

**StorageTek SL150 Modular Tape Library**  
Customer Replaceable Unit Guide

**29812-05**

March 2013

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# Preface

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

## Access to Oracle Support

Oracle customers have access to electronic support through My Oracle Support. For information, visit <http://www.oracle.com/support/contact.html> or visit <http://www.oracle.com/accessibility/support.html> if you are hearing impaired.



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## What's New

- Added information about the HP LTO-6 FC tape drive.





## Product Overview

Oracle's StorageTek SL150 Modular Tape Library is a rack mounted automated tape library with a capacity of 30 to 300 LTO Ultrium tape cartridges (tapes) with 1 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**



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### Illustration Legend:

- 1 - Base Module (Identified as Module 1)
- 2 - Expansion Module (Identified as Module 2 Though 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.

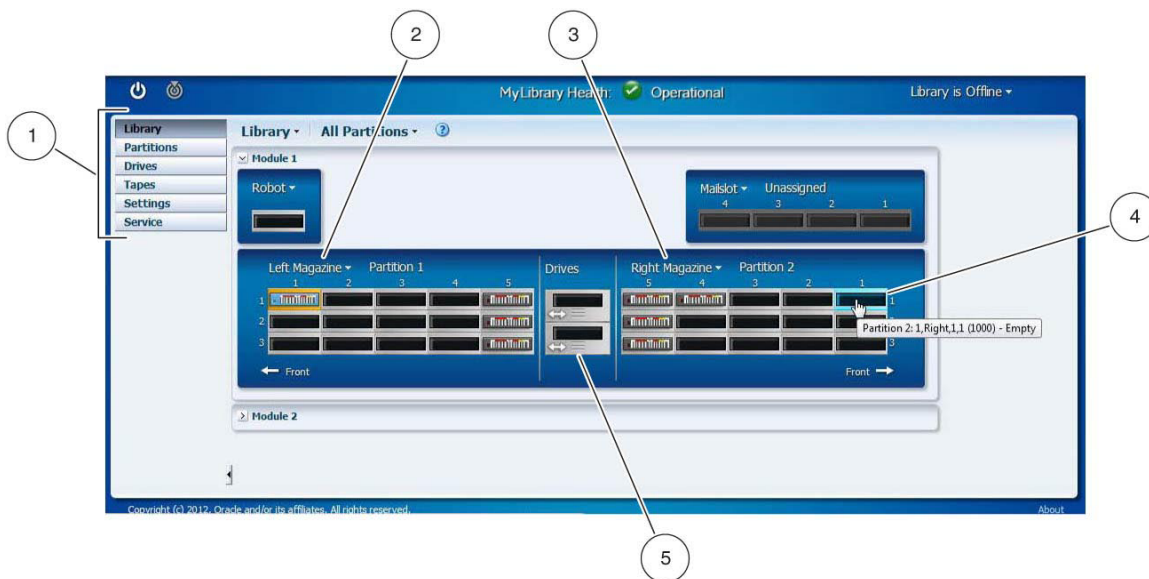
The library can be expanded from one to ten modules. A 2U (88.9 mm, 3.5 inches) expansion module provides the library an additional capacity of 30 tapes and up to two tape drives. Expansion modules are designated Module 2 through Module 10. Modules provide two 15-cartridge magazines, slots for up to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

A graphical user interface (GUI) provides local or remote role-based access control for the library.

- A library is remotely managed by entering the hostname or IP address into a web browser (such as Chrome, Firefox, or Safari). An example of the remote interface is shown in [Figure 1–2](#).

The library information is presented as a graphical representation. Module 1 shows the tape slots in the left magazine, tape slots in the right magazine, and available tape drives between the magazines. 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) which provides basic information about the library (see [Figure 1–1](#)). The

touch screen is designed for use as an information point rather than a tool for maintenance.

The front control panel touch screen is also used to perform basic initialization setup (defining a default administrator password, setting the library date and time, and performing network configuration of Port 1). Additional library management functions are performed by the administrator using the remote interface.

The library can be divided into a maximum of two partitions with each having a bridged tape drive in the base module. Each partition behaves as an independent library, but all partitions share the use of the single robot, reserved slots, and mailslot.

## 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).

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

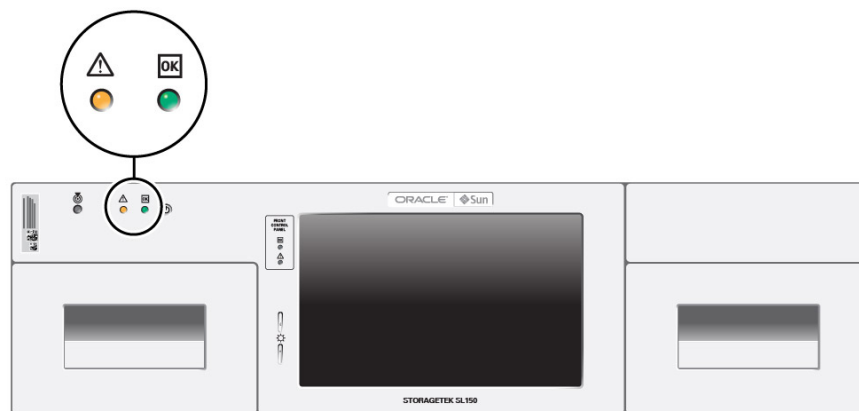
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## Library Status Indicators

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\_135

- Fault: a fault anywhere in the library triggers the fault LED. 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.

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

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- **Locate Library LED:** aids in identification of the specific tape library in need of attention. The LED is enabled locally or through the remote interface.
- **Front Control Panel (see Figure 1-1 near the upper left corner of the touch screen):**

Fault: indicates a failure anywhere in the front control panel CRU.

OK: functioning properly.
- **Robot (see Figure 3-1):**

Fault: indicates a failure anywhere in the robot CRU.

OK: functioning properly.

  - **Robot Lock (see Figure 3-21):** 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 (see Figure 3-10):**

Fault: indicates a power supply failure.

OK: functioning properly.
- **Tape Drive (see Figure 3-8):**

Locate: this LED is on when 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 (SAS tape drives and LTO-6 FC tape drive)

Encryption status

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

- **Module Controller (see [Figure 3–18](#)):**

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

OK: functioning properly.



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## 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 from their containers.
- 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.

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

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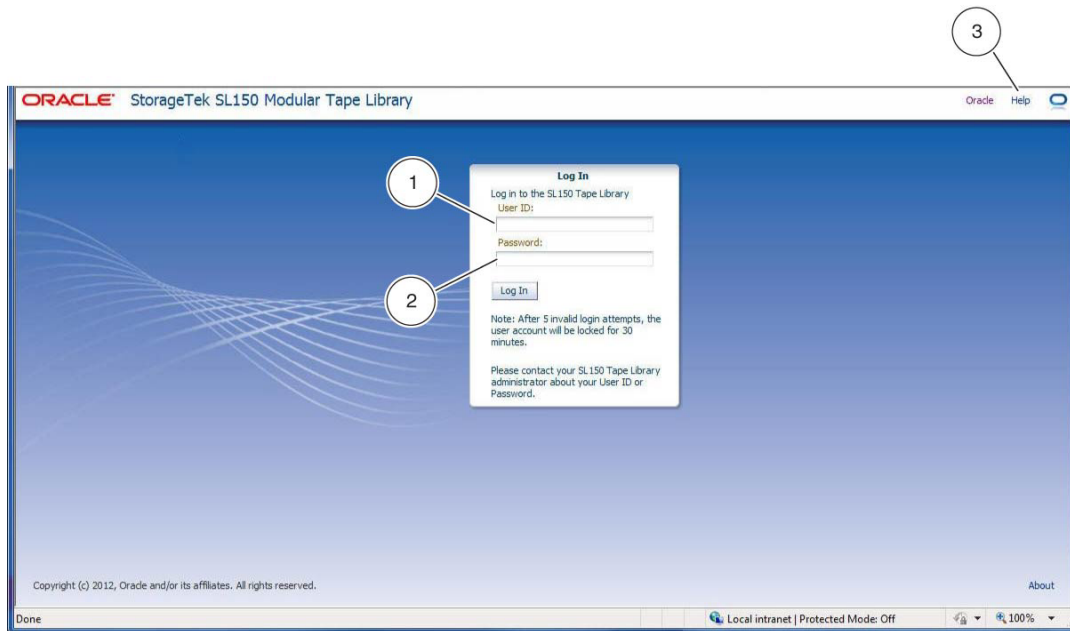
### SL150 Remote Interface

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 tab of that interface.

You access the remote interface by entering the library hostname or IP address in a supported web browser. The login dialog is shown in [Figure 2–1](#). Note the Help link 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**

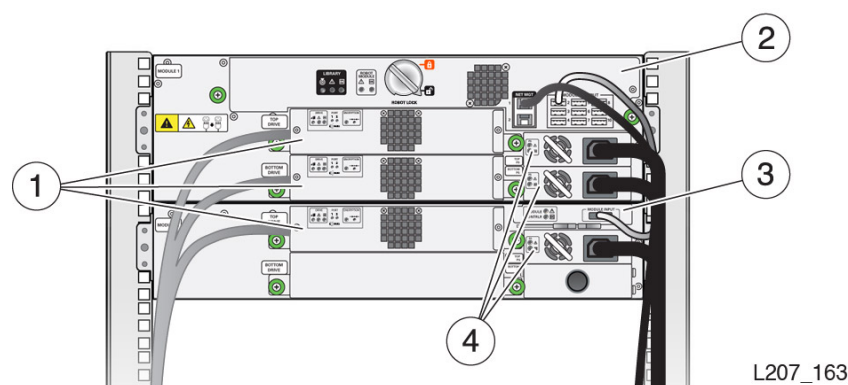


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## Removal and Replacement

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/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 Modules)**



### Illustration Legend:

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

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

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## Problem Determination

This guide assumes that you have isolated the library problem and have the necessary 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 Help system of the SL150 remote interface (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. Move the cursor to the library state control (see [Figure 3–2](#)).
4. Select **Set Library Offline** to place the library into maintenance mode.
5. Click **OK** in the dialog box (see [Figure 3–3](#)).

