop-down.
3. Select either **Enable SDP2** or **Disable SDP2**.
4. To enable SDP2:
 - a. Enable SNMP (see "Enable or Disable SNMP" on page 7-4). You can configure SDP2 without enabling SNMP. But you cannot enable SDP2 until you enable SNMP.
 - b. Configure an SNMP trap recipient to receive trap levels: 13, 14, 15, 102 (see "Configure an SNMP Trap Recipient" on page 7-4). To use SDP2, you must configure at least one SNMP trap recipient to receive the specified traps.
 - c. The button should now read **SDP2 is Enabled (Configured)**. If not, verify you have enabled SNMP and have a recipient configured with the trap levels: 13, 14, 15, 102.

Configure Email Notifications




You can configure the library to send automatic email alerts to specified addresses whenever the library changes state (from online to offline, for example) and/or whenever library health is degraded.

- "Enable or Disable Email Notifications" on page 7-6
- "Configure Email Recipients" on page 7-6
- "Send a Test Email Alert" on page 7-6


Enable or Disable Email Notifications

1. From the remote interface, select **Email Alerts** in the left menu.
2. Click **Configure** .
3. Set **Email Alerts** to **On** (Enabled) or **Off** (Disabled).
4. If enabling email alerts, enter the following information:
 - **SMTP Host Address** — IP address of the Simple Mail Transport Protocol server that will handle outgoing mail for the library.
 - **SMTP Port** — The network port used by your SMTP server. The default is 25, but you may choose any non-reserved port. Reserved ports include 0, 22, 80, 67, 68, 123, 514, 546, 547, 161, 162, and all ports in the range 33200-33500.
 - **From Name** — The name that should appear in the sender field of the email. The default is "Library Alert".
 - **From Email** — The email address that should appear in the sender field of the email.
 - **Secure Connection** — Select **TLS** unless the network does not support TLS. **SSL** is an older protocol that offers less protection. **None** provides no cryptographic protection.
 - If using TLS or SSL, enter a user name and password.

Configure Email Recipients

1. From the remote interface, select **Email Alerts** in the left menu.
2. Click **Add Recipient** , or select a recipient and click **Edit Recipient**  or **Delete Email Recipient** 
 - **Alert on Health and/or Change** — When selected, recipient will be notified when the library health changes.

Send a Test Email Alert

1. From the remote interface, select **Email Alerts** in the left menu.
2. Select a recipient, and then click **Send Test Email** .

Managing Tape Drives

- [Viewing Current Drive State](#)
- [Configure Drive Cleaning](#)
- [Manage Expired Cleaning Cartridges](#)
- [Restart a Drive](#)
- [Update Drive Firmware](#)

See Also:

- ["Drive Tray Removal and Replacement"](#) on page 10-2

Viewing Current Drive State

The current state of the drive is reported to the library. The state is polled approximately every 10 seconds. You can view the state in the Drives table.

1. From the remote interface, select **Drives** in the left menu.
2. View the States column. Possible values are:
 - Empty
 - Cleaning
 - Loading
 - Loaded
 - Reading
 - Writing
 - Rewinding
 - Unloading


Configure Drive Cleaning

LTO drives may require occasional cleaning with a compatible cleaning cartridge. The drive will notify the library or host application when it requires cleaning. You can manage drive cleaning in one of three ways:

- [Enable Library-Managed Drive Auto Cleaning](#)
- [Configure Host-Managed Drive Cleaning](#)
- [Manually Clean a Drive.](#)

Enable Library-Managed Drive Auto Cleaning

Library-managed auto cleaning is the easiest and most flexible way to clean drives. When enabled, the library automatically performs a cleaning whenever a drive requests it.

1. Verify there is at least one universal LTO cleaning cartridge (media type CU) in a reserved system slot. For best drive availability, place two cleaning cartridges in reserved slots.
2. From the remote interface, select **Configuration** in the left menu.
3. Click **Configure** .
4. Select **Configure Library Settings**, and then click **Next**.
5. Set **Drive Auto Clean** to **On**.
6. Set **System Reserved Slots** to 1 or 2. To use the auto cleaning, you must reserve at least one system slot for a cleaning cartridge.
7. Click **Next**. If applicable, click **Next** again to bypass the partitioning configuration.
8. On the summary screen, select **Accept all changes** and then click **Apply**.

Configure Host-Managed Drive Cleaning

Many storage-management and backup applications can manage drive cleaning (such as Oracle Secure Backup, Symantec NetBackup, IBM Tivoli Storage Manager, and others). The host application can manage the cleaning of drives that it controls, if a cleaning cartridge is available in a storage slot.

Advantage of host-managed cleaning:

- The host remains in control of its assigned drives and storage slots at all times.

Disadvantage of host-managed cleaning:

- In a partitioned library, each partition must contain compatible cleaning cartridges, meaning you must provide duplicate cleaning media across partitions. The extra cleaning tapes take up slots that could otherwise hold data tapes.

The sections below summarize the procedures for configuring host-managed cleaning. Always refer to the host documentation for full details.

- [Configure Automatic Cleaning in Oracle Secure Backup During Drive Setup](#)
- [Set Up NetBackup for Reactive Cleaning Using the Administration Console](#)
- [Set Up NetBackup for Reactive Cleaning Using the Commandline](#)
- [Set Up Symantec Backup Exec Drive Cleaning](#)
- [Set Up Reactive Cleaning for HP StorageWorks Enterprise Backup Solution with HP Data Protector](#)
- [Set Up As-Needed Cleaning in IBM Tivoli Storage Manager \(TSM\)](#)
- [Set Up Tape-Alert Cleaning in EMC Networker](#)
- [Set Up CommVault Drive Cleaning](#)

Configure Automatic Cleaning in Oracle Secure Backup During Drive Setup

When you add tape drives to your Oracle Secure Backup configuration, select **Yes** from the **Auto clean** list. Enter the following information:

- **Clean interval (duration)** — The desired interval between cleaning cycles.
- **Clean using emptiest** — Select **Yes** to use cleaning cartridges in round-robin fashion, starting from the least-used cartridge. Select **No** to use each cleaning cartridge until it expires, starting from the cartridge with the fewest remaining cleaning cycles (the default).

Set Up NetBackup for Reactive Cleaning Using the Administration Console

1. From the Administration Console, select **Media and Device Management**.
2. Select **Device Monitor**, and then select **Drives**.
3. In the **Drive Status** pane, select an SL150 drive and then open the **Actions** menu.
4. Select the **Set Cleaning Frequency** parameter, and set the value to **0** (zero). This tells NetBackup to clean drives in response to Tape Alerts.
5. Repeat until you have configured all SL150 drives.

Set Up NetBackup for Reactive Cleaning Using the Commandline

1. To add a drive to the NetBackup configuration, use the command `tpconfig -add -drive -type [hcart|hcart2|hcart3] path drivepath -cleanfreq 0`, where:
 - `hcart*` is the generic NetBackup media identifier.
 - `drivepath` is the path to the device file for the drive. Stop here.
2. If you have already added the drives to your NetBackup configuration, run the command `/usr/openv/volmgr/bin/tpclean/tpclean -F drive_name 0`, where:
 - `drive_name` is the name that was assigned to the drive when it was added to the NetBackup device configuration.
 - `0` is the value that turns off frequency-based cleaning in favor of reactive cleaning.

Set Up Symantec Backup Exec Drive Cleaning

1. On the Backup Exec navigation bar, select **Devices**.
2. Select **Robotic Libraries**, and then select the robotic library for which you are setting up the cleaning.
3. Click **Slots** to display the library's slots in the right pane.
4. Select the slot that contains the cleaning tape.
5. In the task bar, under **General Tasks**, select **Properties**.
6. Select the **Cleaning Slot** option, and click **OK**.
7. Make sure that the cleaning tape is located in the slot that you defined as the cleaning slot.

Set Up Reactive Cleaning for HP StorageWorks Enterprise Backup Solution with HP Data Protector

If you provide correctly labeled cleaning cartridges, Data Protector detects the cartridges and automatically sets up reactive cleaning.

Set Up As-Needed Cleaning in IBM Tivoli Storage Manager (TSM)

1. To configure on-demand cleaning for a drive that has not yet been added to your TSM configuration, use the `DEFINE DRIVE` command.
2. To configure on-demand cleaning for a drive that has already been added to your TSM configuration, use the `UPDATE DRIVE` command.
3. Using the chosen command, set the drive parameter `CLEANFREQUENCY` to `ASNEEDED`.

Set Up Tape-Alert Cleaning in EMC Networker

EMC Networker automatically cleans drives if it is configured to receive Tape Alerts from the drive. To enable Tape Alerts, set up the Networker Common Device Interface (CDI) as follows.

1. In the NetWorker Administration interface, click on **Devices**, and select **View, Diagnostic Mode**.
2. Select **Devices** from the navigation tree.
3. In the Devices table, right-click on one of the SL150 tape drives, and select **Properties** from the context menu.
4. In the Properties window, select the **Advanced** tab.
5. In the Device Configuration area of the Advanced tab, under CDI settings, select **SCSI Commands: Sends explicit SCSI commands to tape devices**.
6. Repeat steps 3-5 until the Common Device Interface has been configured for all SL150 tape drives.

Set Up CommVault Drive Cleaning

1. In the ComCell interface, right-click on the SL150 library, and select **Properties** from the context menu.
2. When the Library Properties sheet appears, select the **Drives** tab.
3. In the Enable Auto-Cleaning section of the tab, check the **On sense code** checkbox.

Manually Clean a Drive

Although not recommended, you can manually manage drive cleaning by monitoring the remote interface for cleaning messages and responding accordingly.

Caution: Over-cleaning can damage drives. Clean only when the drive indicates that it requires cleaning.

- [Check for Drives that Require Cleaning](#)
- [Use the Remote Interface to Clean a Degraded Drive](#)

Check for Drives that Require Cleaning

1. Log in to the remote interface.
2. Check the **Library Health** indicator at the top of the screen. If it is in the Degraded state, click on it, and examine the **Health Table** for code **9030, DRIVE_NEEDS_CLEANING**.

3. If a drive needs cleaning, note the drive address (module number and either **Top** or **Bottom**). Use the library user interface to clean the drive (see below).

Use the Remote Interface to Clean a Degraded Drive

1. Verify that a drive needs cleaning (see ["Check for Drives that Require Cleaning"](#) on page 8-4).
2. Make sure that the library contains at least one unexpired LTO universal cleaning cartridge (media type CU).
3. Select **Library** in the left menu.
4. Locate the drive that needs cleaning. Hover over the drive and verify the drive address is correct.
5. Right-click on the drive, and then select **Clean Drive**.
6. Select a cleaning tape from the drop-down list.
7. Optionally, select **Set the Library back Online ...**

If you do not select this option, remember to bring the library back online once the cleaning finishes.

Manage Expired Cleaning Cartridges

A cleaning cartridge expires when a drive determines the cartridge is no longer usable. When the drive identifies an expired cartridge, it notifies the library. The library dismounts the cartridge, flags it as expired, and alerts the remote interface.

If you have configured your backup or storage management application to automatically handle cleaning requests, the application may manage cleaning media for you. Consult the vendor's documentation for details.

- [Monitor Cleaning Cartridges Using the Remote Interface](#)
- [Replace Expired Cleaning Media Using the Remote Interface](#)
- [Replace Expired Cleaning Media Using the Host Application](#)

Monitor Cleaning Cartridges Using the Remote Interface

1. In the remote interface, select **Library** in the left menu.
2. Right-click a cleaning cartridge, and then select **Properties**.
3. Note the **Cleaning Tape Status**.
4. If the cartridge is expired, replace it:
 - If the cartridge is in a reserved system slot, see ["Replace Expired Cleaning Media Using the Remote Interface"](#) on page 8-5.
 - If the cartridge in a host application-managed storage slot, see ["Replace Expired Cleaning Media Using the Host Application"](#) on page 8-6.

Replace Expired Cleaning Media Using the Remote Interface

Use this procedure to replace a cleaning cartridge in a reserved system cell.

1. From the remote interface, select **Library** in the left menu.
2. If the library is partitioned, [Unassign the Mailslot](#) before proceeding.

3. Right-click on the expired cleaning cartridge, and move it to the mailslot (see ["Move Tape Cartridges with the Remote Interface"](#) on page 6-11).
4. [Open the Mailslot](#), and remove the expired cleaning media.
5. Dispose of the expired media promptly, so that dirty cartridges are not inadvertently reimported and reused.
6. Place new cleaning media in the mailslot. Then [Close the Mailslot](#).
7. Move the new cleaning media from the mailslot to the reserved system slot(s)

Replace Expired Cleaning Media Using the Host Application

Use this procedure to replace a cleaning cartridge in a host-managed storage slot.

1. If the library is partitioned, [Assign the Mailslot to a Partition](#).
2. Move the expired cartridge into the library mailslot using the host application. Consult your application documentation for instructions.
3. [Open the Mailslot](#), and remove the expired cleaning media.
4. Dispose of the expired cartridge promptly, so that dirty cartridges are not inadvertently reimported and reused.
5. Place new a cleaning cartridge in the mailslot. Then [Close the Mailslot](#).
6. Import the new cleaning cartridge into the library using the host application. Consult your application documentation for instructions.

Restart a Drive

Restarting a drive powers the drive off and then back on and performs initialization of the drive. This action may resolve some drive problems.

1. In the remote interface, select **Library** in the left menu.
2. Right-click the drive, and then select **Restart Drive**.

Update Drive Firmware

For instructions on obtaining and installing updated drive firmware, see ["Update Library and Drive Firmware"](#) on page 4-7.

Servicing the Library

This section covers routine procedures you may need to perform when servicing or troubleshooting the library. For details on removing or replacing specific components, see ["Replacing Components \(CRUs & FRUs\)"](#) on page 10-1.

