

StorageTek SL150 Modular Tape Library
Customer Replaceable Unit Guide

E29812-08

April 2014

Copyright © 2012, 2014, Oracle and/or its affiliates. All rights reserved.

This software and related documentation are provided under a license agreement containing restrictions on use and disclosure and are protected by intellectual property laws. Except as expressly permitted in your license agreement or allowed by law, you may not use, copy, reproduce, translate, broadcast, modify, license, transmit, distribute, exhibit, perform, publish, or display any part, in any form, or by any means. Reverse engineering, disassembly, or decompilation of this software, unless required by law for interoperability, is prohibited.

The information contained herein is subject to change without notice and is not warranted to be error-free. If you find any errors, please report them to us in writing.

If this is software or related documentation that is delivered to the U.S. Government or anyone licensing it on behalf of the U.S. Government, the following notice is applicable:

U.S. GOVERNMENT END USERS: Oracle programs, including any operating system, integrated software, any programs installed on the hardware, and/or documentation, delivered to U.S. Government end users are "commercial computer software" pursuant to the applicable Federal Acquisition Regulation and agency-specific supplemental regulations. As such, use, duplication, disclosure, modification, and adaptation of the programs, including any operating system, integrated software, any programs installed on the hardware, and/or documentation, shall be subject to license terms and license restrictions applicable to the programs. No other rights are granted to the U.S. Government.

This software or hardware is developed for general use in a variety of information management applications. It is not developed or intended for use in any inherently dangerous applications, including applications that may create a risk of personal injury. If you use this software or hardware in dangerous applications, then you shall be responsible to take all appropriate fail-safe, backup, redundancy, and other measures to ensure its safe use. Oracle Corporation and its affiliates disclaim any liability for any damages caused by use of this software or hardware in dangerous applications.

Oracle and Java are registered trademarks of Oracle and/or its affiliates. Other names may be trademarks of their respective owners.

Intel and Intel Xeon are trademarks or registered trademarks of Intel Corporation. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. AMD, Opteron, the AMD logo, and the AMD Opteron logo are trademarks or registered trademarks of Advanced Micro Devices. UNIX is a registered trademark of The Open Group.

This software or hardware and documentation may provide access to or information on content, products, and services from third parties. Oracle Corporation and its affiliates are not responsible for and expressly disclaim all warranties of any kind with respect to third-party content, products, and services. Oracle Corporation and its affiliates will not be responsible for any loss, costs, or damages incurred due to your access to or use of third-party content, products, or services.

Contents

Preface	vii
Documentation Accessibility	vii
1 Product Overview	
General Information	1-1
Class 1 Laser Product Notice	1-3
Library Status Indicators	1-3
Customer Replaceable Units	1-4
CRU Indicators and Controls	1-4
2 Preparations	
Electrostatic Discharge	2-1
Electrostatic Discharge Prevention	2-1
Grounding Methods to Prevent Electrostatic Discharge	2-1
SL150 Remote Interface	2-1
3 Removal and Replacement	
Problem Determination	3-1
Common Procedures	3-2
To Set the Library Offline	3-2
To Set the Library Online	3-3
To Enable the Locate Light	3-3
Tape Cartridge Magazine	3-3
To Remove a Tape Cartridge Magazine	3-4
To Replace a Tape Cartridge Magazine	3-6
Hot Swappable CRUs	3-6
Drive Tray Assembly	3-6
Bridged Drive Considerations	3-7
To Remove the Drive Tray	3-7
To Replace the Drive Tray	3-9
Power Supply	3-9
To Remove the Power Supply	3-10
To Replace the Power Supply	3-10
Other CRUs	3-11
Preparation Procedures	3-11

Power-Down.....	3-11
To Perform a Controlled Power-Down from the GUI.....	3-11
To Perform an Orderly Shutdown from the Front Control Panel	3-12
To Perform a Forced Power-Down	3-13
To Remove a Cartridge Magazine Manually	3-13
Front Control Panel.....	3-14
To Remove the Front Control Panel.....	3-15
To Replace the Front Control Panel.....	3-16
Module Controller.....	3-16
To Remove the Module Controller.....	3-17
To Replace the Module Controller.....	3-18
Robot Module	3-18
To Remove the Robot	3-18
To Manually Retract the Robot	3-20
To Manually Disengage the Robot	3-21
To Replace the Robot	3-22
Expansion Module Chassis.....	3-23
To Remove an Expansion Module.....	3-23
To Remove the Drive Filler.....	3-25
To Remove the Power Supply Filler	3-26
To Prepare the Expansion CRU for Replacement	3-27
To Install the Floor	3-27
To Replace the Expansion CRU Chassis	3-29
To Install the Drive Filler	3-31
To Install the Power Supply Filler	3-31
Base Module (Module 1) Chassis.....	3-31
To Remove the Base Module Chassis.....	3-32
To Prepare the Base Module CRU for Replacement	3-33
To Replace the Base Module Chassis	3-33
Power System Behavior.....	3-35
To Power-on the Library	3-35
To Validate Library Operation.....	3-36
CRU Return	3-37

A Startup

Glossary

Index

List of Figures

1-1	StorageTek SL150 Base and Expansion Modules	1-1
1-2	Remote Management Interface	1-2
1-3	Library Status Indicators (Front Control Panel).....	1-3
2-1	SL150 Remote Management Log In Dialog.....	2-2
3-1	CRU Locations (Rear View of SL150 Base and Expansion Module)	3-1
3-2	Set Library Offline.....	3-2
3-3	Offline Confirmation	3-2
3-4	Locate the Library	3-3
3-5	Tape Magazine	3-4
3-6	Magazine Actions.....	3-5
3-7	Magazine Unlock Dialog Box (Code Version 2.25).....	3-5
3-8	Tape Drive Tray CRU.....	3-7
3-9	Thumbscrews, Latch, and Lock	3-8
3-10	Power Supply CRU.....	3-10
3-11	Power Down Library	3-12
3-12	Prepare the Robot for Removal.....	3-12
3-13	Magazine Release.....	3-13
3-14	Rear View of the Front Control Panel.....	3-14
3-15	Front Control Panel Side View.....	3-15
3-16	Front Control Panel Jack	3-15
3-17	Front Control Panel Slots in Base Module.....	3-16
3-18	Module Controller CRU.....	3-17
3-19	Robot Removal and Replacement.....	3-19
3-20	Bullwheel Gear and Robot Lock	3-20
3-21	Robot Lock (Unlocked).....	3-22
3-22	Additional Module CRU.....	3-23
3-23	Library Floor Panel	3-24
3-24	Module Rear Rail Removal.....	3-25
3-25	Tape Drive Filler.....	3-26
3-26	Power Supply Filler	3-27
3-27	Floor Tab.....	3-28
3-28	Floor Latching Tab	3-28
3-29	Avoid Contact with the Operator Panel	3-29
3-30	Module Alignment	3-30
3-31	Base Module CRU.....	3-31
3-32	Base Module Side Tabs.....	3-33
3-33	Cable Attachment	3-34
3-34	Home Screen.....	3-36

Preface

This guide is intended for anyone involved with removing and replacing customer replaceable units (CRUs) in Oracle's StorageTek SL150 Modular Tape Library.

Documentation Accessibility

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at <http://www.oracle.com/pls/topic/lookup?ctx=acc&id=docacc>.

Access to Oracle Support

Oracle customers have access to electronic support through My Oracle Support. For information, visit <http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info> or visit <http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs> if you are hearing impaired.

Product Overview

Oracle's StorageTek SL150 Modular Tape Library is a rack mounted automated tape library with a capacity of 30 to 300 Linear Tape Open (LTO) Ultrium tape cartridges (tapes) and one to 20 half-height LTO-5 or LTO-6 Fibre Channel (FC) or Serial Attached SCSI (SAS) tape drives (see [Figure 1-1](#)).

Figure 1-1 StorageTek SL150 Base and Expansion Modules



Illustration Legend:

- 1 - Base Module (Identified as Module 1)
- 2 - Expansion Module (Identified as Module 2 Through Module 10)
- 3 - Left Tape Cartridge Magazines
- 4 - Right Tape Cartridge Magazines
- 5 - Touch Screen Panel
- 6 - Mailslot

General Information

The minimum library configuration consists of a 3U (133.4 mm, 5.25 inches) base module, designated Module 1, with one robotic hand, a mailslot, a power supply, and one tape drive (with an option to add a second tape drive and a second power supply). Tapes reside in a removable 15-cartridge magazine on each side of the

module. Up to three tape slots of the base module left magazine can be designated as reserved slots to store diagnostic or cleaning tapes.

The external interface for library control is provided by a bridged tape drive. The robot control is a SCSI Medium Changer device appearing as LUN 1 on a tape drive. The base module is the smallest fully functional library.

The library can be expanded from one to ten modules. A 2U (88.9 mm, 3.5 inches) expansion module provides the library an additional capacity of 30 tapes and up to two tape drives. Expansion modules are designated Module 2 through Module 10. Modules provide two 15-cartridge magazines, slots for up to two tape drives, and slots for up to two power supplies.

A graphical user interface (GUI) provides local or remote role-based access control of the SL150 Library.

- You access the GUI by entering the host name or IP address into a web browser. An example of the remote management interface is shown in Figure 1–2.

The library information is presented graphically. Module 1 shows the tape slots in the left magazine, tape slots in the right magazine, and the available tape drives between the magazines to represent their physical location at the rear of the module. The mailslot resides above the right magazine while the robot is above the left magazine. The magazine representation has identifiers for column number and row number. There is a separate image for each module in the library.

Figure 1–2 Remote Management Interface

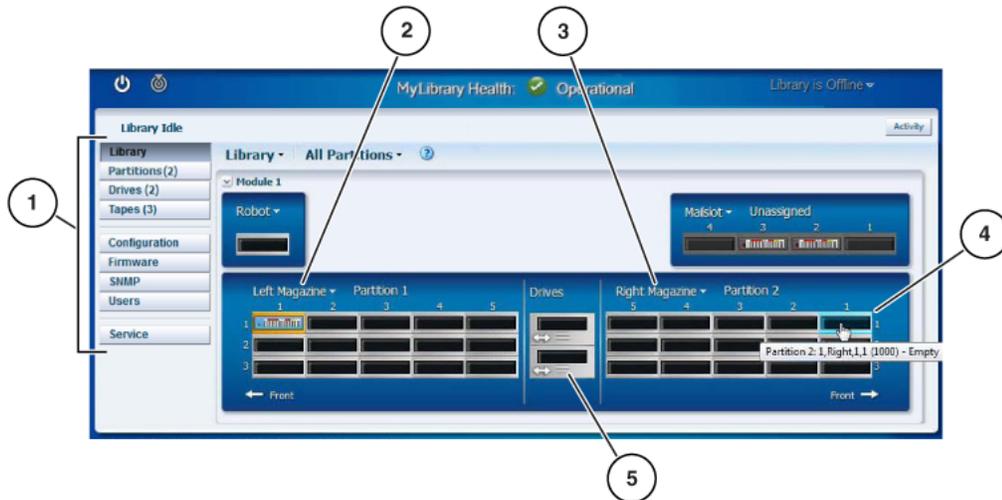


Illustration Legend:

- 1 - Section Navigation
- 2 - Left Magazine Control
- 3 - Right Magazine Control
- 4 - Slot Identification
- 5 - Tape Drive (Two-Headed Arrow Indicates a Bridged Drive)

- The base module front control panel has an LCD touch screen panel (operator panel) and is identified in Figure 1–1. The touch screen provides basic information about the library and is designed for use as an information point rather than a tool for maintenance (see Figure 3–34).

The front control panel touch screen is also used to perform basic initialization setup with an initialization wizard.

Additional library management functions are performed by the administrator using the remote management interface.

The SL150 Library supports partitions. Each partition has an assigned bridged tape drive, and each partition behaves as an independent library. All partitions share the use of the single robot, reserved slots, and mailslot.

Note: Code versions below 2.0 support two partitions, but code versions 2.0 and above support up to eight partitions.

Class 1 Laser Product Notice

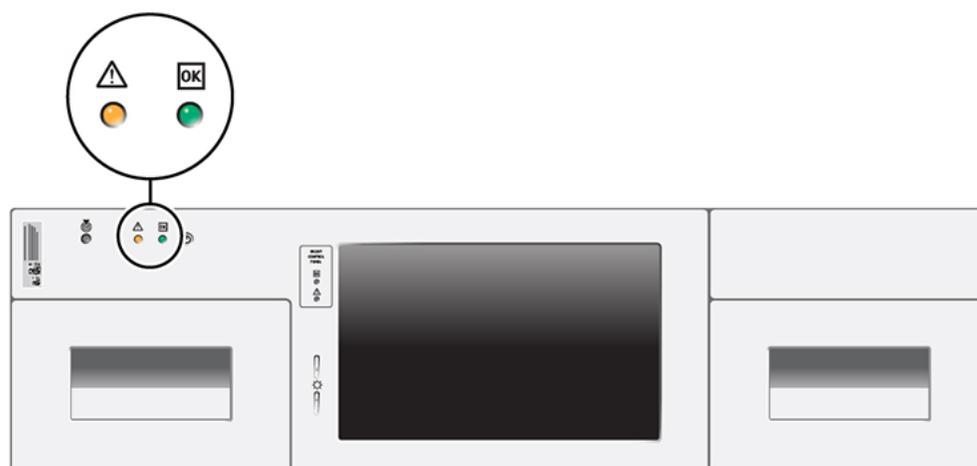
The StorageTek SL150 Modular Tape Library contains a class-1 laser as defined by IEC 60825-1 Ed. 2 (2007).