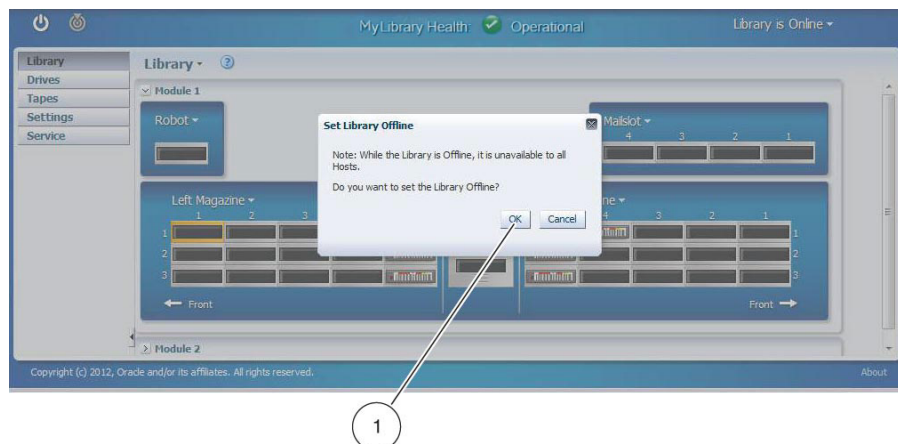
**Figure 3–2 Set Library Offline**



**Illustration Legend:**

**1 - Library State Control**

**Figure 3–3 Offline Confirmation**



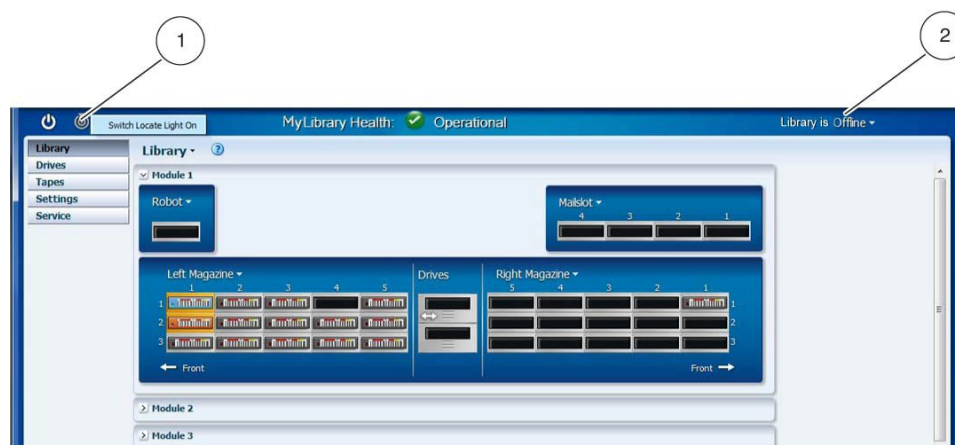
**Illustration Legend:****1 - Confirmation Dialog Box (OK Button)****To Set the Library Online**

1. Log in to the SL150 remote interface using your browser (see [Figure 2-1](#)).
2. Move the cursor to the library state control (see [Figure 3-2](#)).
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](#)).

**Figure 3-4 Locate Icon****Illustration Legend:****1 - Locate LED****2 - Library State**

3. Select **Switch Locate Light On**.

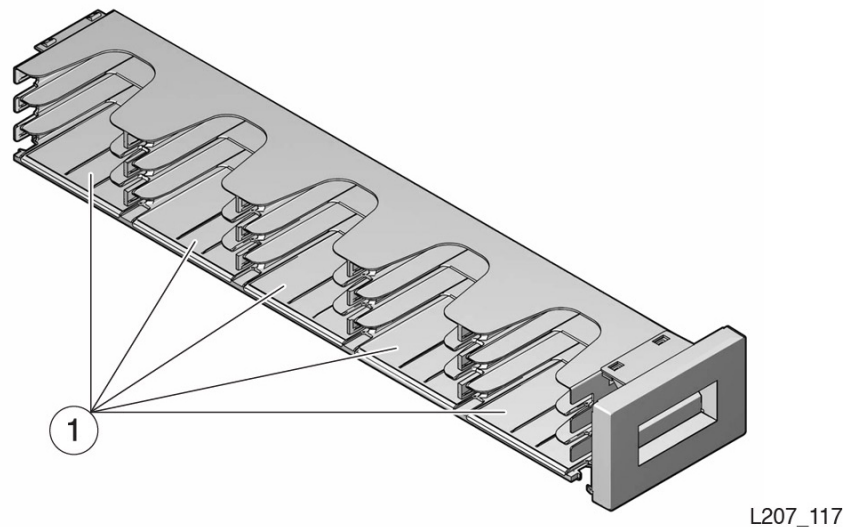
The GUI locate icon activates.

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](#)).

**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 unlatch a cartridge magazine for an offline library. [Figure 3-6](#) shows the remote interface with an expanded menu for the left magazine.

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

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## To Remove a Tape Cartridge Magazine

The following procedure relies on the SL150 remote 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.

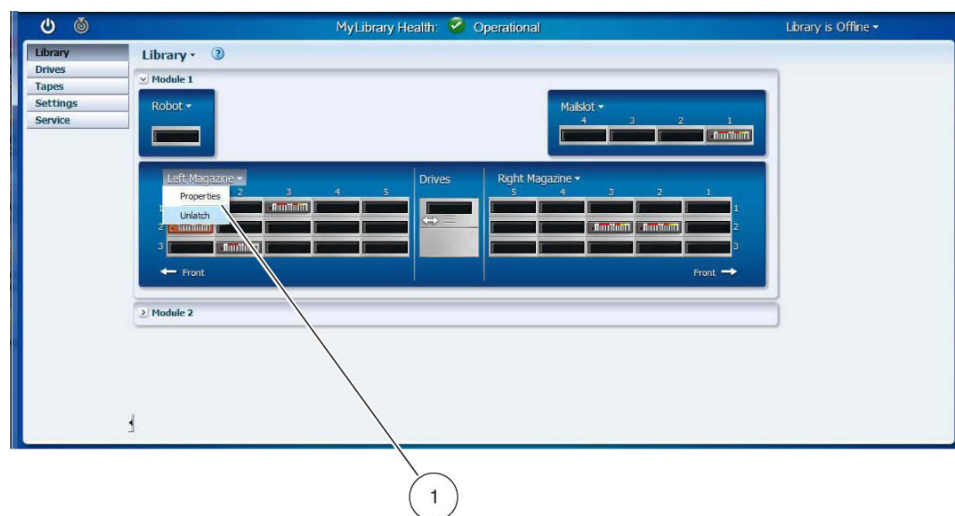
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**Note:** If you are not able to log in to the remote library interface, see ["To Remove a Cartridge Magazine Manually"](#) on page 3-13.

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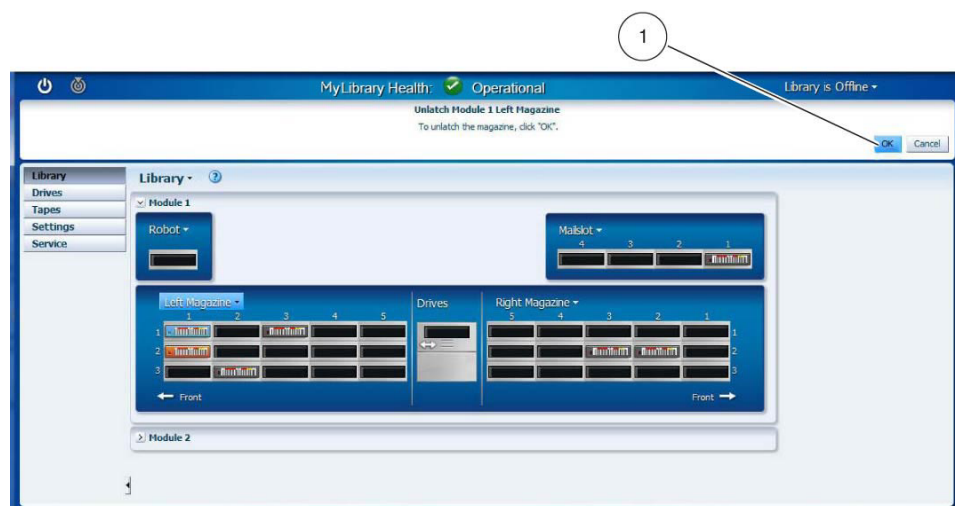
**Task 1 Unlatch the Magazine from the GUI**

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. Locate the appropriate module number (scroll as necessary).
4. Click the label of the magazine you want to remove.
5. Select **Unlatch** (see [Figure 3-6](#)).
6. Click **OK** to confirm the unlatch action (see [Figure 3-7](#)).

**Figure 3–6 Magazine Actions**

**Illustration Legend:**

**1 - Magazine Control (Unlatch)**

**Figure 3–7 Magazine Unlatch Confirmation**

**Illustration Legend:**

**1 - Confirmation Dialog Box (OK Button)**

## **Task 2 Remove the Unlatched Magazine**

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**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.

---

1. Grasp the magazine by the front handle and slowly extend it out of the module a short distance.
2. 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

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

---

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### Task 1 Insert the Magazine

1. Orient the magazine with the cartridge slots facing toward the center of the module.
2. Lift the magazine and point the back toward the module slot.
3. Engage the magazine with the track in the magazine bay of the module.
4. Verify that tapes are properly seated in the magazine slots.
5. Push the magazine fully into the library module.

