StorageTek SL150 Modular Tape Library

User's Guide

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StorageTek SL150 Modular Tape Library User's Guide, Revision 6

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Contents

3 System Configuration

4 User Administration

5 Importing and Exporting Media

6 Monitoring and Diagnostics

7 Maintenance and Upgrades

Preface

This *User Guide* is intended for those who administer, monitor, operate, and maintain an Oracle StorageTek SL150 Modular Tape Library.

The *User Guide* is part of the *StorageTek SL150 Modular Tape Library Customer Documentation Library*. For installation, repair, upgrade, and security information, please consult the companion volumes in this collection.

Conventions

The following text conventions are used in this document:

Convention	Meaning
boldface	Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.
italic	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.
`monospace`	Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.

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Customer Documentation Library

The complete *StorageTek SL150 Tape Library Customer Documentation Library* is available for browsing or download from the `Tape Storage` section of the Oracle Technical Network at `http://docs.oracle.com`.

Class 1 Laser Product Notice

Oracle's 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.

1

The SL150 Modular Tape Library

This chapter provides an overview of the major hardware components of Oracle's StorageTek SL150 Tape Library. The library combines the well-known strong suits of automated tape storage with low initial cost and industry-leading scalability. Tape provides economical data consolidation and reliable data protection and retention. Modular design—base unit plus optional expansion modules—and industry standard, 483-mm (19-in) rack mounting provide growth potential. You can expand the capacity of the library as your data grows.

Understanding Basic SL150 Concepts

This section introduces basic concepts that underlie the design and functionality of the SL150 library. These include:

- Automatic Operation
- Roles and Role-Based Access Control
- Unified Control and Data Path
- Simple Partitioning
- Browser-Based Administration and Monitoring
- Customer Serviceability.

Automatic Operation

The SL150 Modular Tape Library is designed to operate automatically, under the control of a host-resident, storage-, archive-, or backup-management application, such as Oracle Secure Backup. Under normal circumstances, the SL150 library requires little or no operator intervention. Library robotics handle all cartridge movement within the library under application control. Host-application storage catalogs remain consistent and seldom require physical audits of the library contents.

Roles and Role-Based Access Control

Controlling access to library interfaces and controls is critical to the integrity of stored data and to the efficient administration of library resources. Restricting access to user interfaces that move or modify storage media protects data from inadvertent damage and unauthorized access. But restricting user access excessively may also impede necessary library management, maintenance, and troubleshooting. To manage these conflicting demands efficiently, the SL150 user interfaces implement *Role-Based Access Control* (RBAC).

RBAC designs limit the use of controls and interfaces to users that have predefined job *roles*. An administrator creates individual *user accounts* for each person that needs access to the system. Each account has its own, uniquely identifiable log-in name and personal password. The administrator then assigns each account to a distinct role.

The RBAC approach makes it easy to consistently manage access privileges: you assign privileges to the job function and everyone who performs that function automatically has what they need. But it also makes managing individual usage no less easy: every user retains an individual log-in account that can be monitored and audited.

The SL150 recognizes the following user roles:

- Viewer Role
- Operator Role
- Service Role
- Administrator Role.

Viewer Role

The **Viewer** role has view-only access to the library and access to the mailslot. Viewers can log in, monitor library operations, and view component states and properties. They can also use the mailslot. But they cannot otherwise change the configuration or operations of the library.

The **Viewer** role should be the norm for most users, and the local operator panel is permanently assigned to it. Since libraries generally operate automatically, under the control of a host-side backup, storage-management, or library-management application, user intervention via the browser-based user interface is not normally required. Checking for problems and gathering routine information are the only tasks that are required under normal conditions.

Operator Role

The **Operator** role has limited control over the operation of the library, but no control over its configuration.

Under normal circumstances, operators will spend most of their time monitoring the library for problems using the Library Management Screen, Drives Management Screen, and Tapes Management Screen. A storage- or backup-management software application running on the library host controls most routine operations, including movement and mounting of data cartridges, auditing, and, in most cases, drive cleaning.

When necessary, however, operators can perform the following tasks locally, using the SL150 browser-based user interface:

- Taking the Library On and Off Line
- Powering the Library On and Off
- Importing and Exporting Media
- Performing a Library Self Test

Service Role

The **Service** role has all of the capabilities of the **Administrator** role, except for user administration. When you require the assistance of an Oracle service representative, you create a log-in account for the service person and assign the account to the **Service**

user. This gives the service representative all required access to the system, while keeping your **Administrator** accounts secure and access to your library under your control.

Administrator Role

The SL150 library **Administrator** has the authority to fundamentally alter the configuration and operation of the library. Administrator tasks include:

- granting and denying user access to the library
- assigning job roles
- setting and/or changing basic library properties, including system time and host connectivity
- administering the TCP/IP connection between the library and the Browser-Based User Interface.
- administering Simple Network Management Protocol (SNMP)

Given the scope of an administrator's responsibilities, the knowledge required, and the potential for problems if administrative capabilities are misused, you generally want to limit the number of people who are assigned to the **Administrator** role.

Unified Control and Data Path

The SL150 tape storage library communicates with the host via a single, unified, control/data path. The host application sends instructions that position robotics, mount and unmount volumes, clean drives, and query the status of components over the same interface used for sending and receiving stored data.

Both data and commands are sent to the Serial Attached SCSI (SAS) or Fibre Channel data interface on a designated Linear Tape Open (LTO) *bridged* drive. The bridged drive then handles all communications for the library or library partition. Command and control signals are sent to LUN1 (Logical Unit Number 1) of the bridged drive, which is configured as a SCSI medium changer device. The SCSI medium changer communicates with the SL150 library controller across the Automation Device Interface (ADI) on the bridged drive. Data are sent to the remaining LUN on the bridged drive or to LUNs on the other, unbridged drives in the partition, all of which are configured as SCSI sequential-access (tape) devices. A default bridged drive is automatically assigned during library and partition configuration.

Currently, the SL150 library supports Oracle-supplied, half-height, Hewlett-Packard LTO-5 tape drives with SAS or Fibre Channel interfaces and Hewlett-Packard LTO-6 drives with SAS interfaces only.

Simple Partitioning

Generally, storage-applications require exclusive control of their storage media, so that applications do not move or overwrite data that they do not own. If you need to attach more than one host to a library, you must therefore *partition* the library. Each library partition functions as an independent, logical library dedicated exclusively to its assigned host.

The SL150 library can be automatically partitioned to support two host applications. So, for example, you can assign one half of the storage slots and drives to the system that hosts your backup application and the other to the system that hosts your hierarchical content-management software.

When the partitioning feature is enabled, each hosted application controls one half of the storage cells and one half of the drives in the SL150 library. Partition 1 controls the storage slots on the left side and any drives installed in the top drive bays of the library modules. Partition 2 controls the storage slots on the right side and any drives installed in the bottom drive bays. Note that you can have varying numbers of drives in your partitions as long as each partition contains at least one bridged drive for communication with the host.

When partitioning is enabled, the partitions share a common robot and mailslot while keeping their respective media separate. Whenever a shared resource handles media assigned to a partition, the corresponding partition host has exclusive control over the resource.

Browser-Based Administration and Monitoring

The basic user interface to the library is a web application that can be accessed from any workstation that has a network connection and an installed web browser. There is nothing that has to be separately downloaded, locally installed, or locally managed. The Browser-based User Interface is described in detail on page 1-6, below.

Customer Serviceability

The StorageTek SL150 Modular Tape Library is designed for straightforward maintenance and servicing.

Users can, in most cases, troubleshoot and repair their equipment without assistance. Library components are organized into a limited number of *Customer Replaceable Units* (CRUs), each of which has a discrete function in the library. Faults are automatically isolated within the confines of the unit. If any part fails, the whole fails, and the user simply replaces the entire CRU with an equivalent unit.

CRUs can be installed and removed in a few simple steps, using simple hand tools. In the SL150 library, CRUs are secured to the chassis with captive thumb screws and thumb latches that can be removed and installed using, at most, a Phillips screw driver.

More routine tasks have also been streamlined. Tapes can be rapidly bulk loaded and unloaded to facilitate capacity upgrades, reconfiguration, vaulting, or any other operation that cannot be efficiently managed using the mailslot. Each SL150 library module stores cartridges in two, 15-cell, detachable magazines that you can unlatch and draw out of the front of the module, like a drawer.

Understanding the Major Components

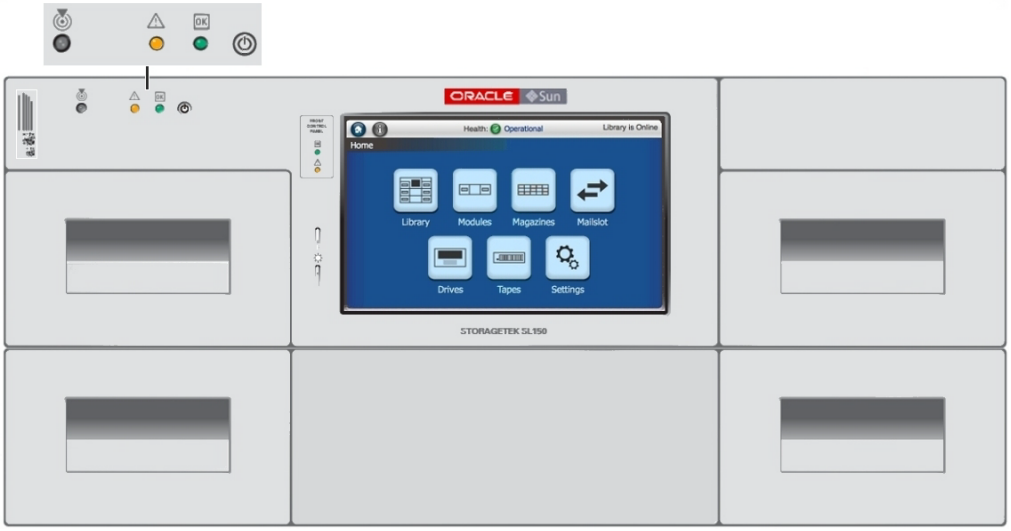
An SL150 library consists of Modular Hardware with a Touch-Screen Local Operator Panel and a Browser-based User Interface that library operators and administrators access over your network.

Modular Hardware

A typical SL150 installation contains a base module and optional expansion modules installed under the base unit. Base and expansion modules share the same storage layout: one or two rear-mounted drives installed one above the other on the center line of the chassis and two drawer-style, front-loading tape magazines at the front, on either side of the chassis. The space between the magazines is reserved for robotic library operations.

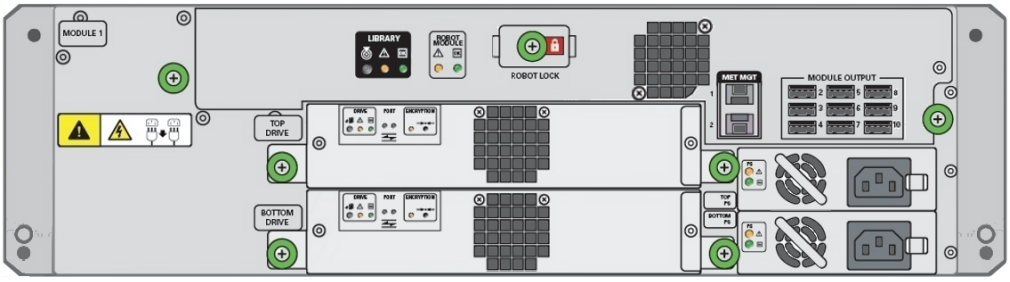
Above the magazines, the taller, base module houses the library controller, robotics unit, and mailslot (cartridge access port). The front panel holds the local operator controls. A large, touchscreen operator panel resides in the center, with status LEDs for the touch panel to its left.

The power button, status LEDs for the library, and the library locator LED lie to the upper left of the operator panel.



The rear of the base module holds the cabling and provides service access to drives and power supplies.

The upper right corner of the rear panel (when facing the rear of the base module), holds two, Ethernet, **NET MGT** ports and nine **MODULE OUTPUT** ports for the module interconnect cables.

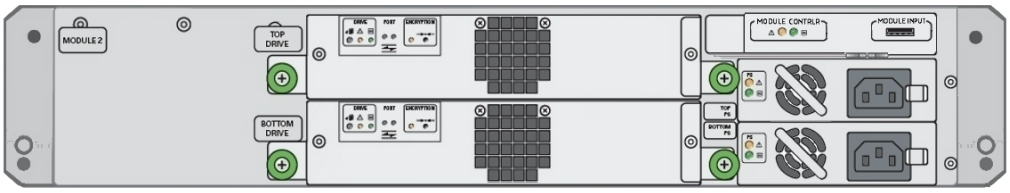


The upper **NET MGT** port, **0** (**Port 1** on the browser-based user interface), supports browser-based user interface connections via the local area network (LAN). It is fully configurable. The lower **NET MGT** port, **1** (**Port 2** on the browser-based user interface), is a service port on a private network local to the library. The service port can be enabled or disabled but cannot be reconfigured.

One or, optionally, two hot-swappable power supplies reside under the cabling ports in the lower right corner of the rear panel. One or two half-height LTO drives are installed to the left of the power supplies on the center line of the chassis. Both drives and power supplies have their own status LEDs. Status LEDs for the library and robotics are visible at center top.

The rear of the expansion module holds provides service access to the module controller at upper right, the drives in the middle, and the power supplies at lower

right. The module controller holds the **MODULE INPUT** port for the module interconnect cable and the status LEDs for the module.



Customer Replaceable Units are secured to the rear of base and expansion modules using easily removable fasteners. The robot/library controller, tape drives, and power supplies are attached by green, captive thumbscrews that can be loosened with a common Phillips screw driver and tightened by hand. The expansion module controller is secured by a latch and lever that can be operated without tools.

Browser-based User Interface

The SL150 library user interface is your main tool for configuring, monitoring, and troubleshooting the library. It combines comprehensive library management, monitoring, and security features with ease of access and deployment. The user interface is a web application, so there is nothing to install or administer on user workstations. Once you have set up the library's network interface, users enter the library's host name or IP address into a standards-compliant web browser, such as Mozilla Firefox, open the application in a browser window, log in, and work.

The dashboard is the key part of the interface and appears at the top of every panel. At left, it hosts a remote power button (a vertical bar enclosed by a circle), a remote library-locator button (concentric circles interrupted by a triangle), and, when the library is busy, a **Busy...** indicator. The dashboard displays the **Library Health** at center (**Operational**, **Degraded**, or **Failed**) and the connection state of the library (typically **Online** or **Offline**) at right. If you click on a **Degraded** value in the **Library Health** field, the user interface displays a tabular list of failed and degraded components. The currently logged in user is displayed at far right. When you are ready to end your session, click the **Log Out** control to its immediate left. This secures the interface and logs you off of the system. The **Preferences** control lets you **Pause Automatic Refresh** of the display and **Resume Automatic Refresh** when ready.

The **About** link at the bottom right corner of the interface displays the library firmware version followed by build information.

A list-type menu on the left side of the interface controls the screen display:

- The **Library** screen lets you monitor component status and library operations via a graphical representation of the library, complete with modules, drives, storage slots, robot, mailslot, and tape cartridges. When necessary, authorized users can move and eject tape cartridges and clean drives independent of library- or storage-management software. In partitioned libraries, you can limit displays and actions by partition. Library resources that are not assigned to the selected partition are then grayed out in the interface.
- The **Drives** screen displays drive properties in tabular form, with a row for each drive in your library. Each row contains a configurable set of columns that can include the **Component** position (**Top** or **Bottom**), the **Module** where the drive is installed, the **Health** of the drive, the drive **Type** (manufacturer and LTO generation), the drive **Interface Type** (**Fibre** or **SAS**), the **Serial Number**, the **World Wide Node** and **Port Name** that uniquely identify the drive to a Storage Area Network (SAN), and cleaning status.
- The **Tapes** screen displays tape properties in tabular form, with a row for each tape in your library. Each row contains a configurable set of columns that can include the **Tape Label**, the **Current Location** of the cartridge, the **Module** that holds the cartridge, the **Location Type** (**Slot**, **Reserved Slot**, or **Drive**), the SCSI **Address** of location, the **Tape Type** (data, cleaning, or diagnostic), and the **Media Type** (LTO Generation, WORM status, and capacity.
- The **Settings** screen lets authorized users change the configuration of the library. **Service** users can change the system time, reserve Library slots, update firmware, change the networking configuration, and change the library partitioning. In addition, the library **Administrator** can add, remove, and modify user accounts and reassign user roles from this screen.
- The **Service** screen lets authorized users review **Product Identification** information, **Replaceable Component** records, and the library **Health Log**.

The interface lets you individually monitor and administer the partitions of a partitioned library. When you specify a partition with the **Partition** control at the top of the **Library** screen, the interface grays out drives, storage slots, tape cartridges, and mailslot that are not assigned to the selected partition.

For information on logging in to the SL150 user interface, see the instructions in Accessing the User Interface on page 2-1.

Touch-Screen Local Operator Panel

The SL150 local operator panel lets you check on library status and configuration when you are working directly with the hardware and cannot easily use the browser-based user interface. You can check for health messages, check the meanings of warning LEDs, open the mailslot, and assign the mailslot to the partitions of a partitioned library. But you cannot carry out potentially disruptive system-configuration and administration tasks that are better left to the remote interface.

System Dashboard

A dashboard at the top of every screen displays the **Library Health** at center (**Operational**, **Degraded**, or **Failed**), and the connection state of the library (typically **Online** or **Offline**) at right. If you click on a **Degraded** value in the **Library Health** field, the user interface displays a tabular list of failed and degraded components.

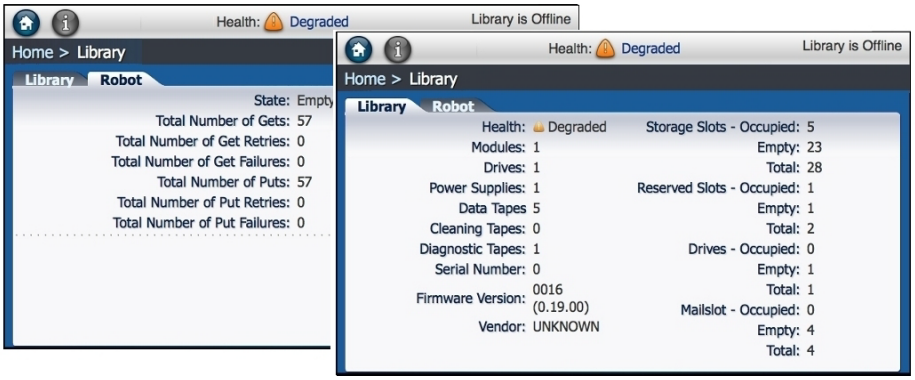
Home Screen

The **Home** screen is your starting point for exploring the operator panel. A two-row, button-style menu provides access to information on the main library components. Press buttons in the first row for information on the **Library** overall, **Modules**, **Magazines**, or the **Mailslot**. Press buttons in the bottom row to see information on **Drives**, **Tapes**, or library configuration **Settings**.

When the Simple Partitioning feature is enabled, the menu contains an additional button for displaying the configuration of the library **Partitions**:

Text-Based Displays

The operator panel presents much the same information as is available in the browser-based user interface but in a simplified, text-oriented form better suited to the smaller display. Tabbed property sheets and tables take the place of some of the graphics used in the browser-based interface.