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

Library Status Indicators

Library status indicators are located on the front control panel above the left cartridge magazine (see [Figure 1-3](#)) and at the rear of the library on the robot customer replaceable unit [CRU] in the dark rectangle to the left of the robot lock (see [Figure 3-1](#)).

Figure 1-3 Library Status Indicators (Front Control Panel)



L207_226

- Fault: a fault anywhere in the library triggers the fault indicator. Look for active fault indicators on other CRUs.
- OK: indicates an operational library.

When both the Fault and OK indicators are active at the same time, the library is in a degraded state.

Customer Replaceable Units

The SL150 Modular Tape Library customer replaceable units (CRUs) are:

- Front control panel
- Tape cartridge magazines
- Robot
- Tape drive
- Power supply
- Expansion module controller
- Base module chassis
- Expansion module chassis (Module 2 through 10)

CRU Indicators and Controls

Each customer replaceable unit (CRU) has status indicators.

Note: The indicators are powered by main power. If the library is turned off, all indicators are turned off.

- **Locate Library Indicator:** aids in identification of the specific tape library in need of attention. This white indicator is enabled locally or from the remote management interface. The indicator is on the front panel next to the library status indicators and on the robot CRU.
- **Front Control Panel CRU Status Indicators:**
Fault: indicates a failure in the front control panel.
OK: functioning properly.
- **Robot CRU Status Indicators (see [Figure 3-1](#)):**
Fault: indicates a failure anywhere in the robot CRU.
OK: functioning properly.
- **Robot Lock (see [Figure 3-9](#)) control:** Secures the robot at the top of the base module after the robot is either parked or manually raised. You must lock the robot before removing it or when replacing an expansion module CRU.
- **Power Supply CRU Status Indicators (see [Figure 3-10](#)):**
Fault: indicates a power supply failure.
OK: functioning properly.
- **Tape Drive CRU Status Indicators (see [Figure 3-8](#)):**
Service Action Allowed: this blue indicator is enabled through the remote management interface to prepare the tape drive for removal from the library.
Fault: indicates a drive tray failure.
OK: functioning properly.
Port 1 activity (FC and SAS tape drives).
Port 2 activity (LTO-5 and LTO-6 SAS tape drives and LTO-6 FC tape drive).

Encryption status: on when a key is present during drive operation.

Encryption reset: a push button switch to reset the tape drive to a default IP address.

- **Module Controller CRU Status Indicators (see [Figure 3-18](#)):**

Fault: a fault anywhere in the module controller (KLE card) triggers the fault indicator and turns off the OK indicator for that specific controller (a library can have up to nine module controllers).

OK: functioning properly.

Preparations

This chapter introduces general topics for your consideration before performing a CRU removal or replacement procedure.

Electrostatic Discharge

Be aware of the precautions needed when handling parts. A discharge of static electricity from a finger or other conductor might damage static-sensitive devices. This type of damage 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 one or more of the following methods when handling or installing electrostatic-sensitive parts:

- Use a wrist strap connected by a ground cord to a grounded 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 any of the suggested equipment for proper grounding, arrange for an authorized reseller to install the part.

SL150 Remote Interface

The process of removing and replacing customer replaceable units (CRUs) relies on functions and commands in the SL150 remote interface (GUI). It is assumed that you are familiar with the library section of that interface.

You access the remote interface by entering the library host name or IP address in a supported web browser. The Log In dialog box is shown in Figure 2-1. A Help link is available in the upper right of the screen.

Refer to the user's guide (<http://docs.oracle.com>) or the Help system to gain familiarity before attempting any removal or replacement action.

Figure 2-1 SL150 Remote Management Log In Dialog

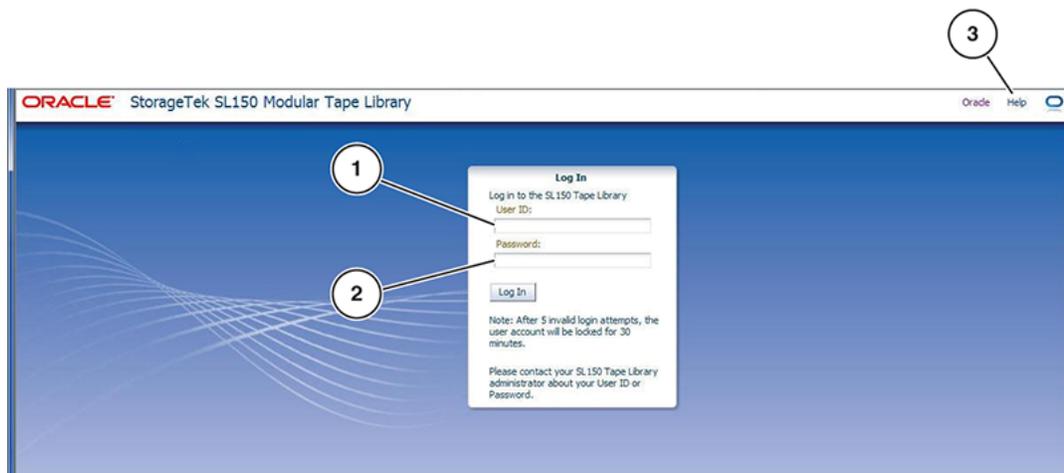


Illustration Legend:

1 - User ID

2 - Password

3 - Help Link

Removal and Replacement

Figure 3-1 shows the rear of an SL150 Library where the robot, tape drive(s), power supplies, and module controller customer replaceable units (CRUs) are located. Most of the CRU removal activity involves cable disconnection, release of a latch or loosening of captive screws, and the extraction of the CRU. Certain CRU removal and replacement activity must be performed when the library is powered down (see "Other CRUs" on page 3-11).

Figure 3-1 CRU Locations (Rear View of SL150 Base and Expansion Module)

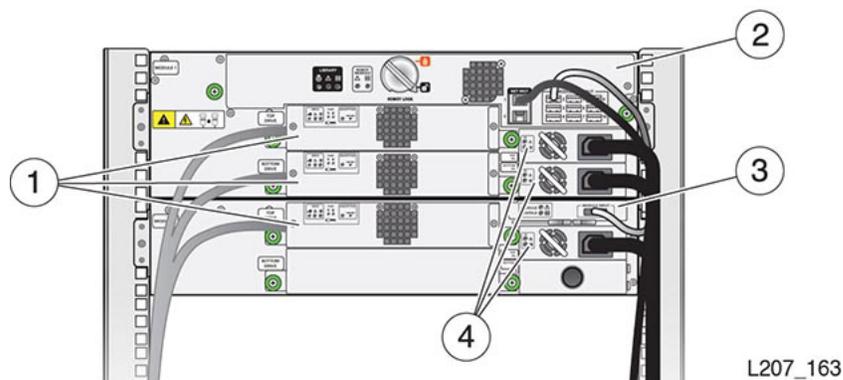


Illustration Legend:

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

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

Problem Determination

This guide assumes that you have isolated the library problem and have the replacement part available. However, if you have not determined the problem; use the troubleshooting information in the user's guide (<http://docs.oracle.com>) or the remote management interface Help (see Figure 2-1).

Common Procedures

This section has some common procedures used in various CRU removal procedures.

- Set the library offline to make sure the host tape management system is notified that something is manually changed in its database and to place the library in maintenance mode.
- Set the library online to remove the library from maintenance mode and return the library to host application control.
- Enable the Locate light to aid in finding the library in the data center.

To Set the Library Offline

1. Quiesce the host application to prevent disruption of active storage operations.
2. Log in to the SL150 remote interface using your browser (see [Figure 2-1](#)).
3. Click **Library is Online** (see [Figure 3-2](#)).
4. Select **Set Library Offline** to place the library into maintenance mode.
5. Click **OK** in the Set Library Offline dialog box (see [Figure 3-3](#)).

Figure 3-2 Set Library Offline

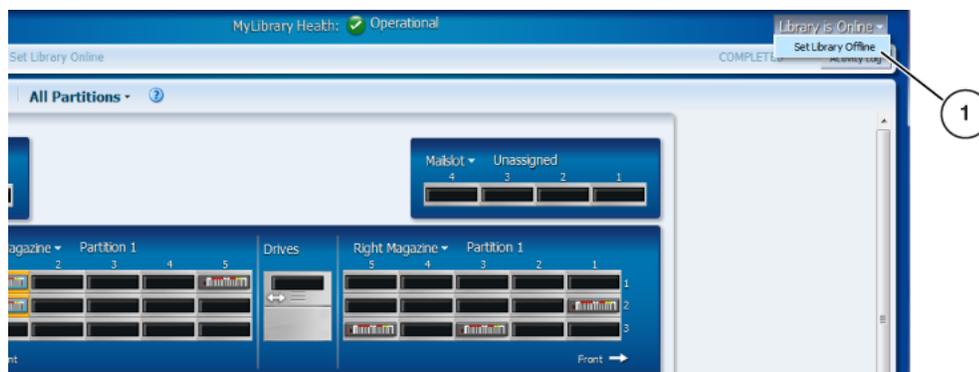


Illustration Legend:

1 - Library State Control

Figure 3-3 Offline Confirmation

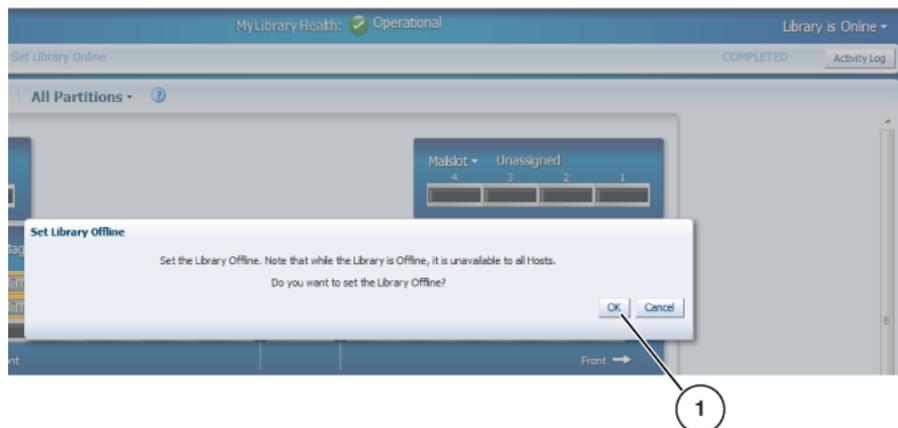


Illustration Legend:**1 - Confirmation Dialog Box (OK Button)****To Set the Library Online**

1. Log in to the SL150 remote interface using your browser (see [Figure 2-1](#)).
2. Click **Library is Offline**.
3. Select **Set Library Online** (takes the library out of maintenance mode).
4. Click **OK** in the dialog box.

The library state changes to online.

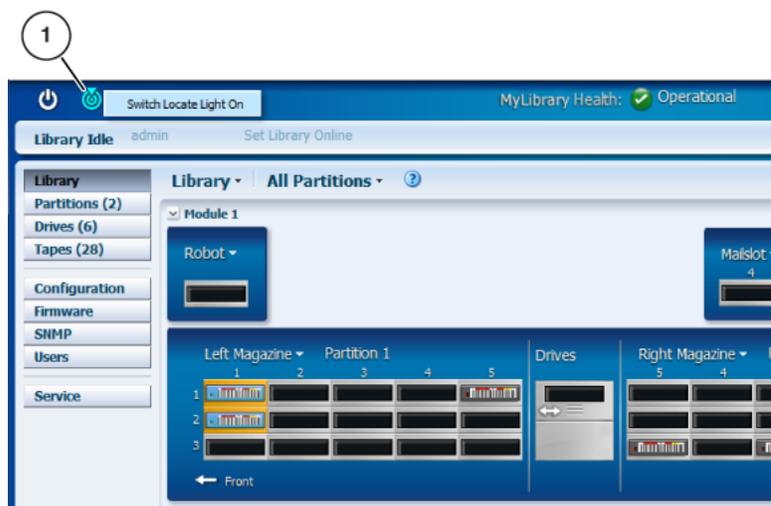
To Enable the Locate Light

1. Log in to the SL150 remote interface using your browser (see [Figure 2-1](#)).
2. Click the *locate* icon in the upper left of the screen (see [Figure 3-4](#)).
3. Select **Switch Locate Light On**.

The GUI locate indicator activates.

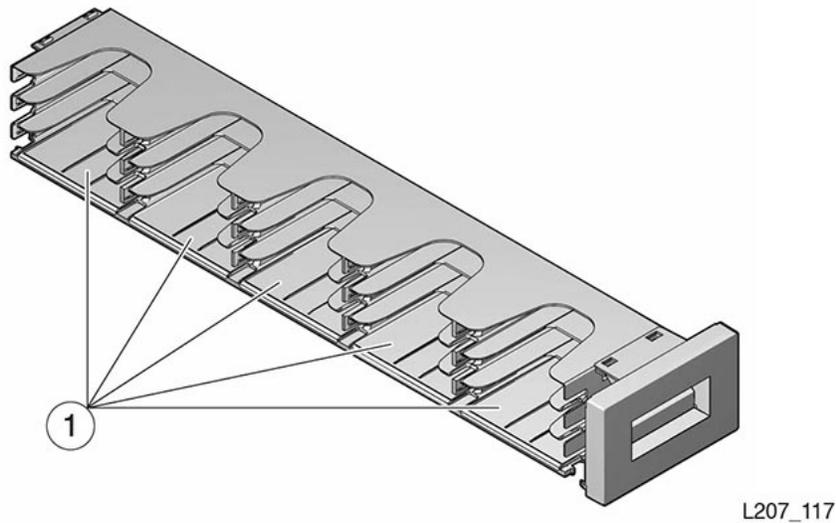
The physical locate indicators activate on the front control panel and in the black rectangle on the robot CRU (at the rear of the base module, see [Figure 3-1](#)).