WARNING: Oracle's StorageTek SL150 Modular Tape Library contains a Class-1 laser, as defined by IEC 60825-1 Ed. 2 (2007). Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

- [Place the Library Online and Offline](#)
- [Power On the Library](#)
- [Power Off the Library](#)
- [Restart the Library](#)
- [Audit the Library](#)
- [Move the Library Rack](#)
- [Enable the Locate Light](#)
- [Troubleshoot the Library](#)
- [Get Parts and Technical Support](#)

See Also:

- ["Run a Self-Test"](#) on page 2-36

Place the Library Online and Offline

Always take the library offline before performing any maintenance that might conflict with host data operations. After you complete the disruptive activity, you can bring the library back online and continue host operations.

1. If taking the library offline, stop any host activity before proceeding.
2. From the remote interface, click the **Library is Online/Offline** drop-down in the upper-right.
3. Select either **Set Library Offline** or **Set Library Online**.

Power On the Library

1. Gain physical access to the library. When the library is off, the browser-based user interface is not running, so you cannot power the system on remotely.
2. Verify the robot is unlocked (if not, see ["Unlock the Robot"](#) on page 2-29).
3. Ensure that the bottom library module has the floor installed.
4. Press the power button on the front upper-left of the base.



The library boots and performs an *audit* (see ["Audit the Library"](#) on page 9-4).

Library Startup Sequence


1. The robot unparks and the hand fully retracts.
2. The robot determines the order of the modules, starting at the top and moving down one module at a time.
3. The wrist sweeps through its full range of motion and the hand moves through the full track range. The reach mechanism extends and retracts.
4. The magazines latch.
5. The library runs a full audit. When the audit completes and all drives are *ready*, the library is operational (see ["Monitoring an Audit in Progress"](#) on page 9-5).

Power Off the Library

There are two methods of powering off the library:

- **Controlled Power-Down from the Interface** — Always recommended, if possible.
- **Forced Power-Down** — Cuts power at the library or rack. Use this method only when the controlled method does not work.

Controlled Power-Down from the Interface

1. Stop any host activity.
2. If using the remote interface, click the power button  in the upper-left, and then select **Power Down Library**. If at the library, press the power button on the Front Control Panel.
3. Optionally, select **Prepare the Robot for removal before the library powers down**. This parks the robot at the top of the library. Select this option if you are powering down for any of the following reasons:
 - Removing or replacing the robot.

- Moving the rack or moving the library to a new rack.
- Preparing the library for shipment.

If you selected this option, see "[Lock the Robot](#)" on page 9-3.

Forced Power-Down

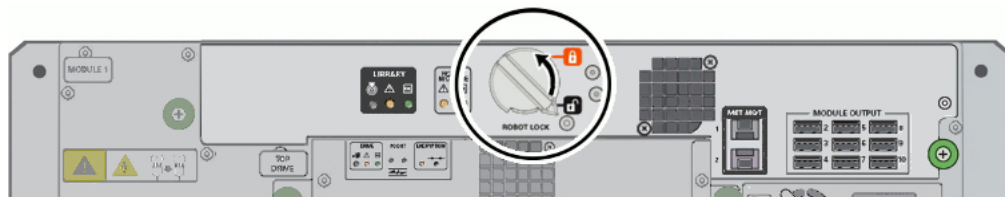
1. Stop any host activity.
2. Remove power from the library using one of the following methods:
 - a. Use the forced (hard) shutdown method. Press the front panel power button and hold it until the library shuts down (approximately 10 seconds).
 - b. Use the physical method, if the hard shutdown does not work. Remove power from *all* power supplies (disconnect the power cord from all power supplies or set the PDU or power strip switch to the off position).

Lock the Robot

1. Make sure you have selected **Prepare the Robot for removal before the library powers down** (see "[Controlled Power-Down from the Interface](#)" on page 9-2). This parks the robot in a protective housing at the top of the library.
2. Locate the robot lock on the back of the base module. There are two robot lock types (see below). Following the procedure for your lock type.
3. After locking, within the power-down dialog, select **I have secured the Robot Lock in the locked position**.

Lock the Knob-type Robot Lock (new version)

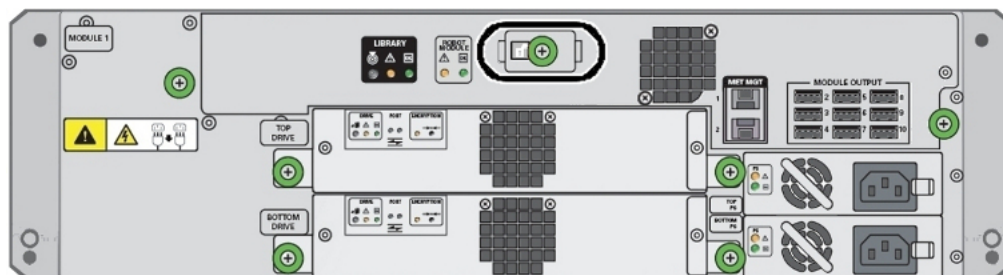
To lock, turn the knob counter-clockwise until it clicks into place.



The pointer on the knob should point past the red, locked padlock icon.

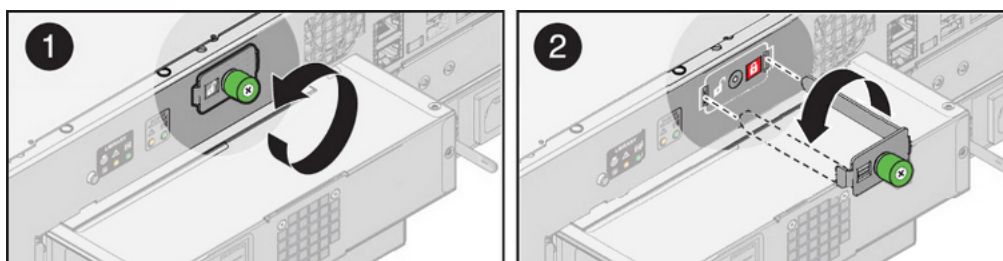


Lock the Thumbscrew-type Robot Lock (older version)




1. Loosen the captive thumbscrew on the lock assembly. Pull the lock straight out until the long tab comes out of the slot at right.
2. Rotate the lock assembly counterclockwise 180 degrees, and slide the long tab into the slot at left.

Verify a red locked padlock icon is visible in the small window.



3. Secure the lock assembly by tightening the captive screw. The robot is now locked.

Restart the Library

1. Click the power button  in the upper-left of the user interface, and then select **Restart Library**.
2. If the library has been operating normally and if its contents have not changed, select **Bypass audit for a faster restart ...**

The option is not available if magazines are open or if the library has been in the Inoperative state. For more information, see "[Audit the Library](#)" on page 9-4.

Restarting the Library Following a Power Outage

If a power outage occurs, the library returns to its last power state once power is restored. When power is restored, the library powers up and runs just long enough to check its previous power state. If the library was ON before the outage, it will be ON afterward. If it was OFF, the library powers itself OFF after a few seconds.

Restarting a library that was off prior to a power interruption is like powering on any other library that is off. See "[Power On the Library](#)" on page 9-2.

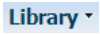
Audit the Library

During an audit the robot checks each cartridge slot, recording cartridge labels and locations to create a tape catalog. The library must audit whenever tapes are manually moved (meaning moved with human intervention) so that it can update the catalog.

The library automatically performs an audit whenever it powers up or whenever you reinsert magazines.

Normally, host applications request audits. However, you can audit the library from the remote interface, but you should avoid this, if possible, as it interrupts host operations.

To manually initiate an audit:

1. From the remote interface, select **Library** in the left menu.
2. From the **Library** drop-down menu , select **Audit Library**.
3. Optionally, select **Set the Library back Online ...**
4. To take the library offline, start the audit, and close the dialog, press **OK**.
5. If you did not check the **Set the Library back Online ...** checkbox, remember to bring the library back online once you are ready.

Monitoring an Audit in Progress

The duration of an audit depends on the size of the library. For example, a 30-slot library can take about 7 minutes to audit.


You can track the progress of the audit on the **Library** screen of the remote interface. Grayed-out cartridge icons represent unaudited slots. As the audit progresses, audited slots return to their normal appearance. Hovering over a slot shows the current cartridge label information (see "[Labeling Cartridges](#)" on page 6-3 for label information).

Move the Library Rack

1. Power the library off (see "[Power Off the Library](#)" on page 9-2).
2. Secure the robot (see "[Lock the Robot](#)" on page 9-3).
3. If the floor is uneven, remove all magazines from library as tape cartridges can shift and obstruct library robotics when the library is restarted.
 - a. Unlock all magazines using the remote interface or local operator panel. Press the **Select All** option on the **Unlock Magazines** dialog.
 - b. Remove all magazines.
4. Set the rack PDU circuit breakers to OFF and disconnect the PDU power cord(s) from the main circuit.
5. Label and disconnect any host connection or LAN cables.
6. Raise any leveling pads until the casters are supporting the rack. Release any rack anti-tip device(s), and remove any wheel chocks.
7. Move the library to its new location. Reset the leveling pads.
8. Reinstall the magazines.
9. Reconnect power, host-connections, and local area network (LAN) cables.
10. Unlock the robot.
11. Power the library on.

Enable the Locate Light

If you have multiple SL150s in your data center, you can use the locate light to physically identify a particular unit.

1. In the remote interface, click the *locate* icon  in the upper left of the screen.
2. Select **Switch Locate Light On**.
3. The physical locate LEDs activate on the front control panel and in the black rectangle on the robot CRU.

Troubleshoot the Library

- ["Diagnose a Browser-Based User Interface Problem"](#) on page 9-6
- ["Diagnose a Library Problem"](#) on page 9-6

Diagnose a Browser-Based User Interface Problem

1. If you have problems with a browser, try a different browser. Check the SL150 firmware release notes for known incompatibilities.
2. If you start to have problems with a browser that used to work, check for recent changes to the browser configuration:
 - If scripting (Javascript) has been disabled, enable it.
 - If browser plug-ins or extensions have been installed or updated recently, disable or uninstall the add-on software.
 - If browser software has been recently updated, roll back the update and revert to the previous version.
3. If an update is available for the browser, install it.
4. If you still have problems after you have tried the latest versions of several browsers, open a service request. See ["Get Parts and Technical Support"](#) on page 9-11.

Diagnose a Library Problem

- [Diagnose a Problem if You Cannot Login to the Remote Interface](#)
- [Use the Health Table to Diagnose the Issue](#)
- [Locate and Remove a Cartridge Stuck in a Magazine Slot](#)
- [Locate and Clear Obstructions, Such as Loose or Protruding Cartridges](#)
- [Save the Health Log to a File](#)
- [Run a Self-Test](#)

Diagnose a Problem if You Cannot Login to the Remote Interface

1. Go to the library and check the local operator panel.
2. If the local operator panel is working and the remote user interface is not, check the Ethernet cable connected to NET MGT port 0 at the rear of the library. Check for network problems.

3. If the local operator panel is also not working, make sure that the library has power. Check the power cord connected to each power supply. Check the data-center power outlet. Check breakers.
4. If the library is connected to power, check the LED Indicators on the library and its components:
 - Power supplies — If an amber power supply LED is lit or if both power supply LEDs are dark, replace the power supply. See ["Power Supply Removal and Replacement"](#) on page 10-4.
 - Robot Module — If an amber Robot Module LED is lit or if both robot LEDs are dark, replace the robot. See ["Robot Module Removal and Replacement"](#) on page 10-8.
5. If the robot module is OK, restart the library, and repeat this procedure.
6. If problems persist after you have restarted the library and repeated the above diagnostic steps, go to ["Get Parts and Technical Support"](#) on page 9-11, check for relevant knowledge articles, and then, if necessary, open a service request.

Use the Health Table to Diagnose the Issue

1. Log in to the remote interface, take the library offline, and use the health table.
2. To access the health table, click the **Degraded** or **Failed** indicator in the status bar.
3. Note the **Fault Code** listed in the health table. Suggested fixes are listed below:
 - *Fault Code 903:*
 - **If Drive Auto Clean is enabled** — If the drive listed in the suspected component field is mounted, wait. The library will attempt a cleaning once the tape dismounts.

If the fault persists after the tape dismounts, a cleaning cartridge is unavailable or expired. Load a new, LTO universal cleaning cartridge into a reserved slot. Then clean the drive using the library user interface.
 - **If using host-managed drive cleaning** — Consult the host application documentation and make sure that fresh cleaning media are available. If necessary, clean the drive listed using the library user interface.
 - *Fault Code 9108:*
 - If the Suspect Component is one or more magazines, see ["Locate and Remove a Cartridge Stuck in a Magazine Slot"](#) on page 9-8.
 - If the Suspect Component is one or more drives, the cartridge may be stuck in the drive. Go to ["Get Parts and Technical Support"](#) on page 9-11, and check for relevant knowledge articles. If you cannot find a resolution, open a service request
 - *Fault Code 9109 or 9102 thru 9107:*
 - See ["Locate and Clear Obstructions, Such as Loose or Protruding Cartridges"](#) on page 9-9.
 - *All other Fault Codes:*
 - Follow the **Recommended Action** listed in the health table one at a time and in the order specified in the suspect components list. See ["Replacing Components \(CRUs & FRUs\)"](#) on page 10-1.

If you replace the robot, the operator panel, or the chassis of library module 1, power-cycle the library as soon as you finish. These three components maintain records of the product serial number and configuration settings. If you replace more than one of them at a time, without restarting the library, this information will be lost.

4. After attempting a fix, if the connection status indicator shows **Library is Inoperative**, restart the library and then see ["Check if Fault is Closed in the Health Log"](#) below.