After magazine insertion, the library detects the magazine, latches the magazine, and moves the robot to audit the contents of the inserted magazine.

### Task 2 Set the Library Online

1. Log in to the SL150 remote interface (see [Figure 2-1](#)).
2. Return the library to the online state.

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**Note:** The library must be online for host-controlled robotic activity to resume.

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3. Log out of the SL150 remote interface.

## 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.

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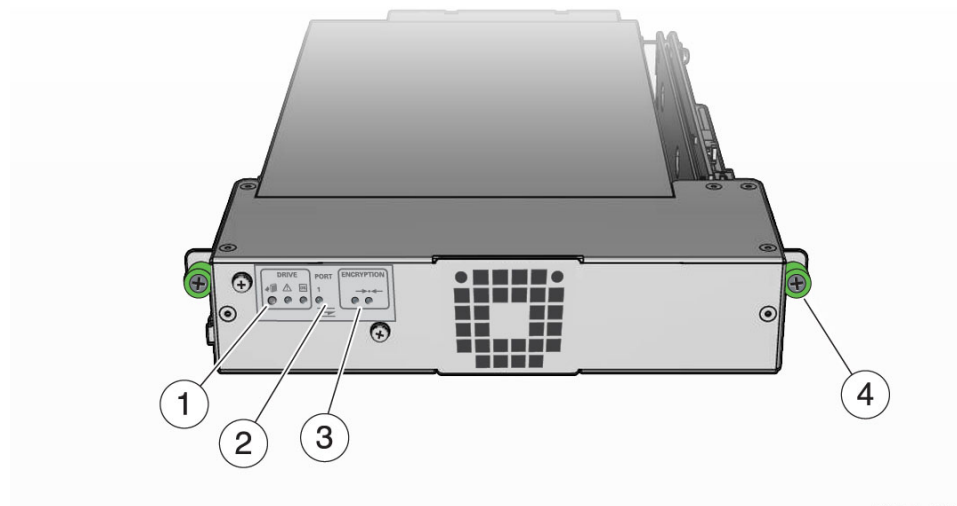
**Warning:** Do not operate the library with open tape drive or power supply slots.

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### 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 (LTO-5 FC Drive has One Port)**
- 3 - Encryption Indicator and IP Reset Switch**
- 4 - Thumbscrew (Drive Tray has two Thumbscrews)**

**Bridged Drive Considerations**

The bridged tape drive is located in the top drive slot of the base module (Module 1). The robot control is a SCSI Medium Changer device that appears as LUN 1 on a tape drive.

If the library is partitioned, Module 1 must have two tape drives, and each tape drive provides the robot control for its assigned partition.

- The top drive in Module 1 for Partition 1 (magazines on the left side of the library, as viewed from the front of the SL150 library).
- The bottom drive in Module 1 for Partition 2 (magazines on the right side of the library, as viewed from the front of the SL150 library).

---

**Note:** Library partitions share library elements such as the mailslot, robot, and reserved cells.

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Bridge drive removal results in loss of host connectivity.

**To Remove the Drive Tray**


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**Note:** If the failed drive is the bridging 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**

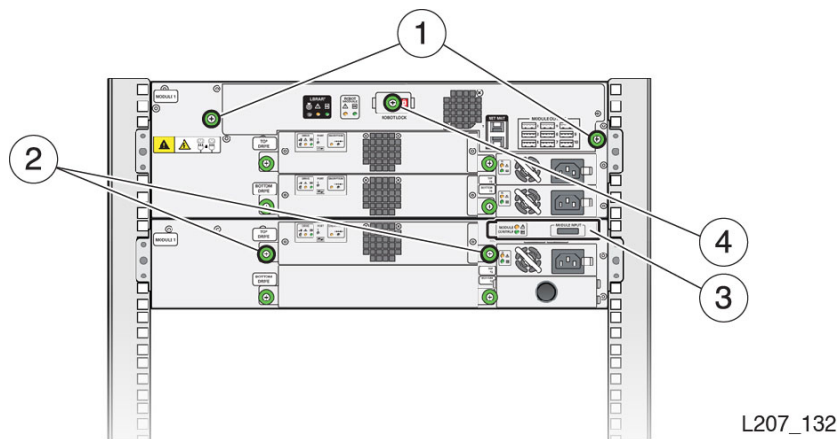
1. Click **Library** on the left of the remote interface.
2. Move the cursor to the drive you need to replace.
3. Click the drive icon and select **Remove Drive**.
4. Click **OK** in the confirmation dialog box.

The physical LED 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 LED (indicates 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 Latch, Lock, and Thumbscrews**

**Illustration Legend:**

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



## To Replace the Drive Tray

### Task 1 Preparation

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**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 LEDs 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 and Ethernet cable (if applicable) to the proper jack on the left side of the drive tray.

### Task 3 Restart the Library

1. Quiesce all mount/dismount activity on the library.
2. Use the physical power button on the library or the power button icon in the remote management interface.
3. Invoke Restart Library on the touch screen or the dialog box of the remote management interface.
4. Wait for the restart to complete.

### Task 4 Confirmation

1. Confirm that the library recognizes and accounts for the drive (Drives area of the SL150 remote interface).

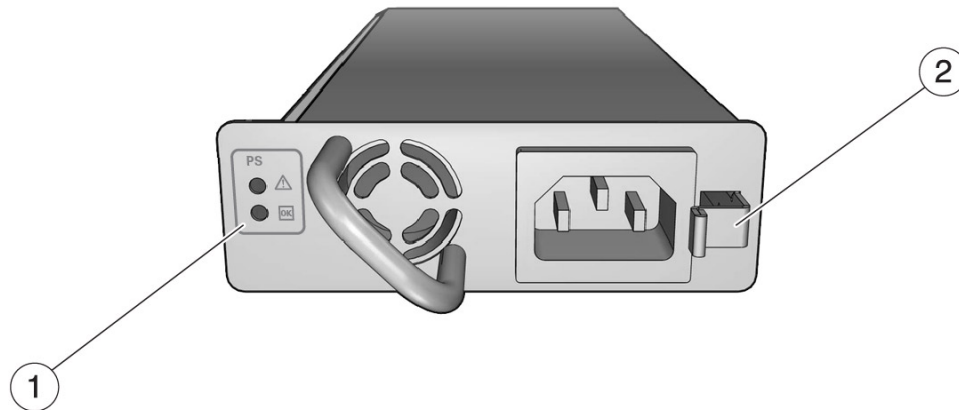
It can take some time for the library to recognize the drive and for the LEDs to indicate the drive is operational.

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 (see [Appendix B, "Drive Firmware"](#)).
4. Log out of the SL150 remote interface or return the touch screen to Home.

## 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.

**Figure 3–10 Power Supply CRU**



L207\_115

### Illustration Legend:

**1 - Power Supply Indicators**

**2 - Power Supply Latch**

Module 1 requires one power supply (see Figure 3–1). Expansion modules require a power supply whenever a drive is installed in that module.

## To Remove the Power Supply

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 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 3-34 if the 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 / rack.

---

**Note:** Only use the forced power-down method 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 the Prepare the Robot for removal before the library powers down check box, if applicable (see [Figure 3-12](#)).
6. Click OK.

- Follow on-screen prompts (for example, instructions to lock the robot).

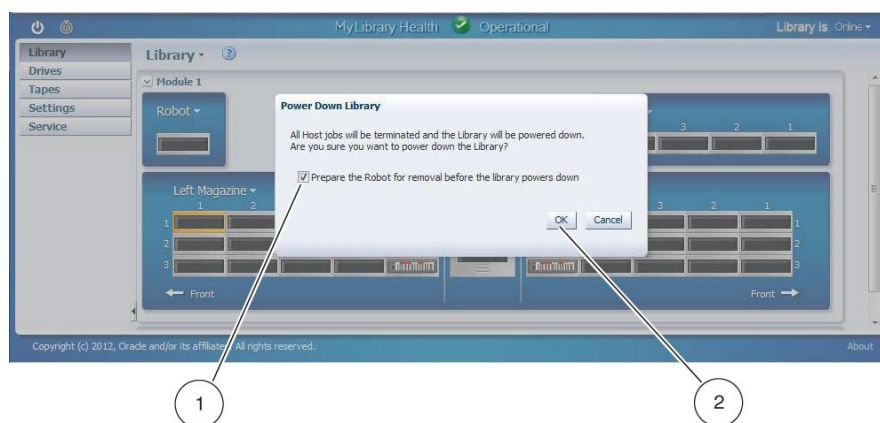
**Figure 3–11 Power Down Library**



**Illustration Legend:**

**1 - Power Down Library Command**

**Figure 3–12 Prepare the Robot for Removal**



**Illustration Legend:**

**1 - Check Box to Prepare the robot for removal before the library powers down**

**2 - OK Button**

### To Perform an Orderly Shutdown from the Front Control Panel

- Quiesce the host application to prevent disruption of active storage operations.
- Press the power button on the Front Control Panel.
- Tap the check box to prepare the robot for removal before the library powers down.
- Tap OK.
- Follow 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/power strip switch to the off position).