Scrolling Through Long Displays

Tap a finger on the operator panel touch-screen to move the cursor and select options. Note, however, that the *scroll bars in operator panel displays cannot be dragged* to a new position, as they can be in a web browser. Instead, you must click on the desired position. The scroll bar will then jump to the new position and scroll the page accordingly.

2

Basic User Interface Operations

This chapter briefly outlines Accessing the User Interface, Navigating the User Interface, Using Common Controls, and Controlling Screen Refresh.

Accessing the User Interface

To access the SL150 browser-based user interface, you must have a log-in account. If you do not yet have an account, contact an SL150 library administrator.

Once you have an account, you must log in to access the interface and log out when finished, as described below.

Log In

Log in to the SL150 browser-based user interface as follows:

1. In a compatible browser, such as Mozilla Firefox, navigate to the hostname or IP address of the library.

   If you are accessing the library user interface for the first time following a new installation or firmware upgrade, your browser may warn you that the connection is untrusted. This is normal. The browser has requested a Hyper Text Transfer Protocol Secure (HTTPS) connection and expects to have the target web server's host name and IP address confirmed by a certificate from a third-party. Since the library's web server host name and address have been newly configured during library initialization, the server has no third-party credentials. So the server returns a self-authenticated certificate, triggering the browser warning.

2. If the browser warns that the HTTPS connection is untrusted, configure the browser to trust the connection. The process varies by browser, so follow the browser's on-screen instructions.

3. When the SL150 user interface **Log In** dialog appears, enter your user name in the **User ID** text field.

4. Enter your password in the **Password** text field.

5. Press the **Log In** button.

Log Out

For security reasons, whenever you are finished with a browser-based user interface session or must leave a session unattended, always log out using the procedure below.

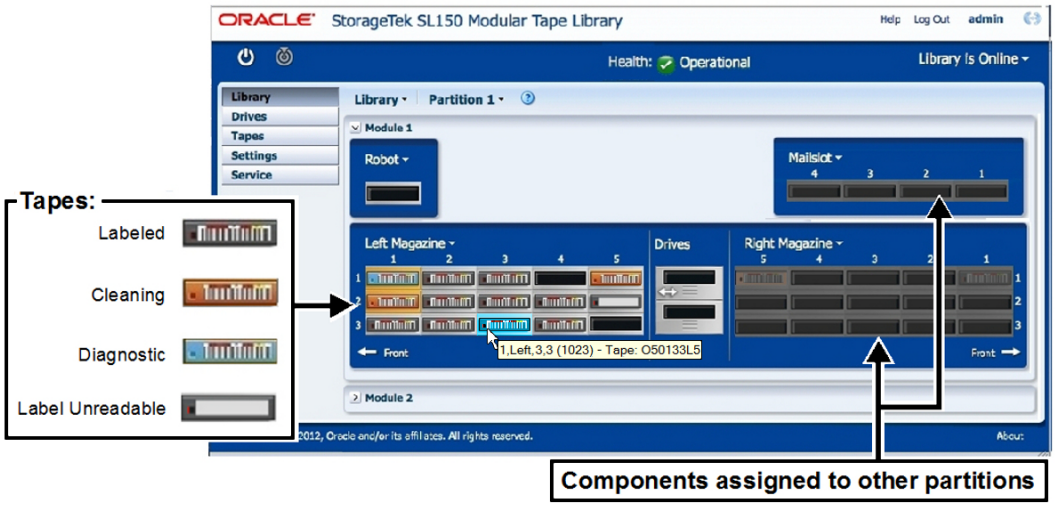
1. In the dashboard area at the top of the interface, immediately above the host connection state control, click on the **Log Out** text link.

2. Wait until the **Logged Out** dialog indicates that you have successfully signed out of the library.
3. If you want to log in again, press the **Go to Log In** button and see Log In.
4. Otherwise, you may close the browser window, if desired.

Interpreting the Graphical Library Display

The **Library** screen of the SL150 user interface lets you view the locations and characteristics of library components at a glance. You can view the whole library or, if parti toned between hosts, a single partition at a time.

Bevel-edged, colored rectangles represent tape cartridges. Data cartridges are dark gray. Cleaning cartridges are orange. Diagnostic cartridges are blue. Labeled cartridges display a representation of a barcode, while unlabeled cartridges and unreadable labels are represented by a blank label. When you place the cursor over one of these tape icons, the icon is highlighted and a fly-over tool tip displays the corresponding slot address and label value.



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

Navigating the User Interface

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

- If you select a library object, such as a tape cartridge, drive, or magazine, the interface displays a context menu listing object properties and available actions.
- If you select a status indicator, the interface displays more detailed information in a pop-up window.
- If you select one of large buttons in the menu on the left side of a screen, the user interface switches to the screen named in the button.

Using Common Controls

The SL150 displays a wide range of information in tabular form. These data tables include a common set of controls that let you control how data is displayed and made available to users. This section describes the following controls:

- View
- Show More Columns
- Reorder Columns
- Export
- Print.

View

The **View** control lets you change the way that data is displayed in a properties table. When you select the **View** button, a context menu provides the options described below.

- The **Columns** option lets you specify the properties that the table displays. You can elect to **Show All** properties, to show specified properties, or to **Show More Columns**.
- The **Detach** option opens the data table in its own popup window.
- The **Reorder Columns** option lets you change the order of the fields within the rows of the table.
- The **Export** option lets you restrict the display to records that meet specified criteria.

Show More Columns

The **Show More Columns** dialog lets you selectively show and hide the data fields that appear in the records shown by a tabular data display.

1. To display a column, select the column heading from the **Hidden Columns** list at left, and press the right arrow button (>) to move the heading into the **Visible Columns** list at right.
2. To display all of the columns, press the right double arrow button (>>) to move them into the **Visible Columns** list.
3. To hide a column, select the column heading from the **Visible Columns** list at right, and press the left arrow button (<) to move the heading into the **Hidden Columns** list at left.
4. To hide all of the columns, press the left double arrow button (<<) to move them into the **Hidden Columns** list.
5. Press **OK** to save the changes and exit or **Cancel** to discard the changes.

Reorder Columns

The **Reorder Columns** dialog lets you change the order in which the columns of a tabular data screen are displayed. To make changes, proceed as follows:

1. In the **Visible Columns** list, use the scroll down and select the column heading of a column that you want to move.

2. Use the controls to the right of the list to move your selection to the top/front of the list, up/forward one, down/back one, or to the bottom/end of the list.
3. To move your selection to the top of the **Visible Columns** list (and thus to the front/leftmost column of the table), click on the top up arrow button.
4. To move your selection up one level in the **Visible Columns** list (and thus to the left one column in the table), click on the lower up arrow button.
5. To move your selection down one level in the **Visible Columns** list (and thus to the right one column in the table), click on the upper down arrow button.
6. To move your selection to the bottom of the **Visible Columns** list (and thus to the last/rightmost column of the table), click on the bottom down arrow button.
7. Press the **OK** button to make the changes, **Cancel** to discard them.

Export

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

Print

The **Print** option of a tabular display reformats the screen data as a new, print-friendly HTML document that you can print with your local printer.

Controlling Screen Refresh

If you find automatically refreshed interface screens distracting, you can use the **Preferences** control to pause and resume automatic refreshes of the browser-based user interface. Proceed as follows.

Pause and Resume Automatic Screen Refresh

1. In the dashboard area at the top of the interface, click the **Preferences** control.
2. From the context menu, select **Pause Automatic Refresh**.

   The interface content will not update itself until you proceed to one of the following steps.
3. When you are ready to update the screen, use your web browser's reload/refresh control.
4. If you want to resume automatic screen refreshes, click the **Preferences** control again, and select **Resume Automatic Refresh** from the context menu.

3

System Configuration

This chapter focuses on the procedures for configuring the SL150 tape library. After you complete the physical installation and initial configuration tasks specified in the *Installation Manual* (see the "Customer Documentation Library" on page ix for details), you perform the tasks described below to finish initial setup. Thereafter, you should refer to this chapter whenever you need to modify parts of the initial configuration.

Configuring a Newly Installed Library

During the installation of a new library, you run an initial-configuration wizard from the local operator console on the library base module (see the *Installation Manual* in the *StorageTek SL150 Modular Tape Library Customer Documentation Library* for details). The wizard lets you specify a secure password for the default administrator account and basic network connectivity, so that you can log in to the remote user interface using a web browser. You then finish the configuration process remotely, as described in this chapter.

During initial configuration, you should perform the following tasks:

- Setting the System Time
- Reserving Storage Slots for System Use
- Checking and Updating Firmware
- Network Administration
- Partitioning
- Configuring Drive Cleaning Operations
- Configuring Tape Drives
- Creating Additional User Accounts
- Setting Up SNMP Monitoring and Management
- Loading Tape Cartridges Into Library Magazines
- Testing the Library Installation.

Setting the System Time

If you did not set the time from the local operator panel or if, at any point, you need to reset it, proceed as follows.

Set the Date and Time

1. Select **Settings** from the menu on the left side of the interface. A set of tabbed property sheets appears.
2. Select the **Library** tab.
3. In the upper left corner of the tab, click on **Edit**.
4. To directly edit the date and/or time, enter text in the **Date and Time** text box using the format *MONTHNAME dd*, *yyyy hh*:*mm*:*ss* [*AM* | *PM*].
5. To select a date and time, click on the calendar/clock icon alongside the **Date and Time** text box. When the **Select a Date and Time** dialog appears, proceed as follows:
   a. Select the current month and year from the corresponding list boxes or click the accompanying left and right arrow buttons to step through the year month-by-month.
   b. Select a day by clicking on the calendar.
   c. Select the hour, minute, and second using the spinner controls at the bottom of the interface, and click the **AM** or **PM** radio button.
   d. Press the **OK** button to set the time and close the dialog, or press Cancel to close the dialog without changing the time.
6. To discard all changes, click on the **Cancel** icon at the top of the **Library** tab.
7. If you are configuring the library for the first time, Designate System Reserved Slots, as described below.

Reserving Storage Slots for System Use

The **System Reserved Slots** field of the **Library** tab on the **Settings screen** displays the number of library slots currently reserved for the exclusive use of the SL150 library itself. Reserved slots may house cleaning and/or diagnostic cartridges.

To change the number of reserved slots, proceed as follows:

Designate System Reserved Slots

1. Select **Settings** from the menu on the left side of the interface. A set of tabbed property sheets appears.
2. Select the **Library** tab.
3. In the upper left corner of the tab, click on **Edit**.
4. In the **System Reserved Slots** field, use the **After Restart** list control to select the desired number of reserved slots. You can reserve from **0** to **3** slots.

   If possible, reserve at least one system slot for library calibration and self-tests. You may also want to reserve one or two slots for cleaning cartridges. See "Providing the Required Cleaning Cartridges" on page 3-10 for more information.
5. To commit your changes, click on the **Save** icon at the top of the **Library** tab.
6. To discard your changes, click on the **Cancel** icon at the top of the **Library** tab.
7. To activate the saved slot configuration, restart using the procedure "Restart the Library" on page 7-3.

8. If you are configuring the library for the first time and do not intend to partition the library, go to Selecting a Volume Label Format for an Unpartitioned Library.
9. If you are configuring the library for the first time and plan to partition the library, go to "Checking and Updating Firmware" on page 3-3.

Selecting a Volume Label Format for an Unpartitioned Library

If you are not going to partition the library and plan to use a non-standard format when labeling your tape cartridges, use the procedure below (for more information on volume label formats see Appendix A, "Accommodating Non-Standard Label Formats" on page A-1).

1. Select **Settings** from the menu on the left side of the interface. A set of tabbed property sheets appears.
2. Select the **Library** tab.
3. In the upper left corner of the tab, click on **Edit**.
4. Select a label format from the **Volume Label Format** list.
5. To commit your changes, click on the **Save** icon at the top of the **Library** tab.
6. If you are configuring the library for the first time, go to Checking and Updating Firmware.

Checking and Updating Firmware

You should check and, if necessary, update SL150 firmware when you first install the library. You should check the firmware periodically thereafter. Proceed as follows.

Identify the Currently Installed Firmware

1. Select **Settings** from the menu on the left side of the interface. A set of tabbed property sheets appears.
2. Select the **Firmware** tab. The **Firmware Version** field displays the current firmware level.
3. Note the firmware level displayed in the **Firmware Version** field.
4. Next, Check/Download Firmware at My Oracle Support, as described below.

Check/Download Firmware at My Oracle Support

1. Open a web browser window, and log in to **My Oracle Support** at `https://support.oracle.com`.
2. Go to the **Patch Search** area of the **Patches & Updates** tab.
3. Click on the **Product or Family (Advanced)** link.
4. Check the **Include all products in a family** checkbox.
5. In the **Product is** field, enter **SL**, and then select **StorageTek SL150 Modular Tape Library** from the list of search results.
6. Check the **Exclude all superseded patches** text box.
7. Press the **Search** button.

8. In the **Patch Search Results** table, click on the hyperlinked **Patch Name** of a patch that you need to download.
9. When the patch description appears, note the details. Then press the **Download** button if you want to download the file immediately or press the **Add to Plan** button to add it to a group of patches that will be applied together.
10. Follow the instructions on screen.
11. For installation instructions, see Update the Firmware.

Update the Firmware

1. In the **Firmware Version** field of the **Firmware** tab, press the **Upgrade** button.

   The **Upgrade Firmware** dialog appears.
2. In the **Firmware File** field of the dialog, press the **Choose File** button to select the file that you downloaded in the preceding procedure.

   If you accidentally choose the wrong file, press the **Clear** button to clear the selection field and press **Choose File** to make a different selection, or simply press **Choose File** to make a different selection.
3. To leave the existing firmware unchanged and exit without upgrading, press the **Cancel** button. When the confirmation dialog appears, press **OK**.
4. To install the new firmware, press the **Upgrade** button.

   The upgrade dialog displays a progress meter and the estimated time required for the upgrade. *Do not close this window until the installation process finishes*.
5. When the upgrade dialog shows that the new firmware has been installed, click the **Close this window** link. If your browser opens a confirmation dialog, go ahead and close the window.

   When you return to the **Firmware** tab of the **Settings** screen, the interface identifies the newly installed firmware and reminds you that you must restart the library to activate it.
6. Restart the library as described in "Restart the Library" on page 7-3.
7. If you are configuring the library for the first time and need to further configure the network interfaces, see Network Administration below.
8. If you are configuring the library for the first time and wish to set up partitions, see "Partitioning" on page 3-6.
9. Otherwise, if you are configuring the library for the first time, go to "Configuring Drive Cleaning Operations" on page 3-7.

Network Administration

You administer network connectivity from the SL150 browser-based user interface. The **Network** tab of the **Settings** screen lets you carry out the following tasks:

- Configuring the Local Area Network Connection (Port 1)
- Enabling and Disabling Service Network Access (Port 2).

Configuring the Local Area Network Connection (Port 1)

To configure Ethernet Port 1, you can either:

- Enable Dynamic Host Configuration Protocol (DHCP) or
- Assign a Static Network Address.

Enable Dynamic Host Configuration Protocol (DHCP)

1. Log in as an **Administrator,** and select **Settings** from the menu on the left side of the interface. A set of tabbed property sheets appears.
2. Select the **Network** tab.
3. In the upper left corner of the tab, click on **Edit**.
4. Move the cursor to the **Network Port 1** portion of the tab.
5. In the **DHCP** field, check the **Enabled** check box.
6. Enter the desired library name in the **Host Name** field.
7. To commit your changes, click the **Save** icon at the top of the tab.
8. To discard your changes, click the **Cancel** icon at the top of the tab.
9. Otherwise, if you are configuring the library for the first time, go to Enabling and Disabling Service Network Access (Port 2) on page 3-5.

Assign a Static Network Address

To configure a static Internet Protocol (IP) address for the library, proceed as follows:

1. Select **Settings** from the menu on the left side of the interface. A set of tabbed property sheets appears.
2. Select the **Network** tab.
3. In the upper left corner of the tab, click on **Edit**.
4. Move the cursor to the **Network Port 1** portion of the tab.
5. In the **DHCP** field, uncheck the **Enabled** check box.
6. Enter the desired library name in the **Host Name** field.
7. Enter the desired address in the **IP Address** text field.
8. Enter the netmask for the specified address in the **Netmask** text field.
9. Enter the IP address of the default internet gateway for the network in the **Default Gateway** field.
10. To commit your changes, click the **Save** icon at the top of the tab.
11. To discard your changes, click the **Cancel** icon at the top of the tab.
12. Otherwise, if you are configuring the library for the first time, go to Enabling and Disabling Service Network Access (Port 2) on page 3-5.

Enabling and Disabling Service Network Access (Port 2)

On the SL150 Modular Tape Library, **Network Port 2** is reserved for service use. You cannot change the IP address. But you can enable or disable the port as required.

Enable or Disable Network Port 2

1. Select **Settings** from the menu on the left side of the interface. A set of tabbed property sheets appears.
2. Select the **Network** tab.

3. In the upper left corner of the tab, click on **Edit**.
4. Move the cursor to the **Network Port 2** portion of the tab.
5. In the **Port 2** field, check the **Enabled** check box to enable the port or uncheck it to disable the port.
6. To commit your changes, click the **Save** icon at the top of the tab.
7. To discard your changes, click the **Cancel** icon at the top of the tab.
8. If you are configuring the library for the first time and wish to set up partitions, see Partitioning below.
9. Otherwise, if you are configuring the library for the first time, go to Configuring Drive Cleaning Operations on page 3-7.

Partitioning

When partitioning is enabled, the SL150 library automatically configures two equal partitions, each of which can be assigned to a different host application. Proceed as follows.

Configure Library Partitions

1. Before proceeding, make sure that all tape-cartridge magazines are latched in place and check the mailslot and drives for tape cartridges.
2. If the mailslot holds cartridges, either move them to their home slots or remove them from the library (see "Move Tape Cartridges Using the Browser-Based User Interface" on page 5-10 or "Opening the Mailslot" on page 5-9).
3. If a drive holds a tape cartridge, return the cartridge to its home slot (see "Move Tape Cartridges Using the Browser-Based User Interface" on page 5-10).
4. Take the library offline. In the host connection state field on right side of the interface, click the **Online** control and select **Set Library Offline**. When the confirmation dialog appears, press the **OK** button.
5. Select **Settings** from the menu on the left side of the interface. A set of tabbed property sheets appears.
6. Select the **Partitions** tab.
7. Click on the **Edit** icon at the top of the tab.
8. In the **Partitions** field, click on the **Enabled** radio button.
9. Choose a volume label format for the tape cartridges in each partition from the **Partition 1 Volume Label Format** and **Partition 2 Volume Label Format** lists.

   For an explanation of volume label formats, see Appendix A, "Accommodating Non-Standard Label Formats" on page A-1.
10. To commit your changes, click on the **Save** icon at the top of the **Partitions** tab or click on the **Cancel** to discard them.
11. Bring the library back online. On the status bar at the top right side right side of the interface, click the **Library Offline** control and select **Set Library Online**. When the confirmation dialog appears, press the **OK** button.
12. If you are configuring the library for the first time, go to Configuring Drive Cleaning Operations on page 3-7.