Check if Fault is Closed in the Health Log

After attempting a fix and restarting the library, you should see if the fault record has been closed:

1. Select **Service** in the left menu. Select the **Health Log** tab
2. Locate the row for the fault and note the value of the **Type** field:
 - If the record is still **Open**, you have not yet isolated the problem. Note the next **Suspect Component** and repeat ["Use the Health Table to Diagnose the Issue"](#) above.
 - If the record is **Closed**, but the library status is still **Degraded**, check for remaining faults in the health table and repeat ["Use the Health Table to Diagnose the Issue"](#) above.
 - If you **Closed** all fault records and still cannot get the library into Operational condition, go to ["Get Parts and Technical Support"](#) on page 9-11, check for relevant knowledge articles, and, if you cannot find a resolution, open a service request. Include fault codes and details of the actions that you have taken.

Locate and Remove a Cartridge Stuck in a Magazine Slot

Use this procedure to resolve **Fault Code 9108** if the **Suspect Components** indicates one or more magazines.

1. Identify the problem slot. Correlate the details of the failed move, as listed in the **Library Activity Panel**, with the **Suspect Components** field of the corresponding **Library Health** record.
2. Manually unlock the magazine that contains the problem (see ["Mount the Base Module Task 2: Remove the Cartridge Magazine with the Hex Key"](#) on page 2-12).
 If you feel any significant resistance when you try to remove the magazine, STOP and check for obstructions. Go to ["Locate and Clear Obstructions, Such as Loose or Protruding Cartridges"](#) on page 9-9.
3. Set the magazine on a flat surface, be careful to not spill cartridges.
4. Locate the slot with the stuck cartridge. Grasp the cartridge by the top and bottom gripping surfaces. Gently try to free the cartridge. Do not force it.
 - **If you free the cartridge**, check the storage slot for damage or defects.
 If you find any damage to the magazine, request a replacement. Go to ["Get Parts and Technical Support"](#) on page 9-11, and create a service request.
 If you find no damage, reseal the cartridge in its slot and make sure that it is moving freely. Reinstall the magazine in its bay and power up the library and see ["Check if Fault is Closed in the Health Log"](#) on page 9-8.

- **If you cannot free the cartridge**, go to ["Get Parts and Technical Support"](#) on page 9-11, and check for relevant knowledge articles. If you cannot find a resolution, open a service request.


Locate and Clear Obstructions, Such as Loose or Protruding Cartridges

If the **Suspect Components** and/or **Recommended Action** fields indicate that an obstruction is interfering with the robot or if the **Fault Code** is either **9109** or in the range **9102-9107**, look for a mispositioned cartridge or obstruction in the library.

1. Remove the magazine that will give you the best view of the interior of the library. If you feel any significant resistance when attempting to remove the magazine, do not force it. Instead, remove a magazine on the opposite side of the library.
2. Using the empty magazine bay as a window, look inside the library. Try to locate obstructions, particularly loose or protruding cartridges. Look across, above, and below.
3. If you cannot see any obstructions, gain additional visibility by removing additional magazines.
4. If you see a cartridge protruding from a storage slot in one of the magazines or lying on the bottom of the library, reach in through the open magazine bay and try to remove it.
5. If you cannot reach the cartridge, remove additional magazines for additional clearance.
6. If you cannot remove the problem cartridge, stop here. Go to ["Get Parts and Technical Support"](#) on page 9-11, and check for relevant knowledge articles. If you cannot find a resolution, open a service request.
7. If you successfully removed the problem cartridge, remove the source magazine and check the source storage slot for defects.
8. If you find any damage to the source magazine, request a replacement. Go to ["Get Parts and Technical Support"](#) on page 9-11, and open a service request.
9. Otherwise, reseal the errant cartridge in its storage cell.
10. Reinstall all removed magazines in their original bays.
11. Once you have reinserted the magazines, start the library and then see ["Check if Fault is Closed in the Health Log"](#) on page 9-8.

Save the Health Log to a File

If you need to work on diagnostics off-line or if you need to open a service request, save the contents of the system health log to a file.

1. From the remote interface, select **Service** in the left menu and then select the **Health Log** tab.
2. Click **Export** , and then save the file.

The HTML-based `SL150_HealthLog.xls` file is compatible with current spreadsheet applications, such as Microsoft Excel and Apache OpenOffice Calc. To view these files in web browsers, simply rename the file using the `.html` file extension in place of `.xls`.

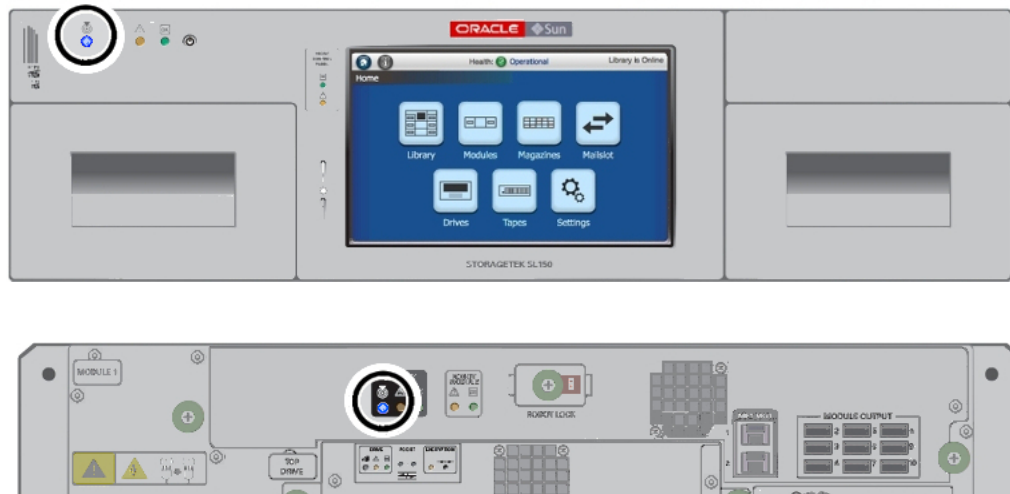
Run a Self-Test

Once you have resolved an issue. You can make sure that the library is functioning normally by running a self test. See ["Run a Self-Test"](#) on page 2-36.

Restore the Factory Default Configuration

Note: Resetting the library erases the existing configuration. You will have to recreate the configuration from scratch, so do not use this procedure on an operational library except as a last resort.

1. This procedure requires two people. One person at the front of the library and one at the rear. A single person cannot reach both buttons simultaneously.
2. Find the locator buttons — front upper left and rear top center (see below)



3. Push and release either one of the locator buttons.
4. Once the locator buttons light, *simultaneously* push and hold both front and rear buttons for about 10 seconds until the lights rapidly flash.

Note: After 3-4 seconds, the lighted locator buttons flash slowly. After 10 seconds, the locator buttons should start to flash rapidly.

5. When the lighted locator buttons start flashing *rapidly*, release both buttons. The library is now reset to defaults. It should power down and restart.

Note: If either Locate button is released before the fast flash rate, the reset process terminates.

6. If the library does not power-on automatically, press the power button.



7. Run the initial installation wizard and reconfigure the library as you would when setting up a new unit (see "[Configure the Library After Powering-on for the First Time](#)" on page 2-30).

Get Parts and Technical Support

- [Check for Relevant Knowledge Articles](#)
- [Get Firmware Updates](#)
- [Create a Service Request](#)

Check for Relevant Knowledge Articles

1. Log in to My Oracle Support at <https://support.oracle.com>.
2. Select the **Knowledge** tab.
3. In the **Knowledge Base** area, select the **Search & Browse** tab.
4. In the **Select a product or product line** field, enter **StorageTek SL150 Modular Tape Library**.
5. In the **Go directly to the best match** area, click the **Information Center: StorageTek SL150 ...** link.
6. In the Information Center document, select the **Resources** tab, and browse the links on the page.

Get Firmware Updates

See "[Update Library and Drive Firmware](#)" on page 4-7.

Create a Service Request

1. Save a library health log (see "[Save the Health Log to a File](#)" on page 9-9).
2. Log in to My Oracle Support at <https://support.oracle.com>.
3. Select the **Service Requests** tab.
4. Click the **Help** control in the upper right corner of the Oracle support page.
5. From the **Help** drop-down menu, select **How do I create a new SR?**
6. Follow the instructions provided.

Replacing Components (CRUs & FRUs)

Caution: The robot, front control panel, and base module are critical to maintaining the product serial number and customer settings. When a replacement is needed, you may *only replace one unique part during a single power down cycle*.

This chapter assumes you have isolated the issue and have replacement parts on hand. If you have not determined the problem, see ["Troubleshoot the Library"](#) on page 9-6.

- CRU Locations
- Drive Tray Removal and Replacement
- Power Supply Removal and Replacement
- Front Control Panel Removal and Replacement
- Module Controller Removal and Replacement
- Robot Module Removal and Replacement
- Expansion Module Chassis Removal and Replacement (FRU)
- Base Module (Module 1) Chassis Removal and Replacement
- Validate the Component Installation
- Return CRU Components to Oracle
- Lock the Robot for Reshipment within Rack

CRU Locations

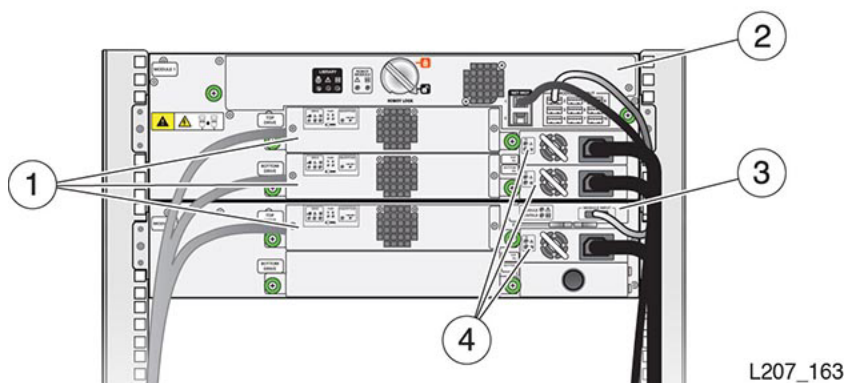


Illustration Legend:

- 1 - Tape Drive Tray
- 2 - Robot (in the Base Module)
- 3 - Module Controller (in the Expansion Module)
- 4 - Power Supply

Drive Tray Removal and Replacement

Warning: Do not operate the library with open tape drive slot or power supply slots.

- [Remove the Drive Tray](#)
- [Replace the Drive Tray](#)
- [Remove a Drive Filler](#)
- [Install a Drive Filler](#)

Figure 10–1 Tape Drive Tray CRU (HP LTO-5)

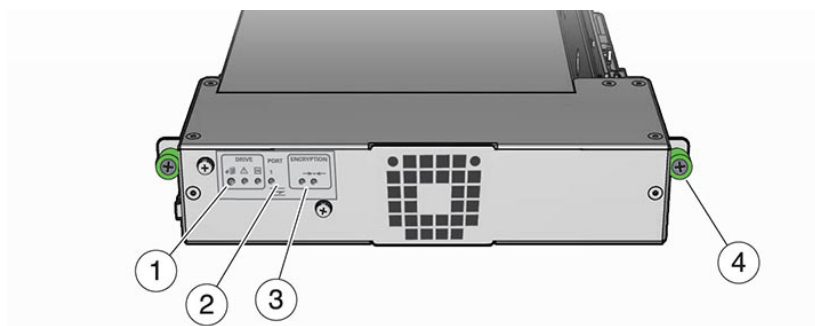


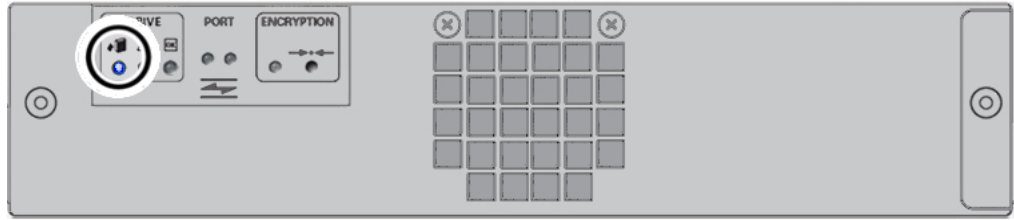
Illustration Legend:

- 1 - Drive Indicators
- 2 - Port Indicator (HP SAS and HP LTO-6 FC Drives)
- 3 - Encryption Indicator and IP Reset Switch (HP drives only)
- 4 - Thumbscrew (Drive Tray has Two Thumbscrews)

Remove the Drive Tray

IMPORTANT: Removal of a bridged drive results in loss of host connectivity to the library.

1. In the remote interface, select **Library** in the left menu. Right-click on the drive, and then select **Remove Drive**.
2. At the back of the library, locate the drive tray with the blue LED indicator (upper left corner).



3. Label and then disconnect the cables from the drive tray.
4. Loosen the two green thumbscrews on the drive tray. Grasp the drive tray, pull it out of the slot, and set it on a work surface.

Replace the Drive Tray

- [Replace the Drive Tray Task 1: Remove New Drive Tray from Package](#)
- [Replace the Drive Tray Task 2: Replace the Drive Tray](#)
- [Replace the Drive Tray Task 3: Verify the Library Recognized the New Drive Tray](#)

Replace the Drive Tray Task 1: Remove New Drive Tray from Package

Caution: Equipment damage. Do not touch the circuit card or static sensitive components. Follow accepted practices to prevent damage from ESD.

1. Handle the drive tray by the rear corners (near the thumbscrews) and the bottom of the tray. Avoid contact with the top cover of the tape drive.
2. Remove the replacement drive tray from the shipping carton. Save the packaging materials to return the failed CRU.