### To Remove a Cartridge Magazine Manually

---

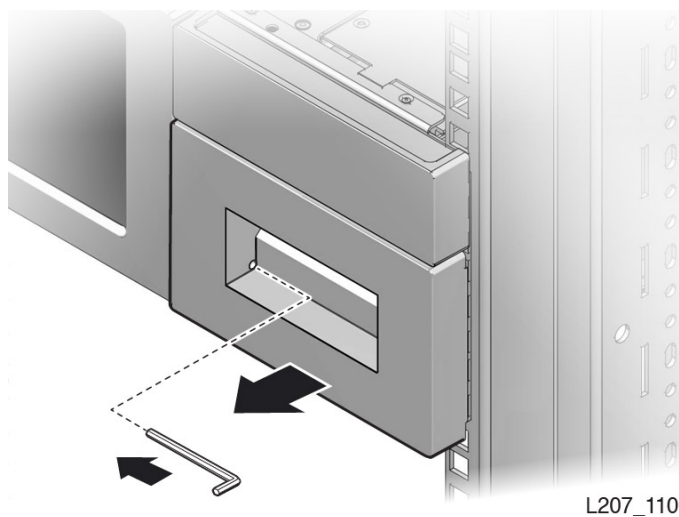
**Caution:** Manual removal of a tape cartridge magazine can damage the robotic mechanism. This procedure supports removal and replacement for some of the CRUs listed in ["Other CRUs"](#) on page 3-11. Power down the library before beginning this procedure.

---

#### 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 module and set it aside.

## Front Control Panel

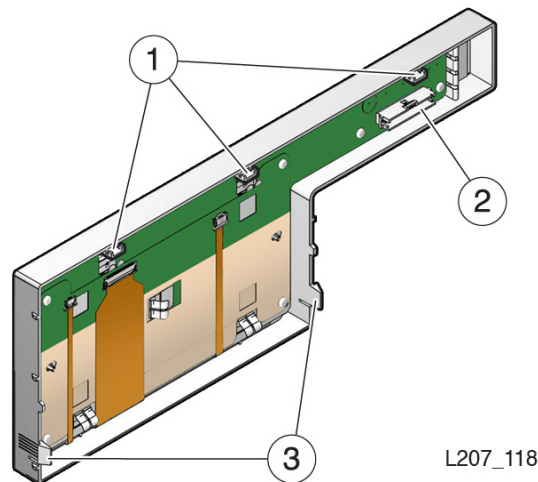
The front control panel is located on the base module. [Figure 3–14](#) shows the back side of the panel with identification of the upper tabs, the circuit card jack, and the latches at the side of the panel.

---

**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



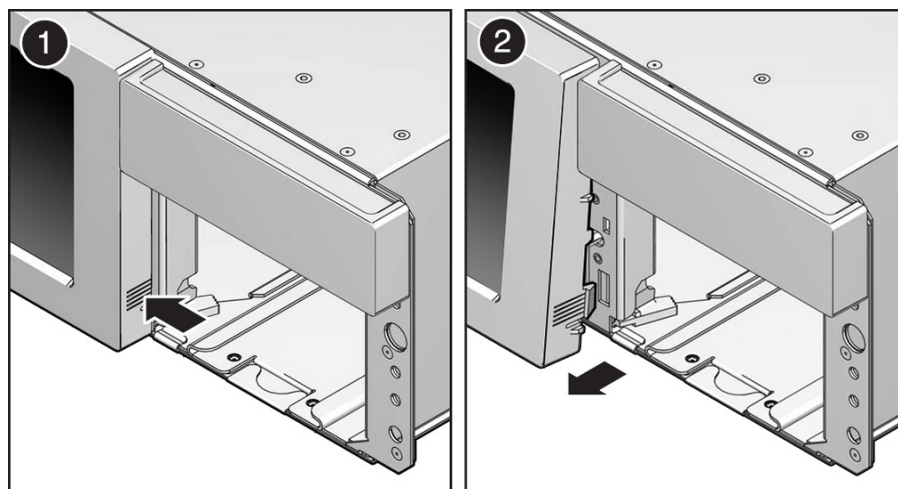
### Illustration Legend:

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

## To Remove the Front Control Panel

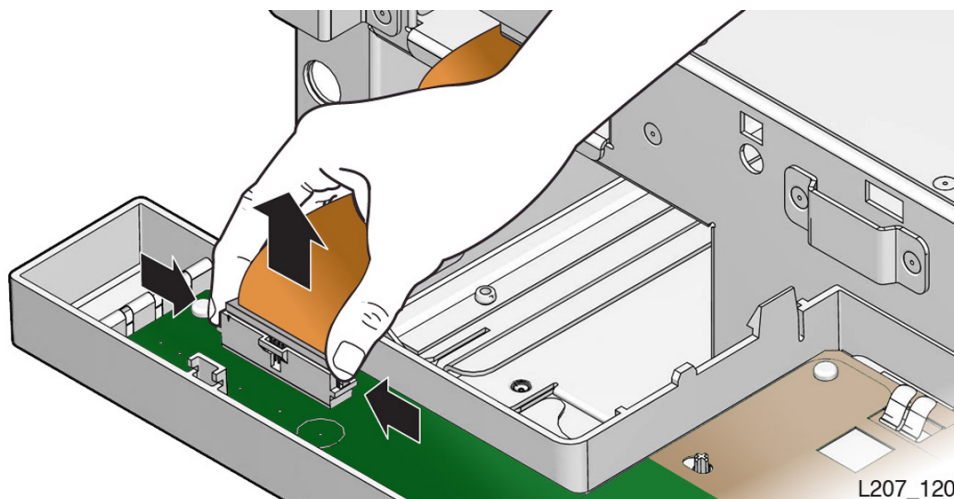
1. Power down the library (see ["To Perform a Controlled Power-Down from the GUI"](#) on page 3-11).
2. Remove both cartridge magazines from the base module (see ["To Remove a Cartridge Magazine Manually"](#) on page 3-13).
3. Press the latch inside *each* magazine bay inner wall and pull the bottom 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

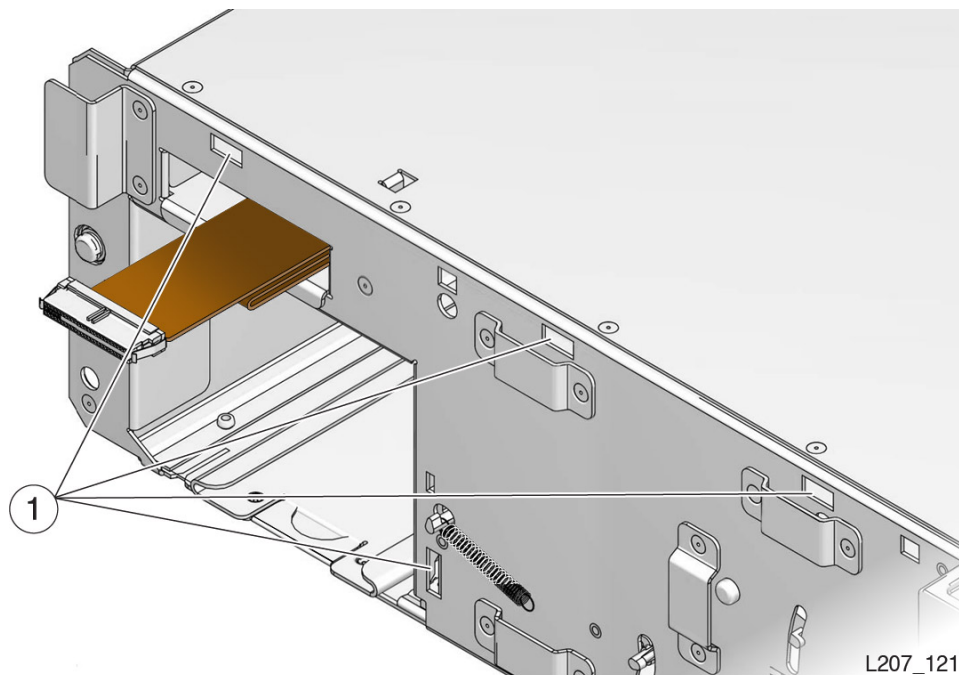
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**Caution:** ESD damage. Do not touch any exposed electronic components, cables, or contacts.

---

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 3-34.

**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 modules two through ten 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 identified which are pertinent to its removal and replacement.

## To Remove the Module Controller

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---

**Note:** See ["Electrostatic Discharge"](#) on page 2-1.

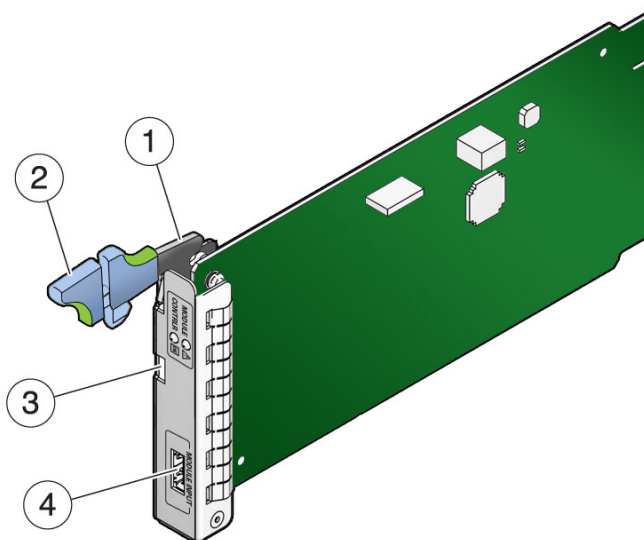
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### Task 1 Preparation

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 connector 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.
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 in the module slot.
5. Seat the latch to secure the module controller.
6. Connect the expansion cable to the connector 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 3-34.

## 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 SL150 remote 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 **only replace 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.

For example, 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 (see [Figure 3–20](#)).