Configuring Drive Cleaning Operations

LTO tape drives are normally self-cleaning, but may, nonetheless, require occasional cleaning with a compatible cleaning cartridge. To configure drive cleaning operations, start by Selecting a Cleaning Strategy. Then either follow the appropriate procedure in "Setting Up Host-Managed Drive Cleaning" on page 3-8 or review the process for "Cleaning Drives Using the Library User Interface" on page 7-6. Finally, provide cleaning media, as described in "Providing the Required Cleaning Cartridges" on page 3-10.

Selecting a Cleaning Strategy

LTO drives sometimes need cleaning because the clearance between LTO magnetic tape media and the read/write heads is very small. When the tape is streaming past the recording heads at maximum speed, small clearances maximize data transfer. But at other times, when the tape is positioning and tensioning to accommodate slow I/O sources, tape can intermittently touch the recording heads in the drive. The tape wears heavily under these conditions, and small deposits of recording media accumulate on the recording surfaces of the drive.

LTO drives are designed to remove normal levels of contamination automatically. Small internal brushes sweep the debris away before it can build up and become a problem. So many LTO drives never require supplementary cleaning with cleaning cartridges. However, slow or intermittent data sources may not be able to provide enough data to keep a drive streaming. The drive may overrun and reposition often enough to cause unusually heavy wear to tapes and abnormally hard, heavy deposits on recording heads. In extreme cases, the internal brushes can no longer remove the buildup and read/write errors begin to increase. When the errors exceed the error correction thresholds set by the drive, the drive returns a tape alert and requests cleaning.

The SL150 user interface notifies you when LTO drives request cleaning, and most host backup and storage management applications recognize the requests as well. You can thus handle the required cleanings in either of two ways.

You can automatically manage cleaning operations using host applications like Oracle Secure Backup, Symantec NetBackup, or IBM Tivoli Storage Manager. You configure the application for *Automatic*, *Tape Alert*, or *reactive cleaning*, depending on the application. The application then cleans drives when the drives issue the corresponding request. See "Setting Up Host-Managed Drive Cleaning" on page 3-8for details.

If host application-managed cleaning is impractical, you can manage cleaning by monitoring the library's user interface for cleaning messages and responding accordingly. When a drive requires cleaning, the **Library Health** indicator at the top of the interface is set to **Degraded**, the **Health Table** displays the drives that need to be cleaned, and the **Health** property of the affected drive requests cleaning. You then make a note of the affected drive(s) and carry out the cleaning as described in "Use the Library User Interface to Clean the Degraded Drive" on page 7-7. ***Since cleaning is not automatic under this option, you must monitor drives regularly and respond quickly when needed***.

Note, however, that routine cleaning in the absence of an alert is emphatically NOT recommended! Cleaning cartridges are abrasive, and overuse can damage LTO drives. You should not *schedule* regular cleanings using a host application, nor should you perform cleanings after some specified number of mounts. Clean only when the drive tells you that cleaning is necessary.

Setting Up Host-Managed Drive Cleaning

In most cases, you want the host application that manages the library or the backup schedule to control cleaning operations. You want to set up the host application to automatically initiate cleaning when a drive requests it. This approach minimizes disruption to data operations, minimizes operator workload, and insures that cleanings are done when necessary and only when necessary.

This section summarizes the steps that you need to take in order to set up some commonly used library host applications. Note, however, that the procedures below are *summaries*. Always consult the host application documentation for full details and late-breaking changes!

Configuring Automatic Cleaning in Oracle Secure Backup During Drive Setup

Oracle Secure Backup can automatically initiate cleaning when a tape drive requests it. The software checks for cleaning requests whenever a cartridge is loaded or unloaded. If cleaning is required, Oracle Secure Backup loads a cleaning cartridge, waits for the cleaning cycle to complete, replaces the cleaning cartridge in its original storage element, and continues with the requested load or unload. To configure automatic cleaning, proceed as follows:

1. When you add each of the SL150 library's tape drives to your Oracle Secure Backup configuration, select **Yes** from the **Auto clean** list.
2. In the **Clean interval (duration)** field, enter the desired interval between cleaning cycles.
3. In the **Clean using emptiest** field, select **yes** to use cleaning cartridges in round-robin fashion, starting from the least-used cartridge, or **no** to use each cleaning cartridge until it expires, starting from the cartridge with the fewest remaining cleaning cycles (the default).
4. Click **OK** to save your changes.

Setting Up NetBackup for *Reactive Cleaning* Using the Administration Console

If you use the Symantec NetBackup Administration Console to add or update drive configurations, proceed as follows:

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

Setting Up NetBackup for *Reactive Cleaning* Using the Commandline

If you use the Symantec NetBackup administrative commandline to add or update drive configurations, set the cleaning frequency for each SL150 drive to zero, as described below (for the full, authoritative, NetBackup command syntax, consult the Symantec *Commands* reference for your version of the software).

1. If you need to add the drive to the NetBackup configuration, use the command `tpconfig -add` with the option `-cleanfreq 0` and stop here. For example:

   ```
   /usr/openv/volmgr/bin/tpconfig -add -drive -type [hcart|hcart2|hcart3]
   ```

```
path drivepath
```

In the example, `hcart*` is the generic NetBackup media identifier that you are using for LTO media and *drivepath* is the path to the device file for the drive.

2. Otherwise, if you have already added the SL150 drives to your NetBackup configuration, run the command

```
/usr/openv/volmgr/bin/tpclean/tpclean -F drive_name 0
```

In the example, *drive_name* is the name that was assigned to the drive when it was added to the NetBackup device configuration and `0` is the value that turns off frequency-based cleaning in favor of reactive cleaning.

Setting Up Symantec Backup Exec

If you configure a cleaning slot, Backup Exec will automatically clean drives. Proceed as follows:

1. On the Backup Exec navigation bar, select **Devices**.
2. Select **Robotic Libraries**, and then select the robotic library for which you are setting up the cleaning.
3. Click **Slots** to display the library's slots in the right pane.
4. Select the slot that contains the cleaning tape.
5. Under `General Tasks` in the task bar, select **Properties**.
6. Select the **Cleaning Slot** option and click **OK**.
7. Make sure that the cleaning tape is located in the slot that you defined as the cleaning slot.
8. Go to "Providing the Required Cleaning Cartridges" on page 3-10.

Setting Up HP StorageWorks Enterprise Backup Solution with HP Data Protector

If you provide correctly labeled cleaning cartridges, Data Protector detects the cartridges and automatically sets up reactive cleaning. See "Providing the Required Cleaning Cartridges" on page 3-10 and "Labeling Cartridges" on page 5-3.

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

To configure as-needed cleaning in IBM Tivoli Storage Manager, proceed as follows.

1. To configure on-demand cleaning for a drive that has not yet been added to your TSM configuration, use the **DEFINE DRIVE** command.
2. To configure on-demand cleaning for a drive that has already been added to your TSM configuration, use the **UPDATE DRIVE** command.
3. Using the chosen command, set the drive parameter **CLEANFREQuency** to **ASNEEDED**.
4. Go to "Providing the Required Cleaning Cartridges" on page 3-10.

Setting Up *Tape-Alert Cleaning* in EMC Networker

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

1. In the **NetWorker Administration** interface, click on **Devices**, and select **View > Diagnostic Mode**.
2. Select **Devices** in the navigation tree.
3. In the **Devices** table, right-click on one of the SL150 tape drives, and select **Properties** from the context menu.
4. When the **Properties** window appears, select the **Advanced** tab.
5. In the **Device Configuration** area of the **Advanced** tab, under CDI settings, select **SCSI Commands: Sends explicit SCSI commands to tape devices**.
6. Repeat steps 3-5 until the Common Device Interface has been configured for all SL150 tape drives.
7. Go to "Providing the Required Cleaning Cartridges" on page 3-10.

Setting Up CommVault

1. In the ComCell interface, right-click on the SL150 library, and select **Properties** from the context menu.
2. When the **Library Properties** sheet appears, select the **Drives** tab.
3. In the **Enable Auto-Cleaning** section of the tab, check the **On sense code** check box.
4. Press the **OK** button to commit the change.
5. Go to "Providing the Required Cleaning Cartridges" on page 3-10.

Providing the Required Cleaning Cartridges

How you configure your library and how you clean your drives determine the number of cleaning cartridges that you need and the locations where they have to reside. The SL150 browser-based user interface can access cleaning cartridges that are located both in reserved system slots and in ordinary cartridge slots. However, host applications cannot access cleaning tapes that reside in system slots or in partitions controlled by other hosts.

So, for example, assume that you want to have two cleaning cartridges available for use at all times:

- If you have configured two reserved system slots, do not require any diagnostic cartridges, and plan to clean the drives using the browser-based user interface only, you need a minimum of two cleaning cartridges, each in a system slot.
- If you did not configure reserved slots, you could place the same number of cleaning cartridges in regular cartridge slots.
- If, however, you configured two reserved slots, do not require any diagnostic cartridges, plan to have host applications manage drive cleanings, and have partitioned your library, then you will need a minimum of six cleaning cartridges: two in reserved slots and two in each of the two partitions.

Determine required cartridge numbers and locations

1. If you reserved one or more system slots for cleaning cartridges, provide a new cleaning cartridge for each reserved slot that you want to use for this purpose (either 1 or 2).
2. If you plan to let the host application clean the drives, provide at least one cleaning cartridge and reserve one storage slot for each unpartitioned library or

for each partition (system slots and storage slots that are not allocated to the partition are not accessible to host applications).

Load Cleaning Media Using a Host Application

1. Load the required number of new cleaning cartridges into the library mailslot.
2. Use the application to move the cleaning cartridges from the mailslot to the storage slot(s) that you have selected for holding cleaning media.
3. If you are planning to load cleaning cartridges into system reserved slots, you must now Load Cleaning Media Using the Library User Interface (host applications cannot access the system reserved slots).

Load Cleaning Media Using the Library User Interface

1. If you have not already done so, Take the Library Off Line.
2. Load the required number of new cleaning cartridges into the library mailslot.
3. In the graphical library map, move to the mailslot and click on a cleaning cartridge.
4. When the context menu appears, select **Move Tape**. The **Move Tape** panel appears at the top of the screen. The **Source** type field should be set to **Mailslot** and the cartridge that you chose should be listed (you may change this selection if desired).
5. In the graphical library map, click on the reserved slot where the cleaning cartridge will reside. The **Destination** type field of the **Move Tape** panel should now identify the **Slot** location that you selected (you may change this selection if desired).
6. In the **Move Tape** panel, press the **OK** button to perform the move or **Cancel** to abort.
7. When the **Move Tape** panel shows that the move is complete, press the **OK** button to close the panel.
8. Repeat the above procedure from step 3 to step 7 until all cleaning cartridges have been loaded.

Configuring Tape Drives

The SL150 browser-based user interface can enable and disable drive ports and configure SAN addressing. For each port that you need to configure, proceed as follows:

Configure Drive Ports

1. Select **Settings** from the menu on the left side of the interface. A set of tabbed property sheets appears.
2. Select the **Drive Port Settings** tab.
3. In the component table, select the row for the drive that you need to configure.
4. In the control bar above the table, click on **Actions** and select **Configure Drive Ports** from the drop menu.
5. Move to the **Updating the Settings for ... Drive Module** area at the top of the interface.

6. To enable or disable a port, click the **Disabled** or **Enabled** radio button in the **Port ... State** field.

   If you disable a Fibre Channel port or both SAS ports on a drive, the SL150 user interface reports that the drive has **Failed**.

7. To disable hard port addressing on Fibre Channel drives, click the **No** radio button in the **Hard Addressing** field.

8. To enable hard port addressing, click the **Yes** radio button in the **Hard Addressing** field, and enter a value in the **Port Loop Id** text field.

9. Press the **OK** button to commit your changes or **Cancel** to discard them.

Creating Additional User Accounts

For information on creating additional user accounts, see "User Administration" on page 4-1.

Setting Up SNMP Monitoring and Management

For information on configuring Simple Network Management Protocol (SNMP), see "Using Simple Network Management Protocol (SNMP)" on page 6-4.

Loading Tape Cartridges Into Library Magazines

When setting up a library, load tape cartridges now, if possible. Loading magazines and the next step, Testing the Library Installation, both require a library restart and reinitialization. So loading the cartridges at this point saves some time.

For instructions, see Chapter 5, "Importing and Exporting Media," especially the sections up to and including "Loading and Unloading Magazines" on page 5-5.

Testing the Library Installation

Before placing a newly installed or re-configured library in production, you should run a library **Full Self Test**. During the test, the robot performs the following tasks:

- It fetches a diagnostic tape cartridge and moves it to every empty storage slot, empty mailslot cell, and free drive in the library.
- It fetches and returns all data tapes that occupy storage slots, mailslot cells, and drives.

Note that a full test can take some time, depending on the number of modules in the library. So plan accordingly.

Test the Newly Configured Library

1. If you have not already done so, take the library offline. See "Take the Library Off Line" on page 7-1.

2. Make sure that you have a diagnostic cartridge stored in a reserved system slot or in the mailslot.

   For further information, see "Loading and Unloading Individual Cartridges" on page 5-7, "Reserving Storage Slots for System Use" on page 3-2, and "Providing Diagnostic Cartridges" on page 5-2.

3. Click the **Library** control at the top left of the **Library** screen.
4. Make sure that the mailslot is closed.
5. Make sure that all magazines are securely latched.
6. Make sure that at least one operational drive is free.
7. Make sure that there is at least one unoccupied cell in the mailslot.
8. Select **Library** from the menu on the left side of the interface. The graphical library map appears.
9. Select **Run Self Test** from the **Library** control's context menu.
10. Select **Full Self Test** from the menu.
11. Press **OK** when the confirmation bar appears at the top of the screen.

    If you need to end the test prematurely, you can do so by pressing the **Stop the Test** button that appears after the test starts. It may take a short while for the test to stop. When it does, press **OK**.
12. If the first run of the test halts for any reason, restart the library to clear the error and repeat this procedure.

    Errors during the first calibration attempt usually indicate a calibration problem rather than a system problem.
13. If the second run of the test halts, something is wrong. Make a note of any error messages, carry out any recommended actions, and then, if the problem is unresolved, proceed with "Troubleshooting" on page 6-9.
14. Otherwise, when the test completes normally, press **OK** to close the result bar.
15. If the diagnostic cartridge was not returned to its reserved cell at the end of the test, move the diagnostic cartridge now. See "Move Tape Cartridges Using the Browser-Based User Interface" on page 5-10.

Reverting to Factory Default Configuration

Network- and password-configuration problems can keep administrators from accessing the library. For example, if you inadvertently enter an incorrect IP address, specify DHCP when no DHCP server is available, or type the intended administrative password incorrectly during installation, you lose all access to and/or control of your library. In this situation, you need to reset the library to the as-shipped, factory default configuration.

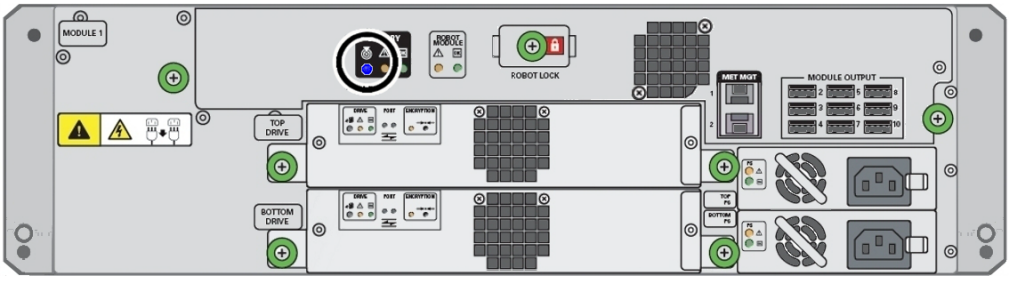
Before proceeding, take note: when you reset the library, you lose the existing configuration, including user accounts, partitions, SNMP configuration, etc. If you have to reset the defaults during initial installation, this hardly matters—not much has been done as yet. But if you are resetting an operational library, you will have to recreate the existing configuration from scratch. So do not use this procedure on an operational library except as a last resort.

That said, when you need to revert to the factory defaults, proceed as follows:

1. Arrange for an assistant, so that one of you can stand at the front of the library and one at the rear.

   Under normal conditions, a single person cannot reach far enough to operate the controls as required.
2. On the front of the server, find the locator button at upper left.

3. At the rear of the library, find the locator button at left center on the controller/robotics assembly at the top of the library.



4. Push and release one of the locator buttons, either the one at the front or the one at the back.

   The locator buttons light up.

5. Once the locator buttons are lit, simultaneously **push and hold both buttons**.

   After 3-4 seconds, the lighted locator buttons flash slowly. After an additional 5-10 seconds, the locator buttons start to flash rapidly.

6. When the lighted locator buttons start flashing rapidly, release both buttons.

   If either locator button is released before the light begins to flash rapidly, the reset process stops.

   Otherwise, the library reverts to the factory-default configuration and shuts down.

7. If the library does not restart automatically, press the power button to start the library.

   The power button is to the right of the locator button and the two status LEDs:

8. Run the installation wizard and reconfigure the library just as you would when setting up a new unit.

   For initial setup instructions, see the *Installation Manual* in the *StorageTek SL150 Tape Library Customer Documentation Library*.

For configuration instructions, see "Configuring a Newly Installed Library" on page 3-1 and Chapter 4, "User Administration."

4

User Administration

The SL150 Modular Tape Library manages user access to the system by user and role, an approach known as Role-Based Access Control (RBAC). An administrator creates individual user accounts for each person that needs access to the system. Each account has its own, uniquely identifiable log-in name and personal password, so individual users can be readily audited. The administrator then assigns each account to a distinct role with a predefined set access privileges. This chapter outlines the basic tasks:

- Adding a User and Assigning a Role
- Removing a User
- Changing an Assigned Role
- Changing Your Own Password (Operator)
- Changing Your Own or Another User's Password (Administrator).

Adding a User and Assigning a Role

To add a user account, proceed as follows:

1. Select **Settings** from the menu on the left side of the interface. A set of tabbed property sheets appears.
2. Select the **Users** tab.
3. Click the **Add User** icon in the menu bar at the top of the tab.
4. When the **Add User** dialog appears, enter a **User ID** in the first text field provided. User IDs must be unique.

   For example, the user's email address makes a good user ID.
5. In the next text field, enter the **Password** for the account.
6. Re-enter the password in the **Verify Password** text field.
7. Select the desired role for the user from the choices listed in the **Assigned Role** control: **Administrator**, **Operator**, **Viewer**, and **Service**.
8. Press the **OK** button to commit your changes and dismiss the dialog, or press the **Cancel** button to discard the changes.

Removing a User

To remove a user account from the system, proceed as follows:

1. Log in under the **Administrator** role.

Only administrators can change passwords.

2. Select **Settings** from the menu on the left side of the interface. A set of tabbed property sheets appears.
3. Select the **Users** tab.
4. Select the account by clicking on the corresponding table row.
5. Click the **Delete User** icon in the menu bar above the table to open the **Delete User** dialog.
6. Press the **OK** button to commit your changes and dismiss the dialog, or press the **Cancel** button to discard the changes.