Replace the Drive Tray Task 2: Replace the Drive Tray

1. Grasp the rear corners of the drive tray and guide it into the drive slot. Push the drive tray completely into the drive slot.
2. Verify that the indicators are active on the rear of the drive tray.
3. Tighten the thumbscrews. Ensure there is no tray movement in any direction.
4. Connect the interface cable(s) and Ethernet cable (if applicable) on the left side of the drive tray.

Replace the Drive Tray Task 3: Verify the Library Recognized the New Drive Tray

1. Confirm that the library recognizes the drive (Drives area of the SL150 remote interface). It can take some time for the indicators to show the drive is operational.
2. Make sure the drive port is enabled (view the Drive Properties and change drive settings if appropriate).
3. Identify the tape drive firmware version and upgrade if necessary (see ["Update Library and Drive Firmware"](#) on page 4-7).

Remove a Drive Filler

You may need to remove a drive filler, if you are installing a new drive tray or need to gain access to the library. See "[Remove a Tape Drive Filler](#)" on page 2-26

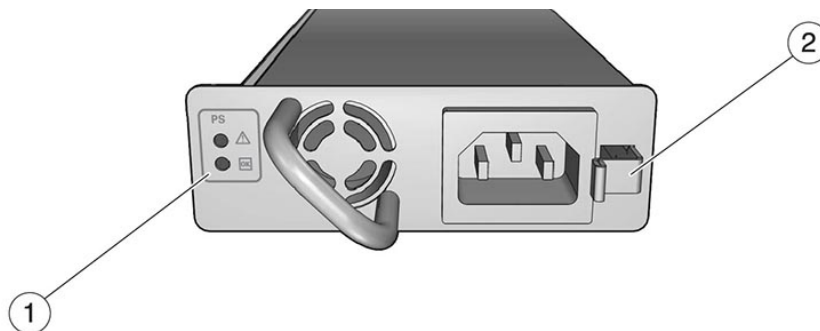
Install a Drive Filler

1. Position the tape drive filler with the spring fingers facing up.
2. Grasp the captive screws and guide the filler into the tape drive slot.
3. Tighten both thumbscrews.

Power Supply Removal and Replacement

- [Remove the Power Supply](#)
- [Replace the Power Supply](#)
- [Remove a Power Supply Filler](#)
- [Install a Power Supply Filler](#)

Figure 10–2 Power Supply CRU



L207_115

Illustration Legend:

- 1 - Power Supply Indicators
- 2 - Power Supply Latch

Remove the Power Supply

1. If the library only has one power supply, power off the library before proceeding (see "[Power Off the Library](#)" on page 9-2).
2. Disconnect the power cord from the defective power supply.
3. Press the latch towards the left (toward the fan) to release the power supply.
4. Grasp the power supply by the handle, pull it out of the library, and set it aside.

Replace the Power Supply

1. Remove the power supply from the shipping carton.
2. Grasp the supply by the handle and support the bottom with your other hand.
3. Orient the power supply as shown in [Figure 10–2](#) (oriented with LEDs on left).

4. Align the rear of the supply with the module slot. Push the supply fully into the module slot. Make sure the power supply is secured in the module slot.
5. Connect the power cord to the power supply receptacle.
6. Verify that the **OK** indicator is active on the power supply. If not, continue to ["Validate the Component Installation"](#).

Remove a Power Supply Filler

You may need to remove a power supply filler if you are adding a new power supply or replacing other CRUs. For instructions, see ["Remove the Power Supply Filler"](#) on page 2-25.

Install a Power Supply Filler

1. Position the filler with the spring fingers facing up.
2. Insert the tabs on the right side of the filler into the power supply slot until the notch is near the module frame.
3. Seat the filler notch against the module frame edge.
4. Push the left side of the filler into the power supply slot.

Front Control Panel Removal and Replacement

The front control panel is located at the front of the base module.

- [Remove the Front Control Panel](#)
- [Replace the Front Control Panel](#)

Caution: The front control panel maintains the product serial number and customer settings. *After installing the panel, you must power-cycle the library before installing any other component.*

Figure 10-3 Rear View of the Front Control Panel

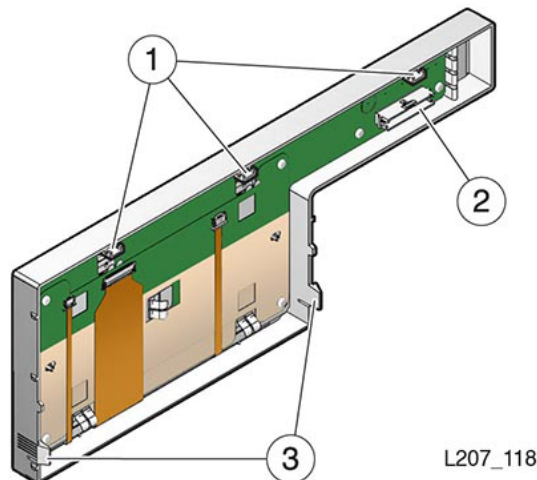
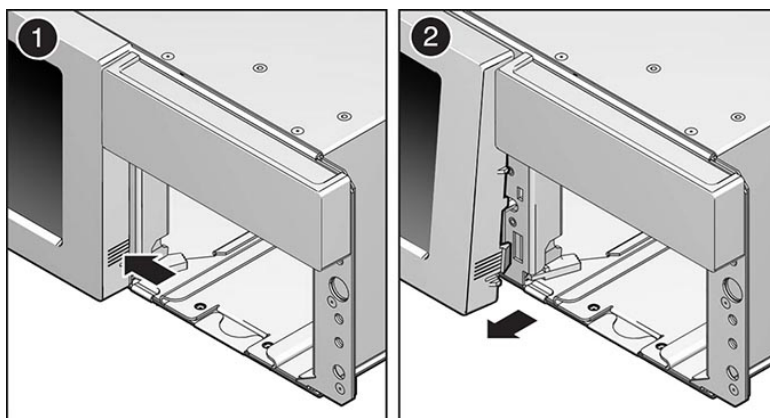


Illustration Legend:

- 1 - Tabs
- 2 - Jack
- 3 - Latches

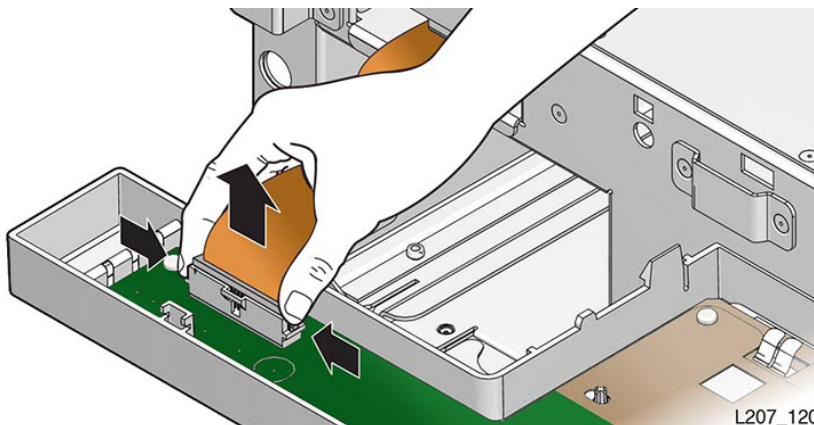
Remove the Front Control Panel

1. Power down the library (see ["Power Off the Library"](#) on page 9-2).
2. Remove both cartridge magazines from the base module (see ["Load the Magazines Task 1: Unlock and Remove the Magazines"](#) on page 6-7).
3. Press the latch inside *each* magazine bay inner wall and pull the bottom edge of the panel away from the module until the panel unlatches (see image below).



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4. Free the tabs on the top edge of the panel from the module.
5. Rotate the top edge of the panel away from the top of the module about 90 degrees and hold the panel in this position with one hand.
6. Disconnect the ribbon cable plug from the jack located on the circuit card.



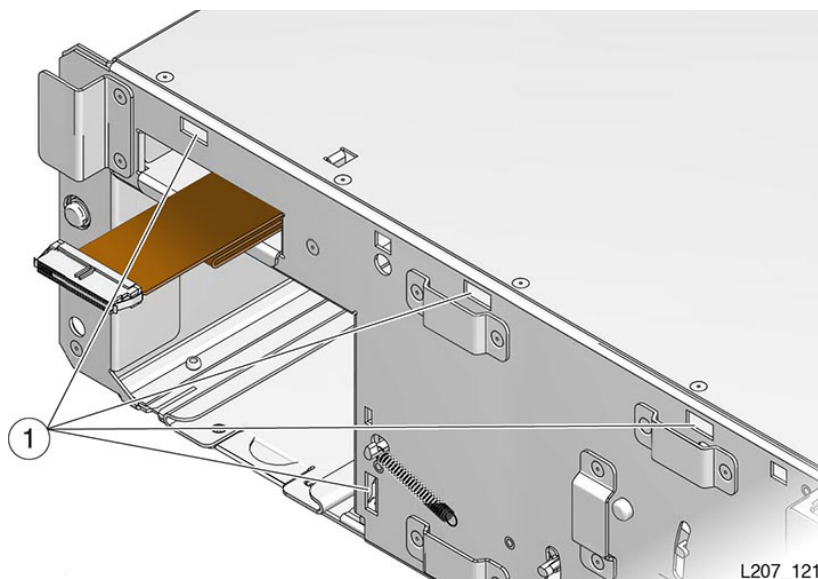
L207_120

7. Set the panel CRU on the anti-static mat.

Replace the Front Control Panel

Caution: ESD damage. Do not touch any exposed electronic components, cables, or contacts.

1. Remove the replacement front control panel from its packaging.
2. Grasp the panel by the plastic housing and raise it to the base module.
3. Attach the cable to the circuit card jack at the back of the panel. Make sure the connector is flush with the jack.
4. Insert the tabs on the top edge of the panel into the base module slots (see image below for slot locations).



5. Rotate the front control panel down and press the bottom edge into the base module slots. The panel snaps in place.
6. Replace both cartridge magazines. Lock the magazines and audit the library (see ["Load the Magazines Task 4: Locking the Magazines and Auditing the Library"](#) on page 6-9).
7. Power-cycle the library. Follow the power on procedures (see ["Validate the Component Installation"](#) on page 10-19).

Module Controller Removal and Replacement

The module controller is located in the upper right corner of the expansion module as viewed from the rear of the library (see ["CRU Locations"](#) on page 10-1). The module controller obtains power from the expansion cable connected to a Module Output port on the base module.

- [Remove the Module Controller](#)
- [Replace the Module Controller](#)

Remove the Module Controller

Note: Be aware of ESD (see ["Electrostatic Discharge"](#) on page 2-3).

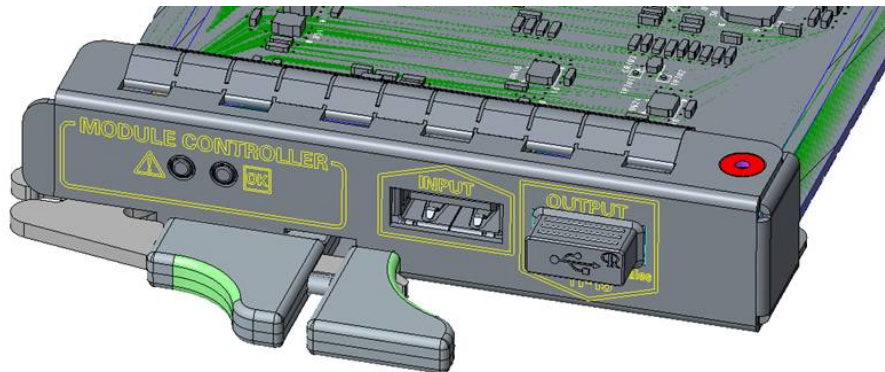
1. Power down the library (see ["Power Off the Library"](#) on page 9-2).
2. Disconnect the expansion cable plug from the *input* port on the module controller.

3. Disconnect the expansion cable plug from the *output* port on the module controller of a library with a tape capacity of greater than 300 tapes. This action applies to Module 6 through Module 10.
4. Squeeze the latch sections together.
5. Extend the latch fully away from the module controller.
6. Pull the controller card out of the module slot.
7. Set the module controller on the anti-static work surface.

Replace the Module Controller

Caution: ESD damage. Do not touch any electronic components or electrical contacts.

1. Remove the replacement module controller from the ESD packaging.
2. Grasp the module controller without touching components or electrical contacts, and open the retaining latch.
3. Insert the module controller, component side up, into the module slot.
4. Seat the latch in the slot to secure the module controller.
5. Connect the expansion cable *input* plug to the module controller input port.
6. Connect the expansion cable *output* plug to the module controller output port. This applies to libraries with tape capacity greater than 300 tapes (Module 6 through Module 10). You must remove the dust cover from the output port.



7. Insert the failed module controller into the ESD packaging.
8. Follow the power on procedures (see "[Validate the Component Installation](#)" on page 10-19).

Robot Module Removal and Replacement

The robot module is located at the top of the base module (see "[CRU Locations](#)" on page 10-1). The robot *must be parked* in the base module, the robot lock engaged, and the thumbscrews loosened before attempting to remove the robot module.

- [Remove the Robot](#)
- [Manually Retract the Robot](#)

- [Manually Disengage the Robot](#)
- [Replace the Robot](#)

Caution: The robot maintains the product serial number and customer settings. *After installing the robot, you must power-cycle the library before installing any other component.*

Remove the Robot

Caution: You must park and latch the robot before attempting to remove it.

- [Remove the Robot Task 1: Park and Lock the Robot](#)
- [Remove the Robot Task 2: Slide Robot CRU Out of Base Module](#)

Remove the Robot Task 1: Park and Lock the Robot

1. Power down the library with the “to prepare the robot for removal” option enabled (see ["Controlled Power-Down from the Interface"](#) on page 9-2).