---

6. Replace the top drive in the base module, if applicable.

## Task 2 Removal

---

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

---

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

---

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

---

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

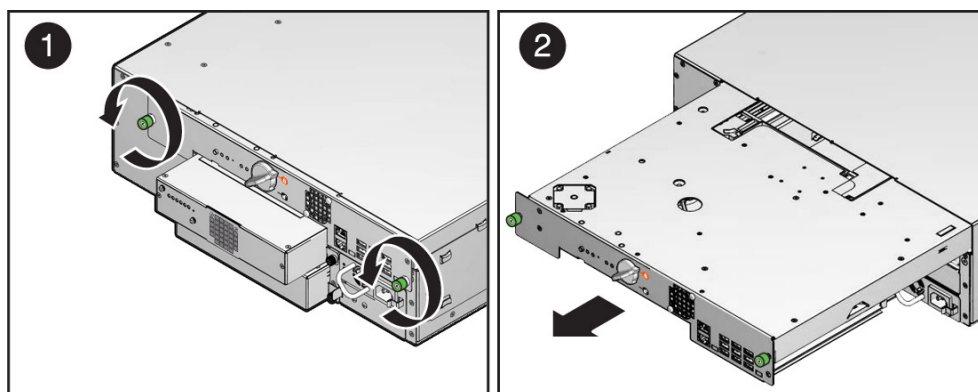
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**Note:** Set the expansion cable(s) aside if the expansion modules have been removed in preparation for base module replacement.

---

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

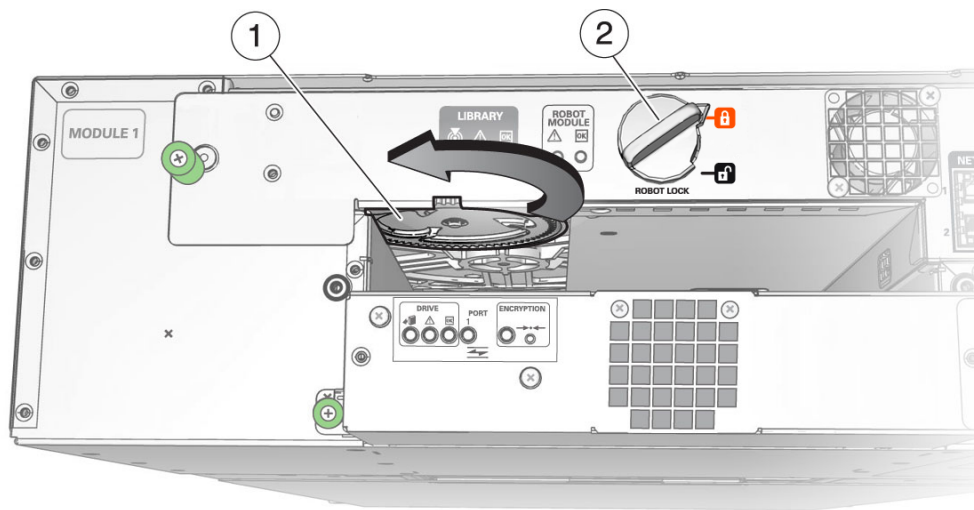
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**Note:** Perform this procedure if you could not park the robot by using the power-down procedure

---

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. Place your finger in an indent on the body of the bullwheel gear. Pick an indent that is near the center of the library (use the Robot Module status indicators as a guideline).
4. Turn the gear toward the rear of the robot CRU to raise the robot.  
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. Continue with Step 5 of ["Park and Lock the Robot"](#) on page 3-18.

**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 Step 1 of "Park and Lock the Robot" or "To Manually Retract the Robot" do 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. Continue to remove cartridge magazines from 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 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.

### 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 to perform this procedure.

## 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.

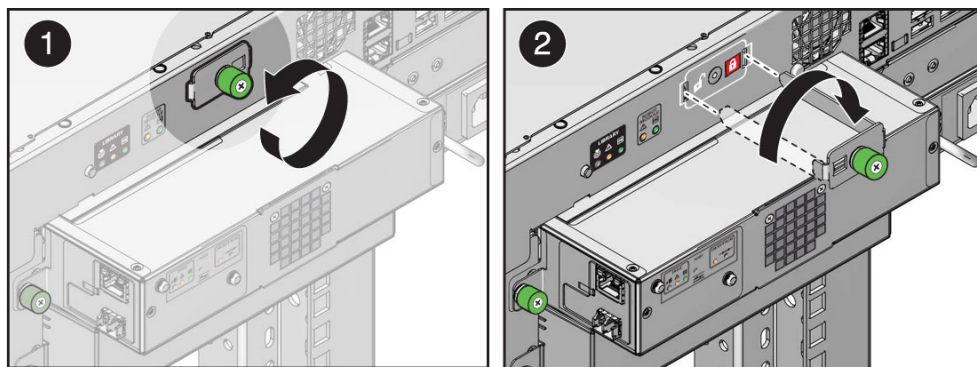
For example, loosen the thumbscrew, remove the mechanism, rotate the mechanism 180 degrees, insert the mechanism, and tighten the thumbscrew.

---

**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 3-34.

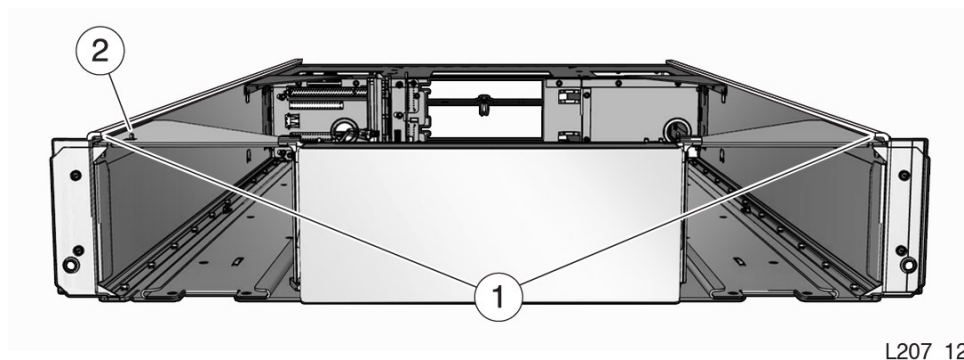
## Expansion Module Chassis

The CRU for modules two through ten 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 de-install 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

---

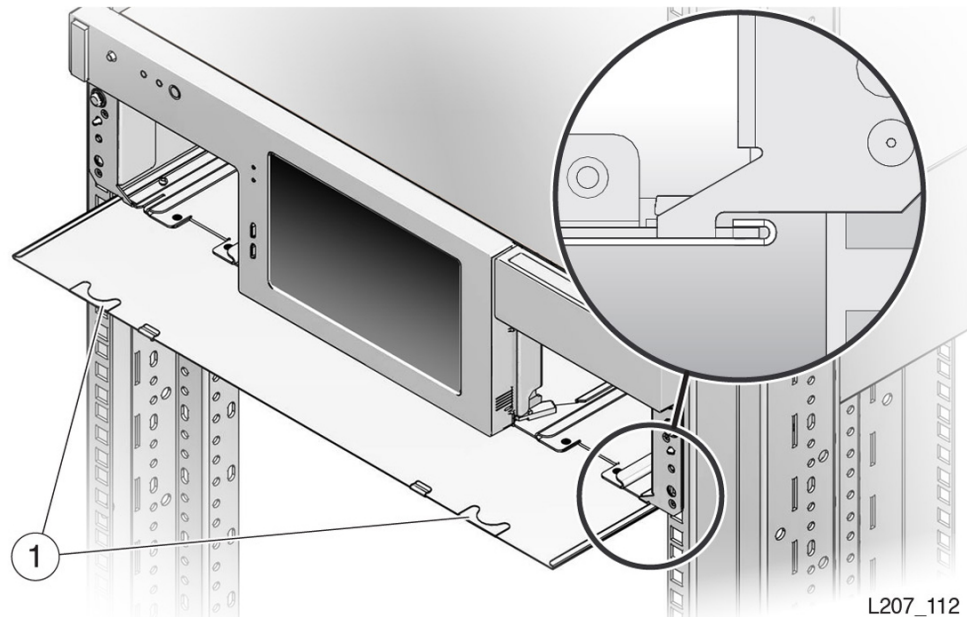
**Caution:** It is critical for the robot to be parked and locked before attempting to remove an expansion module.

---

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 thumbholds within the magazine openings (see [Figure 3-23](#)).
2. Pull the floor out the front of the module.
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 close the hook and loop strap.
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 Thumbholds****Task 3 Remove Operational Expansion Modules Below the Defective Module**

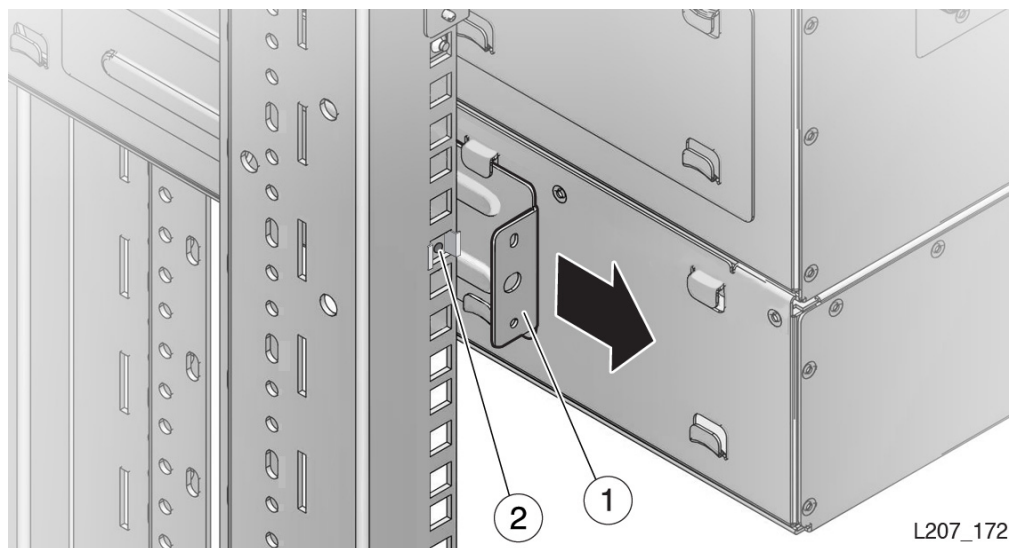
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**Warning:** Heavy object. The expansion module can weigh up to approximately 19.9 kg (43.9 pounds) with two cartridge magazines, 30 tape cartridges, two tape drives, and two power supplies.