Figure 3-4 Locate the Library

**Illustration Legend:****1 - Locate Indicator****Tape Cartridge Magazine**

Adding or removing a tape cartridge magazine posts a Unit Attention to the host connected to the library or to the affected partition.

The tape magazine for the right side of a module is shown in [Figure 3-5](#). The left and right magazines are not interchangeable. Each magazine holds 15 cartridges in slots arranged in a three row by five column array.

Figure 3-5 Tape Magazine**Illustration Legend:****1 - Tape Slots in Magazine (Five Columns and Three Rows).**

The SL150 remote interface provides a method to unlock a cartridge magazine for an offline library. [Figure 3-6](#) shows the remote interface with an expanded menu for the left magazine.

Note: If this method is not practical, see ["To Remove a Cartridge Magazine Manually"](#) on page 3-13.

To Remove a Tape Cartridge Magazine

The following procedure relies on the SL150 remote management interface. This procedure is intended only for removal of a magazine while the library is operational. This procedure is not intended as a preparation step for the removal of a failed library module.

Note: If you are not able to log in to the remote library interface, see ["To Remove a Cartridge Magazine Manually"](#) on page 3-13.

Task 1 Unlock the Magazine from the GUI

1. Log in to the SL150 remote interface using your browser (see [Figure 2-1](#)).
2. Set the library offline (see ["To Set the Library Offline"](#) on page 3-2).
3. Click **Library** in the left navigation area to show the graphical representation of the library.
4. Locate the appropriate module number (scroll as necessary).
5. Click the label of the magazine you want to remove (see [Figure 3-6](#)).
6. Select **Unlock**.

The Unlock Magazines dialog box appears with the specific magazine highlighted when the library is running code version 2.25.

- Click OK to unlock the magazine (see Figure 3–7).

Figure 3–6 Magazine Actions

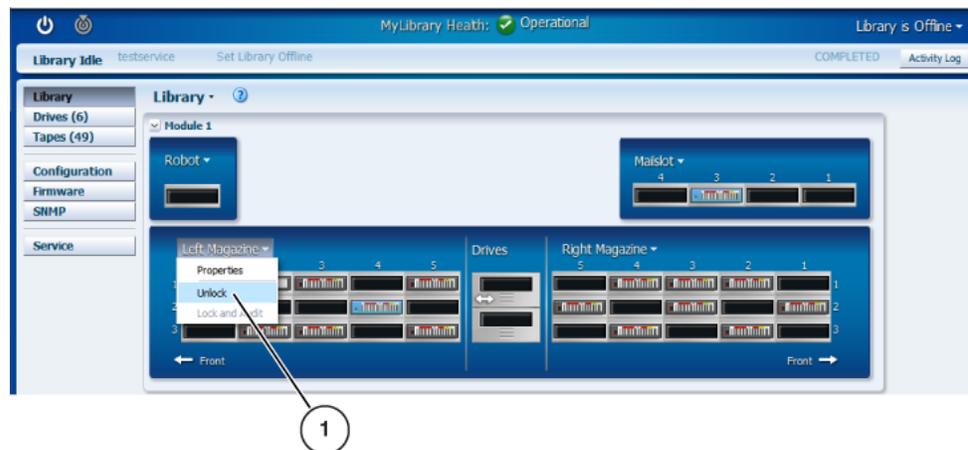


Illustration Legend:

- Magazine Control (Unlock)

Figure 3–7 Magazine Unlock Dialog Box (Code Version 2.25)

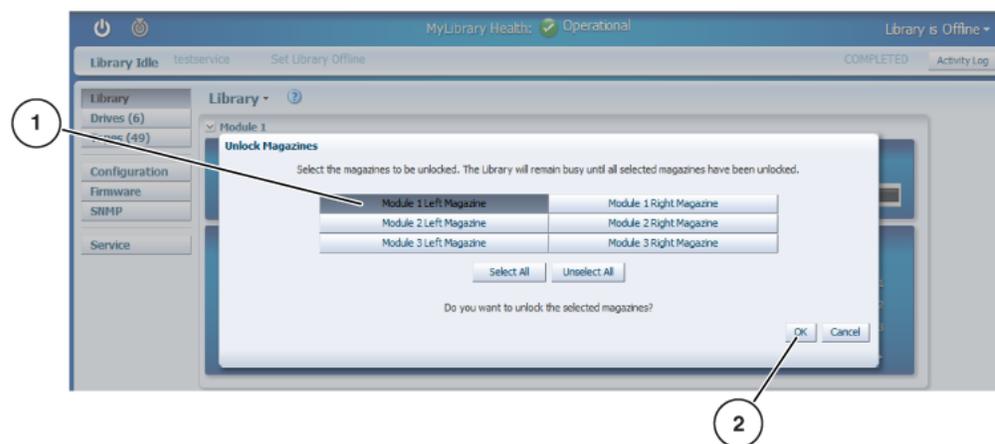


Illustration Legend:

- Specific Magazine is Highlighted
- OK Button

Task 2 Remove the Unlocked Magazine

Caution: Although the magazine contains cartridge retention springs, use care when holding or moving the magazine to avoid tapes becoming unseated or dropping from the magazine.

- Grasp the magazine by the front handle and slowly extend it out of the module a short distance.
- Support the bottom of the magazine with your other hand during removal.

3. Pull the magazine free of the module and set it aside.

To Replace a Tape Cartridge Magazine

Caution: Although the magazine contains cartridge retention springs, use care when holding or moving the magazine to avoid unseating or dropping cartridges.

1. Orient the magazine with the cartridge slots facing toward the center of the module.
2. Lift the magazine and point the back of it toward the module slot.
3. Engage the magazine with the track in the magazine bay of the module.
4. Verify all tapes are properly seated in the magazine slots.
5. Push the magazine fully into the library module.
6. From the Library list, select **Lock and Audit**.

Note: Code levels before 2.25 do not have the Lock and Audit command.

7. Select the **Set the Library back online after applying this action** check box in the Lock and Audit dialog box.
8. Click **OK**.

Hot Swappable CRUs

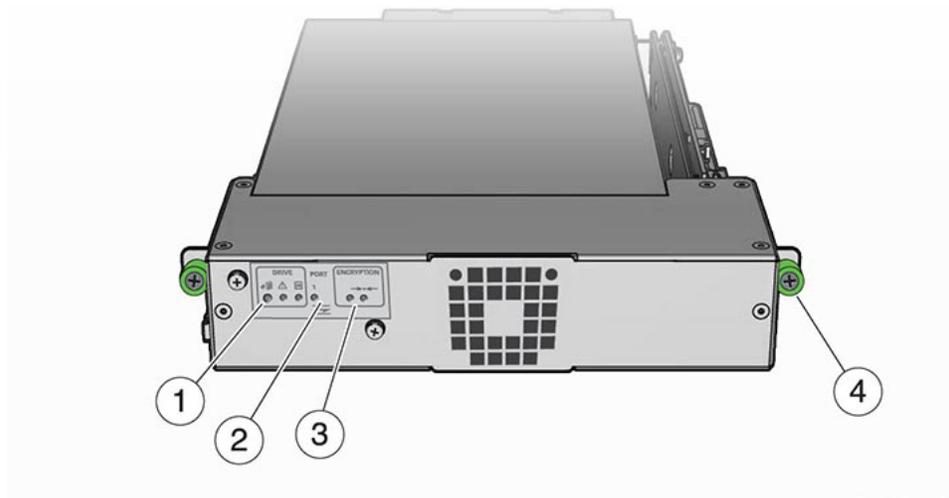
This section provides removal and replacement instructions for the tape drive tray and power supply CRUs that you can replace while power is applied to the library. You temporarily remove the power supply or drive tray assembly and then insert the corresponding CRU in the open slot.

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

Drive Tray Assembly

The drive tray assembly (drive tray) is located in the center, rear of the module (see [Figure 3-1](#)). The drive tray has a series of indicators on the back panel (see [Figure 3-8](#)), an exposed circuit card near the right side thumbscrew, a tape drive, and a chassis (also referred to as a sled).

Figure 3–8 Tape Drive Tray CRU



L207_116

Illustration Legend:**1 - Drive Indicators****2 - Port Indicator (SAS and LTO-6 FC Drives have Two Ports)****3 - Encryption Indicator and IP Reset Switch****4 - Thumbscrew (Drive Tray has Two Thumbscrews)****Bridged Drive Considerations**

The robot control is a SCSI Medium Changer device that appears as LUN 1 on the bridged tape drive.

- If the library is *not* partitioned, there is a designated bridged drive that provides the robot control for the entire library.
- If the library is partitioned, there is a designated bridged drive that provides the robot control for its assigned partition.

Removal of a bridge drive results in loss of host connectivity.

To Remove the Drive Tray

Note: If the failed drive is the bridged drive, see "[Bridged Drive Considerations](#)".

Task 1 Preparation

1. Quiesce activity for this tape drive.
2. Log in to the SL150 remote interface using your browser (see [Figure 2–1](#)).
3. (Optional) Enable the *locate* library indicator (see "[To Enable the Locate Light](#)" on page 3-3).

Task 2 Prepare the Tape Drive Tray for Removal

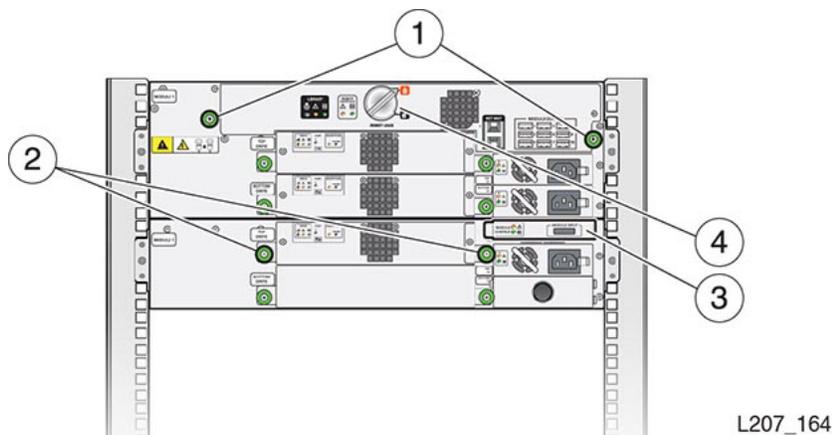
1. Click **Library** in the left navigation area to show the graphical representation of the library. Click the button beside the module identifier if the module map is collapsed.
2. Move the cursor to the drive you want to replace.
A drive has a location in the module (top or bottom) and a SCSI address.
3. Right click the drive icon and select **Remove Drive**.
4. Click **OK** in the confirmation dialog box.

The physical indicator at the rear of the drive tray lights to indicate the drive is ready for removal.

Task 3 Remove the Tape Drive Tray

1. Access the back of the library (open the rear door of the rack, if applicable).
2. Locate the drive tray with the blue indicator (drive is ready for removal).
3. Verify that the interface cables are labeled. Attach a label if necessary.
4. Disconnect the cables from the jacks on the drive tray (see [Figure 3-1](#)).
5. Loosen the thumbscrews on the drive tray (see [Figure 3-9](#)).
6. Grasp the drive tray, pull it out of the library drive slot, and set it upright and flat on a work surface.

Figure 3-9 Thumbscrews, Latch, and Lock



L207_164

Illustration Legend:

- 1 - Robot Thumbscrews
- 2 - Drive Tray Thumbscrews
- 3 - Module Controller Latch
- 4 - Robot Lock (Improved Lock Design)

To Replace the Drive Tray

Task 1 Preparation

Caution: Equipment damage. Do not touch the circuit card or static sensitive components.

1. Follow accepted practices to prevent damage from ESD.
2. Remove the replacement drive tray from the shipping carton. Save the packaging materials for the return of the failed CRU.

Note: 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.

Task 2 Replace the Drive Tray

1. Grasp the rear corners of the drive tray.
2. Guide the front of the drive tray into the module drive slot.
3. Push the drive tray completely into the drive slot.
4. Verify that the indicators are active on the rear of the drive tray.
5. Tighten the thumbscrews firmly on each side of the drive tray to make sure there is no tray movement in any direction.
6. Push the **Locate** indicator on the robot CRU to reset the light, if applicable.
7. Connect the interface cable(s) and Ethernet cable (if applicable) to the proper jack on the left side of the drive tray.

Task 3 Confirmation

1. Confirm that the library recognizes and accounts for 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, if necessary, upgrade it.

Refer to the *StorageTek SL150 Modular Tape Library User's Guide* or the Help system for instructions if your library is running code version 2.0 or higher.