If the robot cannot be parked by using the power-down procedure, perform the manual robot extraction procedure (see ["Manually Retract the Robot"](#) on page 10-10).

2. Remove the top drive tray or drive filler from the base module.
3. Look through the drive slot and locate the position of the robot.
4. Verify the robot is fully seated against the ceiling of the library.

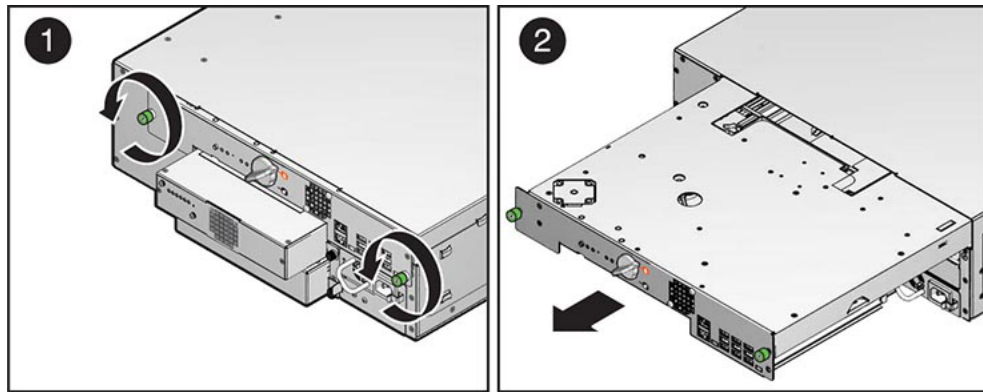
Repeat the parking procedure if necessary to make sure the robot is secured in the proper position.

5. Lock the robot (see ["Lock the Robot"](#) on page 9-3).
6. Replace the top drive or drive filler in the base module.

Remove the Robot Task 2: Slide Robot CRU Out of Base Module

Note: The robot CRU weighs approximately 5 kg (11 pounds).

1. Label the cables connected to the robot CRU as necessary.
2. Disconnect all cables attached to the robot CRU.
3. Loosen the robot module thumbscrews.



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4. Grasp the robot module thumbscrews and pull the robot approximately 25cm (10 inches) out of the base module.
5. Reposition your hands near the center of the extended robot.
6. Pull the robot completely out of the base module, and set it on the anti-static work surface.
7. Proceed to ["Replace the Robot"](#) on page 10-12.

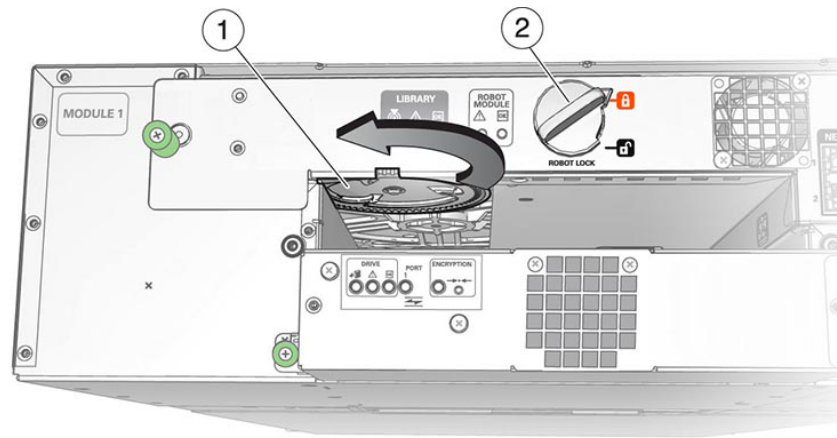
Manually Retract the Robot

Only use this procedure if you could not park the robot by using the power-down procedure.

1. Remove the top drive tray from the base module (see ["Drive Tray Removal and Replacement"](#) on page 10-2).
2. Locate the bullwheel gear inside the library and above the top drive slot (see [Figure 10-4](#)).
3. Look through the drive slot and locate the position of the robot.
4. Turn the gear with your thumb to raise the robot, hold the gear in position with a finger, reposition your thumb, and turn the gear. Repeat as necessary until the robot is at the top of the base module.

If the robot does not retract, disengage it (see ["Manually Disengage the Robot"](#) on page 10-11).

5. Hold the bullwheel gear with the robot fully raised until you lock the robot.
6. Return to Step 5 of ["Remove the Robot Task 1: Park and Lock the Robot"](#) and continue through the last step of robot removal (see ["Remove the Robot Task 2: Slide Robot CRU Out of Base Module"](#)).

Figure 10-4 Bullwheel Gear and Robot Lock

L207_160

Illustration Legend:

- 1 - Bullwheel Gear
- 2 - Robot Lock (Improved Design)

Manually Disengage the Robot

Caution: Perform this procedure *only* if either the library power down (Step 1 of "Remove the Robot Task 1: Park and Lock the Robot") or "Manually Retract the Robot" does not work. This procedure *damages* the robot assembly.

- Manually Disengage the Robot Task 1: Cut Cables
- Manually Disengage the Robot Task 2: Remove the Robot CRU
- Manually Disengage the Robot Task 3: Remove the Z Platform
- Manually Disengage the Robot Task 4: Clean Up

Manually Disengage the Robot Task 1: Cut Cables

1. Make sure the library is powered down.
2. Remove all tape drives from the base module.
3. Cut the accordion cable (folded ribbon cable).
4. Reach into the library and cut both rear suspension cables.
5. Cut the front suspension cables. The Z platform should settle to the floor of the bottom module.

Manually Disengage the Robot Task 2: Remove the Robot CRU

1. Loosen the robot module thumbscrews.
2. Grasp the robot module thumbscrews and pull the robot approximately 254 mm (10 inches) out of the base module.

3. Reposition your hands along the sides of the extended robot and close to the base module.
4. Pull the robot completely out of the base module, and set it aside.

Manually Disengage the Robot Task 3: Remove the Z Platform

1. Remove the cartridge magazines from the base module.
2. Remove cartridge magazines from expansion modules until you locate the Z platform.

Note: You can also perform this procedure at the rear of the library by removing the tape drives or drive fillers from the modules, and reaching through the drive openings.

3. Grasp the platform by reaching through either the magazine or tape drive openings.
4. Raise the platform by hand to the top of the base module.
5. Push the platform through the robot CRU opening at the rear of the base module far enough so that it does not slip back inside the library.
6. Go to the back of the library, grasp the robot CRU, and remove it from the library.

Manually Disengage the Robot Task 4: Clean Up

1. Inspect the library floor and remove any debris resulting from the broken robot.
2. Replace all cartridge magazines and tape drives removed during this procedure.
3. Follow the replace robot procedures (see ["Replace the Robot"](#) on page 10-12).

Replace the Robot

- [Replace the Robot Task 1: Reinsert the Robot CRU and Unlock the Robot](#)
- [Replace the Robot Task 2: Cabling](#)

Replace the Robot Task 1: Reinsert the Robot CRU and Unlock the Robot

1. Remove the replacement robot from its shipping carton, and set it on the anti-static mat. Save the packaging materials for the return of the failed CRU.
2. Grasp the robot near the center with the thumbscrews facing you.
3. Insert the robot into the base module.
4. Push the robot fully into the module.
5. Tighten the thumbscrews on each side of the robot CRU.
6. Unlock the robot (see ["Unlock the Robot"](#) on page 2-29).

Replace the Robot Task 2: Cabling

1. Plug the expansion cable for Module 2 through Module 10 into the appropriate base module connector.

For example, connect the *output* plug of the expansion cable to Port 2 on the robot CRU and the *input* plug of the cable to the Module 2 controller input port.

Note: The initial design of the expansion cable did not have plug labels.

2. Plug the Ethernet cables into the appropriate Net Mgt ports.
3. Follow the power on procedures (see "[Validate the Component Installation](#)").

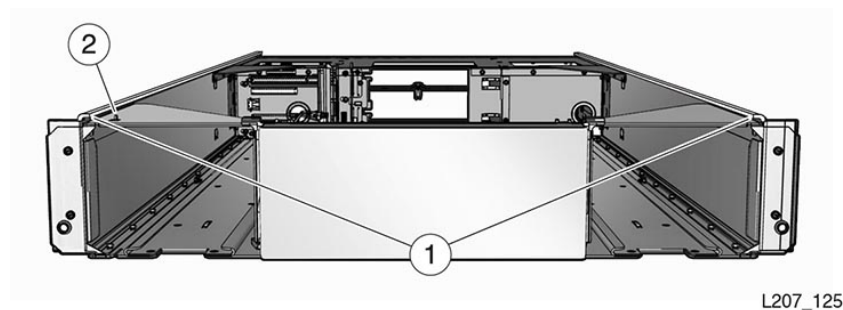
Expansion Module Chassis Removal and Replacement (FRU)

Note: The expansion module is a field-replaceable unit (FRU) and must be serviced by an Oracle service person.

You *must* transfer cartridge magazines, tape drives, tape drive fillers, power supplies, power supply fillers, and the module controller from the failed module to the FRU, as applicable. You might need to remove operational modules to access the defective one.

- [Remove an Expansion Module](#)
- [Replace the Expansion FRU Chassis](#)

Figure 10–5 Expansion Module FRU



L207_125

Illustration Legend:

- 1 - Flange
- 2 - Tab

Remove an Expansion Module

- [Remove Expansion Task 1: Power Down, Lock the Robot, and Remove Magazines](#)
- [Remove Expansion Task 2: Remove the Floor, Cables, and Cords](#)
- [Remove Expansion Task 3: Remove Operational Expansion Modules Below the Defective Module](#)
- [Remove Expansion Task 4: Remove Components from the Defective Module](#)

Remove Expansion Task 1: Power Down, Lock the Robot, and Remove Magazines

Caution: You must park and lock the robot before attempting to remove an expansion module.

1. Power down the library with the option enabled to prepare the robot for removal (see "[Controlled Power-Down from the Interface](#)" on page 9-2).
2. Perform the robot park and lock instructions (see "[Remove the Robot Task 1: Park and Lock the Robot](#)" on page 10-9).
3. Remove the magazines from the defective module. Remove the magazines from all modules below it, and remove the magazines from the module directly above it (see "[Mount the Base Module Task 2: Remove the Cartridge Magazine with the Hex Key](#)" on page 2-12).

Remove Expansion Task 2: Remove the Floor, Cables, and Cords

1. Grasp the library floor at the thumb-holds within the magazine openings.
2. Pull the floor out from the front of the module.

Note: If the floor does not move, reach through the magazine opening and push down on the floor behind the touch screen panel to unseat the floor locks. Pull the floor forward with your other hand.

3. Disconnect the expansion cable plug(s) from the port(s) at each affected expansion module controller. Module 6 through Module 10 could have both ports connected.

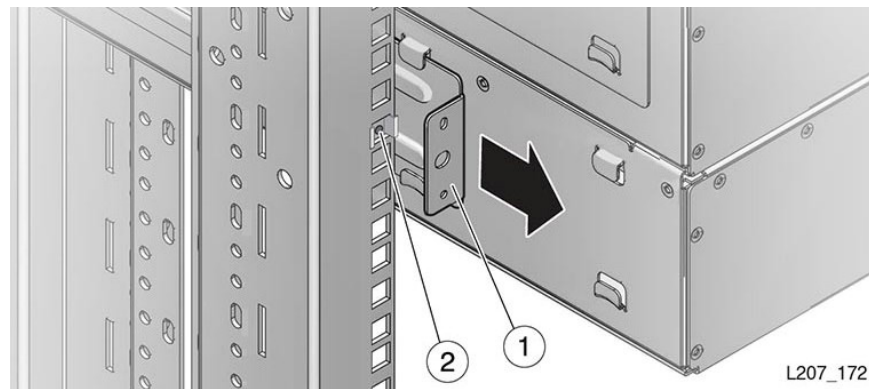
Note: The original design of the expansion controller had a single port only.

4. Open the hook and loop strap, extract all cables and cords, then remove the hook and loop strap (open the plunger on the plastic rivet).
5. Disconnect the power supply cord.
6. Disconnect the drive interface and Ethernet cables, as applicable.

Remove Expansion Task 3: Remove Operational Expansion Modules Below the Defective Module

Warning: Expansion modules weigh about 19.9 kg (43.9 pounds) with two cartridge magazines, 30 tape cartridges, two tape drives, and two power supplies.

1. (Optional) Remove tape drives and power supplies to lighten the weight of the expansion module (see, as necessary, "[Drive Tray Removal and Replacement](#)" on page 10-2 and "[Power Supply Removal and Replacement](#)" on page 10-4).
2. Remove the Phillips screws securing the expansion module to the front of the rack.
3. Grasp the module, pull it forward until the break in the flange is visible, lower the front of the module, pull it free from the module above it, and away from the rack.
4. Set the module down and away from the front of the rack.
5. Remove the Phillips screws and rear rails from the module. Leave the clip nut in place (see [Figure 10-6](#)).
6. Repeat until you have removed all modules below the failed module.

Figure 10–6 Module Rear Rail Removal**Illustration Legend:**

- 1 - Rear Rail
- 2 - Clip Nut

Remove Expansion Task 4: Remove Components from the Defective Module

1. Remove the functional components as applicable:
 - ["Remove the Drive Tray"](#) on page 10-2
 - ["Remove a Drive Filler"](#) on page 10-4
 - ["Remove the Power Supply"](#) on page 10-4
 - ["Remove a Power Supply Filler"](#) on page 10-5
 - ["Remove the Module Controller"](#) on page 10-7
2. Remove the failed expansion module.