Changing an Assigned Role

To change a user's assigned role, proceed as follows:

1. Select **Settings** from the menu on the left side of the interface. A set of tabbed property sheets appears.
2. Select the **Users** tab.
3. Select the account by clicking on the corresponding table row.
4. Click the **Change Role** icon in the menu bar at the top of the tab.
5. When the **Change User Role** dialog appears, select the desired role from the choices listed in the **Assigned Role** control: **Administrator**, **Operator**, **Viewer**, and **Service**.
6. To commit your changes, press the **OK** button in the **Change User Role** dialog.
7. To discard your changes, press the **Cancel** button in the **Change User Role** dialog.

Changing Your Own Password (Operator)

Operators can change their own passwords. Proceed as follows.

1. Select **Settings** from the menu on the left side of the interface. A set of tabbed property sheets appears.
2. Select the **Users** tab.
3. Select **Change Password**.
4. When the **Change User Password** dialog appears, enter the **Old Password**.
5. In the **Change User Password** dialog, enter the desired **New Password**.
6. In the **Verify Password** field of the **Change User Password** dialog, re-enter the new password.
7. Press **OK** to save your changes or **Cancel** to retain the old password.

Changing Your Own or Another User's Password (Administrator)

If you are an administrator, change your own or another user's password using the following procedure:

1. Select **Settings** from the menu on the left side of the interface. A set of tabbed property sheets appears.
2. Select the **Users** tab.

3. Select the user account by clicking on the corresponding table row.
4. Click the **Change Password** icon in the menu bar at the top of the tab.
5. When the **Change Password** dialog appears, enter the new password in the **Password** field. Passwords must contain a minimum of eight characters, at least one of which is a numeral.
6. In the **Change Password** dialog, re-enter the new password in the **Verify Password** text field.
7. To commit your changes, press the **OK** button in the **Change User Role** dialog.
8. To discard your changes, press the **Cancel** button in the **Change User Role** dialog.

5

Importing and Exporting Media

This chapter outlines the basic processes for handling and moving media stored in a StorageTek SL150 Modular Tape Library. It begins with an overview of basic precautions and requirements for working with tape media:

- Using Supported Media
- Handling Cartridges
- Labeling Cartridges
- Inspecting Cartridges

Then it outlines the basic approaches to importing and exporting media and moving cartridges within the library:

- Loading and Unloading Magazines
- Loading and Unloading Individual Cartridges
- Moving Tape Cartridges with the SL150 User Interface.

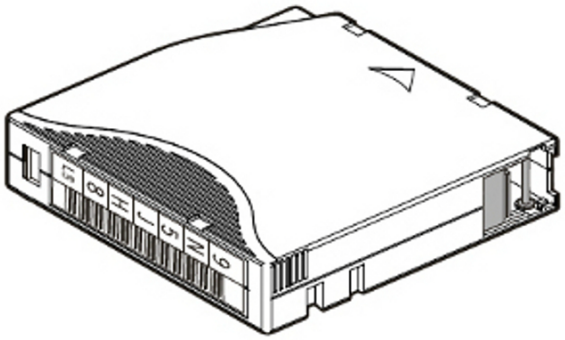
Using Supported Media

The half-height, Hewlett-Packard Linear Tape Open drives in SL150 libraries are designed to read and write Ultrium cartridges, both standard and WORM (write-once/read-many). Each of the Ultrium Gen-6 cartridges used in LTO-6 drives holds 2.5 TB of uncompressed data or up to 5 TB of compressed data. The Gen-5 cartridges used in LTO-5 drives hold 1.5 TB of uncompressed data or up to 3 TB of compressed data. (Some data types, such as JPEG imagery and binary files, do not compress appreciably, so results can vary).

For best capacity and performance, always use cartridges of the same generation as your drives (Gen-5 cartridges in LTO-5 drives, Gen-6 in LTO-6, etc.). You can, however, access data on older LTO cartridge formats as well. LTO-6 drives can read and write Ultrium Generation-5, standard and WORM cartridges, and they can read Ultrium Generation-4 media. LTO-5 drives can read and write Ultrium Generation-4 media and can read Generation-3. Remember, however, that using any significant number of these older media types reduces the overall storage capacity and performance of the library. Older cartridges hold substantially less data, and current LTO drives have to access them at the reduced data-transfer rate specified for each older format.

A typical LTO Ultrium cartridge is a plastic box, 10.2 cm by 10.54 cm by 2.15 cm (4 in by 4.14 in by 0.85 in). There are ribbed, gripping surfaces on the top, bottom, left, and right sides of the case. There is a pronounced, tapered step at the left, rear corner. A triangular depression on top of the case points to the back, where the cartridge inserts into a drive or storage slot. A sliding, write-protection switch is on the front face on the

far left, with an indentation for the cartridge label to its right. A sliding plastic door on the right side near the rear of the cartridge provides access to the *leader pin*, a dumbbell-shaped steel roller that lets the drive grip the end of the tape and wind it onto a take-up reel in the drive.



Providing Diagnostic Cartridges

Diagnostic cartridges are specially labeled data cartridges that are used for testing library robotics and drives. You can purchase diagnostic cartridges or you can create them by applying an Oracle-supplied diagnostic label to any available, blank LTO tape.

Oracle recommends having a diagnostic tape on hand if at all possible. A diagnostic tape lets you efficiently calibrate library robotics before placing a new or expanded/reconfigured library into production. This saves time overall and smooths production deployments. You may also need a diagnostic tape for drive diagnostics.

Handling Cartridges

Improper handling of cartridges can result in a loss of data or damage to library components. So observe the following, basic precautions when adding or removing cartridges from the library and when storing cartridges outside the library:

- Keep cartridges clean and free of dust and contaminants. Leave new cartridges in their protective wrapping until you are ready to use them.
- Do not expose cartridges to direct sunlight, heat, or moisture.
- Do not carry cartridges loosely in a container. Movable parts, such as leader doors and leader pins, can snag and be damaged by other cartridges.
- Do not drop or strike cartridges. Shocks can crack the case and bend or unseat the leader pin. Recording media and internal mechanical parts may be damaged.
- Take special care to protect cartridges from strong magnetic fields, such as those associated with bulk erasure (degaussing), computer monitors, electric motors, and loudspeakers. Magnetic fields can erase data and can make LTO cartridges unusable (blank LTO Ultrium media hold magnetically recorded signalling information that is required by LTO drives).
- Before you pick up a cartridge, make sure that the leader pin is latched. Never unlatch the leader pin or pull tape from the cartridge.
- Never open a cartridge, and never handle exposed tape.

- Use only standard LTO cartridge labels and apply them only in the specified area, adjacent to the read/write tab. Never affix anything to other parts of the cartridge case.
- Use the minimum necessary quantity of an isopropyl alcohol-based cleaning solution when removing labels or cleaning the outside of the cartridge cases. Do not let liquid contact tape media or penetrate the interior of the cartridge case.
- Do not use any other solvents to remove labels or to clean cartridges! Acetone, trichloroethane, toluene, xylene, benzene, ketone, methylethyl ketone, methylene chloride, ethyldichloride, esters, and ethyl acetate, among others, are known to damage the plastic used in cartridge cases.

Labeling Cartridges

SL150 libraries identify individual storage volumes using ANSI standard, code 39 barcode labels that are attached to the front of the tape cartridge. The label carries both a human-readable, alphanumeric identifier and a corresponding, machine-readable barcode. If the library encounters a physical cartridge that lacks a label or if the label is damaged or in an incompatible format, the library assigns the label value **[UNREADABLE]** to the cartridge.

Standard LTO data-cartridges are labeled with a unique, customer-assigned, six-character volume ID, followed by a media ID field. For LTO-6 data cartridges, the media ID can be either **L6** for read/write and diagnostic cartridges or **LW** for WORM cartridges. Corresponding LTO-5 media are identified by **L5** and **LV**, LTO-4 by **L4** and **LU**, and LTO-3 by **L3** and **LT**. (If you need to configure the library for a non-standard labeling scheme, see Section A, "Accommodating Non-Standard Label Formats.")

LTO cleaning and diagnostic cartridge labels include a three-character prefix—**CLN** or **DG** , respectively (the diagnostic prefix includes a trailing space)—followed by a sequence number and media descriptor. Diagnostic cartridges and drive-specific cleaning media use the same media descriptors as the corresponding data cartridges. So, for example a Gen-5 diagnostic cartridge would carry a label of the form **DG** *xxx***L5**.

Universal cleaning cartridges that are suitable for all LTO generations are identified by a **CLNU** prefix, a sequence number, and the media descriptor **CU**: **CLNU***xx***CU**. Note that Oracle recommends using the generic **CU** media descriptor rather than other, vendor-specific variations.

Apply Cartridge Labels

For each cartridge that requires a label, proceed as follows:

1. Make sure that the cartridge has been at room temperature for at least 24 hours.
2. Unwrap each new cartridge as you are ready to label it. Remove the wrapper using the string or pull tab provided for the purpose. Do not use letter openers, knives, box cutters, scissors, or other sharp instruments.
3. Clean the surface where the label will be placed using the smallest practical quantity of an isopropyl alcohol-based cleaning solution. Never use other solvents!
4. Locate the correct type of label (data, cleaning, or diagnostic).
5. Peel the backing from the label.
6. Hold the cartridge so that the write-protect switch is toward you.

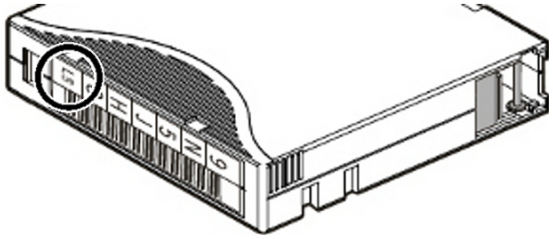
7. Position the cartridge label with the bar-code characters at bottom (towards the hub side of the cartridge) and the alphanumeric characters at the top.
8. Carefully align the label with the slight indentation provided, and press the label into place. The label must not overlap the edges of this indentation!
9. Go to Inspecting Cartridges.

Inspecting Cartridges

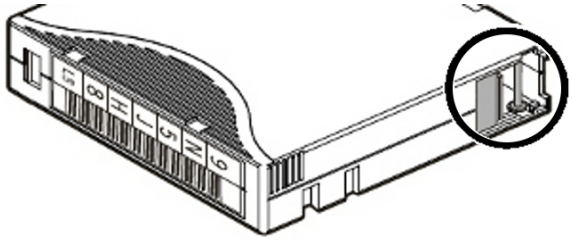
Broken or improperly labeled cartridges can damage library and drive hardware. So, before you load media into a library, carefully inspect each cartridge for defects.

Inspect LTO Cartridges

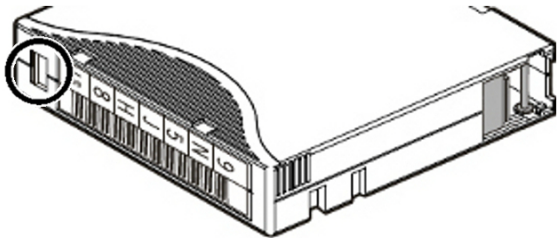
1. Make sure that the cartridge is at operating temperature and free of condensation. If the cartridge appears to have been stored below operating temperature, stop. Before proceeding, leave the cartridge in its intended operating environment for 24 hours, so that temperature and humidity can equalize.
2. Make sure that the cartridge is properly labeled, as described in "Labeling Cartridges" on page 5-3. Make sure that cartridge labels are firmly attached and correctly positioned within the indented labeling area. Relabel mislabeled cartridges before proceeding.
3. Hold the cartridge hub down, with the write-protect switch and the label facing you and the leader latch at right rear.
4. Make sure that the cartridge is an LTO Ultrium Gen-6, Gen-5, Gen-4, Gen-3, or universal-cleaning cartridge. The media type is shown in the last field of the label, adjacent to the write-protection switch at left: **L6** or **LW** indicates Gen-6 media, **L5** or **LV** indicates Gen-5, **L4** or **LU** indicates Gen-4, **L3** or **LT** indicates Gen-3, and **CU** indicates universal cleaning.



5. Make sure that the case is not cracked, split, or otherwise visibly damaged. If you note damage, do not use the cartridge!
6. On the right side of the cartridge near the rear, make sure that the spring-loaded leader door opens cleanly and snaps shut when released. If the door is damaged or does not open and close properly, do not use the cartridge!



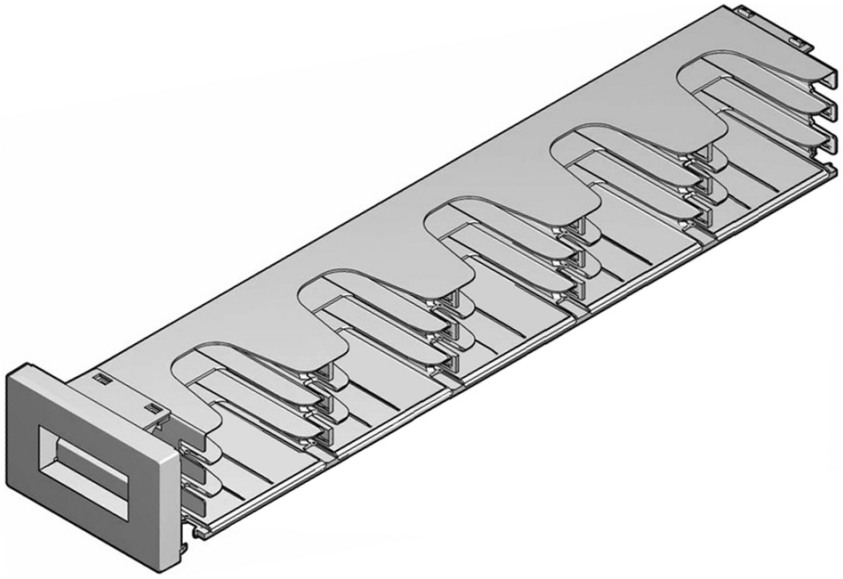
7. Open the leader door, and make sure that the leader pin is straight, undamaged, and correctly positioned in its detents within the case. If the leader pin is damaged or out of position, do not use the cartridge!
8. Make sure that the write-protect switch can slide from side to side and snaps into position with a positive click. If the write-protect switch is broken or does not latch positively, do not use the cartridge!



9. Turn the cartridge over, and examine the plastic teeth and tabs that surround the metal hub. If any parts are broken or significantly worn, do not use the cartridge!
10. If you are loading cartridges during initial installation or, for any reason, need to load or unload cartridges in bulk, go to Loading and Unloading Magazines.
11. If you only need to load or remove a small number of cartridges, go to Loading and Unloading Individual Cartridges.

Loading and Unloading Magazines

The StorageTek SL150 stores tape cartridges in detachable, 15-slot magazines that slide in and out of the front of the library, much like drawers. Each library module holds two of these magazines, one on the left side of the enclosure and one on the right. These magazines let you quickly and efficiently bulk-load cartridges.



If the library has been partitioned, be careful to keep cartridges that belong in one partition together, apart from cartridges owned by the other partition. A host application cannot access cartridges that are not in its partition, and applications may treat foreign cartridges as scratch volumes and accidentally overwrite valid data. So,

before you load or unload a magazine, be sure that you know which partition and host owns it and which owns the cartridges that you add or remove.

If you reserved system slots for cleaning cartridges or diagnostic cartridges, be sure to place the desired type and number of cartridges in the reserved slots, found at library slot address **1, Left, 1, 1** and/or **1, Left, 2, 1** (library slot addresses take the form *library-module*, *magazine*, *row*, *column*, where rows are counted from the top down and columns are counted starting from the front of the library).

When loading cleaning cartridges, be aware that the library software considers any imported cleaning cartridge to be new and sets its usage counter to zero. So make sure that you do not load used cleaning cartridges that cannot be used for a full cycle of cleanings.

To bulk-load the library, carry out the tasks listed below:

- Unlatch the Magazine
- Load and/or Unload the Magazine
- Reinstall the Magazine and Engage the Latch

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

Unlatch the Magazine

For routine loading, unloading, and maintenance of SL150 magazines, always use the browser-based user interface, as described in the procedure below.

Caution: Do not manually override the automatic magazine latches except as directed by installation, maintenance, and troubleshooting procedures or by Oracle service representatives.

1. Log in to the browser-based user interface using an account that fills the **administrator** or **operator** role.
2. Before proceeding further, take the library offline as described in "Take the Library Off Line" on page 7-1.
3. From the menu on the left side of the user interface, select the **Library** screen.
4. Select the module that you intend to load.
5. Click on **Right Magazine** or **Left Magazine**, and select **Unlatch** from the context menu.

   Note that you can only unlatch one magazine at a time.
6. When the confirmation dialogue appears at the top of the screen, press **OK** to continue or **Cancel** to leave the magazine latched.
7. Press the **Close** button to dismiss the dialogue.
8. Using the handle on the front, draw the magazine out of the library module with one hand while supporting the body of the magazine with the other. If the magazine already contains tapes, be careful to hold it so that tape cartridges do not fall out of the slots.

9. Go to Load and/or Unload the Magazine.

Load and/or Unload the Magazine

1. Place each magazine upright on a clean, level surface, where you have room to work and where cartridges will not be subjected to magnetic fields.
2. Pull each cartridge that you need to remove out of its slot in the magazine, and set the cartridge aside in a suitable storage container.
3. Place the cartridges that you will load into the magazine on your work surface, and carefully examine them for defects, temperature, and missing or misplaced labels, as described in "Inspecting Cartridges" on page 5-4.
4. Insert each cartridge into a magazine slot with the cartridge hub down and the label and write-protect switch visible on the open side of the magazine. Push the cartridge into the slot until the plastic retention spring snaps into place.
5. When all desired cartridges have been installed in the magazine, go to Reinstall the Magazine and Engage the Latch.

Reinstall the Magazine and Engage the Latch

1. Grasp the handle on the front of the magazine with one hand while supporting the magazine's weight with the other. Be careful to hold the magazine so that tapes do not fall out of the slots.
2. Carefully align the magazine with the correct magazine bay of the correct library module. Magazines are handed, so a right-side magazine will only fit in the right-side bay and a left-side magazine will only fit a left-side bay.
3. Gently push the magazine into the magazine bay until it latches into place with a noticeable click. The library will not use the magazine until the magazine is positively latched. Once the magazine is latched, the library automatically audits the contents.

   See "Auditing" on page 7-3 for a full description of the process.

Loading and Unloading Individual Cartridges

When you only need to add or remove one to four cartridges at a time, use the SL150 *mailslot* (also known as the *cartridge access port* or *CAP*).

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

- Assign the Mailslot to a Partition (if the library is partitioned)
- Move Cartridges into the Mailslot
- Empty and/or Load the Mailslot
- Import or Export Tape Cartridges.

Assign the Mailslot to a Partition

Host applications must have exclusive control over the media that they use. So, if your library is partitioned for the use of two separate host applications, you must assign the mailslot to the partition that controls the media that you need to export or import. You may proceed in either of two ways, depending on where you are at the moment:

- Assign the Mailslot Using the Remote User Interface

- Assign the Mailslot Using the Local Operator Panel.

Assign the Mailslot Using the Remote User Interface

1. Log in to the browser-based user interface.
2. Select the **Library** screen from the menu on the left side of the interface.
3. In the graphical library map, click on the **Mailslot** icon and select **Assign** from the context menu.
4. When the **Assign Mailslot to a Partition** dialog appears, select a partition from the drop menu.