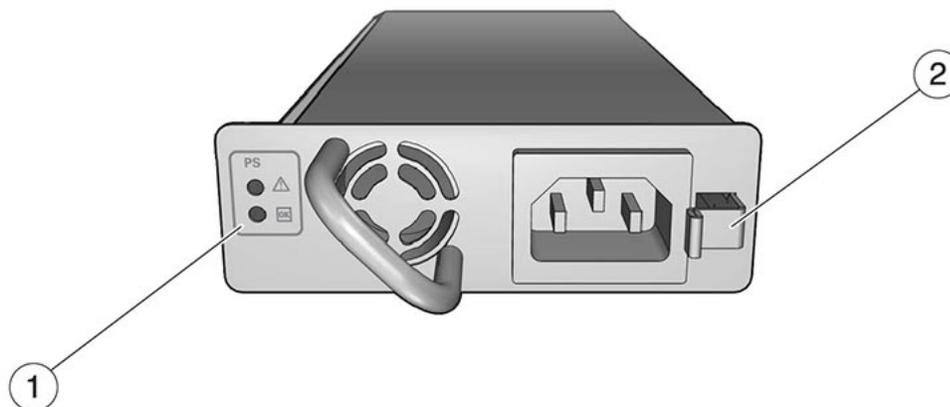
If your library code is lower than 2.0, follow the instructions in the drive code ReadMe file.

4. Log out of the SL150 remote interface.

Power Supply

The power supply (Figure 3-10) has indicators in the upper left corner and a release latch to the right of the power receptacle.

Module 1 requires one power supply (see Figure 3-1). Expansion modules with an installed drive require a power supply.

Figure 3–10 Power Supply CRU

L207_115

Illustration Legend:

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

To Remove the Power Supply

The removal and replacement procedures cover a library with two or more power supplies (see "Hot Swappable CRUs" on page 3-6). If your library has a single power supply, power down the library before continuing with this procedure (see "Power-Down" on page 3-11).

1. Disconnect the power cord from the defective power supply (see Figure 3–1).
2. Press the latch to the left (toward the fan) to release the power supply.
3. Grasp the power supply by the handle, pull it out of the library, and set it aside.

To Replace the Power Supply**Task 1 Preparation**

1. Remove the power supply from the shipping carton.
2. Grasp the power supply by the handle and support the bottom of the supply with your other hand.

Task 2 Install the Power Supply into the Module Slot

1. Position the power supply with the power receptacle to the right.
2. Align the rear of the supply with the module slot.
3. Push the supply fully into the module slot.
4. 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.

Note: Continue with "Power System Behavior" on page 3-35 if the power supply indicator is not active.

Other CRUs

You must *remove power* from the library when working on the following CRUs:

- Robot
- Module Controller
- Front Control Panel
- Base and Expansion Module Chassis

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 for any of these CRUs, you may *only replace one CRU during a single power down cycle*.

In addition, you must remove tape cartridge magazines to replace the Front Control Panel, Base Module, and Expansion Module CRUs.

Preparation Procedures

This section provides procedures to remove library power and manually remove a cartridge magazine to gain access to the screws securing the module to the rack.

Power-Down

There are two methods of removing power from the library: controlled and forced.

- Perform the controlled power down using either the Front Control Panel power button or the SL150 remote interface power icon.
- Perform the forced shutdown method at the library or rack power source.

Note: Use the forced power-down method only when the controlled method does not work (see "To Perform a Forced Power-Down" on page 3-13).

To Perform a Controlled Power-Down from the GUI

1. Quiesce the host application to prevent disruption of active storage operations.
2. Log in to the SL150 remote interface using your browser (see [Figure 2-1](#)).
3. Click the power icon in the upper left of the screen (see [Figure 3-11](#)).
4. Select **Power Down Library**.
5. Select **Prepare the Robot for removal before the library powers down**, if applicable (see [Figure 3-12](#)).
6. Click **OK**.
7. Follow the on-screen prompts (for example, instructions to lock the robot).

Figure 3–11 Power Down Library

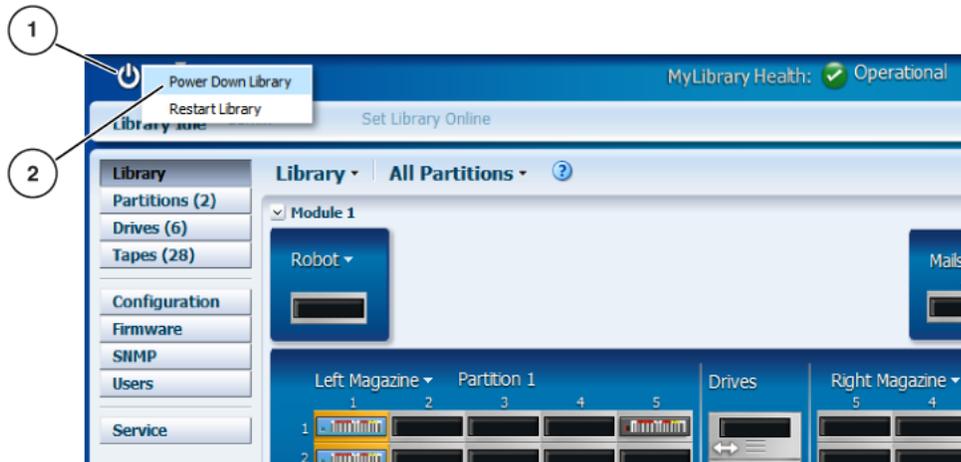


Illustration Legend:

- 1 - Power Down Library Command

Figure 3–12 Prepare the Robot for Removal

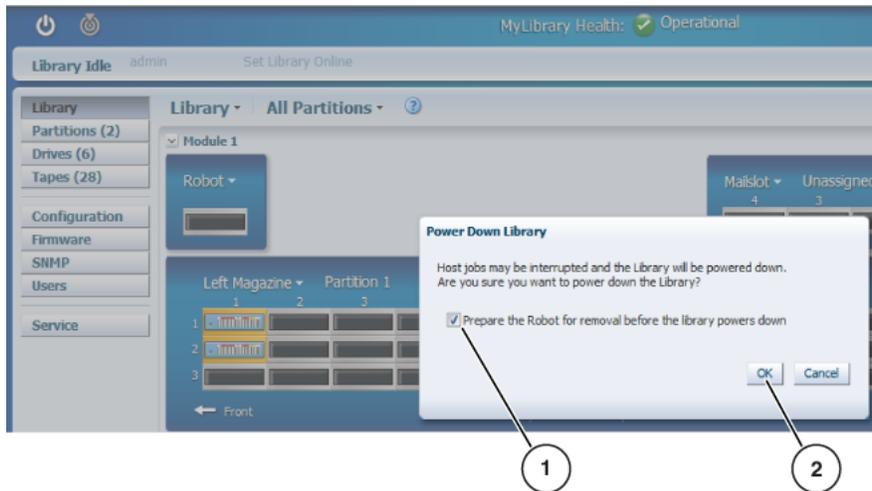


Illustration Legend:

- 1 - Power Down Library Dialog Box (Check Box)
- 2 - OK Button

To Perform an Orderly Shutdown from the Front Control Panel

1. Quiesce the host application to prevent disruption of active storage operations.
2. Press the power button on the Front Control Panel.
3. Tap the check box (**Prepare the Robot for removal before the library powers down**).
4. Tap **OK**.
5. Follow the on-screen prompts (for example, instructions to lock the robot).

To Perform a Forced Power-Down

1. Quiesce the host application to prevent disruption of active storage operations.
2. (Optional) Enable the *locate* library indicator (see "To Enable the Locate Light" on page 3-3).
3. Find the rack containing the library you want to power down.
4. 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. (Optional) 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).

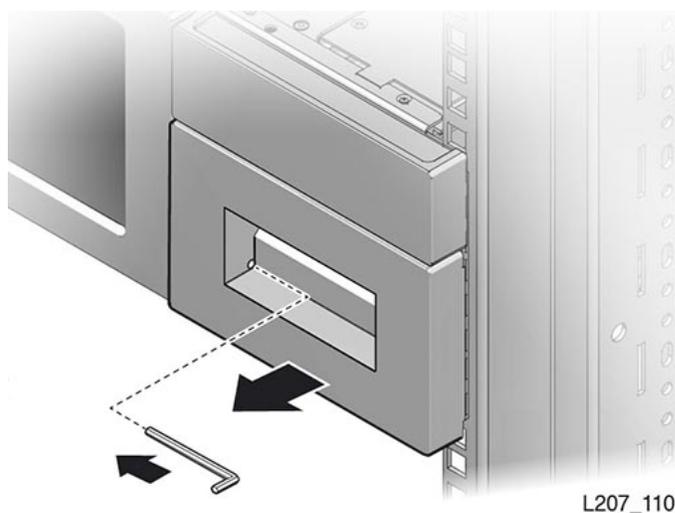
To Remove a Cartridge Magazine Manually

Caution: Manual removal of a tape cartridge magazine can damage the robotic mechanism. This procedure supports removal and replacement for some CRUs listed in "Other CRUs" on page 3-11. Power down the library before beginning this procedure.

Task 1 Release the Magazine Latch

1. Power down the library (see "Power-Down" on page 3-11).
2. Insert the hex key, provided in the installation kit, into the access hole at the lower inside corner of the cartridge magazine.
3. Align the hex key parallel to the magazine face (see Figure 3-13).
4. Push the tool slowly into the access hole to engage the latch located behind the touch screen, and hold the hex key in place.

Figure 3-13 Magazine Release



Task 2 Remove the Magazine

Caution: Although the magazine contains cartridge retention springs, use care while holding or moving the magazine to avoid dropping cartridges.

1. Grasp the tape cartridge magazine opening with your other hand and pull the magazine a short distance out of the library.
2. Remove the hex key and store it for future use.
3. Support the bottom of the magazine with your other hand during removal.
4. Pull the magazine free of the library module and set it aside.

Front Control Panel

The front control panel is located on the base module. [Figure 3–14](#) shows the back side of the panel with identification of the upper tabs, the circuit card jack, and the latches at the side of the panel.

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 for any of these CRUs, you *may only replace one CRU during a single power-down cycle.*

Figure 3–14 Rear View of the Front Control Panel

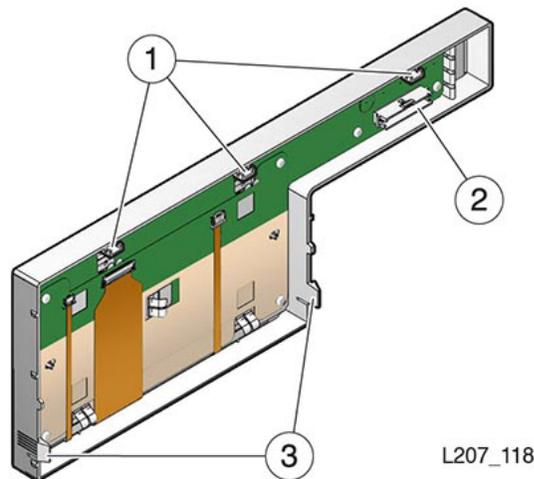


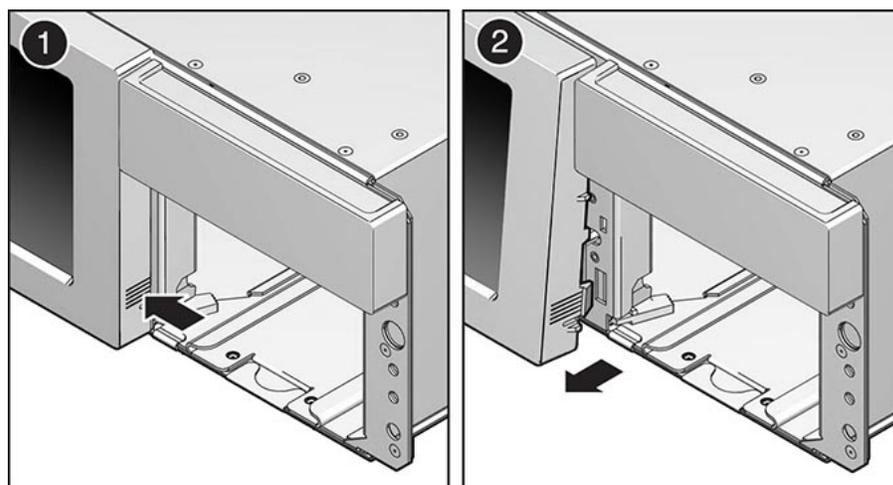
Illustration Legend:

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

To Remove the Front Control Panel

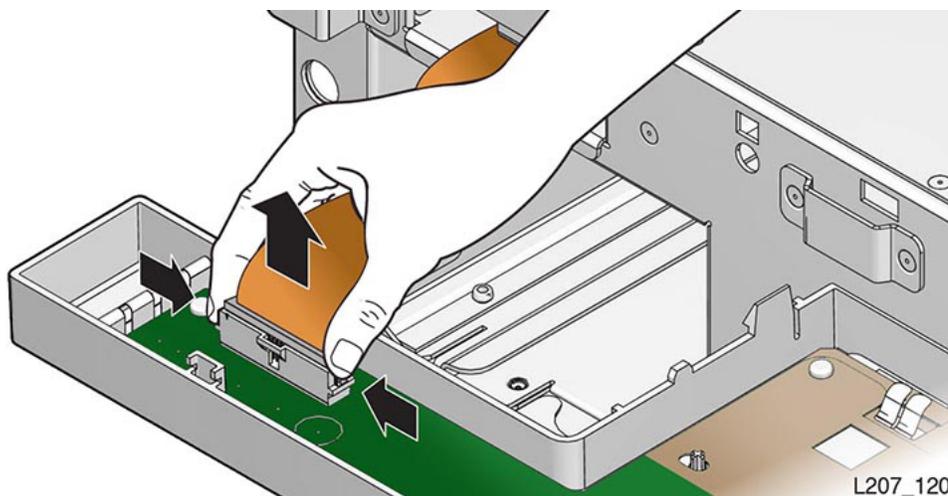
1. Power down the library (see "To Perform a Controlled Power-Down from the GUI" on page 3-11).
2. Remove both cartridge magazines from the base module (see "To Remove a Cartridge Magazine Manually" on page 3-13).
3. Press the latch inside *each* magazine bay inner wall and pull the bottom edge of the panel away from the module until the panel is unlatched (see Figure 3-15).
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 (see Figure 3-16).
7. Set the panel CRU on the anti-static mat.