Replace the Expansion FRU Chassis

- [Replace Expansion Task 1: Install the Chassis](#)
- [Replace Expansion Task 2: Install CRUs, Fillers, and Magazines in Replaced Module](#)
- [Replace Expansion Task 3: Install the Remaining Expansion Modules](#)
- [Replace Expansion Task 4: Finishing Touches](#)

Replace Expansion Task 1: Install the Chassis

1. Grasp the expansion module chassis by the sides and remove it from the shipping carton.
2. Remove the magazines from the expansion module (see ["Prepare the Expansion Module by Removing the Cartridge Magazines"](#) on page 2-17).
3. If this will be the bottom module of the library, install the library floor now (see ["Install the Floor in the Bottom Expansion Module"](#) on page 2-18).
4. Mount the module (see ["Mount the Expansion Module"](#) on page 2-19).
5. Install the rails (see ["Install the Rear Rails for the Expansion Module"](#) on page 2-21).

6. Secure the module (see ["Secure the Expansion Module to the Front Rack Stile"](#) on page 2-22).

Replace Expansion Task 2: Install CRUs, Fillers, and Magazines in Replaced Module

Cables and cords are connected as part of CRU installation.

1. Install the module controller (see ["Replace the Module Controller"](#)).

Tip: When the library capacity is more than 300 cartridges, you will not connect the output port for Module 6 through Module 10 now. You connect the port when installing Module 11 through Module 15.

2. Install the tape drive assembly (see ["Replace the Drive Tray"](#)).
3. Install the tape drive filler (see ["Install a Drive Filler"](#)).
4. Install the power supply (see ["Replace the Power Supply"](#)).
5. Install the power supply filler (see ["Install a Power Supply Filler"](#)).
6. Insert the cartridge magazines.

Replace Expansion Task 3: Install the Remaining Expansion Modules

1. Locate the next expansion module for installation (refer to the module number label on the back of the module).
2. Repeat the installation tasks until all expansion modules and CRUs are installed (refer to and).
3. Make sure you have installed the floor in the bottom module (see ["Install the Floor in the Bottom Expansion Module"](#) on page 2-18).

Replace Expansion Task 4: Finishing Touches

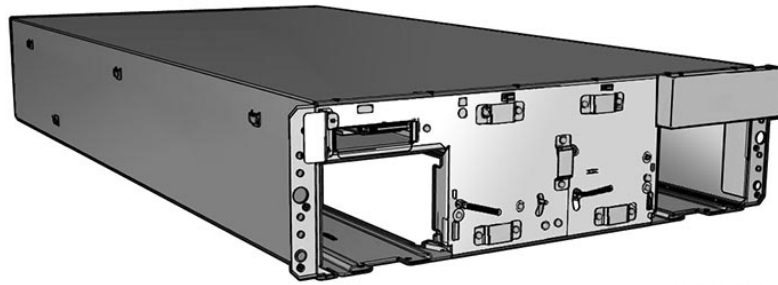
1. Secure the hook and loop strap to the replaced expansion module (close the plunger of the rivet).
2. Align, dress, and secure cables in the hook and loop straps.
3. Follow the power on procedures (see ["Validate the Component Installation"](#)).

Base Module (Module 1) Chassis Removal and Replacement

Note: The base module is a field-replaceable unit (FRU) and must be serviced by an Oracle service person.

You must transfer the cartridge magazines, front control panel, tape drive(s), tape drive filler, power supply, power supply filler, and the robot from the defective base module to the FRU.

- [Remove the Base Module Chassis](#)
- [Replace the Base Module Chassis](#)

Figure 10-7 Base Module FRU

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Caution: The robot, front control panel, and base module chassis are critical to maintaining the product serial number and customer settings. When a replacement is needed, you may *replace only one unique device during a single power-down cycle*.

If the library has expansion modules, remove all of the expansion modules to access the defective base module.

Remove the Base Module Chassis

- [Remove Base Task 1: Lock the Robot and Remove Expansion Modules](#)
- [Remove Base Task 2: Remove Module and Remove Parts for Reuse](#)

Remove Base Task 1: Lock the Robot and Remove Expansion Modules

1. Park and lock the robot (see ["Remove the Robot Task 1: Park and Lock the Robot"](#) on page 10-9).
2. Remove all modules below the base module (see ["Remove an Expansion Module"](#) on page 10-13).

Remove Base Task 2: Remove Module and Remove Parts for Reuse

1. Remove the following applicable parts from the Base module:
 - ["Load the Magazines Task 1: Unlock and Remove the Magazines"](#) on page 6-7
 - ["Remove the Drive Tray"](#) on page 10-2
 - ["Remove a Drive Filler"](#) on page 10-4
 - ["Remove the Power Supply"](#) on page 10-4
 - ["Remove a Power Supply Filler"](#) on page 10-5
 - ["Remove the Front Control Panel"](#) on page 10-6
 - ["Remove the Robot"](#) on page 10-9
2. Remove the screws securing the base module to the front of the rack.

Warning: The base module weighs approximately 12.8 kg (28.3 pounds) without magazines, tape drives, power supplies, or the robot CRU. A best practice is to use two persons to lift the unit.

3. Extract the module from the rack.

Replace the Base Module Chassis

- [Replace Base Task 1: Install the Base Module FRU](#)
- [Replace Base Task 2: Install the Base Module CRUs and Expansion Modules](#)
- [Replace Base Task 3: Reinstall Magazines and Dress the Cables](#)

Replace Base Task 1: Install the Base Module FRU

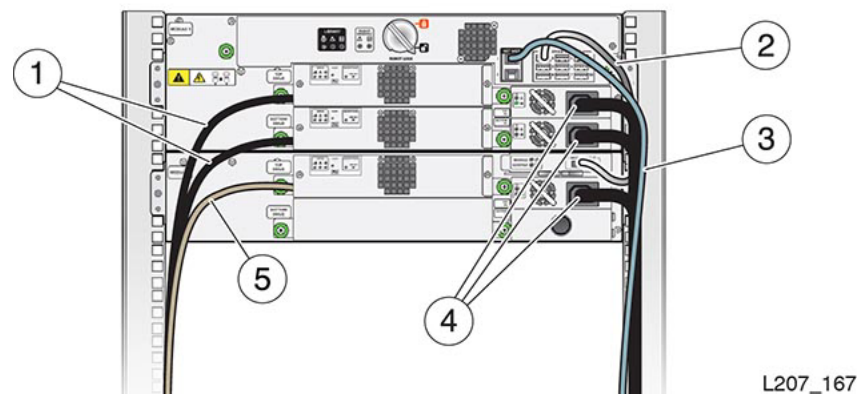
1. Grasp the base module chassis by the sides and remove it from the shipping carton.
2. If there are no expansion modules for this library, install the floor in the base module (see ["Install the Floor in the Bottom Expansion Module"](#)).
3. Mount the base module (see ["Mount the Base Module"](#) on page 2-11).

Replace Base Task 2: Install the Base Module CRUs and Expansion Modules

1. Reinstall the base module components.
 - ["Replace the Robot"](#) on page 10-12
 - ["Replace the Drive Tray"](#) on page 10-3
 - ["Install a Drive Filler"](#) on page 10-4
 - ["Replace the Power Supply"](#) on page 10-4
 - ["Install a Power Supply Filler"](#) on page 10-5
 - ["Replace the Front Control Panel"](#) on page 10-6
2. Reinstall the expansion modules (see ["Replace the Expansion FRU Chassis"](#) on page 10-15). Make sure to install the floor in the bottom module.
3. Re-cable the expansion modules. Connect the specific base module port to the controller card port of the associated expansion module. See ["Cable the Library Task 1: Cable the Expansion Modules"](#) on page 2-27 for details.

Replace Base Task 3: Reinstall Magazines and Dress the Cables

1. Install cartridge magazines in all modules (see ["Load the Magazines Task 4: Locking the Magazines and Auditing the Library"](#)).
2. Align and dress the cables. Secure the cables in the hook and loop straps, if applicable.

Figure 10–8 Cable Attachment**Illustration Legend:**

- 1 - Tape Drive With Fibre Channel Cable**
- 2 - Expansion Module Cable**
- 3 - Ethernet Cable**
- 4 - Power Supply Cord**
- 5 - Tape Drive With SAS Cable**

3. Connect the power cord to each installed power supply.
4. Follow the power on procedures (see "[Validate the Component Installation](#)" on page 10-19).

Validate the Component Installation

1. Power on the library (see "[Power On the Library](#)" on page 9-2).
2. Check the OK indicators on all CRUs.
3. Verify that the library health state is *operational* from either the touch screen or the remote interface (see "[View the Library State](#)" on page 7-1).

If the health state is degraded or failed, see "[Troubleshoot the Library](#)" on page 9-6 to assist with resolving the problem.

4. Perform an operational check of replaced CRUs, as applicable:
 - Front Panel — Test the panel for general operation (locate light, touch screen, open the mailslot, and so forth).
 - Module Controller — Confirm that the library recognizes the module controller (Modules area of the touch screen or Library area of the SL150 remote interface).
5. Run the offline self tests from the remote interface (see "[Run a Self-Test](#)" on page 2-36).
6. Set the library to the online state (see "[Place the Library Online and Offline](#)" on page 9-1) and log out of the remote interface.
7. Run host application commands to ensure that the library and drive applications are synchronized. See your host tape application documentation for guidance.

Return CRU Components to Oracle

You should only replace a single CRU at a time. Keep the original CRU until the correct CRU is identified as faulty.

Return the robot and tape drive tray CRUs to Oracle. Instructions should have been provided regarding the process to return the specific CRU.

Dispose of all other CRUs or recycle them, as appropriate.

Lock the Robot for Reshipment within Rack

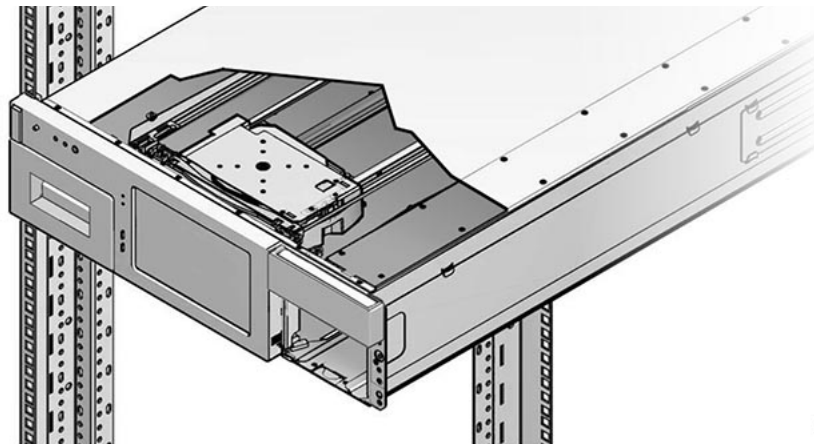
Use the following instructions if you are shipping the SL150 after installing it into a rack.

Caution: Improper installation of the lock could cause catastrophic failure during shipment.

- [Power Down the Library and Verify Robot Position](#)
- [Install the Shipping Clip](#)

Power Down the Library and Verify Robot Position

1. Power down the library with the “to prepare the robot for removal” option enabled (see ["Controlled Power-Down from the Interface"](#) on page 9-2).
2. Lock the robot (see ["Lock the Robot"](#) on page 9-3).
3. Remove the right cartridge magazine from the base module (see ["Mount the Base Module Task 2: Remove the Cartridge Magazine with the Hex Key"](#) on page 2-12 if necessary).
4. Make sure the robot has positioned the hand against the ceiling and front face of the library (see image below).



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Install the Shipping Clip

1. Verify the robot is in position (see [Power Down the Library and Verify Robot Position](#)).
2. Grasp the shipping clip and reach through the cartridge magazine opening.

3. Open the shipping clip and install it over the 7 mm steel shaft behind the hand assembly (see image below).

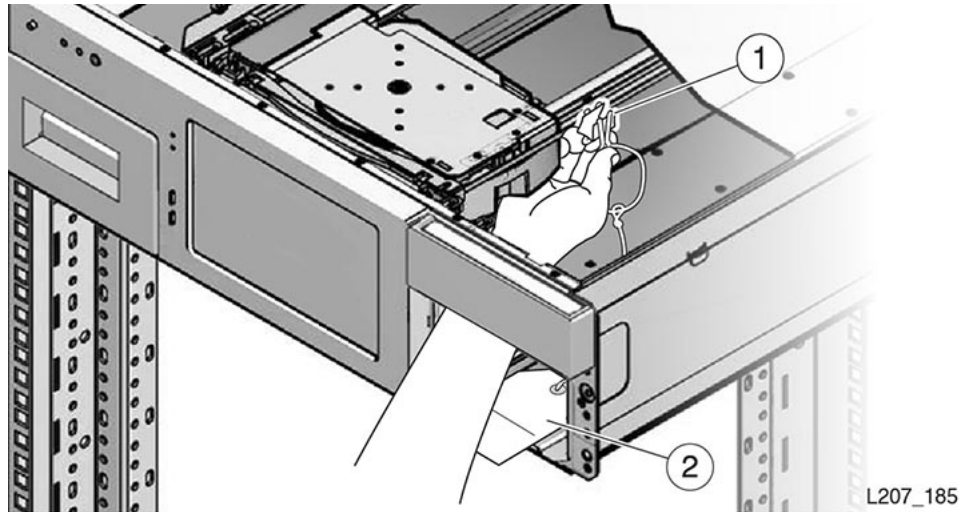
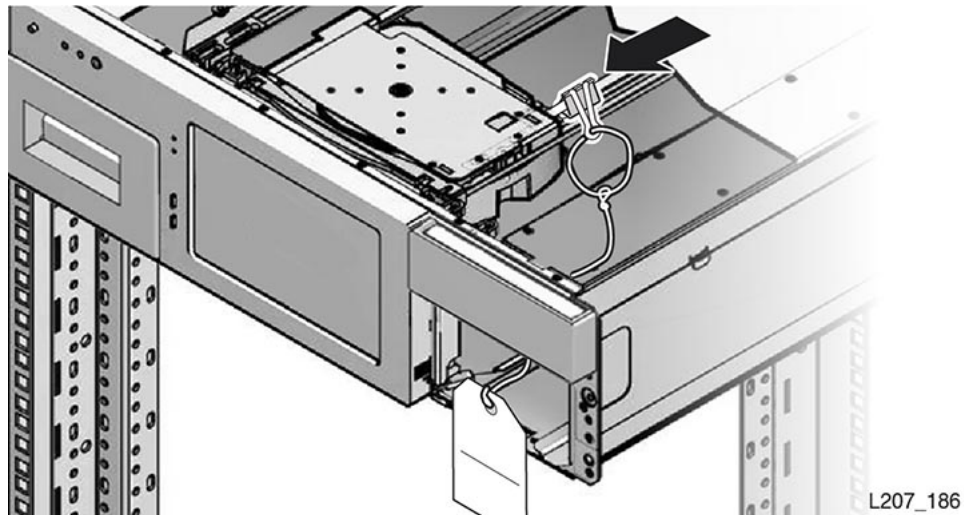