   Select either **Partition 1** or **Partition 2**.
5. Press **OK** to assign the mailslot or **Cancel** to abort.
6. If you simply need to remove cartridges that the host application has already moved to the mailslot, go to Opening the Mailslot.
7. Otherwise, go to Move Cartridges into the Mailslot.

Assign the Mailslot Using the Local Operator Panel

1. On the **Home** screen, tap the **Mailslot** button.

   The **Mailslot** page appears. Buttons for assigning the mailslot to partitions are at upper right.
2. To assign the mailslot to partition 1, press the **Assign to Partition 1** button.
3. To assign the mailslot to partition 2, press the **Assign to Partition 2** button.
4. When the confirmation dialog appears, press **OK** to assign the mailslot to the selected partition or **Cancel** to return to the previous page without assigning the mailslot.
5. If you simply need to remove cartridges that the host application has already moved to the mailslot, go to Opening the Mailslot.
6. Otherwise, go to Move Cartridges into the Mailslot.

Move Cartridges into the Mailslot

1. Log in to the browser-based user interface, if you have not already done so.
2. Select the **Library** screen from the menu on the left side of the interface.
3. In the graphical library map, click on the cartridge that you want to move.
4. When the context menu appears, select **Move Tape**. The **Move Tape** panel appears at the top of the screen. The **Source** field of the **Move Tape panel** displays the address of the cartridge that you selected.
5. In the graphical library map, click on an empty mailslot position. The **Destination** controls of the **Move Tape** panel display the address of the mailslot position that you selected.
6. In the **Move Tape** panel, press the **OK** button to perform the move or **Cancel** to abort.
7. When the **Move Tape** panel shows that the move is complete, press the **OK** button to close the panel.
8. Go to Opening the Mailslot.

Opening the Mailslot

You can open the mailslot using either the remote user interface or the local operator panel.

Open the Mailslot from the Remote User Interface

1. Log in to the browser-based user interface, if you have not already done so.
2. Select the **Library** screen from the menu on the left side of the interface.
3. Click on the **Mailslot** label, and select **Open** from the context menu.
4. When the confirmation dialogue appears at the top of the page, press the **OK** button to open the mail slot or **Cancel** to leave it closed.
5. If you have opened the mailslot, go to Empty and/or Load the Mailslot.

Open the Mailslot from the Local Operator Panel

1. On the **Home** screen, tap the **Mailslot** button.

   The **Mailslot** page appears.
2. If you have partitioned the library and do not see an **Open Mailslot** button at upper right, you need to Assign the Mailslot Using the Local Operator Panel before proceeding further.
3. Press the **Open Mailslot** button.
4. If you have opened the mailslot, go to Empty and/or Load the Mailslot.

Empty and/or Load the Mailslot

1. Draw the mailslot out of its bay at the upper right corner of the front of the base module.
2. Pull each cartridge that you need to remove out of the mailslot, and set the cartridge aside in a suitable storage container.
3. Place cartridges that you will load into the library on your work surface, and carefully examine them for defects, temperature, and missing or misplaced labels, as described in "Inspecting Cartridges" on page 5-4.
4. If you need to import cartridges into the library, insert each one into one of the four mailslot positions. Make sure that the cartridge hub is down and the label and write-protect switch is visible on the open side of the mailslot. Push the cartridge in until the plastic retention spring snaps into place.
5. When all desired cartridges have been inserted, push the mailslot into the mailslot bay using a single, steady motion, so that it latches into place with a noticeable click.

   If you do not insert the mailslot smoothly, you may fail to engage the latch and may trigger needless, multiple re-audits of the mailslot. Note that the library will not be able to access mailslot positions until the mailslot is positively latched.
6. If you are an **Operator**, **Service** representative, or **Administrator**, go to Import or Export Tape Cartridges.

Import or Export Tape Cartridges

1. When possible, you should move tape cartridges to and from the mailslot using host application interfaces. This insures a single, consistent view of the contents of the library with a minimum of auditing.
2. However, if you cannot import and export cartridges using your host application, you can Move Tape Cartridges Using the Browser-Based User Interface.
3. When you are finished with the mailslot, go to Unassigning the Mailslot from the Partition.

Unassigning the Mailslot from the Partition

You should unassign the mailslot from a partition when you are finished with it so that the other partition can access it if necessary. You use either the remote, browser-based user interface or the local operator panel.

Unassign the Mailslot Using the Remote User Interface

1. Log in to the browser-based user interface.
2. Select the **Library** screen from the menu on the left side of the interface.
3. In the graphical library map, click on the **Mailslot** icon and select **Unassign** from the context menu.
4. When the **Unassign Mailslot from a Partition** dialog appears, press **OK** to unassign the mailslot or **Cancel** to abort.

Unassign the Mailslot Using the Local Operator Panel

1. On the **Home** screen, tap the **Mailslot** button.

   The **Mailslot** page appears.
2. Press the **Unassign Mailslot** button.
3. When the **Unassign Mailslot from a Partition** dialog appears, press **OK** to unassign the mailslot or **Cancel** to abort.

Moving Tape Cartridges with the SL150 User Interface

Generally, the host backup or storage-management application should control all data cartridge movements. If you move cartridges with the browser-based user interface, you can cause inconsistencies in application catalogs and force time-consuming audits.

However, when circumstances require, an **Operator**, **Service** representative, or **Administrator** can proceed as follows:

Move Tape Cartridges Using the Browser-Based User Interface

1. If you are not currently logged in, log in as an **administrator** or **operator**.
2. Select the **Library** screen from the screens menu on the left side of the interface.
3. In the graphical library map, click on one of the cartridges that you need to move.
4. When the context menu appears, select **Move Tape**. The **Move Tape** panel appears at the top of the screen. In the **Source** field, the address of the cartridge that you chose appears.

5. In the graphical library map, click on the desired destination cartridge slot (it must be empty). In the **Destination** controls on the **Move Tape** panel, the address of the cartridge slot that you chose appears.
6. In the **Move Tape** panel, press the **OK** button to perform the move or **Cancel** to abort.
7. When the **Move Tape** panel shows that the move is complete, press the **OK** button to close the panel.

6

Monitoring and Diagnostics

Monitoring library operations for component failures and operational problems is one of the few regular tasks that you need to perform when operating an StorageTek SL150 Modular Tape Library. The library is designed to operate automatically, under the control of host software. So, under normal circumstances, little or no operator intervention is needed. You merely need to monitor the system for abnormal conditions. Careful monitoring and prompt corrective actions minimize library downtime and maximize the availability of your data.

This section starts by outlining the main approaches to monitoring the health and operations of the StorageTek SL150 Modular Tape Library and the interfaces that support the,:

- Using SL150 User Interfaces
- Using Simple Network Management Protocol (SNMP)

Then it describes the processes for handling any problems that you detect:

- Troubleshooting
- Getting Parts and Technical Support.

Using SL150 User Interfaces

The SL150 user interfaces provide a comprehensive set of remote and local monitoring tools. This section explains how to carry out each of the following tasks:

- Monitor the Browser-based User Interface
- Check the Local Operator Panel
- Check Library and Component LED Indicators

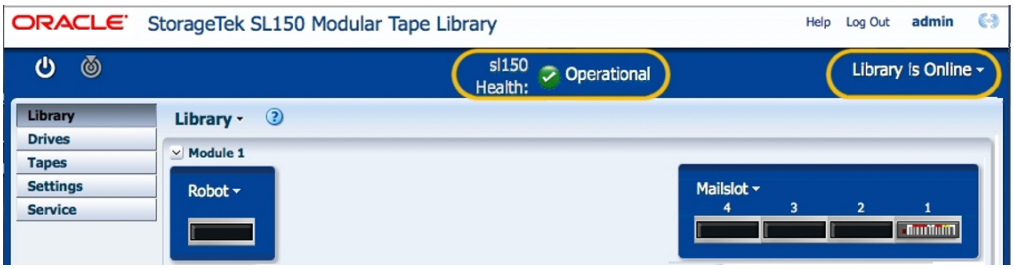
Monitor the Browser-based User Interface

The remote, web-based user interface is the main tool for monitoring the SL150 Modular Tape Library. It provides straightforward monitoring and troubleshooting tools and a comprehensive set of management interface. It is accessible from any workstation that has a web browser installed and network access to the library. Routine system monitoring is as simple as Checking the System Dashboard and Checking Health Details.

Checking the System Dashboard

To monitor the SL150 tape library, you need only glance at the **Library Health** and host connection state indicators found at the top of every screen in the remote user

interface. These two indicators summarize the overall operating condition of the library and the status of its connection with its host system.

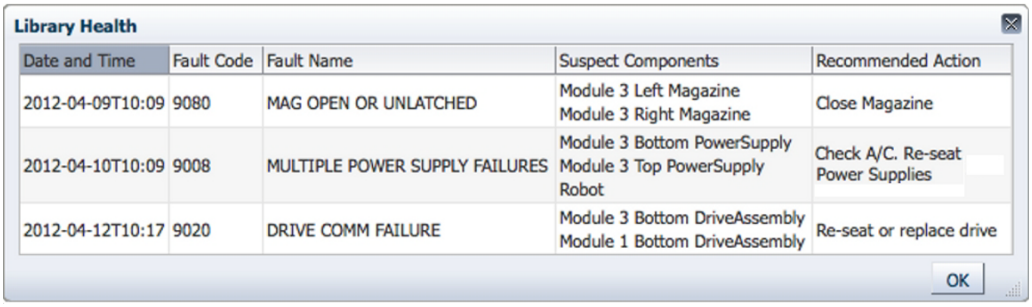


The library **Health** indicator represents the aggregate state of every component in the system. When the library is **Operational**, all library components are themselves **Operational** and the library as a whole is fully functional and available for use. When the library is **Degraded**, the library is working and available for use, but one or more components have either failed or been degraded by subcomponent failures. When the library has **Failed**, it is unusable. Either a critical, non-redundant component has failed or a faulty bridged drive has broken the control-data path between the library and the host.

The library host-connection status indicator shows whether the **Library is Online** and available to host applications or unavailable due to maintenance or system faults. The library may be unavailable for any of the following reasons: the **Library is Offline**, a **Magazine is Open**, the **Library is Initializing**, the **Library is Powering Down**, the library is undergoing **Maintenance**, library **Start-up Failed**, or the **Library is Inoperative** and needs to be restarted.

Checking Health Details

If the library **Health** indicator shows that the library is **Degraded** or **Failed**, click on the indicator to view details. The remote user interface displays a fault table with a **Date and Time**, a **Fault Code** and **Fault Name** a list of **Suspect Components**, and a **Recommended Action** for correcting each problem.



Faults can have side effects that make other, healthy components appear faulty. So the **Suspect Components** field of each fault record lists possible causes in order of probability. For example, if the expansion controller on module 3 has lost its connection to the library controller and the motherboard, chassis, and power supply of the same module appear to have failed, the **Suspect Components** field will list the module interconnect cable that links module 3 to the library controller first, followed by the other, less-likely components.

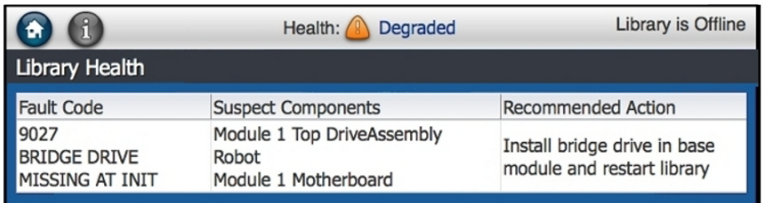
For more information on interpreting library health information, see "Troubleshooting" on page 6-9.

Check the Local Operator Panel

The SL150 local operator panel lets you check on library status and configuration when you are working directly with the hardware and cannot easily use the browser-based user interface. The local operator panel can be especially valuable when you Check Library and Component LED Indicators.

In the operator panel, the **Health** and host connection state indicators are again located at the top of the every screen. If the library **Health** indicator shows that the library is **Degraded** or **Failed**, click on the indicator to view details.

The local operator panel displays the same health details as the remote user interface, but in abbreviated form: a **Fault Code** that includes the fault name, a list of **Suspect Components**, and a corresponding **Recommended Action**:



For more information on interpreting library health information, see "Checking Health Details" on page 6-2 and "Troubleshooting" on page 6-9.

Check Library and Component LED Indicators

When you have physical access to the library, you can monitor its overall status and the status of individual Customer Replaceable Unit (CRU) components by checking the indicators on the library base module. A pair of light-emitting diode (LED) indicators shows the health of the library and the health of each of its customer-replaceable components:

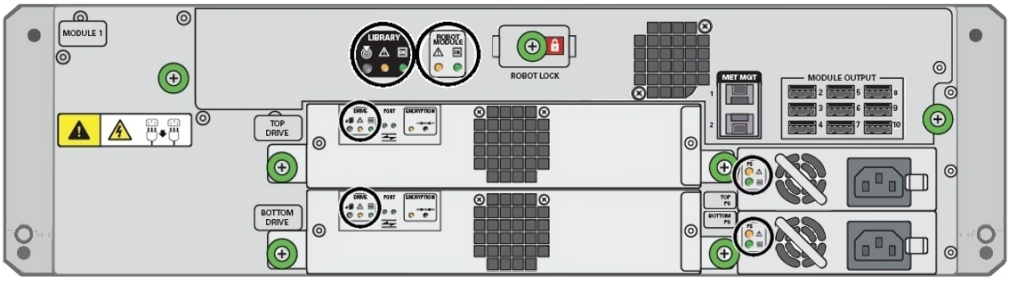
If the **OK** LED is green and the alert (!) LED is off, the library or component is fully **Operational**.

If the **OK** LED is green and the alert (!) LED is amber, the library or component is **Degraded**. It is still operating but with reduced functionality.

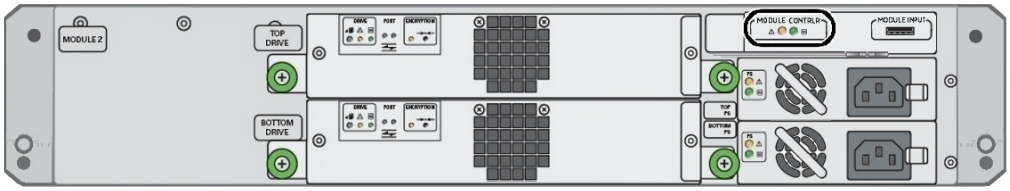
If the **OK** LED is off and the alert (!) LED is amber, the library or component has **Failed** and cannot perform its function.

Library health indicators are located on the front panel of the library base unit at upper left, alongside the power button. Health indicators for the customer-replaceable local operator panel are found alongside the upper left corner of the touch-screen display.

The rear panel of the base unit also holds library health indicators health indicators, this time located at the top just left of center. Additional indicators show the status of customer replaceable units (CRUs), such as the robot/library controller, the power supplies, and tape drives.



The module controller in the upper right corner of the rear panel of an expansion module holds an additional set of LED health indicators.



Using Simple Network Management Protocol (SNMP)

Network management applications can monitor the SL150 Modular Tape Library using the Simple Network Management Protocol (SNMP). You can configure the library's SNMP agent to automatically send *traps* that alert network management stations to faults and configuration changes.

The SL150 library supports both version 2c and version 3 of the SNMP standard, so you can select the version that best meets your needs. Version 2c is backward compatible with earlier versions of the standard but is insecure (authentication credentials—*community strings*—and management data are exchanged in clear text). SNMP version 3 is not backwards compatible but supports a more secure authentication method and encryption of the management data.

The **SNMP** tab of the **Settings** screen lets you carry out the following SNMP configuration tasks:

- Adding an SNMP User
- Updating an SNMP User
- Deleting an SNMP User

- Adding an SNMP Trap Recipient
- Updating an SNMP Trap Recipient
- Deleting an SNMP Trap Recipient
- Sending a Test Trap
- Downloading the Management Information Base (MIB).

For detailed information on SNMP and Oracle's StorageTek Modular Libraries, see the *SNMP Reference Guide* in the *SL150 Modular Tape Library Customer Documentation Library*.

Adding an SNMP User

SNMP users are allowed to access the library's SNMP agent. To add a user, proceed as follows.

1. Log in under the **Administrator** or **Service** role.
2. Select **Settings** from the menu on the left side of the interface. A set of tabbed property sheets appears.
3. Select the **SNMP** tab.
4. Go to the **SNMP Users** table.
5. Click on **Add SNMP User** in the control bar above the table.
6. When the **Add SNMP User** dialog appears, select an SMNP version from the **Version** list. Choose **v3** unless you have no security concerns and need compatibility with older SNMP versions, in which case choose **v2c**.
7. If you chose **v2c**, enter a *community string* (a password or phrase) in the **Community Name** text field. Then go to step 12.
8. If you chose **v3**, enter a name for the new SNMP user in the **User Name** field.
9. Select one of the user-authentication methods listed in the SNMP v3 **Authentication Protocol** list. Choose **SHA** for best security or **MD5** for compatibility with systems that use MD5.
10. Enter a strong authentication password in the SNMP v3 **Authentication Passphrase** text field.
11. To secure management data during network transmission, choose an encryption standard from the SNMP v3 **Privacy Protocol** list. Select **AES** (Advanced Encryption Standard) for best security or **DES** (Data Encryption Standard) for compatibility with systems that use DES.
12. Enter a strong data-protection password in the SNMP v3 **Privacy Passphrase** text field.
13. Press **OK** to commit your changes or **Cancel** to discard them.

Updating an SNMP User

To change the access parameters of an SNMP user, proceed as follows:

1. Log in under the **Administrator** or **Service** role.
2. Select **Settings** from the menu on the left side of the interface.

   A set of tabbed property sheets appears.

3. Select the **SNMP** tab.
4. Go to the **SNMP Users** table.
5. Click on **Edit SNMP User** in the control bar above the table. The **Edit SNMP User** dialog appears.
6. If you need to change the SMNP version used, click the **Version** list. Choose **v3** unless have no security concerns and need compatibility with older SNMP versions, in which case choose **v2c**.
7. If you changed to SNMP **v2c** in the preceding step, enter a *community string* (a password or phrase) in the **Community Name** text field. Then go to step 12.
8. If you just need to change an SNMP v2c community string, make your change in the **Community Name** text field. Then go to the last step.
9. If you changed to SNMP **v3** in step 5, enter a name for the SNMP user in the **User Name** field.
10. If you just need to change an SNMP **v3** user name, make your changes in the **User Name** field.
11. If you need to change the SNMP v3 authentication method, select one of the methods listed in the **Authentication Protocol** list. Choose **SHA** for best security or **MD5** for compatibility with systems that use MD5.
12. If you need to change the SNMP v3 authentication password, make your changes in the **Authentication Passphrase** text field.
13. If you need to change the SNMP v3 data-encryption method, chose a standard from the **Privacy Protocol** list. Select **AES** (Advanced Encryption Standard) for best security or **DES** (Data Encryption Standard) for compatibility with systems that use DES.
14. If you need to change the SNMP v3 data-protection password, make your changes in the **Privacy Passphrase** text field.
15. Press **OK** to commit your changes or **Cancel** to discard them.

Deleting an SNMP User

To deny an existing SNMP user access to the SNMP agent, proceed as follows:

1. Log in under the **Administrator** or **Service** role.
2. Select **Settings** from the menu on the left side of the interface. A set of tabbed property sheets appears.
3. Select the **SNMP** tab.
4. Go to the **SNMP Users** table.
5. Click on **Delete SNMP User** in the control bar above the table. The **Delete SNMP User** dialog appears.
6. Press **OK** to delete the user or **Cancel** to abort.