Figure 3-15 Front Control Panel Side View



L207_119

Figure 3-16 Front Control Panel Jack



L207_120

To 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 [Figure 3-17](#)).
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 (see ["To Replace a Tape Cartridge Magazine"](#) on page 3-6).
7. Continue with ["Power System Behavior"](#) on page 3-35.

Figure 3-17 Front Control Panel Slots in Base Module

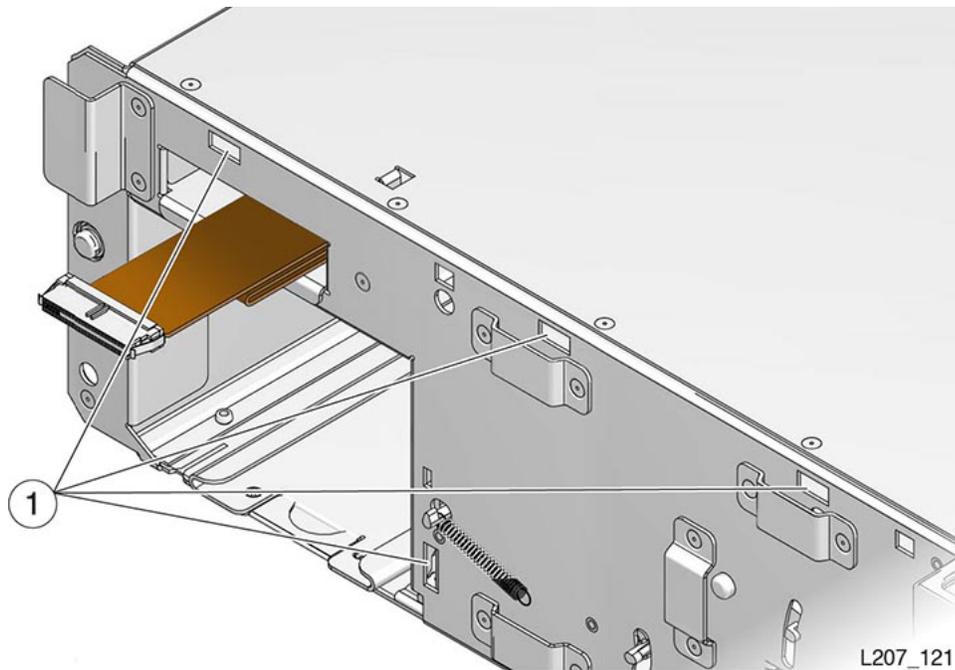


Illustration Legend:

1 - Slots in Base Module Chassis

Module Controller

The module controller is located in the upper right corner of the expansion module as viewed from the rear of the library (see [Figure 3-1](#)). The module controller obtains power from the expansion cable connected to a Module Output port on the base module.

The module controller is shown in [Figure 3-18](#) with items pertinent to its removal and replacement identified.

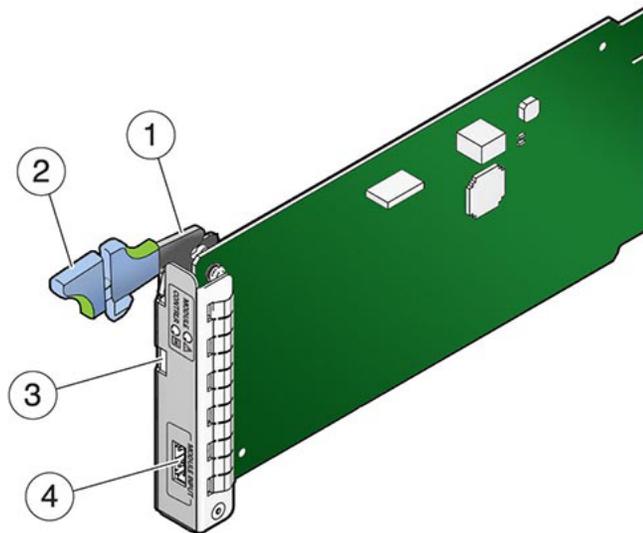
To Remove the Module Controller

Note: See "Electrostatic Discharge" on page 2-1.

Task 1 Preparation

1. Enable the Locate indicator on the library with the failed module controller (see "[To Enable the Locate Light](#)" on page 3-3).
2. Locate the module with the failed controller.
3. Power down the library (see "[To Perform a Controlled Power-Down from the GUI](#)" on page 3-11).

Figure 3-18 *Module Controller CRU*



L207_122

Illustration Legend:

- 1 - Hinge
- 2 - Latch
- 3 - Slot
- 4 - Expansion Cable Jack

Task 2 Removal

1. Disconnect the expansion cable from the jack on the module controller. Do not disconnect the other end of the cable from the base module.
2. Squeeze the latch sections together.
3. Extend the latch fully away from the module controller.
4. Pull the controller card out of the module slot.

5. Set the module controller on the anti-static work surface.

To 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.
3. Open the retaining latch.
4. Insert the module controller, component side up, in the module slot.
5. Seat the latch in the slot to secure the module controller.
6. Connect the expansion cable to the jack on the module controller.
The other end of the cable is already connected to a Module Output port on the robot CRU.
7. Insert the failed module controller into the ESD packaging.
8. Continue with "Power System Behavior" on page 3-35.

Robot Module

The robot module is located at the top of the base module (see [Figure 3-9](#)). The robot *must be parked* in the base module, the robot lock engaged, and the thumbscrews loosened before attempting to remove the robot module.

Both the Front Control Panel and the SL150 remote management interface provide the option to prepare the robot for removal during the power down process.

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 for any of these CRUs, you may *replace only one CRU during a single power-down cycle*.

To Remove the Robot

Caution: It is critical for the robot to be parked and latched before attempting to remove the robot CRU.

Task 1 Park and Lock the Robot

1. Power down the library (see "To Perform a Controlled Power-Down from the GUI" on page 3-11) with the "to prepare the robot for removal" option enabled.
If the robot cannot be parked by using the power-down procedure, perform "To Manually Retract the Robot" on page 3-20.
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. Set the robot lock to the locked position.

If the robot lock is the type with a knob, grasp the knob and turn it counter-clockwise until the point is past the red, locked padlock icon.

If the robot lock is the type with a screw, loosen the thumbscrew, remove the mechanism, rotate the mechanism 180 degrees, insert the mechanism, and tighten the thumbscrew.

Note: Make sure the *locked* padlock icon is indicated.

6. Replace the top drive or drive filler in the base module.

Task 2 Robot Removal

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

1. Make sure to identify each Ethernet port on the robot and its attached cable (label the cable if necessary).

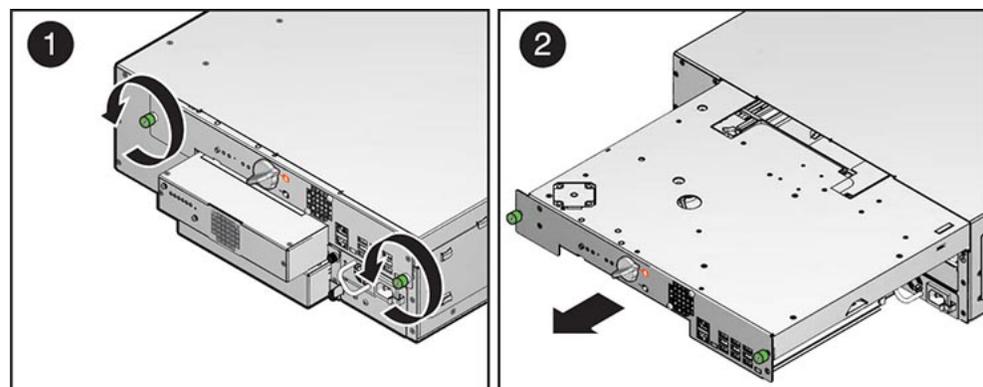
Note: The Ethernet ports might be connected to different networks.

2. Disconnect all cables, Ethernet cable and expansion cable, attached to the robot CRU.

Note: Set the expansion cable(s) aside if the expansion modules have been removed in preparation for base module replacement.

3. Loosen the robot module thumbscrews (see [Figure 3–19](#)).

Figure 3–19 Robot Removal and Replacement



L207_161

4. Grasp the robot module thumbscrews and pull the robot approximately 254 mm (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. Continue with "To Replace the Robot" on page 3-22.

To Manually Retract the Robot

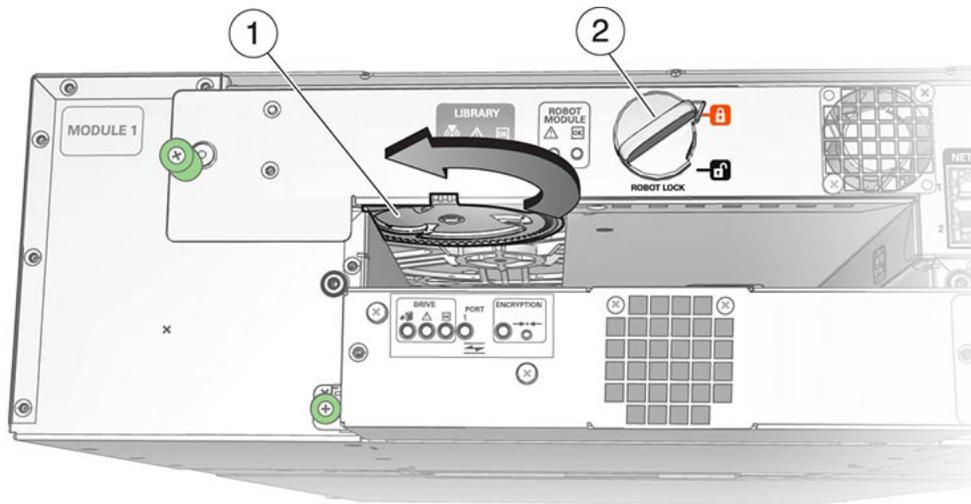
Note: Perform this procedure if you could not park the robot by using the power-down procedure.

1. Remove the top drive tray from the base module (see "Drive Tray Assembly" on page 3-6).
2. Locate the bullwheel gear inside the library and above the top drive slot (see Figure 3-20).
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, continue with "To Manually Disengage the Robot" on page 3-21.

5. Hold the bullwheel gear with the robot fully raised until you lock the robot.
6. Return to Step 5 of Task 1, "Park and Lock the Robot" and continue through the last step of Task 2, "Robot Removal".

Figure 3-20 Bullwheel Gear and Robot Lock



L207_160

Illustration Legend:

1 - Bullwheel Gear**2 - Robot Lock (Improved Design)****To Manually Disengage the Robot**

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

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.

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.

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.

Task 4 Finishing Touches

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. Continue with "To Replace the Robot".

To Replace the Robot

Task 1 Preparation

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.

Task 2 Replacement

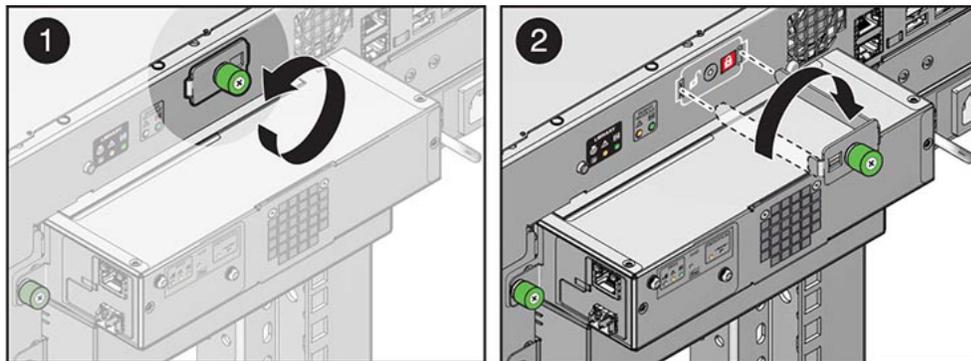
1. Grasp the robot near the center with the thumbscrews facing you.
2. Insert the robot into the base module (see Figure 3-19).
3. Push the robot fully into the module.
4. Tighten the thumbscrews on each side of the robot CRU.
5. Set the robot lock to the unlocked position.

If the robot lock is the type with a knob, grasp the knob and turn it clockwise until the point is past the black, unlocked padlock icon.