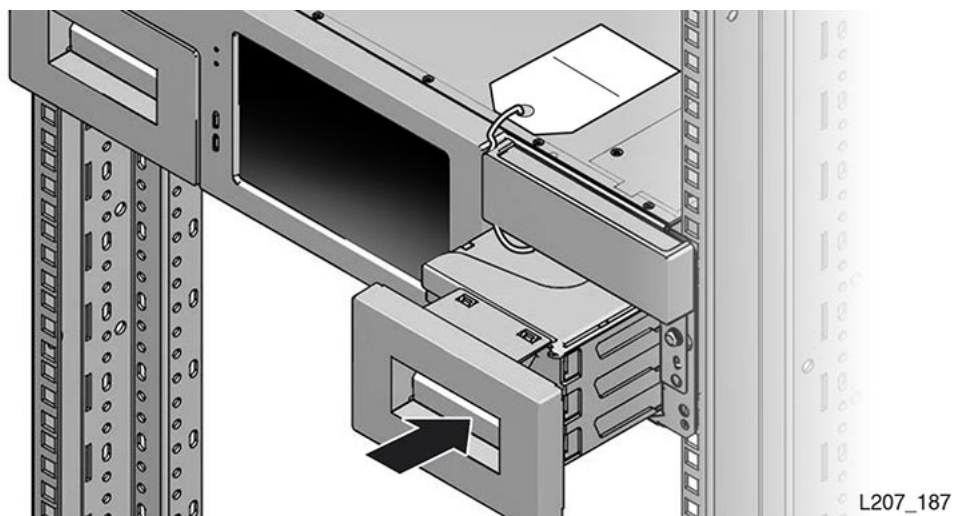
Illustration Legend:

- 1 - Opened Shipping Clip
- 2 - Instruction Tag

4. Squeeze the clip to reduce the clamping force on the shaft and slide the clip toward the hand assembly (see image below). The hand will be contained between the front wall and the clip.



5. Guide the instruction tag out of the cartridge magazine slot. Route the string and instruction tag between the mailslot and right side of the front control panel and set it on top of the base module (see image below).



6. Replace the right magazine in the base module and verify the magazine is securely latched.

Slot Mapping and Cartridge Locations

- Cartridge Slot Addressing
- Drive, Mailslot, Power Supply, and Robot Addressing
- SCSI Element Addressing
- Example Library Configurations and Slot Maps

Cartridge Slot Addressing

Library slots are identified by *library-module*, *side*, *row*, *column*, where:

- *library-module* is the module that contains the slot. Modules are numbered by starting from the base module (1) and counting down.
- *side* identifies the magazine within the module either Left or Right.
- *row* is the row of the slot within the magazine, numbered starting from the top of magazine(1) and counting down.
- *column* is the column of the slot within the magazine, numbered starting from the handle side of the magazine, at the front of the library, and counting to the back.

Reserved Slots

The library can have a maximum of three reserved slots. Only the following slot addresses can be used as reserved slots (see ["Determine the Required Number of Reserved System Slots"](#) on page 6-5). Reserved slots do not have a SCSI element address.

- 1, Left, 1, 1
- 1, Left, 2, 1
- 1, Left, 3, 1

Drive, Mailslot, Power Supply, and Robot Addressing

Component locations are identified using the following addressing schemes:

Component	SCSI Element Address	Physical addressing
Drives	Yes	<i>module,top bottom</i>
Mailslot	Yes	<i>slot number</i>
Expanded Mailslot	Yes	<i>module,side,row,column</i>

Component	SCSI Element Address	Physical addressing
Power Supply	No	<i>module,top/bottom</i>
Hand (Robot)	Yes	n/a

SCSI Element Addressing

The following table shows the starting element address and the maximum number of each element type for a 15 module library.

Table A-1 Starting Element Address and Maximum Number of Elements

Element Type	First Element Address	Maximum Number of Elements for an SL150 Library with 15 Modules and the Standard Mailslot Configuration	Maximum Number of Elements for an SL150 Library with 15 Modules and the Expanded Mailslot Configuration
Hand	0	1	1
Mailslot	10	4	19
Drives	500	30	30
Storage Slots	1000	450	435

Example Library Configurations and Slot Maps

Figure A-1 Non-Partitioned One Module Library, Standard Mailslot, and No Reserved Cells

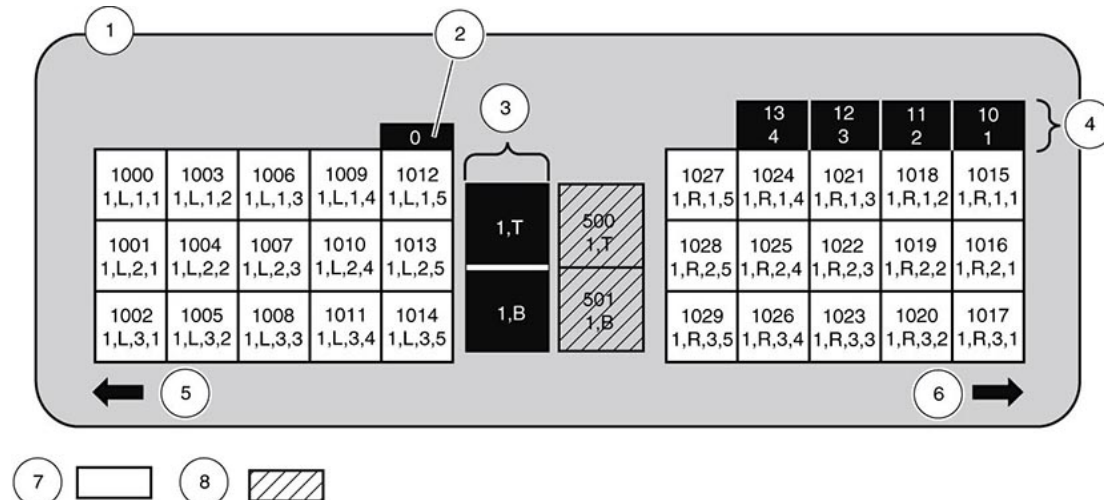


Illustration Legend:

- 1 - Module 1 (Base)
- 2 - Robot
- 3 - Power supplies
- 4 - Standard mailslots
- 5 - Left magazine front
- 6 - Right magazine front
- 7 - Storage slots
- 8 - Tape drives

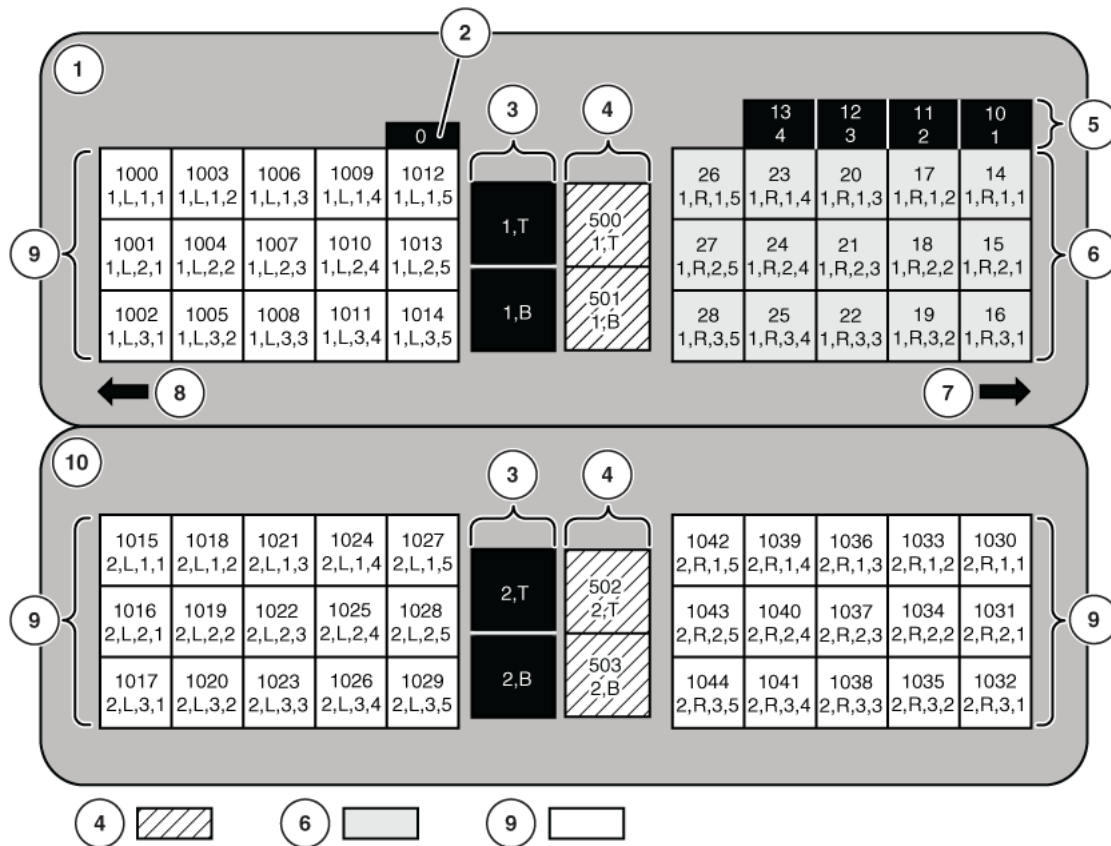
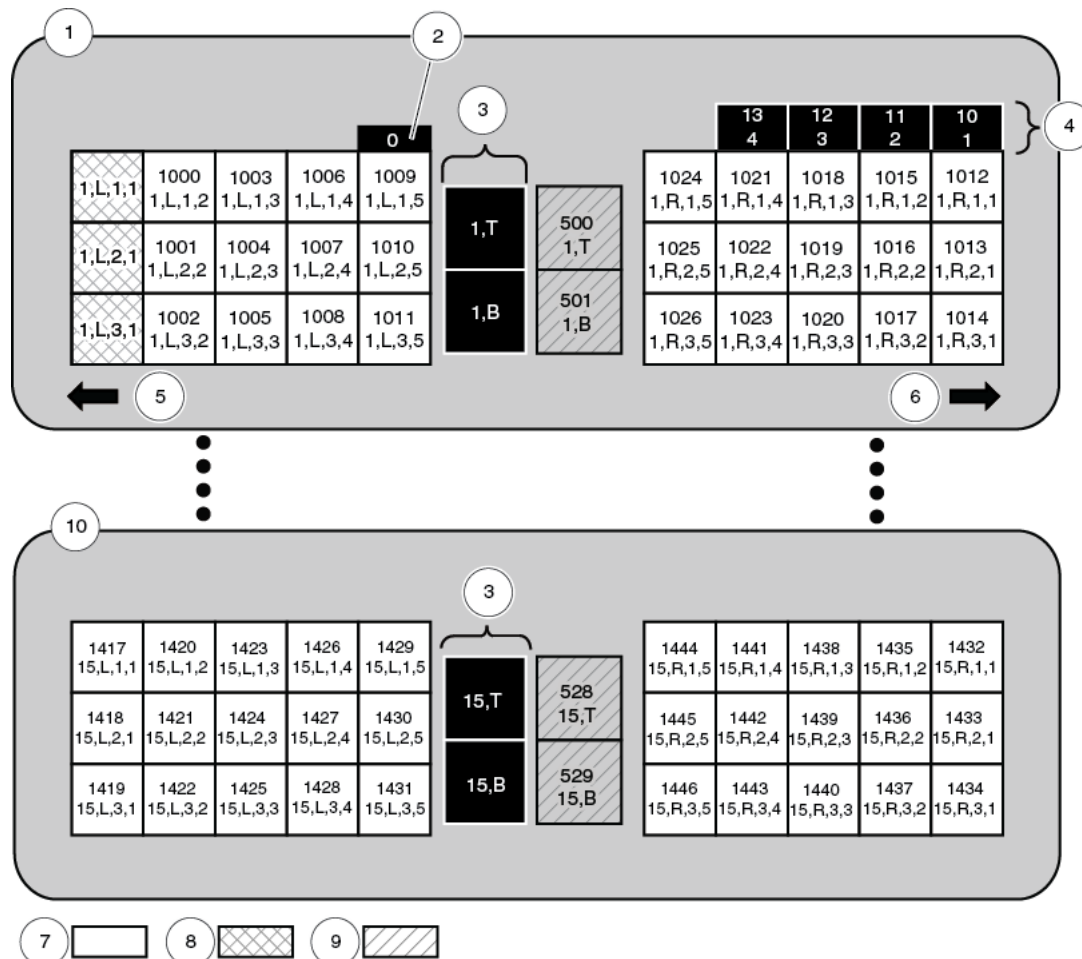
Figure A-2 Non-Partitioned Two Module Library, Expanded Mailslot, and No Reserved Cells

Illustration Legend:

- 1 - Module 1 (Base)
- 2 - Robot
- 3 - Power supplies
- 4 - Tape drives
- 5 - Standard mailslot
- 6 - Mailslot expansion
- 7 - Right magazine front
- 8 - Left magazine front
- 9 - Storage slots
- 10 - Module 2 (Expansion)

Figure A-3 Non-Partitioned 15 Module Library, Standard Mailslot, and Three Reserved Cells



Glossary

This glossary defines terms and abbreviations in this publication.