Adding an SNMP Trap Recipient

An SNMP trap recipient is a network management station that you designate to receive notifications sent by the SNMP agent on the library. To add a trap recipient, proceed as follows.

1. Log in under the **Administrator** or **Service** role.

2. Select **Settings** from the menu on the left side of the interface. A set of tabbed property sheets appears.
3. Select the **SNMP** tab.
4. Go to the **SNMP Trap Recipients** table.
5. Click on **Add Trap Recipient** in the control bar above the table. The **Add Trap Recipient** dialog appears.
6. Enter the IP address of the management host that should receive the trap in the **Host** text field.
7. Enter the severity of the notifications that should be sent to this management station in the **Trap Level** field.

   See Appendix C, "SNMP Traps," for a list of valid entries.
8. Select an SMNP version from the **Version** list.
9. If you chose **v2c**, enter a *community string* (a password or phrase) in the **Community Name** text field. Then go to the last step.
10. If you chose **v3**, enter the name of the SNMP user that will have access to the traps in the **Trap User Name** field.
11. To authenticate the user, select one of the methods listed in the SNMP v3 **Authentication Protocol** list. Choose **SHA** for best security or **MD5** for compatibility with systems that use MD5.
12. Enter a strong authentication password in the SNMP v3 **Authentication Passphrase** text field.
13. To secure management data during network transmission, choose an encryption standard from the SNMP v3 **Privacy Protocol** list. Select **AES** (Advanced Encryption Standard) for best security or **DES** (Data Encryption Standard) for compatibility with systems that use DES.
14. Enter a strong data-protection password in the SNMP v3 **Privacy Passphrase** text field.
15. In most cases, accept the default, library-generated value in the **Engine ID** field. If you must override this value, enter a hexadecimal value that starts with `0x` and does not contain either all zeroes (`0`) or all sixteens (`F`).
16. Press **OK** to commit your changes or **Cancel** to discard them.

Updating an SNMP Trap Recipient

An SNMP trap recipient is a network management station that you designate to receive notifications sent by the SNMP agent on the library. To modify trap recipient information, proceed as follows.

1. Log in under the **Administrator** or **Service** role.
2. Select **Settings** from the menu on the left side of the interface. A set of tabbed property sheets appears.
3. Select the **SNMP** tab.
4. Go to the **SNMP Trap Recipients** table.
5. Click on **Edit Trap Recipient** in the control bar above the table. The **Edit Trap Recipient** dialog appears.

6. To change the IP address of the management host that should receive the trap, enter the change in the **Host** text field.
7. To change the severity of the notifications that are sent to this management station, enter the change in the **Trap Level** field.

   See Section C, "SNMP Traps," for a list of valid entries.
8. If you need to change the SMNP version used, select either **v3** or **v2c** from the **Version** list.
9. If you changed to **v2c**, enter a *community string* (a password or phrase) in the **Community Name** text field. Then go to the last step.
10. If you just need to change an SNMP v2c community string, make your change in the **Community Name** text field. Then go to the last step.
11. If you changed to **v3**, enter the name of the SNMP user that will have access to the traps in the **Trap User Name** field.
12. If you just need to change the name of the SNMP user that will have access to the traps, enter the change in the **Trap User Name** field
13. To change the SNMP v3 authentication method, select one of the methods listed in the **Authentication Protocol** list. Choose **SHA** for best security or **MD5** for compatibility with systems that use MD5.
14. To change the SNMP v3 authentication password, make your changes in the **Authentication Passphrase** text field.
15. To change the SNMP v3 data-encryption method used, choose a standard from the **Privacy Protocol** list. Select **AES** (Advanced Encryption Standard) for best security or **DES** (Data Encryption Standard) for compatibility with systems that use DES.
16. To change the SNMP v3 data-protection password, enter the changes into the **Privacy Passphrase** text field.
17. If you must change the SNMP v3 agent identifier, enter the changes in the **Engine ID** field. Your entry must be a hexadecimal value that starts with `0x` and does not contain either all zeroes (`0`) or all sixteens (`F`).
18. Press **OK** to commit your changes or **Cancel** to discard them.

Deleting an SNMP Trap Recipient

To remove an SNMP management station from the trap recipients list, proceed as follows:

1. Log in under the **Administrator** or **Service** role.
2. Select **Settings** from the menu on the left side of the interface. A set of tabbed property sheets appears.
3. Select the **SNMP** tab.
4. Go to the **SNMP Trap Recipients** table.
5. Click on **Delete Trap Recipient** in the control bar above the table. The **Delete Trap Recipient** dialog appears.
6. Press **OK** to delete the trap recipient or **Cancel** to abort.

Sending a Test Trap

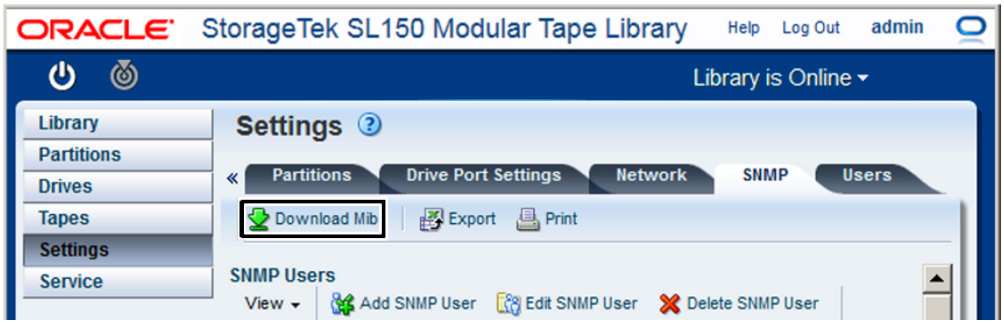
To test your SNMP configuration, proceed as follows:

1. Log in under the **Administrator** or **Service** role.
2. Select **Settings** from the menu on the left side of the interface. A set of tabbed property sheets appears.
3. Select the **SNMP** tab.
4. Go to the **SNMP Trap Recipients** table.
5. Click on **Send a Test Trap** in the control bar above the table. The **Send a Test Trap** dialog appears.
6. Press **OK** to send the test trap to all configured recipients or **Cancel** to abort.

Downloading the Management Information Base (MIB)

You can download the management information base (MIB) using the procedure below:

1. Log in under the **Administrator** or **Service** role.
2. Select **Settings** from the menu on the left side of the interface. A set of tabbed property sheets appears.
3. Select the **SNMP** tab.
4. Click the **Download Mib** icon in the upper left corner of the **SNMP** tab.



5. When your browser's file-download dialog opens, save the `STREAMLINE-TAPE-LIBRARY-MIB.txt` file to disk.

Troubleshooting

To diagnose library problems, proceed as follows:

1. Try to Log In to the remote, browser-based user interface.
2. If you log in successfully, Take the Library Off Line, and Use the Health Table, as described in the next section.
3. If you cannot log in to the remote, browser-based user interface, go to the library and Check the Local Operator Panel.
4. If the local operator panel is working and the remote user interface is not, make sure that an Ethernet cable is connected to **NET MGT** port **0** at the rear of the library. Check for network problems.
5. If you found and corrected network problems, open a web browser and Log In to the remote user interface, then Take the Library Off Line and Use the Health Table to check the library for problems.

6. If the local operator panel is also not working, make sure that the library has power. Make sure that a power cord is correctly connected to each power supply and to a working, data-center power outlet.
7. If the library is not connected to power, correct the problem. Stop here.
8. If the library is connected to power, Check Library and Component LED Indicators.
9. If an amber **PS** (power supply) LED is lit or if both power supply LEDs are dark, replace the power supply, as described in the *StorageTek SL150 Modular Tape Library Customer Replaceable Unit Guide*. Stop here.
10. If an amber **Robot Module** LED is lit or if both robot LEDs are dark, replace the robot as described in the *StorageTek SL150 Modular Tape Library Customer Replaceable Unit Guide*. Stop here.
11. If the robot module is OK, Restart the Library, and repeat this procedure.
12. If you have resolved the problem after restarting the library and repeating the above diagnostic steps, stop here.
13. If problems persist after you have restarted the library and repeated the above diagnostic steps, go to "Getting Parts and Technical Support" on page 6-16, Check for Relevant Knowledge Articles, and then, if necessary, Create a Service Request.

Use the Health Table

The library **Health** indicator at the top of every SL150 browser-based user interface screen is your main diagnostic tool. If the **Health** indicator shows that the library is **Degraded** or **Failed**, proceed as follows:

1. Click on the **Degraded** or **Failed** indicator.

   The user interface displays a **Library Health** table with a row for each fault detected on the system. Each row contains fields for the **Date and Time**, **Fault Code**, and **Fault Name associated with the problem,** a prioritized list of **Suspect Components** that might be causing the problem, and the **Recommended Action** for correcting the problem.
2. For each fault record in the table, Step Through the Suspect Components Listed in the Fault Record.
3. If you close all open fault records and still cannot get the library into **Operational** condition, go to "Getting Parts and Technical Support" on page 6-16, Check for Relevant Knowledge Articles, and, if you cannot find a resolution, Create a Service Request. Include fault codes and details of the actions that you have taken.
4. Otherwise, if desired, you can make sure that the library is functioning normally by Performing a Library Self Test.

Step Through the Suspect Components Listed in the Fault Record

1. Note the **Fault Code** for the record.
2. Note the first component listed in the **Suspect Components** field of the record (the field may identify up to five components).
3. Note the corresponding **Recommended Action**.
4. If the **Fault Code** is **9108** and the **Suspect Components** field lists one or more magazines, carry out the procedure "Locate and Remove a Cartridge that is Stuck in a Magazine Slot" on page 6-11.

5. If the **Fault Code** is **9108** and the **Suspect Components** field lists one or more drives, carry out the procedure "Free a Cartridge that is Stuck in a Drive" on page 6-12.
6. If the **Fault Code** falls in the range **9102-9107** or is code **9109**, an obstruction may be interfering with the robot. Carry out the procedure "Locate and Clear Obstructions, Such as Loose or Protruding Cartridges" on page 6-12.
7. Otherwise, carry out the recommended action shown. Consult the volumes in the *SL150 Modular Tape Library Customer Documentation Library* for instructions. For updates and additional information, see "Getting Parts and Technical Support" on page 6-16, and Check for Relevant Knowledge Articles.

   Be careful to carry out suggested service actions one at a time and in the order specified in the suspect components list.

   If you replace the robot, the operator panel, or the chassis of library module 1, power-cycle the library as soon as you finish. These three components maintain records of the product serial number and configuration settings. If you replace more than one of them at a time, without restarting the library, this information will be lost.
8. If the connection status indicator shows that the **Library is Inoperative**, you need to restart it. See "Restart the Library" on page 14.
9. Once you have carried out the recommended action and, if necessary, restarted the library, see if the corresponding fault record has been closed. See "Check the Library Health Log" on page 6-15.
10. If the **Type** field of the **Health Log** record shows that the record is still **Open**, you have not yet isolated the problem. Note the next item listed in the **Suspect Components** field of the record, and repeat steps 3-8.
11. If the **Type** field shows that the record is **Closed** and the library **Health** status is now **Operational**, stop here.
12. If the **Type** field shows that the record is **Closed** but the library **Health** status is still **Degraded**, check for remaining faults. See "Use the Health Table" on page 6-10.

Locate and Remove a Cartridge that is Stuck in a Magazine Slot

If the Library Health table lists an event with fault code 9108 and includes one or more magazines in the Suspect Components field for the event, a cartridge is probably stuck in a storage cell.

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

To locate and correct the problem, proceed as follows:

1. Select the first magazine listed in the **Suspect Components** field of the fault record.
2. Take the magazine out of the enclosure. See "Manually Unlatch and Remove the Magazine" on page 6-13.

3. Working methodically from one end to the other, grasp each cartridge by the top and bottom gripping surfaces, and see if it moves freely.
4. If a cartridge is stuck, gently try to free it, and check the source storage cell for defects.
5. If you find any damage to the magazine, request a replacement. Go to "Getting Parts and Technical Support" on page 6-16, and Create a Service Request.
6. If you cannot free a stuck cartridge, do not force it. Go to "Getting Parts and Technical Support" on page 6-16, and Check for Relevant Knowledge Articles. If you cannot find a resolution, Create a Service Request.
7. Otherwise, reseat the cartridge in its slot and make sure that it is moving freely.
8. Reinstall the magazine in its bay.
9. The connection status indicator now shows that the **Library is Inoperative**, so you need to restart. See "Restart the Library" on page 6-14.
10. Once the library restarts, see if the corresponding fault record has been closed. Go to "Check the Library Health Log" on page 6-15.
11. If the **Type** field of the **Health Log** record shows that the record is still **Open**, you have not yet isolated the problem. Repeat the procedure "Step Through the Suspect Components Listed in the Fault Record" on page 6-10, this time investigating the next suspect component listed in the fault record.
12. If the fault record is **Closed** and the library **Health** status is now **Operational**, stop here. The library is again operating normally.
13. If the fault record has been closed but the library **Health** status is still **Degraded**, check for remaining, open faults. See "Use the Health Table" on page 6-10.

Free a Cartridge that is Stuck in a Drive

If the Library Health table lists an event with fault code 9108 and includes one or more tape drives in the Suspect Components field for the event, a tape cartridge is probably stuck in the drive. To resolve the problem, proceed as follows:

1. Note the order and identities of the components listed in the **Suspect Components** field of the **Library Health** table row that corresponds to the fault event.
2. Go to directly to "Getting Parts and Technical Support" on page 6-16, and Check for Relevant Knowledge Articles. If you cannot find a resolution, Create a Service Request.

Locate and Clear Obstructions, Such as Loose or Protruding Cartridges

If the Library Health table lists a fault code in the range **9102-9107** or code **9109**, a mispositioned cartridge or similar obstruction is probably interfering with the robot.

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

To locate and clear the obstruction, proceed as follows:

1. Select the magazine that will give you the best view of the interior of the library.

2. Manually Unlatch and Remove the Magazine.
3. If you felt any significant resistance when attempting to remove the magazine, you may have found the obstruction stop (a tape cartridge may be protruding from one of the slots in this magazine and catching on the library structure). Select a magazine on the opposite side of the library, and repeat step 2.
4. Using the empty magazine bay as a window, look inside the library and try to locate obstructions, particularly loose or protruding cartridges. Look across, above, and below.
5. If you cannot see any obstructions, gain additional visibility by removing additional magazines.
6. If you see a cartridge protruding from a storage slot in one of the magazines or lying on the bottom of the library, reach in through the open magazine bay and remove it, if you can. Provide additional clearance, if necessary, by removing additional magazines.
7. If you cannot remove the problem cartridge, stop here, go to "Getting Parts and Technical Support" on page 6-16, and Check for Relevant Knowledge Articles. If you cannot find a resolution, Create a Service Request.
8. If you successfully removed the problem cartridge, remove the source magazine and check the source storage cell for defects.
9. If you find any damage to the source magazine, request a replacement. Go to "Getting Parts and Technical Support" on page 6-16, and Create a Service Request.
10. Otherwise, reseat the errant cartridge in its storage cell.
11. Reinstall all removed magazines in their original bays.
12. Once you have reinserted the magazines, go to "Restart the Library" on page 6-14. Then go to "Check the Library Health Log" on page 15.
13. If the **Type** field of the **Health Log** record shows that the record is still **Open**, you have not yet isolated the problem. Repeat the procedure "Step Through the Suspect Components Listed in the Fault Record" on page 6-10, this time investigating the next suspect component listed in the fault record.
14. If the fault record has been closed and the library **Health** status is now **Operational**, stop here.
15. If the fault record has been closed but the library **Health** status is still **Degraded**, check for remaining open faults. See "Use the Health Table" on page 6-10.

Manually Unlatch and Remove the Magazine

To release the automatic magazine latches during troubleshooting, manually override the software-controlled latches using the following procedure.

Caution: Use this procedure **only** during specified installation, maintenance, and troubleshooting procedures or under the direction of an Oracle service representative. Do not routinely override the automated magazine latches.

To release a magazine during normal operation, use the user interface software: see "Unlatch the Magazine" on page 5-6.

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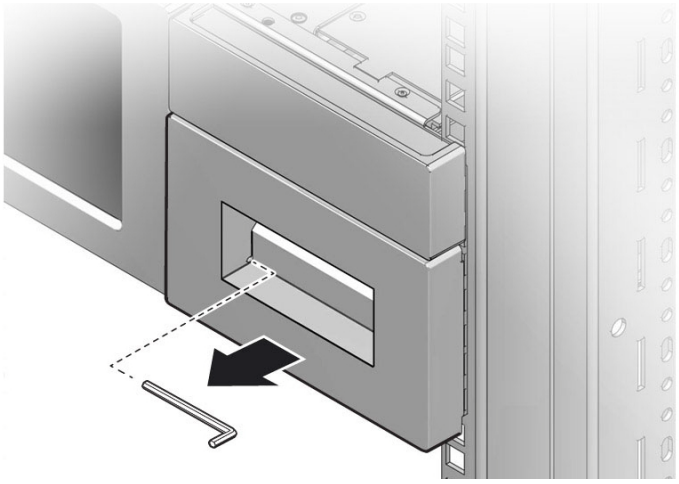
1. If the library is online, carry out the steps under "Take the Library Off Line" on page 7-1 before proceeding further.
2. Insert a 1/64-in Allen wrench into the hole at the lower inside corner of the cartridge magazine (a large paperclip that has been straightened into an L shape will do in an emergency).



3. Align the Allen wrench parallel to the magazine face and slowly push it into the hole.
4. Grasp the handle on the front of the magazine and slowly and gently pull the magazine a short distance out of the library. **Stop if you feel any resistance other than the usual slight friction.**
5. Remove the wrench.
6. Support the bottom of the magazine with your other hand.
7. Slowly and gently start to pull the magazine free of the module.
8. **If you feel any significant resistance, stop immediately**, particularly if you are looking for an obstruction (a tape cartridge may be protruding from one of the slots in this magazine and catching on the library structure).
9. If the magazine slides freely, draw it out of the library, handling it carefully so that cartridges do not spill out.
10. Set the magazine aside on a flat, stable, uncluttered surface, and make a note of the module that you removed it from.
11. Return to what you were doing, either "Locate and Remove a Cartridge that is Stuck in a Magazine Slot" on page 6-11 or "Locate and Clear Obstructions, Such as Loose or Protruding Cartridges" on page 6-12.

Restart the Library

In a troubleshooting situation, you may have to restart the library more than once. Proceed as follows:

1. In the remote user interface, click on the power-button icon—a circle broken by a vertical bar at upper left.
2. When the context menu appears, select **Restart Library**.
3. Return to what you were doing:

- "Locate and Remove a Cartridge that is Stuck in a Magazine Slot" on page 6-11
- "Locate and Clear Obstructions, Such as Loose or Protruding Cartridges" on page 6-12.
- "Step Through the Suspect Components Listed in the Fault Record" on page 6-10.