If the robot lock is the type with a screw, loosen the thumbscrew, remove the mechanism, rotate the mechanism 180 degrees, insert the mechanism, and tighten the thumbscrew.

Note: Make sure the *unlocked* padlock icon is indicated (see Figure 3-20).

Figure 3-21 Robot Lock (Unlocked)



L207_133

Task 3 Cabling

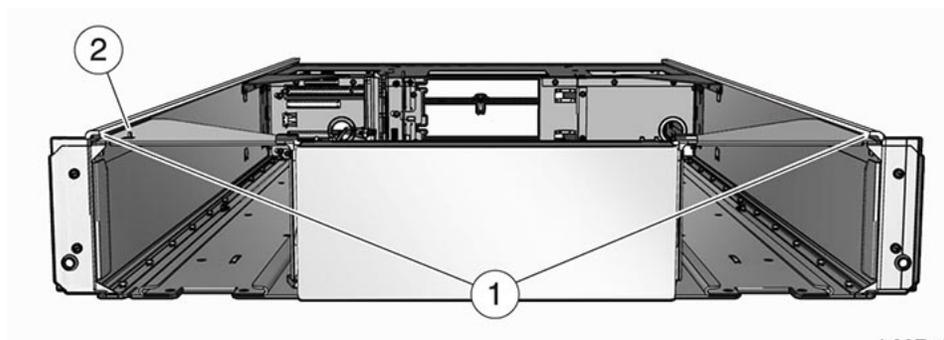
1. Plug the expansion cable for each module into a base module connector (it is permissible to connect a cable to any available connector).
2. Plug the Ethernet cables into the appropriate Net Mgt ports.
3. Continue with "Power System Behavior" on page 3-35.

Expansion Module Chassis

The expansion module CRU is shown in [Figure 3–22](#). 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 CRU, as applicable.

To replace a defective module, you might need to deinstall several operational modules to access the defective one. For example, a 150 cartridge library consists of five modules. If module 2 is defective, you would need to remove module 5, module 4, and module 3 to gain access to the defective module 2. You will also need to remove the cartridge magazines from the module above the defective module.

Figure 3–22 Additional Module CRU



L207_125

Illustration Legend:

- 1 - Flange
- 2 - Tab

To Remove an Expansion Module

Task 1 Preparation

Caution: It is critical for the robot to be parked and locked before attempting to remove an expansion module.

1. Power down the library (see ["To Perform a Controlled Power-Down from the GUI"](#) on page 3-11) with the option enabled to prepare the robot for removal.
2. Perform the instructions in ["Park and Lock the Robot"](#) on page 3-18.
3. Remove the cartridge magazines (see ["To Remove a Cartridge Magazine Manually"](#) on page 3-13) from the defective module, all modules below it, and the module directly above it.

Task 2 Remove the Floor, Cables, and Cords

1. Grasp the library floor at the thumb-holds within the magazine openings (see [Figure 3–23](#)).
2. Pull the floor out 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 cable from the jack at each affected expansion module controller.
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.

Figure 3–23 Library Floor Panel

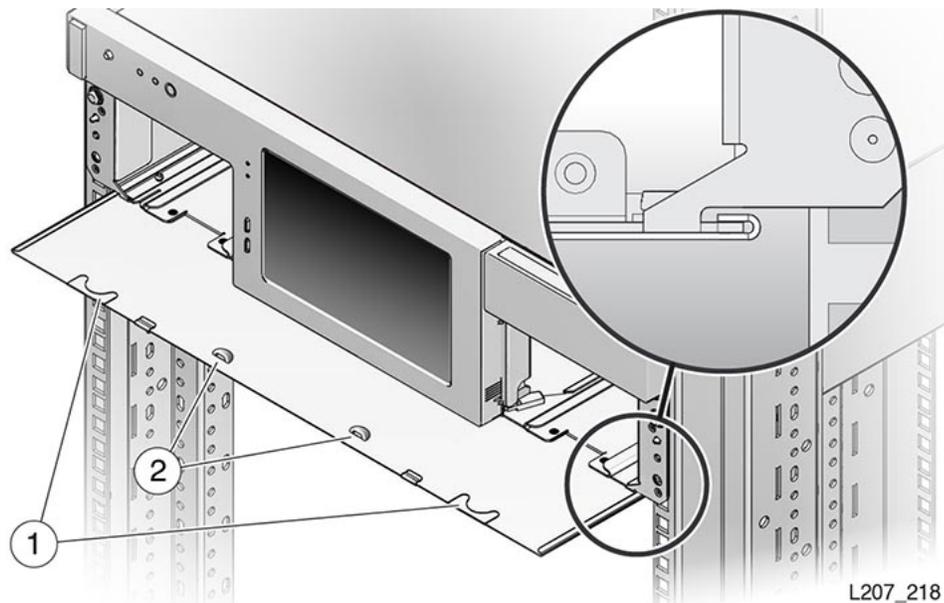


Illustration Legend:

- 1 - Floor Thumb-holds
- 2 - Floor Locks (Improved Floor Design)

Task 3 Remove Operational Expansion Modules Below the Defective Module

Warning: Heavy object. The expansion module can weigh up to approximately 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 "Drive Tray Assembly" on page 3-6 and "Power Supply" on page 3-9, as necessary.
2. Remove the Phillips screws securing the expansion module to the front of the rack.

3. Grasp the module, pull the module forward until the break in the flange is visible, lower the front of the module, pull the module free from the one 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 3-24](#)).
6. Repeat "Remove Operational Expansion Modules Below the Defective Module" on page 3-24 as necessary until you have removed all modules below the failing expansion module.

Figure 3-24 Module Rear Rail Removal

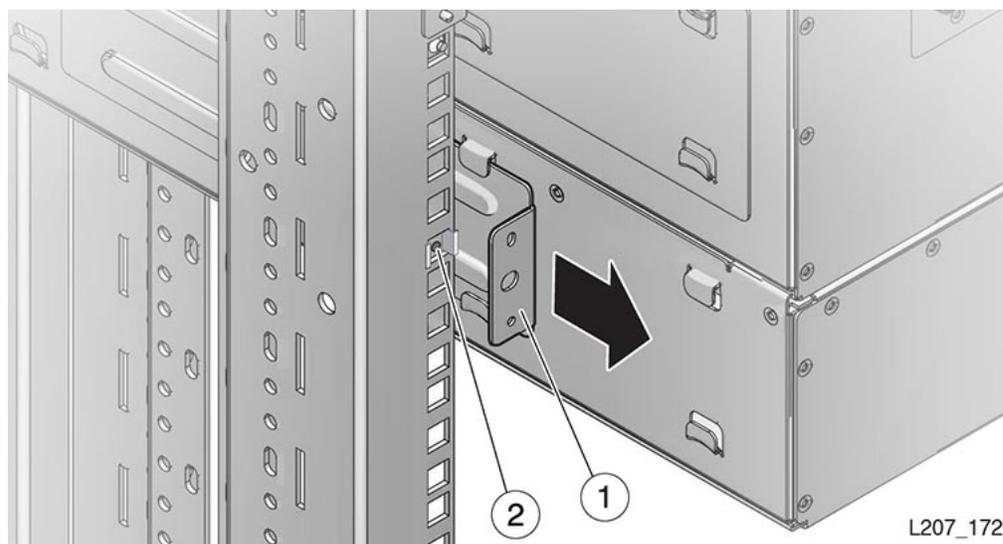


Illustration Legend:

1 - Rear Rail

2 - Clip Nut

Task 4 Remove CRUs and the Defective Module

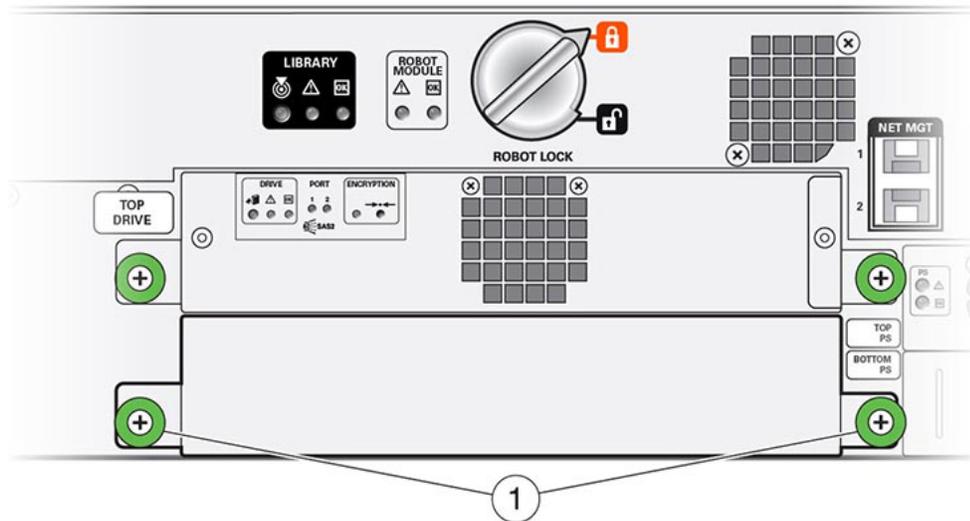
1. Remove the tape drive trays (see "Remove the Tape Drive Tray" on page 3-8), if applicable.
2. Remove the tape drive filler (see "To Remove the Drive Filler" on page 3-25), if applicable.
3. Remove the power supplies (see "To Remove the Power Supply" on page 3-10), if applicable.
4. Remove the power supply filler (see "To Remove the Power Supply Filler" on page 3-26), if applicable.
5. Remove the module controller (see "Removal" on page 3-17).
6. Remove the failed expansion module.
7. Continue with "To Prepare the Expansion CRU for Replacement" on page 3-27.

To Remove the Drive Filler

1. Loosen the thumbscrew on each side of the tape drive filler (see [Figure 3-25](#)).

2. Grasp the captive screws and pull the filler toward you.
3. Remove the filler from the drive slot and set it aside. You will install the filler in the CRU at a later time.
4. Return to Step 4 of "Remove CRUs and the Defective Module".

Figure 3–25 Tape Drive Filler



L207_162

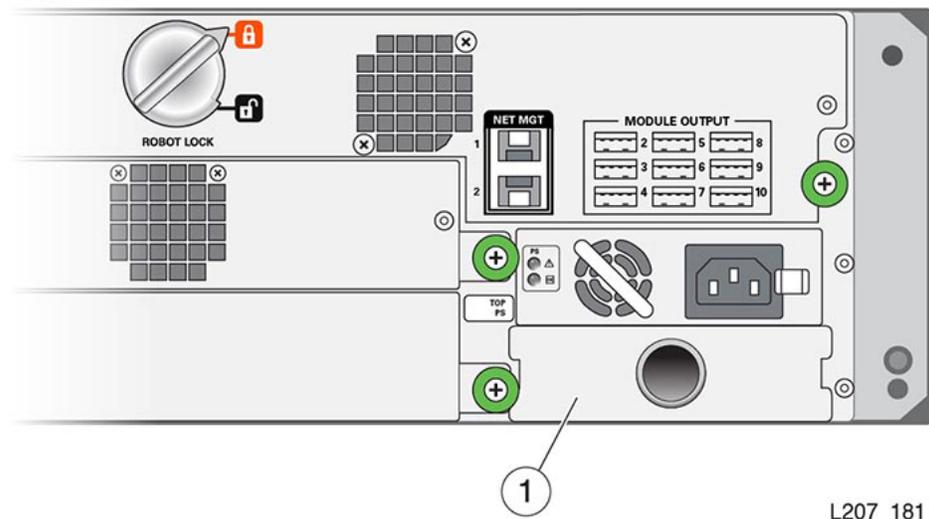
Illustration Legend:

1 - Drive Filler Thumbscrews

To Remove the Power Supply Filler

1. Hook your finger in the hole of the power supply filler (see Figure 3–26).
2. Pull the filler from the power supply slot and set it aside.
3. Continue with "To Prepare the Expansion CRU for Replacement".

Figure 3–26 Power Supply Filler

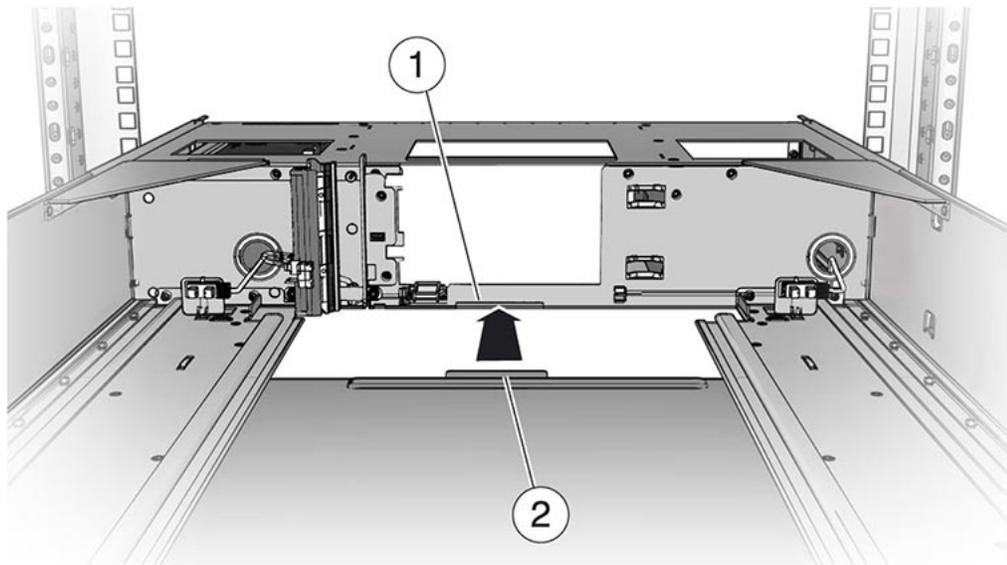
**Illustration Legend:****1 - Power Supply Filler****To Prepare the Expansion CRU for Replacement**

1. Grasp the expansion module chassis by the sides and remove it from the shipping carton.
2. Determine if the CRU is the bottom library module. If it is not the bottom module, continue with ["To Replace the Expansion CRU Chassis"](#) on page 3-29.