---

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 3-10, 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**

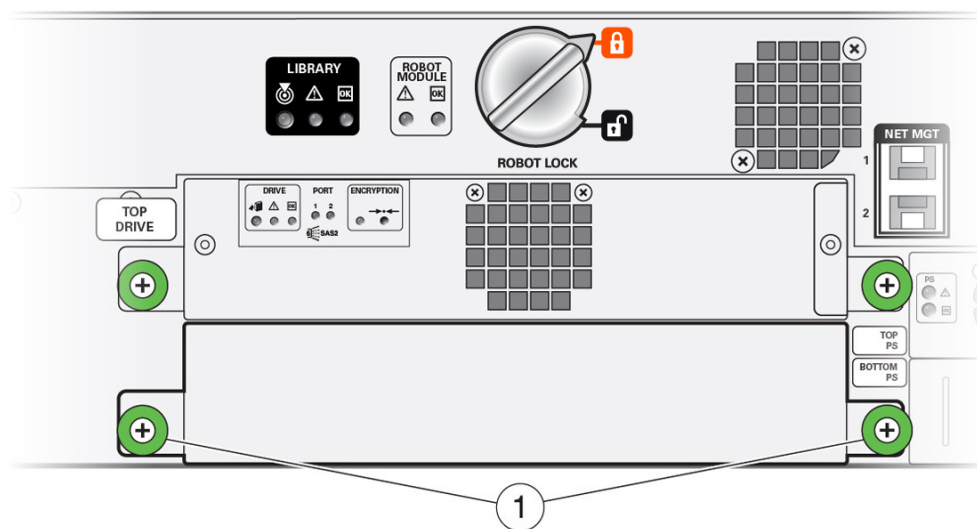
L207\_172

**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 of ["To Remove the Module Controller"](#) 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**

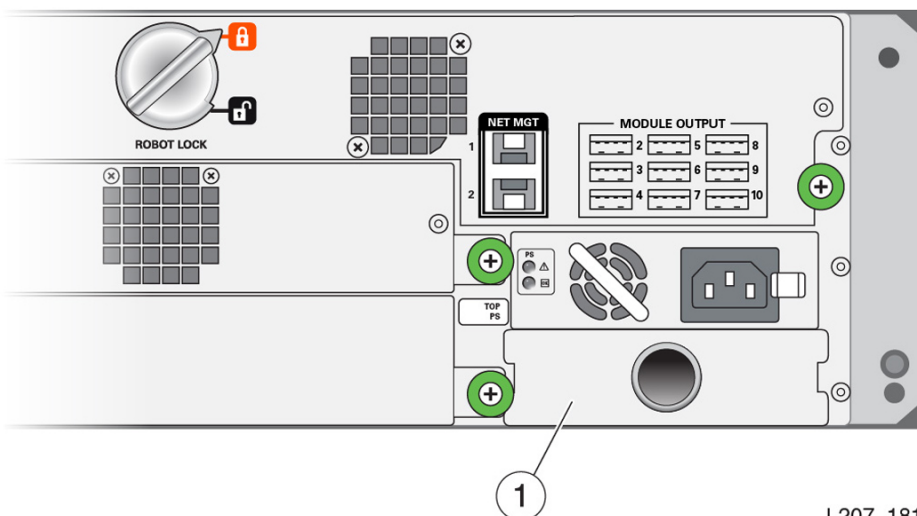
1. Loosen the thumbscrew on each side of the tape drive filler (see [Figure 3–25](#)).
2. Grasp the captive screws and pull the filler toward you.
3. Remove the filler from the drive slot and set it aside. You will install the filler in the CRU at a later time.
4. Return to Step 4 of ["Remove CRUs and 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**

L207\_181

**Illustration Legend:**

## 1 - Power Supply Filler

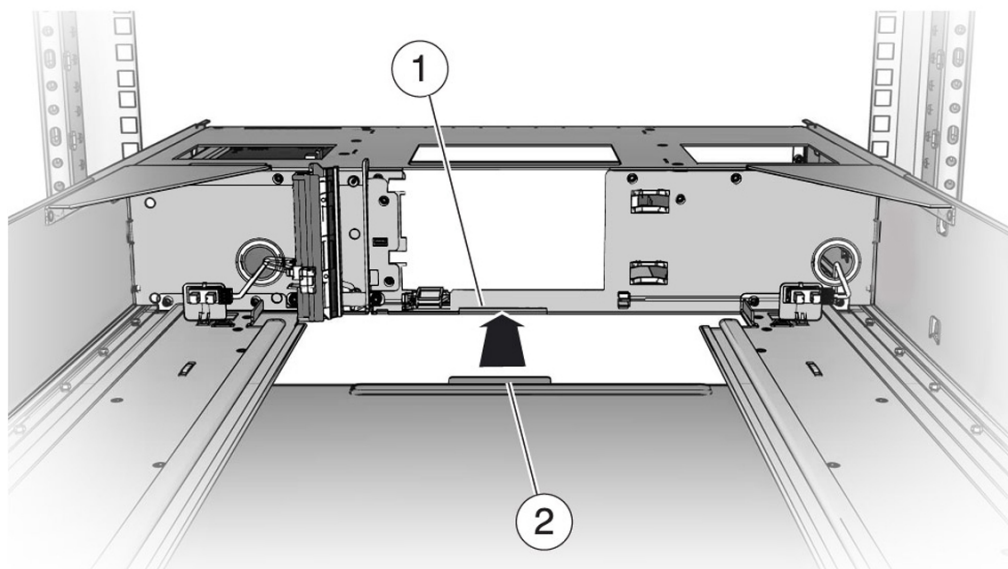
### To Prepare the Expansion CRU for Replacement

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 3-28.

### 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 3-28 or ["To Replace the Base Module \(Module 1\) Chassis"](#) on page 3-32.

**Figure 3-27 Floor Tab**

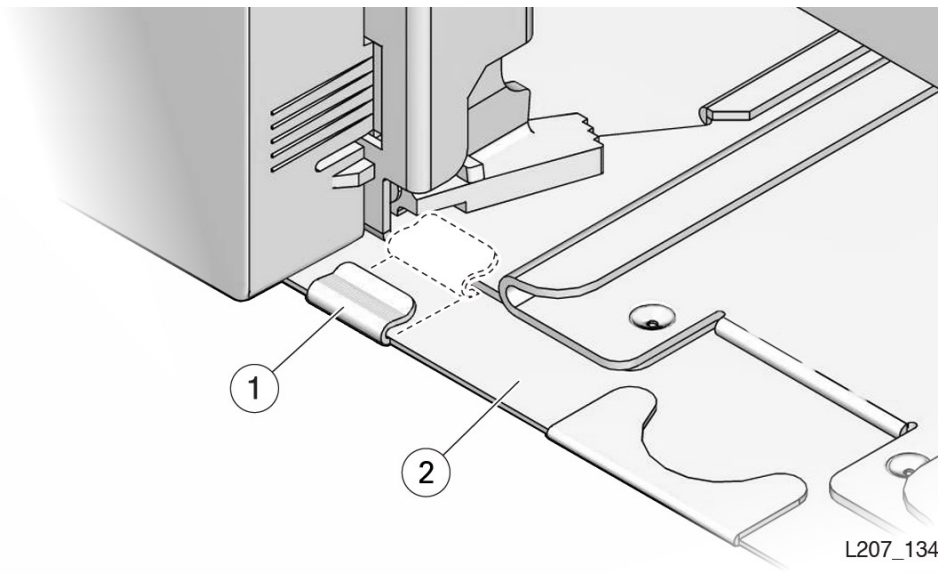


L207\_111

#### Illustration Legend:

1 - Floor Slot

2 - Floor Tab

**Figure 3–28 Floor Latching Tab****Illustration Legend:****1 - Floor Clip****2 - Floor****To Replace the Expansion CRU Chassis****Task 1 Installation**

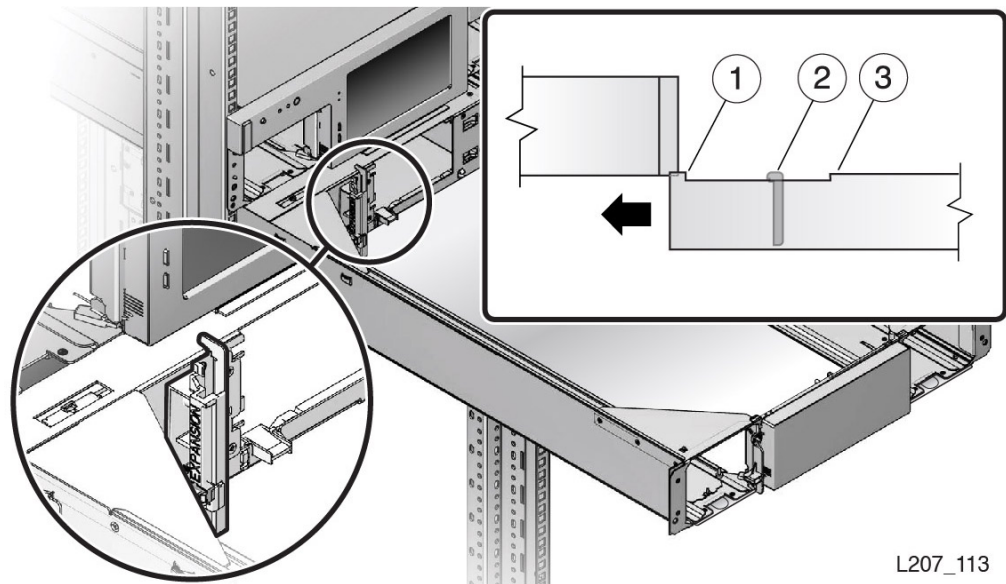
1. Lift the expansion module by the sides.
2. Align the flanges at the rear of the expansion module with the grooves in the lower front edges of the library module.
3. Push the expansion module a few inches into the library.