Check the Library Health Log

1. Select **Service** from the menu on the left side of the browser-based user interface, and select the **Health Log** tab from the tabbed property sheet on the screen.
2. In the **Health Log** table, locate the row for the fault that you have been working on.
3. Note the value of the **Type** field.
4. Return to what you were doing:
   - "Locate and Remove a Cartridge that is Stuck in a Magazine Slot" on page 6-11
   - "Locate and Clear Obstructions, Such as Loose or Protruding Cartridges" on page 6-12
   - "Step Through the Suspect Components Listed in the Fault Record" on page 6-10.

Performing a Library Self Test

The library has a self-test feature that exercises all of the library's capabilities and can thus assist with fault isolation, validation of repair actions, and re-calibration following repairs or reconfiguration. A **Basic Self Test** performs the following tasks:

- It fetches a diagnostic tape cartridge and moves it to every empty mailslot cell and free drive in the library.
- It fetches and returns data tapes that occupy mailslot cells and drives.

A **Full Self Test** expands on the basic test:

- It fetches a diagnostic tape cartridge and moves it to every empty storage slot, empty mailslot cell, and free drive in the library.
- It fetches and returns all data tapes that occupy storage slots, mailslot cells, and drives.
- It recalibrates the library robot.

Note that a full test can take some time, depending on the number of modules in the library. So plan accordingly.

To carry out a self test, proceed as follows:

Run a Library Self Test

1. If you have not already done so, take the library offline. See "Take the Library Off Line" on page 7-1.
2. Make sure that you have a diagnostic cartridge stored in a reserved system slot or in the mailslot.

   For further information, see "Loading and Unloading Individual Cartridges" on page 5-7, "Reserving Storage Slots for System Use" on page 3-2, and "Providing Diagnostic Cartridges" on page 5-2.

3. Click the **Library** control at the top left of the **Library** screen.

   The graphical library map appears.

4. Make sure that the mailslot is closed.
5. Make sure that all magazines are securely latched.
6. Make sure that at least one operational drive is free.
7. Make sure that there is at least one unoccupied cell in the mailslot.
8. Click the **Library** control at the top left of the **Library** screen.
9. Select **Run Self Test** from the **Library** control's context menu.
10. Select **Basic Self Test** or **Full Self Test** from the menu. A basic test will take a few minutes. A full test will take considerably longer.
11. To run the specified test, press **OK** when the confirmation bar appears at the top of the screen. When the test completes, the result bar will display the number of moves performed. Press **OK** to close the result bar.
12. To skip the test press **Cancel**.
13. To end a running test prematurely, press the **Stop the Test** button that appears after the test starts. It may take a short while for the test to stop. When it does, press **OK**.
14. If the diagnostic cartridge was not returned to its reserved cell at the end of the test, move the diagnostic cartridge now. See "Move Tape Cartridges Using the Browser-Based User Interface" on page 5-10.

Saving the Health Log to a File

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

Export the Health Log

1. Log in to the browser-based user interface under the **Administrator** or **Service** role.
2. Select **Service** from the menu on the left side of the interface. A set of tabbed property sheets appears.
3. Select the **Health Log** tab.
4. Select **Export** from the control bar at the top of the tab.
5. When the download dialog appears, save the file to disk.

   The HTML-based `SL150_HealthLog.xls` file is compatible with current spreadsheet applications, such as Microsoft Excel 2010 and Apache OpenOffice Calc 3.4. You can also view these files in web browsers: simply rename the file using the `.html` file extension in place of `.xsl`.

Getting Parts and Technical Support

When you need firmware updates, upgrades, technical assistance, service, or replacement parts, proceed as follows:

1. Open a web browser window, and log in to **My Oracle Support** at `https://support.oracle.com`.

2. Generally, you should start by checking for knowledge articles that address your issue. From the tabbed menu bar that runs across the top of the page, select **Knowledge** and Check for Relevant Knowledge Articles.
3. If you need to check or upgrade the library firmware, select **Patches & Updates**. Then Get Firmware Updates.
4. For all other issues, select **Service Requests**. Then Create a Service Request.

Check for Relevant Knowledge Articles

1. To find relevant knowledge articles, go the **Select a product line or a product** area of the **Knowledge** tab.
2. Using the **Browse** menu, select **Sun Microsystems > Storage-Tape > Libraries—SL-series > StorageTek SL150 Modular Tape Library**.
3. Go to the **What do you want to do?** area.
4. Select an option from the list: **Overview**, **Use Product**, **Troubleshoot**, **Patching and Maintenance**, **Install and Configure**, **Upgrade**, **Optimize Performance**, **Security**, or **Certify** (not all options may be relevant to the SL150 library).
5. Press the **Search** button, and browse the listed titles.

Get Firmware Updates

1. Go to the **Patch Search** area of the **Patches & Updates** tab.
2. Click on the **Product or Family (Advanced)** link.
3. Check the **Include all products in a family** checkbox.
4. In the **Product is** field, enter **SL**, and then select **StorageTek SL150 Modular Tape Library** from the list of search results.
5. Check the **Exclude all superseded patches** text box.
6. Press the **Search** button.
7. In the **Patch Search Results** table, click on the hyperlinked **Patch Name** of a patch that you need to download.
8. When the patch description appears, note the details. Then press the **Download** button if you want to download the file immediately or **Press the Add to Plan** button to add it to a group of patches that will be applied together.
9. Follow the instructions on screen.
10. Then carry out the steps listed in "Update the Firmware" on page 3-4.

Create a Service Request

1. If you have not already done so, carry out the steps in "Export the Health Log" on page 6-16 so that you can include full status information with your request when prompted.
2. Click the **Help** control at the upper right corner of the **Service Requests** tab.
3. From the drop-down menu, select **Creating Service Requests (video)** or the text article **How do I create a new SR?**
4. Follow the instructions provided.

7

Maintenance and Upgrades

This chapter describes the few routine maintenance and upgrade activities that a StorageTek SL150 Modular Tape Library may require. These include the following tasks:

- Taking the Library On and Off Line
- Powering the Library On and Off
- Maintaining Tape Drives
- Moving the Library.

Taking the Library On and Off Line

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

To take the library offline, proceed as follows.

Take the Library Off Line

1. Quiesce the host application, so that active storage operations are not disrupted.
2. Log in to the browser-based user interface under the **Operator**, **Service**, or **Administrator** role.
3. On the status bar at the top of the interface, click on **Library is Online** and select **Set Library Offline**.
4. To take the library offline, press the **OK** button when the confirmation dialog appears.
5. To abort, press the **Cancel** button when the confirmation dialog appears.

Bring the Library On Line

To bring the library back online, proceed as follows:

1. Log in to the browser-based user interface under the **Operator**, **Service**, or **Administrator** role.
2. On the status bar at the top of the interface, click on **Library is Offline** and select **Set Library Online**.
3. To bring the library online, press the **OK** button when the confirmation dialog appears.

4. To abort, press the **Cancel** button when the confirmation dialog appears.

Powering the Library On and Off

If a maintenance procedure requires that you power the library off and/or restart, use the procedures below:

- Power the Library On
- Power the Library Off
- Restart the Library

For an explanation of library behavior following power interruptions, see "Restarting the Library Following a Power Outage" on page 7-3.

Power the Library On

When the SL150 library is powered off, the browser-based user interface is not running, so you cannot power the system on remotely. You must have physical access to the library.

To power the library on, press the power switch on the upper left quadrant of the front panel of the base module.

The library then boots and performs an *audit* of the contents. See Auditing, below, for details.

Power the Library Off

1. If you have physical access to the library, press the power switch on the upper left quadrant of the front panel of the base module.
2. If you are working remotely, log in to the browser-based user interface under the **Operator**, **Service**, or **Administrator** role, click on the power-button icon in the top left corner of the interface.
3. Select **Power Down Library** from the context menu (remote interface) or popup dialog (local operator panel interface).

   A **Power Down Library** confirmation dialog appears.
4. If you plan to move the library to a new location, need to add or replace expansion modules, or need to remove or replace the robot/library controller assembly, go to "Securing the Robot and Controller Assembly" on page 7-8, Park the Robot, and Lock the Robot.

5. Otherwise, in the confirmation dialog, press the **OK** button to power down or **Cancel** to abort.

Restart the Library

1. If you have physical access to the library, press the power switch on the upper left quadrant of the front panel of the base module.
2. If you are working remotely, log in to the browser-based user interface under the **Operator**, **Service**, or **Administrator** role, click on the power-button icon in the top left corner of the interface.
3. Select **Restart Library** from the context menu (remote interface) or popup dialog (local operator panel interface).

   A **Restart Library** confirmation dialog appears.
4. When the **Restart Library** confirmation dialog appears, press the **OK** button to continue or **Cancel** to abort.

Restarting the Library Following a Power Outage

The SL150 Modular Tape Library is designed to recover automatically if power is interrupted. If someone inadvertently unplugs the power cord or throws a circuit breaker at the wall panel or if building power is lost altogether, the library returns to its last power state once line power is restored. If the library was **ON** before the outage, it will be **ON** afterward. If **OFF**, it will be **OFF** afterwards.

So, if the library was powered **ON** at the time of the outage, the library will boot up normally as soon as power is once more available. But, if the library was powered **OFF** when the outage occurred, the library does not automatically restart. When power is restored, the library powers up and runs just long enough to check its previous power state. Since it was **OFF** at the time of the outage, it powers itself **OFF** after a few seconds.

Restarting a library that was off prior to a power interruption is thus exactly like restarting any other library that is off. See "Power the Library On" on page 7-2.

Auditing

A library audit checks each slot in the library for tape cartridges, reads the label of each tape cartridge found, and then checks the slot address and label in its internal database. The library updates any slot/label combinations that have changed and adds records for newly entered cartridges. The duration of the process varies based upon the size of the library. A 30-cartridge library takes about seven minutes, for example.

At any time, you can identify the resident cartridge and library address for an active slot by placing the cursor over the cartridge icon and reading the fly-over text:

- The **Tape** label property displays the value read from the label during the audit or the value **[UNREADABLE]**.

  An **[UNREADABLE]** value means that the cartridge is unlabled, the label has been misapplied or damaged, or the label uses an incompatible format.
- The address within the library or partition is expressed as *module number*, *side*, *row number*, and *column number* (for example, **1,Left,1,2**).

Maintaining Tape Drives

The Linear Tape Open (LTO) Gen-5 and Gen-6 drives used in the StorageTek SL150 Tape Storage Library require little in the way of routine maintenance, other than occasional cleaning, restarts, and, when problems arise, removal:

Cleaning Drives

LTO drives normally clean themselves using internal brushes, so cleaning with external cleaning tapes is only necessary when and if the drive detects contaminant buildup that it cannot remove itself. If you have configured your host software application for automatic, reactive, or Tape Alert cleaning, as described in "Setting Up Host-Managed Drive Cleaning" on page 3-8, even these remaining cleaning-related tasks may be nearly automatic.

If, however, you must clean your drives manually, this section describes the main tasks:

Managing Cleaning Media

A cleaning cartridge expires when the drive determines that it is no longer usable, based on parameters stored in non-volatile LTO Cartridge Memory (LTO-CM). When the drive identifies an expired cartridge, it notifies the library by sending a Tape Alert. The library then dismounts the cartridge, flags it as expired, and alerts the browser-based user interface.

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

Otherwise, you can manage cleaning tapes using the procedures below:

- Monitor Cleaning Media Using the Library User Interface
- Eject Expired Cleaning Media with the SL150 User Interface
- Replace Expired Cleaning Media With New Media
- Import the New Cleaning Media into the Library

Monitor Cleaning Media Using the Library User Interface You can monitor cleaning cartridges using the **Library Health** indicator, as described in "Using SL150 User Interfaces" on page 6-1. You can also check individual cleaning cartridges as follows.

1. Log in to the browser-based user interface, and select **Library** from the menu at left.
2. Click on the storage or reserved slot that holds the cleaning cartridge that you want to check.
3. Select **Properties** from the context menu.
4. When the **Slot Properties** sheet appears, note the **Cleaning Tape Status**.

5. If the **Cleaning Tape Status** is **OK**, stop here.
6. If the **Cleaning Tape Status** indicates that the cartridge has expired and the cartridge resides in a host application-managed storage slot, use the host application to eject the cartridges, and "Move Cartridges into the Mailslot" on page 5-8.
7. If the **Cleaning Tape Status** indicates that the cartridge has expired and you keep cleaning cartridges in reserved system slots, Eject Expired Cleaning Media with the SL150 User Interface.

Eject Expired Cleaning Media with the SL150 User Interface

1. Log in to the browser-based user interface under the **Operator**, **Service**, or **Administrator** role.
2. Select **Library** from the menu at left.
3. In the graphical library map, click on the expired cleaning cartridge.
4. When the context menu appears, select **Move Tape**. The **Move Tape** panel appears at the top of the screen. The **Source** type field should be set to **Slot** and the cartridge that you chose should be listed (you may change this selection if desired).
5. In the graphical library map, click on a free mailslot cell. The **Destination** type field of the **Move Tape** panel should now identify the **Mailslot** cell that you selected (you may change this selection if desired).
6. In the **Move Tape** panel, press the **OK** button to perform the move or **Cancel** to abort.
7. When the **Move Tape** panel shows that the move is complete, press the **OK** button to close the panel.
8. Repeat the above procedure from step 2 to step 6 until all expired cleaning cartridges have been moved to the mailslot.
9. Replace Expired Cleaning Media With New Media as soon as possible.

Replace Expired Cleaning Media With New Media

1. Carry out the procedure "Move Cartridges into the Mailslot" on page 5-8. Remove the expired media.
2. Dispose of expired media promptly, so that dirty cartridges are not inadvertently reimported and reused.
3. Load the required number of new cleaning cartridges into the library mailslot, using the procedures for Loading and Unloading Individual Cartridges on page 5-7.
4. Import the New Cleaning Media into the Library.

Import the New Cleaning Media into the Library

1. If the cleaning cartridges are assigned to host-managed storage slots, use the application to move the new cleaning cartridges from the mailslot to the storage slot(s) that the application uses for cleaning media. Stop here.
2. Otherwise, log in to the browser-based user interface under the **Operator**, **Service**, or **Administrator** role.
3. Select **Library** from the menu at left.

4. In the graphical library map, move to the mailslot and click on a cleaning cartridge.
5. When the context menu appears, select **Move Tape**. The **Move Tape** panel appears at the top of the screen. The **Source** type field should be set to **Mailslot** and the cartridge that you chose should be listed (you may change this selection if desired).
6. In the graphical library map, click on the reserved slot where the cleaning cartridge will reside. The **Destination** type field of the **Move Tape** panel should now identify the **Slot** location that you selected (you may change this selection if desired).
7. In the **Move Tape** panel, press the **OK** button to perform the move or **Cancel** to abort.
8. When the **Move Tape** panel shows that the move is complete, press the **OK** button to close the panel.
9. Repeat the above procedure from step 3 to step 7 until all cleaning cartridges have been loaded.

Cleaning Drives Using the Library User Interface

Oracle does not generally recommend cleaning tape drives yourself if your host application can be configured to manage cleaning automatically. LTO drives rarely require cleaning with external cartridges, so monitoring for cleaning requests is best left to software (see "Selecting a Cleaning Strategy" on page 3-7 for more information). If you must rely on the procedure described in this section when maintaining your drives, you need to understand when and why cleaning is required and why, when unneeded, it may damage the drive.

Linear Tape Open (LTO) drives are self-cleaning in normal use and do not require routine cleaning with cleaning cartridges. Internal brushes remove debris and contaminants before they have a chance to build up on recording surfaces. Cleaning cartridges are only needed if the recording surfaces of the drive frequently come into direct contact with the recording media. For example, when slow I/O causes excessive repositioning and retensioning of the tape media (a phenomenon called *shoe-shining*), the tape media wears rapidly and the normal gap between the tape surface and drive's recording surfaces becomes hard to maintain. When the shoe-shining is prolonged or repeated, magnetic debris from worn tape surfaces transfers to the recording heads of the drive, where it forms hard deposits that cause read/write errors. When the LTO drive detects excessive numbers of these read/write errors, it automatically requests supplemental cleaning by sending standard tape alerts that can be detected by the SL150 tape library and by most host applications.

Cleaning cartridges have to be abrasive to wear away the hard deposits that come with heavy use. So using these cartridges on the polished recording surfaces of a clean drive causes significant damage. For this reason, use the SL150 user interface to clean drives only when you are prompted to do so, either by a fault message in the **Health Table** (code `9030`, `DRIVE_NEEDS_CLEANING`) or in the **Health** property on the drive properties sheet. **Never clean drives according to a calendar schedule or number of media mounts.** On the other hand, you should not ignore cleaning requests. When an LTO drive requests cleaning, you can be sure that external cleaning is necessary to restore drive performance and minimize future problems.

Check for Drives that Require Cleaning

1. Log in to the browser-based user interface under the **Operator**, **Service**, or **Administrator** role.

2. If the **Library Health** indicator on the dashboard bar at the top of the interface is **Degraded**, click on it, and examine the **Health Table** for code `9030`, `DRIVE_NEEDS_CLEANING`.
3. Alternatively, use the **Library** screen to check each drive individually. Click on each drive, select **Properties** from the context menu, and check the **Health** property.
4. If a drive a health table entry or drive property indicates that cleaning is needed, note the component address (the module number and the position, either **Top** or **Bottom**), and Use the Library User Interface to Clean the Degraded Drive.
5. Otherwise, no drives need cleaning. Stop here.

Use the Library User Interface to Clean the Degraded Drive

1. Log in to the browser-based user interface under the **Operator**, **Service**, or **Administrator** role.
2. Select **Library** from the menu on the left side of the interface. The graphical library map appears.
3. Using the mouse, navigate to the icon for the drive that you need to clean, and click on the icon.

   Drive icons are identified by the library module number, physical position (**Top** or **Bottom**), and SCSI address of the corresponding drive.
4. Select **Clean Drive** from the drive icon's context menu.
5. When the cleaning dialog appears at the top of the interface, select a cleaning cartridge from the **Use Cleaning Tape** list control, and click the **OK** button. Or click the **Cancel** button to skip the cleaning.
6. When the cleaning completes, click the **Close** button to close the dialog.

Restarting Drives

When you need to restart a drive, you can do so as follows:

1. Log in to the browser-based user interface under the **Operator**, **Service**, or **Administrator** role.
2. Select **Library** from the menu on the left side of the interface. The graphical library map appears.
3. Using the mouse or Tab key, navigate to the icon for the drive that you need to reset, and click on the icon.

   Drive icons are identified by the library module number, physical position (**Top** or **Bottom**), and SCSI address of the corresponding drive.
4. Select **Restart Drive** from the drive icon's context menu.
5. When the confirmation dialog appears at the top of the interface, press the **OK** button to continue or **Cancel** to abort.
6. When the drive has restarted, click the **Close** button to close the dialog.

Preparing Tape Drives for Removal

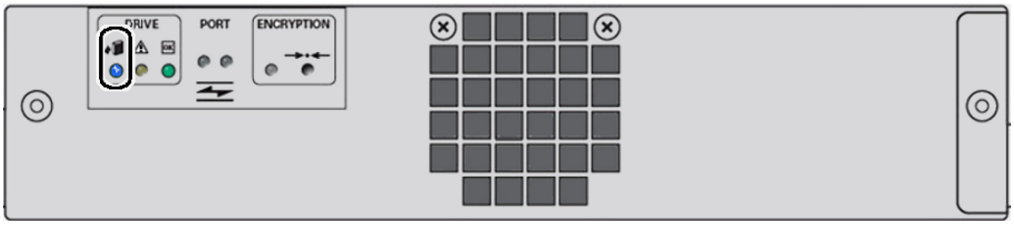
When you need to remove a drive, prepare it for removal using the procedure below:

1. Log in to the browser-based user interface under the **Operator**, **Service**, or **Administrator** role.
2. Select **Library** from the menu on the left side of the interface.