To Install the Floor

1. Turn the module over.
2. Orient the floor so the floor finger holds face the inside of the cartridge magazine slot.
3. Insert the rear edge of the floor into the grooves at the bottom of the module.
4. Push the floor into the module and engage the rear floor tab with the module slot (see [Figure 3–27](#)).
5. Push the floor fully into the module to seat the floor clip in each magazine slot (see [Figure 3–28](#)).
6. Turn the module over and verify the floor clips properly engage the chassis.
7. Continue with the appropriate procedure: ["To Replace the Expansion CRU Chassis"](#) on page 3-29 or ["To Replace the Base Module Chassis"](#) on page 3-33.

Figure 3–27 Floor Tab



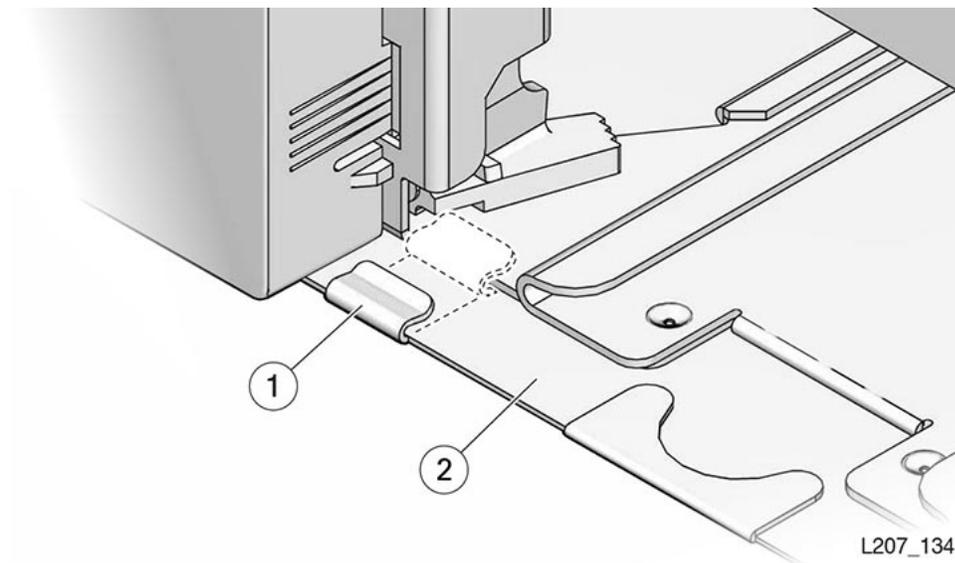
L207_111

Illustration Legend:

1 - Floor Slot

2 - Floor Tab

Figure 3–28 Floor Latching Tab



L207_134

Illustration Legend:

1 - Floor Clip

2 - Floor

To Replace the Expansion CRU Chassis

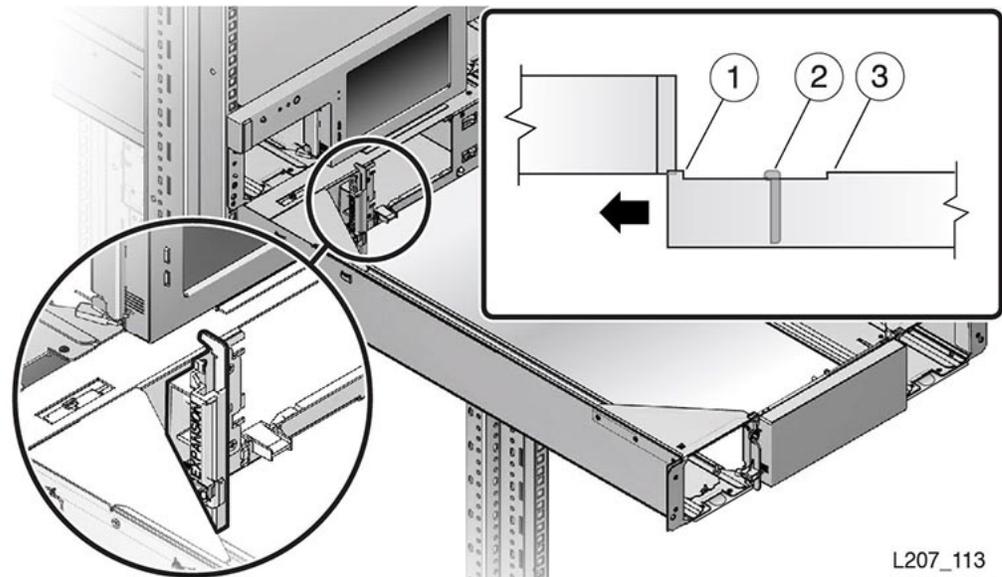
Task 1 Installation

1. Lift the expansion module by the sides.
2. Align the flanges at the rear of the expansion module with the grooves in the lower front edges of the library module.
3. Push the expansion module a few inches into the library.

Note: There is a gap in the module flange.

4. Lower the top front edge of the expansion module while slowly pushing it toward the library.
5. Take care to avoid any contact between the expansion module internal vertical flange and the plastic bezel of the library module (see [Figure 3–29](#)).
6. Lift the front edge of the module to level after the internal vertical flange is behind the face of the installed module. Continue to push the module in until it is about 51 mm (2 inches) from the rack front stiles.
7. Locate the expansion module alignment tab and the slot in the library module left magazine slot (see [Figure 3–30](#)).
8. Push the expansion module in and seat the alignment tab fully in the left magazine slot.
9. Attach the expansion module CRU label (upper-left, rear corner inside the scribe marks) if applicable.

Figure 3–29 Avoid Contact with the Operator Panel



L207_113

Illustration Legend:

- 1 - Flange (Short Section)
- 2 - Internal Vertical Flange

3 - Flange (Long Section)

Figure 3-30 Module Alignment

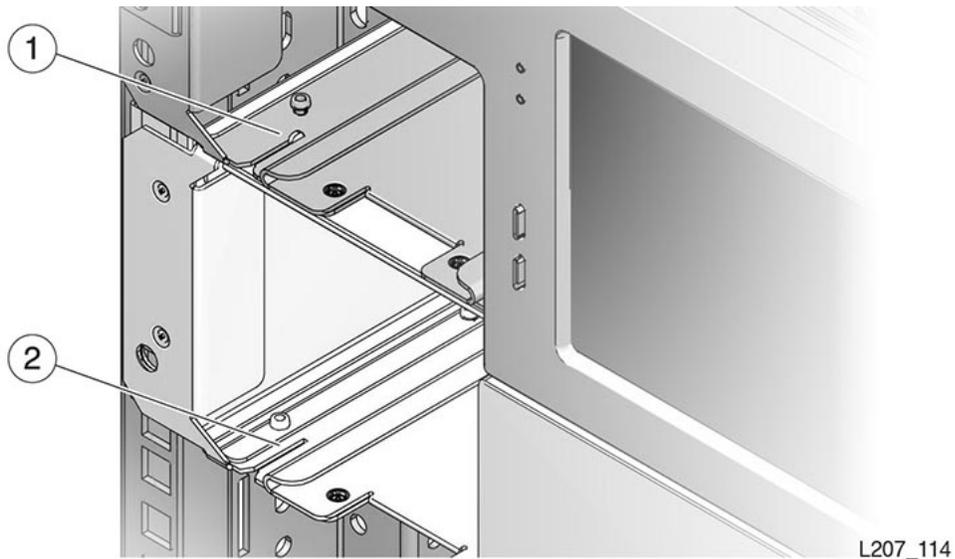


Illustration Legend:

1 - Alignment Tab

2 - Slot

Task 2 Secure the Module

1. Insert the rear rails for each module, and secure them with Phillips screws.
2. Secure the module to the front of the rack with two Phillips screws.

Task 3 Install the CRUs, Fillers, and Magazines in the Replaced Module

Cables and cords are connected as part of CRU installation.

1. Install the module controller (see ["To Replace the Module Controller"](#) on page 3-18).
2. Install the tape drive assembly (see ["To Replace the Drive Tray"](#) on page 3-9).
3. Install the tape drive filler (see ["To Install the Drive Filler"](#) on page 3-31).
4. Install the power supply (see ["To Replace the Power Supply"](#) on page 3-10).
5. Install the power supply filler (see ["To Install the Power Supply Filler"](#) on page 3-31).
6. Insert the cartridge magazines.

Task 4 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. Install the floor if this is the bottom library module (see ["To Install the Floor"](#) on page 3-27).

3. Repeat "Installation" on page 3-29 through "Install the CRUs, Fillers, and Magazines in the Replaced Module" until all expansion modules and CRUs are installed.

Task 5 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. Continue with "Power System Behavior" on page 3-35.

To Install the 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.
4. Return to Step 4 of "Install the CRUs, Fillers, and Magazines in the Replaced Module".

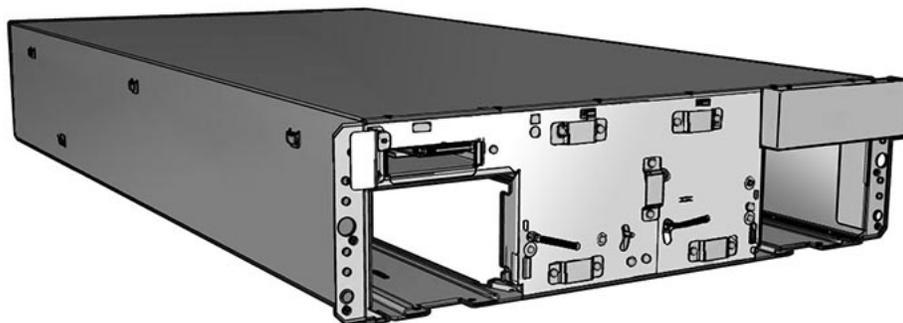
To Install the Power Supply Filler

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.
5. Return to Step 6 of "Install the CRUs, Fillers, and Magazines in the Replaced Module".

Base Module (Module 1) Chassis

The base module CRU is shown in [Figure 3-31](#). 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 CRU.

Figure 3-31 Base Module CRU



L207_126

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 for any of these CRUs, you may *replace only one CRU during a single power-down cycle*.

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

To Remove the Base Module Chassis

Task 1 Preparation

1. Perform "[Park and Lock the Robot](#)" on page 3-18.

Note: It is critical for the robot to be parked before proceeding.

2. Remove all modules below the base module (see "[To Remove an Expansion Module](#)" on page 3-23).

Task 2 Remove Base Module Parts for Reuse0

1. Remove magazines (see "[To Remove a Tape Cartridge Magazine](#)" on page 3-4).
2. Remove the Front Control Panel (see "[To Remove the Front Control Panel](#)" on page 3-15).
3. Remove the robot (see "[To Remove the Robot](#)" on page 3-18).

Note: Includes removal of the Ethernet cable and the expansion cable(s). Set the expansion cable(s) aside.

4. Remove the tape drive trays (see "[To Remove the Drive Tray](#)" on page 3-7).
5. Remove the tape drive filler (see "[To Remove the Drive Filler](#)" on page 3-25).
6. Remove the power supplies (see "[To Remove the Power Supply](#)" on page 3-10).
7. Remove the power supply filler (see "[To Remove the Power Supply Filler](#)" on page 3-26).

Task 3 Removal

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.

1. Remove the screws securing the base module to the front of the rack.
2. Extract the module from the rack.

To Prepare the Base Module CRU for Replacement

1. Grasp the base module chassis by the sides and remove it from the shipping carton.
2. Determine if the CRU is the bottom library module. If it is the bottom module, install the floor (see "To Install the Floor" on page 3-27).

To Replace the Base Module Chassis

Task 1 Install the CRU

1. Grasp the base module along the side and lift it until the back is above the rack rails.
2. Guide the module into the rack and set the rear side-tabs on the rack rails (see Figure 3-32).