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**Note:** There is a gap in the module flange.

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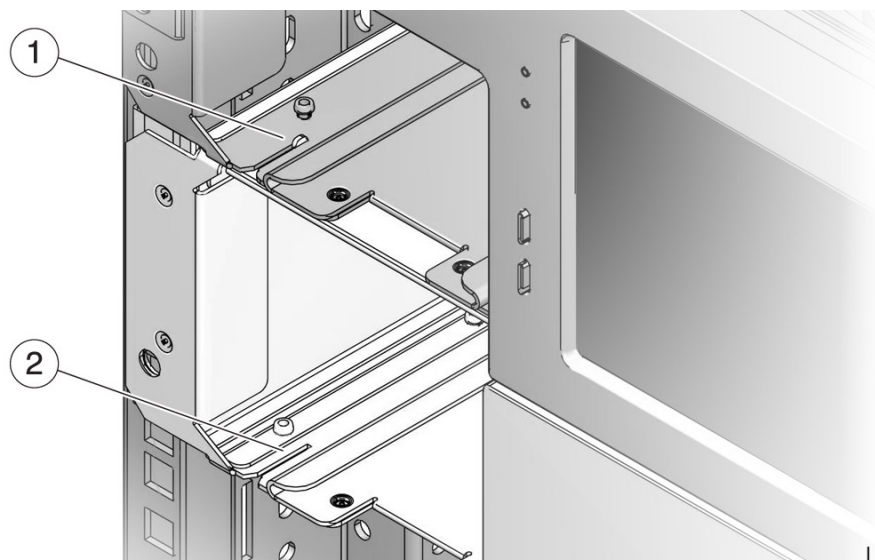
4. Lower the top front edge of the expansion module while slowly pushing it toward the library.
5. Take care to avoid any contact between the expansion module internal vertical flange and the plastic bezel of the library module (see [Figure 3–29](#)).
6. Lift the front edge of the module to level after 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**

L207\_114

**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 3-30).
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 3-30).
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 3-28 through ["Install the CRUs, Fillers, and Magazines in the Replaced Module"](#) until all expansion modules and CRUs are installed.

### **Task 5 Finishing Touches**

1. Align, dress, and secure cables in the hook and loop straps.
2. Continue with ["Power System Behavior"](#) on page 3-34.

### **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.

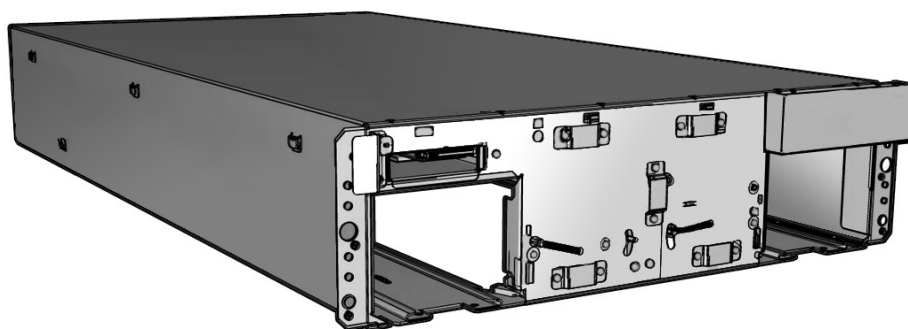
---

**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**.

---

You need to remove all expansion modules before you can remove a defective base module.

**Figure 3-31** Base Module CRU



L207\_126

## To Remove the Base Module (Module 1) 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 Reusable Parts from the Base Module

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 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 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

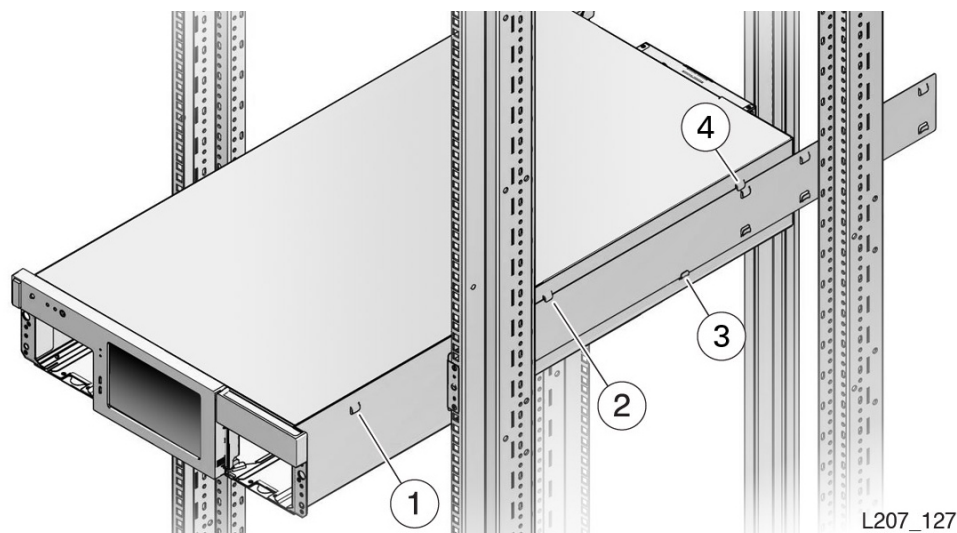
1. Grasp the base module chassis by the sides and remove it from the shipping carton.
2. Determine if the CRU is the bottom library module. If it is the bottom module, install the floor (see ["To Install the Floor"](#) on page 3-27).

## To Replace the Base Module (Module 1) 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



L207\_127



**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 can not 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 3-30).
4. Install the power supplies (see ["To Replace the Power Supply"](#) on page 3-10). However, do not connect the power supply cable at this time.
5. Install the power supply filler (see ["To Install the Power Supply Filler"](#) on page 3-30).
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 3-28).

---

**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, dress, and secure cables in the hook and loop straps.
2. Connect the power cord to each installed power supply.
3. Continue with [Power System Behavior](#).

## Power System Behavior

The behavior of the SL150 Modular Tape 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* powered-down is performed from the SL150 remote 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:** Because this is a bridged library, the host will not be able to see the library if the bridged drive ports are not enabled. Perform the library troubleshooting procedures in the user's guide to resolve the problem.

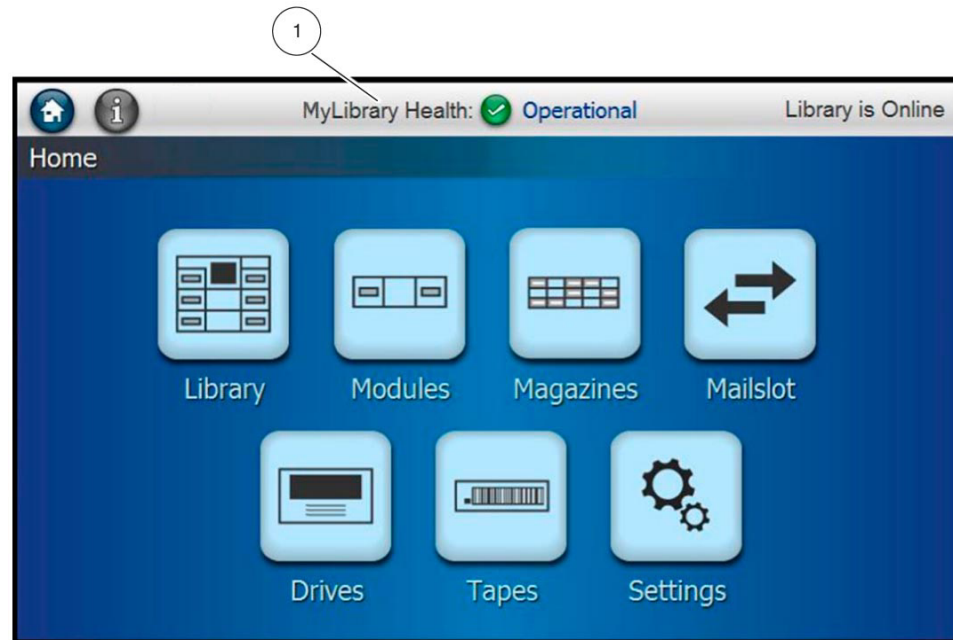
---

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

4. Check the **OK** indicators on all CRUs.
5. Verify that the library health state is *operational* from the touch screen (see [Figure 3-33](#)) 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.

**Figure 3-33 Home Screen**



**Illustration Legend:**

1 - Library Health

## 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 module controller is recognized by the library (Modules area of the touch screen or Library area of the SL150 remote interface).
2. Run self tests from the SL150 remote interface (see [Appendix C, "Library Self-Test"](#)).
3. Set the tape library to the online state, log out of the SL150 remote interface, and return it to operation.

---

**Note:** You might need to run application commands to ensure that the library and drive application are synchronized after CRU replacement. Refer to 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 preformed:

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.

Note 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.