   The graphical library map appears.
3. Using the mouse or Tab key, navigate to icon for the drive that you need to remove, and click on the icon.

   Drive icons are identified by the library module number, physical position (**Top** or **Bottom**), and SCSI address of the corresponding drive.
4. Select **Remove Drive** from the drive icon's context menu.
5. When the confirmation dialog appears at the top of the interface, press the **OK** button to continue or **Cancel** to abort.
6. Click the **Close** button to close the dialog.

   On the drive, a blue LED lights up to show that the drive can be safely removed.



Securing the Robot and Controller Assembly

Before performing maintenance activities that might place obstructions in the path of the robot, Park the Robot in its housing at the top of the base module and Lock the Robot in place. This helps to prevent damage to the robot.

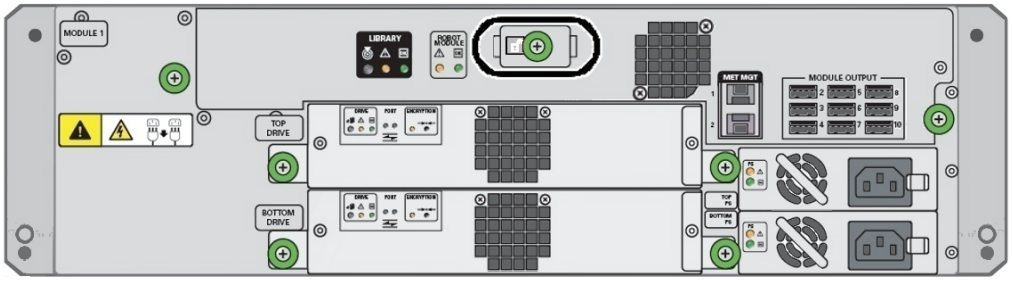
Park the Robot

1. If you have not already done so, Power the Library Off using either the remote user interface or the local operator panel.
2. When the **Power Down Library** confirmation dialog appears, check the **Prepare the Robot for removal before the library powers down** check box.

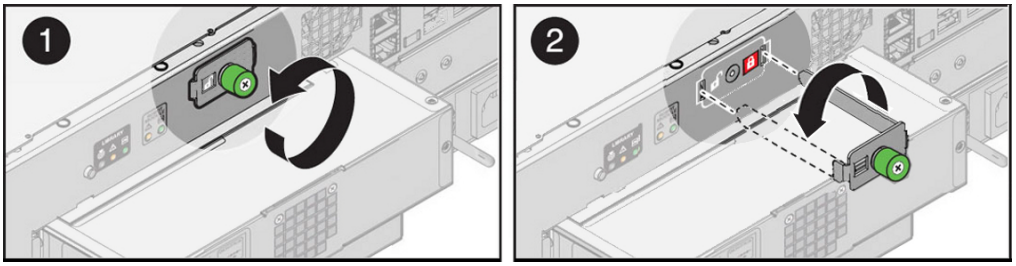
   This moves the robot to its housing at the top of the base module.
3. Press the **OK** button to continue or **Cancel** to abort and stop here.
4. Lock the Robot.

Lock the Robot

1. Locate the robot lock at top center on the back of the base module.



2. Loosen the captive screw on the lock assembly.



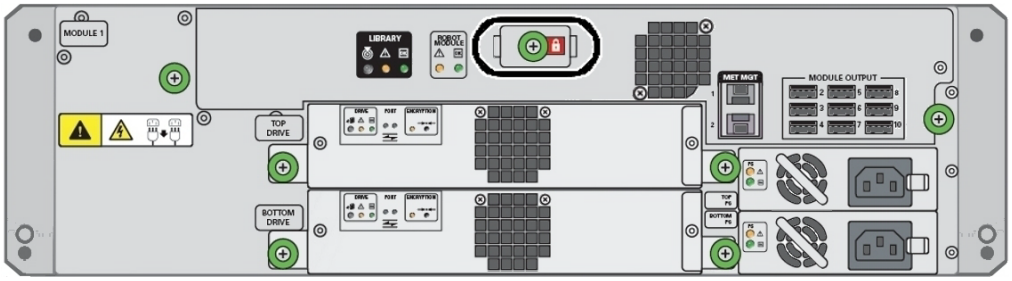
3. Pull the lock assembly straight out of the chassis until the long tab comes out of the slot at right.
4. Rotate the lock assembly counterclockwise 180 degrees, and slide the long tab into the slot at left. Push the lock assembly into the chassis.

   When the lock is correctly inserted, a red, locked padlock icon is visible in the small window on the right side of the lock assembly.
5. Secure the lock assembly by tightening the captive screw.
6. Return to the **Power Down Library** dialog, and check the **I have secured the Robot Lock in the locked position** check box.
7. Press the on-screen **OK** button to continue shutting down or **Cancel** to abort.

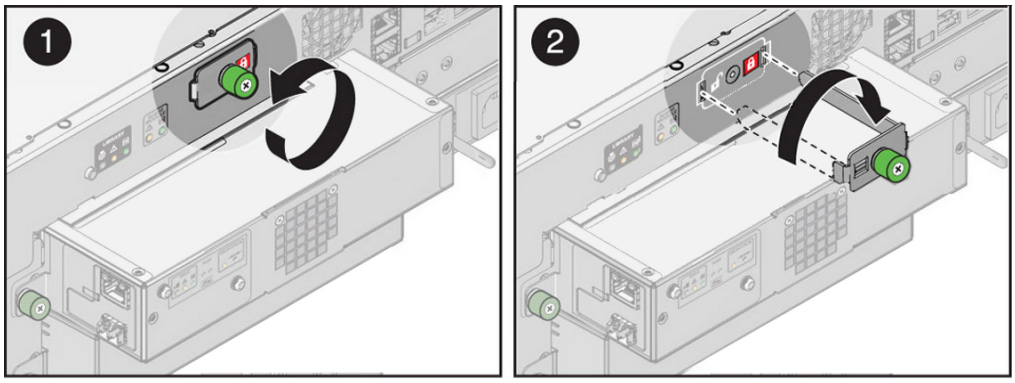
Unlock the Robot

Once you have completed maintenance steps that require locking the robot, remember to unlock it prior to resuming normal operations. Proceed as follows.

1. Locate the robot lock at top center on the back of the base module.



2. Loosen the captive screw on the lock assembly.



3. Pull the lock assembly straight out of the chassis until the long tab comes out of the slot at left.
4. Rotate the lock assembly clockwise 180 degrees, and slide the long tab into the slot at right. Push the lock assembly into the chassis.

   When the lock is correctly inserted, a white, unlocked padlock icon is visible in the small window on the left side of the lock assembly.
5. Secure the lock assembly by tightening the captive screw.

Removing Magazines Prior to Moves or Maintenance

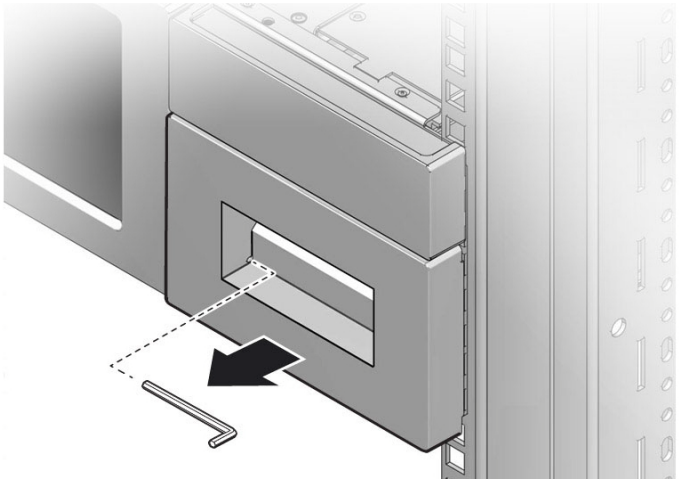
You may need to remove the cartridge magazines prior to some maintenance tasks. You should remove the magazines before moving the library to a new location, for example, because, otherwise, tape cartridges may shift and obstruct library robotics. For each magazine, proceed as follows.

Caution: Use this procedure **only** during specified installation, maintenance, and troubleshooting procedures or under the direction of an Oracle service representative. Do not routinely override the automated magazine latches.

To release a magazine during normal operation, use the user interface software: see "Unlatch the Magazine" on page 5-6.

Remove All Tape-Cartridge Magazines from the Library

1. Park and lock the robot and power down, as described in "Securing the Robot and Controller Assembly" on page 7-8.
2. Insert a 1/64-in Allen wrench into the hole at the lower inside corner of the cartridge magazine (a large paperclip that has been straightened into an L shape will do in an emergency).



3. Align the Allen wrench parallel to the magazine face and slowly push it into the hole.
4. Grasp the handle on the front of the magazine and slowly and gently pull the magazine a short distance out of the library.
5. Remove the wrench.
6. Support the bottom of the magazine with your other hand.
7. Slowly and gently pull the magazine out of the module. Handle the magazine carefully so that cartridges do not spill out.
8. Set the magazine aside on a flat, stable, uncluttered surface, and make a note of the module that you removed it from.
9. Repeat this procedure until all necessary magazine have been removed from all modules.

Moving the Library

1. Power the Library Off.
2. Park the Robot.
3. Lock the Robot.
4. Remove All Tape-Cartridge Magazines from the Library.
5. Move the library to its new location.
6. Reinstall the magazines.
7. Reconnect power, host-connection, and local area network (LAN) cables.
8. Unlock the Robot.
9. Start the library up using the procedure "Power the Library On" on page 7-2.

A

Accommodating Non-Standard Label Formats

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

Translating Between Physical and Logical Labels

To accommodate the fullest range of possible labeling schemes, the StorageTek SL150 Modular Tape Library supports labels 8 to 14 characters long and provides a *label windowing* feature that lets you specify how labels should be interpreted when communicating with the host application.

So, for example, if the host application uses only a portion of the physical cartridge label to identify volumes, you can tell the library to construct a logical label using a subset of the characters, starting from the first column in the label and reading to the right. Alternatively, if the physical cartridge label is simply a string of characters that does not identify the media domain (LTO) and type (Gen-3, Gen-4, Gen-5, Gen-6), you can tell the library to skip domain and type checking and send all characters to the host without any further processing (you should *not* use this option, if your labels do include a domain and type).

The StorageTek SL150 user interface supports the following labeling options:

- **No type checking** passes all characters in the label without modification and without checking the media domain and type. Use this option if your labels do not identify the media: `M123456789AB` does not, for example, contain a media descriptor, such as `L5`.
- **Prepend last two characters** passes all the characters after moving the last two characters in the label to the front: `KL10203012L5` is translated to `L5KL10203012`.
- **Full label** passes the first eight characters in the physical label: `KL10203012L5` is translated to `KL102030`.
- **Trim last character** passes the first seven characters in the physical label: `KL10203012L5` is translated to `KL10203`.
- **Trim last two characters** passes the first six characters in the physical label: `KL10203012L5` is translated to `KL1020`.
- **Trim first two characters** passes the third through eighth characters in the physical label: `KL10203012L5` is translated to `102030`.

- **Trim first character** passes the second through eighth characters in the physical label: `KL10203012L5` is translated to `L102030`.

Managing Unidentifiable, Unsupported, or Missing Labels

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

B

Fault Codes

The table below lists fault codes currently reported by the StorageTek SL150 Modular Tape Library. Use this information to locate relevant replacement parts and service resources in My Oracle Support.

Table B–1 SL150 Tape Library Fault Codes

Code	Name	Description
9000	POWER_SUPPLY_AC_FAILURE	A power supply AC failure has been detected.
9001	POWER_SUPPLY_DC_FAILURE	A power supply DC failure has been detected.
9002	POWER_SUPPLY_REMOVED	A power supply has been removed.
9008	POWER_SUPPLY_UNSPECIFIED_ FAILURE	An unspecified power supply fault has been detected.
9010	MULTIPLE_POWER_SUPPLY_FAILURES	Failures have been detected in both power supplies within the module.
9011	PS_OVERTEMP_WARNING	The power-supply temperature has reached levels that, if sustained, can adversely affect long-term reliability.
9012	PS_OVERTEMP_ERROR	The power-supply temperature has reached levels that, if sustained, can damage equipment.
9013	PS_FAN_SPEED_WARNING	The power-supply fan has slowed enough that it may not be able to keep temperatures within recommended limits.
9014	PS_FAN_SPEED_ERROR	The power supply fan has slowed enough that it may not be able to keep temperatures within acceptable limits.
9020	DRIVE_COMM_FAILURE	The module controller has lost communication with the tape drive.
9024	BRIDGE_DRIVE_FAILURE	A failure has been detected in the bridged drive for the module or partition.
9025	MULTIPLE_DRIVE_FAILURE	Both drives within this module have reported failures.
9026	DRIVE_REMOVED	The tape drive has been removed.
9027	BRIDGE_DRIVE_MISSING_AT_INIT	The bridged drive for this module or partition was missing at initialization.
9028	BRIDGE_DRIVE_ALL_PORTS_DISABLED	All ports on the bridged drive for this module or partition have been disabled.
9029	DRIVE_ALL_PORTS_DISABLED	All ports for this drive have been disabled.
9030	DRIVE_NEEDS_CLEANING	The tape drive has requested cleaning.
9031	DRIVE_OVERTEMP_WARNING	The drive temperature has reached levels that, if sustained, can adversely affect long-term reliability.

Table B–1 (Cont.) SL150 Tape Library Fault Codes

Code	Name	Description
9032	DRIVE_OVERTEMP_ERROR	The drive temperature has reached levels that, if sustained, can damage equipment.
9033	DRIVE_FAN_SPEED_WARNING	The drive fan has slowed enough that it may not be able to keep temperatures within recommended limits.
9040	ROBOT_EXP_CNTRLR_COMM_FAILURE	The main library controller has lost communication with its on-board expansion module controller.
9041	MULTIPLE_EXP_CNTRLR_COMM_ FAILURES	The main library controller has lost communication with multiple expansion module controllers.
9042	EXP_CNTRL_COMM_FAILURE	The main library controller has lost communication with one expansion module controller.
9080	MAG_OPEN_OR_UNLATCHED	A magazine has been opened or unlatched.
9081	MAG_MULTIPLE_OPEN_OR_UNLATCHED	Multiple magazines have been opened or unlatched.
9091	MOD_MB_BASE_MODULE_NUMBER_ INCORRECT	The module number reported by the base module is not equal to one.
9100	ROBOT_NO_TAPE_IN_HAND	The robot has reported it expected a tape cartridge to be in its hand but it does not detect one.
9101	ROBOT_TAPE_NOT_FOUND	The robot has reported it did not find the target tape cartridge.
9102	ROBOT_Z_MOVE_ERROR	The robot has encountered an error while trying to move up and down.
9103	ROBOT_Z_RANGE_ERROR	The robot has encountered an error while trying to find the top and bottom of the library.
9104	ROBOT_REACH_MOVE_ERROR	The robot has encountered an error while attempting to move its hand reach mechanism.
9105	ROBOT_HAND_NOT_EMPTY	The robot has reported it expected its hand to be empty but it is not.
9106	ROBOT_TRACK_MOVE_ERROR	The robot has encountered an error while trying to move to move from side to side.
9107	ROBOT_WRIST_MOVE_ERROR	The robot has encountered an error while attempting to move its wrist.
9108	ROBOT_TAPE_STUCK_IN_SOURCE	The robot has encountered a stuck tape cartridge while attempting to remove it.
9109	ROBOT_INITIALIZATION_FAILURE	The robot has encountered an error while attempting initialization during start-up.
9110	ROBOT_FRONT_VISION_FAILURE	The robot has encountered an error with its front vision sensor.
9113	ROBOT_FIRMWARE_ERROR	The robot has encountered an error that is likely due to a firmware issue.
9114	ROBOT_UNSPECIFIED_FAILURE	The robot has encountered an unspecified failure.
9116	ROBOT_ARM_CPU_COMM_FAILURE	The library controller cannot communicate with the robot microcontroller.
9118	ROBOT_ARM_CPU_APP_MODE_FAILURE	An error has been encountered while attempting to switch the robot motion/vision CPU to application mode.
9119	ROBOT_DRV_CPU_COMM_FAILURE	An error has been encountered while attempting to communicate with the robot drive CPU.
9121	ROBOT_DRV_CPU_APP_MODE_FAILURE	An error has been encountered while attempting to switch the robot drive CPU to application mode.

Table B–1 (Cont.) SL150 Tape Library Fault Codes

Code	Name	Description
9122	ROBOT_HAND_CPU_COMM_FAILURE	An error has been encountered while attempting to communicate with the robot hand CPU.
9124	ROBOT_HAND_CPU_APP_MODE_FAILURE	An error has been encountered while attempting to switch the robot hand CPU to application mode.
9125	ROBOT_TAPE_IN_CELL	The robot has encountered an unexpected tape cartridge within the destination cell.
9126	ROBOT_MAILSLOT_OPERATION	The robot has encountered an error while attempting to access the mail slot.
9127	ROBOT_TRACK_RANGE_ERROR	The robot has encountered an error while attempting to find the horizontal track end points.
9128	ROBOT_WRIST_RANGE_ERROR	The robot has encountered an error while attempting to find the wrist motion end points.
9129	ROBOT_REACH_RANGE_ERROR	The robot has encountered an error while attempting to find the reach motion end points.
9130	ROBOT_TRACK_INTERNAL_ERROR	The robot has encountered an internal hardware error within the horizontal track mechanism.
9131	ROBOT_Z_INTERNAL_ERROR	The robot has encountered an internal hardware error within the vertical track mechanism.
9132	ROBOT_WRIST_INTERNAL_ERROR	The robot has encountered an internal hardware error within the wrist mechanism.
9133	ROBOT_REACH_INTERNAL_ERROR	The robot has encountered an internal hardware error within the reach mechanism.
9134	ROBOT_MODULE_Z_SENSOR_INIT_ ERROR	The robot has encountered an error while attempting to read an expansion module location sensor.
9135	ROBOT_Z_HOME_SENSOR_INIT_ERROR	The robot has encountered an error while attempting to read the base module location sensor.
9136	ROBOT_LOCK_ERROR	The robot lock mechanism did not disengage.
9300	LIBRARY_OVERTEMP_WARNING	The library temperature has reached levels that, if sustained, can adversely affect long-term reliability.
9301	LIBRARY_OVERTEMP_ERROR	The library temperature has reached levels that, if sustained, can damage equipment.
9999	UNSPECIFIED_LIBRARY_FAILURE	An unspecified library error has been encountered.

C

SNMP Traps

The table below lists traps returned by the SL150. For a fully comprehensive discussion, see the *StorageTek Modular Libraries SNMP Reference Guide* that is found in the *SL150 Modular Tape Library* Customer Documentation Library.

Table C–1 SNMP Trap Levels

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

Index

M

N

O

P

R

S

T

U

V

W