Some of the definitions are taken from other glossaries. The letters in the parentheses that follow some definitions indicate the source of the definition:

(A) *The American National Standard Dictionary for Information Systems*, ANSI X3.172-1990, copyright 1990 by the American National Standards Institute (ANSI).

(E) The ANSI/Electronic Industries Association (EIA) Standard-440-A, *Fiber Optic Terminology*.

(I) *The Information Technology Vocabulary*, developed by Subcommittee 1, Joint Technical Committee 1, of the International Organization for Standardization and International Electro-technical Commission (ISO/IEC/JTC1/SC1).

(IBM) *The IBM Dictionary of Computing*, copyright 1994 by IBM.

(T) Draft international standards committee drafts, and working papers being developed by the ISO/IEC/JTC1/SC1.

alphanumeric

A character or group of characters that identifies a register, a particular part of storage, or some other data source or destination. (A).

arm

The robotic assembly that is lowered between the columns of tapes. The arm hangs on four wires from the Z mechanism. The arm includes the hand, the rails the hand rides on, the track motor that moves the hand along the rails, and the KLT card.

audit

The process of recording the location of all tapes in a library.

bar code

A code consisting of a series of bars of varying widths. This code appears on the external label attached to the spine of a tape cartridge and is equivalent to the volume serial number (VOLSER). This code is read by the machine vision system of the library.

base chassis

The sheet metal and plastic chassis that makes up the framework of Module 1.

base module

The smallest, fully functional library consisting of the base chassis with the midplane, robot, front control panel, mailslot, one or two power supplies, up to two half-height LTO Ultrium tape drives, left magazine, and right magazine.

cartridge

A storage device that consists of magnetic tape on a supply reel in a protective housing. The spine of the cartridge usually contains a label listing the volume identification number. Also called tape, tape cartridge, tape volume, or cassette.

cell

See [slot](#).

cleaning cartridge

A tape cartridge that contains special material to clean the tape path in a transport or drive. LTO Ultrium cleaning cartridge labels have a CLN prefix and a CU media identifier.

configuration

The manner in which the hardware and software of an information processing system is organized and interconnected. (T)

data cartridge

A term used to distinguish a cartridge onto which a tape drive may write data.

diagnostics

Pertaining to the detection and isolation of errors in programs and faults in equipment.

dismount

To remove a tape from a drive.

drive

A drive controls the movement of the tape and records or reads the data on the tape as desired by the customer (see [tape drive](#)).

drive cleaning

The device feature that uses a cleaning cartridge to clean a tape drive.

drive slot

The space in the library where the tape drive resides.

drive tray

See [tape drive](#).

dynamic host configuration protocol (DHCP)

A network protocol that enables a server to automatically assign an IP address to devices on a network. DHCP assigns a number dynamically from a defined range of numbers for a given network.

encryption

The process of changing data into a form that cannot be read until it is deciphered, protecting the data from unauthorized access and use.

Ethernet

A local-area, packet-switched bus topology that enables the connection of several computer systems. The Ethernet architecture is similar to the IEEE 802.3 standard.

expanded mailsot

An optional library configuration to increase the capacity of the Mailslot from four to 19 cartridges. A logical entity containing four slots in the Standard Mailslot plus 15 slots in the Base Module right magazine (the Mailslot Expansion).

expansion cable

A cable used to connect expansion modules to Module 1. Each end of the cable has a USB A style connector.

expansion chassis

The sheet metal and plastic chassis that makes up the framework for Module 2–15.

expansion module

A module that can be added to the bottom of an existing library to increase its capacity for drives and tape cartridges (tapes). The module consists of the expansion chassis, a module controller, up to two power supplies, up to two half-height LTO Ultrium tape drives, a left magazine, and a right magazine.

export

The action in which the device places a cartridge into the mailslot so that the operator can remove the cartridge. Also called eject.

FC

See [Fibre Channel](#).

fiber optics

The branch of optical technology concerned with the transmission of radiant power through fibers made of transparent materials such as glass, fused silica, and plastic. (E)

fiber-optic cable

A cable made of ultra-thin glass or silica fibers which can transmit data using pulses of laser light. Fiber-optic cables have several advantages over copper cables: they have much less signal loss; they allow information to be transmitted at higher speeds and over longer distances; they are not affected by external electrical noise; and they are better for transmissions which require security.

Fibre Channel

The National Committee for Information Technology Standards standard that defines an ultrahigh-speed, content-independent, multilevel data transmission interface that supports multiple protocols simultaneously. Fibre Channel supports connectivity to millions of devices over copper or fiber-optic physical media and provides the best characteristics of both networks and channels over diverse topologies.

front control panel

An assembly mounted on the front of the base chassis. It includes the touch screen operator panel, various LEDs and switches, and associated electronics.

get

An activity in which a robot obtains a cartridge from a slot or drive.

gripper

The portion of the hand assembly that grasps and holds a cartridge.

GUI

Graphical user interface. Software that allows the user to control the device through visual screens.

hand

The robotic mechanism that grabs tape cartridges and moves them between slots and the drive. It is a component of the arm. The hand has a reach mechanism that gets tape cartridges from slots or drives and puts them into slots or drives. The hand also has a wrist mechanism that rotates the hand to allow it to reach cartridges on either side or the drives at the back of the library.

hardware

All or part of the physical components of an information processing system, such as computers or peripheral devices. (T) (A)

HBA

See host bus adapter.

host bus adapter (HBA)

A circuit installed in a multi-platform host or device that interfaces between the device and the bus.

host computer

In a computer network, a computer that usually performs network control functions and provides end users with services such as computation and database access. (T)

host interface

An interface between a network and host computer. (T)

import

The process of bringing a cartridge into the library from the mailslot. Also called enter.

indicator

A device that provides a visual or other indication of the existence of a defined state. (T)

initial program load (IPL)

A process that activates a device reset and loads system programs to prepare a computer system for operation. Processors having diagnostic programs activate these programs at initial program load execution. Devices running firmware usually reload the functional firmware from a diskette or disk drive at initial program load execution.

initialization

The operations required for setting a device to a starting state, before the use of a data medium, or before implementation of a process. (T)

interface

Hardware, software, or both, that links systems, programs, or devices. (IBM)

internet protocol (IP)

A protocol used to route data from its source to its destination in an Internet environment. (IBM)

inventory

The process of reading and storing in memory the bar code identification and location of all tape cartridges in a library.

IP

See internet protocol.

IPL

See initial program load.

LC connector

A standard fiber-optic cable connector for Fibre Channel data transfer.

LED

Light emitting diode. An electronic device that lights up when electricity is passed through it.

left magazine

A plastic assembly containing 15 tape slots that can be inserted into the left side (as viewed from the front) of Modules 1–15. Left magazines and right magazines are not interchangeable.

library

A robotic system that stores, moves, mounts, and dismounts tape cartridges that are used in data read or write operations.

LME

Library Managed Encryption. A feature introduced with library code 3.50 where the library manages the enrollment and key delivery for IBM LTO-7 and higher drives for use with OKM.

LTO

An acronym for Linear Tape-Open technology which is a set of data format standards created to enable data interchange among tape drives produced by a consortium of manufacturers. With LTO standards, the tape cartridges are interchangeable among tape drive brands.

LUN

Logical Unit Number. An address for a component of a SCSI device. In this device, the host computer sends the SCSI commands for the *library* to LUN 1 of the master *tape drive* and sends SCSI commands for the tape drive itself to LUN 0.

MAC address

The media access control address is a unique identifier assigned to devices for communication on a physical network.

magnetic tape

A tape with a magnetizable layer on which data can be stored. (T)

magnetic tape drive

A mechanism for controlling the movement of magnetic tape, commonly used to move magnetic tape past a read head or write head, or to allow automatic rewinding. (I) (A)

pailslot

The standard pailslot is a plastic and metal assembly located in the upper right corner of the base chassis used to enter tapes into the library and to remove tapes from the library. Previous StorageTek libraries called this a CAP (Cartridge Access Port).

pailslot expansion

A term describing the Base Module right magazine (the magazine immediately below the Standard Pailslot) when the library has the expanded pailslot configuration. The pailslot capacity expands from four cartridges (Standard Pailslot) to 19 cartridges.

management information base (MIB)

An ASCII text file organized hierarchically that describes the elements (configuration and statistical information) of a managed device. When a manager requests information, or a managed device generates a trap, the MIB translates the numeric strings into readable text that identifies each data object within the message.

midplane

A card mounted in the base chassis or expansion chassis that is behind the tape slots and in front of the tape drives. Other cards connect to it either by direct connection or by a cable.

Module 1

See [base module](#).

module controller

A card inserted into the back of Modules 2–15 that controls the operation of the module. It is connected to the robot by an expansion cable.

Module X (2 through 15)

See [expansion module](#).

mount

To place a tape in a drive and make it accessible to the host system.

multimode fiber

An optical fiber designed to carry multiple signals, distinguished by frequency or phase, at the same time.

net mask

A 32-bit, or 4-byte number, in dotted decimal format (typically written as four numbers separated by periods, such as 255.255.0.0 or 255.255.255.0) that is applied to an IP address to identify the network and node address of a host or router interface. (*Synonymous* with subnet mask.)

network

An arrangement of nodes and branches that connects data processing devices to one another through software and hardware links to facilitate information interchange.

offline

Neither controlled by, nor communicating with, a computer. (IBM)

OKM

Oracle Key Manager, which provides encryption keys to the tape drives.

online

Pertaining to the operation of a functional unit when under the direct control of the computer. (T)

operator panel

A component of the front control panel consisting of a seven inch WVGA color touch screen.

partition

A segmented part of the library that acts to hosts as a separate and independent tape library. The partition must have one bridged drive and at least one magazine. Partitions share the mailslot and robot, but the tape drives and magazines within each partition are for use solely by that partition. Other partitions cannot use these tape drives or magazine storage slots.

port

A specific communications end point within a host. A port is identified by a port number. (IBM) (2) In Fibre Channel, an access point in a device where a link attaches.

power supply

An AC to DC power supply that mounts into the rear of a module Module (1–15). Referred to as top power supply or bottom power supply when referring to a power supply installed in a specific module.

power supply filler

A metal frame that slides into a power supply slot when a power supply will not be used in that slot.

put

An activity in which a robot places a cartridge into a slot or drive.

release

A distribution of a new product or new function and fixes for an existing product. (IBM)

right magazine

A plastic assembly containing 15 tape slots that can be inserted into the right side (as viewed from the front) of Modules 1–15. Right magazines and left magazines are not interchangeable.

robot

An assembly that incorporates the bulk of the Module 1 electronics and the robotic components. This assembly is a combination of mechanical components, electronics, and a sheet metal housing. It is located at the top of the base chassis and incorporates the arm, Z mechanism, a CPU board, plus the KLC and KLZ cards.

SAS

Serial Attached SCSI. A computer bus technology and serial communication protocol for direct attached storage devices, including disk drives and high-performance tape drives.

SCSI

Small Computer System Interface. A standard interface and command set for transferring data between mass storage and other devices. The host computer uses SCSI commands to operate the device. Depending on the model, physical connection between the host computer and the tape drive will use a parallel SCSI, SAS, or Fibre Channel interface.

SLAAC

Stateless automatic address configuration. The process of a host generating its own address by using a combination of locally available information, such as a MAC address, and information that is advertised by routers.

slot

An empty location into which something else may be placed. Most commonly used when referring to the locations in the magazine or mailslot where tape cartridges are placed. Power supplies and drives are also placed in slots.

switch

In Fibre Channel technology, a device that connects Fibre Channel devices together in a fabric.

tape

Also known as cartridge, tape cartridge, tape volume, volume, or cassette.

tape cartridge

A container holding magnetic tape that can be processed without separating the tape from the container. The device uses data and cleaning cartridges. These cartridges are not interchangeable. *See* cartridge.

tape drive

An electro-mechanical device that moves magnetic tape and includes mechanisms for writing and reading data to and from the tape. The drive is mounted into a proprietary tray (sometimes called a sled).

tape drive filler

A metal frame that slides into a tape drive slot when a tape drive will not be used in that slot.

Terabyte

A unit of storage, abbreviated T or TB, equal to 1,024 Gigabytes.

U

A measure of chassis height. 1U in rack measurement is 44.45 millimeters (1.75 inches).

Ultrium

An LTO tape format optimized for high capacity and performance. The Ultrium tape format uses a single reel cartridge to maximize capacity.

USB

Universal Serial Bus. A serial bus standard used to interface devices.

World Wide Name

A unique identifier in a Fibre Channel or SAS storage network. The first three bytes are derived from an IEEE Organizationally Unique Identifier (OUI), which defines the manufacturer or vendor. The remaining five bytes are assigned by the vendor.

WORM

An acronym for Write Once Read Many times, a class of recording systems that allow recording and adding data, but not altering recorded data.

wrist

A component of the hand assembly that rotates the hand horizontally.

Z mechanism

The robotic assembly mounted at the back of the robot that raises and lowers the arm. The Z mechanism includes a motor, gears, the bullwheel, and the wires and pulleys that hold the arm. As the motor turns, the bullwheel rotates and extends or retracts the wires to lower or raise the arm.