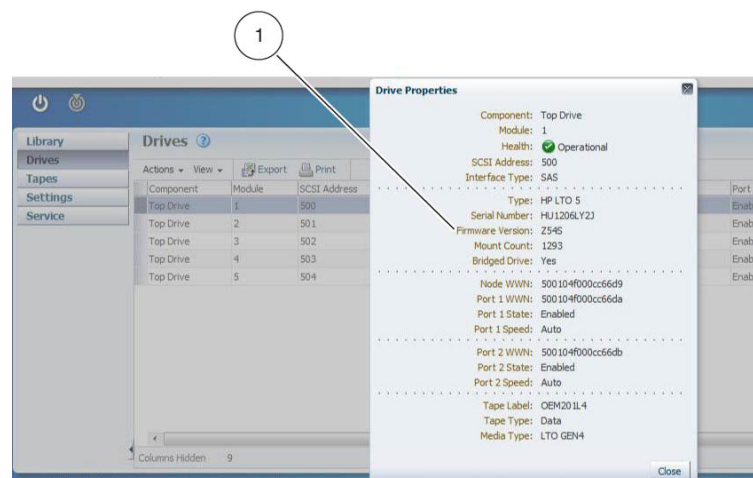
## Drive Firmware

This appendix provides instructions to determine the current drive firmware version, and download firmware from MyOracleSupport.com.

### Determine the Current Drive Firmware Version

1. Login to the SL150 remote interface.
2. Click Drives in the navigation area on the left side of the screen.
3. Highlight the specific tape drive.
4. Click the Actions control and select Properties.
5. Locate the firmware version in the Drive Properties dialog box (see [Figure B-1](#)).
6. Click Close.
7. Change the drive firmware version, if applicable.

**Figure B-1** Drive Firmware Version



#### Illustration Legend:

- 1 - Firmware Version (Drive Properties)

## Download Firmware from MyOracleSupport

**Note:** The drive firmware levels at initial release were:

- HP LTO-5 drive: Y5BS (FC) and Z55S (SAS)
- HPLTO-6 drive: 22GS (FC) and 32DS (SAS)

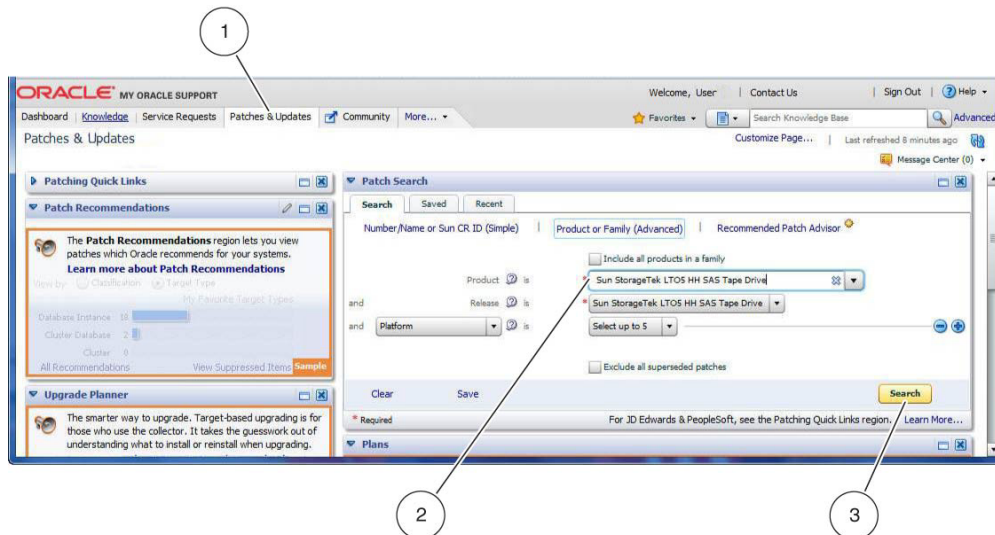
### Task 1 Access MOS

1. Use a web browser and connect to <https://support.oracle.com>.
2. Click Register to create an account, if applicable.
3. Sign in.

### Task 2 List the Available Firmware Versions

1. Click the Patches & Updates tab.
2. Click the Product or Family (Advanced) link in the Search tab.
3. Use the Product control to select the proper tape drive value (see Figure B-2).
4. Click Search.
5. Click the applicable Patch Name link.
6. Open the Read Me file to make sure the firmware version applies to your library drive.

**Figure B-2 MOS Patches & Updates**



### Illustration Legend:

- 1 - Patches & Updates Tab
- 2 - Product Control
- 3 - Search Button



### Task 3 Download the Firmware

---

**Note:** Do not download the firmware file intended for half-height, stand-alone drives used in the 1U media tray.

---

1. Click the Download button.
2. Sign out of MOS.
3. Follow the instructions in the Read Me file to install the firmware on your tape drive.

---

**Note:** Load firmware through the drive interface port using the HP Library and Tape Tools (LTT) utility or the SCSI write buffer download. Use of a firmware update (FUP) tape is not supported.

---



---

## Library Self-Test

The self-test moves a diagnostic cartridge from an origination point in an offline library to a destination point (such as a reserved slot, a storage slot, a tape drive, or a mailslot).

### Self-Test Overview

There are two types of self-test. The Basic Self Test performs moves to and from tape drives and slots in the Mailslot. The Full Self Test performs the moves of the basic test plus moves to all *unoccupied* storage slots.

The self-tests use a diagnostic tape (data tape with a special label). The diagnostic tape can either be stored in a reserved slot or placed in a mailslot when needed.

The following are prerequisites for running a self test:

- Library is offline
- Mailslot is closed
- At least one unoccupied slot in the Mailslot
- All cartridge magazines are latched
- One operational unoccupied tape drive
- Diagnostic tape

### To Run the Self-Test

#### Task 1 Preparation

1. Log in to the SL150 remote interface.

---

**Note:** The Viewer role does not allow running of the self tests.

---

2. Set the library to the Offline state.
3. Insert a diagnostic tape in the Mailslot if the library does not have a reserved slot.
4. Click Library in the left navigation area.

The graphical library map appears containing a section for each installed module.

**Task 2 Run the Self Test**

1. Click the Library control located to the left of the Help (question mark) icon.
2. Click Basic Self Test or Full Self Test (see [Figure C-1](#)).

The Confirm Diagnostics dialog appears (see [Figure C-2](#)).

---

**Note:** The Full Self Test runs for a much longer time than the basic test.

---

3. Click **OK** to begin the test or **Cancel** to exit.
4. Monitor the self-test progress in the Running Diagnostics window section.

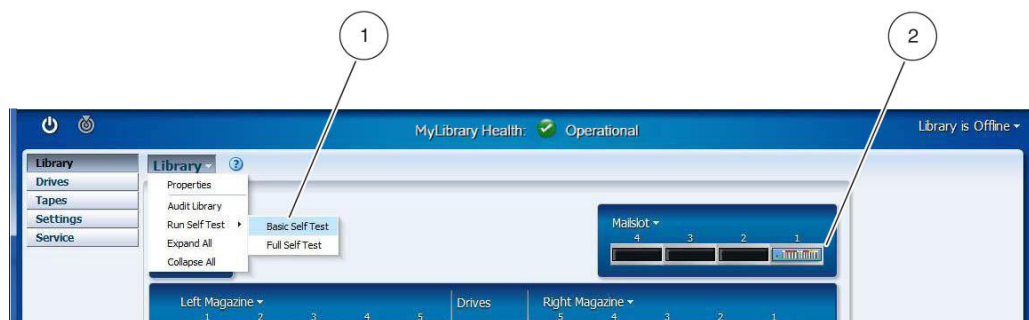
---

**Note:** The library map indicates cartridge movement from a slot to the robot and to a destination tape drive or slot.

---

5. Verify successful test completion.

**Figure C-1 Self Test Commands**

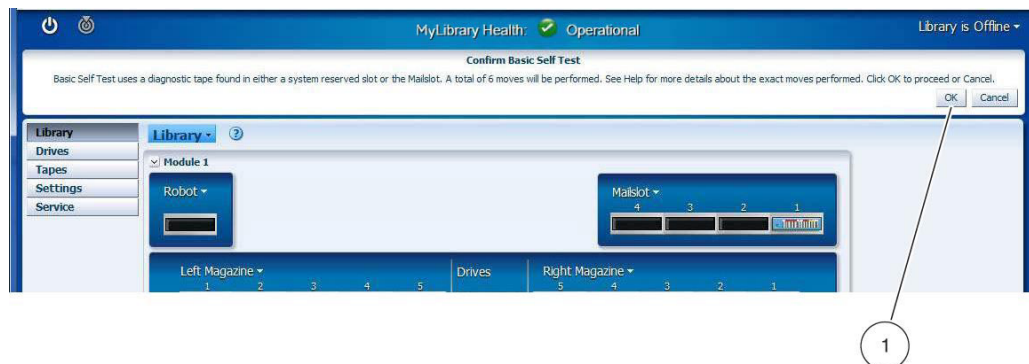


**Illustration Legend:**

1 - Basic Self Test Command

2 - Diagnostic Cartridge in Mailslot

**Figure C-2 Self Test Confirmation**



**Illustration Legend:**

1 - Confirmation Dialog (OK button)

## To Finish the Self Test

1. Click **Close** in the Running Self Test - Completed window section.
2. Use the remote management interface to remove the diagnostic tape from the mailslot, if applicable.
3. Close the Mailslot after removing the diagnostic tape, if applicable.
4. Set the library to the Online state.
5. Log out from the remote interface if you do not intend to perform other operations.



---

---

# 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.

## **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.

## **alphanumeric**

A character or group of characters that identifies a register, a particular part of storage, or some other data source or destination. (A).

## **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 a number of computer systems. The Ethernet architecture is similar to the IEEE 802.3 standard.



**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/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 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 to for the *library* to LUN 1 of the master *tape drive* and sends SCSI commands for the tape drive itself to LUN 0.

**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**

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).

**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.

**put**

An activity in which a robot places a cartridge into a slot or drive.

**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.

**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.

**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.

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