Figure 3-32 Base Module Side Tabs

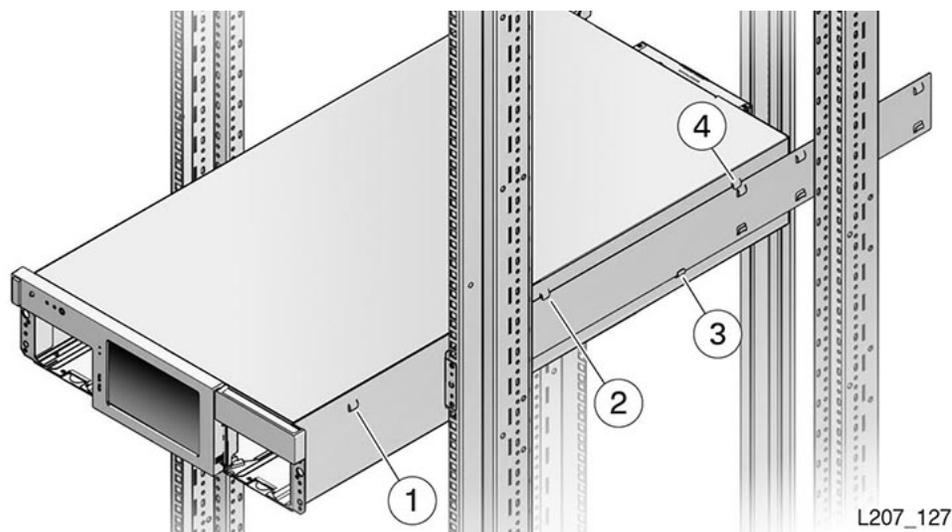


Illustration Legend:

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

3. Push the module into the rack to engage the bottom and center side-tabs.

Note: If you cannot engage the rails properly, remove the base module and adjust the rails. Never bend the tabs to engage a rail.

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.

6. Secure the base module to the rack with screws (put one in a few turns then the other screw and tighten both).

Task 2 Install the Base Module CRUs

Cables and cords are installed as part of the CRU replacement procedures.

1. Install the robot (see "To Replace the Robot" on page 3-22).
2. Install the tape drive trays (see "To Replace the Drive Tray" on page 3-9).
3. Install the tape drive filler (see "To Install the Drive Filler" on page 3-31).
4. Install the power supplies (see "To Replace the Power Supply" on page 3-10). However, do not connect the power supply cable now.
5. Install the power supply filler (see "To Install the Power Supply Filler" on page 3-31).
6. Install the Front control panel (see "To Replace the Front Control Panel" on page 3-16).

Task 3 Install the Expansion Modules

1. Locate Module 2.
2. Determine if this is the bottom library module. Install the library floor in the bottom module (see "To Install the Floor" on page 3-27).
3. Install the module (see "To Replace the Expansion CRU Chassis" on page 3-29).

Note: CRUs, drive cables, and module interconnect cables are installed during replacement of the expansion module.

4. Locate the next module and repeat step 2 and step 3 as necessary until all modules are in place.
5. Install cartridge magazines (see "To Replace a Tape Cartridge Magazine" on page 3-6) in all modules.

Task 4 Finishing Touches

1. Align and dress the cables. Secure the cables in the hook and loop straps, if applicable.

Figure 3-33 Cable Attachment

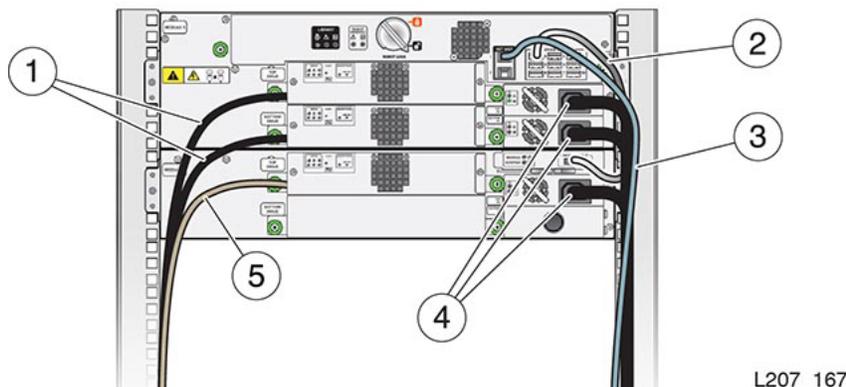


Illustration Legend:**1 - Tape Drive With Fibre Channel Cable****2 - Expansion Module Cable****3 - Ethernet Cable****4 - Power Supply Cord****5 - Tape Drive With SAS Cable**

2. Connect the power cord to each installed power supply.
3. Continue with [Power System Behavior](#).

Power System Behavior

The behavior of the SL150 library when AC power is applied to the system power supplies depends on how the tape library was powered down from the previous powered-up state. The system BIOS is set to recall the last power state from AC loss (such as a utility power outage, removal of the AC power cord, or powering off a PDU or power strip).

When AC power is restored, the system turns on for about 4 seconds while the system BIOS determines the library power state when AC was lost.

- If the tape library was *powered up* when AC was lost, it remains in the powered-on state and the boot sequence starts.
- If the tape library was *powered down* when AC was lost, it returns to the powered-down state about 4 seconds after AC power restoration.

A *controlled* power-down is performed from the SL150 remote management interface or physical library power button (the touch screen GUI is also involved). If power is lost after a controlled power-down, the BIOS resets to power on for about 4 seconds when AC power is restored. The tape library returns to the powered-off state until the power button is pressed to apply power to the tape library.

A *forced* power-down of the tape library is performed by pressing and holding the power button until the library powers down (approximately 10 seconds). If power is lost after a forced power-down, the library *does not* perform the BIOS power on for 4 seconds after AC power restoration. The tape library remains in the powered-down state until the power button is pressed to apply power to the tape library.

To Power-on the Library

1. Make sure the robot is not locked.
2. Make sure the floor is installed in the bottom library module.
3. Press the power switch on the base module to initiate a restart, if necessary.

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

See [Appendix A, "Startup"](#) for a description of the process. Library initialization occurs during startup and includes movement of the robot to determine the number of modules and tape drives in the library. If library initialization fails, the tape drive ports are not enabled.

Note: In a bridged library, the host will not be able to see the library if the bridged drive ports are not enabled. Perform troubleshooting procedures in the user's guide to resolve a bridged drive problem.

Startup duration varies based upon the number of library modules. After completion, the Home screen appears on the touch screen.

Figure 3–34 Home Screen

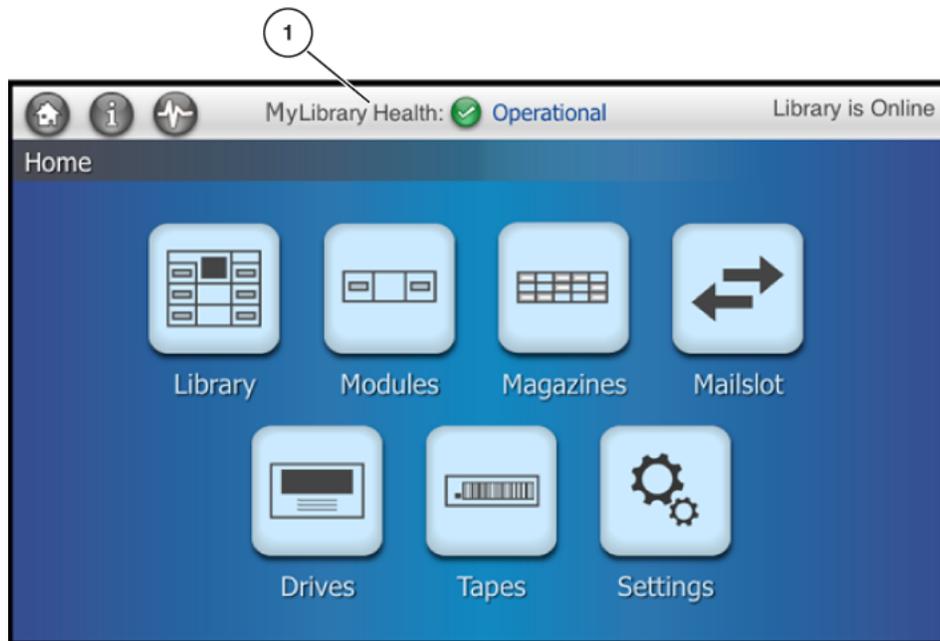


Illustration Legend:

1 - Library Health

4. Check the **OK** indicators on all CRUs.
5. Verify that the library health state is *operational* from the touch screen (see [Figure 3–34](#)) or the SL150 remote interface.

If the health state is degraded or failed, consult the troubleshooting section of the user's guide to assist with resolving the problem.

To Validate Library Operation

1. Perform an operational check of replaced CRUs, as applicable:
 Test the panel for general operation (locate light, touch screen, open the mailslot, and so forth).
 Confirm that the library recognizes the module controller (Modules area of the touch screen or Library area of the SL150 remote interface).
2. Run the offline self tests from the SL150 remote interface (refer to the *StorageTek SL150 Modular Tape Library User's Guide* or the Help system for instructions).
3. Set the SL150 library to the online state and log out of the SL150 remote interface.

Note: After CRU replacement, run application commands to ensure that the library and drive applications are synchronized. See your host tape application documentation for guidance.

CRU Return

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.

The SL150 library is typically started up when power is applied (the power cord is plugged in or the external power is switched on). If the library was manually powered down (from the front panel power switch or the shutdown function of the remote management interface), pressing the front panel power switch starts the library.

During library startup, the following steps are performed:

1. The robot is unparked.
2. The hand fully retracts.
3. The robot moves from the top to the bottom of the entire library. By starting at the top and moving down one module at a time, the robot determines the order of the modules.
4. The wrist sweeps through its full range of motion.
5. The hand moves through the full track range.
6. The reach mechanism extends and retracts.
7. Magazines are latched.
8. A full library audit is performed.

You can observe the progress of a library audit from the Library view in a web browser. Tape slots that the library has *not* audited are greyed-out while audited tape slots are active (a barcode icon is present in the slot). When you move the cursor over the active slot the tape location and barcode information is shown. If the barcode information has a value of unreadable, the barcode label is out of specification, damaged, or it does not exist.

Be aware that the barcode icon is a facsimile and does not represent the actual cartridge barcode.

When the audit completes and all drives are *ready*, the library is operational.

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.

base chassis

The sheet metal and plastic chassis that makes up the framework of the base module (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**, or tape volume.

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 modules 2–10 to the base module (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 2–10.

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. The expansion module connects to the base module by an expansion cable.

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 and 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 bus adapter (HBA)

A circuit installed in a multi-platform host or device that interfaces between the device and the bus.

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)

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)

inventory

See [audit](#).

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 1–10. 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.

LTO

An acronym for Linear Tape-Open technology. An “open format” technology, which means that users will have multiple sources of products and media.

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)

mailslot

The Standard Mailslot 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).

mailslot expansion

A term describing the Base Module right magazine (the magazine immediately below the Standard Mailslot) when the library has the expanded mailslot configuration. The mailslot capacity expands from four cartridges (Standard Mailslot) to 19 cartridges.

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 2–10 that controls the operation of the module. It is connected to the robot by an expansion cable.

Module X (2 through 10)

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)

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.

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 (1–10). 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 1–10. Right magazines and left magazines are not interchangeable.

robot

An assembly that incorporates the bulk of the base module 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).

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.

B

base module chassis
 removal, 3-32
 replacement, 3-33
boot up, A-1

C

cartridge magazine
 description, 1-1, 3-3
 manual removal
 note about, 3-35
 procedure, 3-13
 removal, 3-4
 replacement, 3-6
caution radiation exposure, 3-1
class 1 laser product, 1-3
CRU
 indicator, 1-4
 list of, 1-4

D

description, product, 1-1
drive filler
 removal, 3-25
 replacement, 3-31
drive tray
 description, 3-6
 removal, 3-7
 replacement, 3-9

E

encryption reset, 1-4
ESD prevention, 2-1
expansion module
 chassis replacement, 3-29
 removal, 3-23

F

fault indicator
 CRU, 1-4
 library system, 1-3
floor, installation of, 3-27

front control panel
 description, 3-14
 removal, 3-15
 replacement, 3-16

I

indicator
 CRU description, 1-4
 library system, 1-3
 tape drive service action, 1-4
interface, SL150 remote management, 2-1

L

laser
 caution, 3-1
 notice, 1-3
 product, 1-3
library
 control interface, 1-2
 power down, 3-11
 power on, 3-35
 startup, A-1
locate indicator
 library, description of, 1-4
 switch on, 3-3

M

magazine, cartridge, 1-1
module
 base (Module 1), 3-31
 expansion, 3-23
module controller
 description, 3-16
 removal, 3-17
 replacement, 3-18

P

park robot, 3-12, 3-18
partitions, 1-3
power down, 3-11
power on, 3-35
power supply

- description, 3-9
- filler
 - removal, 3-26
 - replacement, 3-31
- removal, 3-10
- replacement, 3-10
- power system behavior, 3-35
- product description, 1-1

R

removal

- cartridge magazine, 3-4
- cartridge magazine, manual, 3-13
- chassis
 - base module, 3-32
 - expansion module, 3-23
- drive tray, 3-7
- filler
 - drive, 3-25
 - power supply, 3-26
- front control panel, 3-15
- module controller, 3-17
- power supply, 3-10
- robot module, 3-18

replacement

- cartridge magazine, 3-6
- chassis
 - base module, 3-33
 - expansion module, 3-29
- drive tray, 3-9
- filler
 - drive, 3-31
 - power supply, 3-31
- floor, 3-27
- front control panel, 3-16
- module controller, 3-18
- power supply, 3-10
- robot module, 3-22

robot module

- manual disengagement, 3-21
- manually retract robot, 3-20
- park robot, 3-12, 3-18
- removal, 3-18
- replacement, 3-22

S

- service action allowed indicator, 1-4
- set library
 - offline, 3-2
 - online, 3-3
- SL150 remote interface, 2-1
- startup description, A-1

U

- user interface, GUI, 2-1